

CASHEW, *Anacardium occidentale* L., though an important foreign exchange earner, is a neglected crop grown mostly on marginal or wastelands, where no other crop would come up. However, during the last two years this crop has come to be considered as a paying one as a result of the unprecedentedly high prices of its product—the cashewnut. The processing industry provides employment to about 2 lakh persons in registered factories alone and earns a foreign exchange of over Rs 1,200 million which manifests its importance in the economy of our country.

Several factors limit the production of cashewnuts in India. The

In the early stages on the main rachis and/or secondary rachi minute water-soaked lesions are discernible. Gummy exudations can be seen at the lesion site, which later turn pinkish brown in a day or so. They enlarge in size and become scabby within two to three days. The adjoining lesions coalesce to form bigger lesions. As a result, the affected inflorescences dry up presenting a scorched appearance. Till recently, it was thought that the drying up was caused by fungi like *Gloeosporium mangiferae* and *Phomopsis anacardii* in association with tea mosquito *Helopeltis antonii* and hence a combination spray of a fungicide and an insecticide was recommended earlier for

of new shoots and inflorescences and at fruitset help bring down the pest population and the incidence of blight effectively. The trees in the insecticide-treated plots gave an average yield of 2.5 kg nuts per tree as against 1.3 kg in the untreated ones.

Die-back or Pink Disease

The disease caused by the fungus *Corticium salmonicolor-Pellicularia salmonicolor* is prevalent during the South-west monsoon period. The affected shoots start drying up from apex downwards and hence the name die-back. They appear as white or pinkish growth on the bark. The fungus penetrates into the deeper tissues and causes death of the shoot. Towards the end of the monsoon, a film of silky thread of the fungus is seen on the branches. In advanced stages the bark splits and peels off. The mycelium is at first silvery white in colour later turning to pink. The asexual spores are hyaline individually but pink in mass, and readily germinate in water and form the infective propagules. Control measures include pruning the affected branches well below the site of infection and destroying them, protecting the cut surface by application of Bordeaux paste. Prophylactic sprays with Bordeaux mixture 1% twice, one in May-June before the onset of South-west monsoon and the second in October will also help reduce the disease incidence.

Damping off of Seedlings

The disease occurs in nurseries where drainage conditions are poor. Different fungi have been reported from different parts of the country as causative agents of the disease. Thus *Fusarium* sp., *Pythium* sp., *Phytophthora palmivora* and *Cylindrocladium scoparium* have been reported as causative fungi from Kerala, Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra. They attack either the root or collar region or both of seedlings. In the case of *P. palmivora* the affected seedlings became pale,

CONTROLLING CASHEW DISEASES

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cashew tree is subject to the attack by a multitude of major pests and diseases. However, compared to the number of pests attacking cashew and the intensity of damage caused by them, the magnitude of the disease problem is not that much severe. Though more than a dozen fungi have been reported from cashew, serious ones are only a few.

Inflorescence Blight

The most serious problem in cashew is inflorescence blight. As the very name indicates, the malady is characterised by the drying of floral branches. Crop loss due to the blight is estimated to be about 30%.

control. However, recently investigations were conducted at CPCRI Kasaragod under the aegis of the All-India Co-ordinated Spices and Cashewnut Improvement Project with a view to studying the exact role of the insect and fungus in the causation of the malady. The investigations conclusively proved that the disease is primarily caused by tea mosquito infestation and the fungi associated with it are only secondary saprophytic colonizers. The finding is important in that the fungicide can now be eliminated from the spray schedule. Spraying of endosulfan 0.05% with high volume sprayers at the time of emergence

showed water-soaked girdles of darkened tissues around the stems and the seedlings later toppled over. In severe cases leaves also exhibit water-soaked lesions.

The fungus *C. scoparium* caused blight in four-month-old seedlings at Kottarakkara (Quilon district, Kerala). The symptoms were wilting and withering of seedlings and rotting of underground parts. The incidence was severe during rainy season. The fungus on inoculation produced identical symptoms in 14-25 days.

Control measures include provision of adequate drainage conditions in the nursery beds or nursery bags and drenching the beds/bags with ceresan wet 0.1% or Bordeaux mixture 1%.

Anthracnose Disease

The disease called 'soorai' in Tamil Nadu was reported in epidemic form from Trichy in 1965. It was found to affect tender leaves, twigs, inflorescences, nuts and apples. The symptoms include reddish-brown, shiny, water-soaked lesions followed by resin exudation on the affected parts. The lesions soon enlarge in size killing the affected shoots. Affected tender leaves become crinkled and nuts and apples shrivelled. Successive attacks of terminal shoots for a couple of years may result in eventual death of the affected plants. *Collectotrichum gloeosporioides* (= *Gloeosporium mangiferae*) was the causative fungus, and that the fungus perennated on the dead tissues. Removal of affected parts of the plant and spraying the plants with Bordeaux mixture control the disease.

In Cuddalore and Trichy areas of Tamil Nadu, *Fusarium* sp. was isolated from dark shiny lesions, Perithecia of *Melanospora* sp. were found on affected parts when kept under moist conditions. It is not stated however whether the pathogenicity of the fungus is proved or the fungus isolated is only a saprophyte.

Besides the above, the following are some of the minor diseases of cashew.

Shoot-rot and leaf fall

During the south-west monsoon, black linear lesions develop on the stem with gum exudations. The lesions enlarge in size resulting in collapse of the affected shoots and shrivelling up of tender leaves. In the mature leaves the lesions are seen first on the midrib which later spread to the multilateral veins and leaf blade. The causal organism of the disease in Kerala was identified as *Phytophthora nicotianae* var. *nicotianae*. The maximum incidence was during July.

Leaf spot. Several types of leaf spots have been reported on cashew: Grey blight (*Pestalotia microspora*), red leaf spot (*Phyllosticta* sp.), brown leaf spot (*Collectotrichum gloeosporioides*), ferruginous spots (*Phomatospora anacardicola*), red rust caused by an alga *Cephaleuros mycoides*. The diseases are brought to check by spraying with 1% Bordeaux mixture. Recently a vein and leaf blight caused by *Collectotrichum* sp. was reported from Maharashtra.

Sooty mould. When affected the leaves are often covered by dense sooty masses on both the surfaces, hindering the normal photosynthetic activity. The disease is caused by *Capnodium* sp. This can be controlled by spraying with fish oil resin soap 1.5 kg in 100 l water followed by 2% starch solution. The spray will control the associated insects and enable the sooty mould to fall off in flakes from the leaves when dried.

Powdery mildew. During cloudy days cashew blossoms in Maharashtra were affected by the fungus *Oidium* sp. Fruit-set was reduced considerably. Dusting of sulphur was recommended as control measure.

Floral shoot die back in Nigeria. The disease caused by *Lastodipladia theobromae* (= *Batrachodipladia theobromae*) was first reported from Nigeria. The

fungus was isolated from cashewnuts in Tanzania also. Withering of petals and other floral parts followed by a progressive dieback of the rachis are the symptoms of the malady. It usually starts from the apex developing downwards to the main peduncle which loses its normal green colour. As a result of the dieback the flowers are lost and no fruit-set takes place. The affected nuts and apples at immature stages become black and remain attached to the moribund floral shoots. The peduncles show discolouration of the pith when cut longitudinally and it was traceable to the twigs. Predisposition of the peduncles to infection by the pathogen might be due to insect damage. This is supported by the frequent isolation of the fungus from the dead flowers. The fungus invaded the host slowly from the tips of the peduncles to the pith and within six months produced dieback.

In addition to the above diseases, fungi like *G. mangiferae*, *Aspergillus niger*, and *Rhizopus* sp. affect the cashew apples resulting in their decay. While immature and mature nuts have been found to be infected *in situ* in a few cases with *Cladosporium* sp., *Aspergillus niger*, *Penicillium* sp., *Fusarium* sp. and *Rhizopus* sp. infect kernels resulting in their damage. Such storage diseases may be due to imperfect drying or poor storage. Contamination of kernels is caused by bacteria like *Escherichia coli*, *Salmonella* and *Clostridium* in cashew processing factories in Kerala and Tamil Nadu. The extent and type of contamination depends on the level of sanitation in the processing units. The contamination was more in raw nuts as compared to that in processed ones. Infestation of kernels by *Aspergillus flavus* and other types of moulds which are known to produce aflatoxin is of concern to the exporters since some of the importing countries have instituted limits for aflatoxin content.