



CHILLIES (PUNGENT CAPSICUMS)

Chillies are the pungent (hot) fruits of selected types of annual and short term perennial Capsicums from three main different species (*C. annum*, *C. frutescens*, and *C. chinense*). Whole chillies are the juiceless and dried pods of plants of the Capsicum genus. Dimensions vary from 20 mm to 120 mm long and 4 mm to 50 mm wide. Colour varies widely according to variety as well as duration and quality of storage. All chillies contain a pungent principle made up of capsaicinoids.

Dry chillies (or pungent capsicums) are widely used throughout the world to add pungency to food. Chillie oleoresin is used in the food processing and pharmaceutical industry. Fresh chillies are also an important export item but they are considered a vegetable not a spice.

Form

There are a wide range of products based on whole or ground chillie entering world trade. The terminology for these products can be confusing, and definitions can vary between and even within markets. Chillies are used in whole dried or chopped form or as a ground powder. Chillie paste and chillie sauce are also frequently sold. An oleoresin is produced.

The key parameters for any dried chillie product are pungency level (measured in % capsaicin or Scoville Units) and colour (measured in ASTA colour units). In addition, size and appearance may be important. Producers should be sure that they understand exactly what the market requires.

Production and Processing

Great care should be taken over variety selection for yield, pungency content and colour values, as well as annual/perennial types. Perennial varieties (which include the highly pungent Birdseye types) are generally only cropped for three years at most. With increasing age, yields and pungency levels fall. These chillies are

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continually harvested as they ripen. With annual types, fruit can be left to partially wither on the plant before the whole crop is harvested. Well known varieties include Chinese Fukien Rice, Li Ling, Mexican Ancho and Tabasco, and East African Malawi, Ugandan and Mombasa chillies.

Annual types require a minimum of 600 to 900 mm rainfall during the growing season; perennial types benefit from higher levels. The crop is not tolerant to frosts, and does not grow well where average temperatures are below 12 to 15°C. Temperatures above 32°C cause flower drop and can reduce yields substantially. Soils should be well drained. The crop can be direct seeded in the field, or sown in nurseries and transplanted. Seed rates vary widely depending on final plant size (a variety characteristic). For direct seeding, seed rates are in the range of 5 to 10 kg/ha; for nursery operations, 1 kg of seed should give sufficient plants for 1 ha. The crop suffers from a wide range of potentially serious pest and disease problems.

After harvest the fruits are dried to below 10% moisture content. It is important not to break the fruit or the seeds will be lost. Simple sun drying is commonly used, but this reduces colour content and pungency. Artificial drying systems (using indirect fired driers) give a higher quality product. Oleoresin is produced by solvent extraction of the ground chillie powder.

Exporters

The main exporters are Southern Africa (South Africa, Malawi and Zimbabwe), India, and China. Mexico and Pakistan are also major producers but are not major suppliers to Europe. These are mostly low or medium pungency varieties like Indian S4 Chillies, Tiensin Chinese Chillies or Pakistan Dandicut Chillies. Malawi, Zimbabwe and Uganda export limited quantities of the highly pungent "East African Birdseye chillies". PNG also exports a highly pungent Birdseye type, and China exports some high pungency types (Fukien). It should be remembered that Europe represents a very small export market for chillies relative to the USA or Far East markets like Sri Lanka, Malaysia, Korea and Japan.

Imports

Custom codes:090420/0904210/09042031/09042035/09042039/09042090

Imports of chillies can only be estimated as import statistics combine them with paprika and pimento. All data for the major import classifications of Capsicums are given in the section on Paprika. Total imports of chillie powder are estimated at 3,700 to 4,200 tonnes and those of whole chillies around 1,800 to 2,000 tonnes (of which 300 to 400 tonnes are high pungency types). Imports as whole chillies have fallen as exports of chillie powder have grown. There are a number of factories in India, Pakistan and China set up in collaboration with multinational spice companies which are now able to produce chillie powder to meet EC hygiene standards. The UK is by far the most important importer of chillies, reflecting its colonial heritage and

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large ethnic community, with the Netherlands the second largest importer.

Re-exports

The UK is the main European importer and re-exports to other EU members around 200 tonnes of chillie powder, chillie paste and other chillie-based spice preparations.

Prices

Prices of both whole chillies and chillie powder vary greatly depending on cleanliness, pungency, colour and appearance of the product. Generally 0.7% capsaicin is the minimum level for the extraction market. Product with more than 1.0% fetches a premium. Prices for high pungency chillies (ie East African Birdseyes) are typically in the range US\$ 2,000 to US\$ 2,500/tonne. Low to medium pungency Indian chillies (0.3 to 0.5% capsaicin) fetch between US\$ 1,200 and US\$ 1,400 per tonne.

Demand and Opportunities

Demand has been influenced by the size of the Caribbean and Asian communities and the growth in popularity of Asian food in European cities. The major European markets (UK, Netherlands, France) are considered largely saturated and consumption is not expected to grow substantially. Greater growth potential is expected from Germany and Southern Europe. Demand is growing for value added products using chillies such as chillie paste, curry powders and other 'sauces' for the convenience food industry. Some of these are produced at origin but stringent hygiene and quality control levels must be maintained. In the extraction industry, there is always demand for high capsaicin content (over 1%) chillies, as this offers extractors a direct saving on unit costs of extraction.

The best opportunities for new suppliers lie in production of selected varieties of high capcaisin chillies for the extraction market, and in supplying niche retail markets for selected high colour high pungency whole chillies.

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CORIANDER

Coriander (*Coriandrum sativum*) is an annual herb native of South-east Europe. It is widely grown in North Africa, the Middle East and South Asia. The spice is a vital component in curry powders and the fresh herb is widely used as a flavouring in kebabs and other Middle Eastern dishes. Ground coriander and coriander oil or oleoresin extracts are used in beverages such as gin, vermouth and liqueurs as well as in a wide range of sauces, seasonings and meat products. The oil is also sometimes used as a source of the aroma chemical linalol.

Forms

The dried fruits (a small capsule containing two seeds) are the coriander spice of commerce. The dried spice is usually only ground just prior to use to maintain oil content. Coriander oil and oleoresin extracts are also obtained from the spice. The dried ground spice is usually made from the large seeded type, whilst extractors prefer the small seeded type. Coriander leaf is used as a herb in both fresh and dried form.

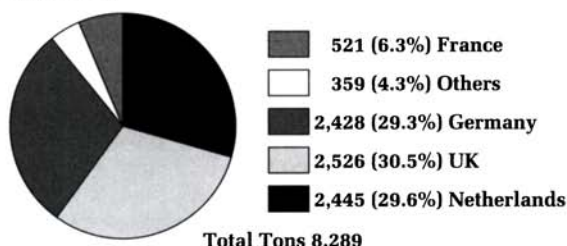
Production and Processing

Coriander is a short season annual herb, with a 3 to 4 month growing season. The crop is tolerant of dry conditions and can be grown on heavy soils using residual moisture. There are two main variety types, and selection depends partly on required end use, and partly on growing conditions. The small seeded types have high oil and extract contents and are best suited to colder climates where early crop growth is slow. The large seeded type is used for grinding and is best suited to warmer growing conditions. The crop is seed sown, with seed rates in the range 15 to 25 kg/ha. It is important that fruits are fully ripe before harvesting, or oil quality (and spice taste) will be adversely affected. Fruit ripen progressively on the plant. There can be high losses around harvest as fully ripe fruit frequently shatter and fall to the ground while other fruit are still immature. To minimise

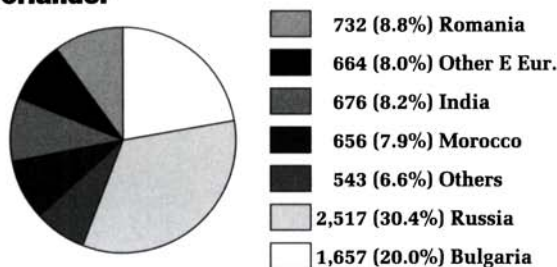
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Table 18

Imports: Coriander 1994, Tons



Origins: Coriander 1994, Tons



Source: Eurostats

Total Tons 8,289

losses, plants should be cut and windrowed when half to two thirds of the fruit are ripe, and left for a few days to allow ripening to be completed. Plants are then threshed. Yields vary widely, in the range 500 to 1,500 kg/ha.

After harvest, fruit are dried to 9% moisture content. Fruits at harvest have around 20% moisture content, and once levels are below 18% temperatures up to 80 to 90°C can be used under artificial drying without significant loss of volatile oils. The oil is produced by steam distillation, and the oleoresin by solvent extraction.

Exporters

World trade in coriander is in the region of 30,000 to 40,000 tonnes. The main producers are the Russian Federation, Bulgaria and Rumania, Morocco, Egypt and India. Morocco has traditionally been the main exporter, supplying around 5,000 to 10,000 tonnes of coriander seed. The Russian Federation has recently become a major source of coriander seed and exports have risen in the last five years to more than 5,000 tonnes. India is a major grower of coriander, and exports vary from 5,000 to 10,000 tonnes. Russian and other East European sources supply the small seeded

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type to the extraction sector. North African origins and India supply the large seeded type to the whole spice market. The European market is small relative to countries like Sri Lanka, Saudi Arabia and Iran. Principal exporters to the EU are shown in Table 18.

Exports of coriander oil are dominated by Russia which exports large quantities (over 20 tonnes). Other minor exporters are Poland (2 tonnes), Bulgaria (2 tonnes) and Romania (1 tonne).

Importers

Customs Code: 0909 20 (Table 18)

The trade frequently divides coriander into three groupings.

- Group A - Small seed fruits of high volatile oil content coming from Russia, Poland and Hungary
- Group B - Large fruits having low volatile oil content coming from India, Indonesia, Morocco and Egypt
- Group C - Fruits midway between Group A & B in terms of size and oil content coming from Czech Republic, Slovakia, India and Romania

EU imports of coriander seed are in the region of 8,000 to 9,000 tonnes (8,289 tonnes in 1994). The UK (2,526 tonnes), Netherlands (2,455 tonnes) and Germany (2,428 tonnes) are the major markets, accounting for almost 90% of imports. The demand is dominated by the small seeded type for processing.

Re-exports

There is a limited re-export trade mostly based on the Netherlands supplying the German and UK markets.

Prices

Coriander seed prices vary substantially according to origin. Seed from Romania and the CIS is available at around US\$ 750/tonne. Moroccan and Egyptian is nearer US\$ 800 to US\$ 900/tonne while Indian is as high as US\$ 1,000 to US\$ 1,100 /tonne.

Coriander seed oil mainly comes from the CIS at around US\$ 20 to US\$ 30/kg. Indian Coriander oil is more than US\$ 50/kg.

Demand and Opportunities

The former Soviet Union used to grow coriander to produce the aromatic chemical linalol. Demand for linalol ex Coriander has fallen dramatically with the result that very large quantities of coriander seed are now available from Russia and to a lesser extent Rumania, Poland and Bulgaria. New entrants would be better to concentrate on the large seeded varieties for the ground spice market coming from India and Egypt where export prices still remain high.



GINGER

Ginger (*Zingiber officinalis*) is a tropical crop whose rhizomes produce an aromatic spice which is widely used in Asian, Caribbean and African cuisine. In Europe ginger is used in domestic cooking, and in a wide range of drinks, confectionery, bakery and processed meat products.

Form

The major products are dried ginger, ground ginger, ginger oil and ginger oleoresin. Dried ginger is sold as whole rhizomes commonly known as ginger root, either peeled or unpeeled. It is also sold as slices or splits (rhizomes sliced lengthways). These irregular shaped rhizomes are tough, fibrous and vary in colour from dark grey/brown to pale cream depending on origin and processing. Bleached ginger has been treated with sulphur. The product is usually supplied to the consumer as ground ginger, a fine mid-brown to pale yellow powder. Lighter coloured ginger has traditionally been more highly prized for its subtle lemony aroma. Dark ginger has more heat and is favoured for extraction purposes.

Fresh ginger is a vegetable and not considered as a spice. Preserved ginger (immature fresh ginger preserved in sugar or brine) is used as a confectionery or vegetable product, particularly in the Far East.

Production and Processing

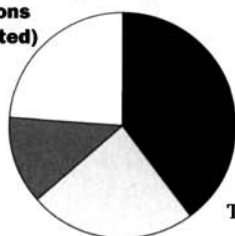
Ginger is tolerant of a wider range of conditions than most spice crops. It is grown at altitudes up to 1500 m though frost destroys foliage and exposed rhizomes, and low temperatures induce dormancy. Optimum temperatures are in the range 25 to 32°C, with minimum temperatures around 17°C. Hot sun can result in leaf scorch, particularly when the crop is young. Rainfed crops require a minimum of 1,000 to 1,200 mm rainfall during the 8 month growing season; the optimum rainfall would be over 2000 mm. Dry conditions will result in low yields and small

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Table 19

Markets: Dry Ginger

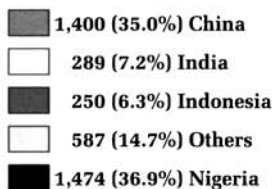
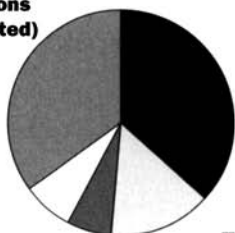
1994, Tons
(estimated)



Total tons 4,000

Origins: Dry Ginger

1994, Tons
(estimated)



Total tons 4,000

Source: Eurostats

sized rhizomes. The crop requires a fertile, well drained soil, of moderate pH (6 to 6.5). The crop is very sensitive to waterlogging. Heavy soils restrict rhizome development and make harvesting difficult. The crop responds to high humus levels and the addition of organic matter. Ginger is propagated vegetatively, using selected healthy rhizomes. Typical seed rates are in the range 1,500 to 1,700 kg/ha, but for early high yields rates up to 3,000 to 4,000 kg/ha can be used. The crop is grown on ridges. Great care must be taken to avoid bacterial wilt and other rhizome rots, and nematode infections.

For the spice market, varieties with high oil (min 2%) or extract (min 6%) levels should be selected. Length of the crop growing season also varies with end product requirements. For preserved ginger, immature rhizomes are harvested at 4 to 6 months; for fresh ginger, rhizomes are harvested at maturity (7 to 9 months); for the dried spice and oil and oleoresin uses, the rhizomes are harvested when fully mature.

After harvest, ginger for the spice market is washed and dried to 10% moisture content. The rhizomes may be peeled, or scraped prior to drying to remove the outer skin. Simple sun drying is usually used, though artificial drying would give a substantially improved product. The oil is produced by steam distillation, and oleoresin by solvent extraction.

Exporters

The main exporters of dried ginger are China, Nigeria and India. Jamaica is a small niche origin, and Indonesia (which has substantial fresh and preserved industry) is increasing production. Nigeria and China are the major suppliers to Europe (Table 19). At present Indian supply is restricted (under 300 tonnes in 1994, down from over 800 tonnes in 1992), and high priced, and Nigeria is substantially down on earlier export levels (1,474 tonnes in 1994 compared with 2,212 tonnes in 1992). Suppliers of ginger oil and ginger oleoresin are India, China, Indonesia and Sri Lanka. A small facility exists in Jamaica. Exports of oil and oleoresin from origin are limited, estimated at around 30 tonnes. The bulk of industry's requirements are produced in the EU from imported dried ginger. Exports of dried ginger into Europe are small relative to the markets of Japan, Middle East and South Asian.

Imports

Customs Code:0910 10 (Table 19)

Imports of dried whole ginger and powdered ginger can only be estimated as official statistics combine fresh and dried ginger under one heading. Total dried ginger imports are estimated at around 4,000 tonnes. The UK is the major import market (around 1,600 tonnes), followed by the Netherlands (950 tonnes), and Germany (500 tonnes).

Re-exports

The re-export trade is almost exclusively based on the Netherlands re-exporting product to Germany, the UK and France, estimated at 500 to 700 tonnes.

Prices

Ginger prices differ greatly according to origin and cleanliness. The benchmark import price for dry ginger is typically in the range US\$ 700 to US\$ 1,000/tonne. In the current market situation with supplies from both India and Nigeria restricted, prices are at the upper edge of the range. For poor quality product (mouldy etc), or if product is dumped in the market, prices will fall to under US\$ 600/tonne. Indian (Cochin) ginger has usually traded around US\$ 1,200/tonne, but current prices are very high at over US\$ 2,500/tonne. Jamaican ginger has a particular niche market and sells in the range US\$ 5,000 to US\$ 6,000/tonne. Prices in Germany appear to be higher than anywhere else in Europe.

Ginger oil prices vary according to strength and purity (zingerbone content). Chinese oil sells at around US\$ 22 to US\$ 30/kg, Indian US\$ 40 to US\$ 50/kg and Sri Lankan at around US\$ 65 to US\$ 70/kg, and have been rising recently. Ginger oleoresin tends to sell at between US\$ 40 and US\$ 50/kg

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Demand and Opportunities

The demand for dry ginger is largely static. China, India and Nigeria each have their own particular segment of the market due to variations in flavour and oil content. Most buyers are to some extent able to substitute one origin for another if shortages occur from any one origin. The same cannot be said for Jamaican ginger.

Opportunities for new suppliers are largely restricted to supply of high quality product to grinders supplying the retail markets. Buyers are looking for clean, well flavoured, artificially dried product with high hygiene levels, in contrast to the bulk of the material in the market which has been sun dried on the ground.



PAPRIKA (NON PUNGENT CAPSICUMS)

Paprika is cultivated from selected cultivars of *Capsicum annuum*. The spice is widely used in Central European cooking to provide colour and a sweet, smooth, subtle flavour. Paprika is also an important natural food colouring providing red and orangy red colour to a wide range of food products.

Forms

Paprika for household use is sold as whole product (around 20% of supply) or as dried ground or crushed powder (around 80% of supply). The berries differ widely in size (0.8 to 12 cm long) and colour (from yellow brown to brick red). Paprika oleoresin is one of the most important spice extracts used in the food industry.

Paprika is primarily graded by colour content (typically measured in ASTA colour units). Colour content is determined by variety, growing conditions, harvesting, whether the product is shade or artificially dried and finally whether the seeds and placenta have been removed prior to grinding and/or extraction. Some grades also have specified (low) levels of pungency (% capsaicin). The main ground paprika blends traded in Europe follow German terminology - noble sweet (edulsuss), semi-sweet (halbsuss), rose (rosen), hot (scharf) and delicate (delikat).

Production and Processing

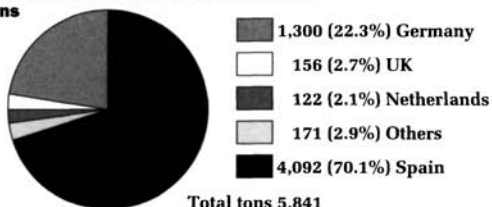
Varieties should be selected carefully to give high and consistent colour values and very low pungency levels. It is a 4 to 5 month crop of the warm (continental) temperate zone and the subtropics and tropics. It is best grown in seasonal rainfall climates with at least 600 to 900 mm rainfall during the season where the fruits can be left to partially dry on the crop at maturity. It is not tolerant to frost, and does not grow well where average temperatures are below 12 to 15°C. Temperatures above 32°C cause flower drop and can reduce yields substantially. High ambient temperatures lead to the development of

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Table 20

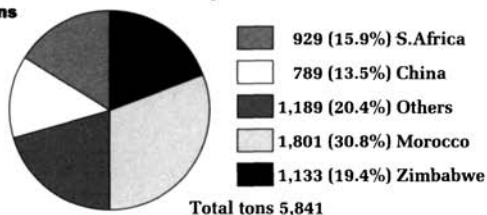
Imports: Whole Sweet Capsicums

1994, Tons



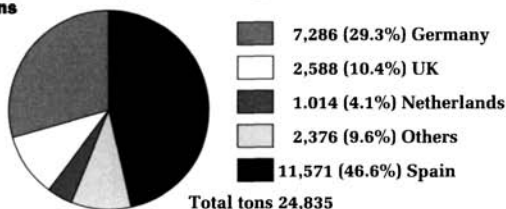
Origins: Whole Sweet Capsicums

1994, Tons



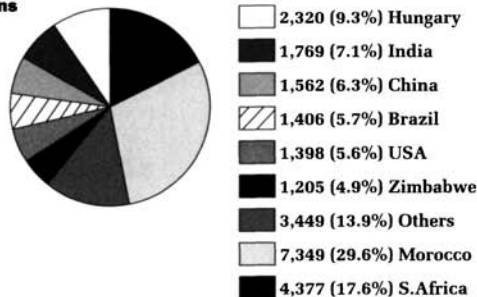
Imports: Crushed/Ground Capsicums

1994, Tons



Origins: Crushed/Ground Capsicums

1994, Tons



Source: Eurostats

Total tons 24,835

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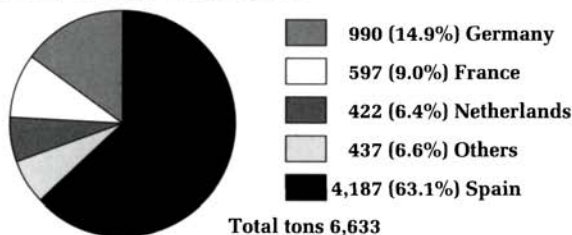
pungency in the crop, which reduces its value. High yields require fertile, well drained soils, and adequate rainfall. It can either be directly seeded in the field or sown in nurseries and transplanted. Seed rates are in the range 5 to 10 kg/ha; for nursery operations, 1 kg of seed should give sufficient transplants for 1 ha. The crop suffers from a wide range of potentially serious pest and disease problems.

After harvest the fruits are dried to below 10% moisture content. Simple sun drying is commonly used, but this reduces colour values and leads to increased rates of colour loss during subsequent storage. Artificial drying systems (using indirect fired driers) give a higher quality product. Oleoresin is produced by solvent extraction of the ground paprika.

Table 21

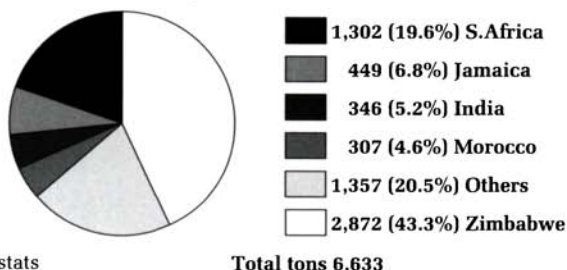
Imports: Other Whole Capsicums

1994, Tons



Origins: Other Whole Capsicums

1994, Tons



Source: Eurostats

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Quality grades are summarised below:

	Grade 1	Grade 2	Grade 3
Hungary	Capsaicin free Delicate Extra sweet	Semi-sweet	Rose Pungent
Spain	Extra	Selecta	Corriente
Yugoslavia	Extra delicate Delicate Red sweet	Red pungent Rose	Pale red pungent Red sweet

Exporters

Western Europe itself is one of the major world producers and exporters, exporting in the range 12,000 to 15,000 tonnes. Morocco is the major supplier to Europe (9,150 tonnes in 1994), followed by South Africa (5,306 tonnes in 1994), Zimbabwe (2,338 tonnes) and Hungary (2,320) Table 20, 21). Exports from Morocco have grown as production has shifted there from Spain. Exports from Hungary are declining (from earlier levels of around 4,000 tonnes) due to rising costs and political change. Brazil, India and Israel are new entrants of growing importance. The USA and Mexico are major world producers, and the USA also exports to Europe (1,398 tonnes in 1994).

Europe is also a major producer and exporter of the oleoresin, producing 800 to 900 tonnes/yr. Morocco, South Africa, Israel and to a lesser extent Hungary and Ethiopia are also exporters of oleoresin, and production is expected to start in India.

Importers

Custom codes: 090420/0904210/09042031/09042035/09042039/09042090 (Table 20 & 21)

European imports of paprika can only be estimated as trade statistics combine them with pimento and pungent capsicums. Imports are dominated by Spain and Germany, accounting for around 80% of all European imports. Total imports from non-European origins are around 30,000 tonnes. (Over 5,000 tonnes of fresh or chilled paprika is imported into the EU mainly from Morocco or Turkey.) Spain has rapidly become the main importer of paprika in Europe, with imports rising from only 2,000 to nearly 16,000 tonnes in five years. This trend is expected to continue as domestic production is replaced by lower cost imports. No other country imports more than 3,000 tonnes.

Estimates of world oleoresin output is more than 1,500 tonnes, with Spain producing 50% of this figure and the USA, the UK, France and the Netherlands a further 30%. European producers blend product from many

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different sources prior to sale. EU imports of paprika oleoresin are estimated at around 250 tonnes, mainly from the USA, Morocco and Israel. Germany is the world's leading importer of oleoresin paprika which is a vital ingredient in its meat processing industry. The UK, the Netherlands and France also import paprika oleoresin usually from Spain but also from the USA, Morocco and South Africa.

Re-exports

There is a growing re-export trade within Europe with Spain as the primary point of import for the European market.

Prices

Prices of whole dried paprika are strongly influenced by harvests in Spain, California and Hungary. Fluctuations are large from year to year. Paprika powder or processed extracts are assessed by their colour intensity, usually in terms of ASTA colour units. The stronger the colour the higher the price. Prices for 110 to 120 ASTA unit paprika powder range from around US\$ 2.5 to US\$ 2.8/kg. Prices rose steadily through the 1980s and early 1990s but have tended to decline recently as many new entrants appeared on the market. Unit prices of paprika in Germany have dropped from 4.8DM/kg to 3.8DM/kg during the last five years.

Paprika oleoresin prices tend to follow those of paprika powder (from which they are made). Prices are usually directly correlated with colour strength. Standard 40,000 ASTA unit oleoresin was formerly selling at around US\$ 26 to US\$ 29/kg but has fallen back to around US\$ 20 to US\$ 22/kg due to increasing new supplies.

Demand and Opportunities

There is very considerable variation in the consumption of paprika within the EU. Only in Germany, Spain and Central Europe is paprika a flavouring of real importance. The use of paprika as a colouring material (both the ground spice and the oleoresin) has tended to increase as demand for processed meat products has grown, and this has broadened the basis for demand and maintained growth in the market. The decline of production in Spain, and also in Eastern Europe, presents continuing opportunities for new low cost suppliers. Spain remains the best market to target given its central role in the European trade. New suppliers must pay great attention to hygiene issues for this crop if they are to have any chance of breaking into this market.

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PEPPER

Pepper (*Piper nigrum*) is a climbing vine of the humid tropics whose whole dried berries are used to produce the pepper of commerce. Pepper is the world's largest spice product. It has a wide range of household and industrial applications. Whole and ground pepper are commonly found in households throughout the world. Pepper oil and oleoresin are used in a very wide range of processed foods.

Form

The major products are whole black and white pepper. Ground pepper (black and white) is a major traded item. The oil and oleoresin are also items of trade. Other specialised products include brined green and red pepper berries, and pepper paste.

Production and Processing

Pepper is a crop of the wet, humid tropics. It is a climbing vine, and requires support. It requires a high (>2,000 mm), well distributed rainfall over an 8 to 10 month growing season. The crop requires high temperatures and high humidities. The crop can tolerate temperatures in the range 10 to 40°C, but optimum temperatures are in the range 25 to 35°C. Good fertility is required for high yields. Soils should be well drained, preferably with a high organic matter content to give good water and nutrient holding capacity. Soil pH should be pH 6 to 7. The crop can be grown under partial shade, usually provided by live support trees. The crop is propagated from cuttings, with plant populations up to 2,000/ha. Selection of elite plant material is essential, affecting both level and consistency of yield, consistency and quality of product and resistance to soil-borne diseases.

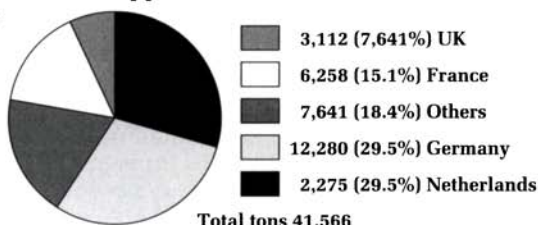
Berries are ready for harvest 6 to 8 months after flowering. Flowering spikes are removed when plants are under 2 years old so that maximum vegetative growth is made. At harvesting, whole spikes are harvested. Several harvests have to be made as the crop ripens progressively. Time of

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Table 22

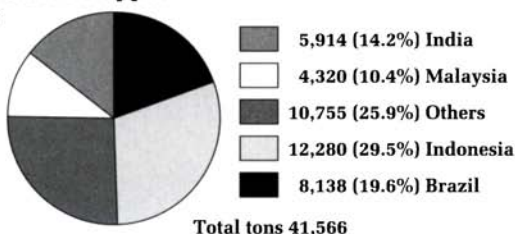
Markets: Whole Pepper

1994, Tons



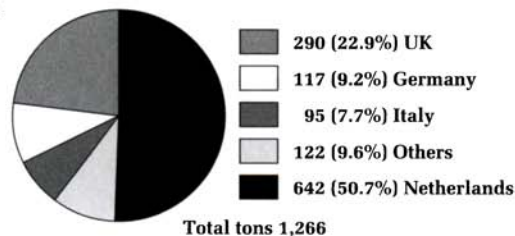
Origins: Whole Pepper

1994, Tons



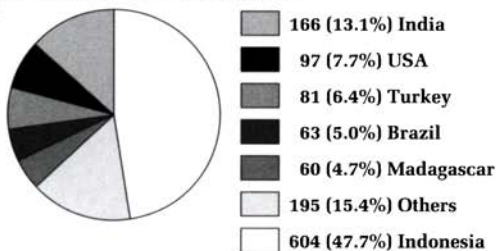
Markets: Crushed/Ground Pepper

1994, Tons



Origins: Crushed/Ground Pepper

1994, Tons



Source Eurostats

Total tons 1,266

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harvesting depends on the product required. For black pepper, the berries are harvested at the mature green stage when the first berries on the spike turn red. For white pepper, fully mature red berries are harvested. Yields of fresh berries vary widely according to variety, age, growing conditions and management. The range is between 1,000 kg/ha and over 10,000 kg/ha.

For the production of black pepper, harvested berries are stored in a pile for 1 to 2 days, to start the colour change, and are then dried to 10 to 12% moisture content. Out-turn fresh:dry is around 30%. For the production of white pepper, berries are harvested at the fully red stage, are stripped from the spikes and left in running water until the outer pericarp is soft and can be removed by rubbing. The berries are then washed again and dried. Out-turn fresh:dry is around 25%. After drying, black and white pepper are graded to remove small and damaged berries.

Pepper oil and oleoresin are produced from black pepper. Varieties differ considerably in terms of their volatile oil content.

Exporters

Pepper exports are dominated by the five main producers: India, Indonesia, Malaysia, Brazil and Vietnam (Table 22). Other small but important exporters are Thailand, Sri Lanka and Madagascar. Overall world trade in pepper averages around 147,000 tonnes per annum. Exports fluctuate widely depending on stocks and harvesting conditions. Exports in 1987 were as low as 108,000 and rose to over 166,000 in 1991.

1995 estimates of world exports of whole pepper are Brazil 17,500 tonnes, India 25,000 tonnes, Indonesia 38,000 tonnes, Malaysia 18,000 tonnes and Vietnam 15,000 tonnes. Indian exports have tended to decline as local consumption and competition from Brazil and Malaysia has increased. Vietnam has increased exports substantially in the last ten years from little more than 7,000 tonnes in 1989 to more than 15,000 tonnes today. China have also begun to export small quantities of pepper. White pepper is almost all exported to Europe. It represents about 65% of EU pepper imports although less than 20% of world trade. Most of this comes from Indonesia.

Exports of ground pepper from origin is as yet small relative to total pepper exports. Total exports are around 2,500 to 3,000 tonnes of ground black pepper and 4,000 to 4,500 tonnes of white pepper.

The export of pepper oleoresin from Asia has grown substantially in the last ten years. Oleoresin extraction capacity in India, Indonesia, Singapore and Malaysia is believed to be around more than 400 tonnes - well in excess of demand. Pepper oleoresin is one of the most important oleoresins traded with nearly 500 tonnes being processed. 40% to 45% of this market is in Europe, the remainder mostly in North America. The UK and Germany are the major buyers of pepper oleoresin mainly from the USA, India, Singapore or other European countries. India contributes 35%, the UK 30%,

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Singapore 15%, the USA and Canada 10%, Indonesia 7.5% and Malaysia 2.5%. Sri Lanka has also started pepper oleoresin exports.

Pepper oil is a small but high value export product. Production is estimated at 30 to 40 tonnes, of which the majority is produced in India (10 to 12 tonnes), Indonesia, Madagascar, the UK, and the USA.

The International Pepper Community (IPC), formed in 1972 and based in Jakarta, consists of members of seven pepper exporting countries including Sri Lanka, Micronesia and Thailand plus founding members Indonesia, Malaysia, Brazil and India. It aims to regulate the market for pepper and promote pepper sales worldwide.

Imports

Customs Code: 0904 11/0904 1110/0904 1190/0904 12 (Table 22)

EC imports of pepper have grown from around 48,000 tonnes in 1989 to nearer 51,000 tonnes in 1994. The majority is black or white whole pepper. Imports of ground pepper from outside Europe are less than 4,000 tonnes. Germany is by far the most important market with imports rising from 15,000 to 17,000 during the last five years. France is the second largest importer with imports of around 10,000 tonnes. The Netherlands is a major entrepot centre for pepper, with imports of more than 8,000 tonnes annually. There is little or no brand loyalty to pepper from any one particular origin at retail level.

Re-exports

There are considerable re-exports of pepper, particularly from the Netherlands. The Netherlands exports 3,000 to 5,000 tonnes of unground pepper and 650 to 700 tonnes of ground pepper each year. Worldwide, Singapore is the chief entrepot for pepper, importing, cleaning, processing and packing 30,000 to 50,000 tonnes of pepper per year.

Prices

Pepper is an internationally traded commodity, quoted forward and spot on the New York Commodity Exchange. During the mid-1980s pepper prices rose to all-time highs of 230 to 250 cents/lb. This encouraged massive plantings which have now fully matured. By the early 1990s prices had fallen to around 50 to 60 cents/lb, causing widespread hardship in the industry. Spot prices have firmed somewhat since then due to poor harvests in Indonesia but five-year cyclical patterns in pepper prices are common. Black pepper prices are lower than white. Black sells at around US\$ 2,500 to US\$ 3,200/tonne while white pepper is between US\$ 3,900 and US\$ 4,000/tonne.

Prices of pepper oleoresin tend to follow closely those of the main spice, although oleoresin can be stocked so that price fluctuations are lower than

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for the raw spice. Prices vary from around US\$ 7.5/kg to US\$ 8.5/kg depending on concentration levels.

Demand and Opportunities

There is a marked variation in the pattern of demand for different forms of pepper. The UK prefers white pepper while France buys mainly black pepper. The overall split between white and black pepper in Europe is 60%:40%.

The collapse of bilateral trade between the former Soviet bloc countries and pepper exporters disturbed the market in the early 1990s, with a drastic decline in imports to the CIS and Eastern Europe. (Exports to this region fell from around 25,000 - 30,000 tonnes to 9,000 - 12,000 tonnes). Demand for pepper has, however, been rising again recently, with the fastest growth in the newly developing industrial economies such as Korea, China and Venezuela.

The scale of the market and the annual variability of crop sizes offer potential for new entrants. However, very small volume origins (a few hundred tonnes) are of little interest to the trade, given the scale of trading. Black pepper offers a simple route into the trade, and there is interest in high extract (piperine) content pepper for the extraction market.



SAFFRON

Saffron is the dried stigmas of the flowers of *Crocus sativus*, one of the most valuable of all spices commercially sold. It has been used since biblical times to provide flavour and colour to Asian and Mediterranean foods. Its principal use is in domestic and commercial cooking of certain traditional foods (certain curries, paella etc) and in various medicinal remedies. Its use as a natural colouring agent has largely disappeared due to the high cost of saffron.

Forms

Saffron is sold in whole or crushed form. At the import/wholesale level, saffron is traded in 1/2kg or 1kg tins. At the retail level it is traded in small sachets or vials containing a few grams. There are three main grades: "Mancha", "Rio" and "Sierra" (see specifications). More detailed grading is given below.

- | | |
|--------------------|--|
| Very Select | • Stigma length over 30 mm with style length 23 to 24 mm; brilliant colour and strong aroma. |
| Select | • Stigma length 30mm with style length 23 mm; hard brilliant dark red colour, thick thread and good odour. |
| Superior | • Stigma length 28mm with style length 22 mm, whole strong threads, dark red colour. |
| Medium | • Stigma length 25mm with style length 21 mm, good odour, colour and appearance. |
| Ordinary | • Stigma length generally 20 to 24 mm with same length style and having a pleasant odour. |
| Slack | • Broken stigmas, dark in colour and less than 20 mm in length. It includes all saffron which, even if the thread is longer, lacks many of the properties of the better types. |

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Very small amounts of crocine, a colouring extract of saffron, are sold for specialist food applications.

Production and Processing

Saffron is a perennial crop. It is an autumn flowering cultivated form of *Crocus sativus*. The crop requires a temperate or sub-tropical climate. It becomes dormant in spring, and is not affected by very hot and/or dry summers, growth beginning again in autumn. The crop is tolerant of frosts, except at flowering. The crop requires rainfall at the end of summer/early autumn to initiate growth and flowering, and reasonable moisture conditions at the end of the season (late winter/early spring) when new corms are being formed. Rainfall during flowering reduces quality. Total rainfall requirements vary widely depending on climate during the growing season. In many areas, total rainfall is less than 400 mm.

The crop is propagated vegetatively, by corms. Cormlets are produced after flowering by the mother corm. At the end of the season the mother corm dies, and the cormlets give the next season's flowers. The crop requires a light well drained soil. Corms are planted 12 to 15 cms deep, 10 cms apart, with 20 cms between rows (500,000/ha). Cormlets are produced above the mother corm, so that fields require replanting every four years as corms rise close to the surface. The crop flowers over a four to six week period in autumn, individual plants flowering over a two week period. Repeated harvests are made during the season. Flowers have to be picked by hand in the early morning of the day of opening, and stigmas removed and dried on the same day. The harvest from approximately 165,000 flowers gives 1 kg of dried whole saffron. 1 ha should yield 7 to 10 kg of dried saffron. Stigmas are cut out of the flowers by hand, and dried. Extreme care must be used in drying to avoid any damage or loss of aroma quality from the product. Stigmas are often still sun dried but colour is lost, quality is lower, and the risk of moulds and other post-harvest problems is higher than if artificial drying is undertaken.

Exports

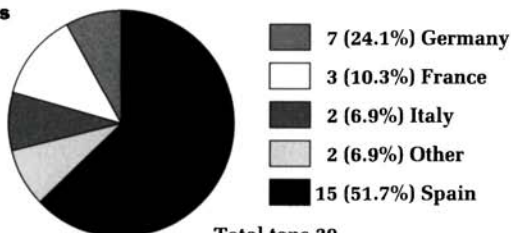
Europe is a major production centre for saffron. Exports outside the EU are little more than 0.25 tonnes. Spain is overwhelmingly the most important grower, producing between 35 and 40 tonnes, 80% to 90% of world output. Production is declining because of the very high harvesting costs. Some is also produced in Italy, France, Iran, Northern India (Kashmir) and Morocco. Spain's official exports are reportedly as high as 200 tonnes, but this probably includes blended and add-mixture products, particularly using material from Iran and Morocco. Iran exports less than 50 tonnes, of which around half comes to Europe (Table 23). Greece exports 5 to 8 tonnes of saffron. Indian production is almost all for domestic use and has declined drastically due to political disturbances in Kashmir. Indian exports to Europe are small because of strong local demand. Exports have seldom

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Table 23

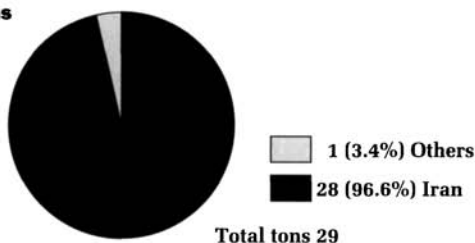
Imports: Whole Saffron

1994, Tons



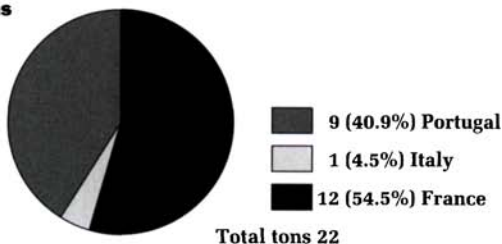
Origins: Whole Saffron

1994, Tons



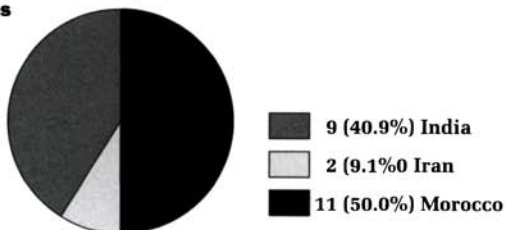
Markets: Crushed/Ground Saffron

1994, Tons



Markets: Crushed/Ground Saffron

1994, Tons



Source: Eurostats

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exceeded 500 kg. Iran's exports to the EU in 1992 were valued at more than US\$ 7 million.

Imports

Customs code: 0910 20/0910 2010 (Table 23)

EU imports of saffron range between 25 and 35 tonnes per annum, about 60% as whole filaments and 40% in crushed or ground form (this probably includes some blended product). Spain is the leading importer. Imports have grown dramatically from around 8 to 10 tonnes in the late 1980s to more than 25 tonnes in 1993 and 1994. This is to supplement declining local production. France imported 7 to 12 tonnes. Germany and Italy import around 4 to 7 tonnes of saffron a year.

Prices

These vary according to grade and origin. The price range is very great, ranging from US\$ 650/kg to US\$ 900/kg. 1st quality (Mancha) saffron is selling at 4,500 FF/kg on the French market with 3rd quality (Sierra) at around 3,000 to 3,500 FF/kg. Iranian saffron is nearer 2,500 FF/kg.

Re-exports

Both Spain and France have a considerable re-export trade. Between them they supply most of the rest of Europe's domestic and industrial requirements.

Demand and Opportunities

European demand for saffron centres around the traditional domestic consumers in Spain, Italy and southern France as well as the top class restaurant trade throughout Europe. The ethnic market is also important. The colour extraction market is small. Ever increasing costs of production in Spain have tended to push prices higher, especially for guaranteed pure material. Exports from Iran have picked up again as peace and political stability have been restored. Climate, soil and the high level of labour and skill needed to grow and process the crop limit new entrants.

Opportunities for new suppliers do exist provided a consistently high quality product can be supplied. Given the very high unit value of the product, any probability that the product might be adulterated or of variable quality will be reflected by severe price reduction and loss of market interest. Development of production requires large volumes of plant material (around 500,000 corms/ha). Great care must be taken to ensure that any import/rapid multiplication programme for planting material is based on high quality material with proven market demand. Adequate harvesting labour must be available for the short, intensive harvesting season.



TURMERIC

Turmeric (*Curcuma longa*) is a tropical rhizome which has been used for culinary and cosmetic purposes since antiquity. Turmeric is the basic ingredient in almost all curry powders and a major source of natural colouring for foodstuffs and pharmaceutical and cosmetic applications. The colour ingredient in turmeric is known as curcumin. It is found in margarine, mustards and soup powders. It is commonly used as a substitute for the much more expensive spice, saffron.

Forms

Turmeric is marketed as dried whole and ground rhizomes. High colour content 'Alleppy' types (5% to 6.5% curcumin content) are mainly sold to the colouring industry. 'Madras' and Rajpuri types (3.5% curcumin content) are mainly sold into the spice market. Madras rhizomes are polished. An oleoresin is also produced for the colouring industry. The most concentrated product is a spray dried 95% curcumin powder. The product is typically sold as whole fingers, with grinding being done in the importing countries. The ground product is stable in storage and hence relatively well suited to grinding at origin.

Production and Processing

Production requirements and practices are very similar to ginger. The crop is propagated vegetatively, by rhizome, and seed rates at planting are typically in the range 1,500 to 2,000 kg/ha. Two main types of turmeric are recognised: the 'Alleppy' type and the 'Madras' type. The crop is harvested at maturity, seven to nine months after planting, depending on variety characteristics and season. Fresh yields are in the range 15 to 25 t/ha. Conversion of fresh to dry yield is in the range 15 to 25%. Minimum commercial dry yields of 2.5 t/ha should be targeted, but yields in excess of 3 to 4 t/ha can be achieved.

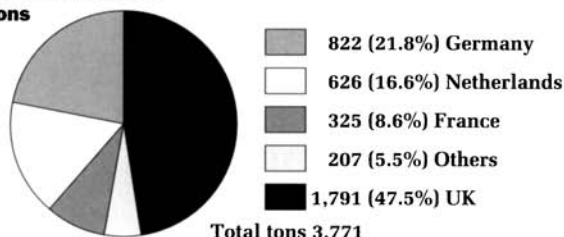
After harvest the fresh rhizomes are washed,

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Table 24

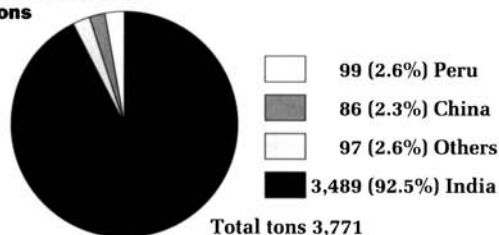
Markets: Turmeric

1994, Tons



Origins: Turmeric

1994, Tons



Source: Eurostats

boiled and dried. Rhizomes are boiled in water for around 60 minutes until they can be pierced with a fork, then immediately removed from the water, spread out to cool, and dried. Traditionally, turmeric is sun dried, but the process is lengthy (10 to 15 days), can be spoiled by rain, and increases risks of contamination by pests and diseases. Artificial drying, using indirect fired driers, should be used. Drying should be done at 55 to 65°C. Moisture content should be reduced to 6 to 8%. When properly dry, rhizomes should break with a clean 'snap', the broken ends showing a glazed surface with a clearly marked dark ring just inside the skin.

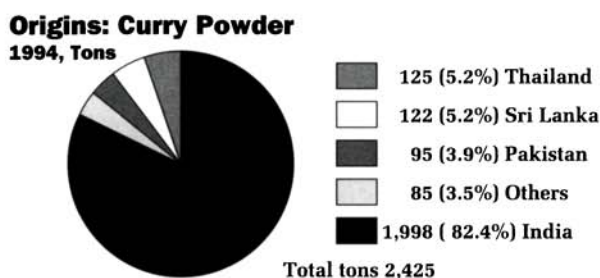
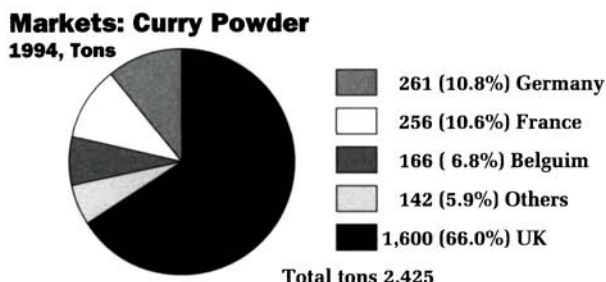
Madras type turmeric, sold as a spice, has to be polished after drying. The dried fingers are put in a rotating drum, and the tumbling action removes the outer skin, giving a matt yellow finish to the surface of the rhizome. Boiling and polishing make Madras turmeric a relatively expensive crop to process. Weight loss during polishing is around 5%.

Exports

World trade in turmeric is between 15,000 and 20,000 tonnes. India dominates the production and export of turmeric worldwide (mainly from Andhra Pradesh, Kerala, Tamil Nadu and Maharashtra). Only 5% of India's total production of around 150,000 tonnes is exported. Other important suppliers are China, Peru, Thailand and Indonesia.

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Table 25



Source: Eurostats

Exports of turmeric to the EU market are relatively small compared with Iran and the Middle East where turmeric is used to add flavour and colour to many rice based dishes. Turmeric oleoresin exports almost all come from India. Total exports are around 35 to 40 tonnes, mainly to the USA.

Imports

Customs code: 0910 30 (Table 24 & 25)

EU imports are between 3,000 and 3,500 tonnes per annum. The UK is the largest market, with imports having risen from around 1,500 to 2,500 tonnes during the last five years. This reflects the growing Asian community and the popularity of Indian foods in the UK. 70% of consumption is for curry powders, the remainder for colouring extracts. Germany is the second largest market, with imports rising from around 485 tonnes to 880 tonnes in the last five years. These are used in mustard and curry sauces. Some special forms of turmeric are imported for use in natural pharmaceutical products. France and the Netherlands import around 600 to 700 tonnes each.

Re-exports

These are mainly from Singapore, although turmeric products, either pure

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or as the main ingredient in curry powder, are exported from the UK to other EU countries.

Prices

Alleppy turmeric is sold on the basis of curcumin content. Prices range from US\$ 1,200 to US\$ 1,400/tonne for 5.5% to 6.0% curcumin product. Madras and Rajpuri turmeric prices range from US\$ 1,040 to US\$ 1,150/tonne.

Demand and Opportunities

The turmeric market is likely to grow along with that of Asian foods. In countries like the UK and the Netherlands, the major European markets, sales appear static. Growth is likely to come from southern and eastern Europe. The market for turmeric as a natural colouring material is expected to grow throughout Europe and hence increase the demand for turmeric oleoresin and spray dried turmeric extracts.

Despite the dominance of India in the market, and its ability to supply export demand from a very small portion of its domestic crop, new suppliers can find interest in the market. However, it is important for prospective suppliers to select planting material carefully to match the target market demand - whether for colouring or spice useage.



VANILLA

Vanilla is a climbing vine, of the Orchid family. Almost all commercially cultivated vanilla is the species *Vanilla fragrans* syn. *V. planifolia*. Vanilla has many food applications, in ice creams, yoghurt, cakes and confectionery goods, and is also used in soft drinks and perfumery products. Cured whole vanilla beans and ground vanilla powder are used directly in domestic cooking.

Forms

Vanilla is mostly sold as cured whole beans, or lower grade cuts and splits. Recently, processing innovations have led to the production of chopped beans (for extraction only). Whole beans are graded according to size, shape, appearance (colour, presence of surface markings, degree of splitting etc) as well as vanillin content (see specifications). Vanilla for household use is usually sold in jars or satchets and there has been some development of packing at origin for this market. Vanilla extracts are presently only prepared in importing countries for industrial applications. Unlike other spices there is a well established synthetic substitute for vanilla (vanillin or ethylvanillin).

Most vanilla is used in processed form, usually alcohol extracts. Germany, France, the Netherlands and Switzerland are the main vanilla extracting countries in Europe. Extraction is mainly done by the large multinational flavours and fragrances houses.

Production and Processing

Almost all commercially cultivated vanilla is the species *Vanilla fragrans* syn. *V. planifolia*. French Polynesia cultivates a different species, *V. tahitiensis* (preferred by the perfumery trade). Vanilla is established from cuttings; seed is not used. It requires a hot humid tropical climate with a single dry season of three months. The dry season is required to stimulate flowering. As the dry season becomes longer, conditions

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become more marginal. Minimum temperatures should be above 12°C. The crop is surface rooting, and requires a thick organic mulch layer in which to grow. The crop requires partial shade (30 to 50%) and a support up which to grow. Flowers have to be individually pollinated by hand. The beans are harvested as they become ripe, about nine months after pollination. The crop requires a high labour input, and is usually grown in small farmer plots. Root rots are the major disease problem, and great care must be taken not to overstress the plant (through poor management or excessive yields), or the incidence will rise dramatically.

When the beans are ripe they are harvested and immediately cured. About 5 kg of fresh beans are required to produce 1 kg of cured beans. There are three stages to curing: killing the bean; sweating; and slow drying and maturation (conditioning). Once they have reached around 25% moisture content they are graded and packed in boxes for the final conditioning stage. Traditional vanilla curing takes one or two months and requires skill and attention. Great care is required to avoid or minimise losses due to pest and disease. Some processors have developed mechanised rapid processing methods. This removes the need for skilled labour but produces a chopped bean product which has a limited, although growing, market.

Exporters

International trade in vanilla is in the region of 1,800 tonnes, of which 1,000 tonnes is of premium quality product. Overall world trade is valued between US\$ 50 and US\$ 70 million. Madagascar and Indonesia dominate supply with around 70% of world trade. Madagascar exports range from 700 to 900 tonnes/year, and Indonesia 350 to 700 tonnes. Comores is the next largest producer (typically around 150 to 200 tonnes). Smaller quantities of vanilla are exported from Tonga, French Polynesia, Mexico, Reunion and, more recently, Uganda. Supply to the European market (around 600 tonnes) is dominated by Madagascar (around 400 tonnes) (Table 26). Indonesia is traditionally a lower quality source and almost all production (around 95%) goes to the US market.

Importers

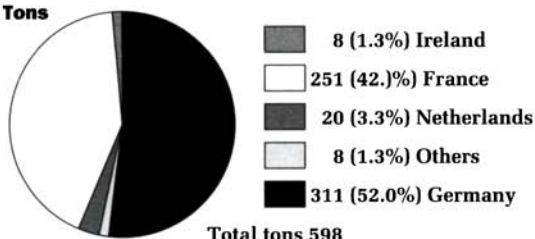
Customs Code: 0905 (Table 26)

Germany is the largest importer of vanilla in Europe (300 to 350 tonnes). Many of the main traders are based in Hamburg. Germany also has a major extraction industry. France (200 to 250 tonnes) is the second largest importer of vanilla in Europe. It has a long tradition of vanilla packing and processing. No other EU member imports more than 30 tonnes from origin. The European Union as a whole is a much smaller market for natural vanilla than North America, which consistently imports more than 1,000 tonnes annually.

Table 26

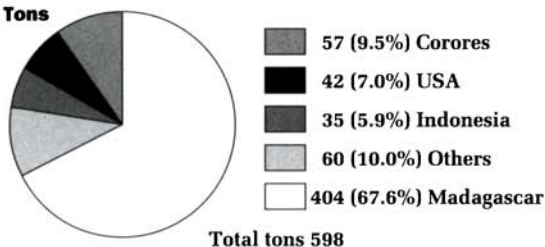
Markets: Vanilla

1994, Tons



Markets: Vanilla

1994, Tons



Source: Eurostats

Re-exports

There is a large re-export trade within Europe for vanilla both as cured beans (around 280 tonnes) and vanilla extract. Germany and France dominate the re-export trade.

Prices

Until recently the Indian Ocean Island cartel dominated by Madagascar set the benchmark price against which other origins were matched. In the early 1990s this price was set at US\$ 74/kg, with other sources selling at US\$ 50 to US\$ 60/kg. Current prices are substantially lower, with high quality vanilla selling from US\$ 45 to US\$ 55/kg and low quality vanilla from US\$ 20 to US\$ 30/kg. Cuts and splits sell at less than US\$ 20/kg. Synthetic vanillin prices are, by contrast, US\$ 9 to US\$ 10/kg.

Demand and Opportunities

There has been a major change in the structure of the vanilla market. During the 1960s and 1970s Madagascar and the other Indian Ocean producers

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(Comores, Reunion, Mayotte) operated a cartel (the Vanilla Alliance). This regulated the supply and price of vanilla. To maintain supply and price stockpiles were maintained. This cartel no longer operates, prices have fallen dramatically and suppliers now compete directly with each other in terms of quality and price. Major new vanilla projects are reported in Sri Lanka, India and China.

The market is divided into vanilla destined for the extraction market and product sold as cured bean to the retail and catering trade. The former is by far the larger of the two segments. The mass market for vanilla flavouring is almost entirely served by synthetics (perhaps with very small amounts of added natural vanilla). These synthetics represent 80% to 90% of the total vanilla flavouring market. Unless the use of synthetic vanilla is further curtailed through legislation no sizable increase in demand for natural vanilla is foreseen except at the very top end of the market.

Despite the limited growth potential in the natural vanilla market, the breakdown in the Madagascar-based marketing cartel, the current decline in vanilla production in Madagascar, the highly variable volumes of the Indonesian crop, and the development of new processing (curing) technologies provide an opening for new competitive suppliers. New suppliers must focus on the production of consistently high quality cured vanilla through the use of efficient low cost processing systems, and developing long term linkages with major buyers and users by providing a product that is processed to meet their particular specifications. There is no market opportunity or interest for new suppliers of low quality cured vanilla.