Market Brief
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The World Market for Cassava / Manioc

ITC

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Front cover image courtesy of David S. Seigler
http://www.life.uiuc.edu/plantbio/263/ROOTCROP.html

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ABBREVIATIONS

ACP	African, Caribbean and Pacific Group of States
CAP	Common Agricultural Policy
CBI	Centrum tot Bevordering van de Import uit Ontwikkelingslanden (Centre for the Promotion of Imports from Developing Countries)
CEN	Comité Européen de Normalisation (European Committee for Standardization)
EC	European Commission
EU	European Union
EUR	Euro
EUROSTAT	Statistical Office of the European Union
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Statistical Databases
HS	Harmonized System nomenclature
IFAD	International Fund for Agricultural Development
ISO	International Standards Organization
ITC	International Trade Centre UNCTAD/WTO
MFN	Most-favoured-nation
OCT	Overseas Countries and Territories
TARIC	Integrated Tariff of the Community
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States of America
USD	US Dollar
WHO	World Health Organization
WTO	World Trade Organization

EXECUTIVE SUMMARY

Currently cassava is an under-explored market, receiving little or no attention in spite of the importance of the product, especially in its function as a staple food in many countries in Africa, Asia, Latin America and the Caribbean. It is mainly produced by small farmers for their own consumption or the local market and basically unknown to consumers in temperate zones. As a consequence, out of a world production of about 162 million tons, not even 6 million tons of fresh, dried or frozen roots are traded worldwide.

A handful of countries dominate the cassava market: In 2001, the EU and China together amounted to 80% of total world imports, followed by South Korea (9%) and the US (6%). Likewise, 70% of world exports came from Thailand, 10% from Viet Nam, 7% from Costa Rica and 4% from Indonesia, followed by the European re-exporters Belgium and the Netherlands. It is worth noting that with the exception of Thailand and Indonesia, the main producing areas do not correspond to the main exporting regions. Particularly in African countries, cassava production is almost entirely consumed as food.

Although there is a multitude of products that can be produced from cassava, this Market Brief only covers fresh, dried and chilled or frozen cassava, which can be used by the animal feed industry or in different forms for human consumption.

A variety of factors are revealed that have a strong influence on the demand for cassava, as animal feed in particular, and show that the prospects for cassava as animal feed do not look very promising in either the EU or China. On the other hand, there seem to be a number of potential opportunities in the food market. However, to become real opportunities, investments in marketing strategies and promotional activities will be needed, especially if markets such as the EU or the US are targeted, where only immigrants from African or South American countries are familiar with the product.

Following a detailed product description, which also includes the different usages of cassava, this Market Brief examines the performance of cassava trade with a focus on the main importers of cassava roots, namely the EU, China, South Korea and the US. It also explores the market access barriers of those countries and provides information on the development of prices of cassava pellets, the main traded product, as well as on common distribution channels and requirements for packaging and labelling, which should be considered by exporters in order to facilitate market access.

In addition, this Brief includes a chapter that gives information on trade fairs and publications with particular relevance to both, exporters of cassava as a vegetable for human consumption and as animal feed.

A last paragraph summarizes the most important findings and works out those market segments producers and exporters, who are looking for market niche opportunities, should consider as they might offer good business prospects.

A. PRODUCT DESCRIPTION

This Market Brief deals with cassava, classified under the following code:

HS 0714.10 Manioc (cassava)

This heading covers the product, fresh, chilled, frozen or dried, whether or not sliced or in the form of pellets made either from pieces of the root (e.g. chips) of this heading or from its flour, meal or powder of heading 1106.20. If binder (molasses, concentrated sulphite lyes, etc.) is added to produce those pellets its proportion may not exceed 3% by weight. The pellets may be disintegrated, but remain classified here provided that they are classified as such.

Products of this heading, which are otherwise prepared, fall in other Chapters:

(1) Flour, meal and powder (HS 1106.20)

(2) Starches (HS 1108.14)

(3) Tapioca (HS 19.03)

The Combined Nomenclature of the **European Union** further distinguishes the following codes:

CN	07.14-1010	Pellets of flour and meal
CN	07.14-1091	Of a kind used for human consumption, in immediate packings of a net content not exceeding 28 kg, either fresh and whole or without skin and frozen, whether or not sliced
CN	07.14-1099	Other

Chinese Customs uses the following classification:

07.14-1010	Fresh manioc
07.14-1020	Dried manioc
07.14-1030	Chilled or frozen manioc

Korean Customs Service uses the following classification:

07.14-1010	A. Fresh manioc
07.14-1020	B. Dried manioc
07.14-102010	(1) Chips
07.14-102020	(2) Pellets
07.14-102090	(3) Other
07.14-1030	C. Chilled manioc
07.14-1040	D. Frozen manioc

The **US** Department of Commerce and the Bureau of Census use the following classification:

07.14-1010	Frozen cassava
07.14-1020	Fresh, chilled or dried cassava

Cassava is a perennial woody shrub, which produces a high yield of tuberous roots with a very high starch content. Originating in Brazil and Paraguay, today the cassava plant is cultivated in most tropical and subtropical regions of the world and is known by many names: in Africa it is called Manioc or Cassava, in Brazil it is Manioc or Mandioca, while Yucca or Aipim is used in other parts of South America, in Thailand it is Cassava, Kespe in Indonesia and Tapioca in India. In Europe and the US the term cassava is usually applied to the roots, while tapioca refers to products made from cassava like starch or dried chips, but also in Europe the terminology differs from country to country.

The plant grows to a height of 1 – 4m and adapts to altitudes of up to 2000 meters. It has the ability to withstand poor environmental conditions, such as low or extreme rainfall and infertile soil and requires minimum maintenance. However, it prefers a fertile sandy-clay soil and does not tolerate flooding or freezing conditions. The root is brown in colour and, depending on the cultivar and the soil conditions, can grow up to 15cm thick and up to 120cm long with a weight of 1 to 8 kg or more. As there is no mature stage for cassava, harvest can take place as soon as the roots are large enough to meet the requirements of the consumer. Typically, it can begin six to eight months after planting, but roots can also remain unharvested for longer than one growing season. If the roots do not receive special treatment (e.g., dipping in paraffin, storing in plastic bags or moist mulch, refrigeration), the shelf life of cassava is very short and roots must be processed within two or three days after harvest.

The roots contain from 20 to 32% of starch in half to one and a half year old plants, which is a high share compared to other starch containing food crops. Cassava is known to be the highest producer of carbohydrates among staple crops, but is inferior in protein, fat and vitamin content.

Table 1 below shows the typical composition of mature cassava roots as defined by the International Starch Institute:

Table 1

Composition of cassava roots

Moisture	69.8%
Starch	22.0%
Sugars	5.1%
Fibre	1.1%
Protein	1.1%
Ash	0.5%
Fats	0.4%

Source: International Starch Institute

Cassava has a multitude of applications. Because of its high starch content it is mainly used in processed form in various food and non-food industries but roots are also used for human or animal consumption directly. In the following a few examples for the use of cassava are given:

Direct use for human consumption:

In many of the producing countries, fresh cassava roots serve as staple food. Although the cassava may be consumed in its raw state, it usually needs preparing in order to eliminate the potentially toxic

concentrations of cyanogenetic glucosides[1]. Through cooking and many other ways of processing (soaking in water, crushing or heating) they can be reduced to innocuous levels.

The roots can be peeled and boiled, baked or fried. Also, they can be grated and then squeezed or pressed to extract the sap. Afterwards they are dried over a fire to make meal, which can then be rehydrated with water or added to soups and stews, or fermented and cooked. After grating they can also be washed to extract the starch, which can then be used to make breads, crackers or pasta. Another possibility is to first ferment the roots in water, then to grate them and finally make a dough that is cooked.

Aside from these traditional ways of preparing cassava roots, they can also be sliced thinly and deep fried to make a product similar to potato chips, a product that has recently been introduced to European markets. But they can also be cut into larger pieces and processed into a product similar to French fries. Dried roots can be milled into flour, which can then be used as a partial substitute for wheat flour in making bread. Bread wholly made from cassava flour has been marketed in the US to meet the needs of people with allergies to wheat flour.

Not only the roots, but also the leaves of the cassava plant are edible. They provide a cheap and rich source of protein and vitamins A and B and can be eaten as a green vegetable, prepared in a similar manner to spinach.

Animal feed:

Mostly in the form of chips or pellets, cassava is widely used for feeding pigs, cattle, sheep and poultry. To produce ***chips*** roots are first sliced in pieces, which vary in size, but should not exceed 5cm in length, and then sun dried until the moisture content reaches 13 - 15%. When the roots are not peeled and washed the chips are usually brown in colour and have a high content of fibre sand and foreign objects. With trimming, peeling and washing white chips of superior quality can be produced if they are sliced and dried shortly after harvest. In general, 2 – 2.5kg of fresh roots are required to produce 1kg of chips.

Pellets are usually obtained by feeding chips into a pelleting machine, which grinds them and hardens them into a cylindrical shape. However, they can also be made from cassava flour, meal or powder. Pellets are uniform in appearance and texture and are about 2 – 3cm long and about 0.4 – 0.8cm in diameter.

Pulp as a residue of starch processing is also used as animal feed, either wet or drip-dry in the neighbourhood of the processing factory or sun-dried for selling.

Because of the deficiency of protein and vitamins, animal feed of cassava must be supplemented by other feeds, typically soymeal. The leaves of the cassava plant can also be used to add protein.

Industrial uses in food and non-food industries:

Various industries use starch obtained from cassava roots. Cassava starch is commercially processed into a wide range of products (e.g., dextrose, glucose, adhesives, modified starches).

[1] Cassava contains a cyanogenetic glucoside called phaseolunatin, which breaks down upon harvest into the toxic hydrocyanic (prussic) acid, acetone and glucose. At the harvest of the roots, the amount of acid varies from harmless to lethal – from a few mg to more than 250mg per kg of fresh root. Investigations show that the actual content of prussic acid is markedly increased by drought and potassium deficiency. Besides it varies in tubers obtained from different locations or different varieties (sweet and bitter cassava).

In the **food industry** unmodified or modified starches are used for following purposes: as thickener for sauces, soups, baby foods, etc., as filler contributing to the solid content of soups, pills and other pharmaceutical products, and as a binder in the manufacture of sausages and processed meats.

Starches that are manufactured into dextrose and glucose syrup made of cassava starch are used in biscuit making to increase volume and crispiness and as sweetening agent in the manufacture of candies. Dextrose can also partially replace sucrose (cane or beet sugar) in the production of canned fruits and jams. Cassava starch can also be used to produce caramel as a colouring agent for many foodstuffs and beverages.

Moreover, cassava starch is the main raw material used in the manufacture of MSG (monosodium glutamate), a product, which is used in powder or crystal form as a flavouring agent in cooking.

Also, tapioca can be made of cassava starch. The extracted starch is mixed with water to form a thick paste, which then is dripped on a heated metallic plate. The drops form small pellets, irregular lumps called flakes or round pearls, which are sometimes crushed or granulated and used for the preparation of soups, puddings or dietic foods.

Non-food uses are manifold as well. In general, starch makes a good natural adhesive. Dextrin made of cassava starch is preferred in remoistening gums for stamps and envelopes, mainly because of its properties regarding taste and colour. Other major fields where dextrins are used are corrugated cardboard manufacture and the production of adhesives for wallpaper and other domestic uses. Moreover, starches are used in the paper industry at different stages of the manufacturing process and in the textile industry in operations such as warp sizing, cloth finishing and printing.

In addition, cassava is used for the production of alcohol. Depending on the method of manufacture it is possible to obtain between 70 and 110 litres of absolute alcohol per ton of cassava roots. Usually this alcohol is used for industrial purposes, such as in cosmetics, solvents and pharmaceutical products, but it can also be produced for human consumption.

B. PRODUCTION, FOREIGN TRADE AND CONSUMPTION

Production

According to FAO estimates, world production of cassava was about 180 million tonnes from almost 17 million hectare in 2002. As is shown in Table 2 below, production steadily increased during the last decade (except for a reduction in 1995/96), while the harvest area increased only slightly indicating an improvement in productivity. Growth in global production in 2002 originated mainly in Africa, Latin America and the Caribbean and was high enough to more than offset a contraction in Asia. The growth in Africa was to a great extent due to policies aimed at enhancing food security and favourable weather conditions, however, it also reflected the progressive replacement of existing varieties with new high-yielding and disease resistant types. In Latin America, low coffee prices led to a replacement of coffee trees with cassava plantings, especially in Colombia, Ecuador and Peru. In Asia, the contraction mainly reflects a crop failure in Thailand caused by flooding problems.

Table 2

The world cassava production

Year	Harvest Area (ha)	Production (tons)
1992	16,637,907	162,161,279
1993	16,587,001	163,431,551
1994	16,838,641	165,216,549
1995	16,467,560	162,150,615
1996	16,272,620	158,640,264
1997	16,071,723	161,940,000
1998	16,576,734	164,551,233
1999	16,742,046	172,280,053
2000	16,918,906	177,454,763
2001, prelm.	17,232,470	181,024,387
2002, forecast	16,907,529	184,852,540

Source: FAOSTAT

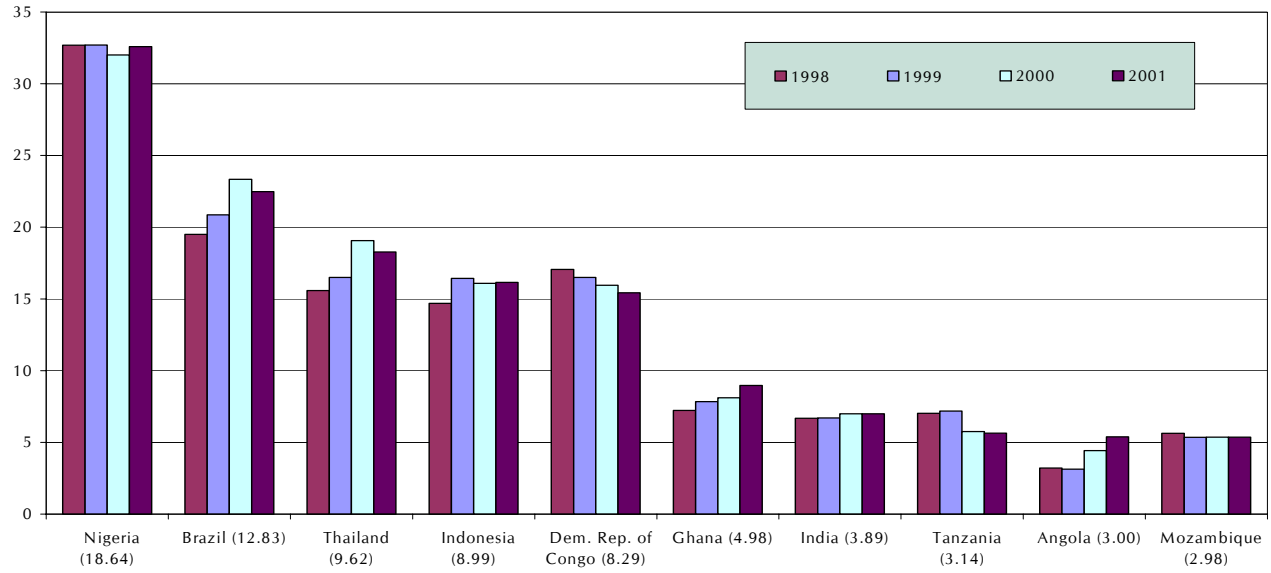
Cassava is grown in 101 countries, more than half of production comes from African countries, another 30% from Asia and almost 20% from Latin America and the Caribbean. Only a negligible share is grown in Central America. These shares by continents changed only slightly over the past decade, but while production was increasing in Africa from 82 million tons in 1992 to 98.5 million tons in 2001 and has been continuously increasing in Latin America and the Caribbean since 1996. In Asia production is lower today than it was ten years ago.

Two thirds of overall cassava production is concentrated in ten countries. Nigeria and Brazil are considered the main producers, accounting for about 19% and 13% of world production, corresponding to 33.5 million tons and 23.1 million tons respectively. And with Thailand and Indonesia, which are ranking number three and four in world production, there are still two Asian countries among the leading producers of cassava. Those four countries provide more than 50% of world production. Another 25% is produced in the Democratic Republic of Congo, Ghana, India, Tanzania, Angola and Mozambique.

Chart 1

Main Cassava Producers

(in million tons, share in world production in brackets)



Source: FAOSTAT

Chart 1 shows that in 2001 production increased in Nigeria, Ghana and Angola. According to the FAO this is due to the expansion of plantings and favourable climatic conditions. In addition, in Ghana the implementation of the Roots and Tuber Improvement Programme had a favourable effect on production by promoting the distribution of disease resistant planting materials to farmers, while in Nigeria the growth was consistent with the Government's emphasis to raise food self-sufficiency. The only African country that clearly shows a downward trend is the Democratic Republic of Congo, where security problems continue to disrupt agricultural activity, while on the other hand production was also curbed by the outbreak of the cassava mosaic virus in 2000. A prolonged drought negatively affected crop production in Tanzania.

In Brazil, production experienced a high growth of about 20% from 1998 to 2000 because rising cassava prices in the country encouraged producers to modernize the sector. Also in Thailand, cassava output in 2000 was 22% above the drought related low of 1998. This growth was a result of improved cassava strains, which were planted on almost half of the cassava cultivation area. However, the situation in Thailand is not stable. Weak international demand for cassava products and depressed prices are encouraging farmers to grow other crops. The strong growth was supported by large intervention purchases by the government.

Foreign trade

Total world imports of cassava can be estimated at about USD 452 million in 2001, corresponding to 5.66 million tons of fresh or dried roots. The principal import markets are the EU and China, which together amounted to more than 80% of total world imports in 2001. The data at the national level shows that China, with a share of 35% of world imports, is the largest import market, followed by the Netherlands, Spain and Belgium-Luxembourg with shares of 21%, 15% and 9% respectively. Besides EU member countries and China, South Korea and the United States are among the top cassava importers.

In the period between 1997 and 2001 world imports grew in terms of quantity, on average, at about 10% annually, while in terms of value there was an average annual decrease of 1%, with a strong growth of 20% in 2001. This increase was mainly due to a high increase in import demand in China and to a lesser extent in South Korea and the US, while demand decreased in all EU member countries. China's share in world imports rose from 5% in 2000 to 36% in 2001, which made China the world's main cassava importer replacing the Netherlands, which had this role in the years before.

With a share of 70%, Thailand is the main supplier of cassava in world trade, followed by Viet Nam (10%), Costa Rica (7%), Belgium-Luxembourg (4%), Indonesia (4%) and the Netherlands (3%). It is striking that with the exception of Thailand and Indonesia, the main exporting areas are not the main producing regions. This is especially true for Africa. Not a single African country is to be found among the leading exporters, as the cassava production of those countries is almost entirely consumed locally as food.

Table 3

Main suppliers of leading cassava import markets

Importing country	Suppliers	Imported value (in 000 USD)	Imported quantity (in tons)	Unit value (USD/ton)	Import growth in value between 2000-2001 (in %)
China	Thailand	124,997	1,629,870	77	2470
	Indonesia	15,006	163,155	92	7
	Viet Nam	13,221	156,982	84	309
Netherlands	Thailand	83,951	1,228,440	68	-12
	Germany	7,026	89,072	79	7
	Costa Rica	2,850	4,646	613	41
	Belgium-Lux	2,229	28,553	78	9
Spain	Thailand	64,955	908,419	72	-33
	Costa Rica	859	1,159	741	86
Belgium-Lux	Thailand	30,967	514,688	60	-17
	Netherlands	7,790	93,913	83	-32
	Costa Rica	351	547	642	31
South Korea	Viet Nam	23,667	225,729	105	10
	Thailand	13,374	192,838	69	1218
	Indonesia	2,473	26,374	94	-54
United States	Costa Rica	25,774	42,771	603	18
	Ecuador	1,120	1,812	618	168
	Philippines	260	238	1,092	-4

Source: COMTRADE

Thailand's exports performed well in 2001, rising 37%. Viet Nam's exports performed even better in 2001 and were, in contrast to Thailand, also increasing over the five-year-period between 1997 and 2001, with an annual growth rate of about 20% in value and 28% in quantity. The strongest decrease among the main exporting countries was experienced by Indonesia, where exports fell by 15% annually in terms of value and 10% in terms of quantity. The best performers were two countries that have almost negligible shares in world exports: Brazil's and Malaysia's exports were over the last five years growing at rates of 160% and 61% p.a. in terms of value, while in terms of quantity they reached rates of 103% and 134% per year respectively.

Table 3 above shows that Thailand, as the main supplier of cassava in world trade, also is the leading supplier to the four main import markets, namely China, the Netherlands, Spain and Belgium-Luxembourg, covering more than 80% of their import demand. For South Korea, Viet Nam is the main supplier, but also here Thailand was accounting for more than 40% of South Korea's overall cassava imports in 2001. Thailand is also the country that shows the highest growth rates between 2000 and 2001. In this year the import growth of cassava supplied by Thailand to China and South Korea was as high as 2470% and 1218% respectively. Of the main cassava import markets, only the US is not supplied by Thailand. More than 90% of US cassava imports come from nearby Costa Rica.

The EU Market

With a share of about 50% of world imports in 2001, corresponding to more than USD 222 million and about 3 million tons of fresh or dried cassava, the EU constitutes the world's largest import market for cassava. Within the EU, the Netherlands (44%), Spain (28%), Belgium-Luxembourg (22%) and Portugal (7%) are the main import markets.

Concerning Extra-EU trade, which accounted for more than 90% of total cassava imports, Thailand, with a share of more than 99% is the leading supplier to the EU market. Of the cassava traded within the EU by Germany, the Netherlands and Belgium-Luxembourg (with shares of 48%, 39% and 12% of Intra-EU imports in terms of quantity), about 70% is imported from Thailand as well. Considering this, one can easily say that Thailand is the only cassava supplier to the European Union. In contrast to Thailand, other major cassava producing countries consume a considerable amount of cassava locally, which leaves less surplus for export. Additionally, Thailand has fewer problems than other producers, particularly African countries, which suffer from adverse weather conditions, various crop diseases and civil unrest, and the Thai government is taking measures to enhance the quality of cassava products and granting technical and financial assistance to local growers.

By the end of the nineties, EU cassava imports had increased considerably from 2.8 million tons in 1998 to 4.5 million tons in 1999. But already in 2000 EU imports decreased again by 12% and by another 18% in 2001 to reach a level of 3.2 million tons. As the main product imported by the EU is cassava pellets for its feed industry, one explanation for the decrease in 2000 would be the disruption to the livestock sector caused by animal disease problems (occurrence of BSE and foot-and-mouth diseases and therefore contraction in livestock herds and meat production). The FAO sees another reason for the reduced import demand in the last two years also in the decline of prices of domestically produced grains,[2] which were therefore substituted for cassava feed products, as well as in the weakness of the Euro relative to the US dollar, which contributed to a price advantage of grain feeds over cassava feeds.

A glance at the different product groups reveals that about 99% of all EU imports are classified under the heading CN 07.14-1099, which covers all fresh, chilled, frozen or dried cassava except for cassava pellets of flower and meal (CN 07.14-1010) and cassava of a kind used for human consumption (CN

[2] Grain prices decreased as a result of a reduction in cereal intervention prices under the Agenda 2000. Within three seasons, they were reduced from a level of USD 125/ton to USD 106/ton for the 2001/02 season. As opposed to the proposed final intervention price cut of 20% in 2003, in January 2003 the European Commission adopted a package of proposals to reform the CAP, which includes the proposal of a final 5% intervention price cut for cereals.

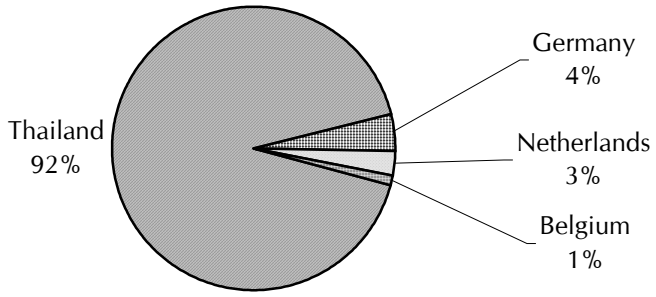
07.14-1091). This means that the bulk of pellets exported to the EU are pellets made of cassava chips and not of flour.[3]Because of this concentration of imports in one product group, all that was stated above on the performance of overall EU cassava imports within the last five years applies to this product group as well. Thus, the Netherlands is importing more than 40% of overall EU imports of pellets made of cassava chips, corresponding to more than 1.3 million tons, Spain is ranked second with almost 30%, followed by Belgium with about 20% and finally Portugal with 7%.

In the Netherlands and Belgium demand for cassava pellets fell considerably in the years 2000 and 2001 for the reasons mentioned above, while in the two southern European countries, Spain and Portugal, the decrease was less pronounced. Both countries even increased their imports by 18% and 15% respectively in 2000, but then reduced them by 30% and 19% respectively in the following year. On the other hand, however, another glance at Table 3 above reveals that these decreases in imports between 2000 and 2001 are related to lower imports from Thailand, whereas imports from Costa Rica, the second largest non-European supplier of cassava to the EU, increased substantially: by 30% to 40% p.a. in Belgium and the Netherlands and by 86% in Spain. This indicates a growing European demand for cassava products for human consumption as cassava from Costa Rica is imported for human consumption (also see Figure 3 below) as opposed to imports from Thailand, which are primarily aimed for animal feed.

Figure 1 shows that Thailand is the main supplier to the EU market in the largest category of other cassava products and as already stated above the other three main suppliers in this product group (Germany, the Netherlands and Belgium) are also mainly supplied by Thailand.

Figure 1

Main suppliers of other cassava products (CN 0714.1099)



Source: EUROSTAT

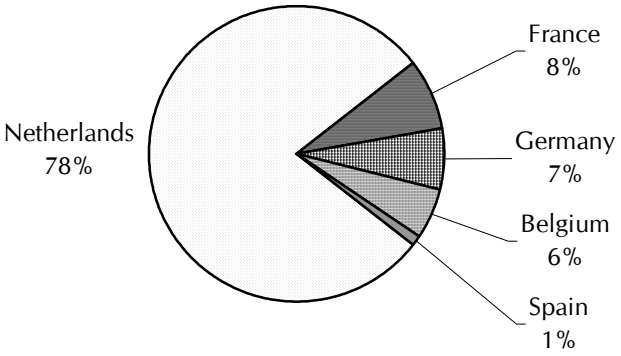
However, Thailand does not play a major role in all three product groups (see Figure 2 and 3).

The main EU importer of pellets of flour and meal, of which the EU imports about 28,000 tons corresponding to a share of 0.86% in total EU cassava imports in 2001, is Belgium (79%), followed by the Netherlands (18%). In this product group, there is a high level of re-exports. That is why all the main suppliers are EU member countries, with the Netherlands ranking first among the main exporters, mainly supplying the Belgian market (see Figure 2 below). Also here, imports decreased strongly in 2001 after having grown about 50% over the period 1997 to 2001.

[3] Hereafter cassava grouped under the heading 07.14-1099 will be referred to as pellets made of cassava chips, while cassava products grouped under the heading 07.14-1091 will be referred to as cassava for human consumption.

Figure 2

Main suppliers of pellets of flour and meal (CN 0714.1010)

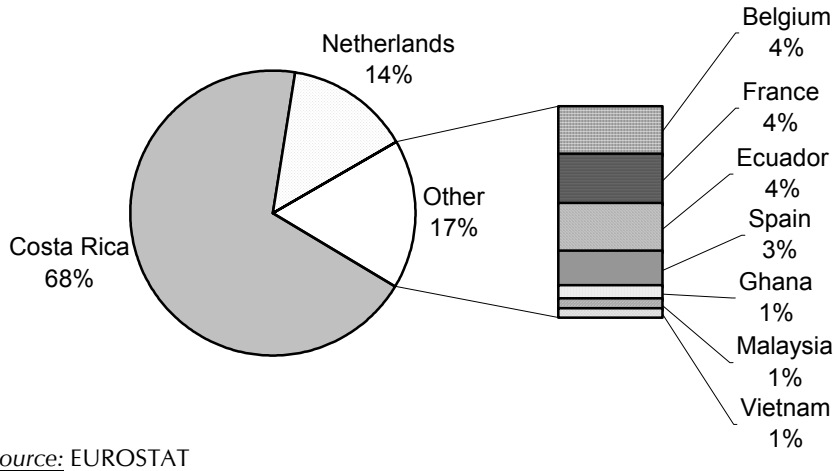


Source: EUROSTAT

With a share of 0.35% in overall cassava imports, corresponding to about 11,000 tons, cassava for human consumption is the smallest product group. Here the main importer is the Netherlands (44%), followed by France (18%) and Spain (10%). The leading supplier is Costa Rica, with Netherlands as a re-exporter, which is also mainly supplied by Costa Rica, ranking second (see Figure 3 below). In contrast to other product groups, supply is more diversified here and, in addition, this is the only product group that experienced continuous growth over the last five years. Imports were 80% higher in 2001 than in 1997, however at a very low level.

Figure 3

Main suppliers of cassava for human consumption (CN 0714.1091)



Source: EUROSTAT

The main feature of the European market is that in all three product groups, no country is in the position to challenge the dominance of the main supplier.

The Chinese Market

As stated above China is the largest national import market for cassava, absorbing about one-third of world imports. China became the leading cassava importer only in 2001, when a major shift in the structure of international cassava trade occurred and Chinese imports increased enormously as compared to the previous year. From a quantity of about 257,000 tons in 2000 cassava imports increased up to a quantity of almost 2 million tons or USD 153 million respectively. In 2002, imports fell again by 10%, but still cassava today has a 92% share of Chinese overall vegetable imports (62% in 2000). According to the FAO the rise in 2001 was in response to unfavourable sweet potato crops in the main growing regions, which encouraged a shift towards cassava utilization in animal feed. Another important factor is also the cut in its import duty to between 7% and 11.2% from the 30% prevailing before its accession to the WTO in December 2001.

Table 4

Chinese imports of cassava by product group and supplying country

(Value: in 000 USD, Quantity: in Metric Tons)

	1997		1998		1999		2000		2001	
Supplier	**Q**	**V**	**Q**	**V**	**Q**	**V**	**Q**	**V**	**Q**	**V**
071410 Cassava (Manioc)										
World	**278,304**	**27,060**	**300,519**	**31,718**	**372,699**	**37,875**	**256,573**	**22,065**	**1,950,030**	**153,301**
Thailand	126,898	12,373	187,168	19,234	169,682	16,748	61,411	4,864	1,629,870	124,997
Indonesia	95,803	8,979	92,260	9,681	163,901	16,546	161,080	13,962	163,155	15,006
Viet Nam	55,599	5,708	21,024	2,735	38,287	4,442	34,081	3,236	156,982	13,221
Malaysia	0	0	0	0	798	88	0	0	0	0
Japan	0	0	0	0	0	0	1	3	22	77
Spain	0	0	33	61	0	0	0	0	0	0
Italy	0	0	0	0	31	50	0	0	0	0
07.14-1020 Dried manioc										
World	277,803	26,754	300,501	31,717	372,699	37,875	256,092	22,035	1,949,568	153,219
Thailand	126,898	12,373	187,168	19,234	169,682	16,748	61,411	4,864	1,629,870	124,997
Indonesia	95,302	8,673	92,260	9,681	163,901	16,546	161,080	13,962	163,155	15,006
Viet Nam	55,599	5,708	21,006	2,734	38,287	4,442	33,600	3,206	156,542	13,217
Japan	0	0	0	0	0	0	1	3	0	0
Malaysia	0	0	2	0	797	88	0	0	0	0
Italy	0	0	0	0	31	50	0	0	0	0
Spain	0	0	33	61	0	0	0	0	0	0
07.14-1010 Fresh manioc										
World	5,003	306	18	1	0	0	481	30	490	4
Viet Nam	0	0	18	1	0	0	481	30	490	4
Indonesia	5003	306	0	0	0	0	0	0	0	0
07.14-1030 Chilled or frozen manioc										
World	0	0	0	0	0	0	0	0	22	77
Japan	0	0	0	0	0	0	0	0	22	77

Source: World Trade Atlas, China Customs

The three main suppliers to the Chinese market are Thailand, Indonesia and Viet Nam. As Table 4 above shows, between 1997 and 2000 Thailand and Indonesia were competing for dominance in the Chinese market, which in this period had a share of only 5% to 8% of the world's supply of cassava. Then, with the strong increase in Chinese cassava demand, Thailand became the leading supplier, supplying more than 80% of the Chinese market in 2001. This is partly due to the fact that Thailand is trying to diversify its markets in order to reduce its dependency on the EU. In addition, Thailand was able to react quickly to the increase in Chinese import demand because of stocks that were held by the Thai Public Warehouse Organization after, in 2000, the government had launched a purchasing programme to support producer prices. Also, Viet Nam was able to increase its supply considerably in 2001, while Indonesia profited the least from the increase in Chinese import demand with its exports remaining close to the level of the previous year.

Except for a negligible share of far less than 1%, which is imported as fresh cassava roots, all cassava imported by China is in dried form. As in the EU, cassava in China is also mainly used as animal feed and therefore mainly imported in the form of chips or pellets.

In the market segment of fresh cassava roots, Indonesia was replaced by Viet Nam as the only supplier in 2000 after imports of fresh cassava stopped completely in 1999.

Chilled or frozen cassava was by China for the first time in at least eight years imported in 2001. All 22 tons of chilled or frozen cassava that were imported that year came from Japan.

The South Korean Market

With an import value of USD 39.5 million corresponding to 445,000 tons, South Korea has a share of 9% of world cassava imports.

Table 5

South Korean imports of cassava by product group and supplying country
(Quantity: in Metric Tons)

	Supplier	1997	1998	1999	2000	2001
071410	**World**	**584,842**	**463,300**	**212,464**	**291,792**	**444,940**
07.14-102010 Chips	**World**	**201,149**	**245,998**	**212,464**	**275,962**	**252,115**
	Viet Nam	142,624	56,907	143,209	217,730	225,729
	Indonesia	58,524	133,295	67,426	57,493	26,374
	Thailand	0	54,461	0	0	12
	China	0	0	1,829	739	0
	Myanmar	0	1,336	0	0	0
07.14-102020 Pellets	**World**	**383,693**	**217,302**	**0**	**15,829**	**192,825**
	Thailand	377,403	211,875	0	15,829	192,825
	India	0	3,700	0	0	0
	Indonesia	0	1,100	0	0	0
	China	2,142	628	0	0	0
	US	4,148	0	0	0	0

Source: World Trade Atlas, Korean Customs Service

Overall, cassava imports have been increasing over the last few years due to an increased consumption of livestock products stemming from economic growth in South Korea. In line with the growth in the livestock industry, the Korean feed industry has expanded its production, and due to a shortage in domestic feed resources had to increase imports as well. However, in the future a slowing of the growth in the feed industry is expected as the current volume of imported livestock is increasing because of the government's policy to liberalize the market.

As Table 5 above shows, Korean cassava imports are limited to the import of dried cassava in the form of chips (57% of overall cassava imports in 2001) and pellets (43%). While imports of chips have been comparably stable in the period under review, ranging between 200,000 and 276,000 tons, there have been substantial ups and downs regarding the import of cassava pellets. Pellet imports have been decreasing from 1996 onwards, stopping completely in 1999. Then, in 2000 with a small quantity of about 15,000 tons, South Korea started importing pellets again and increased the imported amount considerably in the following year. While most pellets were always imported from Thailand, today, Thailand is the only supplier, whereas prior to 1999 smaller amounts were also imported from China, India, Indonesia and the United States. At the same time cassava chips are mainly supplied by Viet Nam, whose main competitor in this market segment is Indonesia. However since 1999, it seems that Viet Nam has won the fight for dominance as it has increased its share in South Korean imports each year, while Indonesia is loosing market share.

The US Market

With an import value of USD 27 million, the US consumes 6% of world cassava imports in terms of value, but with about 45,000 tons not even 1% in terms of quantity. 70% of US imports in 2001 consisted of fresh, chilled or dried cassava, while the other 30% consisted of frozen cassava. In contrast to the other principal import markets referred to above, US imports are primarily intended for human consumption driven by ethnic demand from mainly the Hispanic or Asian population in the United States. This also explains the high unit value of US cassava imports, which with 610 USD per ton is about eight times higher than the unit value of the imports of the EU, China and South Korea.

Table 6

Top 5 suppliers of the US cassava market by product group
(Quantity: in Metric Tons)

	Supplier	1997	1998	1999	2000	2001
071410	**World**	**35,117**	**35,733**	**37,590**	**41,286**	**45,479**
07.14-1020 Fresh, chilled or dried cassava	**World**	**27,015**	**25,625**	**26,925**	**29,736**	**31,874**
	Costa Rica	25,994	24,775	26,814	28,914	30,527
	Ecuador	241	114	11	521	920
	Dominican Republic	55	133	21	76	103
	Panama	116	338	13	0	99
	Nicaragua	17	136	45	29	78
07.14-1010 Frozen cassava	**World**	**8,102**	**10,108**	**10,665**	**11,550**	**13,605**
	Costa Rica	7,594	8,548	10,088	10,756	12,263
	Ecuador	151	879	53	253	892
	Philippines	221	221	107	237	210
	Colombia	0	13	85	91	85
	Tonga	11	18	110	117	74

Source: World Trade Atlas, US Department of Commerce, Bureau of Census

Compared to the other markets, the import demand of the US alone has grown over the whole period from 1997 to 2001.

Another special feature of the US market is that many more countries supply US cassava demand. However, most of the supplying countries have only a very small share in the US market, which is strongly dominated by Costa Rica. In both product groups, more than 90% of imports originate in Costa Rica as can be seen in Table 6. However trade data also shows that Ecuador is trying hard to increase its market share in both market segments, being especially successful in the frozen cassava market, increasing its share from 0.5% up to 6.5% within the last two years.

Exports

As is obvious from what was stated above, Thailand is the major exporter of cassava representing about 83% of world exports in 2001, corresponding to more than 4.6 million tons. It is a net exporter, which is exporting out of own production only. Its exports are focused on the Netherlands and the Chinese market at almost the same proportion. Viet Nam and Costa Rica rank number two and three in world exports. Both countries are net exporters as well. Whereas, Viet Nam is supplying South Korea (64%) and China (36%), Costa Rica is directing 84% of its cassava exports, most of it frozen or waxed roots for human consumption, to the US and another 13% to EU countries, mainly the Netherlands.
Belgium and the Netherlands, both being net importers, with low shares of 4 and 3% of world exports, rank number four and six. All their exports are targeted toward other European countries. While 95% of Belgian exports go to its neighbouring country, the Netherlands, the Netherlands is re-exporting half of its cassava exports to Belgium.

Regarding growth rates, except for Viet Nam's exports, which were annually growing 20% in terms of quantity and 28% in terms of value over the five-year-period from 1997 to 2001, countries that so far have a negligible share in world exports have been showing the best performance over this period. This is especially true for the exports of Brazil and Malaysia, which grew at rates of more than 100% per year in terms of quantity and, in the case of Brazil, also in terms of value. Other countries with high growth rates are Ecuador and Fiji.

Apparent Consumption

According to FAO estimates global cassava utilization as food amounted to about 108 million tons in 2002, of which more than 60% were consumed in Africa and almost 30% in Asia. The consumption of cassava is very much dependant on its availability, which means that climatic or civil strife problems, which lead to reduced production, as was the case for example in the Democratic Republic of Congo in 2002), in general also mark a fall in cassava food consumption, while gains in production result in increased consumption, as was the case in Nigeria, Ghana, Guinea, Mozambique, Angola, Tanzania, Uganda, Zambia, Paraguay, Brazil, Colombia and Viet Nam. In addition, the utilization of cassava as food also depends on supplies of alternative foods, like rice, and their prices. In Indonesia for example, abundant supplies and low prices of rice in particular, led to a substitution of cassava as food and its diversion to animal feed.

Global cassava utilization as feed is estimated at 50 million tons and is concentrated in Latin America (mainly for the poultry industry) and in the European Union (mainly for the swine industry). While production and utilization was expanded in the former, especially in Brazil and Columbia, utilization by the EU decreased substantially, mainly because of a fall in domestic grain prices as was already mentioned above (see B. PRODUCTION, FOREIGN TRADE AND CONSUMPTION, The EU Market).

In Africa, the majority of cassava is used for human consumption. The most common form of consumption is Gari. For the preparation of Gari, peeled cassava roots are soaked in water, then grated, and the resulting mass is packed into cotton sacks, topped with weights to squeeze out the water, and allowed to partially dry and ferment for a few days. The grated cassava is then spread out to dry in the sun, pressed through a sieve, and dry-fried in shallow pans until it is completely cooked and free of moisture. Today, many people use packaged commercially manufactured Gari that is sold in shops and markets. Other forms include Farinha, which is made by grating roots, fermenting and sun-drying them before heating them over low heat, and Foo-Foo, a paste-like meal that is made from fermented roots or flour. Only a small share of about 10% is used for animal feed, mostly in the form of peels or starch-based products, while in Asia most is processed to chips/pellets and starch. Only in Indonesia is the utilization of cassava for human consumption traditionally very high and accordingly its cassava market is mainly national, whereas Thailand is mainly export oriented. In Latin America and the Caribbean cassava is increasingly becoming a market-oriented product. While still more than 60% is destined for traditional food, industrial use of cassava starch is increasing, as well as the use of cassava as animal feed. In the last five years, the Latin American snack and convenience foods industry also discovered the cassava root, resulting in the appearance of some new products mainly in the US, European and Japanese markets.

The comparison of EU import and export statistics shows that the main importers of cassava products are also the main consumers. Therefore, pellets made of cassava chips are mainly consumed by the Netherlands, France, Spain, Portugal and Belgium, while pellets of flour and meal are almost exclusively used in Belgium. Cassava for human consumption seems to be most popular in the Netherlands, France, the UK and Spain.

Chinese production and trade data shows that there is substantial consumption of domestic cassava. Until 2000 only a quantity of 10% of domestic production was imported. But then in the following year the situation changed dramatically and an additional quantity of 2 million tons of dried cassava, almost as much as 50% of domestic production, was consumed in China.

C. MARKET ACCESS

European Union

The conventional rate of duty applied by the EU for imports of cassava products covered by all three subheadings (pellets of flour and meal, cassava for human consumption and pellets made of chips) is 9.5EUR/100kg. However, imports from certain countries, can enter the EU with zero duty, while other countries face a duty of 6% if imports do not exceed certain quotas. The following table shows the applied tariffs and quotas by importing countries/country groups:

	07.14-1010 Pellets of flour and meal	07.14-1091 Cassava for human consumption	07.14-1099 Pellets made of cassava chips
Conventional rate of duty	9.50EUR/100kg		
Preference for WTO members (excl. TH*, ID*, CN*)		6% for imports below a quota of 145,590 tons	
Preference for countries, which are not members of the WTO		6% for imports below a quota of 2,000 tons	6% for imports below a quota of 30,000 tons
Preference for ACP countries	8.60 EUR/100kg	0%	8.80 EUR/100kg
Preference for OCT	0%	0%	0%
Preference for least developed countries under GSP (excl. MM*)	0%	0%	0%
Preference for AL*, BA*, YU*, AD*, HR*, MK*, LB*, SM*	0%	0%	0%
Preference for China		6% for imports below a quota of 350,000 tons	
Preference for Indonesia		6% below a quota of 825,000 tons	
Preference for Thailand	6% for imports below a quota of 5.5 million tons within a maximum quantity of 21 million tons over each four-year period.		

* AD = Andorra, AL = Albania, BA = Bosnia-Herzegovina, CH = China, ID = Indonesia, HR = Croatia, MK = Former Yugoslav Republic of Macedonia, MM = Myanmar, LB = Lebanon, SM = San Marino, TH = Thailand, YU = Yugoslavia (Serbia and Montenegro)

Source: TARIC (May 2003)

In general, entry into free circulation within the EU is subject to the presentation of an import certificate AGRIM, issued in accordance with Reg. (EC) No 1291/2000 (OJ L 152).[4]

Eligibility to benefit from the quota arrangements is subject to the presentation of an import licence.

For Thailand the obtainment of an import licence is subject to the submission of a certificate for export to the European Community issued by the Department of Foreign Trade, Ministry of Commerce, Government of Thailand.[5] For all other countries with quota arrangements the conditions for the obtainment of an import licence are laid down in Commission Regulation (EC) No 2449/1996 (OJ L 333).

[4] All EC regulations mentioned in this chapter are published in the Official Journal (OJ) of the European Union and can be accessed on http://europa.eu.int/eur-lex.

[5] For an example of an export certificate as provided by Thai authorities see Annex 2. For more details on these requirements see Commission Regulation (EC) No 2222/2002 (OJ L 338).

At the time of the preparation of this Market Brief imports from Iraq were still prohibited according to Reg. (EC) No 2465/1996 (OJ L 377).

Furthermore, sanitary and phytosanitary inspections are required. More information regarding these measures can be obtained from National Enquiry Points (see I. IMPORTANT ADDRESSES).

China

After its accession to the WTO in December 2001, China had to decrease its duty rates and is today applying the following tariffs for imports of cassava products:

	07.14-1010 Fresh manioc	07.14-1020 Dried manioc	07.14-1030 Chilled or frozen manioc
MFN duties	10%	7%	11.2%

Source: MAcMap[6]

Also here sanitary and phytosanitary measures come into effect, information on which can be obtained from the International Inspection and Quarantine Standards and Technical Regulations Research Centre of China (see I. IMPORTANT ADDRESSES).

South Korea

South Korea applies a prohibitive import tariff to almost all cassava products. Except for frozen cassava (07.14-1040), to which a tariff rate of 47.8% is applied, the import of all other products is subject to comparably low quotas (e.g. 150,000 tons for manioc chips (07.14-102010) and 296,000 tons for manioc pellets (07.14-102020) for the first half of 2001, inside which a duty rate of 10% for chips and 2% for pallets was applied). Imports exceeding those quotas are subject to a tariff as high as 907.1%.

[6] MAcMap (Market Access Map) is ITC's database of the major instruments of protection (ad-valorem and specific duties, prohibitions, tariff quotas, anti-dumping duties and norms) at the most detailed product level and covering most bilateral preferential arrangements, developed for enhancing transparency and in support of international marketing, trade promotion and easier analysis of trade policy issues by the business sector and civil society at large. For more information on Market Access Map please contact macmap@intracen.org.

US

The US only distinguishes between two different cassava subheadings, frozen cassava and fresh, chilled or dried cassava. For these products the US applies the following tariffs:

	07.14-1010 Frozen cassava	07.14-1020 Fresh, chilled or dried cassava
General tariff	7.9%	11.3%
Tariff for Cuba, Laos and North Korea	35%	50%
Preference under GSP (excl. Costa Rica)	0%	0%
Preference under Caribbean Basin Economic Recovery Act	0%	0%
Preference under Andean Trade Preference Act	0%	0%
Preference for Canada	0%	0%
Preference for Israel	0%	0%
Preference for Mexico	0%	0%
Preference for Jordan	1.9%	4.5%

Source: Harmonized Tariff Schedule of the United States (2003, Rev. 2)

Import permits are required to import these products to protect against the introduction of pests and diseases. To obtain information regarding a Phytosanitary Certificate the appropriate national plant protection organization in the exporting country should be contacted in advance of importation. For a list of foreign contacts see http://www.aphis.usda.gov/ppq/permits/phytosanitary/contact.pdf.

Quality requirements

Quality standards may vary from country to country, but generally cover such aspects as moisture, ash, crude fibre and starch content. The moisture content limit for safe storage is between 12 and 14 %. Ash content and extraneous inorganic contaminants, such as sand and soil, should not exceed 3%. Crude fibre content is generally accepted at 14% and starch content at 74 to 82%.

For the EU such quality requirements regarding feed material are laid down in Commission Directive 98/67/EC (OJ L 261) as follows:

The moisture content should not exceed 14% of the weight of the feed material and must be declared if it does. For roots of cassava, regardless of their presentation the maximum content of ash insoluble in hydrochloric acid is 4.5% of dry matter. If it exceeds 3.5% declaration is compulsory. The declaration of starch content is compulsory as well.

Furthermore, Directive 2002/32/EC (OJ L 140) sets maximum levels of undesirable substances in animal feed and prohibits the use and circulation of products that contain higher levels. For cassava products a maximum content of 100 mg/kg of hydrocyanic acid is set. The content of Aflatoxin must not exceed 0.05mg/kg if cassava is intended for use as complementary feedingstuff for cattle, sheep and goats and 0.03mg/kg for pigs and poultry. For dairy animals and young animals the maximum content is 0.005mg/kg.

In Thailand, the Thai Industrial Standards Institute (TISI) has developed industrial standards for different cassava products, three of which refer to products covered by this Market Brief:

1. TIS 52-2516 (1973) for tapioca products
2. TIS 330-2530 (1987) for hard tapioca pellets (compulsory standard)
3. TIS 1011-2533 (1990) for tapioca pearl

The first standard defines limits for the following constituents:

Sand (acid-insoluble ash)	max. 3.0% of weight (stricter than EU requirements)
Crude fibre	max. 5.0% of weight
Moisture	max. 14% of weight

It also requires the products to be free from foreign materials, abnormal odour and colour, alive insects and they should not be putrid, rotten or mouldy. Furthermore this standard prescribes methods of sampling and analysis.

Any person who manufactures products complying with this standard is allowed to use the Standards Mark after having received a license from the Industrial Product Standards Council.

A product certification further requires an inspection, which includes factory visits and drawing random samples from production, before a licence is granted. After being granted a licence, surveillance of the quality control system or of the product quality by taking samples for testing or both, will be carried out. All three standards can be obtained from the TISI (see I. IMPORTANT ADDRESSES).

Concerning the use of cassava as food, currently, the FAO and the WHO are jointly working on the development of international standards for cassava under the Foods Standards Programme (Codex Alimentarius Commission).[7] In 2002 the Codex Committee on Fresh Fruits and Vegetables adopted a Draft Codex Standard for Sweet[8] Cassava and forwarded it to the Codex Alimentarius Commission for adoption at its next session in summer 2003.

The proposed draft standard[9] places cassava into three classes, "Extra" Class, Class I and Class II, which are distinguished by the degree of defects in shape, the keeping quality and the presentation in the package. In all classes cassava must comply with the following minimum requirements:

The cassava must be:

- whole
- firm
- sound
- practically free of mechanical damage and bruising
- clean, practically free of any visible foreign matter, except permitted substances used to prolong its shelf life
- practically free of pests affecting the general appearance of the produce
- practically free of damage caused by pests
- free of abnormal external moisture, excluding condensation following removal from cold storage
- free of loss of colour in the flesh
- free of any foreign smell and/or taste

And the cut at the distal (narrow) end of the cassava should not exceed 2cm in diameter, while the stalk end of the root should have a clean cut between 1cm and 2.5cm in length.

In all cases, cassava must not be less than 300g in weight nor less than 20cm in length.

Size codes are determined in accordance with the following table:

Size Code	Diameter (at thickest cross-section of the product) in cm
A	4.0 - 6.0
B	6.1 - 8.0
C	>8.0

With regard to hygiene, the draft standard recommends that cassava should be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3-1997) and other relevant Codex texts, such as Codes of Hygienic Practice and Codes of Practice.
Cassava should also comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

Other provisions concern packaging and labelling (for details see F. PACKAGING AND LABELLING).

[7] More information on FAO/WHO Food Standards is available at http://www.codexalimentarius.net.

[8] The draft standard defines sweet varieties of cassava as those that contain less than 50mg/kg hydrogen cyanide (fresh weight basis).

[9] See Report of the tenth session of the Codex Committee on Fresh Fruit and Vegetables, ALINORM 03/53.

In addition, the Hazard Analysis and Critical Control Point (HACCP) quality standard is accepted globally and gaining in importance as it is firmly established as the foremost means of assuring food safety. The HACCP system and guidelines for its application were developed by the Codex Committee for Food Hygiene on the Codex Alimentarius Commission and many countries have established national HACCP standards. Although it is not a mandatory standard for exporters, having an approved HACCP system could be an advantage in finding importers, because many countries have adopted or are likely to adopt HACCAP as part of their food regulations. More information on this standard system is available in ITC's Export Quality Bulletin No. 71, "An Introduction to HACCP", which was published in 2002.[10]

[10] ITC Export Quality Bulletins can be downloaded from http://www.intracen.org/eqm.

D. PRICES[11]

Following a sharp drop in 1992 and another significant drop in 1996 and 1997, international cassava prices today are at levels substantially below those prevailing ten years ago. While in 1992 the average price for cassava pellets was USD 150 per ton, in 2002 it was only 66.32 per ton. It seems, however, that so far prices reached the lowest level in October 2000, when the export price for Thai cassava pellets was USD 47 per ton. Since then, as Chart 2 shows, prices have been increasing monthly, aside from slight downturns at the beginning of both 2001 and 2002, until September 2002.

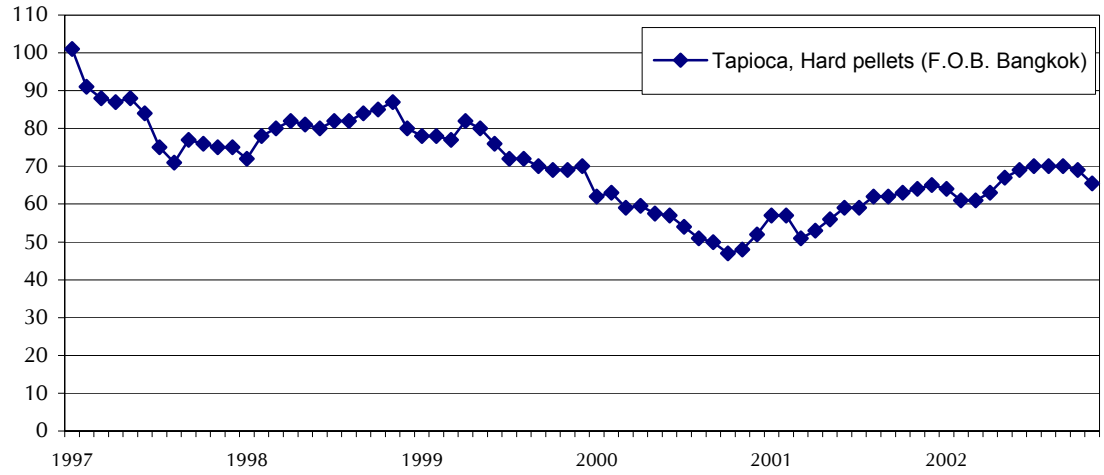
The main reasons for the price fall between 1996 and 2001 are abundant supplies in Thailand and the competitive grain policy of the European Union, the major import market for cassava pellets. As cassava is a substitute for grains in animal feeding, quotations for cassava pellets are heavily dependant on domestic EU grain prices, especially for barley. For example, quotations for barley in Spain, the second largest cassava user in the EU, have been decreasing steadily from the mid 1990s to 2001 (in consequence of the reform of the EU Common Agricultural Policy (CAP)[12]) and led to a substitution of barley for cassava pellets, what also resulted in a decrease in the selling price of cassava pellets.

In addition, in order to substitute grains in animal feed, cassava pellets must be supplemented with protein-rich meals. A mixture of 80% cassava pellets and 20% soybean meal is very common. As a result, soybean meal prices affect cassava prices, since a drop in prices of soybean meal can increase the attractiveness of cassava to feed users. In 2000, prices of soybean meal rose by 25% as compared to the previous year and further depressed cassava pellet quotations. Additionally, a reduced demand for feed for pig-raising in the EU caused by animal disease concerns and the weakness of the Euro compared to the US dollar contributed to lower prices in 2000.

Chart 2

Prices of Pellets made of cassava chips (Jan 1997 – Nov 2002)

(Unit Value: in USD/ton)



Source: The Tapioca Trade Association (TTTA)

[11] If not indicated otherwise, the source for all price information given in this chapter is the FAO (various issues of the Food Outlook).

[12] See Footnote 2, page 8.

After 2000, interventions by the Thai government contributed to an increase in prices, as well as did a growing demand from the Far East, China in particular, which was boosted by both an unfavourable sweet potato crop and low world prices for cassava pellets. Additionally, tighter supply due to a smaller crop in Thailand in 2001/02, led to a recovery of prices from the low levels in previous years, therewith scaring away EU cassava buyers.

Even though health scares in the beginning of 2002 involving meat and bone meal and concerns about transgenic soya rose demand for cassava pellets, price increases made cassava less attractive to European feed compounders, so that feed traders expect the usage of cassava to remain limited in EU markets.

Preliminary figures for Chinese imports of cassava pellets show a decrease in import demand, suggesting prices in 2003 are not likely to remain at a high level. While from May to September 2002 it seemed that import prices (f.o.b. Rotterdam) had stabilized on a level between 90 and 100 EUR per ton, they had already experienced a slight downward trend in the following months and were, on the13th of April, ranging at 87 EUR/ton.

The further development of prices will depend not only on Chinese import demand, but also on the price developments of feed wheat and barley. As stated above in January 2003 the European Commission adopted a package of proposals to reform the CAP, which includes the proposal of a final 5% intervention price cut for cereals as opposed to the initially proposed 20% in Agenda 2000. This means that grain prices will not decline as strongly as expected earlier, so a possible strengthening of cereal prices could support a growing demand for cassava products in the EU.

Demand in the EU could also rise as quality improvements in wheat are expected to lead to higher proportions of wheat going to human consumption, thereby increasing the need for imported substitutes in animal feed. According to Agra Europe this, and the fact that the EU is limiting its grain imports from Eastern European countries, is rising hope among Thai cassava producers that a turnaround in sales to the European market could occur.[13] In addition, the strengthening of the Euro relative to the US Dollar could contribute to an increase in demand for non-grain feed imports by making them less expensive.

At the same time, increasing demand in South Korea could contribute to a recovery of prices as well. Because of serious concerns of possible shortages in wheat feed, due to major delays in scheduled grain shipments from traditional suppliers in Europe and China, South Korean compounders started to switch to cassava products in the beginning of 2003.

Concerning the use of cassava for human consumption, information on European wholesale import prices for cassava (from Costa Rica) are published in the Market News Service (MNS) report "Fresh Tropical and Off-Season Fruit and Vegetables – European markets" of the International Trade Centre UNCTAD/WTO. For more information on the report and the MNS please visit http://www.intracen.org/mns.

[13] The Public Ledger – 29 November 2002.

E. DISTRIBUTION CHANNELS

In Thailand, the largest supplier of cassava in the form of chips or pellets for animal feed to the world market, cassava products are usually traded through direct transactions between buyers and sellers. In general, small-scale entrepreneurs, who either grow cassava themselves or buy the product from growers, transform raw roots into cassava chips. In a next step they sell them for local consumption or supply them to pelleting factories, where chips are turned into pellets for export. These factories then either export the pellets themselves or further provide them to export agents. In the EU, cassava is then mainly imported directly by a few major specialized importers and animal feed compounders.

Almost ten years ago, the Thai Commerce Ministry decided to set up a futures market in order to reduce risks for growers, resulting from volatile prices, to provide a centre where all relevant market information (about cultivation, harvest, standards, etc.) will be obtainable for traders and growers alike, to reduce marketing costs, which are high in spot trading because of the intervention of many middlemen, and last but not least to reduce government intervention in the cassava market. In March 2003, the president of the Agricultural Futures Exchange of Thailand, Seree Denworalak, announced that cassava is expected to be available on the exchange by the end of 2004.

If the EU is the target market for cassava as a vegetable for human consumption, exporters should be aware of the fact that in Europe the growth of large scale retailers is partly eroding the function of specialized importers (see below) because those retailers in most cases import their products directly from the appropriate exporters or producers. Increasingly, they have their own purchasing departments in the countries they are trading with and have even founded their own distribution centres to collect the products and supply their own stores. As these retailers aim at trade on a large scale they have a strong demand for consistent quality and volume. Therefore, in most cases, they are interested in establishing long lasting relationships with reliable suppliers who are able to meet their challenging requirements, such as just-in-time delivery.

Another trade channel includes specialized importers, which supply vegetable wholesalers that in turn supply retailers. The advantage of such importers is that they have strong relationships with suppliers and buyers all over the world and a good knowledge of the international market enabling them to give advice to suppliers regarding various topics, such as quality and packaging requirements. In some cases, importers also make use of specialized agents who function as intermediaries between producers/exporters and importing wholesalers. They establish and maintain contacts between the two parties and also procure the products for their customers. Most agents ask for a commission on the sales price.

On the retail level cassava, as a product that is not well known by consumers in many European countries, is traditionally mainly sold in little “ethnic” shops that are generally run by immigrants to meet the specific demand of immigrants. But increasingly also specialized fruit and vegetable shops and hyper- and supermarkets include fresh cassava roots in their fruit and vegetable assortment, which has become more and more diversified over the past years.

Increasingly, also the Internet is becoming a valuable source for finding trading partners. There already exist a huge number of online-marketplaces, for fruits and vegetables, where buyers and sellers can meet online. Examples of such online sources that include cassava products are Foodtrader.com (http://www.foodtrader.com) and Freshinfo (http://www.freshinfo.com).

F. PACKAGING AND LABELLING

As stated above (see C. MARKET ACCESS) the Codex Alimentarius Commission is not only setting standards concerning the quality of cassava but is also developing provisions with regard to packaging and labelling. The Proposed Codex Draft Standard for Sweet Cassava includes the following requirements:[14]

1. Uniformity

The contents of each package must be uniform in shape and contain only cassava of the same origin, variety and/or commercial type, quality and size. The visible part of the contents of the package must be representative of the entire contents.

2. Packaging

Cassava must be packed in such a way as to protect the produce properly. The materials used inside the package must be new (including recycled material of food grade quality), 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.

Cassava shall be packed in each container in compliance with the Recommended International Code of Practice for Packaging and Transport of Tropical Fresh Fruit and Vegetables (CAC/RCP 44-1995), which recommends proper packaging and transport methods in order to maintain the product's quality during transportation and marketing.

The containers shall meet quality, hygiene, ventilation and resistance characteristics to ensure suitable handling, shipping and preserving of the cassava. Packages must be free of all foreign matter and smell.

3. Marking or Labelling

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 1-1991, Amd. 2-2001), the following specific provisions apply:

Consumer packages shall be labelled as to the name of the produce and type (sweet) and may be labelled as to the name of the variety. A statement indicating that cassava should be peeled and fully cooked before being consumed is required.

Non-retail packages must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside, or in the documents accompanying the shipment:

- Name and address of Exporter, Packer and/or Dispatcher. The indication of the identification code is optional.
- Name of produce and type (sweet) if the contents are not visible from the outside. The indication of the name of the variety is optional.
- Country of origin and, optionally, district where grown or national, regional or local place name.
- For commercial identification information about class, size, net weight, and preparation instructions.

When cassava is being exported to markets where it is not very well known and seen as an exotic product, for example in many European countries, special attention should be given to retail packaging and labelling. Although by nature cassava is a product that can be sold without packaging it might be worth providing it in easy recognisable packages of small amounts (e.g. in open trays, in open bags or nets or in open baskets or boxes) and to include practical product information, perhaps with a suggestion of a method of preparation. This would make it easier for consumers to become familiar with a relatively unknown product.

[14] See Report of the tenth session of the Codex Committee on Fresh Fruit and Vegetables, ALINORM 03/53.

Regarding the packaging of cassava products, which are intended for use as feedstuff, no international standards have been developed so far. In Thailand, cassava pellets are usually packed in plastic sacks, which are made from polyolefin (PP, HDPE) as reported by the Thai Packaging Centre (http://www.tistr.or.th). Cassava chips and pellets can also be packed in bags of other materials like sisal, jute, or gunny but it is important that they are impermeable, free of insects and any odours, which could affect the quality of their contents. Sliced chips must further be protected from sweating and heating, which damages them in long-distance shipment.

With respect to labelling of feedingstuffs, the EU has developed certain requirements.[15] The following details have to be indicated clearly visible, legible and indelible either on the packaging, the container or the label accompanying the feedingstuff:

- an exact description of the type of feedingstuff (e.g. complete feedingstuff, complementary feedingstuff, etc.)
- the animal species, for which the feedingstuff is intended
- the minimum storage life of the feedingstuff
- the precise destination
- directions for use
- the net quantity

In addition, information on the analytical constituents must be provided as set in various Directives of the European Commission. As already stated above, in the case of cassava products the starch content must be declared, as well as the content of other substances if they exceed certain levels (see C. MARKET ACCESS).

Furthermore, a number of general packaging requirements are reflected in various standards across Europe. All these standards can be found on the CEN On-line Catalogue.[16] By entering the search term "packaging" one gets all the standards whether related to terminology or the packaging and distribution of goods in general.

For example, in order to get higher efficiency out of transportation units, packaging dimensions should be selected to suit the dimensions of standard outer packaging. An outer box bottom measurement of 60 x 40cm (or fractions thereof) is frequently used and fits both, the standard EUR-pallet with measurements of 80 x 120cm and the other main common pallet size of 100 x 120cm. Of course, these measurements also have to be taken into account when deciding on retail packaging.

Both the unit/retail and outer box should at least include the product name, country of origin and name of manufacturer/importer. In addition, the outer box should have shipping and handling instructions.

To avoid language problems when marking transport packaging with such instructions, internationally recognised pictorial symbols offer a better possibility of ensuring correct handling. The European standard for symbols is EN ISO 780:1999. It includes symbols for messages as "fragile", "keep away from rain", and so on.

The best general approach, however, to ensure EU market access is to meet the essential requirements in Directive 94/62/EC on Packaging and Packaging Waste, which aims to minimize the impact of packaging on the environment. EUROPEN, the European Organization for Packaging and Environment, has issued a useful guide, which is explaining how companies can assess compliance with this EU Directive.[17]

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[15] See http://europa.eu.int/scadplus/leg/en/lvb/l12037b.htm.

[16] See http://www.cenorm.be/catweb/cwsen.htm.

[17] The EUROPEN guide is available free of charge on its website http://www.europen.be.

Based on this directive, CEN, the European Committee for Standardization, published six European Standards[18]:

EN 13427:2000 Packaging - Requirements for the use of European standards in the field of packaging and packaging waste

EN 13428:2000 Packaging – Requirements specific to manufacturing and composition – Prevention by source reduction

EN 13429:2000 Packaging – Reuse

EN 13430:2000 Packaging – Requirements for packaging recoverable by material recycling

EN 13431:2000 Packaging – Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior caloric value

EN 13432:2000 Packaging – Requirements for packaging recoverable through composting and biodegradation – Test scheme and evaluation criteria for the final acceptance of packaging

The Directive also contains a legal requirement that the concentration of heavy metals (cadmium, hexavalent, chromium, lead and mercury) present in packaging shall be below stated limits.

Another important issue with which the Directive deals, is that importers on the national market have to pay fees for imported products based on packaging weight, volume and type of packaging material. As those fees add to the product cost, exporters should take them into account. However, neither the standards nor the fees are fully harmonized yet and the remaining national differences are significant

Therefore, in order to be certain about what packaging or labelling is required, it is recommended to ask the potential buyer in advance.

[18] At present, CEN is revising these standards. The revised standards are expected to be published in April 2004. For further information see http://www.cenorm.be/sectors/sw_res/transport/packaging.htm.

G. SALES PROMOTION

A very cost-effective way of sales promotion is participation in a trade fair. A visit to a trade fair can provide the exporter with valuable information on, among other things, competitors' products, pricing and promotional techniques, developments in production technology, as well as import legislation, other relevant regulations and market trends. It is also a way of testing one's products and their suitability to the target market and of getting into direct contact with importers.

The following international trade fairs are of interest to the fruit and vegetables industry (non-exhaustive list, sorted by dates):

Title/URL	Place	Dates in 2003/2004
IFE 2003 International Food and Drink Exhibition http://www.ife.co.uk	London, United Kingdom	23. – 26. Mar. 2003 (biennial)
SIAL Montréal International Gathering of Professionals of the Food Sector in North America http://www.sialmontreal.com	Montréal, Canada	02. - 04. Apr. 2003 (biennial)
Alimentaria Lisboa 2003 International Food, Drinks, Machinery and Equipment for the Food Industry Exhibition http://www.alimentaria-lisboa.com	Lisboa, Portugal	06. – 10. Apr. 2003 (biennial)
FoodExpo 2003 International Food & Drink Exhibition http://www.agftotaal.nl	Almaty, Kazakhstan	20. - 23. May 2003 (annual)
AGF Totaal Worldwide Fruit & Vegetables Trade Fair http://www.agftotaal.nl	Rotterdam, The Netherlands	15. - 17. Sep. 2003 (biennial)
SIAL Mercosur International Exhibition of Food and Beverages from the Mercosur http://www.exposium-al.com.ar	Rio de Janeiro, Brazil	15. - 18. Sep. 2003 (biennial)
Anuga International Trade Fair for the Food and Drink Industry http://193.99.40.28/wEnglisch/anuga/index.htm	Cologne, Germany	11. - 15. Oct. 2003 (biennial)
Fruit Logistica International Trade Fair for Fruit and Vegetable Marketing http://www.fruitlogistica.de	Berlin, Germany	05. – 07. Feb. 2004 (biennial)
SIAL China International Trade Exhibition for Food, Beverages, Wines and Spirits http://www.sialchina.com	Shanghai, China	30. Mar. - 1. Apr. 2004 (annual)
Food Asia 2004 Asian International Exhibition of Food and Drink http://www.food-asia.com/food_asia.html	Singapore	20. - 23. Apr. 2004 (biennial)
SIAL - The Global Food Market Place International Food Products Exhibition http://www.sial.fr	Paris, France	17. - 21. Oct. 2004 (biennial)
PMA Fresh Summit http://www.pma.com/events/freshsummit/freshsummit.cfm	Florida, USA	17. - 21. Oct. 2004 (annual)

The following international trade fairs are relevant to the feed industry (non-exhaustive list, sorted by dates):

Title/URL	Place	Dates in 2003/2004
VIV Asia International Trade Fair for Innovative Animal Production and Processing http://www.viv.net	Bangkog, Thailand	5. – 7. Mar. 2003
Afia Agro de las Americas International Exhibition for Equipment, Services and Supplies for the Livestock, Aquaculture, Grain and Feed Industries http://www.afia-agro.com	Guadalajara, Jalisco, Mexico	6. – 8. Mar. 2003 (annual)
Agroexpo International Agricultural Trade Fair http://www.agroexpo2003.com	Bogota, Colombia	31. Jul. - 10. Aug. 2003 (biennial)
Polagra-Farm International Agricultural Trade Fair http://www.polagra-farm.pl	Poznan, Poland	9. - 10. Oct. 2003 (annual)
VIV Europe International Trade Fair for Innovative Animal Production and Processing http://www.viv.net	Utrecht, The Netherlands	28. – 31. Oct. 2003 (biennial)
VIV China International Trade Fair for Innovative Animal Production and Processing http://www.viv.net	Beijing, China	21. – 23. Apr. 2004 (annual)
Food & Agro Expo China International Agricultural Trade Fair http://www.ejkrause.com	Shenzhen, China	10. - 13. Jun. 2004

Another means of sales promotion is advertising in trade publications. The following trade magazines could be pertinent to exporters of fresh cassava to the EU, particularly to the Netherlands, France and Spain:

- "Vakblad AGF", published weekly in the Netherlands,
- "Fruitrop", monthly published French trade bulletin, and
- "Valencia Fruits Online", Spanish online trade magazine.[19]

Another important publication for the fresh produce industry is the Eurofruit Magazine, published monthly. Soon the same publisher will issue similar magazines for the Asian and North American fresh produce markets, the Asiafruit Magazine and the Americafruit Magazine.

Examples of trade magazines important to exporters of cassava as animal feed are:

- "Feed Compounder", monthly published in the UK and
- "Feedstuffs", weekly newspaper in the US.

[19] For full contact details of all trade publications referred to in this paragraph see I. IMPORTANT ADDRESSES.

H. MARKET PROSPECTS

As was shown above cassava is a product that can be used both, as animal feed and as a vegetable for human consumption. However, in the main import markets, namely China, European Union member countries and South Korea, cassava is almost exclusively used as animal feed, while in the producing countries it mainly serves as a staple food. And even though trade statistics suggest that world cassava imports are growing, the prospects for the usage of cassava in animal feed are not very good. From what was mentioned above it is obvious that the growth in imports is very unstable as it depends on so many factors over which producers have no influence. The main factor is the high competition mainly from substitutes such as barley and wheat in the European Union and sweet potatoes in China. So only a bad crop of those substitutes or e.g. policy changes that would eventually raise their prices, would also result in a higher demand for cassava. Also in this respect, cassava lacks proteins, meaning that it cannot be used as a sole feedingstuff but must be supplemented with another feed. It therefore not only depends on the availability and the prices of its substitutes, but also of its complements.

That is why the change of the EU grain policy and high soymeal prices together with recent cassava price increases made cassava less attractive to European feed compounders in particular. Given this, feed traders expect the usage of cassava to remain limited on EU markets. There is, however, hope for a turnaround in EU demand as quality improvements in wheat and a limitation of wheat imports from Eastern European countries could increase the need for imported substitutes in animal feed. Additionally, a continued strengthening of the Euro relative to the US dollar could raise demand for non-grain feed imports. However, as stated above there are too many uncertainties to say that the EU is a promising market for cassava feed.

The same is true for the Chinese market, where it is very likely that cassava purchases will not remain at the high level of 2001 as suggested by preliminary figures for 2002. The South Korean market is undergoing a similar situation. Even though South Korean compounders began to switch to cassava products in the beginning of 2003 due to shortages in wheat feed, it is likely to be a short-term phenomenon as the main reason was a delay in shipments because of bad weather conditions. In spite of continued economic growth and a growing demand for meat products, it is expected that the growth rate of the South Korean compound feed industry will slow down in the future as the volume of imported livestock products is increasing in line with the government's policy to liberalize the market.

Only in Latin America does the expansion in the usage of cassava for feedstuff seem to be more of a long-term development, especially in Brazil and Colombia. However, both countries have a share in world imports that is far below 1% and are, since 1998, increasing their own production. As a consequence the increased usage of cassava as animal feed in Latin America is not going to lead to a significant expansion in trade.

On the contrary, the prospects for the use of cassava in human consumption are much more promising as there is a number of under-explored niche markets in this sector. Even though on a comparably low level, imports of cassava for human consumption experienced a continuous growth over the last five years in both, the EU and the US markets.

In both markets this is mainly due to the fact that "exotic" fruits and vegetables are gaining popularity. So far, however, demand is coming predominantly from ethnic minorities, which is why in the EU consumption of cassava is highest in countries like the Netherlands, France and Spain, which have a higher proportion of African immigrants in their populations, and why it is increasing in North America, where the immigrant populations (mainly Hispanic) are growing. The average European or North American consumer is not familiar with cassava and when seeing it at the supermarket does not buy it because he does not know how to prepare it. Therefore, as was stated above (see F. PACKAGING AND LABELLING), when cassava is being exported to markets where it is not very well known it might be a good idea to include practical product information like . preparation suggestions. Another option is to develop marketing strategies that specifically target ethnic minorities that are familiar with the product.

In general, there is a need to promote the consumption of fresh, dried, chilled and frozen cassava in order to achieve a long-term growth trend in this market.

Another reason for the increasing imports in this market segment is the development of new techniques that extend the shelf life of cassava roots. Typically fresh roots are coated with paraffin to prevent deterioration, but this is a method that does not appear very appetizing for the consumer. Recent alternatives include shipping cassava in sealed plastic bags filled with CO_2 and selling them wrapped in plastic foil. Increasingly also chilled and frozen cassava roots are shipped.

Furthermore, the snack and convenience food industry has recently discovered the cassava root as a marketable product. This market is so far only a small and young market and new products have only recently started to appear in US, European and Japanese markets. Among them there is a product similar to potato chips and even French fries can be made from cassava.[20] Such products are a commercial success, especially in Brazil, Colombia and Venezuela, where several different brands have come to market. With regard to the growing interest of consumers in healthy food, which means that they should be low in fat and have limited sugar and salt content, cassava chips and fries have an advantage compared to potato chips and fries, as cassava absorbs less fat in the frying process. If consumers perceived cassava snacks as a low-fat alternative to common snacks there would be great potential for those products as the snack food market is expected to continue to grow. However, to compete against large snack food manufacturers these products eventually need to be introduced through alternative markets, such as health food stores or ethnic shops and a costly marketing strategy would be needed to familiarize consumers with a basically unknown product. The same applies to the promotion of frozen cassava French fries, also called frozen cassava fingers. In Brazil, these pre-cooked, deep-frozen cassava fingers are priced 10-15% below the prices of deep-frozen potato French fries. Nevertheless, it is very likely that this market will only expand if large and already well-known companies decide to promote these new products. Another market opportunity derives from the fact that worldwide people are working more and more and take less time for the preparation of their meals. As a result, there is a growing trend towards convenience food and there would be a high potential for easy-to-prepare, semi-prepared or already processed cassava. So more effort should be put into the development of such cassava convenience food products.

Also, many people are concerned about food safety and the effects of intensive farming on the environment, resulting in a growing interest in organic foods grown only with natural fertilisers and approved pesticides. This can offer an interesting opportunity especially for cassava exporters who grow their cassava on a small- and medium-scale anyway and are able to maintain soil fertility in a sustainable way. They could apply for eco-labels to use them as a marketing instrument and to draw more consumer attention to their products.[21]

Another trend involving cassava, is so called bubble tea, which is also known as pearl, boba or tapioca milk tea, has recently started to appear in tea or coffee shops across many cities in the US. This drink, which originated in Taiwan in the 1980's and is nowadays very popular there and also in Hong Kong, is made by using a green (or other) tea base, to which black tapioca pearls are added, and can be served hot or cold. Milk, fresh fruits, creamer, sugar cane syrup, powdered flavour and crushed ice can also be added. Vendors hope to market it as a healthy alternative to soft drinks or coffee.

Moreover, consumption of cassava as food could be stimulated by diversification into new value-added products, such as different kinds of cassava flours for making bread, biscuits, noodles, cakes and baby foods. Although cassava flour only played a minor role in trade until now, demand could rise if the food-industry recognized a need to produce gluten-free food products. As was stated above, bread

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[20] E.g. ANSA McAL is a company that is exporting Frozen Cassava Fries (see http://www.ansamcal.com/brands.html#Non-Food%20Items), while Ritz Foods International (see http://www.ritzfoods.com) and El Puente (see http://www.el-puente.de/fairtrade_shop/index.htm) are examples of companies that are manufacturing/selling flavoured and unflavoured Yuca Chips or Exotic Manioc Chips respectively.

[21] In March 2000 the European Commission introduced a logo bearing the words 'Organic Farming - EC Control System' [Regulation (EEC) No 2092/91] to be used on a voluntary basis by producers whose systems and products have been found on inspection to satisfy EU regulations (see http://www.europa.eu.int/comm/agriculture/qual/organic/logo/index_en.htm).

made from cassava flour has already been marketed in the US to meet the needs of people with allergies to wheat flour.

Another market of limited size but with potential for further expansion is the use of cassava starch in the adhesives and the food and beverage industries. Also here cassava has many substitutes and the preferred starch in North America is maize starch, while in Europe mainly potato, wheat and maize starches are used. Therefore, mainly modified cassava starches with specific properties that make them preferable for certain industries have a potential for growth.

As well as using cassava starches for sizing paper and textiles, as sweeteners or in prepared foods, a newly emerging and very promising niche market is the use of cassava starch in the production of biodegradable products, such as packaging material and kitchenware.[22] Most conventional plastics are produced from petrochemicals, are persistent in the environment and therefore, a source of environmental pollution and harming wildlife. In addition, they have a costly impact on waste management for municipalities. Hence, reaching conditions for replacement of those plastics with degradable products is of major interest to decision makers and the plastics industry. Several studies are therefore predicting an annual growth rate of about 30% in Europe and the US for those products provided that they have good physical properties (e.g. water barriers and heat resistance) and the ability to be composted.

A last point that is worth mentioning when talking about market prospects is research. Even though cassava serves as a staple food for about 600 million people, investment in research to improve the tropical root crop lags far behind that of other basic crops. According to the FAO, this has resulted in only minor increases in cassava productivity over the past thirty years, less than 1% annually, compared to 2% to 5% in rice, wheat and corn. While the main cassava planting areas are in Africa, according to the FAO, the average African cassava yield is very low. Compared to the potential 80 tonnes per hectare under favourable conditions, average cassava yield is only 8 tonnes per hectare (12.7 ton in Latin America, 12.9 tons in Asia). This is mainly due to bacterial and viral diseases, insect pests, weeds, and drought. Research that was done to address these constraints facing cassava productivity up to the 1990s was not only limited in quantity, but also limited in success. However, in 1996 interest in cassava started to increase when the International Fund for Agricultural Development (IFAD) formed a Task Force for the development of a strategy for cassava. International experts in 1998 prepared a Global Cassava Development Strategy document, which was officially endorsed by the FAO in April 2000. An implementation plan was also adopted.[23]

In addition, thirty of the world's leading experts in cassava research established a new partnership to promote and coordinate global investment in the genetic improvement of cassava in autumn 2002 - the Global Partnership for Cassava Genetic Improvement. At the same time a Brazilian professor was awarded the World Food Prize for his groundbreaking research on cassava.

The FAO believes that new tools such as advanced molecular biology and biotechnology can change the current situation by offering new approaches to cassava improvement as new technologies have the potential to make cassava much more productive, nutritious, and profitable to grow, which would as a result also improve the market prospects for various cassava products.[24]

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[22] In Thailand a newly Poly Foam like product named KU-Green was developed as package for food containers. For more information see http://www.thaifoodsproducts.com/consumer_product/ku_green.htm.

[23] More information and most of the documents are available at http://www.globalcassavastrategy.net.

[24] For a number of other organizations and institutes that are engaged in cassava research and development see I. IMPORTANT ADDRESSES, Other Useful Addresses.

I. IMPORTANT ADDRESSES

Associations

<table>
<tr><th colspan="2">International</th></tr>
<tr><td colspan="2">International Feed Industry Federation

IFIF

E-mail: info@ifif.org
Internet: http://www.ifif.org</td></tr>
<tr><th colspan="2">Europe</th></tr>
<tr><td>European Association for the Fresh Produce Industry

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Tel: +32 2 7777 1580
Fax: +32 2 7777 1581
E-mail: info@cimo.be
Internet: http://www.cimo.be</td><td>European Union of the Fruit and Vegetable Wholesale, Import and Export Trade

EUCOFEL
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Tel: +32 2 736 15 84
Fax: +32 2 732 17 47
E-mail: eucofel.fruittrade.org@skynet.be</td></tr>
<tr><td>European Feed Manufacturers Federation

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Fax: +32 2 230 57 22
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E-mail: info@fefana.org
Internet: http://www.fefana.org</td></tr>
<tr><td colspan="2">The Grain and Feed Trade Association

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GAFTA's office in China

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</table>

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The Thai Tapioca Trade Association

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Fax: +66 2 236 6084
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Internet: http://www.ttta-tapioca.or

International	
ISO - International Standardization Organization P O Box 56 CH - 1211 Geneva Tel: +41 22 749 01 11 Fax: +41 22 733 34 30 E-mail: central@iso.org Internet: http://www.iso.ch	**Joint FAO/WHO Food Standards Programme CODEX ALIMENTARIUS COMMISSION** Viale delle Terme di Caracalla I – 00100 Rome Tel: +39 06 57051 Fax: +39 06 57054593 E-Mail: codex@fao.org Internet: http://www.codexalimentarius.net
Europe	
CEN - The European Committee for Standardization Central Secretariat 36, rue de Stassart B - 1050 Brussels Tel: +32 2 511 9136 Fax: +32 2 550 0819 E-mail: infodesk@cenclcbel.be Internet: http://www.cenorm.be	
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Direction générale de l'alimentation – M.A.P.
251 Rue de Vaugirard
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Fax: + 33 1 49 55 44 62
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Netherlands

Ministry of Finance
Tax and Customs Administration
Central Licensing Office for Import and Export
Section EC/WTO Notifications
9700 RD Groningen
Tel: + 31 50 523 2133/2134/2135
Fax: + 31 50 523 2159
E-mail: cdiuor@bart.nl

Portugal

Gabinete de Planeamento e Política Agro-Alimentar
Prof. Doutor Francisco Cordovil
Rua Padre António Vieira 1
1099-073 Lisboa

Spain

Secretaría General de Comercio Exterior
Subdirección General de Inspección, Certificación y Asistencia Técnica de Comercio Exterior
Paseo de la Castellana 162
28046 Madrid
Tel: +34 91 349 37 59
Fax : +34 91 349 37 40
E-mail: Buzon.Oficial@SGSOIVRE.SECGCOMEX.SSCC.MCX.ES

United Kingdom

Ministry of Agriculture, Fisheries and Food
European Union International Division
Trade Policy Unit – Room 417
Whitehall Place (East Block)
London SW1A 2HH
Tel: +44 207 270 82 38
Fax: +44 207 270 84 15
E-mail: i.newton@tptf.maff.gsi.gov.uk

China

International Inspection and Quarantine Standards and Technical Regulations Research Center
State General Administration of the People's Republic of China for Quality Supervision and Inspection and Quarantine (AQSIQ)
15 Fang Cao Di West Street, Chao Yang District
Beijing 100020
Tel: +8610 65952460/65068143
Fax: + 8610 6506 8143
E-mail: srrc@aqsiq.gov.cn

South Korea

International Cooperation Division
Ministry of Health and Welfare (MOHW)
1 Joongang-dong, Kwachon
Kyunggi-do, 427-721
Tel: +822 503 75 24
Fax: +822 504 64 18
E-mail: iicd@mohw.go.kr

United States

USDA/FAS/FSTSD
Attn: Carolyn F. Wilson
Stop 1027
Room 5545 South Agriculture Building
1400 Independence Avenue, SW
Washington, D.C. 20250
Tel: +202 720 22 39
Fax: +202 690 06 77
E-mail: ofsts@fas.usda.gov and wilsonc@fas.usda.gov

Trade Magazines

<table>
<tr><th colspan="2">International</th></tr>
<tr><td>International marketing magazine for fresh produce buyers in Europe

Eurofruit
Market Intelligence Ltd
1, Nine Elms Lane
London
United Kingdom
Tel: +44 20 7501 3700
Fax: +44 20 7498 6472
E-mail: info@fruitnet.com
Internet: http://www.eurofruitmagazine.com</td><td>Information trade bulletin on fresh and processed fruit and vegetables

Fruitrop
Cirad-flhor – TA 50/PS4
34398 Montpellier Cedex 5
France
Tel: +33 467 61 71 41
Fax: +33 467 61 59 28
E-mail: catherine.sanchez@cirad.fr
Internet:
http://wwww.cirad.fr/publications/revues/fruitrop/fruitrop.html</td></tr>
<tr><td colspan="2">Specialised trade magazine for fruit and vegetables for exporters, importers, wholesalers, supermarket buyers, greengrocers, trade organisations and technical suppliers/service providers

Vakblad AGF
Bezuidenhoutseweg 82
Postbus 90410
2509 LK Den Haag
Netherlands
Tel: +963 525 301
Fax : +963 525 752
E-mail: redactie@vakbladagf.nl
Internet: http://www.vakbladagf.nl</td></tr>
<tr><td>Newspaper for agribusiness

Feedstuffs
12400 Whitewater Dr., Suite 160
Minnetonka, Minn.55343
United States
Tel: +952 930 4343
Fax : +952 938 1832
E-mail: chuseby@feedstuffs.com
Internet: http://www.feedstuffs.com</td><td>Contact in Asia

JES Media International
2nd Floor ANA Bldg. 257-1
Myungil-Dong
Kangdong-Gu
Seoul 134-070
Korea
Tel: +822 481 3411/3
Fax: +822 481 3414</td></tr>
</table>

Spain

Valencia Fruits
Hernán Cortés, 5
46004 Valencia
Tel: +34 963 525 301
Fax: +34 963 525 752
E-mail: info@valenciafruits.com
Internet: http://www.valenciafruits.com

United Kingdom

Magazine for all feed producers and their suppliers

Feed Compounder
HGM House
Nether End
Baslow
Bakewell
Derbyshire
DE45 1SR
Tel: +44 1246 584000
Fax : +44 1246 584005
E-mail: mail@hgmpubs.com
Internet: http://www.hgmpubs.com/hgmhouse.htm

Other Useful Addresses

International
Consultative Group on International Agricultural Research (CGIAR) CGIAR Secretariat The World Bank MSN G6-601 1818 H Street NW Washington, DC 20433 USA Tel: +202 473-8951 Fax: +202 473-8110 E-mail: cgiar@cgiar.org Internet: http://www.cgiar.org
Food and Agriculture Organization of the United Nations (FAO) Viale delle Terme di Caracalla 00100 Rome Italy Tel: +39 06 5705 1 Fax: +39 06 5705 3152 E-mail: FAO-HQ@fao.org Internet: http://www.fao.org
International Fund for Agricultural Development (IFAD) Via del Serafico, 107 00142 Rome Italy Tel: +39 06 54591 Fax: +39 06 5043463 E-mail: ifad@ifad.org
International Centre for Tropical Agriculture (CIAT) CIAT Headquaters A.A. 6713, Cali Colombia Tel: +57 2 4450000 Fax: +57 2 4450073 E-mail: ciat@cgiar.org Internet: http://www.ciat.cgiar.org
International Institute of Tropical Agriculture (IITA) PMB 5320, Ibadan Oyo State, Nigeria Tel: +234 2 241 2626 Fax: +234 2 241 2221 E-mail: IITA@cgiar.org

International

International Trade Centre (ITC)
Palais des Nations
P.O. Box 10
1211 Geneva 10
Switzerland
Tel: +41 22 730 0111
Fax: +41 22 733 4439
Internet: http://www.intracen.org
see also http://www.p-maps.org

Europe

EUROPEN - European Organization for Packaging and the Environment
Avenue de l'Armée, 6
B - 1040 Brussels
Belgium
Tel: +32 2 736 3600
Fax: +32 2 736 3521
E-mail: packaging@europen.be

France

CIRAD - Agricultural Research for Developing Countries
Head Office
42, rue Scheffer
75116 Paris
France
Tel: +33 1 53 70 20 00
Fax: +33 1 47 55 15 30
Internet: http://www.cirad.fr

Netherlands

CBI - Centre for the Promotion of Imports from Developing Countries
P O Box 30009
NL - 3001 DA Rotterdam
Tel: +31 10 201 3434
Fax: +31 10 411 4081
Internet: http://www.cbi.nl

Colombia

CLAYUCA - Consorcio Latinoamericano y del Caribe de apoyo A la Investigatiòn y Desarrollo de la Yuca
AA 6713 Cali
Colombia
Tel: +57 2 4450157
Fax: +57 2 4450159
Email: b.ospina@cgiar.org
Internet: http://www.clayuca.org

List of Importers

EUROPEAN UNION	
Netherlands - Human consumption	
Exotimex B.V. P.O. Box 154 2740 AD Waddixveen Tel: +49 2191 956 40 Fax: +49 2191 956 420 E-mail: info@exotimex.nl Internet: http://www.exotimex.nl	Herman Kuijper B.V. Noorddammerweg 91B 1187 ZS Amstelveen Tel: +31 20 645 2988 Fax: +31 20 645 2422 E-mail: nkuijper@hermankuijper.com Internet: http://www.hermankuijper.com
Cassava crisps Strootman Trading B.V. Outlandsdijk 10 4721 TB Oudenbosch Tel: +31 165 315 555 Fax: +31 165 315 155 Internet: http://www.strootman.com	TFC Holland B.V. Transportweg 49 3155 RJ Maasland Tel: +31 174 525715 Fax: +31 174 511399 E-mail: info@tfc-holland.com Internet: http://www.tfc-holland.com
France - Human consumption	
Drevin Exotics Bâtiment B 3 81, Rue d'Angers 94584 Rungis Cedex Tel: +32 1 45 60 70 80	Halles Mandar 20, Avenue de la Vilette Fleur 362 94637 Rungis Cedex Tel: +33 1 41 80 50 00 Fax: +33 1 41 80 50 39 Internet: http://www.mandar.fr
Pomona Bâtiment C5 Cour d'Alsace PLA 410 94619 Rungis Cedex Tel: +33 1 56 34 10 20 Internet: http://www.pomona.fr	
Belgium - Human consumption and animal feed	
Special Fruit Wenenstraat 6 Transport Zone Meer E19 2321 Hoogstraaten Meer Tel: +32 3 315 07 73 Fax: +32 3 315 08 43 E-mail: mael@specialfruit.be	

Portugal - Animal feed

Oleocom – Comércio de Oleaginosas, SA
R. José Domingos Barreiros 2
1900-729 Lisboa
Tel: +351 218 620 630
Fax: +351 218 620 640
E-mail: jl@oleocom.pt
Internet: http://www.oleocom.pt

Finland - Human consumption (Cassava crisps)

Heinon Tukku Oy
Orionintie 18-20
02200 Espoo
Tel: +358 9 700361 99
Fax: +358 9 700361 91
E-mail: reijo.hirvonen@heinontukku.fi
Internet: http://www.heinontukku.fi

Norway - Human consumption and animal feed

Multichem Wallinco AS
Maridalsveien 161
0461 Oslo
Tel: +47 230052 00
Fax: +47 230052 01

China

Human consumption

Goodwell China
Room 2723, 583 Ling Ling Road
Shanghai, 200030
Tel: +86 21 6487 6287
Fax: +86 21 6487 6159
E-mail: shanghai@goodwell.com.cn
Internet: http://www.goodwell.com.cn

South Korea - Animal Feed

Dae-Pyung Won Co. Ltd.
Suite 1001/1002, Jeil Office Building
99-3 Karak-Dong, Sngpa-Gu
Seoul
Tel: +82 2 406 0590
Fax: +82 2 406 6931
E-mail: dpwon@farmgate.co.kr
Internet: http://www.farmgate.co.kr

US – Human consumption	
American Fruit & Produce Corp. 12805 NW 42nd Avenue Opalocka, FL 33054 Tel: +1 305 681 1880 Fax: +1 305 681 1880	Gonzales & Tapanes Inc. 230 Moonachie Avenue Moonachie, NJ 07074 Tel: +1 201 329 6260 Fax: +1 201 329 6272 Internet: http://www.lafe.com
Goya Foods of California 15320 Salt Lake Avenue Hacienda Heights, CA 91745-1111 Tel: +1 626 961 6161 Fax: +1 626 937 2466 Internet: http://www.goya.com	Goya Foods of Texas 10460 Westpark Drive Houston, TX 77042-5315 Tel: +1 713 266 9834 Fax: +1 713 953 0965 Internet: http://www.goya.com
J C Enterprises 1221 N Venetian Way Miami, FL 33139-1137 Tel: +1 305 856 4230 Fax: +1 305 858 9819	L & J General International 2424 NW 46th Street Miami, FL 33142 Tel: +1 305 638 5161 E-mail: info@elsembrador.com Internet: http://www.elsembrador.com
Mates International Ent. 1625 NW 20th Street Miami, FL 33142-7403 Tel: +1 305 545 0100 Fax: +1 305 545 0140	N Y Produce Inc. Store 49-58 Bronx Terminal Market Bronx, NY 10451-2037 Tel: +1 718 585 1041
Pan American Frozen Foods Inc. 1496 NW 23rd Street Miami, FL 33142-7695 Tel: +1 305 633 3344 Fax: +1 305 633 1023	T C Tropical 17 Brooklyn Terminal Market Brooklyn, NY 11236-1511 Tel: +1 718 763 5888 Fax: +1 718 241 7292

OTHER IMPORTING COUNTRIES	
Bahrein - Human consumption	**Sri Lanka – Human consumption**
H A Rahman Fikree & Sons WLL 157, Tijjar Road Manamah Tel: +973 253724 Fax: +973 230780	Seven Seas Commodities (Pve) Ltd. 2nd Floor HDC Buidling 64 Keyzer Street Colombo 11 Tel: +94 1 441640 Fax: +94 1 446308

K. LIST OF SOURCES

Publications:

- ARGUS, ACR, Carl Bro (2001): European Commission DGVI.E.3, European Packaging Waste Management Systems (http://europa.eu.int/comm/environment/waste/studies/packaging/epwms.htm).
- Commission Directive 98/67/EC of 7 September 1998.
- Commission Regulation (EC) No 2449/96 of 18 December 1996 opening and providing for the administration of certain annual tariff quotas for products covered by CN codes 0714 10 91, 0714 10 99, 0714 90 11 and 0714 90 19 originating in certain third countries other than Thailand.
- Commission Regulation (EC) No 2222/2002 of 13 December 2002 opening and providing for the administration of a Community tariff quota for 2003 for manioc originating in Thailand.
- Council Regulation (EEC) No 1766/92 of 30 June 1992 on the common organization of the market in cereals.
- Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed.
- DTp Studies Inc. (1999): Global Cassava Market Study.
- European Commission COM (2001) 729: Proposal for a Directive of the European Parliament and of the Council amending Directive 94/62/EC on packaging and packaging waste (http://europa.eu.int/comm/environment/docum/o1729_en.htm).
- FAO: Food Outlook. Various issues.
- FAO (1999): Cereal Policies Review, 1998/99.
- FAO (2000): Commodity Market Review 1999-2000.
- FAO/WHO (2002): Report of the tenth session of the Codex Committee on fresh fruits and vegetables. Mexico City, Mexico, 10-14 June 2002.
- International Trade Centre UNCTAD/WTO (April 1995): Packdata Factsheet No. 28, The European Packaging Directive (EPD).
- International Trade Centre UNCTAD/WTO (2002): The Integrated Export Packaging Information Kit "PACkit", Importing Country Profile: EU.
- Plucknett, D. L.; Phillips, T. P. and Kagbo, R. B. (2000): A Global Development Strategy for Cassava: Transforming a Traditional Tropical Root Crop.

Websites:

- Online market portal for the food and agriculture industry: http://www.foodtrader.com
- Worldwide B2B Marketplace for Agricultural and Fishery Trade: http://www.agrotrade.net
- The global fresh produce portal: http://www.fruitnet.com
- Online marketplace for organically grown products (incl. cassava): http://www.green-tradenet.de

- Economic and technical feed data: http://www.feedbase.com
- Animal Feed Resources Information System: http://www.fao.org/ag/AGA/AGAP/FRG/afris
- Online provider of news and information for the feed industry worldwide: http://www.feedinfo.com

L. Annex

ANEXO — BILAG — ANHANG — ΠΑΡΑΡΤΗΜΑ — ANNEX — ANNEXE — ALLEGATO — BIJLAGE — ANEXO — LIITE — BILAGA

SERIAL No

ORIGINAL

DEPARTMENT OF FOREIGN TRADE

MINISTRY OF COMMERCE
GOVERNMENT OF THAILAND

EXPORT CERTIFICATE SUBJECT TO REGULATION (EC) No 2222/2002

SPECIAL FORM FOR PRODUCTS FALLING WITHIN CN CODES 0714 10 10, 0714 10 91, 0714 10 99

EXPORT CERTIFICATE No	
EXPORT PERMIT No	

1. EXPORTER (NAME, ADDRESS AND COUNTRY)		2. FIRST CONSIGNEE (NAME, ADDRESS AND COUNTRY)	
NAME		NAME	
ADDRESS		ADDRESS	
COUNTRY		COUNTRY	
3. SHIPPED PER		4. COUNTRY/COUNTRIES OF DESTINATION IN EU	

5. TYPE OF MANIOC PRODUCTS	6. WEIGHT (TONNES)	7. PACKING
☐ CN CODE 0714 10 10	SHIPPED WEIGHT	☐ IN BULK
☐ CN CODE 0714 10 91		☐ ..... BAGS
☐ CN CODE 0714 10 99	ESTIMATED NET WEIGHT	☐ OTHERS

WE HEREBY CERTIFY THAT THE ABOVEMENTIONED PRODUCTS ARE PRODUCED IN AND ARE EXPORTED FROM THAILAND

DEPARTMENT OF FOREIGN TRADE

DATE

.....

NAME AND SIGNATURE OF AUTHORISED OFFICIAL AND STAMP

THIS CERTIFICATE IS VALID FOR 120 DAYS FROM THE DATE OF ISSUE

FOR USE BY EU AUTHORITIES: