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DRIED FRUIT BOOK

**Euro
Company**
food for change





The update is complete. Along with our *NUTSBOOK*, published in 2020, dedicated to nuts, this *DRIED FRUIT BOOK* brings together all the encyclopaedic information that Euro Company S.p.A. SB would like to share with our partners, suppliers, collaborators, employees and friends about the dried fruit we sell.

Our desire to share information about the company's values and guidelines dates back - from a purely editorial point of view - to 1999, when, on the 20th anniversary of Euro Company, we published the book *Nuts and Dried Fruit*, a manual distributed to employees and customers so that they could understand all the details about the cultivation, origin and processing of the products we sold. This need for transparency is natural when you believe in your own projects.

Other publications followed, but, along with *Nuts and Dried Fruit* and the *NUTSBOOK*, this book is the only one with such specific information on agronomy and botany. These two recent works are an illustrated update to the original editorial initiative, preserving its principles: sharing, providing knowledge.

In food and environmental science, research is constantly opening up new horizons, but today the path is different: no new foods or living things have been discovered; instead, it is people's new habits that demand a new form of information that is accessible, practical and able to become part of everyday life to the extent that its importance becomes obvious.

This is why the *DRIED FRUIT BOOK* has been created, to be a sort of encyclopaedia that takes us from seed to harvest, exploring the agronomy of the most ancient, precious form of food: fruit. The information has been prepared and updated from a technical and scientific perspective with the professional contribution of Euro Company S.p.A. SB, and is accompanied by evocative, detailed drawings by illustrator Laura Zavalloni. In this way, we will travel the roads that bring the most important fruits from their places of origin to our everyday lives, all with a specific informative focus: drying as a preservation method.





In terms of useful information, what news reaches us today from the world of fruit cultivation? There have been no recent scientific discoveries to warrant a new encyclopaedia on fruit, but instead a new level of curiosity, a need that is leading people to read more about food in order to be able to choose the right ingredients for their wellbeing with more awareness, and understand how they can be treated.

While the importance of fruit continues to be legitimately taken for granted, certain dietary habits are meeting a different fate, especially when it comes to the need for balanced consumption of nutrients and the health effects of preservation methods. This awareness, which is influencing the entire food industry, is increasing demand for natural products, and knowledge about them. These are the new needs that the *DRIED FRUIT BOOK* aims to meet.

The 16 fruits selected represent the main species on the market, which lend themselves very well to drying preservation techniques. One of the oldest methods for preserving food, removing water molecules is also the least invasive method, as it is able to enhance all the sensory properties and taste of the fruit. The current trend of distancing ourselves from industrial preservation methods, which sometimes involve excessive use of laboratories, reaffirms the importance of these processes, making the need/curiosity to understand them more topical than ever.

Challenging chemicals and the technological progress of the modern era, drying is a preservation method that is still superior in terms of its ability to preserve the flavour and wholesomeness of a food product.

Drying can be used in the food industry and at home; it extends the shelf life of fruit, making it available out of season while preserving its characteristics. Appreciating this possibility means reducing food waste.

People's positive intentions should always be supported, and the extent to which this can encourage people to eat in a way that respects them and the environment should be studied, communicated and shared.

Mario Zani









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DRYING (OR DEHYDRATION)

Food left as it is naturally progressively degrades over time, due to the causes listed below.

Microorganisms and enzymes that alter sensory characteristics and nutritional values, as a result of:

- putrefaction of proteins and amino acids;
- souring and rancidity of fats;
- fermentation of carbohydrates.

Physical and chemical agents, such as:

- oxygen;
- light and UV rays that encourage rancidity and browning;
- heat that dehydrates food products, accelerates chemical reactions and the reproduction of microorganisms;
- variations in water content, whose reduction causes withering, while its increase encourages the development of moulds and bacteria, hydrolysis of fats and enzymatic reactions.

All these phenomena soon make food unusable, or make it a vehicle for infections, food poisoning or food-borne illnesses.

Therefore, since ancient times, mankind has been trying to prevent the deterioration of food in order to use it even after a long time, prolonging products' shelf life. Given its long history, drying can be considered to be the oldest food preservation method; it used to be carried out using the sun, the wind and fire. With the socio-economic changes in the early 1800s, the birth of industrial civilisation and large urban centres, rapid development took place in the food preparation, processing and preservation industries.

Drying, which is a synonym of dehydration, can be performed using various processes, and its aim is to remove almost all the water contained in food (from an average level of 65-95 percent, an average water content of 110-15 percent is achieved). The result of the drying process is a loss of weight, and better conservation of the product compared to the fresh version.

This process can be performed using **natural methods** or **artificial methods**.

NATURAL METHODS

Natural methods involve exposing primarily plant-based food to the sun and air, and have been used since antiquity. These methods are still practised today, both at home and at an artisan level, primarily in countries with a warm, dry climate (although examples of natural drying also exist in Nordic countries).

Dehydration can be combined with smoking a product, with the purpose of sterilising it and adding flavour, or with a process of sulphitation.



Natural methods are increasingly being abandoned by modern industry, as they involve various inconvenient aspects, including:

- the impossibility of protecting the product from contamination by microorganisms, insects and fine dust;
- significant changes in the sensory characteristics and nutritional value of the food due to prolonged exposure to the air (browning, rancidity etc.);
- treatment conditions that cannot be standardised or easily controlled, as well as the labour-intensive work of turning the product over periodically.

ARTIFICIAL METHODS

These are modern techniques created in the early 1900s with the production of the first drying chambers, artificially heated spaces in which the product is circulated or temporarily placed. Today, drying can be carried out using various types of systems, using the following technologies.

- **Heated gas:** this is the most widespread method. The hot air present has a dual function: transmitting heat to the food and carrying away the vapour that it releases. The higher the temperatures and air circulation speed is, allowing moist air to be exchanged for dry air, the faster the food dries. However, drying should not happen too fast, in order to prevent the top layers of the food from hardening, creating a barrier that traps the humidity in the inner layers, compromising the success of the process. Indeed, initially high temperatures are later lowered to levels only a little above room temperature. The most popular air dryers are: drying cabinets, tunnel dryers, fluidised bed dryers, spray dryers, and rotary dryers.
- **Radiation:** this method involves the material being transported on a belt as it passes under a source of electromagnetic radiation, which can be infrared rays (IR) or microwaves (MW). These systems work under atmospheric pressure or in a vacuum. The IR directly reaches the food without losing heat into the air, and penetrates the product, heating it up and facilitating dehydration. The advantages of IR radiation include a high capacity for heat transfer, with reduced processing times and a higher drying rate. IR radiation is used to dehydrate spices and aromatic herbs, fruit and vegetables cut into fine slices, and for removing moisture from sugar and salt.
- **Contact with hot surfaces:** for drying through direct contact with a heated surface, the heat reaches the product via a metal plate that also functions as a support. The most widespread machines that use this method are drum dryers, which are suitable for pasteurised food (such as mashed potato). There are also contact dryers in which it is possible to process heat-sensitive food products in a vacuum. The thermal energy is provided through the wall of the tank, in contact with the product, which is then collected in a dust extractor positioned on top of the device.





INNOVATIVE TECHNIQUES

Alongside the traditional technologies, others are emerging that exploit physical methods, and they are proving to be promising in terms of cost-effectiveness. The techniques that stand out are: ultrasound (or sonication), refractance window drying, and electrohydrodynamic drying (EHD).

PROCESSING DRIED PRODUCTS

Today, the process of drying food products has reached a high technological level. While aiming to reduce treatment times, it has been possible to achieve high quality standards, with products that are much more acceptable in terms of their sensory and nutritional properties, as well as being more hygienic.

Drying involves two fundamental aspects:

- heat transfer from a source to the product;
- transfer of water from the product to the environment.

In the transfer of water from the product to the environment, it is possible to identify three main phases.

1. At the beginning, the water migrates in large quantities from the innermost layers through capillary action, moving along small channels that are either already present or formed during the first steps of the process. When it reaches the surface, it evaporates. This phase must take place quickly. This is achieved by raising the temperature and increasing the speed and turbulence of the air (if using air systems).
2. In the second phase, once the channels have dried out, the migration of water is more contained, and takes place through diffusion. In this phase, the temperature must be lowered.
3. Finally, the residual moisture migrates, but a hydrodynamic balance between the product and the environment is established at the same time. The final phase of stabilisation requires an environment with as little humidity as possible (UR = 10-20 percent).

Drying can be used on both liquid and solid foods, primarily plant-based. The process takes place in three stages.



1. Preparation of the product: liquid foods are concentrated through evaporation, cryoconcentration or membrane processing, while solid foods undergo a series of preparatory steps similar to those for tinned or deep-frozen products. For plant-based products, the following processing framework is used:



Preparation

*Only for some products, and not always in the order described.

2. Drying: this process takes place according to the methods described.

3. Packaging: this process plays a significant role in the correct, long-lasting preservation of the product. The best results are obtained by using containers that are impervious to light, air and moisture.



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apricot

- *Prunus armeniaca* L. -





BOTANICAL CLASSIFICATION

Class: *Magnoliopsida*

Order: *Rosales*

Family: *Rosaceae*

Genus: *Prunus*

Species: *P. armeniaca*

There are five famous cousins in the Rosaceae fruit family: peach, cherry, almond, plum and apricot. The last of these is one of the oldest and most admired for the charm of its growth cycle, right from the first buds. The colours of its flowers and the flavours of its harvest are among the best advertisements for Mother Nature.

The apricot tree, *Prunus armeniaca*, is a fruit-bearing tree in the Rosaceae family, in the genus *Prunus*. A tree of small stature, in the wild it can reach 5-6 m, while it doesn't exceed 3.5 m in cultivation, where its growth is controlled to facilitate its care and harvest. The trunk has dark red bark, with longitudinal fissures.

The plant is a deciduous species that goes into a vegetative rest period during the winter. Its ability to adapt has supported the spread of many different varieties, each with unique characteristics in terms of their branches, buds, leaves and fruits, which differ from one cultivar to the next.

Apricot fruit buds have a conical shape, while branch buds are round, and generally located on year-old branches. Unlike pome fruit trees, on apricot trees and other drupe trees the buds are never mixed.

The flowers that bloom on these branches are: sessile, hermaphrodite, campanulate, solitary or in pairs. Single-petaled, with five sepals and petals and many erect stamens, apricot flowers bloom in small groups at the points where the leaves are attached. The colour of the petals ranges from white to pale pink.

The apricot is generally a self-fertile tree; some recent North American and Canadian cultivars are partially self-sterile, meaning that they need to be grown alongside polliniser varieties. Their pollination is entomophilous, taking place with the help of bees and other pollinating insects.

At the moment of their first appearance on the branch, the leaves are reddish, but with time they become deep green and glossy. They are distinguished by their serrated edges, alternate arrangement, heart-shaped form, smooth surface, and the presence of relatively round glands.

The trees are cultivated for the quality of their fruits, which are almost sessile drupes with a rounded shape. They have membranous skin, fleshy pulp, and a woody kernel that is sometimes attached to the mesocarp.

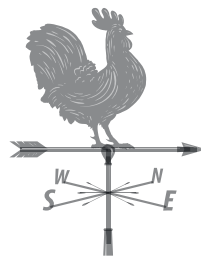




VEGETATIVE CYCLE

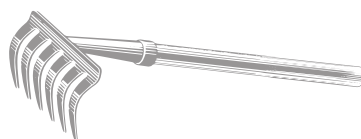
The apricot tree is characterised by a very short vegetative cycle. With flowering at the end of February, by May the tree has completed its fruit set, the growth of shoots and the formation of fruit buds for the following year.

A delicate aspect of the vegetative cycle is the balance given to fruit production. Indeed, an excessive load of fruit prevents the tree from forming a useful number of fruit buds, with the result that flowers and fruits will be scarce the following season. Pruning and thinning are therefore necessary interventions when caring for the tree to prevent over-fruiting.



CLIMATE AND SOIL

Depending on the type of rootstock, *P. armeniaca* is a plant able to adapt to a wide range of soil types and climate conditions. Indeed, these are trees that can be cultivated in both lowland areas and at altitude. There are also varieties that are able to withstand temperatures as low as -35°C during their vegetative rest period without being damaged. However, late frosts are more detrimental to their survival, as it can be dangerous if frost occurs during the flowering period or after fruit set, when the flower transforms into fruit.



CULTIVATION TECHNIQUES

The main training systems used today encourage semi-free crowns, following the natural growth of the plant without particular constraints. This is the current trend, after years of training techniques such as “espalier palmette” or “fan”, “orchard bush” and “vaso cespugliato”. The latter techniques gave the plant more density, but sacrificed the quality of the produce.

A vaso basso or ritardato - formed by three primary branches attached to the trunk at a height of between 70 and 100 cm, to which 3-5 secondary branches are attached on the outer part - is the type best suited to the spontaneous growth of apricot trees. This system is characterised by plant spacing of 4.5-5 m by 3.5-5 m, a plant height of 2.5-3 m, pinching the shoots during the training phase, and light pruning in the first few years, in order not to stimulate vegetative activity and promote early fruiting. Interventions are carried out in the summer rather than the winter.

During planting, the choice of rootstock is fundamental: the final size of the plant, its adaptation to the soil, its normal development, its resistance to parasites and diseases and better pollination all depend on this choice.

There are many rootstocks that are usable for apricot trees. “Franco”, “Manicot” and “Mirabolano” are the most widespread, thanks to their adaptability to marginal or difficult soils; however, these types are becoming less and less suitable for current cultivation requirements. This is due to the genetic heterogeneity, high vigour and slow fruiting of these rootstocks. The only variation in this group is “Mirabolano 29 C”, which has better graft affinity and guarantees early fruiting and high production efficiency. More recently in use in Italy is “Ishtara”, which combines good affinity with the main cultivars, adaptability to heavy soils, adequate vegetative regeneration and lower vigour than the “Mirabolano”. Pruning, which is an essential phase for optimising the relationship between the vegetative part (branches and leaves) and the reproductive part (flowers), must be performed with consideration for the particular features of each different species. It is possible to distinguish: pruning to train the plant, carried out in the first years of its life, which serves to create the chosen shape, helping light to reach the leaves and encouraging full fruiting more quickly; and production pruning, which aids the annual replacement of an adequate number of fruiting branches.

Thinning is an indispensable practice for obtaining fruits of a good size that meet market requirements, balancing the level of production with the vigour of the fruit formations in order to reduce the risk of both exhausting the latter and establishing a situation of alternating production. Thinning is performed by hand, generally between 30 and 40 days after full flowering. The period is defined according to the size of the developing fruits, at a diameter of 15 mm, and when the fruit falls.

Thinning creates balance in the quality of the fruits, removing, for example, those that have developed in the middle of the crown, which have received less sun and therefore have a less intense colour, a more acidic flavour and a lower sugar content.





PRODUCTION PROCESS

Due to variations in climate and soil composition, it is not possible to define a universal calendar for apricot harvest. This is a fundamental moment for the characteristics of the fruit, and intervening promptly makes it possible to preserve the quality of the produce and its shelf life. In the case of apricots, the study values for the ripening process are colour, from green to yellow, the texture of the flesh, which should be tested with a penetrometer, the refractometric dry residue, and finally the acidity level. A comparative analysis of these indicators makes it possible to precisely define the harvest period, which helps to protect the sensory qualities and flavour of the apricots.

The harvest is carried out in 2/3 phases, according to the different levels of ripeness in the fruit; it can be done by hand or using a combined method, with the help of motorised harvesters that can support some of the workers.

When it comes to dried apricots, the processing phases following the harvest are listed below.

FRUIT SELECTION

The apricots are sorted in order to remove both damaged fruits and those that are not at the right level of ripeness. If they are too unripe, the apricots do not absorb enough preservative during the sulphitation process; conversely, if they are too ripe, they absorb an excessive amount of sulphur dioxide.

FRUIT PREPARATION

As well as washing with water, there are other practices used to obtain a high-quality final product. It is necessary to remove all inedible parts, such as the stalk and the kernel. For a faster drying process, after being pitted the apricots are lightly squashed in order to increase the exposed surface area. This technique is identical to the one used for peaches and prunes.

TREATMENT WITH SULPHUR DIOXIDE

Apricots are often treated with sulphur dioxide before being dried. SO_2 , recognised as safe in the permitted doses, helps to prevent browning, the loss of aromas, vitamins and carotene, and also helps to reduce the microflora present on the fruit.

This treatment can be carried out using powdered SO_2 , burned in a designated room (for around 2-3 hours), or using a solution (immersion of the fruit in potassium metabisulphite and sodium bisulphite for one minute). The first treatment has a low cost in terms of creating the fumigation chambers, which can be constructed with cardboard or lightweight wood; the trays inside must be wooden, as the fumes will corrode metal. The practice of immersing the fruit in solutions is not used as much, as the sulphur dioxide does not penetrate evenly, and it also increases the amount of water in the fruit - therefore increasing the time it takes to dry it.

However, these treatments do have negative effects: some consumers do not like the flavour of sulphur, and others can have allergic reactions. In dried apricots, sulphur dioxide is present at levels of around 2,000 ppm. These levels must respect the maximum amount permitted in different countries.



Dried apricots that have not undergone any treatment with bisulphites are becoming increasingly common, and they tend to have more of a brown colour due to enzymatic and non-enzymatic browning processes.

VARIETIES

In Italy, Tyrinthos, Aurora, Reale d'Imola and Portici are the most cultivated varieties. Instead, if we want to look at value, the most appreciated varieties are Monaco, Baracca, Reale d'Imola, Luizet, Pesca di Nancy, Precoce Cremonini and Val Venosta. The main varieties used for drying are listed below.

- **Bulida:** this is a rustic Spanish variety that adapts to any type of soil, including dry soil. It offers highly vigorous trees with regular, abundant production, and is resistant to wind and fruit drop. The fruits are large, with a shallow furrow, and a yellow colour on the outside; they are sweet, quite juicy and fragrant.
- **Canino:** a Spanish variety that has average soil requirements. It offers highly vigorous trees, and is resistant to parasites and fruit drop. The fruits are large or very large, almost round, with a deep orange-yellow colour that is almost red in areas exposed to the sun. The skin is compact, with a good flavour, and an average level of fragrance.
- **Hacıhaliloğlu:** this is the most important dried apricot cultivar from Malatya, Turkey, selected in 1850. The trees are vigorous and produce fruit every year in irrigated, well-managed fields. This variety is vulnerable to frost, drought and some diseases such as *Sclerotinia laxa* and *Coryneum beijerinckii*. The fruits are medium-sized, 25-35 g, symmetrical with an oval shape; the skin and flesh is yellow. The fruit tends to take on a pale red colour. The skin has a solid texture, very sweet and aromatic, with a low water content.
- **Portici:** high, consistent productivity. This is the main characteristic of the vigorous Portici variety, which produces medium-large fruit with an orange-yellow colour. With firm, flavourful flesh, Portici apricots are excellent for preserving in syrup or drying.
- **Dulcinea:** an interesting cultivar due to its high sugar content, making it particularly suitable for puree or drying. A very productive plant, with some genetic types that are highly resistant, especially in the post-harvest and transport phases.
- **Pinkcot:** with an attractive appearance and a rounded shape, it is deep orange in colour, with a bright appearance. The skin is resistant to handling. It stores excellently at low temperatures.
- **Tom Cot:** a deep orange colour, with bright red blush. It has a regular, elongated shape, with very sweet, juicy flesh. Just like Pinkcots, Tom Cots also store very well.
- **Kioto:** highly resistant to over-ripening, this variety has an attractive appearance, with a rounded shape. The fruits are medium-large, and the flavour stands out for its aroma and sugar content.





PRODUCING COUNTRIES

The Mediterranean basin is without a doubt one of the best geographical areas for solid apricot cultivations in the world. From the Pillars of Hercules to the Bosphorus, some of the most generous territories for this plant overlook this sea: Italy, Spain, France, Greece, Algeria and Turkey. These are the leading nations for apricot production in Europe and the Maghreb. Three important producing countries are missing from this list, however: Iran, Pakistan and Uzbekistan.

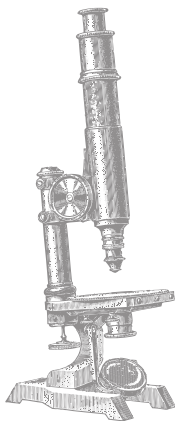


FUN FACT

Armellina. This is the Italian name for the seed inside an apricot kernel. It is edible, used in pastry-making, and it tells us a lot about this fruit. It represents gourmet food, and also history. Because "armellina" derives from Armenia, and it is only after various interpretations of the word in Northern Italian dialects that it has arrived in Italian in this form. Armenia is the country where Alexander the Great first encountered the apricot, later bringing its cultivation to Europe. China domesticated this plant five-thousand years ago, but it is the coasts of the Mediterranean that produce its fruit most generously.

As well as its geographical journey, the apricot has also travelled from tradition to science through the ages. Used over the centuries by Chinese women to encourage fertility, scientific research later discovered that substances in this fruit positively influence female sex hormones.





Nutritional properties

Laboratory:
Chelab - Merieux NutriSciences

			RI*
ENERGY	kcal	291	15%
	kJ	1234	15%
Fats	g	0.5	1%
of which saturates	g	0	0%
Carbohydrates	g	65	25%
of which sugars	g	34	38%
Fibre	g	7.4	-
Protein	g	3.0	6%
Salt	g	0.01	0%
			NRV**
MINERALS			
Calcium	mg	66.3	8%
Iron	mg	1.3	9%
Magnesium	mg	40.9	11%
Phosphorus	mg	74.4	11%
Potassium	mg	1352	68%
Zinc	mg	0.40	4%
Copper	mg	0.37	37%
Manganese	mg	0.24	12%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.14	13%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	0.97	6%
Pantothenic acid	mg	0.50	8%
Vitamin B6	mg	0.16	11%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	0	0%
Vitamin D	µg	0	0%
Vitamin K	µg	2.5	3%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.30	
Monounsaturated fatty acids	g	0.027	
Oleic acid	g	0.017	
Polyunsaturated fatty acids	g	0.28	
Linoleic acid	g	0.16	
Alpha-linolenic acid	g	0.12	
Omega 3	g	0.12	
Omega 6	g	0.16	
Total omega 3 / total omega 6		0.74	

* RI: Reference Intake

** NRV: Nutrient Reference Value





STANDARD FOR DRIED APRICOTS

UNECE STANDARD DDP-15 concerning the marketing and commercial quality control of dried apricots, 2016 edition

1. DEFINITION OF PRODUCE

This standard applies to dried apricots of varieties (cultivars) grown from *Prunus armeniaca* L., intended for direct consumption. This standard does not apply to dried apricots that are processed or for industrial processing, except when mixed with other products for direct consumption without further preparation.

Dried apricots may be presented in one of the following styles:

- whole, unpitted
- whole, pitted
- halves (cut longitudinally into two parts before drying)
- slabs: whole and half apricots of irregular shape, size and thickness, that have lost their normal contour and have become definitely flattened at the edge or rim.

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried apricots at the export-control stage, after preparation and packaging.

However, if applied at stages following export, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried apricots must display the following characteristics:

- intact; however, slight superficial damage is not considered as a defect; the fruit may be pitted or cut into halves
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean; practically free of any visible foreign matter
- sufficiently developed
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from blemishes, areas of discolouration or spread stains in pronounced contrast with the rest of the produce, affecting in aggregate more than 5 percent of the surface of the produce
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and/or calcium chloride and a slight smell of preservatives/additives, including sulphur dioxide

¹ Definitions of terms and defects are listed in Annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.



The condition of the dried apricots must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT²

The dried apricots shall have a moisture content as follows:

- not exceeding 25.0 percent for untreated dried apricots
- above 25.0 percent and not exceeding 40.0 percent for dried apricots treated with preservatives or preserved by other means (e.g. pasteurisation) and products between 32.0 and 40.0 percent should be labelled as high moisture or equivalent denomination.

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried apricots are classified into the following classes:

“Extra” Class, Class I, Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of dried apricots is mandatory for “Extra” Class and Class I.

Size is determined by:

- the number of fruits per kilogramme (1,000 g) or
- diameter (diameter means the shortest measurement across the face of the apricot half when restored to its normal position)

Uniformity in size can be achieved according to one of the following options:

A. By number of fruits per kilogramme:

SIZE CODE	NUMBER OF WHOLE, UNPITTED FRUITS PER KILOGRAMME	NUMBER OF WHOLE, PITTED FRUITS PER KILOGRAMME	NUMBER OF FRUITS HALVES PER KILOGRAMME
0	Less than 60	Less than 80	Less than 160
1	61-80	81-100	161-200
2	81-100	101-120	201-240
3	101-120	121-140	241-280
4	121-140	141-160	281-320
5	141-160	161-180	321-360
6	161-180	181-200	361-400
7	181-200	201-220	401-440
8	201 and over	221 and over	441 and over

² The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.





To ensure uniformity in extra class, the weight of the heaviest 10 pieces of dried apricots of the same size code should not exceed two times the weight of the lightest 10 pieces of dried apricots of the same size code.

B. By diameter:

RANGE (MM)	RANGE (INCHES)
34 mm and larger	1 3/8 and larger
31-34	1 1/4-1 3/8
28-31	1 1/8-1 1/4
25-28	1 - 1 1/8
20-25	13/16 - 1
Smaller than 20 mm	Smaller than 13/16

C. Size ranges other than option A. or B. and size codes other than option A. are allowed provided that the range used is labelled accordingly such as:

GRADE CODE	NUMBER OF WHOLE FRUITS WITHOUT STONES PER PER KILOGRAMME		
A	140 and less	or	32 mm and bigger
B	141-180	or	29-32 mm
C	181-220	or	25-29 mm
D	221-260	or	21-25 mm
E	261 and more	or	Less than 20 mm

However, when a size code is indicated, it should not conflict with Option A.

4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.



4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED, percentage of defective produce, by number or weight ^(a)		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements	9	15	20
of which no more than:			
Mouldy	1	1	1
Rotten	1	1	2
Damage caused by pests	1	2	4
Fermented (untreated)	2	3	5
Fermented (treated)	1	1	2
Living pests	0	0	0
Dirty	2	5	8
Substantial defects in colour or texture, heat injury and sunburn	5	8	10
Spotted	3	5	10
Lesion and Calluses	3	6	8
(b) Size tolerances			
Produce not conforming to the size indicated by diameter, in total (if sized by diameter)	10	10	10
(c) Tolerances for other defects			
Foreign matter and extraneous vegetable materials except pits, pit fragments in pitted fruit (by weight)	0.5	0.5	0.5
Presence of pits, pit fragments and pedicels in pitted fruit	1	1	2
Presence of pieces among whole fruit and halves	2	4	6
Dried apricots belonging to varieties other than that indicated	10	10	10

(a) A minimum sample unit of one kilogramme is required for the test.

5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried apricots of the same origin, quality, style and size (if sized) and if indicated, variety and/or crop year.





The visible part of the contents of the package must be representative of the entire contents.

5.2 PACKAGING

Dried apricots must be packed in such a way as to protect the produce properly. The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher.

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴.

6.2 NATURE OF PRODUCE

- “Dried Apricots” which may be replaced, when appropriate, by high moisture dried apricots or equivalent denomination
- Style
- Name of the variety (optional)

6.3 ORIGIN OF PRODUCE

Country of origin⁵ and, optionally, district where grown or the national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized) expressed as:
 - Option A – by numerical code (as defined in section 3), and/or range; or
 - Option B – by diameter (as defined in section 3); or
 - Option C – by alphabetical code and range.
- Crop year (optional)
- “Naturally” dried (optional)
- “Best before” followed by the date (optional)

³ These marking provisions do not apply to sales packages presented in packages.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.

⁵ The full or commonly used name should be indicated.



pineapple

- *Ananas comosus*
(L.) Merr. -





BOTANICAL CLASSIFICATION

Class: *Liliopsida*

Order: *Bromeliales*

Family: *Bromeliaceae*

Genus: *Ananas*

Species: *A. comosus*

Originally from South America, it was discovered in the 15th century by Christopher Columbus and later introduced by the Portuguese and Spanish to their South African and Asian colonies.

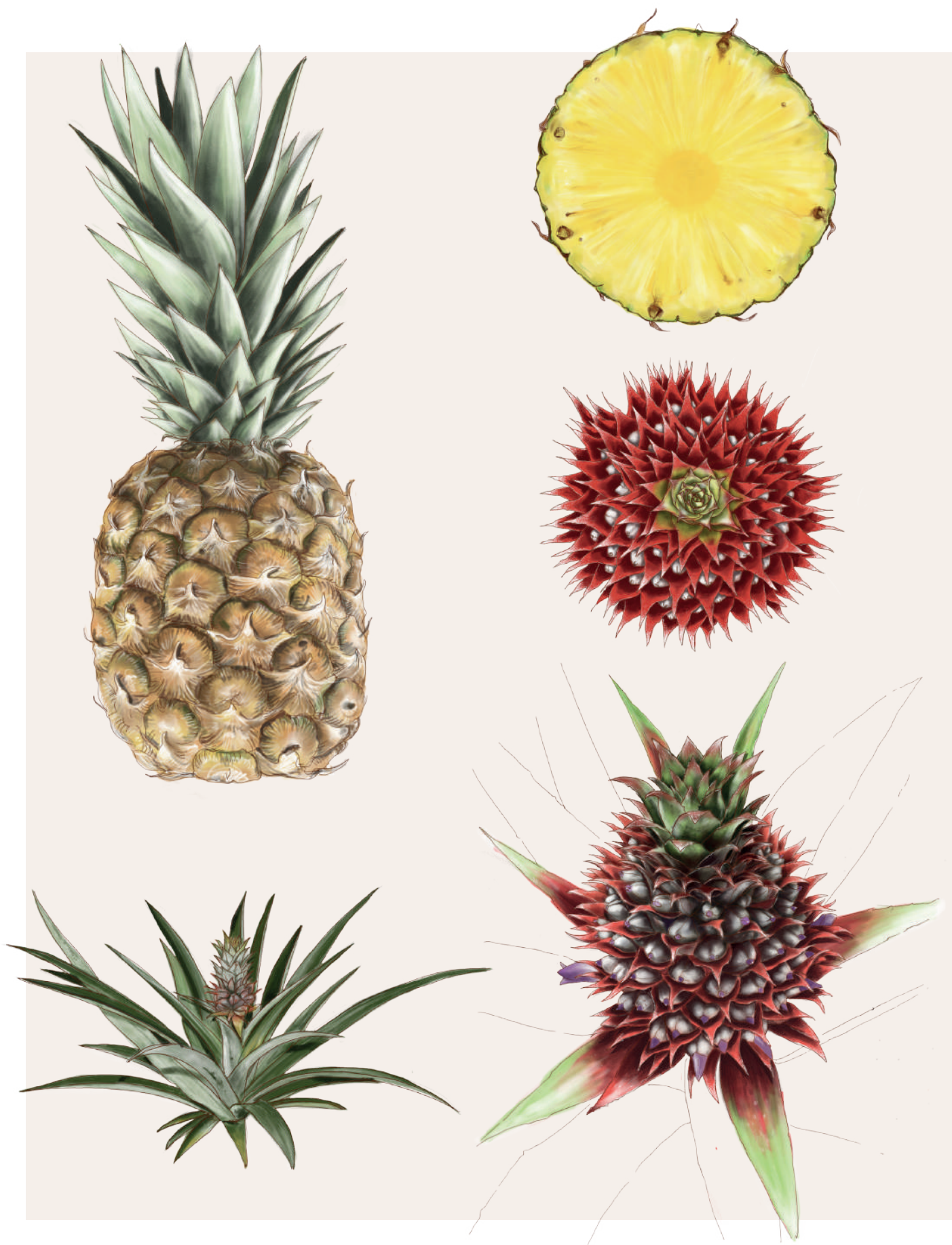
The regions suitable for production are generally limited to altitudes below 800 m above sea level, although there are exceptions: in Kenya there are cultivations at 1400 and 1800 m, and in Malaysia, even at over 2400 m. However, when pineapples are grown at altitudes above 1000 m, the fruits produced are smaller, the flesh has a less attractive colour, and the flavour is more acidic.

The pineapple is a perennial plant, growing to a height and width of between 90 and 180 cm, with long, leathery grey-green leaves. Everything grows from the main trunk, which extends up to the flower head. The leaves, which have a conical shape, are sessile and arranged in a spiral around a central stem. They increase in size towards the top part of the plant, varying in length from 5 to 20 cm in young plants, and reaching up to 1.5 m in healthy mature plants. Once the plant has produced between 70 and 80 leaves, it is ready to flower.

The peduncle of the fruit (stem) and the inflorescence develop from the apical growing point. The emergence of the inflorescence is also known as the "red heart stage", due to the reddish bracts at its base. The inflorescence is made up of a minimum of 50, and up to over 200 individual flowers, and is covered with a crown of many short leaves (up to 150).

The flowering process involves between 50 and 500 individual flowers, and, depending on the cultivar, the fruit can have no crown, or can develop more than one. The growing time depends on the variety and the climate in the region: to produce fruit in Ecuador, it may take 12 months, while in other subtropical zones this could extend to as long as 36 months.

The pineapple is a syncarpous fruit, formed from the fusion of the tissue of individual fruits with the main floral axis. Each flower develops one fruit, which on the outside seems to have a hard, prominent polygonal shield. A ripe fruit can reach a weight of over 2.3 kg, and has a yellow skin and a pleasant aroma; the flesh ranges from yellow to golden yellow, and is sweet and juicy.

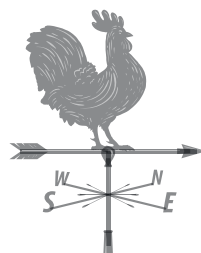




VEGETATIVE CYCLE

The vegetative phase of the pineapple plant ranges from 10 to 16 months. In terms of production, with the application of growth regulators, this period can be contained within 9-13 months, with the possibility of cultivation throughout the year.

The vegetative cycle begins between September and February. Between January and April, the fruit begins to form, reaching full development between May and August.



CLIMATE AND SOIL

Thanks to the leaves' capacity to hold water, this plant adapts well to hot climates and tolerates drought; however, this can lead to a reduction in growth and production. The fruit requires average daily temperatures of 22-26 °C, with an optimal range of 23-24 °C. If temperatures are not optimal, this could affect the quality and quantity of acids and sugars.

Pineapple plants do not tolerate cold temperatures below -2 °C, and temperatures below 15.5 °C and above 32 °C will result in a reduction in growth, caused by an increase in their respiration rate and metabolism, which alters the absorption of nutrients.

Pineapple plants are not very tolerant of excessively wet soil conditions or prolonged flooding. Generally, this reduces growth and production and increases vulnerability to root rot, with a risk of killing the plant.

Pineapple plants can grow in a wide range of soil types, but their favourite is medium-light sandy or sandy-clay soil. The optimal pH is slightly acidic (4.5-6.5), with a low limestone content and no flooding problems. Good preparation of the soil is an essential procedure for the final quality of the fruit, in terms of both yield and flavour.



CULTIVATION TECHNIQUES

As mentioned in the previous paragraph, preparation of the soil is the first important step for the growth of quality fruit.

This preliminary work must be effective in order to ensure good drainage and good root penetration, and requires ploughing the soil down to at least 30 cm. The purpose of ploughing is to break up the topsoil and mix in the residues from the previous harvest, destroy disease pathogens by exposing them to sunlight, and improve airflow and water penetration. This process must be performed as deep as the soil and machines allow, and should be carried out at least two months before planting.

When properly prepared, the soil will be ready to take the seeds, whose positioning should be based on the distance required between the future plants and the lines they are arranged in. Pineapple plants normally grow in raised beds, with a minimum of 50,000 plants per hectare - for a yield of around 100 t of fruit - with spacing of 30 cm between plants, 40 cm between rows, and 70 cm from a corridor or between double rows. If the density increases, the spacing between the plants can be varied, but all other distances should remain the same.

Sometimes the weight of the fruit can cause the stem to bend and break: it may therefore be useful to use a wood or bamboo stake. It is not advisable to use metal or nylon cables, because they could damage the plant's development; if necessary, it is possible to use string made from cotton or natural fibre, which will break down slowly.

The root structure of the pineapple plant is shallow and sparse: in deep soil, the roots can extend down to a maximum of 1 m, although the majority are concentrated in the first 0.3-0.6 m, from which 100 percent of the water is extracted. It is important to position the plants in an area that is not excessively wet or vulnerable to flooding after the summer rains, as the harvest is sensitive to waterlogging and therefore requires soil with good drainage and good aeration. Frequent irrigation (the most common method is with sprinklers) or rain during the harvest period can cause deterioration in the quality of the fruit, and make it vulnerable to fungal growth, causing the core to rot. Irrigation also has an effect on the sugar-acid ratio, in particular in the period before harvest: frequent irrigation reduces the sugar content. However, not enough water is also counterproductive, especially during the period of vegetative growth: a lack of water delays growth, flowering and fruiting, so provision of water in this period should be enough to satisfy all the requirements of the plants.

In pineapple cultivation, flower induction is an important phase: this is a practice that allows the volumes and timing of the harvest to be controlled. For this purpose, the active substance Ethephon is used: this ethylene is applied to the centre of the rosette of leaves, at the top of the plant, at dusk or during the night - in other words, when the temperature reaches 25-27 °C and the stomata are open. Five to seven months later, the fruits will be completely ripe. Flower induction also occurs due to low temperatures, lack of water, or hormonal treatment, but the plants may end up with smaller fruit, as they are being induced to flower early.



PRODUCTION PROCESS

Identifying the right moment to harvest the pineapples is an operation that involves analysing their colour, fragrance and texture. By combining these indicators, it is possible to identify the right time to pick the fruits, in order to begin the subsequent operations of packaging, cutting or drying.

When the ripening process has begun, the individual fruits flatten and the colour of the pineapple begins to turn from green to yellow. When more than a third of the fruit takes on this colour, it is time to cut it.

Smell is another important method of analysis: if it is sweet and intense, it means the harvest can begin. The texture, measurable by hitting the base of the fruit a couple of times, is another aspect to take into consideration. If it makes a sound like an empty container, the pineapple is not yet ready. Instead, if it sounds solid, it means this is the right moment to harvest it.

Harvesting is simple, performed with a knife: one clean cut between the pineapple and the stem that supports it.

VARIETIES

Today, over one hundred varieties of pineapple are cultivated around the world, divided into four large groups: Cayenne, Spanish, Queen and Abacaxi.

One of the most common varieties on the market belongs to the Cayenne group, the Smooth Cayenne: this is the most widespread variety on Italian tables, and comes from Hawaii, with a large fruit, pale yellow flesh and a sweet flavour.

In the second group, the most prized, widespread variety is the Red Spanish, which comes from the Caribbean. It has a rounded shape and it is medium-sized, with a very thick skin that is orange in colour; it is characterised by turgid, fibrous flesh and a tangy flavour.

The variety from the Queen group, which comes from Africa, is characterised by relatively small fruits (maximum 1 kg) and a deep yellow, particularly sweet flesh that is fragrant and aromatic.

Fruits from the Abacaxi group are not very common, especially in Italy. They are mostly grown for self-consumption and sale in South American markets. With a thin skin, they have sweet, juicy flesh.

- **Champaka:** a very in-demand variety, the Champaka has good overall quality, good yield and good resistance to post-harvest handling. Its leaves are not very sharp, making it easier to handle. The fruit has a cylindrical shape, with flat berries with a diameter of 2.5 cm. The colour of the flesh ranges from pale yellow to golden yellow, with around 13 percent soluble solids and 0.6 percent citric acid: this gives it a distinctive flavour that is highly appreciated. Champaka cultivations are widespread in Hawaii, Australia and South Africa.
- **Green Selacia:** a mutation obtained from the Singapore Spanish, its main difference from the original is the green colour of its leaves and flowers, with a yellow plant structure. It has the same level of quality as the Singapore Spanish.



- **Hilo:** this is a variety of Smooth Cayenne, selected in Hawaii in 1960. The plant is more compact, with a smaller, more cylindrical fruit. It doesn't produce slices, but instead a large number of suckers. The fruit weighs around 1-1.5 kg, and has a very small crown.
- **MD-2:** also called "Del Monte Gold Extra Sweet" or "Gold Extra Sweet", it is a hybrid developed at the end of last century by the Pineapple Research Institute in Hawaii. It is currently the most exported fresh pineapple variety in the world. This is a cultivar with golden skin; compared to other varieties, it has sweeter, less fibrous flesh and contains four times more vitamin C.
- **Perola:** has an average weight of 0.9-1 kg. It has a medium-high sugar content (13-16 °Bx) and a high ascorbic acid content. It is resistant to drought, insect infestations and nematodes, but is very vulnerable to infection by the *Fusarium* fungus, especially when grown in Brazil.
- **Perolera:** the leaves are long and broad, with a pale green colour at the base. The fruit's skin has a yellow-red colour, and the flesh is bright yellow, with no fibres and a medium sugar content (12 °Bx). The average weight ranges from 1.5 to 3 kg. It produces good slices, and is a cultivar resistant to infection by the *Fusarium* fungus, but vulnerable to mechanical damage and sensitive to attack from *Melanoloma viatrix*.
- **Queen:** this variety is designated for the fresh market. On average, the fruits weigh between 0.5 and 1.4 kg, and have sharp leaves. The colour of the flesh is golden yellow, with a crunchy texture and a sweet, delicate flavour. It has a high sugar content. The fresh fruit is an excellent source of manganese.
- **Red Spanish:** a variety cultivated in the West Indies, Mexico, the Caribbean and Venezuela, where it makes up 85 percent of the pineapple production. The plant has sharp leaves and a high capacity to produce additional plant structures. The fruit is square-shaped, weighs 1-2 kg, and has straw yellow flesh that is rich in fibre, with an aromatic fragrance. It has a medium sugar content (12 °Bx), with a low acidity level. It is not excessively soft, so it does not suffer damage during shipping thanks to its high tolerance for temperature variation and drought.
- **Smooth Cayenne:** this is one of the most grown varieties in the world, with one of the longest production cycles. It is believed that in ancient times it was cultivated by Native Americans in Venezuela. It originated in Cayenne (French Guiana), and in 1820 it arrived at the Royal Botanic Gardens in Kew, in England, where improvements were made to the variety. It then began to be traded in Jamaica and Queensland, Australia.
- **Singapore Spanish:** produced primarily in South-East Asia, this is a variety used for tinning, but it also produces high-quality juice. The leaves are long and tapered towards the tip. The fruits weigh 1-2 kg, with golden yellow flesh, a modest sugar content (10-12 °Bx) and low acidity. A good producer of both suckers and slices, this cultivar is vulnerable to nematodes and degradation of the fruit's flesh.





PRODUCING COUNTRIES

Global production of this fruit has grown rapidly over the years: statistics from 2020 indicate a total annual production of over 30 million tonnes of pineapples. Currently, pineapple is one of the most important tropical fruits, after bananas, mangoes and coconuts.

In terms of continents, Asia is the leader in production, ahead of the Americas and Africa, with over half of the global harvest. Instead, if we analyse individual production territories, China takes the lead, followed by the Philippines and Costa Rica.

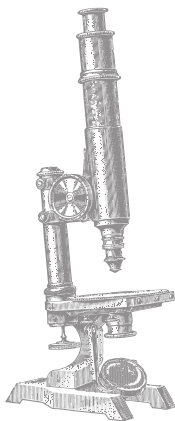


FUN FACT

The pineapple originated in South America, and after its discovery during the colonial period at the end of the 15th century, it spread all over the world. Its scientific name "ananas" derives from the word *nana*, which referred to the excellent flavour of the fruit in the indigenous Guaraní language. Then Columbus arrived and renamed it *piña* due to its shape, and it began to travel the world with its English name, *pineapple*.

The discovery of this fruit in Hawaii is interesting, as it seems to have landed on the archipelago's volcanic coasts after a shipwreck. From this apparently chance event, the fruit found one of the most generous locations for its production.





Nutritional properties

Laboratory:
Chelab - Merieux NutriSciences

			RI*
ENERGY	kcal	302	15%
	kJ	1279	15%
Fats	g	0.3	0%
of which saturates	g	0.1	1%
Carbohydrates	g	68	26%
of which sugars	g	67	74%
Fibre	g	7.8	-
Protein	g	2.9	6%
Salt	g	0	0%
			NRV**
MINERALS			
Calcium	mg	64.6	8%
Iron	mg	1.3	9%
Magnesium	mg	67.1	18%
Phosphorus	mg	35.4	5%
Potassium	mg	667	33%
Zinc	mg	0.66	7%
Copper	mg	0.50	50%
Manganese	mg	5.7	285%
Selenium	µg	20	36%
VITAMINS			
Vitamin C	mg	27	34%
Thiamine / Vit. B1	mg	0.34	31%
Riboflavin / Vit. B2	mg	0.12	9%
Niacin / Vit. PP	mg	0.90	6%
Pantothenic acid	mg	0.46	8%
Vitamin B6	mg	0.22	16%
Folacin / Vit. B9	µg	2.10	1%
Vitamin B12	µg	0.42	17%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	0	0%
Vitamin D	µg	0	0%
Vitamin K	µg	4.0	5%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.22	
Monounsaturated fatty acids	g	0.11	
Oleic acid	g	0.10	
Polyunsaturated fatty acids	g	0.11	
Linoleic acid	g	0.051	
Alpha-linolenic acid	g	0.061	
Omega 3	g	0.042	
Omega 6	g	0.040	
Total omega 3 / total omega 6		1.0	

* RI: Reference Intake

** NRV: Nutrient Reference Value





STANDARD FOR DRIED PINEAPPLES

UNECE Standard DDP-28 - concerning the marketing and commercial quality control of Dried Pineapples, 2014 edition

1. DEFINITION OF PRODUCE

This standard applies to dried pineapples from varieties grown from *Ananas comosus* (L.) Merr., intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. This standard does not apply to dried pineapples that are processed by sugaring, flavouring, or for industrial processing.

Dried pineapples may be presented in one of the following styles:

- whole slices – consist of uniformly cut circular slices or rings cut across the axis of the peeled, cored pineapple cylinders
- half slices – consist of uniformly cut, approximately semi-circular halves of slices
- broken slices – consist of arc-shaped portions which are not required to be uniform in size and/or shape
- spears – consist of slender sectors cut radially and lengthwise from peeled cored pineapple cylinders
- tidbits – consist of reasonably uniform wedge-shaped sectors cut from slices or portions thereof
- chunks – consist of short, thick units cut from slices and/or from peeled, cored pineapple
- cubes – consist of reasonably uniform, cube-shaped units

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried pineapples at the export control stage after preparation and packaging.

However, if applied at stages following export, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried pineapples must display the following characteristics:

- intact (only for whole slices); however, edges that are slightly torn, slight superficial damage and slight scratches are not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter
- sufficiently developed
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta

¹ Definitions of terms and defects are listed in annex III of the Standard Layout - Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.



- free from blemishes, areas of discoloration or spread stains in pronounced contrast with the rest of the produce affecting in aggregate more than 20 percent of the surface of the produce
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and or calcium chloride and a slight smell of preservatives/additives, including sulphur dioxide.

The condition of the dried pineapples must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination.

2.2 MOISTURE CONTENT²

Dried pineapples shall have moisture content as follows:

- not exceeding 20.0 percent for untreated dried pineapples
- above 20.0 percent and not exceeding 44.0 percent for dried pineapples treated with preservatives or preserved by other means (e.g. pasteurisation). Products between 26.0 and 44.0 percent should be labelled as soft fruit/high moisture.

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried pineapples are classified into the following classes:

“Extra” Class, Class I, Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of dried pineapples is optional.

4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.

² The moisture content is determined by one of the methods given in annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.



4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements	10	15	20
of which no more than:			
Damage caused by heat during drying affecting the taste	5	8	10
Mouldy	0	0.5	1.0
Fermentation	0.5	1	2
Rotting	0	0.5	1
Pest damage	2	2	6
Living pests	0	0	0
(b) Size tolerances (if sized)			
For produce not conforming to the size indicated, in total	10	10	10
Presence of other styles among that indicated (by weight)	2	7	13
(c) Tolerances for other defects			
Foreign matter of organic origin such as core and skin fragments (pieces per kilo)	1	2	3
Foreign matter of mineral origin (by weight)	0.025	0.025	0.025

5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried pineapples of the same origin, quality, style and size (if sized).

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

The dried pineapples must be packed in such a way so as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper and stamps bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.



6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1. IDENTIFICATION

Packer and/or dispatcher.

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴.

6.2 NATURE OF PRODUCE

- “Dried Pineapples”, which may be replaced by “Soft pineapples” or equivalent denomination (when appropriate)
- Style

6.3 ORIGIN OF PRODUCE

Country of origin⁵ and, optionally, district where grown or national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized)
- Crop year (optional)
- “Sun Dried” etc. (optional)
- “Best before” followed by the date (optional)

³ These marking provisions do not apply to sales packages presented in packages.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.

⁵ The full or a commonly used name should be indicated.







banana

- *Musa acuminata* Colla
and *Musa balbisiana* Colla -





BOTANICAL CLASSIFICATION

Class: Liliopsida

Order: Zingiberales

Family: Musaceae

Genus: Musa

Species: *M. acuminata* and *M. balbisiana*

Part of the Musaceae family, the banana is cultivated around the entire tropical belt of the planet: there are hundreds of different cultivars, most of which originated - as is the case of the widespread *Musa paradisiaca* - from a hybridisation of the species *M. acuminata* and *M. balbisiana*. Incorrectly referred to as trees due to their height and grandeur, banana plants contain no wood and are therefore classified as herbaceous plants. Also known as the stipe, the plant's trunk develops from the basal leaves, which are characterised by a broad lamina and sturdy ribbing. Arranged overlapping in a spiral, these leaves form a very fleshy trunk, full of water, which can reach a height of 15 m. Inside the trunk is a stem, whose growth comes out of the top of the stipe, forming the typical banana leaves, ready to surround the flower. Indeed, a large clump of leaves develops at the apex of the trunk, arranged in a crown, and in the middle, the typical white-to-yellowish flowers bloom at the beginning of the summer.

Banana plants are self-fertile. This means they produce female, male and hermaphrodite flowers, and therefore require no help with pollination from other plants. Female flowers bloom from a bractea and are arranged in two rows: at the end of their flowering process, they transform into long, green fruits, known as fingers, which as a group are known as a hand. In turn, generally in groups of 6 to 9, the hands form a bunch. The emergence of the male flowers comes afterwards, and occurs along with the growth of the distal part of the inflorescence. After the flowering cycle, the fruits begin to form in small green capsules, grouped in clusters or bunches. Each tree produces one, which can reach 1 m in length, hold around 200 fruits, and weigh up to 50 kg.



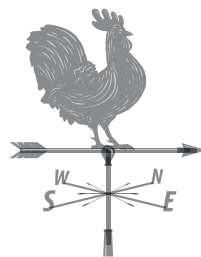


VEGETATIVE CYCLE

For banana plants, the vegetative cycle lasts one year, and begins when the shoot appears at ground level. Generated from the rhizome root apparatus, the shoot grows, and develops leaves, flowers and fruit.

Once the clusters are harvested, the leaves dry out, the plant dies, and a new shoot is ready to emerge next to it. A continuous process on an annual cycle. Each plant emits several shoots, and it is at the farmer's discretion to choose how many and which ones to select to continue the production cycle, and which ones to uproot.

The moment to choose and tidy up the shoots falls in mid-summer: by the end of August, the separation from the mother plant must be complete so that the new plant can prepare for the winter.



CLIMATE AND SOIL

Banana plants require hot, humid climates, and the tropical region is ideal for their growth, as changes in temperature, which damage the plants, are reduced.

The plants grow at an ideal temperature between 22 and 28 °C, and stop when temperatures approach 40 °C or go below 15 °C.

This is a plant that loves direct exposure to the sun, but should be protected from strong wind, which can break the leaves due to their wide open shape.

The ideal soil for banana cultivation must have good fertility, with a medium consistency and good drainage, in order to avoid any waterlogging. Too much water can cause root rot.

Growth can be stunted by excessive acid levels in the soil, with the ideal pH at between 6.5 and 7.



CULTIVATION TECHNIQUES

Reproduction in banana plants is vegetative, and there are two ways to stimulate new production: planting small seedlings, or taking suckers from a production cycle that has just finished.

Varieties and areas of cultivation determine the exact period for planting: an important aspect to consider is the level of solidity the plant must reach to survive the winter and be ready for fruiting the following year. In tropical areas, the deadline for selecting suckers is the end of August, while at Southern-European latitudes, the right period is in late spring.

A widely-used technique in all production areas is mulching, initially performed using plant material, and then during production making use of fallen leaves and the degradation of the trunk. The function of mulching is to protect the soil and the root apparatus from temperature changes, creating a natural way to keep the soil moist and avoid the growth of weeds.

Mulching is especially necessary at the beginning of cultivation, and simple straw can be used for this purpose.

When preparing the soil, it is important to consider the supply of organic matter, and the application of manure is an excellent way to promote the fertility of the soil before planting. Over the years of cultivation, the soil should be nourished with compost or earthworm humus, paying attention to deficiencies in nitrogen and potassium, especially at the beginning of the vegetative phase.

In tropical areas where the banana originated, the plant's water requirements are easily met. In places with less rain, it is fundamental to set up irrigation that keeps the soil constantly moist, while avoiding waterlogging. A frequent, low supply of water is the right balance for good production.

A key moment in the cultivation of the banana and its varieties is choosing the sucker for the following year's production. At the end of the cycle, every plant releases several, and only two should be selected to continue production, while the others should be uprooted.

PRODUCTION PROCESS

The fruiting process lasts around 12 weeks, and increases the weight at the top of the stem, leading it to bend towards the ground. When the fruits are at the right level of ripeness, it is time to cut the cluster, which causes the death of the plant.

Production for commercial purposes involves harvesting when the fruit is still unripe, in order to allow time for preservation processes and trade without the fruit deteriorating. As one of the most-consumed fruits in the world, the banana has many uses, especially in its places of origin and cultivation, where it is not only used as fresh fruit, but in many other ways. Every different use requires a specific harvest period.

To identify the moment when the fruit is fully ripe on the plant, we should consider that it takes almost three months for the fruit to be ready after flowering. The right level of ripeness can be defined as the moment when the colour of the outer hands turns from dark green to pale yellow, around a full fruit that is rounder on the lengths.



VARIETIES

The hundreds of banana cultivars differ in size, flavour and the texture of their flesh. Almost all of them derive from a hybridisation of the species *M. acuminata* with *M. balbisiana*. The main varieties on the market were created from these.

- **Cavendish:** this is one of the most-grown varieties in the world; it is characterised by smaller leaves, making it easier to manage during cultivation and more resilient against wind. The fruit has a thin peel, and grows to a length of 15 to 25 cm.
- **Gros Michel:** one of the top varieties for export, this banana has a sweeter flavour than the Cavendish, and a longer fruit with thicker peel.
- **Grand Nain:** another variety with widespread cultivation, sold all over the world and well adapted to organic farming. Despite the plant's modest size, it is able to produce well, making it ideal for commercial purposes.
- **Lady Finger:** unlike the previous varieties, this one has smaller fruits. An exotic plant extensively grown in Australia, the flavour of this banana is sweet and delicate, and highly appreciated when consumed fresh.
- **Cardava:** a variety that is often used for the preparation of dried fruit. Primarily grown in the Philippines, this variety produces very large fruits.
- **Saba:** another Filipino variety, like the Cardava it is also widely used in the dried fruit market. Its flesh is white and starchy, ideal for drying.





PRODUCING COUNTRIES

Bananas are the most exported fresh fruit in the world, and one of the most popular crops, along with rice, wheat and corn. Cultivated throughout the tropics, the majority of production is found in India, China and Indonesia. While India leads in terms of tonnes produced, Ecuador, Costa Rica and Guatemala are the leaders in exports.



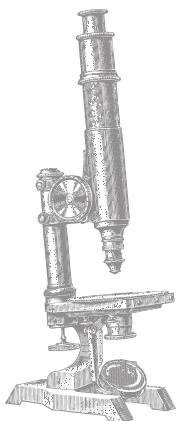
FUN FACT

The origins of banana cultivation are ancient, with the spread of the plant already recorded in prehistoric times. Traces of the oldest plants have been found in Papua New Guinea, where the presence of bananas dates back to between 5000 and 8000 years BC.

We can trace the origins of the plant to this area of South-East Asia, from where it soon spread to China, where the first organised cultivation is dated to around 200 AD.

The banana's journey to the West took place in around 600 AD, when Arab merchants brought the fruit to the coasts of the Mediterranean.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	338	17%
	kJ	1432	17%
Fats	g	2.0	3%
of which saturates	g	0.8	4%
Carbohydrates	g	75	29%
of which sugars	g	48	53%
Fibre	g	6.1	-
Protein	g	2.0	4%
Salt	g	0.13	2%
			NRV**
MINERALS			
Calcium	mg	20.6	3%
Iron	mg	0.96	7%
Magnesium	mg	57.5	15%
Phosphorus	mg	67.5	10%
Potassium	mg	673	34%
Zinc	mg	0.59	6%
Copper	mg	0.13	13%
Manganese	mg	0	0%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	15	19%
Thiamine / Vit. B1	mg	0.037	3%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	2.5	16%
Pantothenic acid	mg	0.36	6%
Vitamin B6	mg	0.83	59%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	40.0	5%
Vitamin E	mg	0	0%
Vitamin D	µg	0	0%
Vitamin K	µg	1.0	1%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	1.2	
Monounsaturated fatty acids	g	0.21	
Oleic acid	g	0.093	
Polyunsaturated fatty acids	g	0.96	
Linoleic acid	g	0.48	
Alpha-linolenic acid	g	0.48	
Omega 3	g	0.48	
Omega 6	g	0.48	
Total omega 3 / total omega 6		1.0	

* RI: Reference Intake
** NRV: Nutrient Reference Value



STANDARD FOR DRIED BANANAS

UNECE Standard DDP-29 concerning the marketing and commercial quality control of Dried Bananas, 2018 Edition

1. DEFINITION OF PRODUCE

This standard applies to unripe and ripe, peeled and dried bananas from varieties grown from *Musa acuminata* and *Musa balbisiana* and their hybrids intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. This standard does not apply to dried bananas that are processed by salting, sugaring, flavouring, or roasting or for industrial processing.

Dried bananas may be presented in the following styles:

- sliced
 - slices - cut cross-wise to the longitudinal axis into oblong /oval rounded/ellipse shapes
 - longitudinally (lengthwise) - cut longitudinally into approximately equal halves or the entire length or sections thereof
- strips
- diced into chunks of irregular shape or approximately equal-sized cubes; and
- any other style of dried bananas shall be permitted provided that the product is distinct from the above-mentioned styles and sufficiently labelled

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried bananas at the export control stage after preparation and packaging.

However, if applied at stages following export, the holder shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried bananas must display the following characteristics:

- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from burns, areas of discolouration or spread stains in pronounced contrast with the rest of the produce affecting in aggregate more than 20 percent of the surface of the produce.
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture





- free of foreign smell and/or taste, except for a taste of sodium chloride and a slight smell of preservatives/additives¹

The condition of the dried bananas must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT²

The dried bananas shall have a moisture content not exceeding:

- 18.0 percent for untreated dried bananas
- between 18.0 and 25.0 percent for dried bananas treated with preservatives or preserved by other means (e.g. pasteurisation)

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried bananas are classified as follows:

“Extra” Class, Class I, Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Dried bananas are presented by style as defined in “Definition of produce”. Uniformity in size is optional in all classes. However, they should be reasonably uniform in shape and size.



¹ A slight smell of sulphur dioxide (SO₂) is not considered as “abnormal”. Preservatives may be used in accordance with the legislation of the importing country. Dried bananas may be sulphured in order to retain their original colour.

² The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.



4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each package or in each lot for produce not satisfying the minimum requirements of the class indicated.

4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements,	5	10	15
of which no more than:			
Injuries, calluses and damage caused by heat during drying	5	8	10
Mouldy and mildew spots	1	4.5	9
of which no more than:			
Mouldy	0	0.5	1.0
Fermented or damaged by rotting or deterioration	0.5	1.5	3
of which no more than:			
Fermented (for dried ripe bananas only)	0.5	1	2
Slightly affected by decay	0	0.5	1
Pest damage	2	2	6
(b) Size tolerances			
For produce not conforming to the size indicated	10	15	20
Presence of pieces among halved bananas (by weight)	2	7	10
(c) Tolerances for other defects			
Foreign matter, inner skin fragments (by weight)	0.5	0.5	0.5
Not fully ripe fruit among ripe fruit	0	4	6





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried bananas of the same origin, quality, style and variety or commercial type (if indicated).
The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

The dried bananas must be packed in such a way as to protect the produce properly. The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper and stamps bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue. Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴.

6.2 NATURE OF PRODUCE

- “Dried ripe bananas” or “Dried bananas”, followed by the style
- Name of the variety or commercial type (optional)
- “Sun Dried” or method of drying. (optional)

³These marking provisions do not apply to sales packages presented in packages.

⁴The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.3 ORIGIN OF PRODUCE

Country of origin⁵ and, optionally, the district where grown or the national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- Crop year (optional)
- “Best before” followed by the date (optional)

⁵The full name or commonly used name should be given.







coconut

- *Cocos nucifera* L. -





BOTANICAL CLASSIFICATION

Class: Liliopsida

Order: Arecales

Family: Arecaceae

Genus: Cocos

Species: *C. nucifera*

Behind the name of this fruit is the "omo nero", the "black man" who appears in children's nursery rhymes in many cultures: "*Ninna nanna, ninna oh, questo bimbo a chi lo do*" ... The character known as the "uomo nero" in Italy, and the *Boogeyman* in America, is called *El Coco* in Hispanic tradition - an anthropomorphic spirit with a head in the form of a pumpkin. "Coco", means "head" in Spanish, and Vasco de Gama's sailors gave this name to the palm nuts they discovered during their voyages to the Indies. Coco, like the head of the monster from their nursery rhymes.

The plant is believed to be native to Southeast Asia (Malaysia, Indonesia and the Philippines) and the islands between the Indian and the Pacific Oceans. From that region, the fruit of the coconut palm is considered to have been taken to India, and then to East Africa.

The coconut palm is anchored to the ground with a root apparatus made up of a few strong roots, and a basal mass of fibrous roots which spread in all directions and at all angles, up to 10 m in order to reach groundwater.

The coconut palm has a height of 20 to 40 m, and can be straight or curved. The slender trunk, which grows from a base called the "bolo", is slightly wider at the base (with a diameter of 50-70 cm) and thinner at the top (with a diameter of 25-35 cm), while the central cylinder is made up of parenchyma tissue that surrounds the vascular and fibrous bundles (widely spaced compared to the periphery).

At the top of the trunk is a dense crown of leaves, arranged in a way that allows them to receive as much sunlight as possible. This crown is made up of a variable number of leaves, from thirty to forty.

The coconut palm is a monoecious plant (not dioecious like many other palms), and has diclinous flowers, meaning that both male and female flowers are present. Both types are small, with colouring that ranges from white to pale yellow; they are sessile and arranged in bunches.

Coconut pollination, which is both anemophilous and entomophilous, is mostly performed by insects. Once pollination and fertilisation has taken place, the fruits develop and become ripe over a period of around 12 months. The fruits, which in botanical terms are defined as drupes (and not nuts, as they are commonly known), have an ovoid shape, and reach an average of 20-30 cm with an average weight that ranges from 1 to 2 kg.





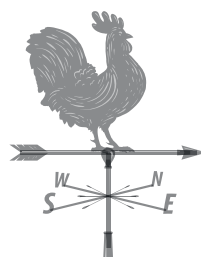
VEGETATIVE CYCLE

In favourable conditions, tall coconut palms begin to flower around 5 years after seeding (the dwarf coconut flowers 3 years after seeding), while the fruit fully develops after 11-12 months. Usually, only 30-40 percent of fruits reach maturity, with the majority being interrupted within three months of pollination. The palm produces 12-15 sporadic inflorescences each year, at relatively regular intervals. This means that every month, a new bunch of coconuts forms, which continues to grow on the palm until it is ready for harvest, or until the coconuts fall from the tree for propagation and germination.

Propagation takes place through the inactive coconut fruit, which requires no specific treatment for germination. Generally, 90 percent of seeds germinate. The remaining 10 percent are usually discarded because they do not germinate due to a pathogenic infection inside the seed, caused by the fracturing of the shell in the first three months after germination.

During germination, the coconut's haustorium begins to develop. This is a sweet, spongy mass (cotyledon), which dissolves and absorbs the endosperm. The growth of the haustorium facilitates the development of the roots and shoots inside the germinating coconut. In the right conditions, this germinated coconut will become a seedling.

The best moment to replant the seedlings is at the beginning of the rainy season, using seedlings that are 8-10 months old.



CLIMATE AND SOIL

The coconut palm grows between the Tropic of Cancer and the Tropic of Capricorn, at an optimal consistent temperature of 27-28 °C, and in any case no higher than 34 °C and no lower than 22 °C. It has been observed that the fruit is directly influenced by minimum monthly temperatures below 22 °C for a period of 4 months in the 18 months before harvest. Generally, the coconut palm requires at least 2,000 hours of sunlight a year to fully exploit its production potential, but it is estimated that 120 hours of sunlight per month is favourable enough.

Normally, low temperatures around 0 °C for a short period do not kill the palm, but cold snaps below 10 °C can seriously compromise coconut palms (the level of damage is also determined by the length of the cold period).





Another of the factors that influence the coconut palm is the relative humidity, which determines transpiration, and therefore the absorption of water and nutrients. Even if there are sufficient quantities of water and nutrients present in the soil, if the humidity level is low, the stomata of the plant may close, reducing its capacity for photosynthesis.

Some wind is favourable for coconuts when there is enough available water, as it increases transpiration, and consequently, the absorption of water and nutrients. However, strong winds and cyclones can cause considerable damage, twisting or even ripping off leaves and inflorescences. Adequate water supply throughout the year is one of the main requirements for good coconut production, especially in areas with groundwater that is not easily reachable by the roots. 125-195 mm of rain per month, equal to 1500-2300 mm per year, is the ideal amount for coconuts. The distribution is more important than the yearly total. To conclude, water supply involves not only the availability of water in the soil, but also the relative humidity in the air, the wind and the temperature (these all play a role in the supply of water and the palm's evapotranspiration).

CULTIVATION TECHNIQUES

Irrigation and drainage are two aspects that need to be considered for field placement, as they must be incorporated from the beginning in a rational way, and are also often connected to each other: it is sometimes difficult to carry out irrigation without drainage.

Interventions from technicians are essential, and focus on:

- setting the amount of water needed for adequate irrigation, according to the climate of the area;
- choosing an irrigation system that is able to support the function and availability of water;
- the drainage, to identify the zones where there is risk of accumulation of water and find possible solutions to provide open drains, in order to collect this excess water (it should be considered that fruit trees are highly sensitive to asphyxia).

As the availability of water is one of the most important requirements for coconut palms, and for fruit production, irrigation is essential in arid zones or regions with dry seasons. Some palms end up succumbing to drought, despite their tolerance levels (higher in tall varieties than hybrids, which are in turn more tolerant than dwarf varieties). A shortage of more than 115 mm of water causes serious stress to coconut palms, so it is recommended to take this level as a critical point at which to start irrigation and plan a schedule for water provision.

For irrigation, various systems are possible (determined by local conditions). The water can be supplied in rivulets parallel to the row of palms, or be collected in a container around the palm. The percolation of the water through the soil must be correctly analysed. The majority of the absorbent roots on palms are found in the first 0.5-1.0 m of earth. To avoid losses, the water should be provided at a speed that restricts the percolation to the rooted area, as it has been observed that coconut palms concentrate their roots in the wet soil around irrigation zones.





The correct choice of soil is another key element for healthy, vigorous growth, early production, resistance to disease and parasites, and also for a long productive life. The great adaptability of coconut palms has allowed their cultivation to spread more than any other, to many soil types. However, these palms prefer an airy environment and soil with good drainage. A minimum soil depth of 80-100 cm is needed for nutrition, as well as to improve the tree's resilience against wind.

Planting distance should be 7 by 7 m, for a density of around 200 plants/hectare. Sunlight is an important factor to consider for coconut palms, which is why their spacing must be relatively wide, and wherever possible, planting should be carried out with north-south exposition. The site does not need any particular preparation on sandy terrain, unlike for heavier soils. Soil sampling, to perform analysis, is essential in order to modify or correct mineral levels.

When it comes to fertiliser, manure can be used at doses between 50 and 100 kg per tree per year. Alternatively, it is also possible to use mineral fertilisers on a circular area of approximately 0.5 to 2 m around the trunk, depending on the age of the plant and the depth of its roots. The use of organic fertiliser has certain advantages over chemical fertiliser, as it involves micro and macro-elements and improves the soil structure, its capacity to retain moisture, its microbiological conditions and its cation-exchange capacity.

PRODUCTION PROCESS

The harvest can be performed after the coconut shells have turned brown, and the volume of water in the fruit has reduced. Some varieties of coconut keep their fruits attached to the trunk for a very long time, sometimes even until their germination. These trees require climbing or other methods for harvest, but access to the fruits with a machine is often impossible, so harvesting the coconuts at several intervals can be a good solution.

Many varieties of coconut tend to drop their fruits when they are ripe. However, leaving the fruits to fall is a method that also has certain disadvantages, as coconuts on the ground are easy to steal, which is a serious problem especially in densely populated areas.

In Indonesia, Malaysia and Thailand, monkeys are sometimes used to pick the fruits. This system is anything but cheap, due to the careful training they must undergo before climbing. However, the use of these animals can give surprising results: their daily performance capacity is considerable, and can reach up to 1000 fruits.



VARIETIES



Over 80 different varieties of *C. nucifera* have been described, all classifiable into two macro-categories: tall and dwarf. This division is not strictly defined in all cases, and there are varieties that do not fall into either of the two categories.

* - TALL VARIETIES - *

Tall varieties, sometimes known as "typical" varieties, are generally very long-lived plants that easily reach 80 years. They usually take 5-6 years to flower, and produce flowers continuously, fruiting relatively late compared to the planting date (up to 10 years after seeding), and reaching peak production even later. They are resilient palm trees that tolerate a wide range of environmental conditions. They normally cross-pollinate, and are therefore considered to be heterozygous.

* - DWARF VARIETIES - *

Despite their shorter height, these plants certainly do not lack grandeur, with the ability to reach up to 12 m.

The main characteristic of these varieties is the speed at which they reach reproductive maturity, with the possibility of harvesting the first fruits from the fourth year after planting.

Dwarf varieties have a shorter lifespan and are negatively affected by drought, parasites and diseases. They normally self-pollinate, and are therefore considered to be homozygous.

* - HYBRIDS - *

- **Port Bouet 121:** this is a Malaysian hybrid of the yellow dwarf from West Africa. The number of fruits harvested annually is 120-200. It is characterised by less significant fluctuations in production compared to other coconut trees during periods of drought, and above all, the capacity to meet high production levels in a short time when rain levels are high. It grows in both very sandy and clayey soils, at both acidic (3.5-4) and basic (8.0) pH levels. It is also resistant and tolerant to the main parasites.
- **Port Bouet 111:** this red dwarf hybrid is more sensitive to water levels, and moderately resistant to parasites.





PRODUCING COUNTRIES

The most significant coconut cultivations are found in the belt between the two tropics, with Asia boasting the greatest surface area of cultivated land. The leading nations on the continent for this plant are Indonesia, India and the Philippines.

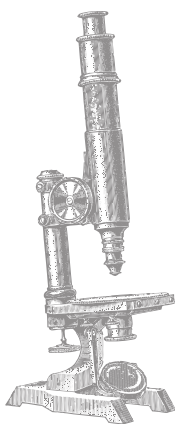
Brazil is the strongest producer in the Americas, along with Mexico and cultivations on tropical islands.

The third continent for production is Africa, mainly represented by Ghana, Tanzania and Mozambique.



FUN FACT

Of all palm trees, the coconut is probably the most cultivated in the world, as well as being the best-known and the most important in economic terms. Coconuts are one of the main sources of income for producing countries, as they are used for a multitude of products that are also used and appreciated in Western countries. It is the national tree of the Maldives, and is considered the most important tree in the country, to the extent that it is even included in their national emblem. In India, giving the gift of a coconut during a wedding ceremony is considered very good luck, while in many tropical countries, the coconut is considered to be the king of the plants, both because no part of it is thrown away, and because it is an excellent source of fats and proteins, representing a fundamental food for the nutrition of populations in the South Seas.



Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	710	36%
	kJ	2926	36%
Fats	g	69	99%
of which saturates	g	64	320%
Carbohydrates	g	10	4%
of which sugars	g	7.4	8%
Fibre	g	12	-
Protein	g	6.3	13%
Salt	g	0.06	1%
			NRV**
MINERALS			
Calcium	mg	12.7	2%
Iron	mg	3.6	26%
Magnesium	mg	71.5	19%
Phosphorus	mg	160	23%
Potassium	mg	568	28%
Zinc	mg	2.8	28%
Copper	mg	1.1	110%
Manganese	mg	2.2	110%
Selenium	µg	31	56%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.037	3%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	0.53	3%
Pantothenic acid	mg	0.13	2%
Vitamin B6	mg	0.060	4%
Folacin / Vit. B9	µg	1.40	1%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	0	0%
Vitamin D	µg	0	0%
Vitamin K	µg	0	0%
Biotin / Vit. H	µg	9.2	18%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	4.9	
Monounsaturated fatty acids	g	3.9	
Oleic acid	g	3.8	
Polyunsaturated fatty acids	g	0.84	
Linoleic acid	g	0.93	
Alpha-linolenic acid	g	0	
Omega 3	g	0	
Omega 6	g	0.84	
Total omega 3 / total omega 6		0	

* RI: Reference Intake

** NRV: Nutrient Reference Value





DEHYDRATED COCONUT KERNEL PIECES

UNECE Standard DDP-31 concerning the marketing and commercial quality control of Dehydrated coconut kernel pieces, 2019 edition

1. DEFINITION OF PRODUCE

This standard applies to dehydrated pieces of peeled and unpeeled coconut kernels from varieties (cultivars) grown from *Cocos nucifera* L. intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. It does not apply to dehydrated coconut kernel pieces that are salted, sugared, flavoured, roasted or for industrial processing.

Dehydrated coconut kernel pieces are made from freshly broken coconuts. The kernel must be sufficiently firm and may be fully developed or not fully developed; the pieces may be peeled¹ or un-peeled.

Dehydrated coconut kernel pieces may be presented in the following styles:

- desiccated;
 - extra fine
 - fine
 - medium
- slices, strips, chips and shredded
- cubes
- other styles - irregular in shape, size and thickness and excluding the whole kernel.

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dehydrated coconut kernel pieces at the export-control stage, after preparation and packaging.

However, if applied at stages following export, the legal holder shall be responsible for observing the requirements of the standard. The legal holder of products not in conformity with this standard may not display such products or offer them for sale or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried coconut kernel pieces must display the following characteristics:

- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded;
- clean, practically free of any visible foreign matter;
- free from living pests whatever their stage of development;
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta;
- free from blemishes; areas of discolouration, spread stains or adhering testa (in case of peeled coconut kernel pieces) in pronounced contrast with the rest of the produce affecting in aggregate more than 20 percent of the surface of the produce;
- free from mould filaments visible to the naked eye;
- free from rancidity
- free of abnormal external moisture

¹ Removal of the brown skin (testa/seed coat) that connects the kernel to the inside surface of the shell.



- free of foreign smell and/or taste, except for a taste of sodium chloride and a slight smell of preservatives/additives²

The condition of the dehydrated coconut kernel pieces must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination.

2.2 MOISTURE CONTENT³

The dehydrated coconut kernel pieces shall have a moisture content not exceeding 3.5 percent.

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dehydrated coconut kernel pieces are classified into the following classes:

“Extra” Class, Class I, Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of dried coconut kernel pieces is optional in all classes; however, when sized, size is determined by diameter of the widest part.

- Desiccated:
 - extra fine; of which not less than 90 percent of the weight shall pass easily through a sieve of square apertures of 0.85 mm, but of which a maximum of 25 percent of the weight passes through a sieve of 0.50 mm aperture size
 - fine; of which not less than 80 percent of the weight shall pass easily through a sieve of square aperture size of 1.40 mm, but of which a maximum of 20 percent of the weight passes through a sieve of 0.71 mm aperture size
 - medium; of which not less than 90 percent of the weight shall pass easily through a sieve of square aperture size of 2.80 mm, but of which a maximum of 20 percent of the weight passes through a sieve of 1.40 mm aperture size
- slices, strips and shredded of 6 – 12.5 mm wide, 3 mm thick and max 20 mm long
- chips of 6 – 12.5 mm wide and longer than 20 mm
- cubes with sides measuring a minimum of 8 mm by 8 mm
- chunks of irregular shape no longer than 30 mm

² A slight smell of sulphur dioxide (SO₂) is not considered as “abnormal”. Preservatives may be used in accordance with the legislation of the importing country. Dehydrated coconut kernel pieces may be sulphured in order to retain their original colour.

³ The moisture content is determined by one of the methods given in Annex I of the Standard Layout Determination of the moisture content for dehydrated produce <http://www.unece.org/trade/agr/standard/dry/StandardLayout/StandardLayoutDDP_e.pdf>. The laboratory reference method shall be used in cases of dispute.





4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the requirements of the class indicated.

4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements	5	10	15
of which no more than:			
Injuries, calluses and damage caused by heat during drying	3	5	7
Mouldy and mildew spots	1	2	3
of which no more than:			
Mouldy	0.5	0.5	1
Rancid or damaged by pests, rotting or deterioration	0.5	1.5	3
of which no more than:			
Rancid	0.5	1	2
Slightly affected by decay	0	0.5	1
Pest damage	0.5	1	1
Living pests	0	0	0
(b) Size tolerances			
For produce not conforming to the size indicated, if sized	10	10	15
Presence of pieces among cubes (by weight)	2	5	10
(c) Tolerances for other defects			
Foreign matter (by weight)	1	2	2
Pieces of skin/testa among peeled	3	7	10



5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dehydrated coconut kernel pieces of the same origin, quality, size (if sized) and style.

For “Extra” Class and Class I, the dehydrated coconut kernel pieces must be from kernels with the same level of development.

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

The dehydrated coconut kernel pieces must be packed in such a way as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper and stamps bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package⁴ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁵.

6.2 NATURE OF PRODUCE

- “Dehydrated coconut kernel pieces”, followed by the style
- Name of the variety (optional)

⁴ These marking provisions do not apply to sales packages presented in packages.

⁵ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.3 ORIGIN OF PRODUCE

Country of origin⁶ and, optionally, the district where grown or the national, regional or local place name.

6.4. COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- Crop year (optional)
- “Best before” followed by the date (optional)

⁶ The full or a commonly used name should be indicated.



date

- *Phoenix dactylifera* L. -





BOTANICAL CLASSIFICATION

Class: *Liliopsida*

Order: *Arecales*

Family: *Arecaceae*

Genus: *Phoenix*

Species: *P. dactylifera*

The origin of this species dates back to the Neolithic period, coinciding with the appearance of large farming civilisations. Its cultivation then gradually spread from its place of origin, probably the Middle East, to the Mediterranean basin in ancient times.

The date palm is a monocotyledon angiosperm belonging to the *Arecaceae* family, which contains about 200 genera, including the genus *Phoenix*, which includes 12 species. Of these 12 species, only 6 produce edible fruits.

The *Phoenix dactylifera* is not a tree, but a shrub, with a trunk of up to 30 metres in height, conspicuously covered with the remains of the sheaths of the fallen leaves. The trunk, or stipe, normally does not grow branches. It has a variable diameter, and its growth in thickness occurs very early, before growing in height. The most common, best-known form for these palms is in woody tree form, with a single trunk, without branches, that leads to a crown of leaves at the apex.

The leaves, grouped in a maximum number of 20-30 to form a sparse apical crown, are pinnate and up to 6 m long. The upper ones point upwards, and the basal ones curve downwards, with coriaceous, linear, rigid and pungent segments and a glaucous green colour. The inflorescence, produced at the axil of the leaf, is a ramified spadix wrapped in a coriaceous spathe that protects the flowers until they are mature. The spadix can reach a length of 130 cm.

Every female tree carries an average of ten spathes; this number is usually higher on a male. The ramified spadix is formed by "spikelets" (in a number that varies from 50 to over 110), each of which carries a large number of small unisexual flowers, which can vary from an average of 20 to over 50. The flowers, which are unisexual on dioecious plants, are small, off-white and fragrant, grouped on axillary spadices that can be up to 120 cm long, and strongly curved due to the weight of the fruits. Only the female plants produce fruits.

The fruit has an oval-cylindrical shape, from 3 to 7 cm in diameter, and ranges in colour from red to yellow, depending on the variety. Dates contain a single seed that is 2 to 2.5 cm long, and from 6 to 8 mm thick. The fruits of these palms are drupes, which are extremely variable in shape and size. The most substantial part is the mesocarp, which can be fleshy or dry and fibrous; the epicarp can be smooth or rough, sometimes with grooves, or covered with scales or thorns; the endocarp can have a membranous or a woody texture.





VEGETATIVE CYCLE

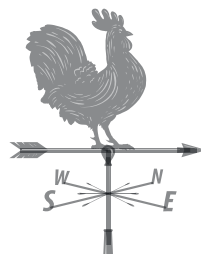
From pollination to fully mature dates, it takes around 200 days. During their formation and ripening, dates go through four distinct growth phases, distinguishable by morphological and chemical characteristics. These 4 fundamental phases are referred to by their Arabic nomenclature (*kimri*, *khalal*, *rutab* and *tamr*).

During the *kimri* stage, the average length of the fruits is around 27.5 mm, and the diameter is around 17.8 mm. The average weight of five of the date varieties studied is 5.8 g.

In the second stage, called *khalal*, the colour of the dates changes from green to a mix of yellow and red, depending on the type of plant. During this stage, the average length of the fruits grows to 32.5 mm, and their diameter reaches 21 mm. In this phase, the tannins begin to drop and lose their astringency; in some varieties, this process evolves rapidly and makes the dates more pleasant in terms of sensory properties, which means we can begin to consider their commercial ripeness.

Third stage: *rutab*. In this phase, the tips of the dates begin to brown, and their weight decreases due to loss of moisture through a partial conversion of sucrose into invert sugar (the level varies depending on the date variety). The skin turns brown and the dates become soft and translucent. This is the beginning of ripening.

In the final stage, *tamr*, the dates are dark and soft, and have lost quite a lot of water, giving them a sugar to water ratio that is high enough to prevent fermentation. In this phase, dates can keep for a long time, especially if the humidity is no higher than 24-25 percent.



CLIMATE AND SOIL

The *P. dactylifera* is a very unusual tree species in terms of its morphology (dioecious) and its climate and water requirements, which are fundamental in the development of the plant.

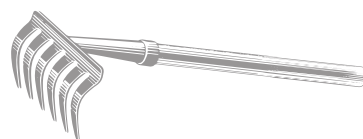
While sensitive to the cold, this is a shrub that is able to grow in soil of any type, as long as it is fertile and has good drainage.

In order for the fruits to reach full ripeness, it is fundamental that temperatures are high (40 °C) and there is considerable availability of water.

If we look at the areas of date cultivation around the world on a map, we can see a large concentration in the southern Mediterranean basin, with significant spread towards the countries on the Persian Gulf.

The date palm offers great possibilities for adaptation; it is a heat-loving species, showing activity from 7 °C to 10 °C.

Maximum fruit production is reached at temperatures above 30 °C, while at 38-40 °C it stabilises and begins to decrease.



CULTIVATION TECHNIQUES

The date palm is a dioecious species, meaning that it has male and female trees. In Arabic, the female palm is called the *nakhla*, and the male palm the *dhokkar*. Pollination is anemophilous and entomophilous, and requires the same number of male and female trees. This relationship decreases significantly if artificial pollination is used.

The pollination period extends from the end of February to mid-April, depending on environmental conditions (temperature and humidity) and the variety. The optimal ratio of male to female plants is 1 to 20.

Generally, reproduction takes place through rooted suckers, which can be planted immediately, or after a year in a nursery. The mother plant produces suckers (rooted and aerial) in its first 20 years of life. The rooted suckers become ready for planting at 4-5 years old, when they have a diameter of around 25 cm and their own root apparatus.

Aerial suckers are not often used, as they have no roots, and marcottage is not convenient in terms of either money or time, as the plant produces plenty of rooted suckers.

Preparing the soil for planting suckers involves digging holes with a volume of around 1 m³. Once the sucker has been planted, the soil around the plant should be compacted well, with a small basin for irrigation. In general, there are two planting periods for suckers: the main one in spring, from March to April, and the other in summer, from mid-August to mid-September. Supported by an irrigation system (the most used are basin irrigation and drip irrigation), the palm takes around 4 or 5 years from planting to begin producing. The amount of time depends on the variety. From this moment, the date palm's production continues to increase, reaching its peak around the 50th year of life.

Pruning interventions involve removing the suckers at the base of the trunk if they were not taken for propagation, and removing old leaves that have begun to droop, making them potential causes for the onset of parasites.

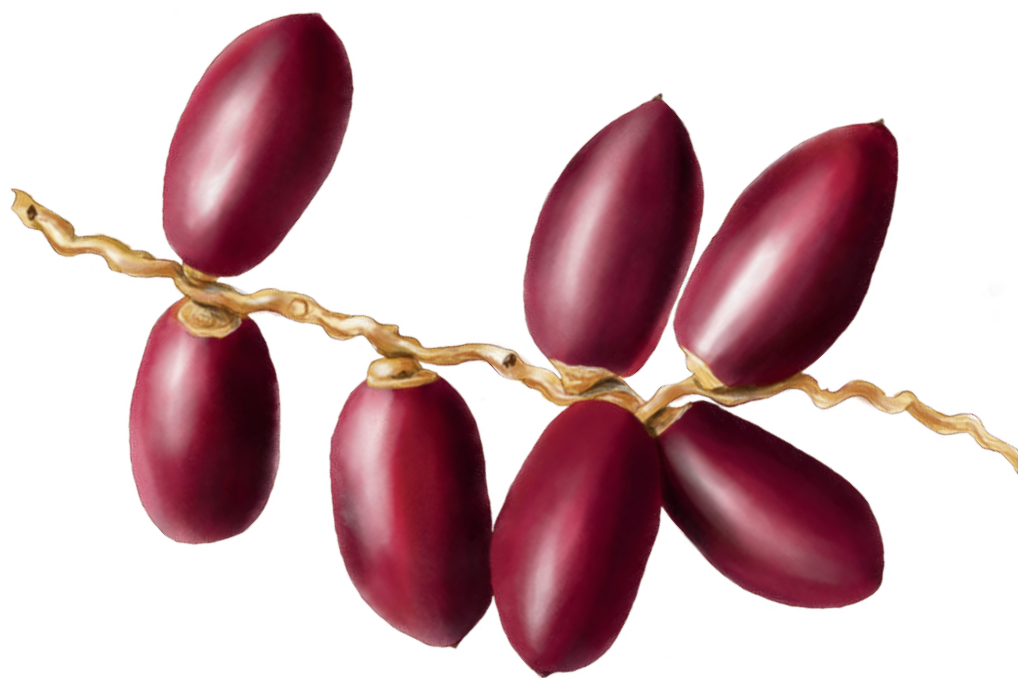


PRODUCTION PROCESS

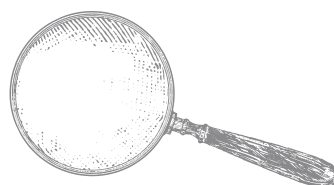
A healthy adult plant is able to guarantee 80-150 kg of dates per year. Up to an age of 10-15 years, the bunches can be cut directly from the ground, but later it becomes necessary to climb the trunk or use platforms. A very dense bunch on an adult plant requires several interventions to remove dates, in order to allow the ones on the inside to ripen as they should, by being exposed to direct sunlight.

The date harvest begins between August and September, ending at the beginning of November when the drop in temperature begins to prevent ripening.

One of the first processes the fruits undergo has the purpose of protecting them from insects. It is now a widespread practice, also in desert oases, to protect the dates from insects using paper bags or nets, which enclose the branches of dates. These methods provide physical protection for the dates that manage to ripen more quickly, with benefits for the plant's production.



VARIETIES

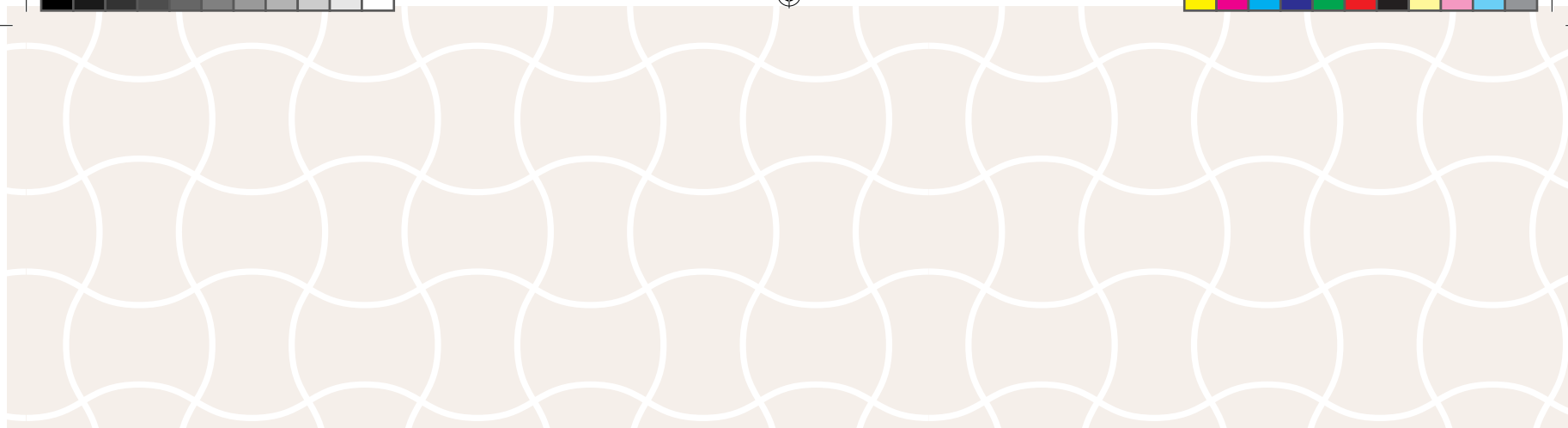


The 29th parallel is the best for date cultivation. From the Atlantic coast of North Africa to Pakistan, there are many varieties of this fruit, all with different shapes, colours, flavours and sensory properties.

* - ISRAELI DATES - *

The area of the State of Israel has been famous for the excellent quality of its dates since the first century BC. Today, the area of cultivation extends from the Gulf of Aqaba to the Sea of Galilee, with the most significant concentrations in the Jordan Valley, the Dead Sea and the Arabah. The Israeli varieties derive from Iraqi cultivars, modified over time into the Deglet Nour and Medjoul varieties.

- **Hadrawi:** this is the first date to ripen and be harvested in every season. Its full, sweet flesh recalls the popular Halawi, from which it is differentiated by its rounder shape and darker colour, tending towards mahogany.
- **Barhi:** with smooth, yellow skin with no spots, and an oval shape, every Barhi date is a perfect fruit. Sold only on the stem, fresh Bahri dates are best eaten cold. Each fresh date weighs around 15-20 g.
- **Medjoul:** this is the date of the River Jordan. Large, soft and sweet, Medjoul dates vary in colour from light to dark brown, depending on the area of origin. Medjoul dates are unique not only for their sweetness, but also for their juiciness.
- **Hayani:** never excessively sweet, but succulent and aromatic, Hayani dates have a long shelf life when frozen. The oblong fruits have a smooth texture and, when ripe, they have a glossy, dark-coloured skin. Eaten fresh as a snack, Hayani dates are available all year round.
- **Amari:** these dates are large, with a magnificent reddish-brown skin. Related to Medjoul dates, they are appreciated for their high fibre content.
- **Halawi:** their exquisite sweetness makes this variety one of the most sold. Oblong and medium-large, these dates have an attractive light brown skin.
- **Deglet Nour:** in Arabic, this name means "date of light", and it is traditionally the most popular date from the River Jordan area. Known for its delicious aroma, the Deglet Nour is harvested semi-dried, when it has a colour ranging from light to dark brown.



- **Deri:** these dates have a unique aroma similar to caramel, and dark, glossy skin. Each dried date weighs 7-10 g.
- **Zahidi:** known as the "Golden Date" for its intense gold colour, the Zahidi has a delicate aroma, and is never too sweet. Round and easy to peel, Zahidi dates are used in cooking, and cooked as snacks.

* - TUNISIAN DATES - *

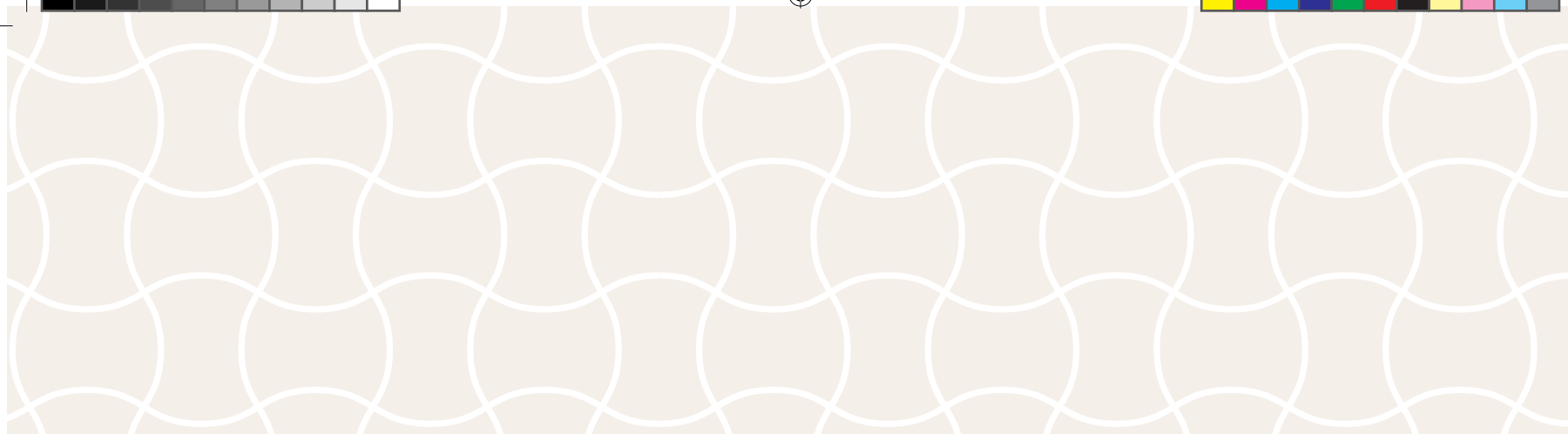
The production of dates in Tunisia is mainly in the Tozeur, Kebili and Tamerza regions. The dates are harvested when their colour turns dark, their flesh is soft, and their soluble dry matter content is double the water content.

- **Kenta:** with a light gold colour and an elegant appearance, this variety ripens early. It is less sugary than other varieties, and its structure is semi-dried.
- **Allig:** has a long shape, a particularly full flavour, and a sweet appearance. This date variety is harvested in November. It has a dark brown colour, and a semi-moist structure.
- **Khouat Allig:** due to their similar quality, colour and flavour, the Khouat Allig is commonly known as the sister of the Allig; however, it has a more refined shape and a less sugary flavour.

* - SAUDI ARABIAN DATES - *

Saudi Arabia is one of the top date producing countries in the world. The number of date palms in the country is estimated at 23 million, with over 450 different date varieties, spread across its vast landscape. Saudi Arabia has given utmost importance to research activities on date palms and their fruits, with regard to crop improvement, micropropagation, farming practices, the management of diseases and parasites, harvest and post-harvest techniques, storage, added value and marketing.

- **Khudri:** these dates are soft, and are one of the cultivars used for exports. They have a reddish-brown colour, with slightly wrinkled skin that flakes a little. With an elongated oval shape, these dates have a soft, gummy texture, a delicate sweetness and a flavour similar to caramel, like Khalas dates.



- **Sukkari:** this is one of the most popular types of dates, both in European countries and in the Middle East, as well as being one of the most famous date varieties when it comes to exports. The flavour of Sukkari dates is very sweet, and precisely because of this sweetness, they are also known as "Sugary" dates. These dates are soft when ripe, and the more they ripen the drier they become. They have a light gold colour, and are fleshy with a conical shape, and a flavour similar to caramel.
- **Safawi:** soft and moist, with a black colour and a long cylindrical shape, these dates have a long, wrinkled appearance similar to Medjoul dates. They are medium-sized, and their flesh is soft and easy to chew. Cultivated primarily in Medina, in Saudi Arabia, they are widely available, because the Safawi date palm is highly fertile.
- **Ajwa:** Ajwa dates are a summer fruit, and are a popular date variety around the world, grown in Medina, Saudi Arabia. Ajwa dates are small and almost round, with a dark brown or black colour with white lines. These dates have wrinkly skin and a very pleasant flavour. Very popular around the world, they are also one of the more commercial cultivars used for exports.
- **Segai:** these are semi-dry dates, cultivated in Saudi Arabia. They have an elongated shape and are famous for their two-tone skin. Their skin is wrinkly like Medjoul dates. These dates are one of the most famous commercial varieties from Saudi Arabia, and they are the most eaten, most popular dates in Arabic and European countries.
- **Medjoul:** also known as the "King of the Dates", this is a very high quality variety. What distinguishes Medjoul dates from other types is their larger size, and their sweet, caramelised flavour. These dates are soft and fleshy, with a dark brown colour and a soft texture.
- **Mabroom:** cultivated in Saudi Arabia, these are a soft type of date with a firm texture, a long, thin shape and a reddish-brown colour. Mabroom dates are one of the best varieties, and they are highly appreciated in European and Arabic countries for their attractive colour and extraordinary flavour.
- **Khalas:** these are some of the most popular dates in Saudi Arabia. They are soft, with a flavour similar to caramel. They have a light, golden colour, with semi-transparent skin. Thanks to their delicate sweetness, these dates are often served to guests with Arabic coffee.





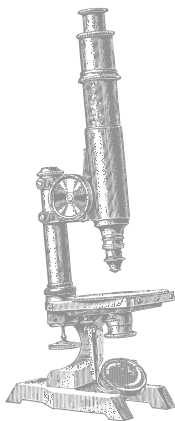
PRODUCING COUNTRIES

Thanks to its traditions and production volume, the Middle East is without a doubt the point of reference for global date production. Egypt is the leading country, followed by Saudi Arabia and Iran, two countries that look over the Persian Gulf, where the fruit is considered to have originated. As well as the countries already mentioned, North Africa is a significant area for production with Tunisia and Algeria. Meanwhile, Israel is the leading country for the production of the prized Medjoul date variety.



FUN FACT

"No plant has occupied man, since the darkest nights of time, like the palm". This is how Francesco De Santis begins his preface to the reprint of Salvatore Cusa's text *The Palm in Poetry, Science and Sicilian History* (1998), reminding us of the charm this plant has always held in the eyes of mankind. This fascination can only be partly justified by the unique morphological features of palm trees, which have no equals in the vegetable kingdom, and partly by these plants' capacity to provide, naturally or through cultivation, indispensable resources for food and the creation of many artefacts.



Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	315	16%
	kJ	1333	16%
Fats	g	0.4	1%
of which saturates	g	0	0%
Carbohydrates	g	72	28%
of which sugars	g	66	73%
Fibre	g	7.1	-
Protein	g	2.2	4%
Salt	g	0	0%
			NRV**
MINERALS			
Calcium	mg	51.4	6%
Iron	mg	0.41	3%
Magnesium	mg	70.9	19%
Phosphorus	mg	55.2	8%
Potassium	mg	686	34%
Zinc	mg	0.52	5%
Copper	mg	0.29	29%
Manganese	mg	0.61	31%
Selenium	µg	20	36%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.058	5%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	1.2	8%
Pantothenic acid	mg	0.86	14%
Vitamin B6	mg	0.18	13%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	0	0%
Vitamin D	µg	0	0%
Vitamin K	µg	3.0	4%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.27	
Monounsaturated fatty acids	g	0.058	
Oleic acid	g	0.048	
Polyunsaturated fatty acids	g	0.21	
Linoleic acid	g	0.18	
Alpha-linolenic acid	g	0.029	
Omega 3	g	0.029	
Omega 6	g	0.18	
Total omega 3 / total omega 6		0.17	

* RI: Reference Intake

** NRV: Nutrient Reference Value



STANDARD FOR DATES

UNECE standard DDP-08 concerning the marketing and commercial quality control of Dates¹, 2021 edition

1. DEFINITION OF PRODUCE

This standard applies to pitted and unpitted dates in their natural state or washed, re-hydrated, and/or coated and/or pasteurised from varieties (cultivars) grown from *Phoenix dactylifera* L. intended for direct consumption. It does not apply to dates for industrial processing.

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dates after preparation and packaging.

However, if applied at stages following export or dispatch, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products may not display such products or offer them for sale, or deliver or market them in any manner if not in conformity with this standard.

2.1 MINIMUM REQUIREMENTS²

In all classes, subject to the special provisions for each class and the tolerances allowed, the dates must display the following characteristics:

- intact; dates affected by mashing, tearing, breaking of the skin, leaving the pit visible so that the appearance of the fruit is noticeably affected are excluded
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter; excluding coating ingredients
- free from living pests whatever their stage of development
- free from pest damage visible to the naked eye, including the presence of dead insects and/or mites, their debris or excreta
- free from mould filaments and insect/mites/parasite damage visible to the naked eye
- free of fermentation
- free of unripe fruit, i.e. fruit light in weight, stunted or distinctly rubbery in texture
- free of unpollinated fruit; i.e. fruit not pollinated, as indicated by stunted growth, immature characteristics and absence of pit
- free of blemished fruit; i.e. fruit scarred, discoloured or sunburnt, or having blacknose (noticeable darkening of the head, generally accompanied by severe checking or cracking of the flesh) or side-spot (a very dark patch extending into the flesh) or similar abnormalities affecting an area at least as large as a circle of 7 mm diameter

¹ “Dates in this standard are those having the typical characteristics of dried fruit. They are naturally dried while still attached to the date palm and must be at the tamar stage, i.e. soft fruit, dull brownish in colour.

² Definitions of terms and defects are listed in Annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.



- free of abnormal external moisture
- free of foreign smell and/or taste

The condition of the dates must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT³

The dates shall have a moisture content not exceeding 26.0 percent for cane sugar varieties and 30.0 percent for invert sugar varieties.⁴ In their natural state, however, for the variety Deglet Nour the maximum moisture content shall be 30.0 percent.

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dates are classified into the following three classes:

“Extra” Class, Class I and Class II.

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Size is determined by the unit weight of the fruit. The minimum weight of dates shall be 4.0 g.

4. PROVISIONS CONCERNING TOLERANCES

Tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.

³ The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.

⁴ A list of varieties classified by the nature of their principal sugar component is given in the annex of this standard.



4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements	5	10	20
of which no more than:			
Immature or unpollinated fruit	1	2	4
Sour, decayed or mouldy fruit	0	1	1
Fermented or damaged by pests, ^{a,b,c} rotten or deteriorated	3	8	12
Blemished, discoloured or blacknose, sunburnt, cracking of the flesh	3	5	7
Live pests	0	0	0
(b) Size tolerances (if sized)			
For produce not conforming to the minimum size, in total, depending on the characteristics of the product	10	10	10
(c) Tolerances for other defects			
Unpitted among pitted fruit (by number)	2	2	2
Extraneous matter (of organic origin) such as loose shells, shell fragments, fragments of hull, leaves, dust (by weight)			
Foreign matter (of inorganic origin) such as stones, metal, and glass (by weight)	1	1	1
Dates belonging to varieties or commercial types other than that indicated – depending on the characteristics of the product	10	10	10

^a Reservations from Poland and the United Kingdom, which wish to retain the former tolerances: Extra, 2 percent; Class I, 4 percent; Class II, 6 percent.

^b When applying its national legislation, Switzerland does not admit a tolerance higher than 6 percent for produce damaged by pests.

^c When applying its national legislation, the United States does not admit a tolerance higher than 5 percent for produce damaged by pests.



5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dates of the same origin, quality, variety (if indicated).

The visible part of the contents of the package must be representative of the entire contents.

5.2 PACKAGING

Dates must be packed in such a way so as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be practically free of all foreign and extraneous matter, excluding decorative material (rachis, stems, plastic forks, etc.), in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

5.3 PRESENTATION

Dates must be presented in bags or solid containers. All sales packages within each package must be of the same weight.

Dates may be presented:

- in clusters (consisting mainly of the rachis and the stems to which the fruit is attached naturally)
- in stems (stems which are separated from the rachis and to which the fruit is attached naturally)
- separated into individual fruit, arranged in layers, or loose in the package.

Stems presented in clusters or separated from the rachis must be at least 10 cm in length and carry an average of four fruits per 10 cm of length.

Where the dates are presented in stems or clusters, there may be a maximum of 10 percent of loose dates.

The ends of the stems must be cleanly cut.

6. PROVISIONS CONCERNING MARKING

Each package⁵ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical country or a code mark officially recognised by the national authority⁶ if a country applying such a system is listed in the UNECE database.

⁵ Package units of produce prepacked for direct sale to the consumer shall not be subject to these marking provisions, but shall conform to national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units.

⁶ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.2 NATURE OF PRODUCE

- “Dates”, when the contents are not visible from the outside
- Name of the variety and/or commercial type (optional)
- “Cluster” or “stems”, where appropriate
- “Pitted”, where appropriate

6.3 ORIGIN OF PRODUCE

- Country of origin and, optionally, district where grown or national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Crop year (optional)
- “Best before” followed by the date (optional)





fig

- *Ficus carica* L. -





BOTANICAL CLASSIFICATION

Class: *Magnoliopsida*

Order: *Urticales*

Family: *Moraceae*

Genus: *Ficus*

Species: *F. carica*

The epithet "*carica*" that completes the binomial nomenclature of the *Ficus* derives from Caria, a region of western Anatolia where the fruit originated. From Mesopotamia to Egypt, Asia Minor was the birthplace of this species, which was already being cultivated in the first agricultural civilisations.

The fig is part of the *Moraceae* family, which groups together around 1500 species, most of which are woody plants that produce latex.

There are two subspecies of the Genus *Ficus carica* L.: *F. carica sativa* (domestic fig) and *F. carica caprificus* (caprifig or wild fig).

The *F. carica* L. is the most Nordic species of the genus; the tree in its natural state lives, on average, 50-90 years. It can reach 10–12 m in height, but in specialised farming is kept to within 3–4 m. In its wild state, its shape can be shrubby, while its grown form is arboreal.

The trunk of the fig tree is distinctive: short, branched, with smooth, ash grey bark. Ramification can vary depending on the cultivar, with curved or gnarled branches, in a crown that can be more or less tall and ramified.

The roots are robust and extensive, with a high penetration capacity; the branches and trunk can also grow adventitious roots.

Fig leaves are another distinctive feature of the plant: large, oblong and formed by 3 or 5 lobes. With a dark green colour on the top part, the colour is lighter underneath, where there is also some fine down.

"I'm going to pick the syconium": this is the name for what is erroneously referred to as the "fruit" of the fig tree, which is really an inflorescence that contains a great many fig flowers.

Syconia form after fertilisation of the longistylous female flowers, or through parthenocarpy. If fertilisation takes place, true fruits are formed, which are achenes. The flesh surrounding the small achenes is succulent and sweet, and forms the edible part.



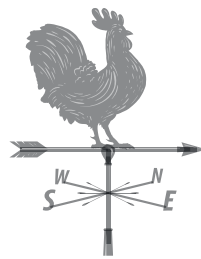


VEGETATIVE CYCLE

Depending on the variety and the climate in the area of cultivation, fig trees can fruit from one to three times a year. Production begins around the plant's fifth year of life, and reaches its peak of 40-60 kg of fruit when the plant is 30-40 years old.

The first fruiting opens the summer, when the so-called "breba crop" figs form on the branches in June and July. The second fruiting is the "main crop", the true figs, closing the summer and developing on branches that have grown over the course of the hot season.

If supported by a mild climate, some varieties also produce a third fruit crop on the buds.

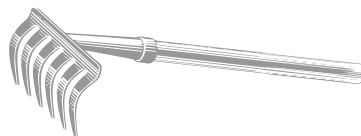


CLIMATE AND SOIL

The *F. carica* likes hot, dry climates, adapts to any soil type as long as it is loose and well-drained, and does not tolerate long periods of temperatures below -10/-12 °C.

Young plants, when growing intensely, can also be seriously damaged at -5/-8 °C, while adult plants in sunny areas with scarce water have shown resistance even down to -17/-18 °C, and in extraordinary cases, at even lower temperatures. At a temperature of 45/46 °C, or with extreme aridity, the plant stops vegetative processes and drops its leaves.

Fig tree roots are excellent at finding water, with high penetration capacity, and can be potentially invasive in their growth.



CULTIVATION TECHNIQUES

Grafting, root cutting, marcottage or layering: the propagation methods normally used in fig cultivation are agamic.

Reproduction through seeding is the only way to obtain new varieties, but it is very complicated: it is necessary to take seeds from fruit that are definitely fertilised, and with this technique there is also a 50 percent chance of getting caprifig trees and a 50 percent chance of getting edible figs. The situation is also made difficult by the presence of other independent factors, such as unfertilised fruit drop, from parthenocarpy. If you have caprifig and fig trees available, it is possible to propagate through seed using a sort of assisted fertilisation (caprification), by putting the fruits from the caprifig close to the female fig tree, near a swarm of insects.

Planting a specialised fig orchard is generally performed using a square layout, and more rarely rectangular, with distances that vary from a minimum of 5 to a maximum of 11-12 m, depending on the fertility of the soil and the growth characteristics of the cultivar. Currently, the square layout is losing popularity in favour of a continuous planting system in aligned rows, in which the distances between each tree can also be variable.

Planting is generally performed at the end of the winter, and is preceded by balanced provision of fertiliser to the soil that will receive the plant.

Irrigation may be necessary only in the first few years of life, while in later phases of growth, it is the root apparatus that will satisfy the plant's water requirements, thanks to its significant capacity for extension into the ground.

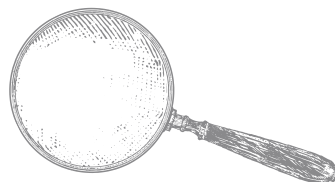
The pruning period is at the end of the winter, and there are many types of interventions that become necessary over the life of the plant. Operations aiming for the correct growth of the crown and better fruiting in terms of quality and quantity are necessary practices that require precise execution, which differ depending on the variety.

PRODUCTION PROCESS

Generally speaking, the fig harvest is carried out in September, but as mentioned before, every variety has different timing and phases, so this period can extend from July to October. A key aspect of harvesting figs is that it must be done gently. As they are highly perishable, figs should be detached from the plant with care, and positioned without excessively overlapping the syconia. Harvest for the purpose of consumption or the preparation of jams requires syconia with a medium-soft consistency, while if they are designated for drying, it is important that the fruits are very ripe. Once they are detached from the plant, the syconia immediately stop ripening.



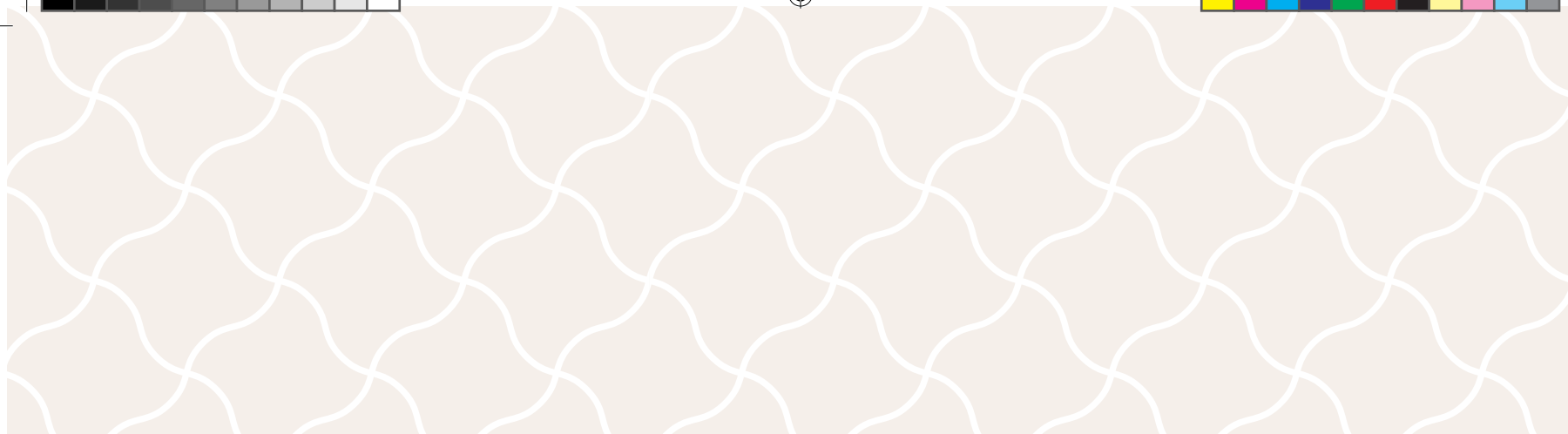
VARIETIES



* - ITALIAN FIGS - *

There are a great many varieties of figs in Italy. It is complicated to speak about the cultivars individually, partly due to the difficulty of distinguishing them based on their various local names. The most representative are types of early fig: Brogiotto (both white and black) and the very widespread Dottato, as well as the Troiano and the Cilento white fig. Those particularly suitable for drying are the Dottato, the Cilento white fig, the Farà and the Taurisano.

- **Dottato:** a plant of significant size, with pale green leaves with rounded lobes that are only slightly incised. The best fruits are taken from suckers and year-old branches. The harvest is performed in several steps, from mid-August to the second half of September, at least twice a week.
- **Pissalutto:** a fig with a medium-small fruit and an average weight of 40 g, with an elongated pyriform shape, thin skin, and a pale green-yellowish colour that turns canary yellow when ripe. There is also a black variant. The pulp is fleshy, with a wine-red colour. It is honeyed, almost liquid, with a good flavour; not too sweet, not too sour. Excellent eaten fresh, but also suitable for drying.
- **Verdino:** the fruits of this variety begin to ripen (main crop) around two weeks after the Dottato. A breba crop is produced only in exceptional circumstances. It has smaller fruits that are a bright, matte green colour with fiery red flesh, and very thin skin. The fruit has a lot of flavour, which is slightly fizzy when not too ripe; it is distinctly sweet, with a characteristic flavour when it begins to dry ("passolini" Verdino figs). It is excellent eaten fresh, and pairs well with cold meats and cheeses. The dried fruits are recommended for preserving in grappa or other spirits.



- **Black Brogiotto:** this is one of the most magnificent examples of the fig, able to reach an enormous size. The plant has expansive growth, with dense foliage and large leaves. Its fruits generally ripen one week after the Dottato's fruits, and continue until October. A characteristic of the fruits is their dark colour, which is black with purple hues, tending towards blue if the figs have grown more exposed to the sun. The sweetness of the edible part makes them ideal for eating fresh.
- **San Piero Fig:** this plant is enormous, with paler leaves compared to the Verdino and black Brogiotto. The leaves are longer, and often subtly three-lobed. It essentially produces only a breba crop, between the end of June and the beginning of July (the reference date is the 29th June, the feast of S.S. Peter and Paul), which generates fruits with a pale green-purple skin. The fruits are of a significant size, and the sapwood, instead of being white like the cultivars described so far, has purplish streaks. The fruits are very delicate: they must be picked with the utmost care taken not to squeeze the flesh, only holding them by the stem. They have sweet, juicy flesh and peel easily. They are only eaten fresh.
- **Corbo Fig:** this is a very rare remontant variety. In shape it is similar to the Verdino, but it is differentiated by the darker colour of its leaves, which have well-defined lobes. The production of the Corbo Fig tree generates a breba crop from June to July, and a main crop between August and September. The fruit is black, with a decidedly elongated shape and a medium size. The flesh is a distinctive bright red.

* - TURKISH FIGS - *

Figs are cultivated in five regions in Turkey: Aydin, Izmir, Bursa, Adana and Icel. The area on the Aegean Sea (the Aydin and Izmir regions) alone represents over 2/3 of the figs cultivated in Turkey. The majority of Turkish figs belong to one variety, the Sari Lop, whose fruits are almost exclusively designated for drying. The climate conditions in the Turkish production area are extremely favourable, both during the summer season for the development of the fruit and its ripening, and during the drying period. The other variety cultivated in Turkey, whose fruits are sold to be eaten fresh, is the Bursa Siyahi.

- **Sari Lop:** this variety is obtained through caprification. The plant is vigorous and its leaves have five lobes, while the fruits are large and flattened, yellowish with a thin skin, and fleshy, with quite a sweet flavour and a pleasant aroma of hazelnut.

In Izmir, classifiers sort the figs into 6 classes: Susme - extra quality; Elerne - excellent quality; Patchal 1st and 2nd; Natural - figs designated for industrial use; Hordas - discarded figs used for coffee substitutes.





PRODUCING COUNTRIES

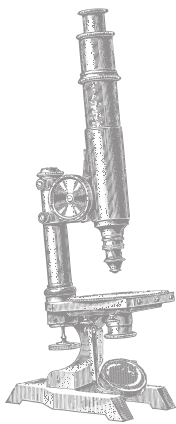
The Turkish coasts on the Aegean and in the South, facing towards Syria, make up the most important area in the world for fig cultivation. While it is impossible to know for certain the real origin of *F. carica*, its geographical epithet is certainly fitting for the present-day production in the area. All the nations facing the Mediterranean cultivate this plant; important producing countries are Turkey, Egypt, Morocco, Algeria, Iran and Spain.



FUN FACT

There is no culture around the Mediterranean that doesn't have a legend connected to the fig tree. A shrub that challenged the role of the apple tree in the Garden of Eden, the fig tree was sacred to the God Dionysus in Greece, cultivated in the heavenly gardens of Babylon, and revered as the tree of life by the Egyptians.

The she-wolf that nursed Romulus and Remus did it in the shade of a fig tree, and this is how ancient Rome adopted the plant as an auspicious symbol.



Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	287	14%
	kJ	1213	15%
Fats	g	1.9	3%
of which saturates	g	0.3	2%
Carbohydrates	g	60	23%
of which sugars	g	56	62%
Fibre	g	10	-
Protein	g	2.5	5%
Salt	g	0.25	4%
			NRV**
MINERALS			
Calcium	mg	173	22%
Iron	mg	3.2	23%
Magnesium	mg	74.2	20%
Phosphorus	mg	58.7	8%
Potassium	mg	804	40%
Zinc	mg	0.62	6%
Copper	mg	0.33	33%
Manganese	mg	0.57	29%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.083	8%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	1.9	12%
Pantothenic acid	mg	0.40	7%
Vitamin B6	mg	0.15	11%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	1.6	13%
Vitamin D	µg	0	0%
Vitamin K	µg	5.8	8%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	1.6	
Monounsaturated fatty acids	g	0.37	
Oleic acid	g	0.33	
Polyunsaturated fatty acids	g	1.2	
Linoleic acid	g	0.49	
Alpha-linolenic acid	g	0.68	
Omega 3	g	0.69	
Omega 6	g	0.49	
Total omega 3 / total omega 6		1.4	

* RI: Reference Intake

** NRV: Nutrient Reference Value



STANDARD FOR DRIED FIGS

UNECE Standard DDP-15 concerning the marketing and commercial quality control of Dried Figs, 2016 Edition

1. DEFINITION OF PRODUCE

This standard applies to whole figs dried from ripe fruits of varieties (cultivars) grown from *Ficus carica* L., intended for direct consumption. This standard does not apply to dried figs for industrial processing.

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried figs at the export-control stage, after preparation and packaging.

However, if applied at stages following export, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried figs must display the following characteristics:

- intact; the stem and the eye (ostiolum) ends of the figs may be cut off
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter; however, naturally crystallised sugar is not considered foreign matter or a defect
- sufficiently developed
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from blemishes, areas of discolouration or spread stains in pronounced contrast with the rest of the produce, affecting in aggregate more than 5 percent of the surface of the produce
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and or calcium chloride and a slight smell of preservatives/additives, including sulphur dioxide

The condition and development of the dried figs must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

¹ Definitions of terms and defects are listed in Annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.



2.2 MOISTURE CONTENT²

The dried figs shall have a moisture content:

- not exceeding 26.0 percent for untreated dried figs
- above 26.0 and not exceeding 40.0 percent for high moisture dried figs provided they are labelled as high moisture or equivalent denomination and treated with preservatives or preserved by other means (e.g. pasteurisation).

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried figs are classified into the following classes:

“Extra” Class, Class I and Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Size for whole dried figs is determined by the number of fruit per kilogramme or by diameter.

3.1. SIZING BY NUMBER OF FRUITS PER KILOGRAMME:

When sized by number of fruits per kilogramme, the number of fruits in each size is shown in the following table³:



² The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The Laboratory reference method shall be used in cases of dispute.

³ Reservation from Greece against the table on sizing, which it considered created sub-divisions of quality classifications.





SIZE CODE	NUMBER OF FRUITS PER KILOGRAMME	TO ENSURE UNIFORMITY IN SIZE
		the weight range (grams) between the largest and smallest figs should not exceed
1	Up to 40	12
2	41-45	
3	46-50	
4	51-55	
5	56-60	
6	61-65	10
7	66-70	
8	71-80	
9	81-100	
10	101-120	
11	121 and over	6

Optionally the number of fruits per kilogramme may be limited to 65 for “Extra” Class and 120 for Class I.

3.2 SIZING BY DIAMETER

When sized by diameter, the minimum diameter is 18 mm for black fig varieties and 22 mm for white fig varieties. When diameter ranges are used, range must be indicated.





4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.

4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements	10	15	30
of which no more than:			
Damaged by pests	9	12	15
Seriously damaged by sunscald, split or torn, excessively dried	8	10	20
Mouldy, and fermented	3	4	5
Living pests	0	0	0
(b) Size tolerances			
For produce not conforming to the size indicated in total	20	20	20
(c) Tolerances for other defects			
Foreign matter, loose stems, eye (ostiolum) and dust (by weight)	0.5	0.5	0.5
Among white fig varieties (white to dark brown in colour) and among black fig varieties (from purple to black in colour), dried figs that are distinctly different in colour, by count	10	10	10





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried figs of the same origin, quality, size, and variety (if indicated).

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

Dried figs must be packed in such a way as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package⁴ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or Dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁵.

6.2 NATURE OF THE PRODUCE

- “Dried figs”, which may be replaced (when appropriate) by high moisture or equivalent denomination
- Name of the variety (optional)
- Commercial type (optional)

6.3 ORIGIN OF THE PRODUCE

Country of origin⁶ and, optionally, district where grown or national, regional or local place name.

⁴ These marking provisions do not apply to sales packages presented in packages.

⁵ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.

⁶ The full or commonly used name should be indicated.

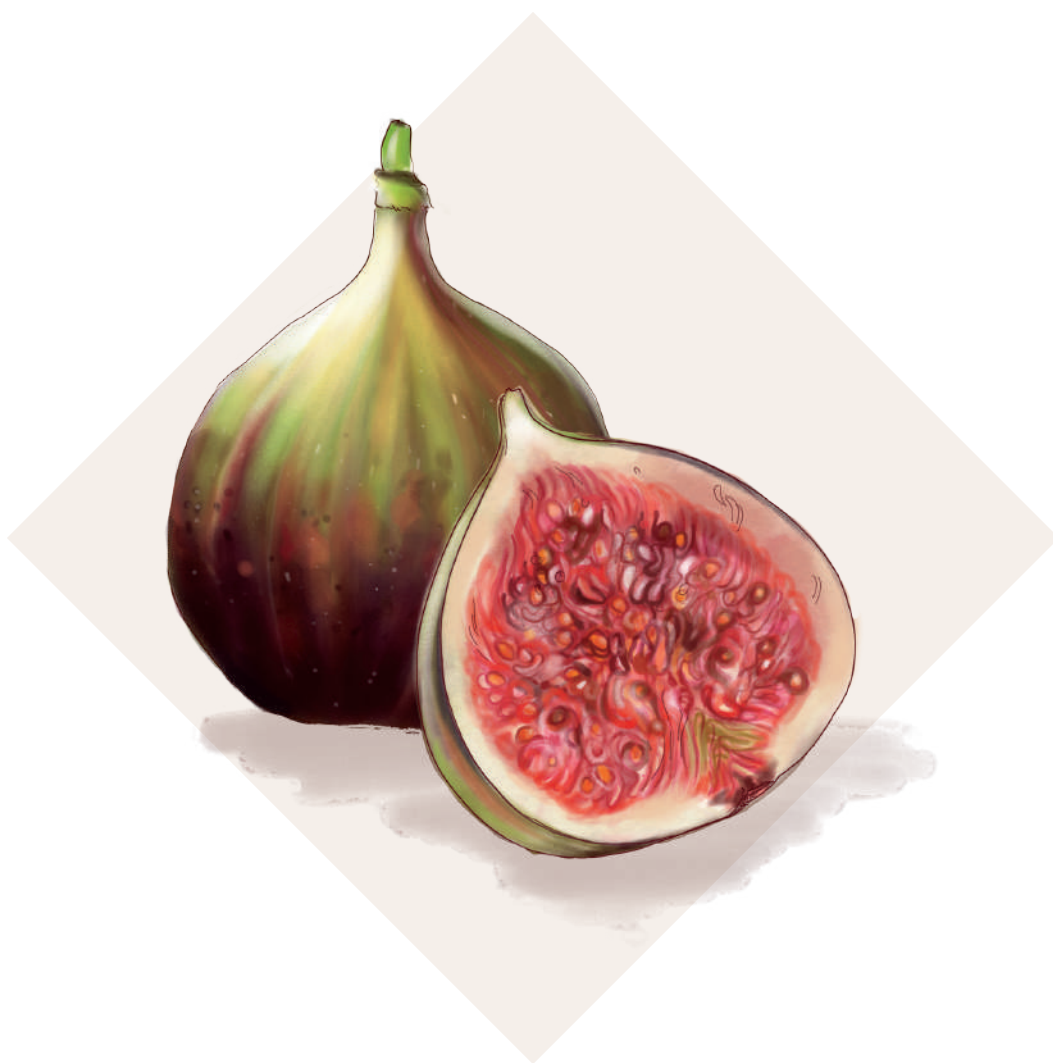


6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size⁷; expressed in accordance with section 3; when sized by diameter, the size or size range should be indicated
- Crop year (optional)
- "Naturally dried" (optional)
- "Best before" followed by the date (optional)

⁷The delegate of Greece expressed a reservation in favour of optional marking for size and number of fruit per kilogramme.







strawberry

- *Fragaria L.* -





**BOTANICAL
CLASSIFICATION**

Class: *Magnoliopsida*

Order: *Rosales*

Family: *Rosaceae*

Genus: *Fragaria*

The strawberry is the edible part of the plant from the genus *Fragaria*. It is referred to as a fruit, but from a botanical perspective, it is a receptacle. The true fruits are the achenes: the little seeds on the red surface of the strawberry.

There are over 20 species of *Fragaria* botanically classified, the majority of which are derived from the hybridisation of European and American varieties.

While there are differences between the various species, this plant is generally delicate, prefers mild climates that are on the cooler side, and should be protected from humidity for full, healthy production.

The plant is a stoloniferous perennial with a contained, shallow root apparatus, from which a short stem known as the crown emerges. The leaves grow from the crown in small trifoliate tufts: oval, elongated and serrated. Typical white flowers grow from their axil, grouped in corymbs of 3-8 pieces, forming one of the most characteristic symbols of the undergrowth. Flowering takes place from April to July, and some varieties also repeat in autumn. Stolons grow laterally from the base of the plant. Their removal and planting is a very efficient reproduction technique, which is widely used for this purpose.

The edible part of the plant is the strawberry, a flower receptacle that grows in size, turning red. On its surface, arranged in a regular pattern, it is possible to see the true fruits of the plant: the achenes, millimetric yellow seeds that are eaten along with the false fruit.

The fragrance and flavour of the edible part positions strawberries among the queens of nature's fruits.

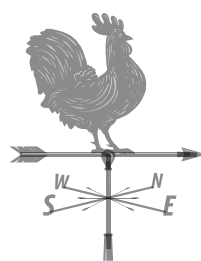




VEGETATIVE CYCLE

The vegetative cycle of the strawberry is essentially annual, with one or two fruit crops depending on the variety. The time taken to start production and the dormant period vary, but the spring can be considered as strawberry season. Depending on the climate and latitude, flowering begins at the end of the winter, and is followed in mid-spring by the development of the strawberries. This can also be repeated in late summer, and, in fact, there are many commercial cultivations that use cultivars able to fruit until October.

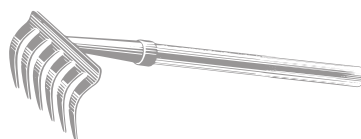
The strawberry plant has a two-year productive life cycle; the second year already shows a drop in production, which pushes many farmers to replace the plant every year.



CLIMATE AND SOIL

Heat and humidity are the two climate conditions that strawberry plants need to be protected from. While able to resist temperatures close to zero, strawberry plants suffer from high temperatures and exposure to the sun. Their delicate nature reveals itself with temperature changes: indeed, sudden cold snaps can cause damage to the plants and their flowers and fruits. Especially during the flowering and fruiting period, the plant's activity needs to be supported by consistent, mild temperatures, without extreme nighttime temperature changes. Cultivation in greenhouses therefore becomes a way to maintain the climate that the plant requires.

Considering the climate, strawberry plants grow from the plains up to 1000 m above sea level. The ideal soil needs to be sub-acid, with an optimal pH of 5.5-6.5. Other important characteristics for the soil are good fertility and the capacity to drain excess water. Very calcareous and saline soil should be avoided.



CULTIVATION TECHNIQUES

Late summer is the best period for strawberry reproduction, with the ideal method being the use of stolons. The strawberry plant produces many of them, and their removal and planting is one of the most used methods of propagation.

To uproot a stolon, it is necessary to remove the earth covering its roots, extract it and then replant it in new growing soil.

Once the useful stolons have been identified and the new growing site has been prepared, the primary focus is watering. This must be constant until the beginning of the autumn and the arrival of the rains.

For in-ground cultivation, the plants can be arranged in single or double rows, leaving 25 cm between each specimen to avoid contact between the fruits. Another method is arranging the plants on a small mound of earth, to prevent waterlogging by creating an easier flow of water.

Generally, strawberry plants should be replaced every two years, before the crop's drop in productivity becomes significant. For some productions and varieties, the plants are even replaced annually.

For better productivity and more efficient management of irrigation, mulching is a widespread technique in strawberry cultivation. This helps to reduce the need for weeding and supports the optimal development of the plant.

Straw and plastic sheets are used for mulching, or in the case of basic soil, pine needles are also used. This technique reduces the transpiration of water, helping the earth to maintain the concentration of humidity necessary for the growth of the plant.

In strawberry cultivation, there are two types of soil fertilisation used: one for preparation and one for maintenance. The first uses rotted manure, at a ratio of 4 kg per 10 m², and this guarantees the supply of organic matter needed for the entire production cycle.

If the cultivation is long term, the soil needs to be maintained with a supply of other fertilisers that are able to provide the individual nutrients needed, so that there are no deficiencies. Phosphorus and potassium are the most important micronutrients to replenish the soil with.

Strawberry cultivation requires no pruning interventions during production, but it is fundamentally important to clean up the plant at the end of the production cycle. Dried leaves or those showing signs of disease should be removed from the plants, along with extra stolons that will not be used for future cultivations.



PRODUCTION PROCESS

The strawberry harvest is generally carried out in the period between the second half of May and the month of August. Each variety has its own specific timings, and if cultivated in a protected environment, the strawberries can be ready for harvest up to two weeks early.

Common features of every harvest are that the fruit must be ripe, and that it must be picked from the plant taking care to preserve the stem. It is necessary for the stem to remain attached to the fruit so that the product lasts longer.

VARIETIES

The main classification of strawberry varieties is between uniferes and biferes. The former have only one abundant fruiting period, during the spring, and the fruits are characterised by their intense sugary flavour and juicy flesh.

Bifere varieties, also known as reflowering varieties, instead have the capacity to produce a second time during the year, extending their fruiting period until the autumn.

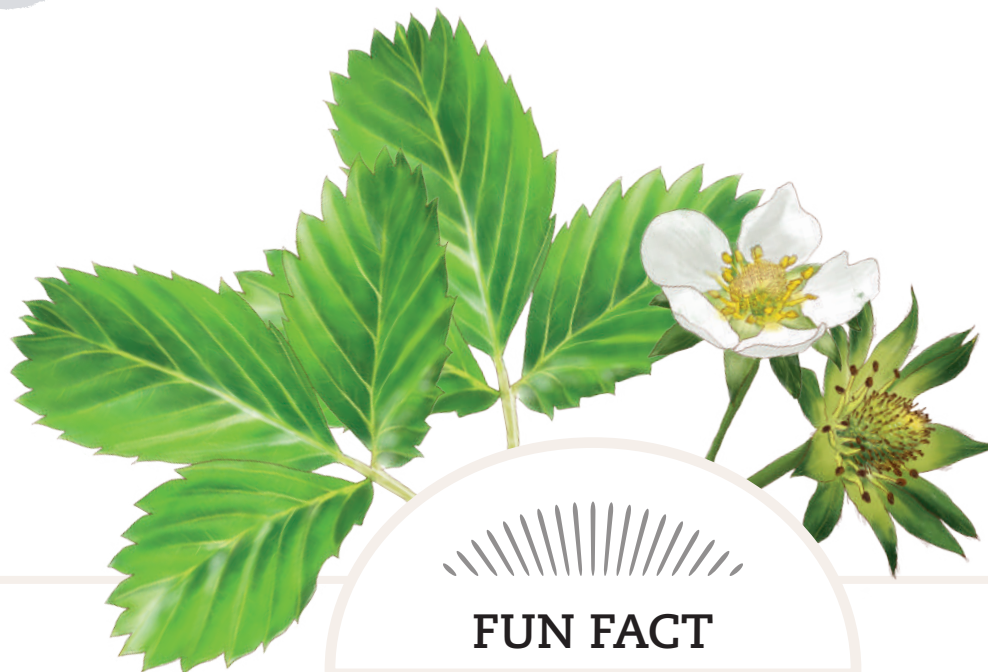
- **Candonga:** this is one of the most widespread varieties, with excellent sensory characteristics. It produces medium-large strawberries, with firm flesh and a high sugar content. This variety is also very widespread due to the resistance of its fruits and its good productivity throughout the entire harvest period.
- **Antea:** this cultivar fruits early, and produces juicy, sweet strawberries that make an excellent commercial product, partly thanks to their natural resistance to post-harvest processing.
- **Chiflon:** another precocious variety, with medium-large strawberries, it is distinguished from Candonga and Antea by the more tangy flavour of its fruits. A characteristic of the Chiflon is its resistance to temperature changes, which makes it ideal for cultivation throughout the Mediterranean basin.
- **Melissa:** a significantly productive plant, precocious and rustic, which needs to be controlled during strawberry development, as the fruits can become excessively large. This variety is very successful thanks to the quality of its production, the flavour of its fruits and its resistance to environmental stressors.
- **Sabrina:** the beauty of its fruits is one of the main characteristics of this cultivar. During their ripening process, Sabrina strawberries preserve their sugary, slightly acidic flavour, firm flesh and excellent resistance to post-harvest processing.
- **Sandra:** a precocious cultivar with abundant production, this is one of the best reflowering varieties. Its fruits are characteristically sweet.



PRODUCING COUNTRIES

According to FAO data, in the second decade of the 21st century, global strawberry production grew considerably, with a 22 percent increase in the area of production between 2008 and 2019, when it reached 4000 km².

China is the leading producer, followed by the United States, with these two nations together producing 50 percent of the strawberries grown around the world every year. In Europe, the leaders in strawberry production are Spain and Turkey.

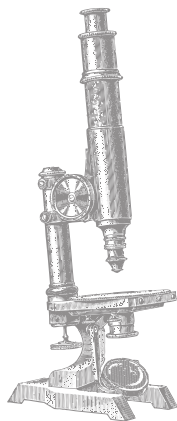


FUN FACT

The Night of Saint John, the 24th June, is an important date in Italian agricultural and cultural tradition. This is the day when walnuts are harvested for the production of Nocino liqueur, and the night when strawberry leaves are picked for protection against snake bites. Legend says that a belt made from dried strawberry leaves is excellent protection against snake bites, especially from vipers.

Better known is the legend of the origin of strawberries: according to the ancient Romans, these fruits were none other than the tears of Venus, which fell to earth when she was crying about the disappearance of Adonis. When they reached the earth, these tears transformed into fragrant hearts: strawberries.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	334	17%
	kJ	1410	17%
Fats	g	1.4	2%
of which saturates	g	0.3	2%
Carbohydrates	g	64	25%
of which sugars	g	48	53%
Fibre	g	17	-
Protein	g	7.9	16%
Salt	g	0.01	0%
			NRV**
MINERALS			
Calcium	mg	149	19%
Iron	mg	3.3	24%
Magnesium	mg	116	31%
Phosphorus	mg	242	35%
Potassium	mg	1530	77%
Zinc	mg	0.98	10%
Copper	mg	0.22	22%
Manganese	mg	4.0	200%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	475	594%
Thiamine / Vit. B1	mg	0.062	6%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	5.6	35%
Pantothenic acid	mg	0.67	11%
Vitamin B6	mg	0.23	16%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	10.0	1%
Vitamin E	mg	2.1	18%
Vitamin D	µg	0	0%
Vitamin K	µg	25	33%
Biotin / Vit. H	µg	7.2	14%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	1.2	
Monounsaturated fatty acids	g	0.17	
Oleic acid	g	0.16	
Polyunsaturated fatty acids	g	1.0	
Linoleic acid	g	0.61	
Alpha-linolenic acid	g	0.43	
Omega 3	g	0.43	
Omega 6	g	0.61	
Total omega 3 / total omega 6		0.70	

* RI: Reference Intake
** NRV: Nutrient Reference Value



STANDARD FOR STRAWBERRIES

UNECE standard FFV-35 concerning the marketing and commercial quality control of strawberries, 2023 edition

1. DEFINITION OF PRODUCE

This standard applies to strawberries of varieties (cultivars) grown from the genus *Fragaria* L. to be supplied fresh to the consumer, strawberries for industrial processing being excluded.

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for strawberries after preparation and packaging.

The holder/seller of products may not display such products or offer them for sale, or deliver or market them in any manner other than in conformity with this standard. The holder/seller shall be responsible for observing such conformity.

However, if applied at stages following export, products may show, in relation to the requirements of the standard:

- a slight lack of freshness and turgidity
- for products graded in classes other than the “Extra” Class, a slight deterioration due to their development and their tendency to perish.

2.1 MINIMUM REQUIREMENTS

In all classes, subject to the special provisions for each class and the tolerances allowed, the strawberries must be:

- intact, undamaged
- sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded
- clean, practically free of any visible foreign matter
- fresh in appearance, but not washed
- practically free from pests
- practically free from damage caused by pests
- with the calyx (except in the case of wild strawberries); the calyx and the stalk (if present) must be fresh and green
- free of abnormal external moisture
- free of any foreign smell and/or taste.

The development and condition of the strawberries must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MATURITY REQUIREMENTS

The strawberries must be sufficiently developed and display satisfactory maturity and/or ripeness.





2.3 CLASSIFICATION

The strawberries are classified in three classes, as defined below:

I) "Extra" Class

The strawberries in this class must be of superior quality. They must be characteristic of the variety.

They must be:

- bright in appearance, allowing for the characteristics of the variety
- free from soil.

They must be free from defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package

II) Class I

Strawberries in this class must be of good quality. They must be characteristic of the variety.

The following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- a slight defect in shape
- presence of a small white patch, not exceeding one tenth of the total surface area of the fruit
- slight superficial pressure marks

They must be practically free from soil.

III) Class II

This class includes strawberries that do not qualify for inclusion in the higher classes but satisfy the minimum requirements specified above.

The following defects may be allowed, provided the strawberries retain their essential characteristics as regards the quality, the keeping quality and presentation:

- defects in shape
- a white patch, not exceeding one fifth of the total surface area of the fruit
- slight dry bruising not likely to spread
- slight traces of soil

3. PROVISIONS CONCERNING SIZING

Size is determined by the maximum diameter of the equatorial section.

The minimum size shall be:

- 25 mm in "Extra" Class¹
- 18 mm in Classes I and II

There is no minimum size for wild strawberries.

¹ Reservation from the United States of America.



4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the requirements of the class indicated².

4.1. QUALITY TOLERANCES

I) "Extra" Class

A total tolerance of 5 percent, by number or weight, of strawberries not satisfying the requirements of the class but meeting those of Class I is allowed. Within this tolerance, not more than 0.5 percent in total may consist of produce satisfying the requirements of Class II quality.

II) Class I

A total tolerance of 10 percent, by number or weight, of strawberries not satisfying the requirements of the class but meeting those of Class II is allowed. Within this tolerance, not more than 2 percent in total may consist of produce satisfying neither the requirements of Class II quality nor the minimum requirements, or of produce affected by decay.

III) Class II

A total tolerance of 10 percent, by number or weight, of strawberries satisfying neither the requirements of the class nor the minimum requirements is allowed. Within this tolerance, not more than 2 percent in total may consist of produce affected by decay.

4.2 SIZE TOLERANCES

For all classes: a total tolerance of 10 percent, by number or weight, of strawberries not satisfying the requirements as regards the minimum size is allowed.

5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only strawberries of the same origin, variety and quality.

In "Extra" Class, strawberries, with the exception of wild strawberries, must be particularly uniform and regular with respect to degree of ripeness, colour and size. In Class I, strawberries may be less uniform in size.

The visible part of the contents of the package must be representative of the entire contents.

5.2 PACKAGING

The strawberries must be packed in such a way as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter.

² A conformity check shall be made by assessing primary or composite samples. This is based on the principle of presumption that the quality of the randomly taken samples is representative of the quality of the lot. The OECD Operating Rules for Conformity Checks are recommended for application – also by operators – at the stages of dispatch as well as in wholesale and distribution centres and food retail storerooms.





6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher/exporter:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴ if the country applying such a system is listed in the UNECE Code Mark Registry⁵. In the case where there is no street address available, the physical address can be made up of the name of the farm or facility, the nearest village, town, region, and postal code; or GPS coordinates and a PO Box address together with nearest town, region and country shall be accepted as a physical address⁶.

6.2 NATURE OF PRODUCE

- “Strawberries” if the contents of the package are not visible from the outside
- Name of the variety (optional)

6.3 ORIGIN OF PRODUCE

- Country of origin⁷ and, optionally, district where grown, or national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class

³ These marking provisions do not apply to sales packages presented in packages bearing these particulars. However, they do apply to sales packages (pre-packaged) presented individually.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference “packer and/or dispatcher (or equivalent abbreviations)” has to be indicated in close connection with the code mark, and the code mark should be preceded by the ISO 3166 (alpha-2) country/area code of the recognising country, if not the country of origin.

⁵ See <http://www.unece.org/trade/agr/codemarkregistry.html>

⁶ Reservation from the United States of America on the use of a PO Box address, as it may not allow facility inspections or rapid intervention in case of recalls, and is not part of its national labelling requirement related to packer and/or dispatcher/exporter.

⁷ The full or a commonly used name should be indicated.



mango

- *Mangifera indica* L. -





BOTANICAL CLASSIFICATION

Class: *Magnoliopsida*

Order: *Sapindales*

Family: *Anacardiaceae*

Genus: *Mangifera*

Species: *M. indica*

The mango belongs to the genus *Mangifera*, which comprises about 30 species of tropical fruit trees in the *Anacardiaceae* family.

The *Mangifera indica* tree is a vigorous evergreen that can reach a significant size, with a large root apparatus that gives it excellent stability, even in particularly dry soils. The bark is smooth, greyish and wrinkled, full of resin canals. The leaves, which are perennial, are found in the apical zone of the branches. They are from 8 to 40 cm long, with an oblong or lanceolate shape, and have a coriaceous lamina with two sharp ends. The leaves are bright green on the top, and pale green underneath. The petiole is 1-1.5 cm long.

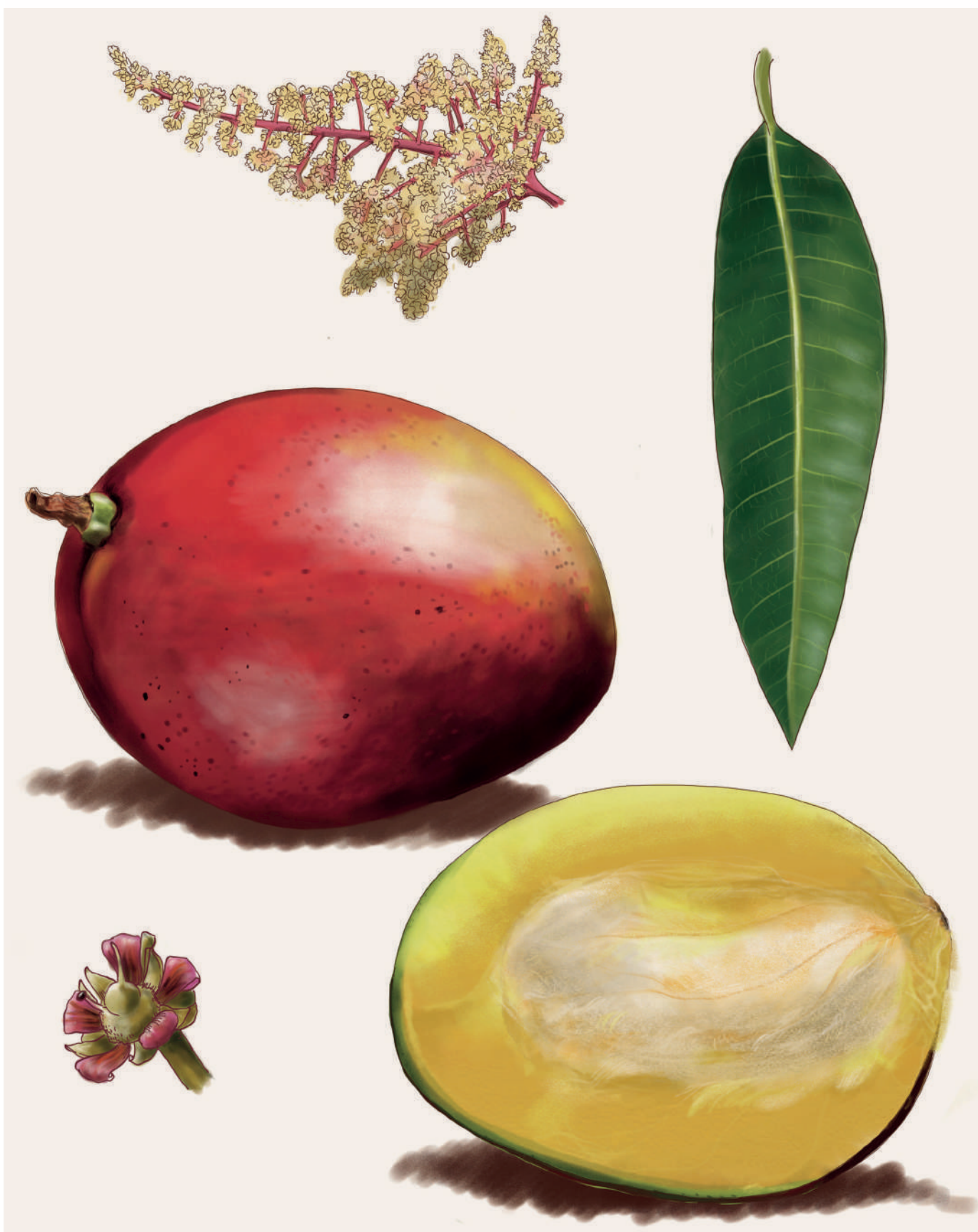
The inflorescence, which is in the form of a panicle, generates many flowers, each of which is made up of 5 sepals and 5 petals. Both hermaphrodite flowers (with 4-5 stamens) and seminiferous flowers (with one functioning stamen) coexist simultaneously, with a predominance of male flowers, although this varies depending on the cultivar.

The many flowers reach full development 25-30 days after flowering begins, but only a few will become mature fruits. Despite being a self-fertile plant, able to produce fruits without cross-pollination, the latter process is favoured by some pollinating insects.

The fruit is a round or oblong ovoid drupe, with a fleshy, juicy mesocarp. It has only one seed, which is a large round stone that can be monoembryonic or polyembryonic, contained within a hard endocarp, with fibres that extend into the flesh.

In terms of the fruit, there is some variability in colour, shape and size depending on the cultivar. The epicarp is green and reddish-purple before ripening, later turning yellow and green, while the mesocarp can be different shades of yellow, often tending towards deep yellow. The pulp is particularly fleshy, with a texture similar to that of a peach, with filaments created by the fibres extending from the stone.







VEGETATIVE CYCLE

The vegetative phase of the mango usually lasts from the autumn to the summer. On emergence, the buds are closed and covered with brownish-green scales. The buds then begin to swell, with the scales separating one by one and changing colour, turning from light green to dark copper brown, with the tips of the shoots clearly visible.

In the second phase, the tips of the leaves become visible 10 mm beyond the scales of the buds, and the first leaves extend gradually, growing away from the shoot.

Once the shoot has developed to its final size, the flower buds, initially closed and covered with green or brown scales, swell and begin to open. This is the budbreak, when the first flowers become visible and the panicle begins to develop.

In this phase, the flowers swell and begin to be visibly separated from each other, and the secondary axes of the panicle start to develop, turning from green to crimson.

The first flowers now begin to open: initial early flowering is determined when 30 percent of the flowers on the panicle are open, and full flowering is when the percentage exceeds 50 percent. The end of flowering is the point at which all the petals are dry or have fallen off, and the fruit begins to develop (fruit set).

During the period when the fruit is between 10 and 30 percent of its final size, fruit drop can occur (a phenomenon in which, due to unfavourable conditions, fruit falls prematurely from the tree). The fruit then reaches its standard size, remaining green until it is fully ripe, which will lead the flesh inside to turn pale yellow.

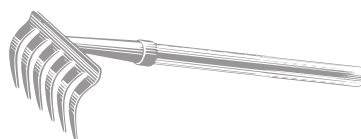
CLIMATE AND SOIL

The mango, a plant that loves the tropical climate, can be cultivated at an altitude up to 4,000 m, although the best production takes place below 2,000 m, with an optimal temperature of around 24-27 °C.

The plant is able to survive in very dry soil, and can also grow in areas with high rainfall. Fruit drop and the size and quality of the fruit can be influenced by good irrigation during the phase of fruit development. The ideal soil, however, is alluvial soil.

Considering the extension of its root apparatus, the mango needs deep soil that is brittle and crumbly, and not too compact: a layer of hardened ground, or different alternating layers, make it difficult for the roots to penetrate, and compact soil structures also impede the filtration of water. In order to promote good flower formation, it is fundamental for the soil to have an adequate rest period, meaning that it must be able to dry out for 2 or 3 months before the flowering phase. This phenomenon is attributed to a simultaneous stimulation of vegetative growth during the autumn, which in turn influences the formation of the flowers in the spring. The trees of this species grow better in soil with a pH between 6 and 7.2. The *M. indica* is sensitive to limescale deposits; indeed, if the soil's pH exceeds 7.5, signs of iron deficiency will be visible in the leaves. Instead, pH values below 6 or above 7.2 cause deficiencies in trace elements, in particular phosphate and potassium. The plant requires a minimum calcium content of 200 ppm, a minimum phosphate content of 20 ppm, and the ideal potassium level is from 80 to 200 ppm. The level of aluminium in the soil is also important: if it is not above 30 ppm, soils with a pH of 5.5 or above can be used.

Especially in the first stages of its life, the mango plant does not cope well with warm, persistent wind.



CULTIVATION TECHNIQUES

Before planting a seedling or a grafted tree, two practices are necessary for the correct development of the plant. Six weeks before planting, the taproot (the primary root axis) must be cut by around 30 cm in order to encourage the roots to grow into the ground.

The second preparatory intervention: one week before planting, the plants should be exposed to the sun for a few hours.

When it comes to planting arrangements, as these trees vary in lateral growth, the spacing required depends on the cultivar and the soil type, and can range from 10.5 to 18 m between trees. Spacing of 10.5 by 10.5 m allows for 35 trees per acre (86 per hectare); instead, spacing of 15.2 by 15.2 m allows for only 18 trees per acre (44.5 per hectare).

It is important to make sure the rows, where the plants are closer to each other in the layout, are facing north-south: this is important because the mango requires an even distribution of light on both sides of production. For this reason, at a latitude such as that of Italy, for example, the spacing should be rectangular and not square.

Younger trees should be placed in prepared, enriched holes with a width and depth of at least 60 cm. Depending on the soil texture found, deep preparation work (trenching) should be performed, ranging from ploughing at a depth of 50-60 cm to turning over the soil with the help of backhoes up to a depth of 1 m. Trenching should preferably be carried out in September-October, in order to allow the earth to store a certain amount of rainwater and settle. It is advisable to perform planting around the end of March-April, as in this period the temperatures begin to rise, and the mango plants have plenty of time to develop their root apparatus.

Each young plant should be supported with a chestnut wood stake with sheep netting, supported by another two chestnut wood stakes, 50 percent covered by green shade net.

The biggest problem for mango plants is poor soil drainage. For this reason, in clay soils it is advisable to create wide ridges (strips of raised earth between two furrows) along the rows before planting the trees, in order to improve the soil's drainage capacity.

In lighter soils such as sandy ground, irrigation will need to be more frequent than in heavier soils such as clay, although the most demanding soil in terms of water is gravel and earth.

Water requirements vary from 50 to 400 l/day per plant, depending on various factors: soil type, climate conditions, density of the plantation, variety, phenological stage (water requirements increase during fruit development), and finally the size and age of the trees (requirements increase with age, and stabilise when the entire crown has developed after around 20-25 years).

In a new plantation, the trees must be irrigated throughout the year, including drought periods that occur during the rainy season, in order to allow the plants to develop fast.



In terms of soil fertilisation, the presence of nitrogen, zinc, manganese and copper is important, as these are very useful to the plants, while a lack of iron can be remedied with the application of small amounts of chelated iron.

The aim of pruning is to form a plant that is a maximum of 2.5-3 m tall, with a pyramid-shaped crown starting at least 60 cm above the ground. It is fundamental to evaluate where to cut, because incorrect pruning could mean that the plant is not able to support the weight of its fruits, or that it is no longer able to effectively receive plant protection products if it is found to have a disease.

PRODUCTION PROCESS

The most important factor to consider for the final quality of the product is the ripeness of the fruits at the moment of harvest, which is normally performed from 100 to 150 days after the flowering phase.

A fruit is considered to be ripe based on various parameters: shape, colour of the skin, texture of the skin, texture of the flesh (a ripe mango is soft to the touch) and colour of the flesh (an even colour is an indicator of ripeness).

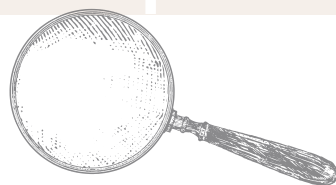
Ripening takes place at temperatures between 15 and 30 °C, but it is between 20 and 22 °C that the best combination of colour, texture and flavour is guaranteed.

Mangoes are harvested by gently shaking the tree in a way that does not damage the branches and root apparatus. The alternative is to pick the fruits by hand.

Before entering the packaging plant, the mangoes are sampled by cutting slices up to the seed. After this, they are stored in a large, open space to protect and ventilate the fruits and allow a more representative sample to be obtained.

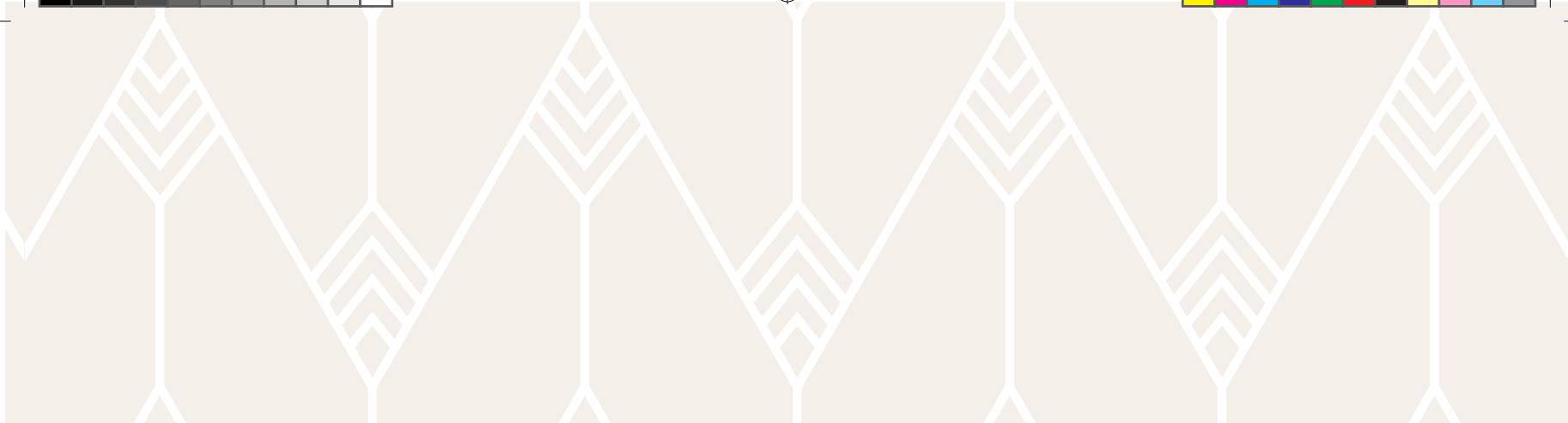
Once they enter the factory, the mangoes are put in quarantine and immersed in hot water to reduce the number of live microorganisms on the surface, and then transferred via a water transportation system to sizing lines.

VARIETIES



There are many mango varieties around the world: according to the literature, the number is as high as one hundred. Some of the most important varieties are described below.

- **Alampur Benishan:** a variety originating in India, this mango is a medium-sized fruit, with a colour that ranges from green to yellow. The flesh of the ripe fruit varies from yellow, to golden yellow, to orange-yellow. The majority of Indian varieties remain green even when fully ripe, although a slight yellow or red area is often visible near the stalk. The flesh has a slightly tangy flavour, with hints of cinnamon. This is a very old, highly prized cultivar, sometimes known as Seeri in the south of India.
- **Anderson:** this variety is large, weighing over 1 kg on average. It has a long, slim shape, with a small beak on the side. It has thick skin with 3 colours: green with shades of yellow and a little crimson red. The flesh is yellow, sweet and sour, with no fibres, and contains seeds. It ripens between July and August in Florida.
- **Glenn:** a typical variety in the USA and Italy, this is a highly appreciated cultivar with excellent profitability. The fruit has an elongated oval shape, with a rounded base and a pointed apex, with no beak. It weighs 300-600 g, with a thin but resistant exocarp that turns bright yellow when it fully ripens. The fruit develops an orange colour that turns red on 25-50 percent of its surface when exposed to the sun, while it remains completely yellow if ripened in the shade. It has a rich, sweet flavour and flesh with no fibres, containing one monoembryonic seed. It has a pleasant aroma.
- **Keitt:** this variety is relatively large, and can reach a weight of two kilos. The fruits have an oval shape, with a rounded apex with no beak, and the colour of the skin is typically green with a little reddening. The green colour remains even when the fruit is ripe, so it is necessary to gently touch it to test its ripeness. The flesh is relatively low in fibres, with a strong, tangy but sweet flavour, and contains one monoembryonic seed. This is a popular cultivar in Asian cultures, where it is appreciated despite its green skin, and is even used for pickling.



- **Kent:** this is a cultivar that originated in the south of Florida in 1940, from moderately vigorous trees that provide ripe fruits in January, February, June-August and December. Kent is a mango variety that is ideal for juicing and drying. The fruits are large, with an oval shape and sweet, rich flesh that is completely smooth, with no fibres. Their quality is excellent, with a creamy flavour. The skin is greenish-yellow with a red spot that grows as they ripen. When it is ripe, the fruit takes on a yellow undertone. The fruit weighs from 470 to 550 g. Inside is a small, monoembryonic seed. A disadvantage of this cultivar is the fact that in some cases, its skin remains relatively dark green: this means that only a small percentage of the fruits cultivated (those that turn red, which are preferred by the market) are selected for export. The primary sources are Mexico, Ecuador and Peru.
- **Osteen:** this is a fruit with an oblong shape and purple skin. Its average weight is around 525 g, with a small seed inside. It has a low fibre content, making it ideal for eating with a spoon.
- **Palmer:** a variety originating in Florida, where it is widely cultivated, although the main producers are now Brazil and Puerto Rico. The fruit is small, with an oblong shape and pointed ends, and it is easily recognised by the colour of its skin, which ranges from red to purple. The flesh is delicately sweet, and smooth, without many fibres. It is mainly available from January to March.





PRODUCING COUNTRIES

Mangoes are cultivated in the majority of countries with subtropical and tropical climates, where the temperature is warmer and the plants are protected from frost.

The undisputed leader in production is Asia, with India at the top globally for quantities harvested. Indonesia and China complete the list of Asian countries with significant agriculture dedicated to mangoes.

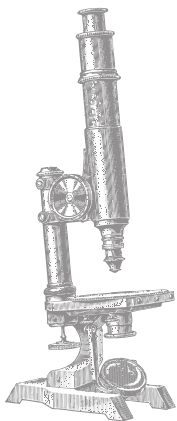
Other important production regions around the world are found in Central and South America, as well as South-East African and South-East Asian countries.



FUN FACT

The mango is an ancient fruit; it is believed that it was already being cultivated 6000 years ago. Its existence is documented in Hindi writings dating back to 4000 BC, in particular by Buddhist monks who were dedicated to its cultivation. Mangoes are considered by these populations in Southeast Asia as a sacred fruit because it is said that the Buddha himself meditated under a mango tree. Its seeds began to travel from around 300 or 400 AD. The Portuguese landed in Calcutta in 1498 and were the first to establish the mango trade there, while Spanish explorers brought the fruit to South America and Mexico in the 1600s. Today, mangoes are a basic ingredient in the cuisines of all tropical and subtropical countries.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	299	15%
	kJ	1267	15%
Fats	g	1.2	2%
of which saturates	g	0.4	2%
Carbohydrates	g	66	25%
of which sugars	g	61	68%
Fibre	g	7.1	-
Protein	g	2.6	5%
Salt	g	0.22	4%
			NRV**
MINERALS			
Calcium	mg	27.5	3%
Iron	mg	0.56	4%
Magnesium	mg	55.7	15%
Phosphorus	mg	67.0	10%
Potassium	mg	16.3	1%
Zinc	mg	0.55	5%
Copper	mg	0.40	40%
Manganese	mg	0.35	18%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	28	35%
Thiamine / Vit. B1	mg	0.075	7%
Riboflavin / Vit. B2	mg	0.14	10%
Niacin / Vit. PP	mg	2.4	15%
Pantothenic acid	mg	0.32	5%
Vitamin B6	mg	0.15	11%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	134	17%
Vitamin E	mg	2.8	23%
Vitamin D	µg	0	0%
Vitamin K	µg	2.4	3%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.57	
Monounsaturated fatty acids	g	0.57	
Oleic acid	g	0.29	
Polyunsaturated fatty acids	g	0	
Linoleic acid	g	0.056	
Alpha-linolenic acid	g	0.18	
Omega 3	g	NA***	
Omega 6	g	NA***	
Total omega 3 / total omega 6		NA***	

* RI: Reference Intake
** NRV: Nutrient Reference Value
*** NA: not analysed.



STANDARD FOR DRIED MANGOES

UNECE Standard DDP-25 concerning the marketing and commercial quality control of Dried Mangoes, 2013 edition

1. DEFINITION OF PRODUCE

This standard applies to dried mangoes from varieties (cultivars) grown from *Mangifera indica*, intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. It does not apply to mangoes for industrial processing.

Dried mangoes may be presented in one of the following styles:

- halves
- slices
- pieces

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried mangoes at the export-control stage after preparation and packaging.

However, if applied at stages following export, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried mangoes must display the following characteristics:

- intact (only for halves); however, edges that are slightly torn, slight superficial damage and slight scratches are not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter
- sufficiently developed
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from blemishes, areas of discolouration or spread stains in pronounced contrast with the rest of the produce, affecting in aggregate more than 20 percent of the surface of the produce
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and or calcium chloride or a slight sour taste of citric acid and a slight smell of preservatives/additives, including sulphur dioxide

¹ Definitions of terms and defects are listed in annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.





The condition of the dried mangoes must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT²

The dried mangoes shall have a moisture content:

- not exceeding 15.0 percent for untreated dried mangoes
- above 15.0 percent and not exceeding 35.0 percent for dried mangoes treated with preservatives or preserved by other means (e.g. pasteurisation). Products between 30.0 and 35.0 percent should be labelled as soft fruit/high moisture

2.3 CLASSIFICATION

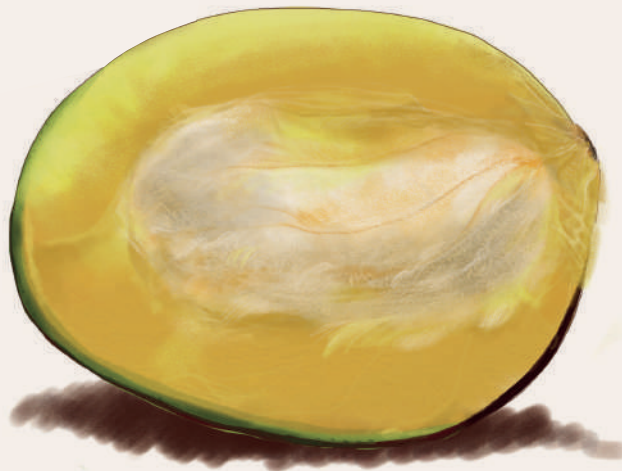
In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried mangoes are classified into the following classes:

“Extra” Class, Class I, Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of dried mangoes is optional. However, when sized, size is determined by diameter of the widest part.



² The moisture content is determined by one of the methods given in annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.



4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.

4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements,	10	15	20
of which no more than:			
Injuries, calluses and damage caused by heat during drying	5	8	10
Mouldy and mildew spots	0.5	4.5	9
of which no more than mouldy:	0	0.5	1.0
Fermentation	0.5	1	2
Rotting	0	0.5	1
Pest damage	2	2	6
Living pests	0	0	0
(b) Size tolerances (if sized)			
For produce not conforming to the size indicated, in total	10	10	10
(c) Tolerances for other defects			
Dried mangoes belonging to varieties other than that indicated	10	10	10
Presence of pieces among halved mangoes (by weight)	2	7	13
Foreign matter, loose stems, pit fragments, skin fragments (pieces per kilo)	3	7	10
Foreign matter of mineral origin (by weight)	0.25	0.25	0.25





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried mangoes of the same origin, quality, style and size (if sized) and variety (if indicated).

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

The dried mangoes must be packed in such a way as to protect the produce properly. The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper and stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴.

6.2 NATURE OF THE PRODUCE

- “Dried mangoes”
- Name of the variety (optional)
- Style
- “Soft fruit” or equivalent denomination (when appropriate)
- “Sun Dried” etc. (optional).

³ These marking provisions do not apply to sales packages presented in packages.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.3 ORIGIN OF THE PRODUCE

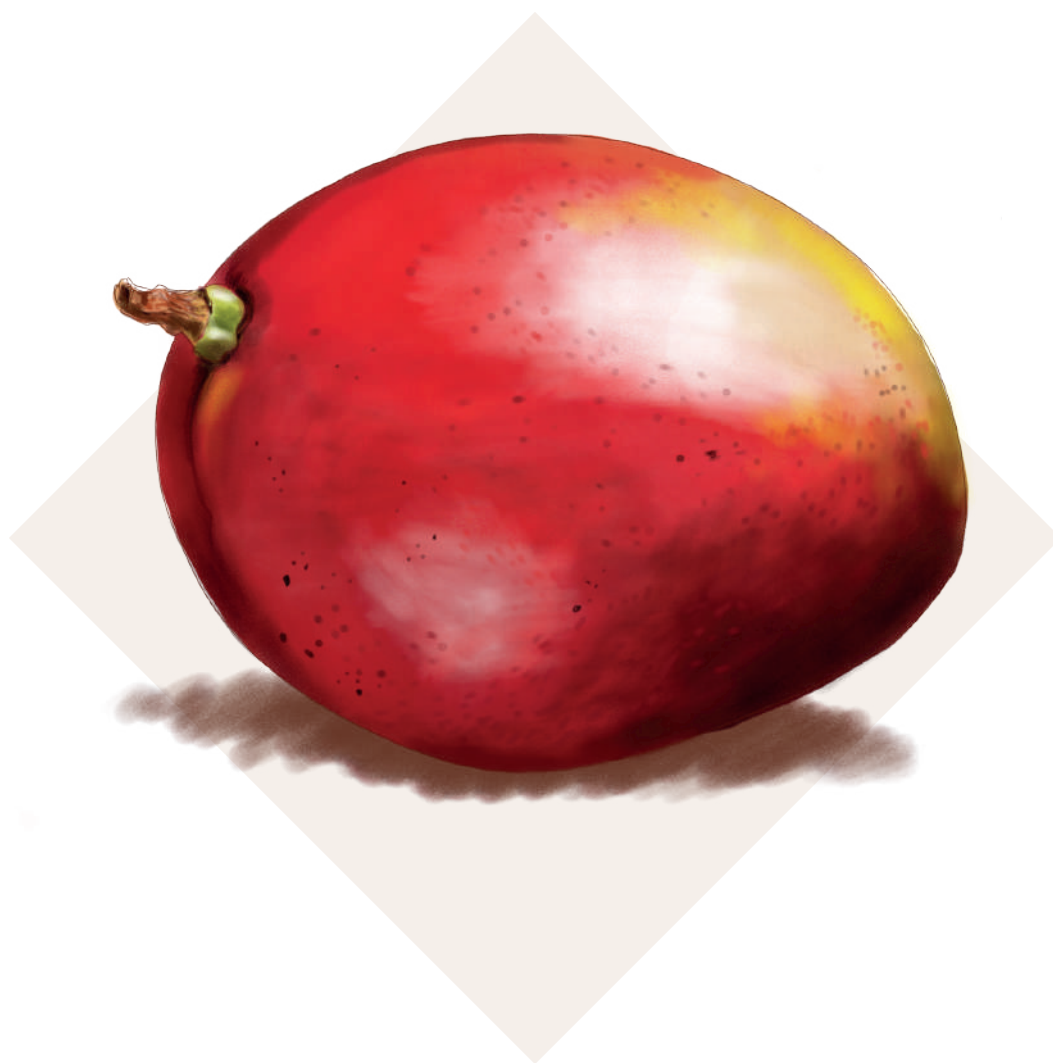
Country of origin⁵ and, optionally, district where grown or national, regional or local place name.

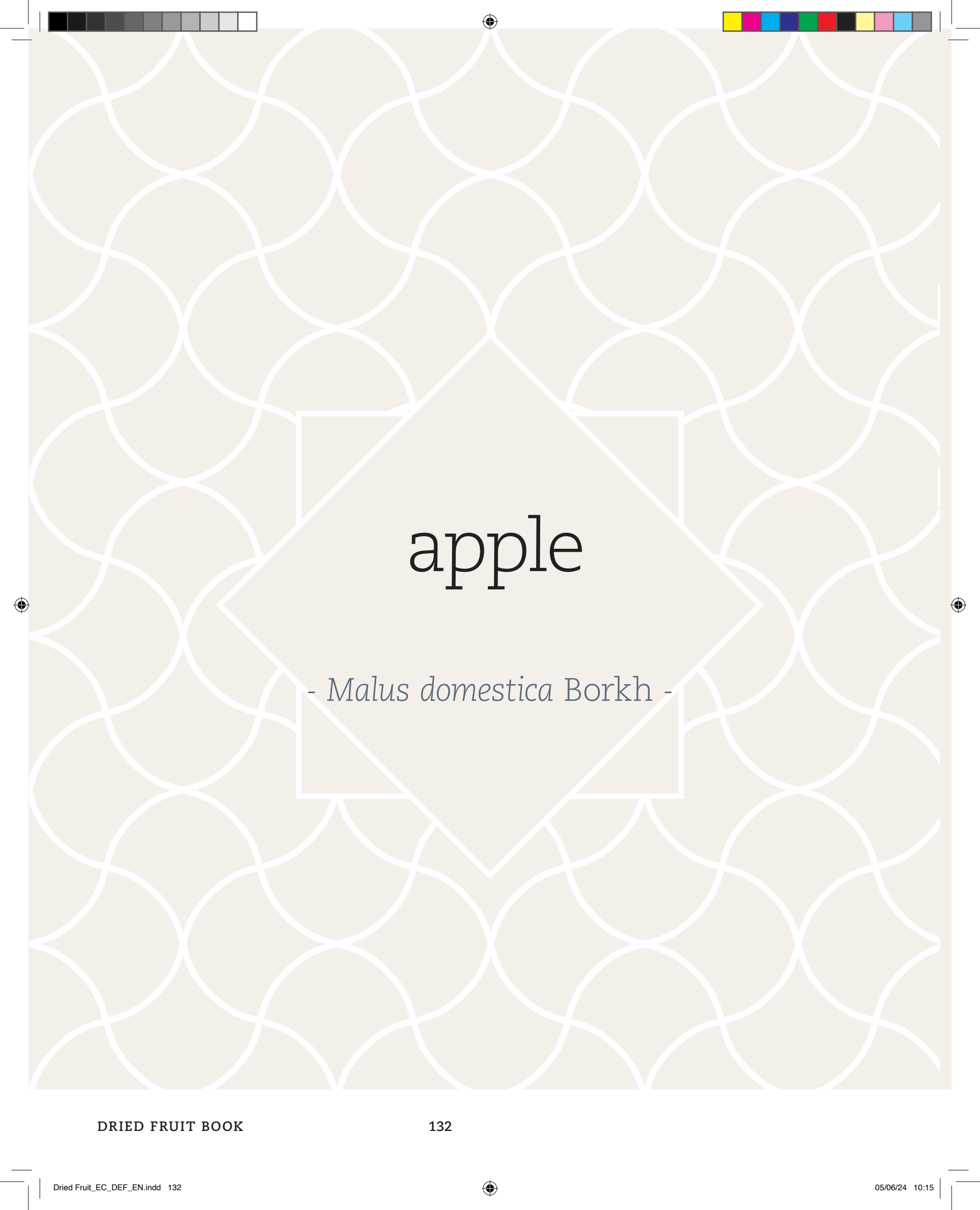
6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- Crop year (optional)
- “Naturally dried” (optional)
- “Best before” followed by the date (optional), but mandatory for soft fruit/high-moisture product

⁵The full or commonly used name should be indicated.







apple

- *Malus domestica* Borkh -



BOTANICAL CLASSIFICATION

Class: *Magnoliopsida*

Order: *Rosales*

Family: *Rosaceae*

Genus: *Malus*

Species: *M. domestica*

The apple (*Malus communis* or *Malus domestica*) is a vigorous plant of medium-large size, with a shallow root apparatus. Extending from the trunk, which typically has smooth bark and an upright habit, is a system of branches similar to that of the pear tree. It can reach a height of between 5 and 12 m, with a broad crown. The leaves are alternate and oval, slightly serrated, measuring 6-10 cm long and 3-5 cm wide. They are smooth on the top, with a light down underneath, and a petiole that reaches 2-5 cm. The productive branches on an apple tree are at least 2 years old. Fruiting branches carry small buds and fruit buds that develop flowers afterwards; the small buds lead to the development of branches with flowers only from the second year onwards.

The flowers have a corolla made up of 5 petals, with a pinkish-white colour, and have both stamens and pistils, grouped in inflorescences in the form of corymbs. Flowering generally occurs in the spring, after pollination by insects.

The fruit is a pome (false fruit), meaning that it forms through the growth of the flower receptacle together with the ovary; it has a round shape, generally 5-9 cm in diameter, which is first green, and then - when ripe, in the summer and autumn - varies in colour from yellow-green to red.

The true fruit is really the core, which has a harder consistency than the flesh, and contains the pericarp, which is the wall of the fruit, with the seeds inside.

The external skin, called the epicarp, can have different colours (yellow, red or green) and textures (smooth or rough) depending on the variety of the fruit.

The flesh is generally white, yellowish or even slightly pink; it is firm and juicy, sometimes floury, and has a flavour that varies from sweet to very tart.

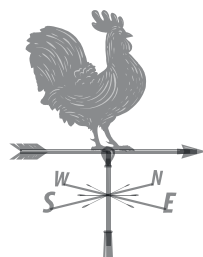




VEGETATIVE CYCLE

The annual vegetative cycle of the apple tree is made up of a few phases that lead to the formation of the fruit.

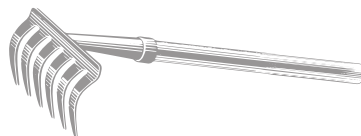
Vegetative recovery begins when the outdoor temperature reaches around 7 °C; the second phase is germination, when the branch buds that formed the previous year open and form shoots; finally, flowering takes place around twenty days after recovery. The flowers usually emerge at the end of March/beginning of April, later than peach and pear trees.



CLIMATE AND SOIL

In the majority of cases, temperature is not a problem. Indeed, apple trees tolerate even particularly low temperatures (down to -25 °C, with a few exceptions), while sensitivity to late frosts depends on the flowering period. Apple trees can grow in full sun, but only in places where they are not vulnerable to strong gusts of wind. Apple trees can be cultivated anywhere, but they prefer fresh climates and areas between 600 and 1,000 m above sea level. They are vulnerable to drought and waterlogging.

Apple trees are plants that adapt very well to a wide variety of soils. The most suitable soils for apple cultivation are deep, rich in organic matter, with good drainage, and not too calcareous, although the best areas for the growth and production of apples are in the hills and mountains. It is advisable to avoid soil with less than 40 cm of usable depth for the root apparatus. The ideal pH ranges from 6.5 to 7.5; soil with a pH below 5.4 or above 8.8 should be avoided.



CULTIVATION TECHNIQUES

Planting usually takes place in the autumn, except in cases of overly moist soil. Indeed, the plant does not like humidity, and therefore in these cases, planting should be postponed to the first months of the year, just before germination.

During the first months after planting, the soil should be free of weeds, and it is advisable to mulch the soil with straw to avoid their growth, and to avoid excessive evaporation of water from the soil.

The most used training systems for apple trees are palmette and spindle.

The palmette is a training system that prevents the plant from expanding in depth, so it remains generally flat, and is widely used in intensive plantations. It is considered the most suitable system when the varieties and rootstock of the tree are stronger, and the soil is fertile. The spacing in the row cannot be below 2.3-2.8 m.

The spindle system is also often used, and with this pruning method, the apple tree takes on a conical shape.

The plant has just one vertical axis, from which the lateral branches develop, becoming shorter towards the top. With this method, apple trees are easier to work with and more accessible.

The planting layout requires 4 m between one row and the next, with 1 to 1.5 m between each plant.

The smallest plants, in orchard formation, should be given supports, which should be removed only when the plant reaches the correct position.

It is also important to remove excess fruit. This practice allows the best fruits to grow without overly weighing down the branches, which could then snap in the event of wind or natural disasters. This technique should be applied in around June or July, around 2-3 weeks after flowering.

Irrigation should be frequent but not too abundant, and must in any case be suspended one month before harvest. For each square metre of cultivation, around 110 l of water is needed on average, distributed at intervals of ten days.

Soil fertilisation should be carried out during planting: for each hole, 2-3 kg of well-matured manure should be inserted. In the following spring, around 100 g of ammonium sulphate should be added for each plant.



PRUNING

- **Pruning for shape:** this trains the plant in its first years of growth, guarantees a solid base, corrects imbalances in the crown and gives the plant a stable shape that will help it to resist both the weight of its fruit and bad weather.
- **Production pruning:** this should be performed annually on all plants, and is used to manage the optimal balance between production and vegetation. These types of interventions have the purpose of balancing the different types of branches. It is therefore necessary to cut the most developed, largest branches, to level them. This pruning begins from the fourth year, as the first three years of growth serve to develop the plant according to the training method chosen. Renewal through containment pruning is for fruiting branches that develop above three-year-old branches. Tips should never be shortened, only partially thinned if necessary.
- **Pruning for renewal:** this is performed in the winter. This technique involves the elimination of some of the older branches that fruited the previous year. Pruning this type of branch stimulates the plant to produce new green shoots that will fruit in later years, therefore renewing part of the crown. The purpose of pruning for renewal is also to keep the crown balanced and aerated in the centre. For this reason, again in the winter, all branches that are bundled together should also be removed, along with branches that cast too much shade over the central part. The main shoots (the branches that control the development of the main ramifications) only need to be trimmed at the apex.

PRODUCTION PROCESS

The harvest period for apples ranges from July to October, depending on the variety. Picking the fruits at the right moment enhances their qualities and extends their shelf life. To identify the best moment for harvest, there are certain "indicators of ripeness" that should be referred to. The most used are the hardness of the flesh, its starch content, and the base colour of the skin.

The fruit can be harvested manually, or with the help of fruit harvesters. The fruits must be placed in crates or boxes with care, in order not to cause malformations or damage, which, as well as the direct damage caused, could also encourage attacks from pathogens.

VARIETIES



There are around 7,000 types of apples, which are distinguished by their different flavours, colours and textures.

The best known, with the biggest presence on the market, are the following:

- **Renetta:** its name derives from the French word *reine*, which means queen. It is a relatively large apple, with a flattened shape, and yellow skin with dark spots. It keeps well, and when the outer skin becomes wrinkled, the flesh becomes even sweeter.
- **Golden Delicious:** the Golden Delicious is a yellow apple with a very sweet flavour and crisp flesh.
- **Stark Delicious:** with a bright red skin, it has a sweet flavour without any hints of acidity. When it is riper, its texture becomes more floury.
- **Granny Smith:** with Australian origins, a bright green colour and a tangy, refreshing flavour.
- **Royal Gala:** it is recognised for its smooth, thin skin that is red with shades of yellow. It should be eaten immediately, otherwise it loses its aroma.
- **Fuji:** this apple was created in 1939 in Japan, and from there it spread across the globe, becoming the most cultivated apple in the world. It has an attractive reddish colour with yellow and green streaks, and is crisp, sweet and very juicy.
- **Annurca:** this apple variety is IGP certified, originating in central-southern Italy. This apple is recognisable for its wine red skin, intense fragrance and crisp flesh, which is slightly tart and juicy.
- **Pink Lady:** compared to the other varieties, this is more recent. It is very sugary, with a fruity flavour; its skin has a pinkish hue.
- **Braeburn:** this is a firm, compact apple, with yellow-green skin with reddish streaks. It has excellent resistance to high temperatures, so it is perfect for cooking.
- **Morgenduft:** originating in the United States, it has a sweet flavour, with a fresh, delicate aroma. Thanks to this characteristic, it is the apple most used in industry for making fruit juice and other confectionery products.
- **Kanzi:** this variety is recognisable for its red skin, and its balanced sweet and sour flavour.



- **Fujion:** an excellent example of modern fruit cultivation, the Fujion variety, patented by the Ferrara CIV (Italian Consortium of Gardeners) is appreciated for its light, delicate flavour, as well as for its productivity. The Fujion apple, which has a delicate fragrance, is medium-sized, with a bright red colour, crisp, juicy flesh, and a very intense sweetness (generally superior to the Fuji apple). It is a variety that is often used for the production of dried fruit.
- **Buckeye:** this variety is the red mutation of the Imperial Gala, which originated in the United States. Its main characteristic is its intense, early-appearing colour. Indeed, this fruit is bright red, more intense than Galas. The flesh also resembles the flavour of Galas, with a distinct aroma and a sweet flavour. It is a variety that is often used in the dried fruit market.

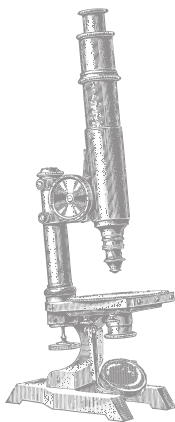
PRODUCING COUNTRIES

China was the birthplace of the apple, and it is the leading producer, followed by the United States: cultivations in these two countries make up over 50 percent of global production. In Europe, the most prolific countries are Poland and Italy, with a consistent upward trend in recent years. But Asia is still the leading continent for apples: indeed, as well as China, India and Russia are also among the leading global producers.



FUN FACT

Tien Shan is the Asian mountain range where Almaty, "the place of apples", sits. This Kazakh city is believed to be the place of origin of the first *Malus sieversii*. The area of Almaty stretches from 500 to 1,700 m above sea level, and offers unique views of apple woods, bush-trained and single trunk plants, with three-century-old specimens that are still fruiting, some with unexpected purple flesh. The varieties of fruit and the colour palette during ripening - and, beforehand, flowering - make it one of the places described as closest to earthly paradise; and since we are talking about apple trees, this is no surprise.



Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	333	17%
	kJ	1410	17%
Fats	g	0.6	1%
of which saturates	g	0.2	1%
Carbohydrates	g	74	28%
of which sugars	g	68	76%
Fibre	g	13	-
Protein	g	1.5	3%
Salt	g	0	0
			NRV**
MINERALS			
Calcium	mg	36.9	5%
Iron	mg	0.74	5%
Magnesium	mg	33.1	9%
Phosphorus	mg	46.1	7%
Potassium	mg	696	35%
Zinc	mg	0.12	1%
Copper	mg	0.19	19%
Manganese	mg	0.23	12%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0	0%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	0.41	3%
Pantothenic acid	mg	0.24	4%
Vitamin B6	mg	0.21	15%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	1.4	12%
Vitamin D	µg	0	0%
Vitamin K	µg	8.7	12%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.41	
Monounsaturated fatty acids	g	0.048	
Oleic acid	g	0.038	
Polyunsaturated fatty acids	g	0.36	
Linoleic acid	g	0.27	
Alpha-linolenic acid	g	0.089	
Omega 3	g	0.089	
Omega 6	g	0.27	
Total omega 3 / total omega 6		0.33	

* RI: Reference Intake
** NRV: Nutrient Reference Value



STANDARD FOR DRIED APPLES

UNECE standard DDP-16 concerning the marketing and commercial quality control of Dried Apples, 2012 edition

1. DEFINITION OF PRODUCE

This standard applies to dried apples of varieties (cultivars) grown from *Malus domestica* Borkh, intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. This standard does not apply to dried apples that are processed by sugaring or flavouring, or for industrial processing.

Dried apples may be presented in one of the following styles:

- peeled and unpeeled
- with core and coreless
- whole, halves, rings, slices and pieces

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried apples at the export-control stage, after preparation and packaging.

However, if applied at stages following export, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried apples must display the following characteristics:

- intact (only for wholes and halves); however, slight superficial damage and slight scratches, coreless are not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean; practically free of any visible foreign matter
- sufficiently developed
- free from blemishes, areas of discolouration or spread stains in pronounced contrast with the rest of the produce, affecting in aggregate more than 5 percent of the surface of the produce
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and/or calcium chloride and a slight smell of preservatives/additives, including sulphur dioxide

¹ Definitions of terms and defects are listed in Annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (in-shell nuts and nut kernels) and dried produce; see <<https://unece.org/trade/agr/DDP-Standards>>.



- Not over-dried (brittle or burned)
- Not hollow, except for coreless

The condition of the dried apples must be such as to enable them:

- To withstand transportation and handling
- To arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT²

The dried apples shall have a moisture content not exceeding:

- 22.0 percent for untreated dried apples
- 25.0 percent for dried apples treated with preservatives or preserved by other means (e.g. pasteurisation)

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried apples are classified into the following classes:

“Extra” Class, Class I, and Class II.

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of dried apples is optional. However, when sized, the size of whole apples, halves and rings is determined by the diameter of the widest part.

The minimum size is 23 mm.

The thickness of slices/rings and pieces may not exceed 7 mm.

The difference between the diameters of the largest fruit and the smallest fruit shall not exceed:

- 20 mm for wholes and halves
- 10 mm for slices.

Slices: no less than 90 percent (by weight) of all units should be more than 10 mm wide.



² The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce; see <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.





4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.

4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage (except for seeds) of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements	5	10	15
of which no more than:			
Bruised fruit	3	5	10
Fermentation	0.5	1	2
Slightly affected by rotting	0	0.5	1
Mould	0	0.5	1
Damage by pests	2	4	6
(b) Size tolerances (if sized)			
For produce not conforming to the size indicated, in total	10	15	20
(c) Tolerances for other defects			
Colour and texture defects	2	5	10
Dried apples belonging to varieties other than that indicated	10	10	10
Foreign matter (weight)	1	2	3
Stem	1	2	3
Core-carpel (in case of cored fruit)	5	10	15
Presence of pieces among whole and halved apples	2	7	13
Seeds (in case of cored fruit) by number per kilogramme	9	14	22



5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried apples of the same origin, quality, style and size (if sized) and variety (if indicated).

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

The dried apples must be packed in such a way so as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper and stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside.

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴.

6.2 NATURE OF PRODUCE

- “Dried apples”
- Name of the variety (optional)
- Style

6.3 ORIGIN OF PRODUCE

Country of origin⁵ and, optionally, district where grown or national, regional or local place name.

³ These marking provisions do not apply to sales packages presented in packages.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded by the ISO 3166 alpha country code of the recognising country, if not the country of origin.

⁵ The full or commonly used name should be indicated.





6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- Crop year (optional)
- “Naturally dried” (optional)
- “Best before” followed by the date (optional)





blueberry

- *Vaccinium corymbosum* L. -





**BOTANICAL
CLASSIFICATION**

Class: *Magnoliopsida*

Order: *Ericales*

Family: *Ericaceae*

Genus: *Vaccinium*

Species: *V. corymbosum*

The *Vaccinium corymbosum*, commonly known as the "blueberry", originated in eastern North America, where it typically grows in humid forests and wetlands. Its domestication began in 1908, when a researcher from the United States Department of Agriculture, Dr. F.V. Coville, launched a study of wild blueberries and a search for superior plants for reproduction.

In 1911, Elizabeth White, a commercial cranberry farmer in New Jersey, came to hear about his work and realised its potential. Over time, the species spread widely, and today blueberries are cultivated all over the world, even in Japan.

The Giant American Blueberry plant is a perennial shrub with an upright habit, between 180 and 365 cm tall.

The leaves are deciduous, alternate and simple, with an elliptical or oval shape, from 1 to 3.5 cm long and slightly waxy on the top, with pubescence. The plant has small white or pink flowers grouped in corymbs; it is self-fertile, but takes advantage of cross-pollination.

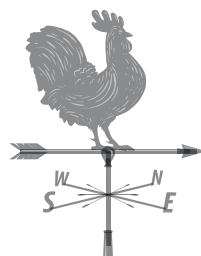
The shallow root apparatus of this plant has two types of roots. The larger ones (around the diameter of a pencil or a little bigger) are used to collect reserve substances and anchor the plant to the ground, while the thinner ones absorb nutrients.





VEGETATIVE CYCLE

The vegetative phase of the Giant American Blueberry plant lasts from spring to autumn. Depending on the variety, flowering occurs in the spring, and fruiting finishes between June and August. The area of cultivation also influences the time needed for ripening and harvest. The fruits develop gradually, and a plant can even continue to produce fruit for four weeks.



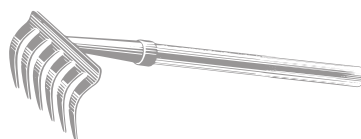
CLIMATE AND SOIL

Blueberry plants have certain requirements that can prevent the spread of cultivations. Indeed, this plant needs very specific soil, with an optimal acidity level between a pH of 4.5 and 5.5. Other necessary characteristics are the absence of limestone, a rich presence of organic matter, and a loose structure to prevent waterlogging. Furthermore, good water availability is also necessary to satisfy the plant's water requirements in the summer months.

Blueberry plants tolerate winter frosts well, and if their wood is mature, some varieties can survive even down to -29 °C. It is therefore important to postpone the application of fertiliser until the end of June, to encourage good lignification of young tissue.

Overall, the blueberry is a plant that is relatively resistant to late frosts. The critical phase is in the flowering period, when drops in temperature down to 8-10 °C below zero could compromise fruit set.

To produce at its best, the blueberry plant must be well-exposed to the sun, and sheltered from wind.



CULTIVATION TECHNIQUES

Blueberry plants are usually cultivated as free bushes without supports, formed by 5-6 productive branches, alongside 1-2 suckers for renewal.

The main purpose of pruning is to regulate production and the plant's renewal simultaneously. It is therefore fundamental that drastic cuts do not throw the plant off balance, accentuating a growth spurt. On the other hand, a lack of intervention, especially in plants above 4 years old, can cause the branches to age prematurely, as they may not adequately produce productive tips. Soil fertilisation is very important in the development of the blueberry plant and its fruit production.

In general, there are two methods for the distribution of fertiliser: injection of concentrated water-soluble fertiliser, or regular applications of scattered fertiliser.

Blueberry plants require good availability of organic matter in the soil. It is therefore necessary to plan for interventions of organic fertilisation using well-matured composted material, avoiding fresh manure, which could cause problems due to excess chlorine and urea. This requirement can also be satisfied by mulching the row of plants, using natural products such as peat, pine needles, pine tree bark, used wood materials, etc.

Irrigation is a determining factor in the growth and production of the giant blueberry. Due to the plant's lack of root growth, it is very easy to run into risky situations of water stress. On average, the maximum water requirements of the blueberry are 30-50 hl per day per 1000 m², for adult plants in full production.

PRODUCTION PROCESS

Depending on the cultivar and the area of cultivation, blueberry harvest takes place during the summer, between June and August. The fruits ripen gradually, with plants able to produce for up to four weeks, with pauses every 5-10 days.

The colour of the berry is a good indicator to evaluate the level of ripeness; this colour should evenly cover the whole berry.

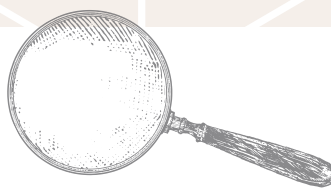
Apart from for industrial production, hand-picking is the preferred method to protect the fruits and the plants. Other systems that involve the use of tools, such as combs, risk causing damage to the branches and fruits.

In extensive American cultivations, harvesting techniques are used that can operate on a large scale. One method is flooding the field, with the fruits detaching from the plant when the water level reaches them.

Another harvesting method for large-scale production is shaking the plant, with a connected system to collect the fruits.



VARIETIES



There are several varieties of *V. corymbosum*, each with specific characteristics in terms of taste, productivity and cultivation.

- **Patriot:** this variety is a vigorous, productive shrub, which is highly resistant to cold winter temperatures, as it is able to tolerate -29 °C. Its fruits are large, with a pale colour and a good flavour.
- **Blue One:** a variety that flowers early, in direct competition with the Duke variety. Despite its slightly inferior levels of production, its fruits are much more aromatic.
- **Duke:** identified in 1985, this variety has undeniable qualities. Its fruit is pale blue, with a good size and a long shelf life.
- **Collins:** this is a variety with vigorous berries and production that adapts even to less optimal soils. Its fruits are a good size, slightly flattened in shape, with a dark colour. They are very aromatic, but slightly tart.
- **Bluecrop:** this is one of the most popular planted varieties in the world. It is an upright bush with large, pale fruits. It is considered a benchmark for a high production level.
- **Atlantic:** this variety reaches a height of up to 2.5 m, and adapts to difficult growing conditions, producing small fruits with a dark blue colour and a very sweet flavour.
- **Legacy:** this cultivar is vigorous and very widespread. Its berries are medium-sized, with a light blue colour and a good flavour.
- **Blue Pearl:** a variety developed for its ornamental characteristics, with blue leaves and a very compact form. Its berries are small, with an excellent flavour.
- **Rubel:** identified in 1911 from a wild *V. corymbosum* plant, the Rubel cultivar is one of the oldest varieties. Its fruits are small, with a dark blue colour and an aromatic flavour, and are particularly rich in antioxidants.
- **Elizabeth:** a vigorous, upright shrub, this variety produces very aromatic fruit of a good size, with a light blue colour. It is a variety recommended for cold regions.
- **Misty:** this variety has a good yield of fruits that are a good size, and solid, with a good flavour. Developed in 1989, it remains one of the varieties best adapted to the Mediterranean climate.



PRODUCING COUNTRIES

As number 1 in the sector, the United States produces almost double the amount of blueberries compared to its closest competitor, Peru, which is in turn followed by Canada. As is also the case for cranberries, North America is the global leader in the production of these small fruits, and they are cultivated on both coasts: Washington, Oregon and Georgia are the leading states for production.

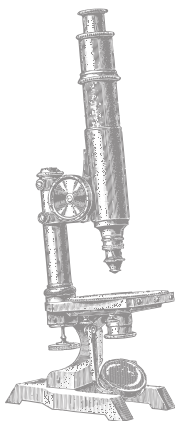
The blueberry has spread throughout the world: it is widely cultivated in central Europe, the Far East and New Zealand.



FUN FACT

Some of the oldest traces of blueberries are found in fabric from the Aztec age, when the juice from these berries was used for its indigo colour. Meanwhile, Native Americans created grey dye from milk and blueberries, to dye fabric or paint their faces before battle.

The origin of the blueberry is ancient, and certainly American. Although it was known about in ancient Rome, when in Nero's time Dioscorides described its medical and botanical properties, the blueberry only spread in the 1600s, thanks to the settlers that arrived on the north-Atlantic coasts of the American continent.



Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	331	17%
	kJ	1399	17%
Fats	g	3.7	5%
of which saturates	g	0.4	2%
Carbohydrates	g	70	27%
of which sugars	g	67	74%
Fibre	g	6.7	-
Protein	g	1.1	2%
Salt	g	0.01	0%
			NRV**
MINERALS			
Calcium	mg	59.2	7%
Iron	mg	1.0	7%
Magnesium	mg	18.8	5%
Phosphorus	mg	36.6	5%
Potassium	mg	227	11%
Zinc	mg	0.38	4%
Copper	mg	0.14	14%
Manganese	mg	10	500%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.083	8%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	1.2	8%
Pantothenic acid	mg	0.060	1%
Vitamin B6	mg	0.060	4%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	2.1	18%
Vitamin D	µg	0	0%
Vitamin K	µg	32	43%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	3.3	
Monounsaturated fatty acids	g	1.9	
Oleic acid	g	1.8	
Polyunsaturated fatty acids	g	1.4	
Linoleic acid	g	0.93	
Alpha-linolenic acid	g	0.47	
Omega 3	g	0.47	
Omega 6	g	0.94	
Total omega 3 / total omega 6		0.50	

* RI: Reference Intake

** NRV: Nutrient Reference Value



STANDARDS FOR GRADES OF BLUEBERRIES

United States Standards for Grades of Blueberries, Effective March 20, 1995

1. GENERAL

These standards apply only to selected and hybrid varieties of the highbush (*Vaccinium australe* Small and *Vaccinium corymbosum* L.) and rabbiteye (*Vaccinium ashei* Reade) blueberries produced under cultivation, but not to other species of the genus *Vaccinium*, nor to the true huckleberries of the genus *Gaylussacia*.

Because of the size differences between varieties and the difference in size preference in various markets, there are no size requirements in the grade. Therefore, size will not be determined unless specifically requested by the applicant. If requested, size may be specified as provided.

2. GRADE

U.S. NO. 1

"U.S. No. 1" consists of blueberries which meet the following requirements:

A) BASIC REQUIREMENTS:

- similar varietal characteristics
- clean
- well colored
- not overripe
- not crushed, split, or leaking
- not wet

B) FREE FROM:

- attached stems
- mold
- decay
- insects or when there is visible evidence of the presence of insects
- mummified berries
- clusters

C) FREE FROM DAMAGE CAUSED BY:

- shriveling
- broken skins
- scars
- green berries
- other means



D) **TOLERANCES AS SPECIFIED IN THE "TOLERANCES" SECTION IN POINTS** (a) and (b) and applied pursuant to Application of Tolerances

3. SIZE CLASSIFICATIONS

The following size classifications may be used in specifying size of blueberries:

- Extra large. Less than 90 berries per cup¹
- Large. 90 to 129 berries per cup¹
- Medium. 130 to 189 berries per cup¹
- Small. 190 to 250 berries per cup¹
- For tolerances see point 4

4. TOLERANCES

In order to allow for variations incident to proper grading and handling, based on sample inspection, the following tolerances, by count, shall be allowed:

a) For defects at shipping point². 10 percent for blueberries which have attached stems. Additionally, not more than 8 percent of the blueberries may be below the remaining requirements of the grade: Provided that included in this amount not more than 4 percent shall be allowed for defects causing serious damage, including in this latter amount not more than 1 percent for blueberries which are affected by mold or decay.

b) For defects en route or at destination. 10 percent for blueberries which have attached stems. Additionally, not more than 12 percent of the blueberries may be below the remaining requirements of the grade: Provided that included in this amount not more than the following percentages shall be allowed for defects listed:

- 8 percent for blueberries which fail to meet the requirements for this grade because of permanent defects; or,
- 6 percent for blueberries which are seriously damaged, including therein not more than 4 percent for blueberries which are seriously damaged by permanent defects and not more than 2 percent for blueberries which are affected by mold or decay.

c) Off-size. When size is designated according to one or more of the size classifications in "size classifications", not more than 10 percent of the samples in any lot or one sample, whichever is the greater number, may fail to meet the range in count specified.

5. APPLICATION OF TOLERANCES

Individual samples are subject to the following limitations: Provided that the averages for the entire lot are within the tolerances specified for the grade:

- for a tolerance of 10 percent or more, individual samples may contain not more than one and one-half times the tolerance specified.
- for a tolerance of less than 10 percent, individual samples may contain not more than double the tolerance specified.

¹ Cup equals 237 ml, 1/2 pint, or 2 gills.

² Shipping point, as used in these standards, means the point of origin of the shipment in the producing area or at port of loading for ship stores or overseas shipment, or, in the case of shipments from outside the continental United States, the port of entry into the United States.



6. DEFINITIONS

SIMILAR VARIETAL CHARACTERISTICS

"Similar varietal characteristics" means that the berries are similar in color and shape.

CLEAN

"Clean" means that the individual berry is practically free from dirt, frass, or other foreign material.

WELL COLORED

"Well colored" means that more than one-half of the surface of the individual berry is blue, bluish-purple, purple, bluish-red, or bluish-black.

OVERRIPE

"Overripe" means that the individual berry is dead ripe, the flesh is soft and mushy, and past commercial utility.

DAMAGE

"Damage" means any specific defect described in this section, or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which materially detracts from the appearance, or the edible or marketing quality of the blueberries. The following specific defects shall be considered as damage:

- wet berries when the individual berry is wet from juice from crushed, leaking, or decayed berries, but not due to condensation;
- clusters when there are three or more joined capstems with at least one berry attached;
- shriveling when the wrinkling is readily noticeable;
- broken skins when not well healed or when well healed and readily noticeable, except for an allowable area within a 1/8 inch (3.2 mm) circle centered at the stem scar;
- scars when affecting more than 20 percent of the surface of the individual berry; and,
- green berries when one-half or more of the berry is green

SERIOUS DAMAGE

"Serious damage" means any specific defect described in this section, or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which seriously detracts from the appearance, or the edible or marketing quality of the blueberries. The following specific defects shall be considered as serious damage:

- decay
- moldy berries
- overripe berries
- crushed, split, or leaking berries
- mummified berries when the individual berry is dried up, withered or shrunken



- insects or when there is any visible evidence of the presence of insects, including but not limited to an insect, the insect larva, feeding, webbing or frass
- broken skins when not well healed
- scars when affecting more than 50 percent of the surface of the individual berry





cranberry

- *Vaccinium macrocarpon* Ait. -





**BOTANICAL
CLASSIFICATION**

Class: *Magnoliopsida*

Order: *Ericales*

Family: *Ericaceae*

Genus: *Vaccinium*

Species: *V. macrocarpon*

The *Vaccinium macrocarpon* is a fruit that originated in North America. Its area of spontaneous growth is found in the temperate zones between the East Coast and the central United States, and between southern Canada and the Appalachian Mountains.

The cranberry plant is a low shrub or a vine, with dimensions that vary greatly depending on the species. It can be from 5 cm to 4 m tall, and up to 2 m long.

The plant has thin, flexible branches and small, evergreen leaves. The flowers vary in colour from species to species, from white to dark pink, with petals that have a wide variety of hues. Pollination takes place thanks to honey bees.

The fruit is a "false fruit", which is often larger than the leaves. It is initially white, and as it ripens it turns dark red or purple.





VEGETATIVE CYCLE

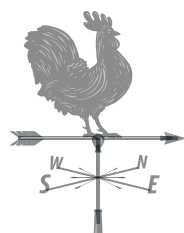
The cranberry plant begins production after 2 or 3 years, and reaches its maximum vigour after 5 or 6. A characteristic of this species is the length of its vegetative cycle, which takes 16 months. Indeed, the shoots begin to sprout the year before being harvested, generally in around July.

The shoots continue to grow during the summer and autumn, when the buds begin to form from the apical shoots. In August, the buds begin to become visible, and they continue to grow until the end of September, sometimes also into October. If the region where the cultivation is located is very mild, this phase can even extend beyond October.

To face the adverse winter weather, the shoots become dormant until the following spring. This defence mechanism is triggered by a combination of two factors: the low temperatures and the reduction in daylight hours.

The shoots remain dormant until the plant receives a sufficient number of hours of sunlight. At the end of this period, determined by the increase in temperature and longer days, the buds open and flowering begins. In June, the flowers open, and the cranberry plantation turns pink. From late June until early July, the flowers are pollinated by honey bees, and fruit set begins. This period overlaps with the beginning of the following year's vegetative cycle.

For the first 3 weeks after fruit set, the fruits receive the majority of their mineral components. After this, the fruits collect carbohydrates and water. Irrigation is fundamental at this point. In September, the fruits continue to ripen, and turn their characteristic red colour thanks to the production of anthocyanins, water-soluble pigments that vary in colour from red to blue. The fruits fully ripen around 80 days after full flowering.



CLIMATE AND SOIL

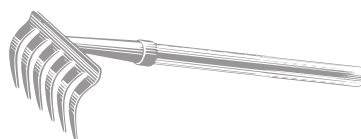
Cranberry plants, which are shrubs or very low vines, grow in marshy ground made up of alternating layers of sand and organic matter. The soil must have the possibility to be simply irrigated, or to be completely flooded.

Cranberries grow well in acidic soil with a pH of 5-5.5 that is well-equipped with organic matter, fertile and fresh, with no active limestone. For irrigation, hard water must not be used, and it is always preferable to use rainwater.

To maintain the productivity of the soil used for cultivation, unlike standard practice for other crops, the soil should not be prepared, ploughed or treated, only refreshed every 2-5 years with sand and organic matter, primarily made up of dried leaves.

The application of sand can be performed in different ways: dry, on ice, or with a barge. For dry distribution, the sand is scattered with the use of marsh vehicles or by hand, directly on the vines. Another method is when the sand is spread over the ice that forms during flooding in the winter months. Finally, distribution with a barge is performed using a boat to cross the marsh and spread the sand.





CULTIVATION TECHNIQUES

To begin cranberry cultivation, the first task is to make sure all wild plants have been removed from the marshland, the second is to level the soil, and the final step is to plant the shrubs. The plant is propagated using woody or herbaceous cuttings. These cuttings can be from 10 to 25 cm long, and should be planted directly in the ground.

During their development, cranberry plants need very light pruning. Fertilisation is performed with great care, in order to maximise berry production and not encourage the plant to grow.

The presence of plenty of honey bees with good activity is fundamental for correct pollination. The beehives should be positioned in the field when 10-20 percent of the flowers have bloomed. In this phase, it is important not to use fruit protection products, in order not to harm the bees. Cranberry plants produce for many years; in fact, it is not unusual to find marshes in production for 75 or 100 years. Farmers usually uproot shrubs and cut down trees around the perimeter of the marsh in order to encourage airflow, which lowers the risk of ice and significantly lowers the risk of fungal damage. Airflow also helps to protect the plants from insect attacks, and helps to limit the use of pesticides.

In Europe, the cranberry is cultivated intensively only in Germany, and derives from selections of wild forest cranberries that are present primarily in Scandinavia and northern Europe. It has more limited growth, reaching around 30 cm tall, and the berries ripen in September. Harvest is usually performed by hand, with special "combs".

PRODUCTION PROCESS

Once harvested, the cranberries are transported to reception points, where they are washed, measured and checked before being packaged or processed.

For the cranberries to be marketed, they must have certain characteristics. Every single cranberry must be reasonably well-coloured (at least 75 percent of the fruit must present the typical colour) and the whole container must have a reasonably uniform colour.

The diameter of each cranberry should be no less than 1 cm, although 3 percent of the product can be smaller, and 5 percent can fail to meet the remaining requirements.

The fruits are sold at a stage of ripening that allows them to become fully ripe with full colouring. Cranberries with more than a small spot of green are considered unripe.

Finally, at the moment of sale, the berries must be presented undamaged and free of dust, dirt, spray residues and any other foreign substance.

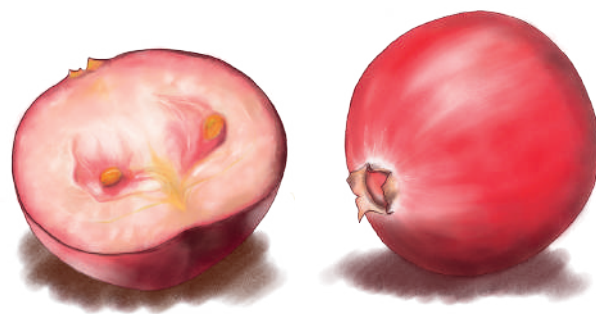




VARIETIES



- **Lingonberry or Cowberry:** grows spontaneously in Europe, 10-40 cm tall, with white or pink flowers grouped in bunches. It produces red berries that are sour and bitter. In Italy, it is widespread in the Alps and the northern Apennines.
- **"Mortella di palude":** growing spontaneously in Europe and North America, this plant is an evergreen creeper, with filiform stems that are 20-30 cm long. Its berries are red and spherical.
- **Cranberry or "bacca delle gru":** native to the Atlantic coast of North America, this variety likes high altitudes. The most distinctive characteristics of this cranberry are its leaves, which are 10 to 20 mm long, and its unusual flavour, which is similar to apple.





PRODUCING COUNTRIES

Cranberries are grown in Europe, Asia, North Africa and New Zealand, but North America is the undisputed leader in production. The United States and Canada produce between 80 and 90 percent of the cranberries on global markets, establishing themselves as clear points of reference in the sector.

In the United States, production is concentrated in Massachusetts, Wisconsin, New Jersey and Oregon. British Columbia and Quebec are the leading production areas in Canada.



FUN FACT

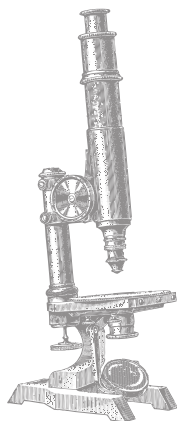
The name *cranberry* derives from the word *crane*, and it was given to the plant by the first European settlers in America. The reason for this was the cranberry flower's resemblance to the shape of the marsh bird.

Another name that is mainly used in Canada is *mossberry*, from *moss*, while the traditional English name for the *Vaccinium oxycoccus* is *fenberry*, from the word *fen*.

For Native Americans, cranberries were considered to be medicinal, and were used as an ingredient for curative pastes that extracted venom from wounds. The indigenous people of Delaware used cranberries as a symbol of peace.

The cranberry is the most widespread crop in many American states (Maine, Massachusetts, Wisconsin, Michigan, Minnesota, New Jersey, Oregon) and in some provinces of Canada (British Columbia, New Brunswick, Ontario, Nova Scotia, Newfoundland and Quebec). It should be no surprise, then, that North Americans are its top consumers, with an average consumption of 180,000 t per year.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	337	17%
	kJ	1430	17%
Fats	g	0.6	1%
of which saturates	g	0.1	1%
Carbohydrates	g	80	31%
of which sugars	g	70	78%
Fibre	g	5.1	-
Protein	g	0.4	1%
Salt	g	0.01	0%
			NRV**
MINERALS			
Calcium	mg	8.70	1%
Iron	mg	0.21	2%
Magnesium	mg	4.00	1%
Phosphorus	mg	5.70	1%
Potassium	mg	72.6	4%
Zinc	mg	0.082	1%
Copper	mg	0.046	5%
Manganese	mg	0.15	8%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.024	2%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	0	0%
Pantothenic acid	mg	0.16	3%
Vitamin B6	mg	0	0%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	1.5	13%
Vitamin D	µg	0	0%
Vitamin K	µg	5.6	7%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	40.1	
Monounsaturated fatty acids	g	39.9	
Oleic acid	g	0.39	
Polyunsaturated fatty acids	g	0.14	
Linoleic acid	g	0.12	
Alpha-linolenic acid	g	0.018	
Omega 3	g	NA***	
Omega 6	g	NA***	
Total omega 3 / total omega 6		NA***	

* RI: Reference Intake
** NRV: Nutrient Reference Value
*** NA: not analysed.



STANDARDS FOR GRADES OF FRESH CRANBERRIES¹

Effective August 26, 1971

1. GENERAL

These standards apply only to the commonly cultivated cranberry (*Vaccinium macrocarpon*).

Compliance with these standards is determined by analyzing samples of 100 berries each drawn at random from individual containers representative of the lot. The tolerances for off-size and defective berries apply to the lot and there is no restriction on the percentage that may occur in individual samples or containers: Provided that the averages for the entire lot are within the tolerances specified for the grade.

2. GRADES

U.S. NO. 1

“U.S. No. 1” consists of cranberries which meet the following requirements:

A) BASIC REQUIREMENTS:

- one variety or similar varietal characteristics
- clean
- mature
- firm
- not soft or decayed

B) FREE FROM DAMAGE CAUSED BY:

- moisture
- bruises
- freezing
- smothering
- scarring
- sunscald
- foreign material
- disease
- insects
- mechanical or other means

C) COLOR:

Individual cranberries shall be at least fairly well colored, and the cranberries in the container shall be fairly uniform in color.

D) SIZE:

Unless otherwise specified, the diameter of each cranberry shall be not less than thirteen thirty-seconds of an inch.

¹ Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug and Cosmetic Act, or with applicable State laws and regulations.



E) TOLERANCES:

In order to allow for variations incident to proper grading and handling in this grade, the following tolerances, by count, in any lot are provided:

- 3 percent for cranberries which fail to meet the size requirements;
5 percent for cranberries which fail to meet the remaining requirements of the grade, but not more than three-fifths of this amount, or 3 percent, shall be allowed for cranberries which are soft or decayed at shipping point: provided that an additional tolerance of 2 percent, or a total of not more than 5 percent, shall be allowed for soft or decayed berries en route or at destination; and,
- 5 percent for containers in which the cranberries fail to meet the requirements of fairly uniform in color

3. DEFINITIONS

SIMILAR VARIETAL CHARACTERISTICS

"Similar varietal characteristics" means that the cranberries in the container are similar in color and shape.

CLEAN

"Clean" means that the cranberries are practically free from dirt, dust, spray residue, or other foreign material.

MATURE

"Mature" means that the cranberry has reached the stage of development which will ensure the proper completion of the ripening process. Cranberries which show more than a slight amount of green color shall be considered immature.

DAMAGE

"Damage" means any specific defect described in this section; or any equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which materially detracts from the appearance, or the edible or marketing quality of the individual cranberry or the general appearance of the cranberries in the container. The following specific defects shall be considered as damage:

- moisture when the cranberries in the container are wet from the juice from crushed, leaking, or decayed berries. Cranberries which are moist from condensation or which have been cleaned by water shall not be considered damaged by moisture;
- bruises when the affected area is soft and watery beneath the skin;
- scarring which detracts from the appearance of the individual cranberry to a greater extent than scars aggregating the area of a circle one-fourth inch in diameter on a cranberry eighteen thirty-seconds of an inch in diameter;
- insects when any larvae or holes caused by them are present or when feeding injury exceeds the area of a circle one-eighth inch in diameter; and,
- foreign material which materially detracts from the appearance of the cranberries in the container



FAIRLY WELL COLORED

"Fairly well colored" means that 75 percent of the surface of the individual cranberry, in the aggregate, shows pink or red color characteristic of the variety.

FAIRLY UNIFORM IN COLOR

"Fairly uniform in color" means that the berries in the individual containers do not show sufficient variation in color to materially detract from the general appearance of the berries in the container.

DIAMETER

"Diameter" means the greatest dimension measured at right angles to a line from stem to blossom end of the berry.

METRIC CONVERSION TABLE

Inches	Millimeters (mm)
1/8	3.175
1/4	6.350
12/32	9.525
13/32	10.319
14/32	11.112
15/32	11.906
16/32	12.700
17/32	13.494
18/32	14.288
19/32	15.081
20/32	15.875
21/32	16.669
22/32	17.462
23/32	18.256
24/32	19.050







papaya

- *Carica papaya* L. -





BOTANICAL CLASSIFICATION

Class: Magnoliopsida

Order: Violales

Family: Caricaceae

Genus: *Carica*

Species: *C. papaya*

Central America is the place of origin of the *Carica papaya*; this paternity is disputed by Africa and Asia, where the fruit is widespread, but always with the same name, which has clear Caribbean etymology. The Spanish colonial trade route also explains the later spread of the plant to the Philippines and Africa.

The *C. papaya* is a herbaceous plant that develops a tall, fleshy stem that can reach 20 m. Also known as the "giant plant" for this reason, it grows fast, making it productive already after one year of life. This significant growth complicates harvest, which is why commercial cultivations tend to replace plants when they reach a height of 4-5 m.

The plant has a single, grey-brown spiny stem or bine, which becomes fibrous over the years. Other characteristics of the *C. papaya* are its roots, which develop only in the first 30 cm of the soil, and its stem, which generally develops branches only if it is damaged. The leaves, which are arranged in a rosette at the apex of the trunk, are simple, alternate, 40-70 cm long and 25-27 cm wide. They are deeply lobed, present only at the end of the bine, and have a long stalk. These many-lobed leaves resemble fig or maple leaves, but they are larger (up to half a metre or more in width), and have a hollow peduncle.

The papaya plant is a dioecious species, with male and female flowers on separate plants. Some can also develop as hermaphrodites. The female flowers are axillary and solitary or arranged in small groups, while the male ones are on long axillary racemes, distinguished by their monopetalous corolla in a clear cylindrical shape.

The fruit of the *C. papaya* is an elongated ovoid berry, characterised by a highly variable shape and size, from 10 to 25 cm long and 7 to 15 cm wide. The fruits are yellowish-green in colour, turning yellow or yellow-orange when ripe. The flesh is juicy, dense and quite solid, with an orange-pink colour, and surrounds a central cavity, containing small black seeds covered with a mucilaginous film.

The fruits have a variable weight from 250 to 3000 g, and are not all alike: those from female trees are spherical, while the shape of the fruits from hermaphrodite plants is influenced by environmental factors, in particular by the temperature, which changes the morphology of the flower during the initial phases of development of the inflorescence. Ripe fruits contain a large number of grey-black seeds with a diameter of 5 mm. In female specimens, the flowers - from which the fruits develop - are found at the base of the leaves. The pericarp of the fruit is rich in milky juice.

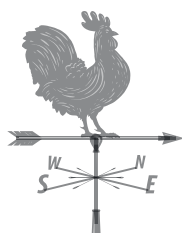




VEGETATIVE CYCLE

With a capacity of between 25 and 100 fruits, the papaya plant enters full productivity from its second year of life; it reaches its peak fast, as a drop in yield begins to be noticeable from the third and fourth years.

Cultivated in areas with a warm climate all year round, fruiting takes place 4-5 months after flowering, allowing a continuous cycle of harvests. Instead, where temperatures are lower, ripening is 9-10 months after flowering. The fruit harvest period runs from November to June.



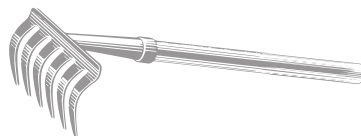
CLIMATE AND SOIL

Many adverse climatic conditions (such as low temperatures, drought, strong winds, lack of sunlight) reduce the papaya's growth and production, as it prefers tropical and subtropical climates.

The plant needs full sun exposure: the optimal temperature range for growth and fruiting is between 21 and 32 °C, and the development of roots is encouraged by soil temperatures above 16 °C.

In semi-desert climates, the fruits have a higher sugar content compared to those grown in humid tropical zones.

In terms of soil, the papaya is a relatively demanding plant: it prefers sandy and volcanic soils with fast water drainage, rich in organic matter, with an optimal pH of 5.5-6.5. Loamy and clay-rich soils hold onto water, and this can cause root or collar rot.



CULTIVATION TECHNIQUES

Papaya propagation is primarily through seeds, and planting can be performed either by planting seedlings taken from seedling bags, or directly sowing the seeds in the field. In the latter case, 20-25 seeds can be planted per space. Germination takes 2-3 weeks.

When the seedlings emerge, 4-5 are selected to reach the flowering stage, in order to check whether they are dioecious plants or hermaphrodites. Of the 4-5 seedlings, the most vigorous is chosen, while the others are cut.

Once the plant reaches a height of 15-30 cm, it is moved to an ideal position: before planting, trenching and soil fertilisation should be performed to a depth of 50 cm. The most used planting layouts are simple rows: 2-2.5 m by 2.5 m for manual work, and 1.8 m by 3.5 m when using machines.

Mulching papaya plantations is performed by covering the soil with a layer of 5-15 cm of bark, wood chips and similar material, which prevents the growth of weeds, maintains the humidity of the soil, protects the soil from erosion, avoids the formation of so-called surface crust, reduces soil compaction, maintains the soil structure and increases the temperature of the soil. It is advisable to keep the mulch 20-30 cm from the trunk.

Soil fertilisation should be performed from the moment of planting with mature manure, or with a supply of nitrogen, phosphorus and potassium.

Good fruiting should be supported with correct irrigation that meets the plant's needs of 100 ml of water per month.

PRODUCTION PROCESS

Papaya harvest is an operation performed either by hand or with the help of platforms and basic equipment. The fruits can be picked while green for use as a vegetable, or at the moment of ripening, when the colour of the skin turns from yellow to orange.

In general, the fruits can be harvested when 1/5 to 1/3 of the surface of the skin is yellow, and the more the colour develops, the higher the sugar content. After harvest, the fruits must be kept at room temperature until they are completely ripe, which takes 4-7 days after picking.

VARIETIES



For a better yield, hermaphrodite plants are preferred, as they are able to self-pollinate. The best-known varieties are Solo, Kopoho Solo or Puna Solo, and Sunrise.

- **Solo:** a variety introduced to Hawaii from Barbados in 1911. Its fruits are pear-shaped and weigh around 500 g. They are excellent quality, and when fully ripe, have a thin yellow-orange coloured skin, and golden orange flesh that is very sweet.
- **Kapoho Solo or Puna Solo:** a Hawaiian cultivar, it became popular with farmers in Kauai before 1950, and is only cultivated in its archipelago of origin. This fruit also reaches around 500 g, and has a pale yellow-orange flesh with a sweet, delicate flavour.
- **Sunrise:** introduced to Puerto Rico from Hawaii, the fruits of this variety are pear-shaped, with similar quality to the Solo, and when fully ripe they have a thin yellow-orange coloured skin with golden orange flesh, and a high sugar content.





PRODUCING COUNTRIES

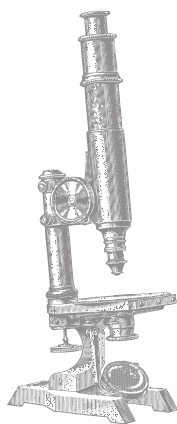
Papaya cultivation is widespread throughout the tropical zone of the planet. India, the Dominican Republic, Brazil, Mexico and Indonesia are the top producing countries. In greenhouses, or using other cultivation techniques able to protect it from the cold, the *C. papaya* is also becoming more widespread in the Mediterranean basin.



FUN FACT

Papaya is used in medicine to extract papain, a proteolytic enzyme that has various uses in the cosmetic and food industries, as well as in the processing of natural rubber. The papaya also produces latex, which is extracted from the skin when it is still unripe. The operation is performed by making longitudinal cuts into the skin and collecting the latex that comes out. The incisions are repeated every 3-4 days, and as the fruit ripens, the amount of latex gradually reduces until it disappears.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	288	14%
	kJ	1218	14%
Fats	g	0.8	1%
of which saturates	g	0.4	2%
Carbohydrates	g	62	24%
of which sugars	g	57	63%
Fibre	g	11	-
Protein	g	2.7	5%
Salt	g	0.05	1%
			NRV**
MINERALS			
Calcium	mg	906	113%
Iron	mg	1.3	9%
Magnesium	mg	101	27%
Phosphorus	mg	54.4	8%
Potassium	mg	1078	54%
Zinc	mg	0.35	4%
Copper	mg	1.9	190%
Manganese	mg	0.17	9%
Selenium	µg	14	25%
VITAMINS			
Vitamin C	mg	149	186%
Thiamine / Vit. B1	mg	0.027	2%
Riboflavin / Vit. B2	mg	0.17	12%
Niacin / Vit. PP	mg	1.1	7%
Pantothenic acid	mg	1.2	20%
Vitamin B6	mg	0	0%
Folacin / Vit. B9	µg	1.2	1%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	0	0%
Vitamin D	µg	0	0%
Vitamin K	µg	0	0%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.46	
Monounsaturated fatty acids	g	0.23	
Oleic acid	g	0.078	
Polyunsaturated fatty acids	g	0.23	
Linoleic acid	g	0.050	
Alpha-linolenic acid	g	0.18	
Omega 3	g	0.18	
Omega 6	g	0.050	
Total omega 3 / total omega 6		3.6	

* RI: Reference Intake

** NRV: Nutrient Reference Value



STANDARD FOR DRIED RIPE PAPAYAS

UNECE Standard DDP-32 concerning the marketing and commercial quality control of Dried Ripe Papayas, 2019 edition

1. DEFINITION OF PRODUCE

This standard applies to dried ripe papaya, peeled and unpeeled, from varieties (cultivars) grown from *Carica papaya*, of the Caricaceae family and their hybrids intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. This standard does not apply to dried ripe papayas that are processed by salting, sugaring, flavouring, or roasting or for industrial processing.

Dried ripe papayas may be presented in the following styles:

- sliced; varying lengths and thickness
- diced into chunks and/or cubes
- chips and strips of irregular shapes; and
- any other style of dried ripe papayas shall be permitted provided that the product is distinct from the above-mentioned styles and sufficiently labelled

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried ripe papayas at the export control stage after preparation and packaging.

However, if applied at stages following export, the legal holder shall be responsible for observing the requirements of the standard. The legal holder of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried ripe papayas must be:

- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from blemishes, burns, areas of discolouration or spread stains in pronounced contrast with the rest of the produce affecting in aggregate more than 20 percent of the surface of the produce.
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste, except for a taste of sodium chloride and a slight smell of preservatives/additives¹

¹ A slight smell of sulphur dioxide (SO₂) is not considered as “abnormal”. Preservatives may be used in accordance with the legislation of the importing country. Dried ripe papayas may be sulphured in order to retain their original colour.





The condition of the dried ripe papayas must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT²

The dried ripe papayas shall have a moisture content:

- not exceeding 18.0 percent for untreated dried ripe papayas
- between 18.0 and 25.0 percent for dried ripe papayas treated with preservatives or preserved by other means (e.g. pasteurisation)

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried ripe papayas are classified as follows:

“Extra” Class, Class I, Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing and uniformity in size of dried ripe papayas is optional in all classes; however, when sized, size is determined by diameter of the widest part.



² The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.



4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each package or in each lot for produce not satisfying the requirements of the class indicated.

4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce, by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements,			
of which no more than			
Injuries, calluses and damage caused by heat during drying	5	10	15
Mouldy and mildew spots	1	4.5	9
of which no more than			
mouldy	0	0.5	1
Fermented, rotten or deterioration	0.5	1.5	3
of which no more than:			
Fermented	0.5	1	2
Rotten	0	0.5	1
Pest damage	0.5	1	2
Living pests	0	0	0
(b) Size tolerances			
For produce not conforming to the size indicated	10	15	20
(c) Tolerances for other defects			
Foreign matter, seeds and pieces of seeds, skin fragments (by weight)	0.5	0.5	1
not fully ripe fruit among ripe fruit	0	1	3





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried ripe papayas of the same origin, quality, size (if sized), style and, if indicated, variety or colour.

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

The dried ripe papayas must be packed in such a way as to protect the produce properly. The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper and stamps bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴.

6.2 NATURE OF PRODUCE

- “Dried ripe papaya” followed by the style
- Name of the variety and/or colour (optional)
- “Sun dried” or method of drying (optional)

³ These marking provisions do not apply to sales packages presented in packages.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.3 ORIGIN OF PRODUCE

Country of origin and, optionally, the district where grown or the national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- Crop year (optional)
- “Best before” followed by the date (optional)







pear

- *Pyrus communis* L. -





BOTANICAL CLASSIFICATION

Class: *Magnoliopsida*

Order: *Rosales*

Family: *Rosaceae*

Genus: *Pyrus*

Species: *P. communis*

The pear is a very widespread tree; it is medium-sized, and can reach a height of 10-15 m.

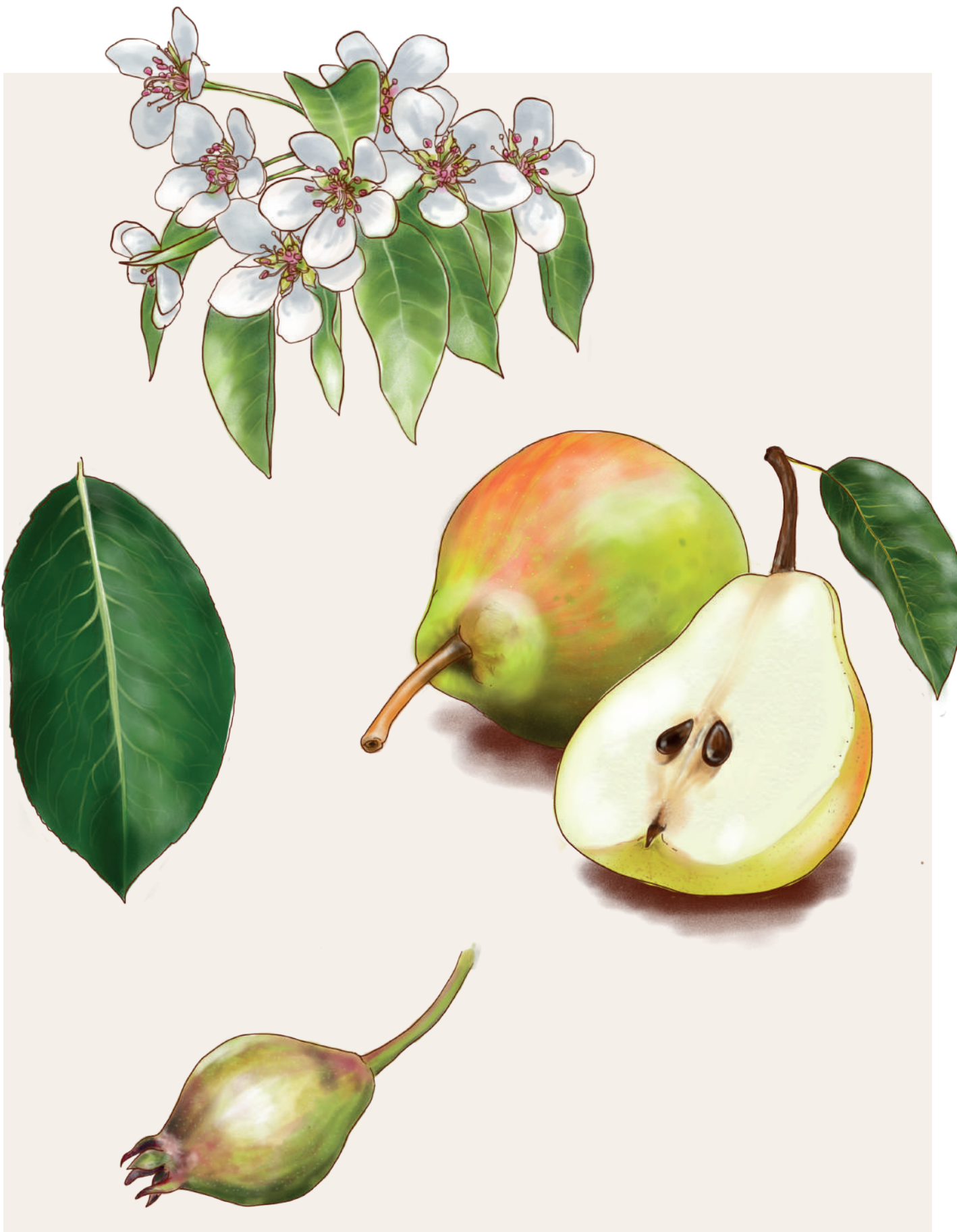
The trunk is initially smooth in the first years of growth, and over time it develops many deep cracks in its bark in quadrangular sections; its colour tends to be greyish.

A plant with an upright habit, the *Pyrus communis* has leaves that are up to 12 cm long, with an elliptical shape, and a glossy green colour in some species, or silver and fuzzy in others. The top is glossy compared to the more matte, pale green underside; the shape of the leaves varies from oval to narrow and lanceolate.

Made up of five petals, pear flowers are yellow or pinkish-white, and rarely spotted, with a diameter that ranges from 2 to 4 cm. Flowering takes place between April and May.

Pollination of the flowers occurs thanks to the presence of pollinating insects: pear plants are for the most part self-incompatible, and therefore they need at least one other variety growing nearby to produce fruits. For this reason, it is advisable to always choose at least two varieties compatible for pollination to plant in a cultivation, in order to achieve a good level of production.

The fruits (which are really false fruits) vary in size, shape, consistency of the flesh, colour and sweetness, depending on the cultivar.

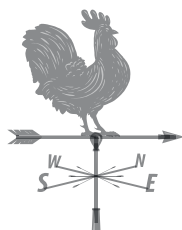




VEGETATIVE CYCLE

The fruiting pear tree flowers between the first and second ten day period in April: the majority of the flowers on the corymb open fully. One of the various peculiarities of this event is the fact that the pollen fertilises the ovary through cross-pollination. After this phase, the petals drop off on their own.

The fruits begin to ripen in the first part of June, and this process can continue until mid-October. The leaves fall during the winter, mainly in November and December; once this phase has finished, the pear plant begins its dormant period.



CLIMATE AND SOIL

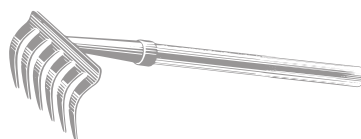
The ideal climate for pear cultivation is characterised by temperatures that drop no lower than -20 °C, which must allow the buds to come out of dormancy. The pear is a demanding species in terms of its need for the cold, because many cultivars need an average of 1000 hours in which the temperature stays below 7.2 °C. However, this depends on the variety.

A majority of the species tolerate polar temperatures of between -25 °C and -40 °C in winter, except for evergreen species, which only tolerate temperatures down to -15 °C.

Late varieties need a mild climate for full ripening of the fruits, and are better suited to areas where autumn temperatures are relatively mild. However, at least one month of vernalisation at temperatures close to 3-4 °C is still fundamental for them.

In terms of soil, the pear plant's requirements depend on the type of rootstock used. A pear tree that is grafted onto "franco" rootstock can adapt even to arid, calcareous and poorly irrigated soil, while a pear grafted onto quince rootstock needs fertile, deep soils with a high organic matter content, a neutral or slightly sub-alkaline pH, and a low limestone content.

Pear plants typically need a neutral substrate (pH values around 6.5-7), but they also adapt well to a sub-acid (pH value around 5-5.5) or calcareous (pH of 7.5-8) substrate. The ideal soil for this plant must be fresh and deep, with a medium texture.



CULTIVATION TECHNIQUES

Pear trees are planted in October-November, before the beginning of the real winter season. Alternatively, they can be planted in March.

For pear cultivation, it is possible to graft onto “franco” rootstock, which is supported by many varieties. Alternatively, grafts can be made onto quince rootstock: however, these types of plants need more care, and are more vulnerable to disease compared to plants grafted onto “franco” rootstock. Other methods for reproducing pear plants are through seeds, layering or marcottage. The planting holes must be dug to the right size, and soil fertilisation or modification can be used if it does not behave as predicted. If the decision is made to use an area of land solely for pear cultivation, it is necessary for the soil to be covered with grass, which will need to be cut regularly.

In the period immediately after the appearance of the fruitlets, it is important to check their state of health, and if necessary, remove those that are not healthy or present serious deformities. Irrigation for pear trees is a fundamental, delicate procedure: it is important to be careful not to supply too much water during vegetative growth and after the harvest, while attention should be paid to any water shortages pre- and post-flowering, as situations of water stress can follow. An adult pear plant, however, does not require specific irrigation methods, and can even last long periods without using them.

In terms of soil fertilisation, the fundamental elements are nitrogen, potassium and calcium, and in second place, phosphorus and magnesium. As soon as the plants have been put in the ground, it is possible to fertilise the soil around them with well-matured manure. In the spring, it is possible to add ammonium sulphate at a quantity of 400 g per 10 m² of cultivation, or to use 200 g of urea.

Every year in the autumn, directly below the surface layer of the soil, potassium and phosphate fertilisers can be provided (around 400 g per 10 m² of cultivation); every two years in the autumn, animal manure or well-matured compost can also be added.

In terms of pruning, it is important to thin out the branches, but not shorten them, because as this is a pomaceous plant, some of the branches that have already fruited would be removed; it is better to bend them than cut them.

Green pruning is important, especially when training the plants. The pear is a species that also adapts very well to mechanical pruning. The aim of pruning is to give the tree a shape that is as natural as possible, generally tending towards a pyramid shape.

PRODUCTION PROCESS

The pear harvest begins in June, and can extend until October, depending on the species.

The right moment is naturally indicated by precise factors such as the colour of the skin, resistance to picking, and the hardness of the flesh. The fruits should present an even colour, and a size that is typical for their cultivar.





It is important to pick the pears carefully, so that the stalk, which is woody, does not damage the top of the fruit.

Pears should be kept at low temperatures, around 3-4 °C, and they should in any case be eaten within a short space of time, around 1-2 weeks. Pears can also be kept in the refrigerator if there is no cool, well-ventilated environment available.

VARIETIES

- **Williams:** one of the best-known varieties, the Williams pear was selected for the first time around the end of the 1700s in the village of Aldermaston, England, and in Italy is grown mainly in the Po Valley and Emilia-Romagna. It is a medium-sized pyriform (pear-shaped) fruit, with a crisp, very juicy texture.
- **Conference:** this is the most classic pear, both in shape and colour. It has firm, juicy, sweet flesh, with a slightly tangy aftertaste.
- **Kaiser:** this pear has brown skin, sometimes tending towards a rusty colour, a slightly rounded shape, and can weigh over 200 g. Its flesh is juicy, firm and crisp, and resistant to high temperatures.
- **Abate:** discovered around the middle of the 15th century by Abbot Fetel, from whom it takes its name, today this is one of the most used varieties in Italy, where it has become the main pear crop. Its primary characteristic is its elongated shape and pale green skin, with mottled russetting that ranges from yellow to brown. Its flesh is white, juicy and slightly grainy, with a citrusy aftertaste.
- **Decana:** this variety originated in France. It has a rounded shape, with yellow-green skin, and juicy, solid flesh.
- **Rosada:** a pear with a rounded shape, the Rosada's colour turns from yellow to red to pink, with very small spots. Its firm, white, juicy flesh is very solid.
- **Passa Crassana:** typical of the winter months, this pear is found from October to the beginning of March. It has a rounded shape, and thick skin that is yellowish-green with rust-coloured spots. Its flesh is grainy.
- **Coscia:** a typically Italian variety, this is mainly grown in the central-southern regions. The fruit is small, with skin that ranges from yellow to red. Its flesh is juicy, sugary and grainy, with an intense flavour.
- **Santa Maria:** created from a cross between Williams and Coscia pears. Grown mainly in the south of Italy, this pear has a rounded shape, and yellow skin with small dark green spots.



PRODUCING COUNTRIES

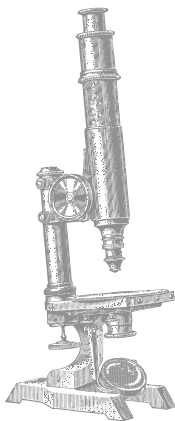
China is the world's primary producer of pears in terms of tonnage: indeed, almost 70 percent of global production is in China. After China, Italy, the United States, Argentina, Turkey and South Africa are the most important areas of production.



FUN FACT

Especially in the 1700s, pears were eaten as street food. They were sold along the road after being cooked, coated in caramel, and put on sticks for easy consumption. Vendors of this delicacy were known as "peracottari" in Italian, a term that is still in use today, but has taken on the meaning of a naive, clumsy person.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	323	16%
	kJ	1360	16%
Fats	g	0.4	1%
of which saturates	g	0.1	1%
Carbohydrates	g	65	25%
of which sugars	g	49	54%
Fibre	g	23	-
Protein	g	3.3	7%
Salt	g	0.18	3%
			NRV**
MINERALS			
Calcium	mg	57.4	7%
Iron	mg	0.95	7%
Magnesium	mg	49.0	13%
Phosphorus	mg	84.9	12%
Potassium	mg	903	45%
Zinc	mg	0.72	7%
Copper	mg	0.62	62%
Manganese	mg	0.35	18%
Selenium	µg	4.9	9%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.082	7%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	1.0	6%
Pantothenic acid	mg	0.21	4%
Vitamin B6	mg	0.13	9%
Folacin / Vit. B9	µg	2.30	1%
Vitamin B12	µg	0.42	17%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	2.5	21%
Vitamin D	µg	0	0%
Vitamin K	µg	0	0%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.38	
Monounsaturated fatty acids	g	0.038	
Oleic acid	g	0.030	
Polyunsaturated fatty acids	g	0.34	
Linoleic acid	g	0.30	
Alpha-linolenic acid	g	0.041	
Omega 3	g	0.041	
Omega 6	g	0.30	
Total omega 3 / total omega 6		3.6	

* RI: Reference Intake
** NRV: Nutrient Reference Value



STANDARD FOR DRIED PEARS

UNECE standard DDP-13 concerning the marketing and commercial quality control of Dried Pears, 2012 Edition

1. DEFINITION OF PRODUCE

This standard applies to dried pears of varieties (cultivars) grown from *Pyrus communis* L. intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. This standard does not apply to dried pears that are processed by sugaring, flavouring, or for industrial processing.

Dried pears may be presented in one of the following styles:

- peeled and unpeeled
- with core and coreless
- whole, halves, slices and pieces

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried pears at the export-control stage after preparation and packaging.

However, if applied at stages following export, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried pears must display the following characteristics:

- intact (only for wholes and halves); however, edges that are slightly torn, slight superficial damage and slight scratches are not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter
- sufficiently developed
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from blemishes, burns, areas of discolouration or spread stains in pronounced contrast with the rest of the produce, affecting in aggregate more than 5.0 percent of the surface of the produce – except for pear varieties with blushed surfaces
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and/or calcium chloride and a slight smell of preservatives/additives, including sulphur dioxide
- not gritty, except when grittiness is characteristic of the variety

¹ Definitions of terms and defects are listed in Annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.





The condition of the dried pears must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT²

The dried pears shall have a moisture content as follows:

- maximum of 22.0 percent for untreated dried pears
- maximum of 26.0 percent for dried pears treated with preservatives or preserved by other means (e.g. pasteurisation)
- between 26.0 and 40.0 percent for high moisture dried pears provided they are labelled as soft fruit and treated with preservatives or preserved by other means (e.g. pasteurisation)

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried pears are classified into the following classes:

“Extra” Class, Class I, and Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of dried pears is optional. However, when sized, size for wholes and halves is determined by diameter of the widest part.

The minimum size for whole and halves both peeled and unpeeled is 18 mm.

The maximum difference between the diameters of the largest and smallest fruit in any package is 20 mm.



²The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The Laboratory reference method shall be used in cases of dispute.



4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.

4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES ALLOWED percentage of defective produce (except for seeds), by number or weight		
	Extra	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements	10	15	20
of which no more than:			
Bruised fruit	3	5	10
Injuries, calluses and damage caused by heat during drying	5	8	10
Mouldy and Mildew Spots, of which no more than:	1	4.5	9
Mouldy	0.5	0.5	1.0
Fermentation	0.5	1	2
Rotting	0.5	0.5	1
Pest damage	2	2	6
Living pests	0	0	0
Grittiness among non-gritty pear varieties	1	2	3
b) Size tolerances (if sized)			
For produce not conforming to the size indicated, in total	10	15	20
c) Tolerances for other defects			
Dried pears belonging to varieties other than that indicated	10	10	10
Foreign matter, including dust	0.25	0.25	0.5
Stems among cored fruit	1	2	3
Seeds (in case of cored fruit) by number per kilogramme	9	14	22
Presence of pieces among whole and halved pears (by weight)	2	7	13





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried pears of the same origin, quality, style and size (if sized) and variety (if indicated).

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

The dried pears must be packed in such a way as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper and stamps bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package³ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or Dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁴.

6.2 NATURE OF PRODUCE

- “Dried pears”
- Style
- Name of the variety (optional)
- “Soft fruit” or “Soft pears” or equivalent denomination (when appropriate)
- “High moisture dried pears” or equivalent denomination (when appropriate)
- “Sun Dried” etc. (when appropriate) (optional)

³ These marking provisions do not apply to sales packages presented in packages.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded by the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.3 ORIGIN OF PRODUCE

Country of origin⁵ and, optionally, district where grown or national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- “Best before” followed by the date (optional)

⁵The full or commonly used name should be indicated.







peach

- *Prunus persica* -





BOTANICAL CLASSIFICATION

Class: *Magnoliopsida*

Order: *Rosales*

Family: *Rosaceae*

Genus: *Prunus*

Species: *P. persica*

Velvety and soft red. The skin of your beloved can be easily compared to a peach. This is the fruit of the *Prunus persica*, a plant in the *Rosaceae* family, of Chinese origin, where it is considered a symbol of immortality. As well as the flavour of its fruits, peach flowers are another wonderful feature of this plant, which is cultivated for its ornamental beauty.

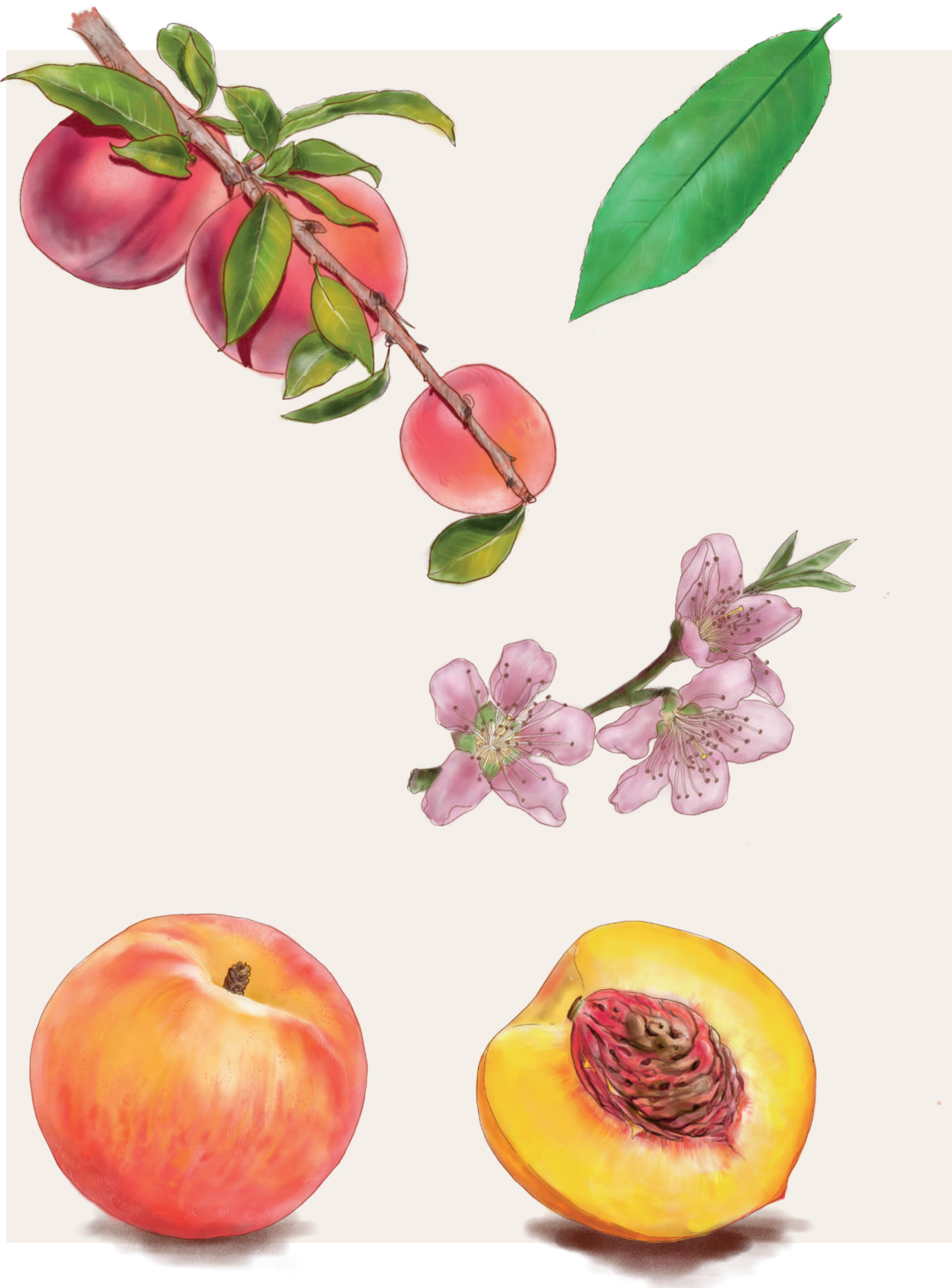
The trees are between 3 and 8 m tall, with a very shallow root apparatus. In younger plants, the bark is dark red; this colour becomes paler over time, tending towards grey. The branches are sparse and widely spaced, with a red-brown colour. The leaves grow from a short peduncle, and can be light or dark green. Peach leaves are lanceolate, with a serrated edge. With a maximum length of 15 cm, they are glossy on the top. The flowers, which bloom before the appearance of the leaves, are axillary pentamerous hermaphrodites, and can be more or less bright pink. They are located at the apex of the youngest branches, but not on developing shoots.

The fruits are fleshy drupes, which are juicy, sweet, and can be more or less acidic, with a rounded shape that has a longitudinal furrow on one side. The skin is reddish-yellow, sometimes brown, and can be thin and furry, or smooth (nectarines).

The flesh of a peach is sweet, with an intense fragrance.

Depending on the variety, it can be yellow or white, with red veining that is more visible close to the stone. There are two types of peaches, classified by how well the flesh attaches to the stone: clingstones (attached) and freestones (unattached).

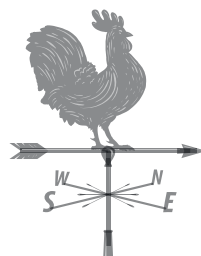
Protected by the flesh, the stone contains just one seed, which is deeply furrowed, with a characteristic bitter flavour due to the abundant presence of amygdalin.





VEGETATIVE CYCLE

For the areas that cultivate this plant, peach blossom is one of the most beautiful signs of spring. When its dormant phase ends, the plant is reborn with its pink blossom, creating buds and fruits that will be ready for harvest in mid-summer. Depending on the variety, each type of peach has its own harvest period, which can range throughout the summer season. Especially in the initial stages, peach trees require attention when it comes to pruning and the shape given to the tree and its crown. The shallow depth of the roots, resulting in low wind tolerance, is one of the characteristics to bear in mind when cultivating this plant.



CLIMATE AND SOIL

The peach finds its ideal climate in the sun, although it is able to tolerate minimum winter temperatures down to 15-18 °C below zero. While the plant is resistant during its winter dormancy, it is less able to tolerate drops in temperature during flowering. In fact, late frosts can cause significant damage to peach cultivations.

The ideal climate for the peach is therefore temperate, with average humidity values and not too much wind.

The possibility of using many different rootstocks allows this plant to be cultivated in various types of soil. It is important that there is a good percentage of organic matter, and soils that are too acidic should not be used. The plant also grows well in sandy soil, although it will need frequent watering to maintain a high concentration of organic matter. In terms of acidity, the soil should be neutral or slightly alkaline, with pH values of between 7 and 8.



CULTIVATION TECHNIQUES

The peach plant needs various interventions to grow at its best. It should be guided in its growth in order to regulate its trunk and its crown, with specific pruning techniques depending on requirements.

Shape through volume, vertical wall and inclined wall: these are the three main cultivation techniques, all determined by pruning and production goals.

These are techniques that can meet the need for the precise development of a specific shape, or early production. To pay off the investment in a short time, early production is one of the most common objectives of modern fruit farming.

Other elements of clear importance in peach cultivation are the choice of soil, and climate-related considerations such as wind, temperature and sun exposure. The climate around the peach tree should be warm, and it needs sunlight as soon as the stripling is planted. Peach trees should be planted in full sun, in moderately ventilated areas that are able to mitigate extreme temperatures in the winter and summer.

In terms of irrigation, the amount of water needed for peach cultivation should be decided based on the quality of the soil, the rootstock, the average rainfall and the variety. All production requires increased irrigation in the period between flowering and fruit set, and reduced irrigation during the lignification of the stone. Outside these phases, regular irrigation will facilitate optimal growth of the plant and its fruits.

The amount of water needed changes with every variety. Of course certain standards can be set, such as the need for frequent irrigation in loose soil, and a constant supply in the phases leading up to fruiting.

After water, nitrogen is maybe one of the most important elements for peach plants. The peach needs nitrogen more than other fruit trees, requiring fertiliser that is able to influence the quality and size of the fruits.

Ordinary soil fertilisation is usually recommended towards the end of the winter, and is carried out with ternary mineral fertilisers or organic fertilisers. It is important that this phase is completed before vegetative recovery.

Nitrogen fertilisation is useful, or even indispensable, and can also be used during the vegetative cycle and fruit growth. This procedure should be performed with the utmost attention to timing: late soil fertilisation has damaging effects on the quality of the produce, and the lignification of the shoots. There is also a risk of lowering the plant's defences against winter frosts. In order to prevent excess nitrogen from negatively influencing production, it is important to pay attention to the type of fertiliser, and consider the presence of potassium, which is a nutrient able to compensate for excess nitrogen.

In terms of managing the plant, pruning is an operation that affects its shape and fruit capacity. Production pruning begins immediately, with the peach tree already able to produce fruit in its second year of life, and reaching full production at around 4 or 5 years old. When the plant reaches full capacity, pruning needs to pay attention to maintaining a balance between vegetation and production. It is important to keep fruiting branches as close as possible to the main frame of the plant.

Considering the shape and structure of the peach tree, thinning operations are used to directly intervene in fruiting, in order to reach the desired commercial size for the fruit.

Thinning is usually carried out between the fourth and sixth week after flowering. If started early, it guarantees better fruit size, early ripening and a better colour. There are many varieties that require a double thinning process: an initial substantial operation, and a concluding one for finishing touches.



PRODUCTION PROCESS

The ripening of the fruits, and the resulting harvest, takes place between the first and second ten day period in May in southern areas, and up to the end of September for later cultivars. To determine the optimal moment for harvest, it is possible to use a penetrometer, along with checking the colour of the skin, in particular the base colour.

Peach cultivation usually requires more than one harvest. These are phases that use traditional methods, with the use of ladders or adequately equipped fruit harvesters.

VARIETIES

Cultivated in most of the world, there are many varieties of peach that are quite diverse in shape, colour, skin, flavour and texture. Italy has some of the most generous soils for bringing out these differences, producing some of the best quality fruits in the world.

The varieties mainly used for drying are described below.

- **Big Top:** this is the name of the benchmark peach for yellow-fleshed nectarines. The quality of this cultivar's fruits has made it a symbol, a "big top" in peach production. On top of their already significant size (average weight 159 g), they have a fragrant flavour, with firm flesh protected by smooth skin. The pleasant flavour of the Big Top is characterised by a slight tangy note.
- **Vistarich:** with a rounded shape, only slightly elliptical, the Vistarich is a large peach, generally classified under size codes A and AA, with consistent production that makes it a highly appreciated variety. This is a new generation cultivar, with red skin in a range of tones varying from orange to darker red. Its yellow flesh has a good texture and a balanced flavour.
- **Ali Top:** a nectarine with a medium-large size and a weight above 160 g, this variety flowers early and has medium-high productivity. It produces fruits with solid skin and flesh that tends to be yellow, with soft hints of acidity in their flavour.
- **Magique:** this white-fleshed nectarine has a rounded oblong shape, and yellow skin with a bright red top-colour on 80 percent of its surface. It has a good texture and a slightly tart flavour. It is a semi-freestone fruit, with flesh with a solid, melting texture; it ripens slowly. Its size is usually A-AA.
- **Orion:** the Orion variety is characterised by its size - very large, with an AA-AAA size code - and its regular spherical shape. The flesh of these peaches is yellow, veined with red around the stone, firm with a melting texture, and has a good, balanced flavour.



PRODUCING COUNTRIES

After China, Italy is the top country in the world for peach production. This position is challenged every year by Spain, another great European producer. Two other countries in the Mediterranean basin follow them: Greece and Turkey.

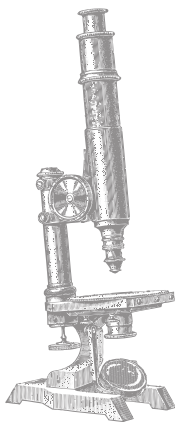
Focusing on Italian production, the best regions for these fruits are Campania, Emilia-Romagna, Piedmont, Sicily and Calabria.



FUN FACT

"Globose drupe"... Even in its precise botanical descriptions the peach is fascinating. The peach is older than humans, as fossil findings from the Late Pliocene found in the Yunnan province in China show. The first traces of the fruit, in this case its endocarps, have been dated to over 2.5 million years ago. Conducted by the Chinese Academy of Sciences, the research on peach fossils demonstrates the evolution of the fruit, developing over the centuries through natural selection, in its first interaction with large frugivorous mammals such as primates.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	325	16%
	kJ	1375	16%
Fats	g	0.6	1%
of which saturates	g	0.2	1%
Carbohydrates	g	68	26%
of which sugars	g	57	63%
Fibre	g	12	-
Protein	g	5.9	12%
Salt	g	0	0%
			NRV**
MINERALS			
Calcium	mg	31.1	4%
Iron	mg	1.3	9%
Magnesium	mg	55.3	15%
Phosphorus	mg	161	23%
Potassium	mg	1520	76%
Zinc	mg	0.86	9%
Copper	mg	0.57	57%
Manganese	mg	0.33	17%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.042	4%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	3.8	24%
Pantothenic acid	mg	1.1	18%
Vitamin B6	mg	0.19	14%
Folacin / Vit. B9	µg	9.90	5%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	7.1	59%
Vitamin D	µg	0	0%
Vitamin K	µg	15	20%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.41	
Monounsaturated fatty acids	g	0.042	
Oleic acid	g	0.029	
Polyunsaturated fatty acids	g	0.38	
Linoleic acid	g	0.28	
Alpha-linolenic acid	g	0.096	
Omega 3	g	0.096	
Omega 6	g	0.28	
Total omega 3 / total omega 6		0.34	

* RI: Reference Intake
** NRV: Nutrient Reference Value



STANDARD FOR DRIED PEACHES

Standard DDP-20 concerning the marketing and commercial quality control of dried peaches, 2008 Edition

1. DEFINITION OF PRODUCE

This standard applies to dried and re-hydrated peaches of varieties (cultivars) grown from *Prunus persica* Sieb. and Zucc., intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. This standard does not apply to dried peaches that are processed by sugaring, flavouring, or for industrial processing. Dried peaches may be presented in:

- wholes (pitted)
- halves (pitted peaches cut longitudinally into two equal parts before drying)
- slices (predominantly parallel-cut strips of irregular size and thickness)
- slabs (pieces of pitted sound peaches of irregular shape, size and thickness)

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried peaches at the export-control stage, after preparation and packaging.

However, if applied at stages following export, the holder shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried peaches must display the following characteristics:

- intact (only for wholes and halves); however, edges that are slightly torn, slight superficial damage and slight scratches are not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean; practically free of any visible foreign matter
- sufficiently developed
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from blemishes, areas of discolouration or spread stains in pronounced contrast with the rest of the produce, affecting in aggregate more than 5 percent of the surface of the produce
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture

¹ Definitions of terms and defects are listed in annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.





- free of foreign smell and/or taste, except for a taste of sodium chloride and a slight smell of preservatives/additives²

The condition of the dried peaches must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT³

Untreated dried peaches shall have a moisture content not exceeding 20.0 percent.

Dried peaches treated with preservatives or preserved by other means (e.g. pasteurisation) may have moisture content between 20.0 and 37.0 percent.

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, dried peaches are classified into the following classes:

“Extra” Class, Class I, Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of dried peaches is optional in all classes. However, when sized, size is determined by:

- diameter: the maximum diameter of the dried fruit
- count: the number of pieces (halves) of dried fruit per 1000 g or per pound (453.5 g)

4. PROVISIONS CONCERNING TOLERANCES

Tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.



² A slight smell of sulphur dioxide (SO₂) is not considered as “abnormal”. Preservatives may be used in accordance with the legislation of the importing country. Dried peaches may be sulphured in order to retain their original colour.

³ The moisture content is determined by one of the methods given in annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. reference method shall be used in cases of dispute.



4.1 QUALITY TOLERANCES

DEFECTS ALLOWED ⁴	TOLERANCES ALLOWED percentage of defective dried peaches by count or weight ⁵		
	"Extra" Class	Class I	Class II
(a) Tolerances for dried peaches not satisfying the minimum requirements,	10	15	20
of which no more than:			
Fermented or damaged by pests, rotting or mouldy, of which	2	3	5
Mouldy ⁶ :	1	1	2
Blemishes, discolouration and /or dirty fruits	3	5	10
Mechanical injuries, scars and calluses	3	5	8
Substantial defects in texture and heat injury	2	3	5
Living pests	0	0	0
b) Size tolerances For produce not conforming to the size indicated, if sized			
When sizing by count (the number of units per kilogramme/pound), a tolerance for counts above or below the specified range or screen is allowed	2	2	2
When sizing by diameter of the units, a tolerance, by count, for units not conforming to the indicated size or screen is allowed	10	10	10
c) Tolerance for other defects			
Presence of halves, slices or slabs among wholes	1	2	3
Presence of wholes, slices or slabs among halves	1	2	3
Foreign matter and extraneous vegetable material	0.5	0.5	0.5
Presence of whole pits within whole dried peaches	0.25	0.5	0.75
Presence of pit fragments among halves and pieces	1	3	5
Dried peaches belonging to varieties or commercial types other than that indicated	10	10	10

⁴ Standard definitions of the defects are listed in annex III of the Standard Layout for Dry and Dried Produce.

⁵ A minimum sample unit of one kilogramme is required for the test.

⁶ Reservation from Poland requesting 0.5 percent tolerance for mould in all classes.





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried peaches of the same origin, quality and size (if sized). In “Extra” Class, dried peaches must be similar in shape and appearance, with a distinctly uniform colour⁷. In Class I, dried peaches must be reasonably uniform in colour⁷.

The visible part of the contents of the package must be representative of its entire contents.

5.2 PACKAGING

Dried peaches must be packed in such a way as to protect the produce properly. The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non toxic ink or glue.

Packages must be free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

5.3 PRESENTATION

Dried peaches must be presented in bags or solid containers. All sales packages within each package must be of the same weight.

6. PROVISIONS CONCERNING MARKING

Each package⁸ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or Dispatcher: Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁹.

6.2 NATURE OF PRODUCE

- “Dried peaches”, together with the specification “wholes”, “halves”, “slices” or “slabs”
- “Re-hydrated” or equivalent denomination, if applicable
- Name of the variety and/or commercial type (optional)

⁷ For “Extra” Class, a maximum range of three consecutive colours is allowed, and for Class I a maximum range of five consecutive colours is allowed.

⁸ Package units of produce repacked for direct sale to the consumer shall not be subject to these marking provisions, but shall conform to national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units.

⁹ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.3 ORIGIN OF PRODUCE

Country of origin and, optionally, district where grown or national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- Crop year (optional)
- Moisture content (optional, but mandatory for high moisture)
- “Best before” followed by the date (optional)







plum

- *Prunus domestica* L. -



BOTANICAL CLASSIFICATION

Class: Magnoliopsida

Order: Rosales

Family: Rosaceae

Genus: *Prunus*

Species: *P. domestica*

The *Prunus domestica* plant is a deciduous tree, probably deriving from a hybridisation between *Prunus spinosa* and a variety of *Prunus cerasifera*.

Also known in Italian as a "susino", the plant can reach a height of 6-10 m, although it normally stops at around 5-6 m. It has an average lifespan of 30 years, and takes from 6 to 8 years to become productive. Depending on climate conditions and the variety, grafted trees can already begin to produce from the third year; on average, a 4-year-old tree will produce around 150 fruits, which rises to 1,400 when it reaches 7 years old.

The trunk is covered with glossy, smooth, bluish-brown bark. It produces alternate branches that are small, thin, and sometimes smooth and hairless, sometimes pubescent and villous.

The leaves are green, oblong and serrated, and are smooth on the top and pubescent on the underside. The flowers appear on small, short 1-year-old branches, and are white and solitary, with shorter peduncles than cherry blossom, pubescent and squashed, with small buds covered in rough scales; they have a chalice-shaped torus with the sepals, petals and stamens attached to its edges, and the ovary at the bottom. There are five sepals, alternating with the five petals, which are free, narrow at the base, and have a scalloped edge. There are numerous stamens, with bilobed anthers. The ovary is oval-shaped, and contains two ovules in one cavity.

The fruit is a round or oval drupe, covered with whitish wax (wax bloom, which protects the fruit from ultraviolet rays and prevents excessive dehydration). It is yellow, red or purple, with a medium-sized furry stem, and a compressed oblong stone that is quite rough, with a single rib on one side. Inside the stone are two seeds, or more often only one, due to the abortion of the other. The seeds lose their germination capacity after one month. The flesh is solid and compact, usually sweet and succulent, and sometimes tart due to the presence of tartaric and citric acid.

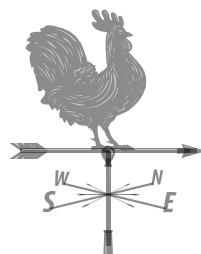




VEGETATIVE CYCLE

During winter dormancy, the buds are brown, inactive and completely closed. When the spring arrives, they tend to swell until they take on an elongated shape. The perulae open, revealing the pale green sepals, which turn white and prepare for flowering. Shortly afterwards, the petals begin to open, revealing the stamens; at this point, the flowers are fertilised, leading to full bloom.

Once the petals fall off and the stamens begin to dry out, the ovaries swell and the fruitlets they form push the dried collar of the torus upwards, until the fruit is fully formed.

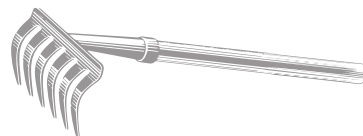


CLIMATE AND SOIL

This plant is highly adaptable to diverse climate conditions, and is relatively rustic and resilient; it can tolerate warm-temperate climates, and the cold-temperate climates of northern latitudes, where the winter begins early and temperatures drop to -25 °C.

Climate-related factors, in particular light intensity and air temperature, are important for both the tree's optimal growth and its yield.

The *P. domestica* develops without particular problems, especially when planted in deep, medium-textured, fertile soils full of nutrients, but it also tolerates more difficult soils. However, it prefers clay-rich and calcareous soils that are rich in organic matter, always with good drainage. It is fundamental that the substrate does not allow waterlogging, which could cause root rot.



CULTIVATION TECHNIQUES

The planting of plum trees takes place in the autumn, before temperatures drop and the risk of frost arrives. Particular attention should be paid to good sun exposure and the depth of the root apparatus: this must be the same as the plant had in the nursery, allowing for the settling of the soil in the hole or furrow, to avoid the risk of scion rooting.

When planting a new orchard, it is essential to prepare the soil and create the ideal conditions for the correct growth of the young plum trees.

Trenching to a depth of 80-100 cm should be performed (the layer of soil in which almost the entire root system is contained). The trees should be arranged according to a geometric layout, forming parallel rows with space between the rows that permits the transit of machinery. The spacing used has the purpose of obtaining high quality fruit and an orchard with a high production capacity. For this purpose, layouts are used that allow sunlight to reach the entire crown of the trees, and facilitate interventions.

After this, the soil should be harrowed: this is an operation that aims to implement good basic fertilisation to enrich the soil, especially with phosphorus and potassium, and smaller quantities of nitrogen. Following this are indispensable operations to drain and level the earth, to prevent waterlogging, which is always damaging to the root apparatus of all fruit trees. Plotting and planting the trees in the holes is performed using special drills, and concludes the preparation process for the new orchard.

Irrigation is a highly important operation, especially during flowering, fruit set and fruit development: it is essential to maintain continuous vegetative activity, without causing unnecessary and damaging situations of water stress. The availability of water in the soil depends on its structure, but the majority of orchards receive water through irrigation, which is greatly needed, especially in the summer.

In terms of pruning, during the plant's training phase, "green" pruning is preferable, because it facilitates the success of the chosen final structure.

Intervention methods vary depending on the training technique chosen, and the method used for this agricultural practice has a considerable influence on the qualitative and quantitative results of production, as well as on other characteristics of the orchard, such as the availability of light and the growth of the crown - and therefore the longevity of the plantation.

Production pruning is indispensable to guarantee the renewal of the productive parts of the tree. In this case too, green pruning is preferable, while winter pruning should be considered for finishing.



PRODUCTION PROCESS

While it varies depending on the individual cultivar, plums generally ripen between late August and early September, making them ready for harvest.

Especially for the production of dried products, the end of summer is the point at which the sensory qualities of the fruit are ideal for a successful drying process.

With the fruits fully ripe, the speed of the harvest becomes important, and it is generally performed using tree shakers. The speed of this system makes it widely used in plum production.

VARIETIES

The cultivars of the *Prunus* originated in Asia, Europe and America, and derive from various species grouped into three main categories: the Asian-European group (*P. domestica*, *P. insititia*, *P. cerasifera*); the Sino-Japanese group (*P. salicina*); the American group (*P. americana*).

The varietal differences (as well as the area of cultivation, climate and agricultural methods) influence the quality of the fruit, also determining the type of consumption (fresh or processed).

- **Anna Spath:** a plant originating in the Hungarian town of Kadoszberg, its fruit is medium-large, with a truncated elliptical shape. The skin ranges from purple-red to blue-violet, sometimes with pale spots. The flesh is greenish-yellow, firm, not very juicy, but sugary, aromatic and pleasant.
- **D'Agen:** large, oval fruits, with a deep violet colour, and juicy, solid, sweet flesh. Excellent for drying.
- **Greengage:** this cultivar generally has high production, but tends to alternate. The fruit is small, spherical and slightly flattened at the poles. The skin and flesh tend to be yellowish-green. It is very sweet and aromatic. It is considered one of the best varieties available.
- **Ruth Gerstetter:** a plant that produces medium-small fruits, with waxy, purplish-brown skin and firm, yellow-green flesh with some reddish veining. It is not very juicy, and has a sweet and tangy flavour.
- **Santa Rosa:** this plant was developed in the early 1900s in the United States; it is highly vigorous with medium productivity. Its fruit is large, generally round, with yellow skin spotted with very bright purplish-red. The pinkish-yellow flesh veined with red is sweet, firm and attached to the stone.



PRODUCING COUNTRIES

Asia and Europe are the continents where plum cultivation is most widespread. China is the global leader in production in terms of tonnage, and Iran, Turkey and India are the other Asian countries with significant *Prunus* cultivation.

Serbia and Romania are the most prolific areas of production in Europe. Italy also numbers in the top 10 producers of plums.

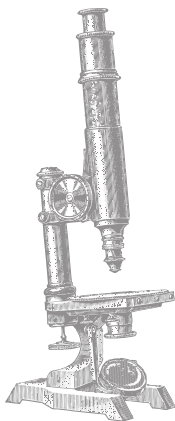


FUN FACT

The plum is an ancient fruit that was introduced to Europe around 20,000 years ago. It originated in Eurasia and North America. The first records of its presence in Italy can be dated to the 1st century AD, thanks to Pliny the Elder, who mentioned it in his *Naturalis historia*.

In close proximity to *Prunus spinosa* trees, and *Rosaceae* spinose in general, it is not uncommon to find the *Calocybe gambosa*, an excellent edible mushroom that appears in the spring with an intense smell of flour, commonly known in Italy as the "Prugnolo" mushroom.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	310	15%
	kJ	1309	16%
Fats	g	0.4	1%
of which saturates	g	0.1	1%
Carbohydrates	g	67	26%
of which sugars	g	51	57%
Fibre	g	13	-
Protein	g	3.0	6%
Salt	g	0	0%
			NRV**
MINERALS			
Calcium	mg	25.0	3%
Iron	mg	0.88	6%
Magnesium	mg	33.1	9%
Phosphorus	mg	71.3	10%
Potassium	mg	862	43%
Zinc	mg	0.49	5%
Copper	mg	0.39	39%
Manganese	mg	0.29	15%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0	0%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	1.6	10%
Pantothenic acid	mg	0.94	16%
Vitamin B6	mg	0.17	12%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	1.9	16%
Vitamin D	µg	0	0%
Vitamin K	µg	21	28%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.28	
Monounsaturated fatty acids	g	0.084	
Oleic acid	g	0.070	
Polyunsaturated fatty acids	g	0.19	
Linoleic acid	g	0.083	
Alpha-linolenic acid	g	0.11	
Omega 3	g	0.11	
Omega 6	g	0.082	
Total omega 3 / total omega 6		1.3	

* RI: Reference Intake
** NRV: Nutrient Reference Value

STANDARD FOR PRUNES

UNECE standard DDP-07 concerning the marketing and commercial quality control of Prunes¹, 2021 Edition

1. DEFINITION OF PRODUCE

This standard applies to prunes (dried ripe plums) of varieties (cultivars) grown from *Prunus domestica* L. intended for direct consumption or for food when intended to be mixed with other products for direct consumption without further processing. This standard does not apply to prunes that are processed by salting, sugaring, flavouring or roasting or for industrial processing. Prunes may be presented in one of the following styles:

- whole, unpitted; from which pits have not been removed
- whole, pitted; from which pits have been removed

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for prunes after preparation and packaging.

However, if applied at stages following export or dispatch, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products may not display such products or offer them for sale or deliver or market them in any manner other than in conformity with this standard.

2.1 MINIMUM REQUIREMENTS²

In all classes, subject to the special provisions for each class and the tolerances allowed, the prunes must be:

- without peduncle
- fleshy, the flesh being elastic and pliable
- sound; produce being affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free from any visible foreign matter
- free from living pests, whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from damage to skin and/or flesh affecting an aggregate dimension more than 20 mm in diameter such as:
 - callous growth-cracks occurring at the ends of the prunes, scars, splits or breaks
 - splits or breaks exposing a substantial part of the flesh and seriously affecting the appearance of the fruit
 - cracks, splits or breaks down to the stone in unpitted prunes
- free from mould filaments and insect/mites/parasite damage visible to the naked eye
- free of fermentation

¹ In some countries “prunes” is used interchangeably with “dried plums”. For ease of reading, the word “prunes” is used throughout the text. Anywhere it appears in the standard, the words “dried plums” can be substituted, including in the marking provisions.

² Definitions of terms and defects are listed in Annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.



- free of abnormal external moisture
- free of foreign smell and/or taste

The condition of the prunes must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

2.2 MOISTURE CONTENT³

The prunes shall have a moisture content not exceeding 35.0 percent.

However, prunes with a moisture content exceeding 35.0 percent should be labelled as high moisture or equivalent denomination.

Prunes may be treated with preservatives or preserved by other means (e.g. pasteurisation).

2.3 CLASSIFICATION

In accordance with the defects allowed in section “4. Provisions concerning tolerances”, prunes are classified into the following classes:

Class I and Class II

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Sizing of prunes is determined by the number of prunes per 500 g or per 1 lb (453 g). These stated designations are not correlated.

Pitted prunes must be sized after pitting.

To ensure uniformity in size, the subsequent tables or the numeral categories must be applied.



³ The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.

SIZE NOMENCLATURE BY WEIGHT, FOR COUNT

TABLE A - DESIGNATION PER 500 g

Designation	Number of prunes per 500 g	
	Pitted prunes	Unpitted prunes
Super giant	Not more than 44	Not more than 32
Giant	From 45 to 56	From 33 to 44
Very large	From 57 to 72	From 45 to 55
Large	From 73 to 84	From 56 to 66
Medium	From 85 to 100	From 67 to 77
Small	From 101 to 120	From 78 to 99
Very small	More than 120 prunes	More than 99

TABLE B - PITTED PRUNES DESIGNATION PER POUND (453 g)

Designation	Number of prunes per pound (453 g)
Extra large	Not more than 36 to 43 prunes
Large	From 44 to 53 prunes
Medium	From 54 to 67 prunes
Small	From 68 to 85 prunes

NUMERICAL CATEGORIES

Size categories may also be described numerically by the range of average count per 500 g or per pound (453 g), for example: 30/40; 35/45; 90/120 etc.

“PRESSURE-PITTED PRUNES”

Sizing of pressure-pitted prunes is optional.



4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum characteristics of the class indicated.

DEFECTS ALLOWED (percentages by weight or number)	UNPITTED PRUNES		PITTED PRUNES	
	Class I	Class II	Class I	Class II
(a) Tolerance for produce not meeting the minimum requirements	10	15	10	15
of which no more than				
Non-characteristic colour and texture	10	15	10	15
Fermented	1	2	1	2
Damaged by pests ^a	2	4	2	4
Rotten or deteriorated ^a	1	2	0.5	2
of which mouldy ^a	0.5	1	0.5	1
Skin or flesh damage, calluses, heat injury	2	4	2	4
End cracks	0	0	8	10
(b) Size tolerances (if sized)				
For produce not conforming to the size indicated, in total, depending on the characteristics of the product	10	10	10	10
(c) Tolerances for other defects				
Extraneous matter i.e., stem (attached or pieces), leaves (whole or pieces) (by weight)	1	1	1	1
Foreign matter such as stones, metal, and glass (by weight)	0.1	0.1	0.1	0.1
Whole pits and pit fragments among pitted fruit	0	0	2	2

^a France does not permit tolerances for produce affected by pest damage, rot and mould.





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only prunes of the same origin, quality, size (if sized), variety (if indicated), crop year (if indicated). The visible part of the contents of the package must be representative of the entire contents. Prunes in Class I must be of the same variety.

5.2 PACKAGING

Prunes must be packed in such a way as to protect the produce properly. The materials used inside the package must be clean and of a quality so as to avoid causing any external or internal damage to the produce. The use of materials, particularly paper or stamps bearing trade specifications, is allowed provided the printing or labelling has been done with non-toxic ink or glue. Packages must be free of all foreign and extraneous matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package⁴ must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁵ if a country applying such a system is listed in the UNECE database.

6.2 NATURE OF PRODUCE

- Name of the produce: the words “prunes” “dried plums”, “unpitted prunes” “prunes with pits” “pitted prunes” or “pressure-pitted prunes”
- Name of the variety (optional)
- High moisture or soft prunes or equivalent denomination and moisture content, where appropriate

6.3 ORIGIN OF PRODUCE

Country of origin⁶ and, optionally, district where grown or the national, regional or local place name.

⁴ These marking provisions do not apply to sales packages presented in packages.

⁵ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.

⁶ The full name or commonly used name should be given.





6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size expressed in accordance with the provisions of section 3, either:
 - As the minimum and maximum number of prunes contained in 500 g or 1 lb (453 g), by “X/Y prunes per 500 g” “X/Y prunes per pound”
 - By the corresponding designation per 500 g or 1 lb (453 g)
- Crop year (optional)
- “Best before” followed by the date (optional)/mandatory for high moisture produce
- Net weight





grape

- *Vitis vinifera* L. -





BOTANICAL CLASSIFICATION

Class: Magnoliopsida

Order: Rhamnales

Family: Vitaceae

Genus: Vitis

Species: *V. vinifera*

Botanically, the grape is a berry, classified as a fleshy fruit with multiple seeds. It develops from the inflorescence of the *Vitis vinifera*, a woody plant that, unlike other species, is not able to support itself, because it is a climbing shrub.

Covered with a characteristic rhytidome, the stem of the vine has a twisted shape, and after its initial vertical growth, it continues horizontally or diagonally.

The roots of the *V. vinifera* are divided into taproots, which grow from the seed, from which the smallest roots develop, and adventitious roots, which grow from the scion. They are usually close to knots, and are fasciculated, with uniform development.

The leaves are simple, distichous and alternate, formed by a petiole of varying length and a palmately lobed lamina with five main veins that can form the same number of lobes, separated by clefts (whole, trilobate or pentalobate leaves). Vines display a phenomenon called heterophyly, which means the presence of different forms and sizes of leaf on one plant.

The buds on a vine are found at the base of the petiole and the leaves, where they are arranged in groups ranging from 2 to more than 5. Very close together, the fruit-bearing shoots develop from the main bud.

The flowers form an inflorescence known as a compound cluster or panicle, attached to the shoot. The inflorescence is formed by a main axis (rachis) that holds the racemes, divided into various systems; the last of these is called the pedicel, and carries the flower. The flowers are hermaphrodite, and the number per cluster is highly variable (up to 100).

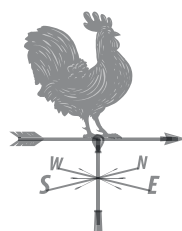
Once the flower has been fertilised, the ovary transforms into a small grape (fruit set), which gradually grows in volume and weight, becoming a fruit with the botanical classification of berry.





VEGETATIVE CYCLE

In the *V. vinifera*, there are three cycles that describe the entire life of the plant and its production. The first is the life cycle, and involves four phases: the first two years of the plantation; growing productivity from the 3rd to the 6th year; a phase of consistent productivity from the 7th to the 20th-25th year; the final phase of declining productivity, until the removal of the plants. The second cycle, known as the biennial cycle, launches fruiting. This is when the plant forms hibernating buds after a year of preparation, ready to fruit the following year. The third cycle is annual, and its various phenological stages are divided into vegetative and reproductive phases.



CLIMATE AND SOIL

The vine is a plant that adapts well to various types of climate. It is fundamental to evaluate the level of sunlight - which determines the sugar content and ripening period of the grapes - and the temperature, which influences all growth phases of the plant.

Vines need different amounts of water depending on the vegetative period. Low rainfall during the winter encourages the plant to recover, but after fruit set, the shoots generally stop growing and the grapes do not ripen. Serious damage can also be caused by summer droughts, because this means that there is not enough availability of water precisely at the time when the plant particularly needs it. Excessive rain during the summer or autumn is also damaging.

Based on the different phenological stages, optimal temperatures are around 9-10 °C during germination, around 18-22 °C for flowering, around 21-22 °C during veraison, from 20 to 24 °C between veraison and ripening, and around 18-22 °C for the harvest period.



CULTIVATION TECHNIQUES

During the 1800s, three forms of blight - powdery mildew, downy mildew and phylloxera - had a strong influence on vine cultivation techniques, leading to the introduction of rootstock.

Rootstocks have good resistance to phylloxera, and also have good properties in terms of adaptability to soil, graft compatibility, vigour and resistance to nematodes. One of the problems that must be resolved through the use of suitable rootstocks for vines is resistance to limestone, a chemical substance that causes iron deficiency in the soil and the plant, strongly limiting its production capacity. The rootstock must also be resistant to excessive humidity and drought, and to excessive presence of salts in the soil.

Soil fertilisation should be performed using trenching at a depth of 80-100 cm, or scissure to the same depth. After trenching, it is worth checking the level of the ground, in order not to leave any depressions that could create problems of waterlogging. If the ground is not particularly sloped, before planting the vine shoots it is good practice to finish the soil using a rotary harrow, in order to form a good substrate around the seedlings.

Plant varieties, soil types and climate conditions determine the different planting methods to use, whether manual or mechanical. Manual planting is performed by making a hole in the soil with a pole, to a depth of 30 cm, and inserting the vine shoot. Mechanical techniques involve the use of towed planting machines, which save a significant amount of time.

The year after planting, supports are usually positioned; these are appropriately chosen by the vine grower, between prestressed concrete braces, wooden stakes or steel poles. The number of stakes per hectare varies depending on the density of the plantation, although generally braces are positioned every 5-6 m.

However, there is no fixed rule when it comes to vine cultivation: every form of viticulture has a maximum limit of plants per hectare which shouldn't be exceeded; every quality goal has its own balance between the training technique and the number of vines per hectare; every wine-growing area has soil and climate conditions that impose certain limits; and every variety has its own growth habit that needs to be carefully considered.

PRODUCTION PROCESS

The plant variety, soil and climate conditions of the area of cultivation and production goals determine the right period to harvest the grapes, which are generally ripe and ready for harvest between August and September.

The grape harvest can be performed by hand, by cutting the clusters where they are attached to the productive branch, or mechanically, by shaking the plant and causing the fruit to fall.

Later processing depends on production purposes: winemaking, drying, preparation for fresh consumption, or transformation into juice.



VARIETIES

From their different forms of consumption to their numerous varieties, there are a great many grape cultivars around the world. As this book is dedicated to dried fruit, the grapes listed below are those processed and sold as raisins.

- **Sultana:** known as Thompson Seedless, this variety originated in Asia Minor, in an area that is now part of Iran and Turkey. It produces fruits that typically reach 21 °Brix from the first week of September. The peak harvest period is from the 25th August to the 10th September, but it can last from the 20th August to the 20th September, depending on the season and the condition of the vineyard.
- **Black Corinth (currant):** a variety with small, black berries, Black Corinth grapes usually reach 22-24 °Brix from the 15th to the 20th August; readings of 26-30 °Brix are common, especially when the grapes have dried on the vine. The harvest is made difficult by dense foliage and small clusters that break easily.
- **Izmir Grape (sultana):** this is produced in Asia Minor, in particular in the area around Izmir. These are isolated grapes complete with their stalks, generally well-defined, dry, regular, oval or elliptical, a little flattened, 12-14 mm long and 7-10 mm wide, with a golden or reddish colour.
- **Malaga Grape:** the artisan practice of drying grapes in the province of Malaga dates back to ancient times, and has created a major industry. Good quality Malaga Grapes are formed in whole bunches, with an angular reddish-yellow stalk and large grapes with a beautiful purple colour and a slightly whitish patina (wax bloom), resistant but flexible skin, and crisp, fleshy pulp that is relatively sweet.
- **Flame Seedless:** an early-fruiting red seedless variety. Very productive, it has an excellent flavour and round grapes that are crisp when fresh.





PRODUCING COUNTRIES

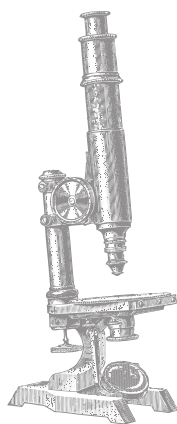
Spread throughout the world, grapes are mainly produced in China, followed by Italy, the United States and Spain. Turkey and the United States are the leaders when it comes to the production of raisins.



FUN FACT

There is no certain place or date for the origin of viticulture, but there are many traces of it in ancient literature and along the first trade routes between Asia and the Mediterranean. Many agree that the vine originated in India, and from there, in the third millennium BC, it spread first to Asia and then to the Mediterranean basin. From then on, vine cultivation developed in almost all the countries in the Mediterranean.





Nutritional properties

Laboratory:
Eurofins

			RI*
ENERGY	kcal	324	16%
	kJ	1373	16%
Fats	g	1.2	2%
of which saturates	g	0.3	2%
Carbohydrates	g	73	28%
of which sugars	g	69	77%
Fibre	g	4.8	-
Protein	g	2.9	6%
Salt	g	0.07	1%
			NRV**
MINERALS			
Calcium	mg	30.4	4%
Iron	mg	1.5	11%
Magnesium	mg	40.2	11%
Phosphorus	mg	99.4	14%
Potassium	mg	716	36%
Zinc	mg	0.10	1%
Copper	mg	0.42	42%
Manganese	mg	0.27	14%
Selenium	µg	0	0%
VITAMINS			
Vitamin C	mg	0	0%
Thiamine / Vit. B1	mg	0.060	5%
Riboflavin / Vit. B2	mg	0	0%
Niacin / Vit. PP	mg	0.36	2%
Pantothenic acid	mg	0.070	1%
Vitamin B6	mg	0.17	12%
Folacin / Vit. B9	µg	0	0%
Vitamin B12	µg	0	0%
Vitamin A / Retinol	µg	0	0%
Vitamin E	mg	1.5	13%
Vitamin D	µg	0	0%
Vitamin K	µg	11	15%
Biotin / Vit. H	µg	0	0%
UNSATURATED FATTY ACIDS			
Unsaturated fatty acids	g	0.90	
Monounsaturated fatty acids	g	0.27	
Oleic acid	g	0.24	
Polyunsaturated fatty acids	g	0.63	
Linoleic acid	g	0.59	
Alpha-linolenic acid	g	0.024	
Omega 3	g	NA***	
Omega 6	g	NA***	
Total omega 3 / total omega 6		NA***	

* RI: Reference Intake

** NRV: Nutrient Reference Value

*** NA: not analysed



STANDARD FOR DRIED GRAPES

UNECE Standard DDP-11 concerning the marketing and commercial quality control of Dried Grapes, 2016 Edition

1. DEFINITION OF PRODUCE

This standard applies to seed-bearing and seedless dried grapes from varieties (cultivars) grown from *Vitis vinifera* L. intended for direct consumption.

2. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements for dried grapes at the export control stage, after preparation and packaging.

However, if applied at stages following export, the holder/seller shall be responsible for observing the requirements of the standard. The holder/seller of products not in conformity with this standard may not display such products or offer them for sale, or deliver or market them in any other manner.

2.1 MINIMUM REQUIREMENTS¹

In all classes, subject to the special provisions for each class and the tolerances allowed, the dried grapes must display the following characteristics:

- intact; however, slight superficial damage is not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from mould filaments visible to the naked eye
- free from underdeveloped berries
- free from capstems exceeding 3 mm in length, except for lots presented with capstems
- free from sugar crystals visible to the naked eye
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and or calcium chloride and a slight smell and taste of vegetable oil and preservatives/additives, including sulphur dioxide

The condition of the dried grapes must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

¹ Definitions of terms and defects are listed in Annex III of the Standard Layout – Recommended terms and definition of defects for standards of dry (Inshell Nuts and Nut Kernels) and dried produce <<https://unece.org/trade/agr/DDP-Standards>>.





2.2 MOISTURE CONTENT²

The dried grapes shall have a moisture content not exceeding:

- 18.0 percent for seedless varieties except for the Monukka variety at 19.0 percent
- 20.0 percent for currants
- 19.0 percent for seed-bearing varieties and
- 31.0 percent for the Malaga Muscatel variety treated with preservatives or preserved by other means³

2.3 CLASSIFICATION

In accordance with the defects allowed in section "4. Provisions concerning tolerances", dried grapes are classified into the following three classes:

"Extra" Class, Class I and Class II.

The defects allowed must not affect the general appearance of the produce as regards quality, keeping quality, and presentation in the package.

3. PROVISIONS CONCERNING SIZING

Size is optional in all classes. Size is determined by:

- screening, i.e. minimum diameter; or
- count, i.e. maximum number of berries per unit of 100 g

4. PROVISIONS CONCERNING TOLERANCES

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the minimum requirements of the class indicated.



² The moisture content is determined by one of the methods given in Annex I of the Standard Layout – Determination of the moisture content for dried produce <<https://unece.org/trade/agr/DDP-Standards>>. The laboratory reference method shall be used in cases of dispute.

³ Reservation from Greece in favour of a moisture content of 15 percent for sultanas or raisins and 16 percent for currants.





4.1 QUALITY TOLERANCES

DEFECTS ALLOWED	TOLERANCES FOR DEFECTIVE FRUIT					
	Percent by weight			Pieces by count per 100 g		
	Extra Class	Class I	Class II	Extra Class	Class I	Class II
(a) Tolerances for produce not satisfying the minimum requirements						
Total tolerance	6	10	15			
Underdeveloped berries						
seedless	2	3	5			
seedbearing	2	5	8			
for currants	1	2	5			
Mouldy ⁴	2	3	4			
Damaged by pests, sunburn, mechanical damage						
for seedless	2	3	5			
for seedbearing	3	4	5			
for currants	1	2	3			
Living pests (only for seedless varieties)	0	0	0			
Berries having seeds in seedless types				2	2	2
Berries with capstem* attached						
for seedless				3	4	5
for seedbearing				3	4	5
for currants				2	3	3
(b) Size tolerances, if size is indicated						
For produce not conforming to the size indicated, in total	10	10	10			
(c) Tolerances for other defects						
Extraneous vegetable material excluding pieces of stem	0.01	0.02	0.03			
Mineral impurities	0.01	0.01	0.01			
Sugared	5	10	15			
Seedless	6	10	15			
Seed bearing/currants	5	10	15			
Pieces of stem (per 1 kg)				1	2	3

* The tolerance for capstems applies only to dried grapes presented without capstems.

⁴The national legislation of Switzerland does not permit tolerances for produce affected by mould, or the presence of dead or living insects. For seed bearing varieties, Poland considers that the tolerance for visible mould should be 0.5 percent in all classes.





5. PROVISIONS CONCERNING PRESENTATION

5.1 UNIFORMITY

The contents of each package must be uniform and contain only dried grapes of the same origin, quality, size, commercial type, and if indicated, crop year and/or variety.

The visible part of the contents of the package must be representative of the entire contents.

5.2 PACKAGING

Dried grapes must be packed in such a way as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be practically free of all foreign matter in accordance with the table of tolerances in section “4. Provisions concerning tolerances”.

6. PROVISIONS CONCERNING MARKING

Each package⁵ must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

6.1 IDENTIFICATION

Packer and/or dispatcher:

Name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognised by the national authority⁶.

6.2 NATURE OF THE PRODUCE

- “dried grapes” or “raisins” or “currants”
- Commercial type expressed as
 - seedless may be replaced by “Sultana” or Thompson Seedless where appropriate
 - seed bearing
- Name of variety (optional)
- Type of presentation: “Clusters” (when appropriate)
- “With capstems” (when appropriate)

⁵ Sales packages should bear the following particulars: name of the produce, net weight and origin.

⁶ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in cases where a code mark is used, the reference “packer and/or dispatcher” (or equivalent abbreviations) must be indicated in close connection with the code mark, and the code mark should be preceded with the ISO 3166 alpha country code of the recognising country, if not the country of origin.



6.3 ORIGIN OF THE PRODUCE

Country of origin⁷ and, optionally, the district where grown or the national, regional or local place name.

6.4 COMMERCIAL SPECIFICATIONS

- Class
- Size (if sized); expressed in accordance with section 3
- Crop year (optional)
- “Best before” followed by the date (optional)
- "Naturally dried" (optional)

⁷The full or commonly used name should be indicated.







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