Major Diseases of Coconut and their Management in North Eastern Hill Region of India

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Coconut palm (*Cocos nucifera* L.) is one of the most useful plants also known as tree of prosperity or tree of life or kalpavriksha (kolpataru) by all the coconut growers of North Eastern Hill Region. In recent years, the area under coconut in N.E.H. Region has been increasing very rapidly due to introduction of high yielding hybrid varieties and financial and technical assistance rendered by the Coconut Development Board, North Eastern Council (I.C.A.R.) and State Agriculture Department of this hilly under developed coconut growing region, simultanously a good number of debilitating and devastating diseases are also noticed in a few coconut plantations. To study the major coconut disease problems and their management practices of N.E.H. Region a survey was conducted in different Government orchards, Research Stations and private coconut plantations. During field and laboratory studies the coconut diseases so far identified from this hilly coconut growing region are Bud rot (*Phytophthora palmivora* Butl), Leaf rot (*Bipolaris halodes* Drechs comb, *Gliocladium roseum* Bins *Gloeosporium* sp.) Grey leaf stop or blight (*Pestalotia palmarum)*, Trunk and root rot *(Ganoderma lucidum)*, Stem bleeding *(Thielaviopsis paradoxa* (de synes), *Ceratostomella paradoxa*, (de synes), Immature nut fall *(phytophthora* sp.), Fruit rot (*Phytophthora omnivora)*, Root wilt, Tapering stem or pencil point diseases and abnormal leaf. The information available so far on symptomatology, etiology, epidemiology and suitable means to manage these diseases in N.E.H. coconut growing region are presented in this communication.

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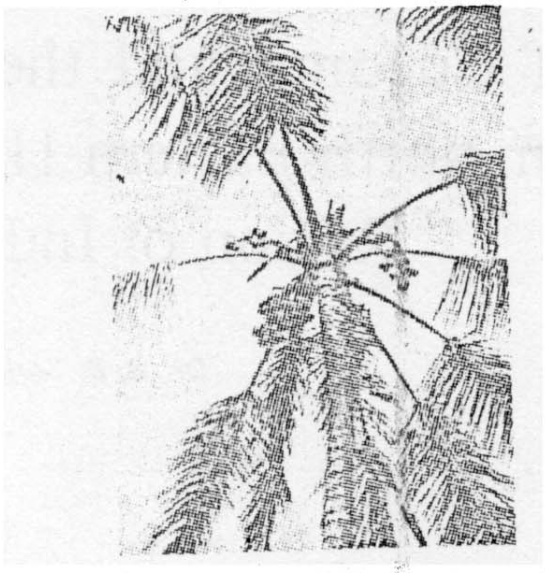
Bud Rot :

Bud rot of coconut palm is a sporadic disease of N.E.H. coconut growing region of India. The disease is very common during rainy season among the trees between 12 and 40 years old.

The visible symptoms are noticed only after the infection of *Phytophthora palmivora* Butl, has proceeded far. The central shoot of the effected tree turns pale, bends over and breaks down at the base. The soft tissues around the growing point of apical bud start rotting, the central shoot withered and can be drawn out by exerting a slight pull. Finally the affected palm dies, although the older leaves with coconut bunches may

remain healthy for a couple of months (Fig-1).



Symptoms of bud rot

Control : The disease can be checked by cutting and burning the unrecoverable disease affected palm in situ. If the palm is not severly infected cut out and remove the rotten portions and burn them carefully, then drench the crowns thoroughly with Bordeaux mixture (10:10:100) or any 50% Copper fungicide (Blue copper or Fytolan or Blitox or copper oxychloride) @ 2g/l of water.

Apparently healthy palms in the plantation of the diseased one should be given prophylactic sprays of 1% Bordeaux mixture or 0.3% copper fungicide.

Leaf Rot :

Leaf rot disease is also a very common disease of coconut palm in North Eastern Hill coconut growing states particularly in Assam and Tripura during the rainy season and observed on the palms below 25 years of age. The characteristic symptom is the blackening and shrivelling up of the tender leaflets due to rotting from tip downwards and margin inwards (Fig-2).

The infected leaflets when dry broken off in bits by the wind and show a characteristic geometric symptom. During wet season reddish brown rotting symptom appear on the central shoot, and when the weather gets hot and dry, the rotten portions dry up, turn black and in severe case the rotten portions stick together and the leaflets fail to unfold. Leaf rot

(Fig-2)

Leaf rot disease on tender leaf blade

disease is not fatal but causing considerable reduction of the yield of coconuts. High water table, improper drainage, high humidity and low temperature favours the disease. Three types of fungi *Bipolaris halodes*, *Gliocladium roseum* and *Gloeosporium* sp. are frequently isolated from the disease infected materials.

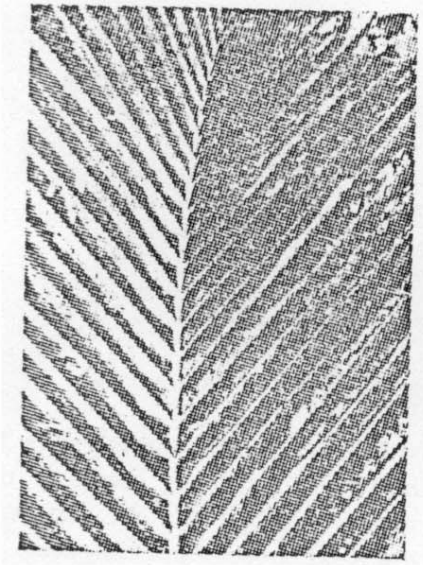
Control : Leaf rot disease can be checked by spraying Carbendazim (Agrozim 50 or Bavistin 50) @ 1g/l or 1% Bordeaux mixture or with 50% Copper fungicides (Blue copper or Fytolan or Blitox or Copper Oxychloride) @ 2g/l or organic fungicide like Dithane M-45 @ 3g/l or Thiram 75 W.P. @ 3g/l. As prophylactic measures two round spraying of any one of the above fungicide, once during April-May and again during September-October found useful but spraying, accompanied with the application of balanced fertilizer as per soil test report and better agronomic and Phytosanitation practices has been found most effective to revive the disease infected palm of N.E.H. Region coconut plantation.

Grey Leaf Spot or Blight :

This disease is of common occurrence in most of the coconut palms growing in ill drainage soils or potash deficiency plantation of N.E. Region. The first visible symptom observed only on the outer whorl of leaves or older leaves as minute yellowish brown spots which gradually become oval in shape with

greyish white centre encircled by a greyish band and yellowish halo. In severe case several spots coalese, resulting irregular, grey, necrotic patches on the leaflets (Fig-3). On minute closer observation black dot like pycnidia of the causal fungus *Pestalotia palmarum* can be seen on the upper leaf surface. Under favourable condition of the disease development, the tips, the margins, and the whole leaflets show a burnt or blighted appearance.

(Fig-3)



Grey-leaf-spot or blight on older leaf.

Control : Use of high dose of potassic fertilizer, reduced and split dose of nitrogenous fertilizer, improving phytosanitary and drainage condition in the disease infected plantation help to revive the palms. Spraying with Carbendazim (Bavistin 50 or Agrozim 50) @ 1g/l or 1% Bordeaux mixture or other copper fungicides (Blitox or Blue copper or Fytolan or Copper oxychloride) @ 3g/l whenever new spots developed found effective against the blight disease of coconut palm in N.E.H. Region.

Trunk and Root Rot :

Trunk and root rot is a sporadic but fatal disease of coconut palm in N.E.H. Region. The first visible symptoms of the disease is the abnormal wilting of the older leaves which droop and remain suspended until they shed (Fig-4). Younger leaves may remain green for six months to three years but ultimately become barren. In severe cases oozing of reddish brown fluid confined from the basal portion of trunk through small cracks (Fig-5). Production and development of new roots retarted. Extensive rotting and discolouration of older roots along with distinct alcoholic smell are characteristic symptoms of the disease infected palms. Fruiting bodies of *Ganoderma lucidum* is also observed in a few severely infected or dead palms (Fig-6). Beside this *Rhizoctonia* sp. *Fusarium* sp. and *Diplodia* sp. were also isolated from the diseased parts. Older coconut palms are more susceptible to the disease.

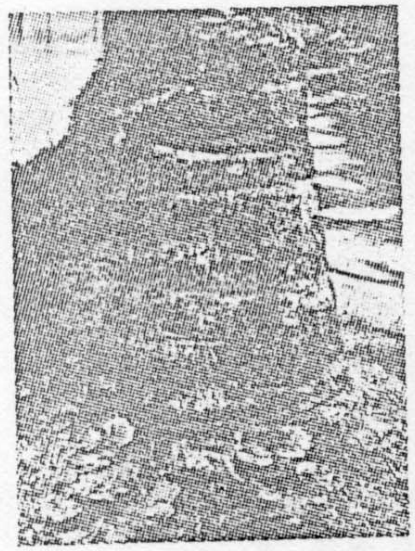
(Fig-4)

Wilting of older leaves which droop and remain suspended at initial stage of trunk and root rot disease.

(Fig-5)

Oozing of Reddish brown fluid from the basal portion of trunk through small cracks.

(Fig-6)



Fruiting bodies of Ganoderma lucidum on dead palm.

Control: Severely infected dead palms should be cut and burnt in situ. palm and irrigation should be avoided. Opening of isolation trenches 30 cm wide and 1 m deep around diseased palms check the spread of the disease. Soil drenching with P.C.N.B. (Brassicol 75 WP @ 200 g in 40 litres of water per palm around the root zone and spraying with Benzimidazol (Bavistin 50 WP) @ 1g/1 on the arial parts or stem injection with aureofungin 2g+copper sulphate 1 g in 100 ml water showed promising results in the early stages of infection. In addition to the above application of 5 kg neem-cake and 25 kg compost per palm per year and regular irrigation specially during hot dry months along with mulching reduced the disease intensity in the N.E.H. coconut growing region.

Stem Bleeding :

Stem bleeding disease is a major malady of all ages of coconut palms in the North Eastern Hill coconut growing states. The disease is very common in the areas with high water table and high acidity. A fungus *Thialaviopsis paradoxa* with the perfect stage *Ceratostomella paradoxa* is associated with a few diseased palms. The first visible symptom is the bleeding or oozing of a dark reddish brown liquid from growth cracks on surface of the stem. The exuded material dries up and turns black on the bark. On chiselling out the bark at the bleeding crack dark brown rotting lesions can be seen in the inner soft tissues. The downward extension of the rotting makes the tree hollow (Fig-7) and such palms are likely to be broken by strong wind.

(Fig-7)

Excessive stembleeding makes the palm hollow.

Control: The disease affected portion together with 2'5 cm of the surrounding healthy tissue should be cut and removed by a sharp chisel. The cut surface is then dressed with hot coal tar or Bordeaux paste. If cavities are formed, after proper cleaning they have to to be filled up with a mixture of mud + 50% copper fungicide + BHC 5% dust @ 1 kg + 5 g + 50 g respectively.

As the pathogen is a wound parasite, try to avoid any mechanical injury to the stems. As prophylactic measures apparently healthy palms should be given one round spraying with Bavistin 50 @ 1 g/ 1 water.

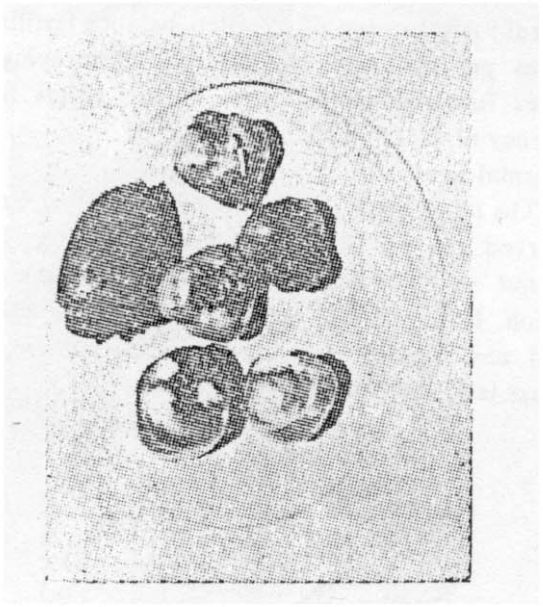
Improved phytosenitation practices, including manuring, soil management and other cultural practices should be done properly to reduce the disease intensity.

Immature Nutfall :

Dropping of immature nut before and after fertilisation is a common phenomena in the cocount plantation of this hilly region. This problem can be termed as disease complex as a number of causes are often associated, such as excessive moisture, inadequate moisture, water logging, deficiency of nutrients or attack of fungus organism (*Phytophthara* sp., *Colletotr-*

ichum sp.) during wet weather. Generally immature nuts are shed with their stalk-ends discoloured (Fig-8) or sometimes splitting of husk accompanied by exudation of gum.

(Fig-8)



Discoloured stalk-end of immature nuts.

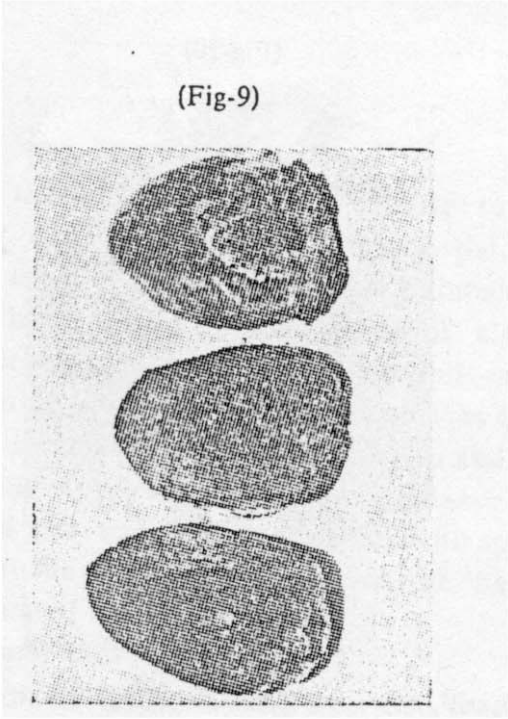
Control: Application of balance fertilizers as per soil test report, adequate irrigation in dry spell, proper drainage facilities during rainy season and two round spraying of 1% Bordeaux mixture or Blue copper 50 or Blitox 50 or Fytolan 50 or Copper oxychloride 50 @ 3 g/l of water on the buches of immature nuts after the nuts are set at one month interval gives satisfactory result against this problem in N.E.H. region coconut plantation.

Fruit Rot :

The fruit rot disease of coconut is caused by the fungal pathogen *Phytophthora omnivora* during rainy season in the N.E.H. coconut growing region. The disease is not so serious but cause a considerable loss in yield before hardening of shell (Fig-9). The significant symptom of the disease is the rotting and droping of immature nut. At first water soaked lesions appear near the stalks. The lesions gradually turn brown with depressions due to rotting. Whitish fungal mycelial growth are also sometimes visible on the surface of the fallen nuts when the atmosphere is very wet.

Control: To reduce the initial focai of infection the shed nuts should be collected, burnt in situ and simultanously thorough cleaning of the crowns should be done.

(Fig-9)



Fruit rot disease of developing nuts.

Two round spraying, once during the month of April-May and other during the month of August with 1% Bordeoux mixture or (Blitox 50 or Blue copper 50 or Fytolan or Copper oxychloride) @ 3 g/l of water is found to be very effective against fruit rot disease of coconut in this region.

Root Wilt :

Root wilt is a sporadic, debilitating disease and is a slow killer of coconut plam in N.E.H. region. The characteristic symptoms of the disease in the initial stage of infection is general yellowing of the outer whort of leaves. Abnormal bending of the leaflets known as ribbing or flaceidity is also a typical symptom of the disease (Fig-10). The necrotic spots developed on the leaflets turned brown and finally show burning appearance. Shedding of immature nuts, reduction in number and size of nuts and poor development of kernal and poor copra quality are also associated symptoms of the root wilt disease of coconut palm.

As the disease advances, the growth and productivity of the affected palm dwindles but the diseased palms may survive for several years in an uneconomic condition. The disease is generally found in low lying areas and hill slopes of N.E.H. region.

Control: Application of fertilizer @500 g urea, 1 kg Rock phosphate and 1 kg Muriate of potash along with 30 kg cowdung and 2 kg Dolomite per palm per year can maintain the yield at the initial stage of disease infection

(Fig-10)

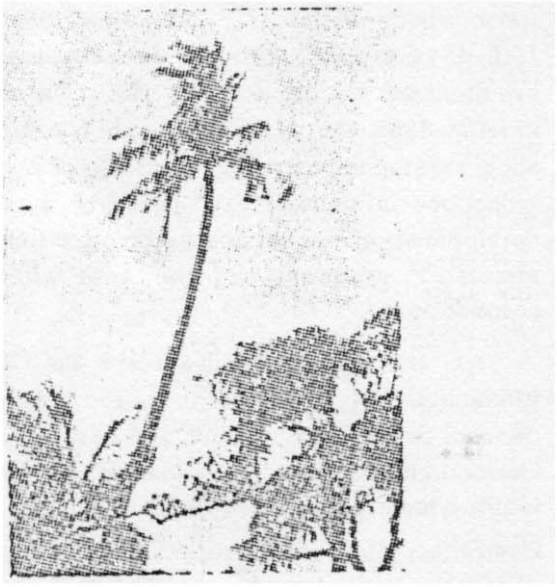
Ribbing of leaflets a typical symptom of root wilt disease.

and help to rejuvenate the affected plam to some extent. Severely disease affected plams showing uneconomical yield viz. less than 10 nuts per annum should be uprooted and replanted with High yielding hybrid.

Tapering stem or pencil point disease :

Tapering stem or pencil point disease is very common in laterite, prolonged essential nutrient deficiency soil of N.E.H. Region. The characteristic symptoms are the yellowing with reduction of leaves size and a gradual tapering or decrease in the girth of the trunk (Fig-11). The pencil point stem progresses

(Fig-11)



Gradual decrease in the girth of the trunk, a symptom of Tapering stem or pencil point disease.

until the small crown fails entirely to produce new leaves and ultimately the coconut palm dies and the trunk remains standing just like a pointed pencil.

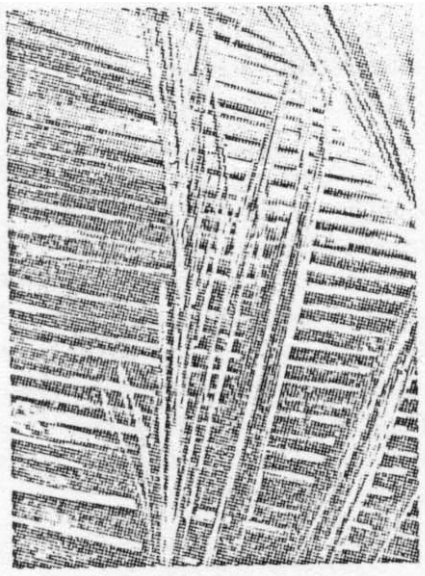
This problem in this region is also a disease complex and mainly caused by soil exhaustion, soil hardening or water logging. The leaves are sometimes found to be infected by *Pestalotia.* sp and *Diplodia* sp.

Control : Application of complete balance fertilizer mixture as per soil test report along with spraying of any copper fungicide help to revive the palms from the tendency of tapering stem.

Abnormal Leaf :

The lamina portion particularly 'feather-limb' are observed to turn forked like structure (Fig-12) in the coconut variety 'Sakhigopal' grown in the N.E.H. Region. In severe case the entire leaflets are sometimes fused and looked like a rod shape structure, but the disease is not fatal to the palm.

(Fig-12)



Forked like abnormal leaf.

Control: No pathogenic fungus or bacteria could be isolated from the abnormal forked leaves. But sometimes the palms recovered after two years with the application of balance fertilizers as per soil test report and two round spraying of BHC 50% WP @ g + Blue copper 50 @ 3 g/l during the month of April and October.

Acknowledgement

The author is grateful to the Director of Agriculture, the Director of Horticulture of the Government of Tripura for providing facilities during course of studies and to the scientist friends of plant pathology wing of I.C.A.R. complex for N.E.H. Region, Lembucherra, for their help and valuable suggestions.

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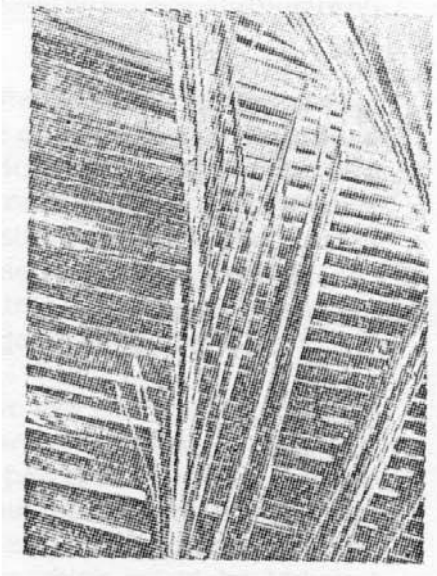

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