PLANT PATHOLOGY NOTE: NO. 16

FUNGAL DISEASES OF TOMATO

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INTRODUCTION

Until comparatively recently the tomato (*Lycopersicon esculentum* Mill.) was grown in Papua New Guinea only as a minor crop in subsistence gardens and in some commercial market gardens (see Dodd, 1979). Now, to help satisfy the demands of a rapidly increasing town population, and to reduce expensive imports, commercial tomato production has been significantly increased. This has been mainly by the use of intensive farming techniques. As a result of these techniques, a number of economically important fungal diseases have appeared.

Shaw (1963) listed a number of fungal pathogens (disease-causing organisms) isolated from diseased tomato plants and fruits in Papua New Guinea. These included *Alternaria solani*, *Cladosporium fulvum*, *Fusarium oxysporum*, *Septoria lycopersici* and *Verticillium* sp. Dodd (1977) also mentioned two fungi, *Phytophthora nicotianae* and *Sclerotium rolfsii*, which were often found with rotting tomato fruits.

For this paper, information collected by the Plant Pathology Section of the Department of Primary Industry was used to indentify the most common, and potentially serious, fungal diseases of commercially grown tomatoes in Papua New Guinea. These diseases are described and recommendations are made for their control.

EARLY BLIGHT

Early blight, caused by *Alternaria solani* is probably the most frequently encountered fungal disease of tomato in Papua New Guinea. The disease is common throughout the world but is particularly troublesome in the warmer tropics and subtropics.

Symptoms

Infection by *A. solani* results in the formation of brown-black lesions (spots) on leaves, stems or fruit. Usually the lower, older leaves are attacked first.

The lesions, which may be circular or angular, are easily identified in the field by the presence of characteristic concentric circles (different sized circles which have the same centre), or ridges. Occasionally lesions may spread together to cover much of the leaf surface and cause the leaves to fall off when they are still young.

Control

Satisfactory control of the disease is generally obtained

Early blight: typical lesions on a tomato leaf

by the immediate removal and destruction of infected plants and plant debris (rubbish). Where possible, strict crop rotation procedures should be practised.

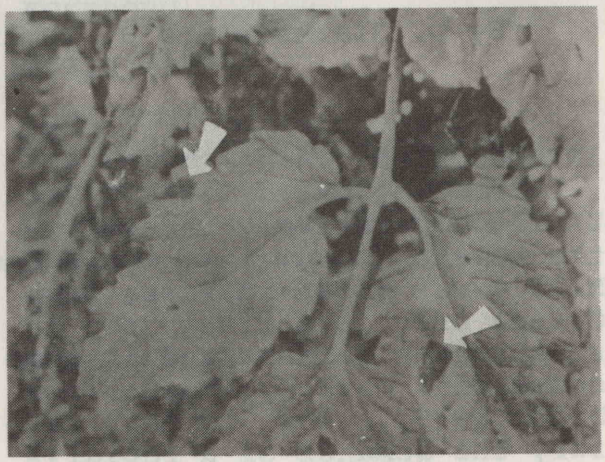
Carbamate fungicides, including maneb, zineb and mancozeb are often used to prevent the disease on the larger commercial plantations. The rate of application of all these fungicides is 150 g in 100 litres of water per ha.

BROWN LEAF SPOT

Cercospora fuligena , the pathogen causing brown leaf spot of tomato, is common in the lowland areas of Papua New Guinea. The disease is usually not serious. However, it can cause significant losses locally when suitable conditions for the development of the fungus last for a long enough time.

Symptoms

The leaf spots are dark brown. They vary greatly in size and are usually angular. The felt-like appearance of the spots is caused by the production of upright tufts of conidiophores (part of the fungus). Occasionally spots may spread together to form larger lesions. Severe infection will cause leaves to die early.



Brown leaf spot: the dark brown, angular spots are marked with arrows.

Control

Control measures are not generally considered necessary. However, recent work at Laloki Research Station, Port Moresby has demonstrated that several fungicides will reduce infection levels and lengthen the period of production of infected plants. Benlate (benomyl), (applied at 5 g in 10 litres of water per 10 m x 10 m area) and Dithane (mancozeb) (applied at 15 g in 10 litres of water per 10 m x 10 m area), can both do this.

COLLAR ROT

Collar rot, an economically important disease of tomato throughout Papua New Guinea, is caused by *Sclerotium rolfsii*. Under continuing conditions of intensive cultivation this fungus will almost certainly prove to be one of the most destructive pathogens of the tomato.

Symptoms

S. rolfsii can cause tomato seedlings at all stages to die in damp conditions. The fungus is most frequently found as a collar rot of older plants.

The first infection symptoms include wilting and later the appearance of a dense white mycelium (vegetative part of a fungus) at the base of stems. During wet or humid weather the mycelium may grow away from the stem and across the surface of the soil for some distance.

Frequently, sclerotia, which look like mustard seeds in size and shape, are formed amongst the mycelial strands. The fungus uses sclerotia to survive when there are no suitable host plants.

Once infected with this fungus, plants quickly get sick and die.

Collar rot: white mycelium at the base of a tomato plant (arrowed)

Control

Diseased plants should be removed and destroyed as soon as possible. Infected soil should be drenched with an effective fungicide such as Thiram or Dithane. The rate of application of both these fungicides is 15 g in 10 litres of water per 10 m x 10 m area.

Control of the disease has also been achieved by the deep-ploughing of contaminated soil to inhibit sclerotium germination. Fungicidal drenches at the time of planting have been shown to reduce infection.

FUSARIUM WILT

Two species of Fusarium have been associated with this disease in Papua New Guinea namely *Fusarium oxysporum* f. sp. *lycopersici* and *Fusarium equiseti*.

Symptoms

Both pathogens cause similar symptoms in their hosts. These are wilting and yellowing foliage and discoloration of vascular tissues in the lower stem. The tomato plant eventually dies.

A tomato plant infected with fusarium wilt

Control

Crop rotation and fungicide treatment do not help much in the control of fusarium wilt. However, a number of resistant tomato varieties have been developed overseas. At the moment, using resistant varieties is the only practical means of controlling the disease in the field.

To prevent contamination of clean land, healthy seed should be sown in disinfested (steam or methyl bromide treated) nursery soil or compost. Care should be taken to prevent the transfer of infested soil from contaminated areas to clean areas.

REFERENCES

Dodd, J. (1977). Tomato cultivation in the Port Moresby area of Papua New Guinea: the effects of pests and disease control and pruning on fruit yields. Unpublished M. Sc. thesis, University of P.N.G. Library, Port Moresby.

Dodd, J. (1979). Effects of pests and diseases on the yield and quality of tomatos in the Port Moresby area, Papua New Guinea. *Papua New Guinea Agricultural Journal*, 30: 51-59.

Shaw, D.E. (1963). Plant pathogens and other micro-organisms in Papua New Guinea. Department of Agriculture, Stock and Fisheries Research Bulletin No. 1, Port Moresby, P.N.G.

FURTHER INFORMATION

Further information about diseases of tomato can be obtained from the Chief Plant Pathologist, D.P.I., P.O. Box 417, Konedobu.

Copies of this Plant Pathology note and of others in the series are available from the Publications Officer, Publications Section, D.P.I., P.O. Box 417, Konedobu.