

# STATUS OF VEGETABLE INDUSTRY IN MALAYSIA

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## ABSTRACT

Vegetable industry in Malaysia is smaller than that of industrial crops like rubber, oil palm and cocoa. The annual production is only 330,000 tons and the requirement is estimated at about 400,000 tons. Malaysia imports about M\$242 million worth of vegetables annually and the main vegetables imported are onion, shallot, garlic, potato, chilli, cabbage and processed vegetables.

The industry faces several constraints, including lack of good varieties, problems of pests and diseases, and problems of seed supply. Research conducted by MARDI and Universities has so far led to the development of several technologies relating to varieties, pest and disease control, post-harvest handling and cultural practices.

This paper outlines, the status of the vegetable industry, the constraints and the achievements of research and development.

## Introduction

Malaysia is basically an agricultural country, with about 36% of her population (17 million) involved in agricultural activities. Agricultural sector contributes about 20% of the country's GDP, valued at M\$13,000 million. The per capita income is M\$4,600 (1985). The major agricultural crops are rubber, oil palm, rice, cocoa (Table 1), and the main agricultural exports are rubber, oil palm, cocoa, timber and pepper. Food crops such as vegetables, maize and legumes are cultivated to a much lesser extent compared to the export crops.

## Current status

### Vegetable area

Table 1 Acreage of crops in Malaysia, 1984-1987 (hectare)

Crop	Year			
	1984	1985	1986	1987
Rubber	1978680	1959000	1991965	1999758
Oil palm	1349300	1464900	1564459	1586179
Cocoa	242000	258000	276680	354245
Rice	769750	775220	633958	645423
Coconut	298000	274000	296776	297204
Pepper	10500	10100	8164	8050
Fruit	92000	94000	107000	112500
Tobacco	9310	9130	15983	12658
Vegetable	7830	8090	11507	11632

Source : Ministry of Agriculture, 1988. Statistical Division and Economic and Planning Division Ministry of Agriculture Kuala Lumpur.

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The area under vegetable cultivation in Peninsular Malaysia fluctuates between 7,000 and 12,000 ha. Nearly 2,000 ha are situated on the highlands exceeding 1,500 m above sea level. Vegetable areas in the East Malaysian states of Sarawak and Sabah cover about 1,000 ha and 2,000 ha, respectively. The main vegetable-growing areas are located in the states of Johor, Pahang, Kelantan, Perak, Selangor, Melaka and Penang which together constitute about 85% of the total vegetable area in the country. The distribution of the vegetable growing areas for Peninsular Malaysia is shown in Table 2.

### Supply and demand

Malaysia produced about 330,000 tons of vegetables in 1986. This production was lower than in the previous years and this figure is very much lower than that projected which is about 480,000 tons per year. This situation may be ascribed to over-estimation made before (Anon, 1984 ; Berahim and Mohd Khairol, 1988).

Malaysia exported about 94,000 tons of vegetables to Singapore, in 1983, valued at S\$29.3 million. However the amount and value have declined since then, and in 1986, Malaysia's export of vegetables to Singapore was only S\$23.5 million (Table 3). The major vegetable types exported are leafy vegetables, tomato, chilli, tubers and fruit vegetables.

More than fifty types of vegetables are grown in Malaysia, and the main ones are Chinese mustard, cabbage, chilli, tomato, longbean, cucumber, water convolvulus, bitter gourd, ginger, brinjal, spinach and loofah. The acreage of each type of vegetable grown is shown in Table 4.

**Table 2 Main vegetable production areas in Peninsular Malaysia**

State	1984	1985	1986	1987
Johor	3230	1302	2836	3313
Pahang	2250	1976	1578	2007
Kelantan	1130	1497	1350	1582
Perak	730	1003	1479	1121
Selangor	710	1173	1208	722
Melaka	330	225	533	767
Penang	320	564	511	468

Source : Ministry of Agriculture, 1988, Statistical Division and Economic and Planning Division, Ministry of Agriculture, Kuala Lumpur.

**Table 3 Vegetable import of Singapore from Malaysia (S\$000)**

Type of vegetables	1983		1985		1987	
	Vol (t)	Val (S\$)	Vol (t)	Val (S\$)	Vol (t)	Val (S\$)
Tomato (fresh)	7373	3156	6718	2355	6750	2419
Tomato (canned)	2456	1090	n.a	n.a	287	124
Cabbage fresh	n.a	n.a	n.a	n.a	13581	4114
Other cabbages	4405	1863	4117	1380	n.a	n.a
Leafy vegetables	15871	6563	23162	6818	25600	9529
Tubers	7154	1447	7533	1207	6606	1835
Other vegetables	6367	1135	212	64	69	30
Fruit vegetables	43114	10041	53087	11882	46586	16497
Chilli fresh	5540	3201	5567	3386	6215	4483
Ginger fresh	2645	839	1586	559	1866	959
Total	94965	29333	101982	27651	107560	23493

Source : From Berahim Hj. Ithnin and Mohd Khairol Mohd Ariff, 1988.

**Table 4 Area of specific vegetables for Peninsular Malaysia in 1986**

Types of vegetables	Acreage (ha)
Long bean	1640
Sweet potato	1588
Chilli	1500
Cucumber	1249
Chinese mustard	1246
Cabbage	987
Okra	747
Tomato	652
Brinjal	569
Ginger	496
Loofah	527
Water convolvulus (kangkong)	447
Bitter gourd	376
Spinach	207

Source : Ministry of Agriculture, 1986. Areas miscellaneous crops, Ministry of Agriculture, Kuala Lumpur.

Although Malaysia produces a sufficient amount of fresh vegetables for local consumption, she still imports a substantial amount of temperate and processed vegetables. Malaysia imported about M\$242 million worth of vegetables (excluding dried beans and mushroom) in 1986 (Table 5). The most common vegetables imported are onion, garlic, cabbage, chilli, Irish potato and processed vegetables. These vegetables are imported because the production is insufficient or not suitable or uneconomical in Malaysia.

The current demand for vegetables in Malaysia is estimated to be about 400,000 tons annually and the amount projected for the year 2000 is about 600,000 tons. The projected demand for each vegetable type for the year 2000 is given in Table 6.

### Socio-economic status

In order to gain a better insight into the vegetable industry in Malaysia, an Agro-Economic Survey of the industry was carried out by MARDI in 1981 for Peninsular Malaysia (Anon., 1983). The survey indicated that the majority of the vegetable farmers in the lowlands were Chinese (60%), followed by Malays (37%) and others (3%) while in the highlands, 81% were Chinese, 18% Indian and 2% others. The farm size per household ranged between 0.8 and 1.2 ha for the lowlands and 0.7 ha on average in the highlands. The family size was about 4.8 persons per household.

Many vegetable growers used owned or family labour, especially in highland areas. The national average for labour utilization in vegetable production was 2070 man-days per hectare per year. It is estimated that about 34,000 people are engaged in vegetable production for Peninsular Malaysia alone. Most of the farmers are old, above 45 years of age, but many of them have at least 15 years of experience in vegetable production. About 49% of the farmers are owner operators while 19% are tenants.

### Role of vegetables in nutrition

Malnutrition is not a problem in the country, though isolated cases do exist. Nutritional deficiency is also encountered. This nutritional problem appears to be associated with several factors, namely, the level of literacy, family income and food taboos.

Vegetables contributed only 4% of the protein requirement, with the main supply being derived from fish. Malaysian consumption of fruits and vegetables accounts for only 3.7% of the diet. The vegetables consumed consist of both modern and traditional

**Table 5** Volume and value of vegetables imported by Peninsular Malaysia

Type of vegetables	1983		1985		1987	
	Vol (t)	Val (M\$)	Vol (t)	Val (M\$)	Vol (t)	Val (M\$)
Potato	45186	28.2	45172	23.8	49113	23.3
Tomato	3023	5.5	5635	9.0	5676	6.6
Onion	80180	58.5	92520	60.0	96720	64.2
Garlic	15101	30.3	20707	33.1	28050	40.7
Shallot	338	0.5	617	0.9	946	1.2
Cabbage	21559	5.4	33530	12.8	24040	10.5
Chilli	13764	27.5	15928	29.9	22024	27.4
Beans	38888	37.9	72930	36.4	49052	39.1
Mushroom	1225	22.9	951	22.5	1647	22.3
Other vegetables	39097	53.0	39675	58.9	52005	68.6
Total	258361	269.7	327685	287.3	329273	303.9

Source : From Berahim Haji Ithnin and Mohd Khairol Mohd Ariff, 1988.

**Table 6** Demand of vegetables in Peninsular Malaysia (by types)

Type of vegetables	Demand (t)	
	1984	2000*
Chinese mustard (choy sum)	46,000	69,000
Long bean	39,000	58,000
Cucumber	39,000	57,000
Cabbage	33,000	49,000
Brinjal	29,000	43,000
Chilli	28,000	33,000
Tomato	22,000	33,000
Water convolvulus	21,000	32,000
Spinach (Amaranthus)	n.a	32,000
French bean	16,000	22,000
Okra (lady's finger)	13,000	20,000
Potato	45,000	100,000

\* projected demand

Source : Anon., 1984. Development of the Vegetable Industry in Malaysia, MARDI, Serdang, (unpublished).

types. Many of the traditional vegetables contain high levels of protein and essential amino acids. Popular traditional vegetables include *Souropus androgynus* (cekur manis), *Champeria griffithii* (cemperai), *Parkia speciosa* (petai), *Pithecellobium lobatum* (jer-ing), *Sesbania grandiflora* (turi) and papaya shoot. Their protein contents range between 5.9% and 9.1%. The villagers and low income groups either grow the traditional vegetables themselves or spend relatively more money on the purchase of these vegetables compared to the modern ones (Zanariah *et al.*, 1986).

### Constraints in vegetable industry

The development of the vegetable industry lags behind that of industrial crops like rubber, oil palm and cocoa. This is due mainly to the fact that vegetable cultivation is a high risk enterprise beset with many problems. Some of the constraints in the industry

are :

**Lack of high-yielding, quality, pest and disease-resistant varieties.**

Until recently, most farmers grew local or unselected introduced varieties, resulting in low crop yield, poor quality and susceptibility to pests and diseases. The chilli and tomato cultivars grown are susceptible to bacterial wilt, viral diseases, late blight and anthracnose while local cultivars of long beans and cucumber not only produce low yields but have poor keeping quality.

**Problems of pests and diseases**

Pests and diseases pose major problems in vegetable cultivation. In the national survey, 85% of the farmers reported these as a problem and about 65% used pesticides to control them. Some of the most important pests and diseases of vegetable crops are viruses of chilli and tomato, *Plutella* and *Hellula* of cabbage, rust of long bean and French bean, bacterial wilt of chilli and tomato and soft rot of cabbage, and early and late blight of tomato.

**Problems of seed supply**

Sources of seed supply are mainly from seed merchants (52%), Department of Agriculture (7%) and farmers' own plots (Rahmat Suffian and Chua Lee Kiang, 1985). The main problems of seed supply are lack of good quality seeds (true to types, high viability, etc.), limited supply, inconsistency and non-timeliness of supply, untested or non-proven cultivars and poor distribution system. These problems have hampered the development of the vegetable industry.

**Post-harvest handling and processing**

It has been reported that losses between 20% and 30% of the vegetable produce before consumers are reached are common. This is due to the lack of application of post-harvest handling techniques such as cleaning, sorting or grading, storage, packaging and transportation. FAMA (Federal Agricultural Marketing Authority) and MARDI have developed a grading system and standardization for some vegetables to reduce such losses and to maintain quality.

**Problems of marketing**

About 48% of the respondents in the national vegetable survey reported this as a problem. Marketing problems encountered include failure to supply produce at reasonable prices, price fluctuations, lack of transportation, infrastructure and market information. These problems can also be attributed to the currently unorganized nature of vegetable production.

## **National policy on vegetables**

The National Agriculture Policy (NAP) was launched in 1984. NAP has stressed that vegetable production will be upgraded to meet increasing local demand and export markets. Increased production will be made through increased productivity from existing areas as well as by opening up new areas (Ministry of Agriculture, 1984).

In order to ensure the implementation of the policy, the government has introduced various incentives, namely pioneer status, tax holiday, export allowance, and credit facilities. All agencies responsible for upgrading the industry have been directed to step up their role, including research by MARDI, extension and seed production by Department of Agriculture, marketing by FAMA and provision of infrastructure by Drainage and Irrigation Department (DID) and FAMA.

## Research on vegetables

The main Institute in Malaysia conducting vegetable research is the Malaysian Agricultural Research and Development Institute or MARDI. The objective of vegetable research in MARDI is to develop appropriate and efficient technologies to increase productivity as well as to increase the income of producers. Some of the specific objectives are as follows :

- 1 To develop superior and resistant planting materials that are able to meet quality requirements and are adaptable to the growing environments as well as being high-yielding.
- 2 To formulate efficient production techniques under various scales of production and management systems, to obtain high productivity and quality, and to prevent crop losses due to pests and diseases.
- 3 To develop efficient post-harvest handling and processing techniques to ensure quality produce and high return to producers.

In order to strengthen vegetable research in Malaysia, collaboration was established with foreign research organizations such as AVRDC, TARC and NIVOT. The collaboration includes training of scientists, assignment of expertise, visit of scientists, short term research, exchange of planting materials and procurement of equipment. Collaboration is also established with local universities.

Vegetable research in MARDI places emphasis on several crop types in several disciplines. The crops are chilli (pepper), tomato, cabbage and potato and the main research thrusts are breeding and selection, pest and disease control, cultivation techniques and post-harvest handling. Priority setting is based on constraints in the industry and issues or problems of the industry.

Vegetable research by other institutions is very limited. Some research is conducted at the Agricultural University of Malaysia (UPM), University of Malaya (UM) and National University of Malaysia (UKM). The Department of Agriculture (DOA) does not conduct research but organizes mainly extension services.

Research in the universities is conducted on *ad hoc* basis, as this depends on the availability of grants. Currently research in UPM is mainly on breeding and selection of yard long bean, chilli and sweet corn ; physiology and nutrition of cabbage and virus diseases of chilli. Cultivation of vegetables in hydroponic is also being carried out by the university. In other universities research includes germplasm collection and evaluation of *Dioscorea*, control of chilli viruses, genetic, tissue culture and cultivation techniques.

## Research and development achievements in vegetables

Over the years, a number of achievements in research and development in vegetables have been made in the country. These include recommendation of new varieties, fertilizer management, pest and disease control, post-harvest handling and processing, cultural practices and economics of production. These achievements have been reported previously (Saharan, 1986 ; 1988 ; Saharan and Shukor, 1988 ; Hanada, 1987 ; Saadaoui, 1986 ; Mah and Saharan, 1989 ; Yap and Saharan, 1989 ; Mohamad Roff, Saharan and Ong, 1989 ; Syed *et al.*, 1989). Some of these achievements are presented below (Tables 7, 8 and 9).

## References

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- 2) Anon. (1984) : Development of the Vegetable Industry in Malaysia. MARDI, Serdang (unpublished). 60pp.

**Table 7 Recommended varieties of vegetables for lowland area**

Vegetable types	Varieties	Note
Tomato	MT1, MT11	AVRDC material
Chilli	MC4, MC5, MC10	Local selection
Cabbage	K Cross US Tropical Summer Autumn	—
Long bean	MKP5	Local selection
French bean	MKB1, MKB2	—
Cucumber	MTi2	Local selection
Okra	MKBe1, Better5	—
Cauliflower	Snow Ball, 45	—
Broccoli	Green King	—
Asparagus	Mary Washington UC 157	—

**Table 8 Recommended varieties of vegetables for highland area**

Vegetable type	Varieties	Note
Tomato	Local varieties Hybrid 1169	—
Cabbage	KY Cross	—
Bell pepper	Keystone Resistant Giant California Wonder	
Broccoli	Green Belly Gem	
Lettuce	Sunny Lake	
Potato	Cardinal, Diamant, Farmosa, Desiree, Baraka, Tekau	Holland material
Cauliflower	Rami F1	
Asparagus	Poletum	New Zealand material Takei Seed Co.,

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**Table 9 Other research and development technologies generated on vegetables**

Technology	Crop/pest/disease	Note
Nutrient removal	Cabbages, Chilli, Tomato, Long bean, French bean, Cucumber	Led to fertilizer recc.
Major pests	Cabbages, chilli, Tomato, Bean sugar peas, etc.	<i>Plutella</i> , <i>Helula</i> , <i>Heliothis</i> , Maruca, etc.
Major diseases	Tomato, Chilli, Cabbages, Beans Cucumber, etc.	Blight, Baterial wilt, Virus. Anthracnose, soft rot, mildew etc.
Pest control	<i>Plutella</i> <i>Helula</i> <i>Heliothis</i>	Chemical, IPM Chemical Chemical
Disease control	Bacterial wilt Virus Anthracnose Blight Mildew	Chemicals, Resist. var IPM Chemicals, Resist. var Chemical Chemical
Post-harvest handling and packaging	Chilli Okra Potato	Degreening Packaging Storage, Washing

- 9) Mohamad Roff, M. N., Saharan, H. A., and Ong, C. A. (1989) : Research on Chilli Viruses in Malaysia. Paper Presented at the AVRDC Planning Meeting for Germplasm Improvement. Sub-network for ADB Project at AVRDC, Shanhua, Taiwan, May 31st-June 2nd., 1989. 13pp.
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### Discussion

Imai, H. (Japan) : It appears that the major constraint on vegetable production in Malaysia is the damage caused by diseases and pests. Could you outline the strategy adopted by MARDI to achieve some control of major diseases such as bacterial wilt in tomato and chilli and soft rot in cabbage. Do you consider that the control can be achieved through conventional breeding methods for resistance or that it may be necessary to apply biotechnological procedures ?

Answer : The strategy is as follows : 1. To introduce resistant varieties from abroad, in particular from AVRDC and other institutions. For example AVRDC has supplied us with tomato varieties resistant to bacterial wilt. 2. To collect local germplasm and select good performing lines in terms of yield and quality as well as pest and disease tolerance. For example in the case of chilli and hot pepper we introduced resistant germplasm from Mexico. Also a chilli line introduced from Thailand was crossed with local varieties and is tolerant to two important virus diseases, namely those caused by CMV and CVMV. 3. To cross resistant lines with materials which have certain good characteristics in order to produce resistant or tolerant hybrids for recommendation. 4. To develop and apply IPM techniques which combine cultural practices, chemical application and resistant varieties. However, for the time being our breeding work is still centered on varietal selection.