STUDIES ON MANGO FRUIT ROT

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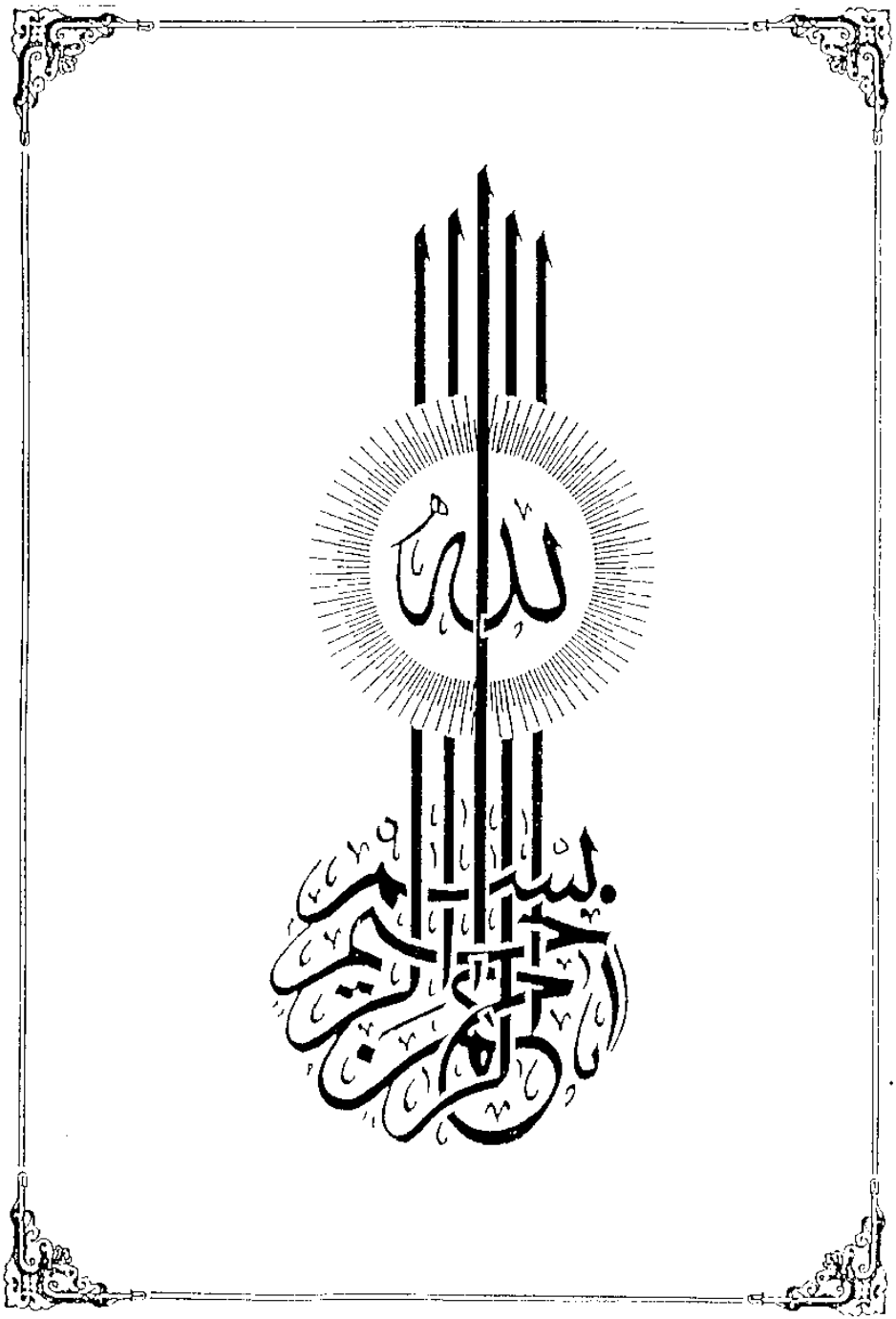

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INTRODUCTION

Mango (Mangifera indica) is one of the most popular fruits in many tropical and subtropical countries. Mango trees cover in A.R.E. an area of 26,700 feddans producing about 97000 tons fruit per year according to 1971 Statistics (Anon, 1971). The fruit has entered lately into export trade.

Numerous diseases attack mangoes especially during storage causing considerable loss. Among the most widely distributed diseases either in the field or in storage is mango fruit rot.

Fruit rot of mango has been recognized as a common disease in various countries (Fernando, 1937 & Bhargava et al., 1965 & Srivastava and Tandon, 1966 and Srivastava, 1969).

The disease is caused by various pathogenic fungi such as Aspergillus, Botryodiplodia, Diplodia, Pestalotia, and Rhizopus Spp. in addition to Gloeosporium mangiferae, Colletotrichum gloeosporioides, and Sphaceloma manaiferae attacked mango fruits and caused the symptoms of anthracnose disease (Asswah, 1966).

In Egypt, Botryodiplodia theobromae, was recorded as the causal of mango fruit rot. However, Colletotrichum gloeosporiaidae, Diplodia Sp., and Epicoccum Sp. associated the disease without any mention to their pathogenic potential (Aly et al., 1972).

The present investigation was planned to study the fungi which cause fruit rot. Some factors affecting fruits during storage were also investigated to define the fungi cause fruit rot and the chemical trials for its control. The effect of the disease on the quality and chemical components of the fruits during storage was also studied.

REVIEW OF LITERATURE

The causal organisms:

Botryodiplodia theobromae Pat.

The fungus B.theobromae is the main causal organism of mango fruit rot in different regions (Fernando, 1937; Dawood, 1962; Bhargava et al.,1965; Srivastava and Tandon, 1965; and Srivastava, 1969).

In Egypt, Ragab (1961) and Ragab et al. (1971) stated that mango fruit rot is caused by B.theobromae.

Fernando (1937) stated that the fungus B.theobromae invaded both the ripe and the green fruits of mango.

Dawood (1962) reported that B.theobromae infected mango fruits and the infection usually started at the stem end as a dark coloured water lesion. The rot spreads rapidly to include the whole fruit in few days. The pulp beneath, the affected part loses coherence, becomes dark coloured and attains an alcoholic smell and unpalatable flavour.

Allen (1970) found that B.theobromae caused fruit rot of Giant granadilla. Symptoms of maturing fruit included a soft rot and necrosis from the stalk end.

Geotrichum candidum:

The fungus G. candidum was described as rot pathogen of ripe fruits i.e. citrus, banana and peach in the market, storage and the field(Heim, 1946 in banana; Diferri, 1955 in citrus; and Filipek et al., 1972 in peach).

Pestalotia versicolor:

The fungus P. versicolor caused many plant disease problems, i.e. leaf spot, root rot, stem canker, seedling blight and fruit rot diseases of Mangifera indica, Coffea arabica, apple, coconut, grapes, avocado, and citrus (Guba, 1961).

According to Guba (1961) in his monograph, the fungus was of world-wide distribution and it was essentially a wound parasite capable of existing under moist conditions of different plants.

Varietal resistence:

Botryodiplodia theobromae:

Ragab (1961) reported that there was no difference between different varieties of mango as regards to infection with B.theobromae.

Dawood (1962) indicated that Hindi variety of mango was the least and Fairi was the most affected with B.theobromae. Tymour and Kobania varieties were inbetween.

Physiological studies

Fungal growth media:

a: Botryodiplodia theobromae:

Dawood (1962) indicated that the fungus B.theobromae utilized each of glucose, fructose, disaccharides, and various polysaccharides.

Srivastava (1968) pointed that mannose, among 28 carbon compounds, supported best growth. Carbohydrates were generally better than sugar alcohols or organic acids.

b: Geotrichum candidum :

Butler, et al.(1965) found that G.candidum grew well in pasteurized lemon juice, and formed slime on potato dextrose broth and lemon juice.

Lewis et al.(1966) reported that the growth of G. candidum was significantly greater on orange endocarp extracts than extracts of epicarp or mesocarp.

c: Pestalotia versicolor:

Tandon and Mitra (1963) indicated that the growth of P.versicolor increased in medium containing 4 g.KNO_3; 2 g. Mg SO_4; 3 g. KH_2PO_4; or 50 g. glucose/liter. Sporulation decreased with < 3 or > 14 g. glucose. Maltose was the best carbon source, whereas peptone and asparagine were the best nitrogen sources.

P.versicolor, isolated from Syzygium cumini, by Agarwal and Agnihotri (1970) utilized all the pentoses and hexoses except mannose earlier than P. sapotae, isolated from Achras sapota.

Weststeijn and Okafor (1971) indicated that P.versicolor sporulated well on P.D.A. medium.

Amylase activity:

Botryodiplodia theobromae :

Wanglm (1960) reported that the diastatic (amylase) activity of B.theobromae was the strongest, when compared with that of Gloeosporium musarum or that of Ceratostomella paradoxa which was the least.

Umezurike(1969) indicated that B.theobromae, from staining decaying wood of Bombox buonopozense, showed a degree of amylase activity in culture filtrates of the fungus.

Effect of temperature:

Botryodiplodia theobromae:

El-Helaly et al. (1955) indicated that banana fruit rot caused by B.theobromae developed at 15-35°C, and rotting increased greatly at 25-35°C.

Dawood (1962) reported that cardinal temperature (minimum, optimum, and maximum) for the fungal growth of Botryodiplodia were 15°C, 28-30°C and 35 - 37°C, respectively and the range of (10° - 18°C), 30°C, and +1°C for spore germination.

Srivastava (1968) pointed out that the growth of B. theobromae was in maximum values at 30°C. Temperatures of 15°C and 10°C controlled the rot of citrus and Achras sapota, respectively.

Verma et al. (1970) indicated that max. and min. temps. for B. theobromae were 31.5 and 25.9°C. In culture,

the fungus grew well at 27 - 30°C, germ tubes of single - celled spores at 30°C and those of bi-celled spores at 33°C. Exposure to high temperature for 10 minutes killed discharged spores at 54°C and those in pycnidia at 56°C.

Adehiji (1970) reported that B. theobromae causing yam decay was inactive at 35°C.

Geotrichum candidum :

Wright et al. (1964) reported that sour rot infection of carrots was favoured by high temperatures. The min.,opt., and max., temperatures for growth of G. candidum in culture were 40°, 86°, and 98°F, respectively.

El-Tobshy et al. (1965) indicated that one plant isolate of G. candidum grew on an optimum temperature of 27°C compared with 30 - 31°C for a human isolate.

Lewis and Sinclair (1966) reported that 3 plant and 1 human isolate of G. candidum on capsicum and water-melon held at 27°C varied from 0.2 - 15 cm^2.

Pestalotia versicolor:

Pandon and Mitra (1963) indicated that optimum temperature for P. versicolor growth was 22 - 25°C.

Weststeizn and Okafor (1971) indicated that P.versicolor sporulated best at 20°C on P.D.A.

Relative humidity (R.H.):

Botryodiplodia theobromae:

Dawood (1962) reported that the growth of B.theobromae was unfavourably affected at atmospheric humidities below saturation. Spores germinated readily in free water, but on dry glass slides germination was relatively poor and took place only if 95 % or above atmospheric relative humidity was provided.

Ekundayo (1970) stated that the rate of germination of B. theobromae was maximum at 100 % R.H.

Verma et al. (1970) stated that the conditions favourable for mango die-back disease development were R.H. > 80 %.

Adenigi (1970) reported that the amount of yam decay caused by B. theobromae was not significantly influenced by moisture availability although max. decay occurred at 90 % R.H.