

### 3. PLANT VIROLOGY IN PENINSULAR MALAYSIA

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#### **Development of Plant Virology**

Plant pathology in Peninsular Malaysia had a modest beginning in 1906 (Grist, 1936). The first plant pathologist, then referred to as mycologist, was employed by the Department of Agriculture, Federated Malay States. The main responsibility then was to investigate into diseases of rubber. Subsequently plant pathologists recruited in the Department of Agriculture as well as in the Rubber Research Institute (established in 1926) were mainly trained mycology. During that time most of the efforts were concentrated on the studies of fungal diseases. Very little emphasis was given to bacterial and virus diseases (Ting, 1975). Later, with the intensification of agriculture in the country, the need for plant virologist was recognized. Numerous virus-like diseases were reported (Thompson and Johnston, 1953; Johnston, 1960), however, no detailed studies of the virus diseases were made. Most of the viruses reported were based mainly on symptomatology. Until 1967, no trained plant virologist was working in the country. Since then the number of workers have been increasing steadily (Fig. 1), and presently, are engaged in research as well as teaching.

#### **Present Status of Plant Virology**

Prior to the formation of the Malaysian Agricultural Research and Development Institute (MARDI) in 1969, plant virus research was the responsibility of the Plant Pathology Division, Department of Agriculture. At present, MARDI, having been charged with the responsibility for conducting research on all crops, (except of rubber) is actively involved in plant virus research.

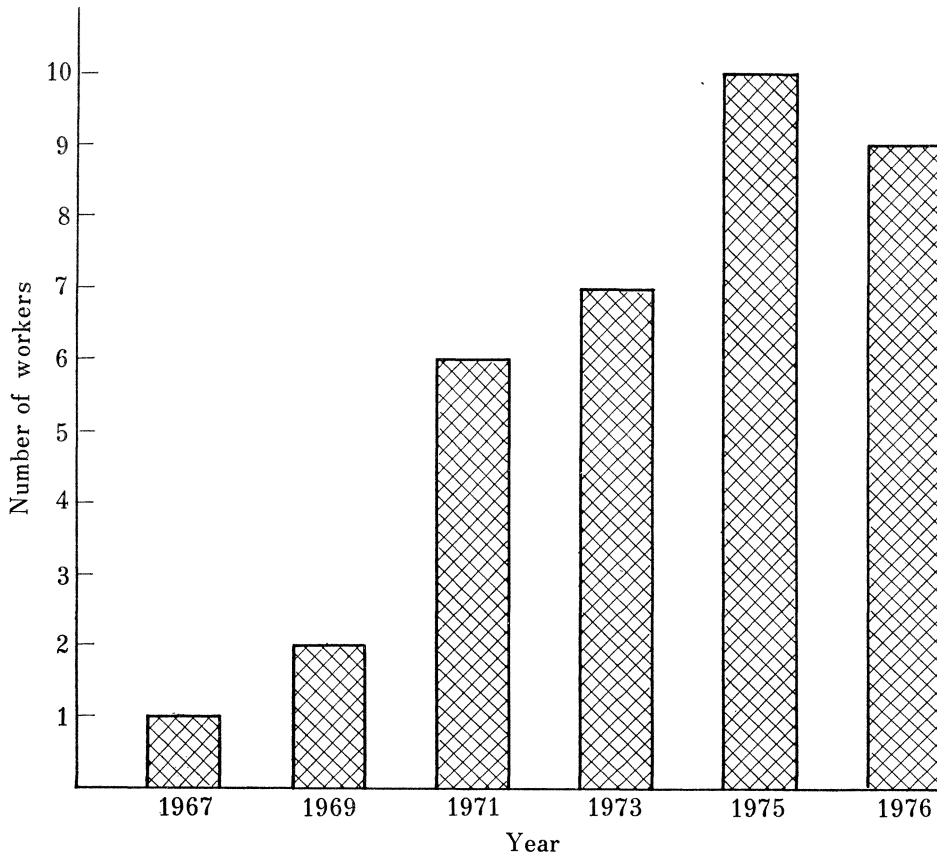
In depth studies on plant virus diseases in Peninsular Malaysia have been in progress only for the past ten years, however, research activities in this field are gaining momentum. The earliest virus problem investigated was on citrus tristeza virus (Ting, 1962). Subsequently, the attention was focussed on the virus diseases of paddy. A number of virus diseases affecting cereals, legumes, vegetables, fruits, and ornamentals have also been studied. Most of the efforts at present are concentrated on studies of virus diseases affecting economic crops.

In addition to detection, diagnosis, identification, and characterization of viruses, other aspects have also been looked into. Facilities are available for studies on purification, serology, virus-vector relationships, and electron microscopy. A number of plant viruses have been successfully purified and antisera to these viruses have also been prepared for diagnostic purposes.

Epidemiological studies of some of the more important plant viruses like penyakit merah virus (tungro) of paddy have received increasing attention. The development of promising control measures including varietal resistance screening, application of selective pesticides for control of vectors and use of reflective surfaces to repel aphid vectors are also being undertaken. Another aspect of plant virus research presently pursued is

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**Fig. 1. Number of workers in plant virology (1967-1976)**

use of tissue culture techniques in the production of virus-free planting materials.

The presence of a number of virus diseases previously reported in other countries have been confirmed. This has contributed to the elucidation of the geographical distribution of some of the viruses. A number of the viruses studied e.g. groundnut mosaic virus (Ting et al., 1972), passion fruit mosaic virus (Ong and Ting, 1973) and chilli veinal mottle virus (Ong, 1975) appeared to differ from viruses affecting similar crops described elsewhere. Detailed description of the plant viruses studied in the country will be discussed in the technical paper (Ong and Ting, 1976).

The number of workers in the field of plant virology have increased from one in 1967 to 9 at present. Table 1 shows the distribution of these workers in various institutions in Peninsular Malaysia. Out of the 6 researchers in MARDI, 3 are engaged in full time research on plant virus diseases. The other 3 research workers are devoting part of their time to plant virus research as they are also involved in other programmes like mycology, bacteriology, and entomology. In the universities the plant virologists are mainly involved in teaching and may devote some of their time for research in this field. The plant virologist in Department of Agriculture is involved in extension activities related to plant diseases including diseases caused by viruses.

Prior to 1970, plant pathology courses in the universities were mainly concerned

**Table 1. Distribution of workers in the field of plant virology in Peninsular Malaysia-1976**

Institution	No. of workers
Malaysian Agricultural Research and Development Insititute	6
Department of Agriculture	1
University of Science Malaysia	1
University of Agriculture	1
Total	9

with diseases caused by fungi and bacteria. The lack of emphasis on the teaching and training in plant virology at degree level was a major contributing factor for the shortage of man-power in this field. However, formal courses in plant virology are now being taught in three of the five local universities.

Publication of most of the research findings in plant virology appear in 3 local journals viz.: Malaysian Agricultural Journal, MARDI Research Bulletin and MARDI Report. An analysis of the articles published in the latest two volumes of MARDI Research Bulletin showed that 4 out of the 17 articles on plant pathology are research papers on plant virus diseases.

### **Main Virus Problems**

The main virus disease problems in Peninsular Malaysia have thus far been restricted largely to short-term crops like paddy, vegetables and legumes.

Penyakit merah virus disease of paddy which is capable of causing an average yield loss between 69 to 92% (Lim and Goh, 1969), depending on the varieties and time of infection, is considered the most important virus disease of paddy in the country. However, the disease appears to be limited to certain districts, e.g., Krian, Perak and its occurrence tends to be cyclic in nature. Outbreaks of the disease were reported in 1963–1964 and again in 1968–1968. No major outbreaks have been reported since then. There is strong indication that the outbreak of this virus is closely correlated with the population build up of its major vector, *Nephotettix virescens*.

Vegetables like chilli or red pepper, tomato, brinjal, lettuce, choy sam (*Brassica rapa*), cucumber and pumpkin are commonly observed to be infected by virus diseases. Some of these virus diseases can cause severe reduction in yield. For example, chilli veinal mottle virus has been reported to cause about 58% yield loss when infection sets in a month after sowing the chilli. (Ong, 1975).

Legumes are also known to be commonly affected by a number of virus diseases. A yield reduction of about 23% has been recorded when 10 day-old groundnut plants were infected with groundnut mosaic virus (Geh and Ting, 1974). Other leguminous plants reported to be naturally infected by virus diseases are long bean, cowpea, soybean and french bean.

Virus diseases are also widespread in ornamentals like amaryllis, periwinkle and orchids, including those grown for commercial cut-flowers viz., Wendy Scott, James Storei, Maggie Oei and Golden Showers.

It can be seen that virus diseases constitute one of the limiting factors in crop production. The damage can often be serious if no adequate attention is given to research on plant viruses. Malaysia is fortunate in that the major plantation crops like rubber, oil palm, coconut and cocoa, are not known to be infected by virus diseases. There is no

record of virus diseases affecting rubber trees in other countries. However, cocoa and coconut elsewhere have been reported to be affected by a number of virus diseases.

Similarly, most of the local fruit trees, with the exception of citrus, banana, and passion fruit, are also not known to be infected with virus diseases. No virus diseases have been reported on mango, durian, rambutan, mangosteen, star fruit and papaya.

It is hoped that the increase in research efforts on plant viruses in Malaysia will lead to a better understanding of the role of virus diseases in the tropics. This will no doubt provide useful guidelines in the development of sound control procedures against the major problems of the country.

Relatively little is known about virus diseases in the tropics compared to temperate countries. Scientists should therefore co-operate in solving problems which may be common to the area. Consideration should be given to the exchange of information between countries, through newsletters. The establishment of seedbanks for virus indicators and type culture collection center (including antisera) to serve Asian countries would be extremely beneficial. In addition consideration should be given to strengthen the human resources in virus research in developing countries. This could be achieved through training and exchange visits of workers in Asian countries.

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### Discussion

**T. Soelaeman, Indonesia:** 1. Beside tristeza, are there any other viruses or mycoplasma on citrus? (Is there no greening?)

2. What kind of indicators do you use for tristeza?

**Answer:** 1. Apart from tristeza, Psorosis virus has also been observed, but it is not as prevalent as tristeza. Tests conducted on suspected greening plants was not conclusive, as such the presence of greening has not been adequately confirmed.

2. West Indian/Mexican lime—*Citrus aurantifolia* is commonly used as the indicator plant.

**H. Kitajima, Japan:** What kind of citrus is grown in Malaysia commonly?

**Answer:** The citrus grown in Malaysia are mainly: Mandarin orange—*Citrus*

*reticulata*, Pomelo—*Citrus grandis*, lime—*Citrus aurantifolia* and to a limited extent *Citrus sinensis*.

**M. D. Mishra**, India: What is the position of whitefly transmitted viruses like tobacco leaf curl or bean yellow mosaic virus, etc. This is important in view of the fact that you have no report of leaf curl virus on papaya which is an important disease in India. Is it due to the absence of tobacco leaf curl virus on varieties grown in Malaysia?

**Answer:** This question can be taken up in the session of technical reports.