

NEW DEVELOPMENTS IN THE CASSAVA SECTOR OF VIETNAM

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ABSTRACT

In Vietnam cassava has great potential both for export and for domestic consumption. In terms of cassava exports Vietnam ranks 2nd or 3rd in the world, behind Thailand and Indonesia. Exports of cassava starch are now reaching 180-350 thousand tonnes a year. Major markets of Vietnam's cassava exports are P.R of China and Taiwan, Japan, Singapore, Malaysia, South Korea and countries in Eastern Europe.

Cassava research in Vietnam has made remarkable progress since 1988 when Vietnam began its cooperation with CIAT and the Asian Cassava Research Network. Further progress was achieved when Vietnam established its Cassava Research and Extension Network, in close cooperation with starch processing factories, especially Vedan Vietnam Enterprise Corp. Ltd. Presently, we have 25 cassava processing factories currently in operation with a total installed capacity to process about 1.2-2.0 million tonnes of fresh roots per year (60-80% of cassava production). New, high-yielding cassava varieties, such as KM60, KM94 and KM98, and more sustainable production practices have increased the economic effectiveness of cassava production, especially in the Southeastern region. The use of farmer participatory research (FPR) in the development and transfer of new technologies to cassava households has been quite successful in mountainous and hilly areas of the North, the Central Coastal and Southeastern Regions. The use of cassava roots and leaves in animal feed is also being studied. The Vietnam Cassava Research and Development Project promotes the rapid multiplication and wide distribution of high-starch and high-yield varieties, and the adoption of sustainable cassava production practices, especially in the Central Coastal, Central Highland and Mekong Delta Regions.

INTRODUCTION

In Vietnam, cassava has rapidly changed its role from a food crop to an industrial crop, with a high rate of growth during the first years of the 21st Century. Vietnam has become the third exporter of cassava products, after Thailand and Indonesia. Cassava is one of the seven new agricultural export products, which caught the attention of the government and local authorities. This paper covers three subjects: 1) New features of cassava production and consumption; 2) New progress in cassava research and extension; and 3) Investment in cassava development: opportunities and prospects.

NEW FEATURES OF CASSAVA PRODUCTION AND CONSUMPTION

High Cassava Price in 2001

The price of cassava increased, while those of coffee and black pepper decreased. Cassava farmers were very satisfied because the price of fresh cassava roots ranged from about 450 to 650 VND/kg (1US\$ = 15,500 VND) in 2001. FAO reported that the trade of

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cassava products all over the world was about 7.3 million tonnes, including dried chips, pellets and starch (**Table 1**). Thailand and Vietnam were the two main tapioca exporting countries.

Table 1. World trade of cassava products (dried chips, pellets and starch) in millions of tonnes.

Market Region	Average of '83-'85	Average of '92-'93	Average of '95-'96	1998	1999	2000 prelim.	2001 forecast
World Exports	7.0	9.8	5.9	4.4	7.0	6.9	7.3
Thailand	6.4	8.3	4.6	4.0	6.4	6.5	7.0
Indonesia	0.4	1.1	0.6	0.2	0.3	0.2	0.1
China&Taiwan	0.1	0.3	0.4	-	-	-	-
Vietnam	-	-	0.1	0.2	0.2	0.2	0.2
Others countries	-	0.1	0.3	-	-	-	-
World Imports	6.6	9.7	5.9	4.4	7.0	6.9	7.3
EC	5.5	6.5	3.5	2.9	4.3	3.7	2.7
China&Taiwan	0.3	0.9	0.7	0.5	1.1	0.9	2.4
Japan	0.3	0.5	0.4	0.3	0.5	0.6	0.6
South Korea	0.2	0.7	0.3	0.4	0.1	0.1	0.3
Other countries	0.3	1.1	1.0	0.3	0.9	1.6	1.3

Source: Henry and Gottret, 1996; Henry and Hershey, 1998; Hoang Kim et al., 2000; FAO, 2001.

Although in Vietnam cassava processing is a relatively new business and export volumes are still low, the cassava processing factories are new and modern. That's why Vietnam's tapioca products have a competitive advantage in the world market. With higher profits, many cassava farmers have become rich. Market demand for cassava products increased and new high-yielding cassava varieties are being disseminated widely, resulting in higher profits for cassava farmers. Many farmers have become rich by growing cassava. For example, in An Vien commune in Thong Nhat district of Dongnai province, 97% of the agricultural land has poor gray sandy soil. Cassava is the main crop (1,099 ha), followed by cashew (534 ha) and other minor crops. Previously, farmers grew the old cassava varieties Gon and HL23 with an average yield of about 9-12 t/ha. In recent years, by growing new high-yielding varieties and applying improved cultural practices, the average yield in this commune increased up to 16-32 t/ha. Many farmers are now growing varieties KM94 and KM98, obtaining 25-35 t/ha in areas of 3-5 hectares. They have become rich by growing cassava.

Building of New Cassava Processing Factories

In Vietnam there are now 25 cassava processing factories in operation with a total processing capacity of 1.2-2.0 million tonnes of fresh roots/year. **Table 2** shows the location and production capacity of the cassava starch factories presently in operation or under construction in Vietnam. The nation produced about 400-600 thousand tonnes of dry cassava products. Export of cassava starch is now reaching 180-350 thousand tonnes a year. Major markets of Vietnam's cassava exports are the P.R. of China and Taiwan, Japan, Singapore, Malaysia, South Korea and countries in Eastern Europe. Vedan-Vietnam Enterprise Corp. Ltd. is one of the leading companies in cassava processing. In addition,

animal feed factories also contributed significantly to the increasing demand for cassava roots.

Table 2. Cassava processing factories in Vietnam in 2001.

Region	Province	Number of cassava processing factories	Capacity (tonnes of cassava starch/day)	Production ('000 tonnes) of cassava fresh roots/ year	Note
Southeastern Region	Tay Ninh	06	420	479.1	in operation
		03	250		under construction
	Binh Phuoc	06	590	370.6	in operation
	Dong Nai	05	415	284.5	in operation
	Baria Vungtau	01	175	121.2	in operation
Mekong River Delta	An Giang	01	60	24.0	in operation
Central Highlands	Dak Lak	02	110	36.1	in operation
	Gia Lai	01	50	144.0	in operation
	Kon Tum	02	150	155.8	under construction
South Central Coast	Quang Nam	01	100	108.9	in operation
	Quang Ngai	01	50	63.9	in operation
	Phu Yen	01	50	33.7	in operation
	Thang Hoa	02	110	93.1	under construction
North Central Coast	Nghe An	01	60	63.1	under construction
	Quang Tri	01	60	27.4	under construction
	Thuathien Hue	01	100	28.3	under construction
Northeastern Region	Bac Can	02	180	123.3	under construction
	Yen Bai	01	50	76.2	under construction
	Phu Tho	01	60	92.5	under construction
Northwestern Region	Son La	03	150	142.8	under construction
Total	19/61	42	3,190	2,069.5	

Wide Dissemination of New High Yielding Varieties

In the 1991-2000 period, the Institute of Agricultural Science of South Vietnam (IAS) and the Vietnam Cassava Research and Extension Network (VNCP), in close cooperation with CIAT, Vedan and other starch processing factories have released six new varieties: KM60, KM94, KM95, KM95-3, SM937-26 and KM98. New high-yielding cassava varieties and more sustainable production practices have increased the economic effectiveness of cassava production, especially in the Southeastern region (**Table 3**).

With the establishment of new processing factories in recent years, cassava has changed from being a food crop to being an industrial crop in Vietnam. In 2001/2002 more than 94,500 ha of new varieties were grown, mainly in the Southeastern Region. This corresponds to about 33% of the total cassava area in the country.

Increases in yield and starch content resulted in increased production of 450 thousand tonnes of fresh roots or 126 thousand tonnes of starch; this means that approximately 252-378 billion VND (16.8-25.2 million US\$) per year were added to farmers' income.

Table 3. Approximate cassava area, production and yield as well as the spread of new varieties in various regions of Vietnam in 2001/2002.

Regions	Cassava production (1,000 t)	Fresh root yield (t/ha)	Total area ('000 ha)	Total area with new varieties ('000 ha)	% with new cassava varieties
Total Vietnam	3,145.1	10.9	288.4	94.5	33
-Red River Delta	74.3	9.4	7.9	0.5	6
-Northeastern, Region	443.4	9.2	48.2	4.5	9
-Northwestern Region	261.3	7.8	33.5	1.0	3
-North Central Coast	269.5	7.0	38.5	1.5	4
-South Central Coast	413.7	10.5	39.4	17.8	45
-Central Highlands	515.9	11.0	46.9	12.6	27
-Southeastern Region	1,097.3	16.5	66.5	54.0	78
-Mekong River Delta	69.7	9.3	7.5	2.6	35

Source: adapted by Hoang Kim from MARD, 2002a; MARD, 2002b; Statistical Yearbook, 2001.

NEW PROGRESS IN CASSAVA RESEARCH AND EXTENSION

Selection and Development of High Yielding Varieties

The aim of the Vietnam Cassava Research and Development Project (VNCP) in the 2001-2005 period is: 1) to increase the growing area of KM94 and other promising varieties up to 150 thousand hectares, or close to 55-60% of the total cassava area in the country; 2) to select and release 1-2 new varieties with high-yield capacity of 35-40 t/ha, a starch content of 27-30%, a growing period of 8-10 months, erect stems, short internodes, less branching, compact canopy, uniform root size, white root flesh and suitable for industrial processing; 3) to select short-duration varieties of high quality, suitable for fresh human consumption and animal feeds.

In the 2001-2002 period, five million stakes of new varieties, mainly KM94 and KM98, were distributed to various provinces in this program; 250 cassava accessions were maintained in the germplasm bank; 12,000 hybrid seeds were either collected or introduced; more than 780 promising clones have been selected, of which KM140, KM146 and KM163 will be further tested and possibly selected for release; trials and multiplications were conducted in 25 provinces (Hoang Kim *et al.*, 2002).

In the 2003-2005 period, VNCP will promote the rapid multiplication and wide distribution of high-starch and high-yield varieties, and the adoption of sustainable cassava production practices, especially in the Central Coastal, Central Highland and Mekong Delta Regions.

Farmer Participatory Research (FPR)

The project of "Improving the Sustainability of Cassava-based Cropping Systems in Vietnam" sponsored by the Nippon Foundation, was implemented with CIAT's technical support. The use of Farmer Participatory Research (FPR) in the development and transfer

of new technologies to cassava households has been quite successful in mountainous and hilly areas of the North, the Central Coast and Southeastern Region.

Several suitable cassava cultural practices were developed: 1) erosion control by growing vetiver grass and other plant species along contour lines; 2) balanced fertilizer application of about 60 kg N, 40 P₂O₅ and 120 K₂O/ha, together with animal manures; 3) intercropping cassava with peanut and/or mungbean; 4) planting new high-yielding varieties; 5) using the herbicide Dual (2.4 l/ha); and 6) using silage of cassava leaves and roots for animal feeding (Tran Ngoc Ngoan and Howeler, 2002; Nguyen Huu Hy *et al.*, 2002; Thai Phien and Nguyen Cong Vinh, 2002). The project was actively supported by farmers, because it helped them make effective use of available local resources and developed better cassava cultural practices through their own selection (Nguyen The Dang, 2002; Nguyen Thi Cach *et al.*, 2002; Tran Thi Dung and Nguyen Thi Sam, 2002).

Use of Cassava Leaves and Roots in Animal Feeds and Food Processing

Cassava leaves have a high protein content (20-25% of dry leaves), while cassava roots have 25-30% starch but are low in protein (1-3%). High yielding cassava varieties usually have high HCN contents, limiting the use of roots and leaves for animal feed. Drying or ensiling of cassava leaves and roots will markedly reduce their HCN content. Many studies have shown the effect of different processing methods on the chemical contents and nutritional values of cassava leaves and roots (Pham Sy Tiep, 2001); the use of cassava roots and leaves for feeding pigs (Le Duc Ngoan and Nguyen Thi Hoa Ly, 2002); young stems and leaves for feeding cows (Doan Duc Vu, 2001); the use of cassava dried leaf powder as animal feed for chickens and pigs (Duong Thanh Liem *et al.*, 1998); feeding cassava leaves to silkworms (Tran Cong Tien *et al.*, 2001); using cassava stems to grow mushrooms (KCM TN, 2002). Studies about the use of cassava leaves in industrial processing and for feed by Glon-Sanders Inc. and Proconco Company were conducted in the Southeastern Region (Froehlich and Thai Van Hung, 2001).

Applying Biotechnology in Cassava Breeding and Multiplication

Tissue culture techniques were applied to improve the cassava breeding and multiplication (Hoang Kim *et al.*, 2002). We are studying these techniques to maintain cassava germplasm *in vitro*, for rapid multiplication of new high-yielding varieties, to make wide hybridizations, and for mutation breeding.

Cassava Starch Industry and High Quality Products

The cassava starch industry is already highly developed in Thailand, China, South Korea and Japan. However, only a few studies have been conducted in Vietnam about the hydrolysis of cassava starch by amylase enzyme for alcohol production (Ngo Ke Suong and Hoang Kim Anh, 2001).

Cassava Market Information and Trade Contacts

FAO, IFAD and other international organizations have developed a global cassava strategy in order to cooperate and support cassava growing countries. Information on Vietnam cassava production can be found at <http://www.globalcassavastrategy.net>; <http://www.ciat.cgiar.org>; <http://danforthcenter.org/iltab/cassavanet>; <http://www.agroviet.gov.vn>; and <http://mard.gov.vn> and <http://www.vneconomy.com.vn>

INVESTMENT FOR CASSAVA: OPPORTUNITIES AND PROSPECTS

Increasing Demand for Cassava

Cassava roots have multiple end-uses, such as for the starch industry, for food and feed processing, for the pharmaceutical industry and for export.

Cassava is an easy crop to grow. It can grow in poor soils and produces high yields with suitable management. The crop can be grown in many areas. The average yield of cassava is now only 8-10 t/ha, but the yield can be doubled in many provinces. Previously, people were reluctant to grow cassava, because they thought that cassava caused soil degradation and produced low profits. But in reality one hectare of cassava can produce 60-80 tonnes of roots and leaves. The situation has changed because of the development of sustainable cultivation techniques and new high-yielding varieties. Cassava has become a cash crop in many provinces of Vietnam. Cassava starch is now being produced competitively, and cassava markets are promising. The combination of growing and processing cassava has created many jobs, has increased exports, attracted foreign investments, and contributed to industrialization and modernization of several rural areas.

Development of the Vietnam Cassava Program

After ten years of development (1991-2001), intensive cassava research and extension have changed cassava from being a food crop to being an industrial crop. Vietnam cassava starch is now very promising for export and domestic use.

During the tenth Vietnam Cassava Workshop it was agreed to emphasize the following seven topics (Pham Van Bien *et al.*, 2001):

- 1) Determination of an appropriate strategy for cassava research and development
- 2) Selection and dissemination of high-yielding varieties with high starch contents
- 3) Transfer of appropriate cultivation techniques to farmers in different areas
- 4) Cooperation with processing factories in establishing areas with a stable source of raw materials
- 5) Research on the development of cassava processing technologies
- 6) Structural improvement and development of the extension network
- 7) Development of local and export markets for cassava products (Pham Van Bien *et al.*, 2001).

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