<u>Annexe V</u>

BLACK PEPPER CULTIVATION IN BRAZIL

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INTRODUCTION

Black pepper is an exotic crop in Brazil and was first recorded as introduced into the State of Bahia in the early 17th century by Portuguess during the colonisation period. Production of black pepper subsequently spread from Bahia through Atlantic coastal regions to the states of Paraiba, Maranhão and Pará, but at first its use was restricted to families. Commercial production of black pepper began only in 1933 after the introduction of Kuching, a highly cultivar which is known in Brazil as Cingapura, by Japanese immigrants. Its subsequent widespread use has resulted in genetically uniform crops over large and continuous areas mainly in Tomé-Açu, Santa Izabel e Igarapé-Açu districts in the State of Pará (Albuquerque & Conduri, 1971; Homma & Miranda Filho, 1979; Albuquerque, 1980). In the late 1970s plantings of black pepper had spread to the nearby River Tocantins, which nowadays has become the largest production area in Pará (Albuquerque & Duarte, 1991). High profits have encouraged new black pepper plantings also in southeast Brazil mainly in the State of Espírito Santo which has become the second largest producer, contributing about 2% of the total production amounting to 7,000 tonnes in 1991 (Milanez et al., 1987).

It is only in the past forty years however, that black pepper has become one of the

¹Plant Pathologist, EMBRAPA-CPATU, Caixa Postal 48, 66095-100, Belém, PA. ²Plant Pathologist, Imperial College, Ascot, Berkshire, SL5 7PY, England, UK. most important and profitable crops, particularly in the State of Pará which contributes some 95% of total Brazilian production (Albuquerque & Duarte, 1991). This is reflected in the increase in the area under cultivation from 760 hectares in 1958 to 30,000 hectares in 1990. Total production of black in 1991 pepper was estimated at 35,000 tonnes or 19,9 % of world production. This made Brazil the third largest producer after India and Indonesia (Anonymous, 1991). However, because of falling and destructive epidemics of *Fusarium* wilt, production was reduced to about 10,000 tonnes in 1995. Pará is still the main centre of production, but pepper has been found to grow very well in other states such Espírito Santo, Bahia and northern parts of Minas Gerais.

THE CULTIVATED BLACK PEPPER PLANT

The climate prevailing in the major pepper growing regions is essentially warm and humid. Day time temperatures range up to 28°C to 32°C and relative humidity often exceeds 80%. Such climatic condition are similar to those prevailing in southern India (Paulose, 1973).

Black pepper has been grown in Brazil on a variety of soils but the best pepper plantations are found in light and heavy textured yellow latosols (Albuquerque & Condurd, 1971).

In the Amazon region black pepper is produced in shadeless open areas similar to those used in Sarawak, Malaysia. Pepper are trained to climb up strings attached to wooden posts 2.8 to 3.0 m high. The most common cultivar Kuching, known in Brazil as Cingapura, covers about 90% of the planted area and produces up to 2.0 to 3.0 kg of dry pepper per vine. About 1,300 to 1,600 vines are grown per hectare (Albuquerque & Conduru, 1971).

For propagation stem cuttings are taken from productive plantations or from specialist clonal nurseries. Two types of stem cuttings have been used for propagation. Mature threenoded cuttings, taken from orthotropic branches are rooted in black plastic bags or in nursery soil. In this case they can be planted in the field with naked roots. Otherwise, herbaceous cuttings, most of them two-noded and also taken from orthotropic branches, provided with a leaf in the top node, are used to produce plants in plastic bags (Bavappa, 1978; Albuquerque & Duarte, 1979).

Black pepper plantations established in shadeless open areas require heavy and frequent application of fertilisers, otherwise they will not be economic. Each plant is supplied with 130 to 250 g of phosphate, 100 to 100 g of urea and 80 to 200 g of potassium chloride per year during rainy season (Albuquerque *et al.*, 1989). Dolomite lime, about 500 g per plant, is used in alternate years to correct soil acidity and to supply calcium and magnesium. Also organic matter such as castor bean wastes, cotton and carap nut cake (1 kg to 2 kg/vine) are supplied yearly. Foliar feeding is used to supply microelements, mainly zinc, boron, molybdenum and sometimes calcium and magnesium (Albuquerque *et al.*, 1989).

In most plantations the soils are kept weed-free by manual or chemical means. Mulching with grass leaves allows vigorous vegetative growth. In trials, the cultivar Kuching has shown an average production of 3.0 kg/vine when grown in poor soil with mulching. In plots without mulching the same cultivar showed an average production of about 1.8 kg/vine. Growing pepper under the shade trees has not been tried in Brazil except for mixed plantations with perennial crops such as rubber. Recently some black pepper plantations have been grown in farming systems with forest trees such as mahogany, in order to optimize, the use of land after devastation of black pepper by *Fusarium* epidemics. Mahogany is planted in alternate lines with two or three-year-old pepper plants. In other production systems two or more plant species, mainly passion fruit (*Passiflora edulls*), cupuaçó (*Theobroma grandiflorum*) and Antilles cherry (*Malpighia* sp.), and more rarely orange (*Citrus aurantium*) and time (*Citrus* sp.), are cropped in the same area as the succeeding species after the third or fourth year. Papaya (*Carica papaya*), which is very common in Amazônia, is also planted to replace black pepper in the same areas.

To promote cocca cropping in Tome-Aça, during 1970 to 1968, minut farming systems were adopted in which fertiliser residuer, mainly phosphorun, were utilised by succeeding crops. Many pepper plantations growing in poor soils were replaced successfully by tropical pastures.

Intensive aualight probably is the main factor promoting early production. Climatic conditions such rainfall, relative humidity, air temperature and intensive sunlight have contributed towards higher production in other regions, and shortened the production cycle. Production starts in the second year with an average of 3.0 kg/vine/year. In the sixth or seventh year plants begin to die in areas affected by Fusarium diseases but in areas free of his disease they last for ten to twelve years after planting. The berries are harvested by hand starting mid May and progressing until October.

Products such as grown popper, white pepper, dry popper, piperine and emential oils

- 70 -

are all utilised by food, pharmaceutical and cosmetic industries. Brazil has produced only green, dry and white pepper. Green pepper is prepared from green grains harvested when they reach one third of their development, then boiled in saline solution, stored in plastic barrels and exported mainly to Germany and Austria. Dry pepper is prepared from completely developed grains but with the skin still green or slightly yellowish. These grains are dried on large black sheets under the sun or in electric dryers at 120°C for 24 hours and at 60°C for further 24 hours. White pepper is prepared from ripened grains which are immersed in running tap water in pods to allow the skin to peel and then dried under the sun or in electric dryers. The major importer countries of Brazilian pepper are the United States, Germany, Argentina and Middle East.

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