Biotic barriers of coconut and its management

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Coconut (*Cocos nucifera Linn.*) is an important plantation and perennial oil seed crop of India. It is called Kalpavriksha or Tree of Heaven or tree of Abundance, because each and every part of the coconut is useful to human being. Coconut farming offers livelihood security to millions of people across India and it provides improved nutrition, employment and income generation as well. Though coconut palm is hardy in nature and adaptable to varied climatic conditions, it is affected by many diseases at various phases of its growth starting from seedlings to bearing stage. Diagnostic symptoms of coconut diseases and their management strategies are detailed below.

1.Bud rot

The bud rot was first reported in India by Butler in 1906.

Causal organism - *Phytophthora palmivora*

Symptoms

Palms of all ages are susceptible to the disease, but it is more severe in young palms up to 10 years. The symptoms initiated on the central shoot (spindle) of the tree. The heart leaf becomes brown or black instead of yellowish brown followed by drooping and breading off the heart leaf. The affected internal tissues of the spindle leaf show rotting and emit foul smell. The central shoot comes off easily on slight pulling as the basal portion is dead.

Bud rot symptom

Favourable conditions

High rainfall, humidity (above 90%), low temperature (18-20°C) (November to January months) are highly favorable for the development of the disease.

Management

- The infected tissues (crown) should be removed and cleaned
- The crown should be poured with 1% Bordeaux mixture or 0.25% copper oxychloride
- Application of 50 g each of *Bacillus subtilis* and *Trichoderma viride* along with 10 kg of farm yard manure per palm at six months interval

2.Grey leaf spot

The disease was first reported in British Guyana.

Causal organism - *Pestalotia palmarum*

Symptoms

Symptoms develop on the outer whorl of leaves, especially in older leaves. Minute yellow spots surrounded by a greyish margin appear on the leaflets. Gradually, the centre of the spots turns to greyish white with dark brown margins with a yellow halo. Many spots coalesce into irregular grey necrotic patches. Large number of globose or ovoid black acervuli appear on the upper surface of leaves.

Grey leaf spot

Favourable conditions

Ill drained soils, soils with potash deficiency, continuous rainy weather for 4-5 days and strong winds

Management

- Removing and burning of the infected and fallen leaves periodically
- Improving the drainage conditions of the soil
- Application of potash 3.5 kg per palm per year
- Application of *Bacillus subtilis* @ 200g along with 50kg of decomposed FYM per palm per year
- Application of 5 kg of neem cake per palm per year
- Spraying Copper oxychloride @ 0.25% or Bordeaux mixture 1% before onset of the rainy season

3.Leaf Blight

Leaf blight was first reported in India. Palms more than 15 years old are highly susceptible to this disease. It causes yield loss up to 25 per cent in advanced stages of infection. The disease is severe during summer months.

Causal organism - *Lasiodiplodia theobromae*

Symptoms

Leaf blight causes serious damage in seedlings, leaves and nuts of adult palms. Generally the adult leaves in the outer whorls are affected. The affected leaflets start drying from the tip downwards and exhibit a charred or burnt appearance. Dark grey to brown lesions with wavy to undulated margins appear from the apex of the nuts. The fungus entered in to the kernel through mesocarp, resulting in the decay of the endosperm. The affected nuts were desiccated, shrunken, deformed and dropped prematurely.

Leaf blight Favourable conditions

The disease is noticed throughout the year and the maximum incidence is observed during summer months.

Management

- Removal and burning of the severely affected leaves in the lower most leaf whorls to avoid further spread
- Spraying of 1% Bordeaux mixture or 0.25% copper oxychloride two times at 30 days interval (or)
- Root feeding with carbendazim 2 g or hexaconazole 2 ml in 100 ml water three times at three months intervals
- Application of 200g Bacillus subtilis along with 50 kg of FYM
- Application of 5 kg of neem cake per palm per year
- Application of an additional quantity of 1.5 kg of potash over and above the normal recommendation of 2 kg per palm per year

4.Stem bleeding

The disease was first reported in Sri Lanka. In the early stage of infection, there is not much yield loss. However, in later stages, there is a steady yield decline causing considerable loss and in advanced stages even death of affected palms occurs. The disease occurs in all soil types, but more in laterite and sandy soils.

Causal organism - *Theilaviopsis paradoxa* (*Ceratocystis paradoxa*)

Symptoms

The characteristic symptom is the exudation of reddish brown fluid from the cracks in base of the stem bark and form irregular streaks of exudation. In course of time, this progresses upwards to several feet on the stem and the exudates dry up forming a black crust. The tissues below the cracks turn yellow and decay. The exudates eventually dry up to form black encrustations with dark brownish orange margin. Cavities are formed in the palm from which liquid comes out, when the bark is pushed or punctured. In advanced stage of infection, the trees may become barren and die.

Stem bleeding Favourable conditions

Copious irrigation or rainfall followed by drought, shallow loamy soils or laterite soil with clay or rock layer beneath the soil and damages by Diocalandra and Xyleborus weevils.

Management

- Removal and destruction of the severely affected dead palms

- Application of 50 kg FYM and 5 kg neem cake per palm per year
- Application of 50 g of *Bacillus subtilis* and 50 g of *Trichoderma viride* along with 10 kg of farm yard manure per palm
- The infected portion should be treated with Bordeaux paste or Trichoderma paste
- Root feeding with hexaconazole 2ml in 100 ml of water for three time at 3 months interval

5.Basal stem rot /Thanjavur wilt

Ganoderma wilt or Basal stem rot or Thanjavur wilt is a very important destructive disease in coconut. In Tamil Nadu, this disease was first observed in Thanjavur district in 1903.

Causal organism - *Ganoderma lucidum / G. aplanatum*

Symptoms

The trees in the age group of 10-30 years are easily infected by the pathogen. Symptoms are yellowing, withering and drooping of the outer fronds which remain hanging around the trunk for several months before shedding. More often the spindle is blown off leaving the decapitated stem. The wilted plants also show bleeding patches near the base of the trunk. A brown gummy liquid oozes out from the cracks in the tree which slowly result in the death of outer tissues. Numerous tiny holes made by Xyleborus weevil (secondary invader) are seen on the trunk all along the bleeding patches. In advanced stages of infection, the fungus produces fruiting body (Bracket) at the basal portion of the trunk.

Basal stem rot Favourable conditions

Sandy loam and sandy soils, water logging during severe rains, low soil moisture content during summer months and damages caused by weevils and beetles.

Management

- Removal and destruction of severely affected dead palms
- Irrigation water should be restricted from the infected palm to healthy palms by forming isolation trenches around the infected palms
- Soil drenching of 1% Bordeaux mixture @ 40 litres per palm
- Root feeding of hexaconazole 2ml in 100 ml of water thrice at 3 months interval
- Intercropping with banana reduced the severity of the disease
- Application of *Bacillus subtilis* and *Trichoderma viride* @ 100g each along with 50 kg FYM and 5 kg neem cake per palm per year

6. Leaf Rot Disease

It is a complex of fungal disease which occurs on root (wilt) affected palms

Causal organism - *Colletotrichum gloeosporioides, Exserohilum rostratum, Fusarium spp*

Symptoms

Appearance of water-soaked brown lesions in the spear leaves of root-wilt affected palms. Gradually these spots enlarge and coalesce resulting in extensive rotting. As the leaf unfurls, the rotten portions of the lamina dry and get blown off in wind, giving a "fan" shape to the leaves.

Leaf rot Management

- Removal of the rotten portions from the spear and the two adjacent leaves
- Pouring of fungicide solution of hexaconazole 2ml or mancozeb 3g in 300ml water per palm to the base of spindle leaf
- Spraying the crowns and leaves with 1% Bordeaux mixture

7. Root wilt disease (Kerala wilt)

In India, the coconut root (wilt) disease was first reported from Erattupetta of Kottayam district, Kerala and now spreads to Tamil Nadu also. In root (wilt) disease affected plantations the extent of decline in yield is proportional to the intensity of the disease and generally varied from 10 to 80 per cent.

Causal organism – Phytoplsama and transmitted by plant hopper (*Proutista moesta*) and lace wing bug (*Stephanitis typicus*)

Symptoms

Wilting and drooping of leaves, flaccidity (curved abnormally inwards, resembling the ribs of mammals), ribbing, yellowing and necrosis of leaflets are typical symptoms on foliage. The important diagnostic symptom is "flaccidity" of leaves. Yellowing of leaves, marginal necrosis of leaflets and rotting of roots occur. The crown size also gets reduced and trees remain unproductive.

Root (wilt) Management

- Removal of the infected palms yielding less than 10 nuts per year
- Application of balanced dose of chemical fertilizers (Urea – 1.3 kg; Super phosphate – 2.0 kg; Muriate of Potash – 3.5 kg; Magnesium sulphate – 1.0 kg per palm per year)
- Application of *Bacillus subtilis* and Trichoderma viride @ 100g each along with 50 kg FYM and 5 kg neem cake per palm per year
- Growing green manure crops viz., cowpea, sunhemp, *Calopogonium mucanoides, Pueraria phaseoloides*
- Irrigating properly in summer (250 litres/day) and also provide proper drainage
- Growing suitable inter and mixed crops (banana, pepper, cocoa, vanila, turmeric, ginger, pineapple, coffee, nutmeg, tapioca etc.)
- Spraying of Dimethoate @ 2 ml per litre of water with 1 ml Sandovit for the management of lace wing bugs and plant hoppers

World Coconut Day Celebration and National Teachers' Day - 2023
at ICAR-CPCRI, Regional Station, Kayamkulam

ICAR-CPCRI Regional Station, Kayamkulam incollaboration with Coconut Development Board, Kochi observed World Coconut Day celebrations and National Teachers' Day on 5th September 2023 with various activities including farmers' seminar, farmer-scientist interaction, felicitation to retired teachers from Kerala Agricultural University (KAU) and competitions for staff members. The theme of this year's World Coconut Day was 'Coconuts:Transforming Lives'. Dr. Regi Jacob Thomas, Principal Scientist, welcomed the gathering and briefed about importance and significance of both the events. The programme was inaugurated by Dr. C. K. Peethambaran, Retired Director of Research, KAU. Dr. P. Anithakumari, Acting Head, ICAR-CPCRI, RS, Kayamkulam was the chairperson of the session. Dr. A. Abdul Haris, Principal Scientist, led the interactive session with the farmers. Dr. C. K. Peethambaran, Dr. D. Alexander (Retired Director of Research, KAU), Dr. Sverup John (Retired Dean, Faculty of Agriculture, KAU), Dr. Shylaja S. (Retired Professor (Agricultural Extension), Dr. Arthur Jacob (Retired Associate Director of Research (Southern Region), Dr. A.V. Mathew (Retired Associate

Director of Research, RARS, Kumarakom) were the panelists of the technical session in farmers seminar. The retired teachers from KAU who nourished three generations of agriculture graduates were honored. 'Kalpasthupam', reminiscence for commemorating the legacy of 75 years of service to coconut farming community was unveiled during the event. Various competitions were organized for the staff members depicting the importance of coconut to the society. Sixty farmers, people representatives and officials of Department of Agriculture Development and Farmers Welfare from Thanneermukkom Panchayath participated in the programme. Dr. A. Joseph Rajkumar, Principal Scientist proposed vote of thanks.