Annexe VII

DISTRIBUTION AND IMPORTANCE OF *PHYTOPHTHORA* FOOT ROT ON BLACK PEPPER IN BRAZIL

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Phytophthora foot rot was observed for the first time in the state of Pará, Brazil in 1966 by Albuquerque (1966). Severe epidemics of the disease have not been reported in Pará. Rather, the disease appears to be endemic with some increase in severity under environmental conditions that are favourable for spore production and dispersal of the pathogenic agent. The causal organism is known nowadays as *Phytophthora capsici*, but previously was referred to as *P. palmivora*.

P. capsici produces deciduos sporangia with long pedicels. In contrast, esporangia of *P palmivora* are formed with short pedicels and may or may not be deciduous, *P. palmivora* occur on cocoa (*Theobroma cacao*) and other native *Theobroma* species infecting roots and stems of plants growing in nurseries and in the field but has never been reported on black pepper (Campelo & Luz, 1981).

P capsici infects different hosts in the state of Pará including cocoa and rubber tree. Diseases caused by *P. capsici* are third in importance on black pepper after diseases caused by *Fusarium* diseases and cucumber mosaic virus (CMV). Incidence of *P. capsici* is favoured by increases in rainfall during March-April and markedly reduced temperature during a short period after midnight, during at least two to seven days in these months. The pathogen infects leaves, flowers, stems and roots . Assays were carried out in Brazil to detect physiological differences between isolates from leaves and stems as was done in the Dominican Republic (Matsuda et al., 1994). It was noticed that leaf isolates were unable to infect roots, and that their growth responded differently to temperature. However, leaf isolates from Indonesia (Holliday & Mowat, 1963) and Malaysia (Kheng, 1979) were pathogenic to both roots and stems.

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In the state of Pará, *P. capsici* was isolated from infected plants of black pepper in Tomé-Açú, Capitão Poço, Paragominas and Benevides. The infected plants were all growing in clay soils with poor drainage and near to cocoa plantations affected by black pod. *P. capsici* is the most common species damaging cocoa pods. This same pathogen has been recovered from lesions on leaves and roots of black pepper plants. Foliar lesions show a characteristic pattern that appears locally in central parts of leaves or near leaf margins. Edges of the lesions are characteristically fimbriate. Infection of the roots and stem bases lead to a rapid death of the plant a phenomenon known in India and Malaysia as quick wilt. To control *Phytophthora* foot rot on black pepper and black pod of cocoa, cultural practices such as soil drainage are used in some cases and the foliage and basal portions of infected and health vines are sprayed with metalaxyl plus mancozeb at 2,000 ppm of commercial formulation.

In the state of Bahia where cocoa is extensively cropped, black pod is the most important disease. Under favourable conditions of relative humidity and temperature, high concentrations of zoospores are liberated in the cultivated areas. Many black pepper plantations, nearby have been infected and destroyed. Hence, in Bahia, this disease has become a limiting factor in black pepper commercial plantations due to the need of expensive control measures.

In the state of Espirito Santo the disease plays no important role but has been detected on plants in nurseries. Diseases such as root rot and stem blight (*Nectria hæmatococca* f. sp. *piperis*), cucumber mosaic virus (CMV) and root knot (*Meloidogyne incognita* and *M. javanica*) are more harmful to black pepper crops (Milanez *et al.*, 1987) in Espirito Santo. As preventive control measure, Bordeaux mixture is used on foliage as sprays and as paste, brushed on stem bases of health vines where the pathogen infects more frequently.

Neither resistant nor tolerant cultivars are found in Brazilian germplasm collection. Native *Piper* species, such as *Piper colubrinum*, *P. aduncum* and *P. hispidum*, more resistant or tolerant to *Phytophthora* foot rot have been tested as rootstocks to black pepper. Although combinations of rootstock and plants have shown a good compatibility evidenced by vigorous growth, incompatibility, characterised by rejection of tissues and falls of productivity, may occur even after two years.

Tests with rootstocks as a control measure should be continued with more native species, as well as, to evaluate different black pepper genotypes as grafted plants (Alconero *at al.*, 1972)

LITERATURE

Albuquerque, F.C. (1966) Podridão do pé da pimenta-do-reino (*Piper nigrum*) causada por *Phytophthora palmivora*. *Ata Instituto de Micologia*, Recife 3, 458-487.

Alconero, R.; Albuquerque, F.C.; Almeyda, N. & Santiago, A.G. (1972) *Phytophthora* foot rot on black pepper in Brazil and Puerto Rico. *Phytopathology* 62, 144-148.

Campelo, A.M.F.L. & Luz, E.D.M.N. (1981) Etiologia da podridão parda do cacaueiro nos estados da Bahia e Espírito Santo, Brasil. *Fitopatologia brasileira* 6, 313-321.

Holliday, P. & Mowat, W.P. (1963) Foot rot of *Piper nigrum* L. (*Phytophthora palmivora*). *Commonwealth Mycological Institute*, Kew, Surrey, Phytophatological paper no. 5, 1-69.

Kheng, K.T. (1979) *Pests, diseases and disorders of black pepper in Sarawak*. Department of Agriculture, Sarawak, East Malaysia, 68p.

Matsuda ,A.; Hamada,M. & Gonzalez, J.L. (1994) Outbreak and control of foot rot on black pepper in the Dominican Republic. *Japan Plant Protection Association* no. 64, 23-26.

Milanez, D; Ventura,J.A. & Fanton,C.J. (1987) *Cultura da pimenta-do-reino*. Vitória, EMCAPA, 1987, 99p. (EMCAPA. Documentos, 35)