
Wilt disease of guava (*Psidium guajava* L.) by *Botryodiplodia theobromae* Pat.

P.K. PANDIT* AND N. SAMAJPATI**

Cashew Plantation Division, Midnapore*; Department of Botany, University of Calcutta, Kolkata 700 019**

The wilt disease of guava was studied and it was found that the disease is caused by the infection of *Botryodiplodia theobromae*. This is the first report of *B. theobromae* causing wilt of guava in the world.

Key Words : Guava wilt disease, *Botryodiplodia theobromae*, *Fusarium oxysporum*, *Macrophomina phaseolina*

INTRODUCTION

Guava (*Psidium guajava* L.) is known as apple of tropics and one of the most common fruits in India. It is claimed to be the most important fruit in area and production after mango, banana and citrus. It is now widely grown all over the tropics and subtropics and has become the most common of the newly introduced subtropical fruits in Israel. Guava is a quite hardy, prolific fruit bearing crop which is highly remunerative without much care.

It is believed to be introduced in India at a very early date (17th Century) and gradually became a crop of great commercial significance covering nearly 50,740 ha of land. Though it is successfully grown all over the country the most important guava growing states are U.P. (23000 ha), Bihar (6850 ha), M.P. (3738 ha), and Maharashtra (2700 ha) U.P. is by far the most important guava producing state in India and Allahabad has the reputation of growing the best quality guava in the country.

In West Bengal, guava is commercially cultivated mainly in Baruipur S.D. in the district of South 24-Parganas where out of 138 'moujas', guava is cultivated in 40 'moujas' covering an area of about 550 ha with an yield of about 76 metric tons

per ha. Besides Baruipur, commercial cultivation of guava

is also made in isolated areas in Sainthia (Dist. Birbhum), Jhargram S.D. (Dist. Midnapore) and in some areas of Bankura and Purulia districts.

Guava trees are very hardy and can thrive on all types of soil from alluvial to laterite but they are sensitive to water logging condition. It can grow best in well drained soil. The guava thrives on light soil with pH value as low as 4.5 and on limestone with a value upto 8.2. It can not grow in saline or alkaline soil. Soil type of Baruipur is alluvial and Jhargram is red lateritic. The pH of the Baruipur soil varies from 7.0 to 8.0. Several investigators have studied on the wilt disease of guava (Chattopadhyay and Bhattacharyya, 1966; 1968; Mehta, 1987; Suhag and Khera, 1986), however, the exact nature of the causal agent is an elusive problem.

In the present investigation an attempt has been made to find out the causal organism(s) of the wilt disease of guava in West Bengal.

MATERIALS AND METHODS

In Baruipur area all the orchards are quite old (more than 30 years old). The common varieties of guava grown in this area are Allahabad Safed,

Khaja, Dudkhaja and Patnai.

Before starting the survey work several farmer's meetings were arranged by the local Panchayet Committee in the main guava growing belts of Baruipur. In the meeting all the farmers have mentioned that wilt is the main constraint of guava cultivation.

The investigation was started in 1985, several field surveys were made in Baruipur, Jhargram, Sainthia, Bankura and Purulia areas where the fruit is cultivated in a commercial way.

Several isolations were made from the diseased parts of the wilted trees and also from soils. The isolations were purified by repeated subculturing and then identified with the help of the International Mycological Institute, Kew, Surrey, England.

The disease situation in 10 orchards in Baruipur area was surveyed during the years 1985-89. The observations revealed that wilt was the predominant disease of guava with occasional occurrence of twig die back in a few orchards. Separate surveys were conducted during the years 1985-86, 1986-87, 1987-88 and 1988-89 for the incidence of wilt and die back. Maximum occurrence of wilt was observed during and after the monsoon and during the flowering to fruiting period. The percentage of totally wilted plants in different orchards surveyed varied from low (2.2%) to appreciably high (33.3%). Partially wilted plants took sometimes more than one year to succumb to the disease. In terms of annual loss, the amount may be as high as Rs. 1500/- in an orchard having 150-200 plants.

It may be mentioned here that cultivators of Baruipur area are quite progressive and take proper attention of their orchards. Plants showing wilt symptoms are uprooted by them.

In other districts of West Bengal such contiguous area of guava cultivation is not observed, the orchards are rather scattered here and there. Percentage of wilting also varied. One orchard in Sainthia area (District Birbhum) having about 400 plants was found to be totally abandoned as all the plants were killed due to wilting.

OBSERVATIONS AND DISCUSSION

The main symptom consists of progressive drying of some twigs from the tip downwards. Some twigs and branches ultimately dried up completely.

Maximum outbreak of wilt disease was generally observed in the field during the rainy season i.e.

during fruiting or just before fruiting stage of the plant. Sometimes severe wilt disease outbreak took place when the plant was in full bearing stage.

Two types of symptoms are recognizable : slow wilting and rapid wilting. In slow wilting the first recognizable symptom is a colour change of leaves from pale green to yellowish and subsequent shedding of leaves resulting in die back from tip of the branches. The affected plant gradually dries up and ultimately killed within a few months. Partial wilting of one or a few branches is a common symptom while other portion remains alive for several months. This type of symptom is more common in alluvial soil of Baruipur region.

In some cases of severe infection, however, plants of about one and one and half years to eight to nine years old, suddenly collapse in full bearing stage, specially after rain. In such cases symptom consists of total wilting and drying of leaves similar to fire blight symptom. This type of symptom is common in red and lateritic soil of Birbhum district where spread of wilt disease is very fast as compared to gangetic alluvial soil region.

Cultures made from die back infected portion of the plants yielded *Botryodiplodia theobromae*. Isolations made from the tap roots, secondary roots, lower stem portions and dry twigs of wilt infected plants collected from different regions of West Bengal yielded a species of *Fusarium*. From Baruipur *Macrophomina phaseolina* has also been isolated from root and stem portions of the affected plants. All the cultures were sent to CMI, where these were identified as *F. oxysporum*, *B. theobromae* and *M. phaseolina*.

Guava varieties artificially inoculated with *Botryodiplodia theobromae*, *F. oxysporum* and *M. phaseolina* were : Allahabad Safeda, Harija, L-49, apple and Baruipur local. The inocula were multiplied separately in sand maize-meal medium in 250 ml Erlenmeyer flasks. Guava layerings, as well as guava seedlings were used for inoculation. These were grown in 15 inch diameter earthen pots. Three months after transplantation of the layers and 1-1 ½ year old seedlings were inoculated separately with *B. theobromae*, *F. oxysporum* and *M. phaseolina* by soil inoculation. Inoculum of one flask being added to the soil of one pot. All the fungi caused total wilting of the inoculated plants. First symptoms appeared after 1 ½ to 3 months as yellowing of the upper leaves. Time required for total wilting varied from 3-4

months (in case of layerings) and 4-6 months (in case of seedlings).

In this experiment observations were recorded from the artificially inoculated and wilted plants collected from the field. Starting from the base of stem, stem pieces were cut at different heights of the plants upto the stem top. Similarly starting from collar region, roots were cut into small pieces at intervals upto root tips. These cut pieces were surface sterilized and seeded on PDA plates for observing the height upto which the fungus could be isolated.

The isolation studies showed that only *B.theobromae* proceeded upto the tip portion of the infected plants. Similar observation on the role of *B. theobromae* in causing wilt and die-back diseases of the cocoa (Ang *et al.*, 1987; Bastos and Evans, 1979), rubber (Chattopadhyay *et al.*, 1982), mango (Rath *et al.*, 1978; Gonzaler *et al.*, 1999) and *Albizia* (Sharma and Sankaram, 1988) have already been reported.

During the field survey it was noticed that the farmers are habituated to twist severely the branches of the guava plants prior to flowering with a firm belief that this practice will give more yield of fruits. It is assumed that the infection of *B. theobromae* takes place through the openings resulting out of these twisting by the conidia. But it needs further research works for confirmation.

REFERENCES

- Ang, B.B.; Lim, T.K. and Tee, S.K. (1987). A sudden die-back of cocoa caused by *Botryodiplodia theobromae*. *Planter*, **63**: 228-234.
- Bastos, C.M. and Evans, H.C. (1979). Occurrence of cocoa die-back in the Federal Territory of Rondonia. *Fito, Brasil*, **4** (3): 483-486.
- Chattopadhyay, N.C.; Hazra, N.G. and Ghosh, N. (1982). A new report of die-back disease of rubber (*Hevea brasiliensis*) from Tripura. *Curr. Sci* **51** (23): 118-119.
- Chattopadhyay, S.B. and Bhattacharyya, S.K. (1966). Physiological studies on incidents of guava wilt, *Fusarium solani* (Mart.) appl. and Wr. Emend Snyder Hanser and *Macrophomina phaseoli* (Maulb.) Ashby. *Ind. J. Mycol. Res.*, **4**: 22-31.
- Chattopadhyay, S.B. and Bhattacharyya, S.K. (1968). Investigation on wilt disease of guava (*Psidium guajava* L.) in West Bengal. *Ind. J. Agric. Sci.*, **38** (1): 65-72.
- Gonzaler, E.; Umane, G.; and Arauz, L.F. (1999). Cultural practices to control mango stem and rot caused by *Botryodiplodia theobromae* Pat. *Agro. Coslar*, **23**: 31-35.
- Lakshmanan, P. and Mohan, S. (1989). Twig and stem blight of cotton caused by *Botryodiplodia theobromae*. *Pl. Pathol.*, **38** (2): 290-292.
- Kuke, P.B. and Paul, K.M.S. (1982). A new record of *Botryodiplodia theobromae* Pat on *Morus alba* L. (on mulberry). *Curr. Sci.*, **51** (8): 427.
- Mehta, Naresh (1987). Distribution of guava wilt in relation to age, soil type, management practices and varieties grown in Haryana. *Pl. Dis. Res.*, **2** (1): 116-119.
- Rath, G.C.; Swain, W.C. and Mohanan, M.K. (1978). A note on die-back of mango. *Orissa. Ind. Phytopathol.*, **31** (3): 384-386.
- Sharma, J.K. and Sankaram, K.V. (1988). Incidence and severity of *Botryodiplodia theobromae* Pat in plantation of *Albizia falcataria* in Kerala, India. *For Ecol. Manag.*, **24** (1): 43-48.
- Suhag, L.S. and Khera, A.P. (1986). Studies on the variation in nutritional level of wilted, regenerated and healthy trees of guava cultivars Banarasi Surkha. *Ind. Phytopathol.*, **39** (1): 90-92.

(Accepted for publication November 28, 2001)