ARECANUT DISEASES AND THEIR MANAGEMENT

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Arecanut is affected by many diseases from root to fruit throughout its growth period (Chowdappa *et al.*, 2014). An outline of arecanut diseases, disorders and their management is summarized below.

A. Diseases

1. Fruit rot or Mahali or Koleroga (*Phytophthorameadii)*

Symptoms: Rotting and heavy shedding of fruits are the characteristic symptoms during south-west monsoon (June-September). Dark green water-soaked lesions noticed near perianth end and spread gradually covering the entire surface of fruit and finally shed off (Fig.1). In advanced stages, whitish mycelial growth seen over the nut surface (Fig.1). Infected nuts showed discoloration of kernel, reduction in weight and large vacuole. At the end of monsoon the fruits dry up, remains mummified without shedding.

Management:

- Field sanitation practices include collection and destruction of the infected nuts and other plant parts should be strictly followed.
- Prophylactic spraying of 1 per cent Bordeaux mixture at least three times at an interval of 45 days *i.e.* just before the onset of south-west monsoon, during the monsoon period and if the monsoon prolongs, a third spray is essential.
- Use adhesive or sticker to ensure tenacity of the spray deposit on treated substrate. Covering the bunch with polythene cover before the onset of monsoon also gives complete control.

Fig.1. a & b) Symptoms of fruit rot and c) covering bunches with polythene

2. Bud rot and crown rot (*Phytophthora meadii)*

Bud rot: Bud rot is characterized by initial yellowing of spindle leaf, rotting of growing bud (Fig.2) which can be drawn out easily with a gentle pull, followed by infection in surrounding leaves. As the disease advances, adjacent leaves also showing yellowing, drooping and finally falling off completely by

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leaving the bare stem. Secondary pathogens colonization of the infected portion converts it into a slimy mass, which emits an offensive odour.

Crown rot: Crown rot is typically renowned by the green drooping leaves followed by yellowing of leaf sheaths and leaves of the outermost whorl by leaving the spindle leaf healthy (Fig.2). Inner portion of the affected leaf sheath shows clear water-soaked lesions. The spear leaf remains green till the bud portion is fully damaged. In advanced stages, all the leaves become yellow, droop, dry up and remain attached to the stem. Inner stem tissue becomes discoloured and shows varying degrees of rotting. The infected palms are killed and the top portion of the stem gets cut off at the point of infection.

Both rots occur during south-west monsoon season and continue to appear even after the rainy season ends *i.e.* from October-February. Rare summer shower, cool nights with low temperature and dew fall in winter season favours the pathogen growth.

Management:

- Bud rot/ crown rot can be managed if the affected palms are treated in the initial stages of infection.
- Field sanitation practices like removal and destruction of fruit rot affected, dried bunches, shed nuts and the crowns of the palms affected by bud/ crown rots may help to reduce the year round survival of the pathogen inoculum.
- Drenching the crown with 1 per cent Bordeaux mixture and smearing with 10 per cent Bordeaux paste after removal of affected tissues is effective in saving bud rot affected palms.
- Crown rot can be managed by drenching the rhizosphere region with potassium phosphonate/ salt of phosphorous acid. Minimum 5 litres of fungicidal solution/ palm (15 ml fungicide in 5 l water) is required for drenching (Saraswathy, 2004).
- Regular monitoring of treated palms is needed for checking further advancement of symptoms.

Fig.2. Bud rot and crown rot

3. Yellow leaf disease (YLD) (*Candidatus* Phytoplasma)

Symptoms: Yellowing of the leaves is the typical symptom of YLD. Yellowing starts from the tip of the leaflets of the outer leaves and sometimes seen in the middle whorl. Yellowing spreads gradually extending from the margin to the middle of lamina portions near the midrib remain green (Fig.3). In advanced stages, yellowing spreads to all leaves completely, dry and fall off. Kernel of the nuts of affected palms become soft, show blackish discolouration and assumes a spongy texture (Fig.3) YLD is transmitted by the plant hopper, *Proutista moesta* (Fig.3).

Management: Since this disease is not amenable to contain by conventional protection measures, other management practices have to be adopted.

Mildly affected areas: Removal of all the diseased palms and replanting with disease free seedlings.

Heavily affected areas

- Removal of the severely affected palms with poor yield should be carried out.
- Balanced nutrient management (NPK @ 100:40:140 g/palm/year), organic manure application @ 12 kg/palm/year and an additional dose of super phosphate (1 kg/ palm) along with provision of summer irrigation can improve the condition of the palms.
- Proper drainage facilities should be provided to avoid water stagnation.

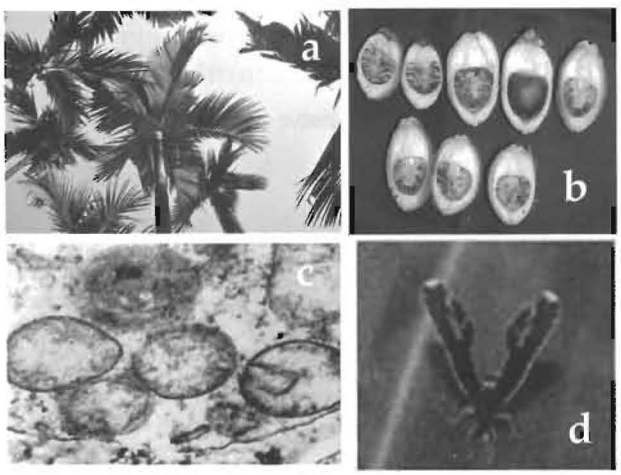

Fig.3. a & b) Yellow leaf disease symptoms on leaves and fruits (c) Phytoplasma (d) *Proutista moesta*

4. Inflorescence die-back (*Colletotrichum gloeosporioides)*

Symptoms: Yellowing starts from the tip of the rachillae towards the main rachis and spreads downwards. Later, it turns dark brown followed by drying, a condition called as 'die-back' (Fig.4). Subsequent spread of yellowing and discoloration induces shedding of female flowers. Though it is occurring throughout the year, becomes severe in February- May.

Management:

- Field sanitation practices include removal and burning of infected dried bunches to reduce the inoculum level in the garden should be strictly followed.
- Spraying of mancozeb (3 g/l) while opening of female flowers will reduces the disease incidence. A second spraying should be taken up after 20-25 days.

Fig.4. Inflorescence die-back

5. Anaberoga or foot rot or basal stem rot (*Ganodermalucidum)*

Symptoms: Initially there is yellowing of outer whorl of leaves gradually extending to inner whorls. As the disease progresses, the entire crown becomes yellow leaving only the spear leaf green. In the advanced stages, spindle also gets dried up and finally the crown drop off leaving the base stem (Fig.5). At the basal portion of the stem, small dull brown spots occurs which later coalesce to bigger patches at 1 m height of the trunk from ground level (Fig.5). At acute stage, brown gummy liquid

oozes out and bracket shaped fruiting bodies formed at the base of the trunk after death of palms (Fig.5). Rotting of roots and internal tissues of the basal portion of the stem occurs and it is difficult to identify the disease in the early stages of infection.

Management:

- Following good management practices are the best way to check this disease.
- Field sanitation measures like cutting and burning of the dead palms along with bole and roots should be strictly followed.
- Improved drainage facilities will reduces the disease spread.
- Drenching the rhizosphere with propiconazole (1 ml/l) @ 15-20 l/palm along with root feeding of propiconazole (1 ml/l) @ 125 ml/palm at quarterly intervals will help in disease management.
- Neem cake application (2 kg/palm/year) helps in disease management.
- Trenching of 30 cm width and 60 cm depth around the diseased palm and basal application with neem cake enriched with *Trichoderma harzinaum* (1kg/plam) arrest the further spread of the disease.

Fig.5. Basal stem rot

6. Leaf blight (*Colletotrichum gloeosporioides* and *Phyllosticta* spp.)

Symptoms: Small, round, brown to dark brown or black coloured spots with yellow halo are the characteristic symptoms of this disease. Later, the spots coalesced to form blighted patches (Fig.6). Severe infection resulted in drying, drooping and shredding of the infected leaves.

Management:

- Collection and destruction of diseased plant parts helps in reduction of inoculum load of this disease.
- Spraying of 0.3 per cent Mancozeb or 0.2 per cent Foltaf results in effective management this disease.

Fig.6. Leaf blight

7. Collar rot (*Fusarium* spp. and *Rhizoctonia* spp.)

Symptoms: Collar rot is frequently noticed in secondary nurseries and field planted seedlings. Infection by the pathogen is through collar region or root and it leads to rotting of the

growing bud, while root infection leads to seedling wilt.

Management:

➥ Providing good drainage facilities and soil drenching with 1 per cent Bordeaux mixture will reduce the disease incidence.

8. Bacterial leaf stripe (*Xanthomonas vasculorum* (Cobb) Dowson)

Symptoms: Initially, symptom starts as appearance small, dark green, water-soaked, translucent linear lesions or stripes alongside and parallel to the midrib of the leaflet and its main veins. The margins of the lesions are usually straight and well defined but at times become wavy due to lateral spread. Profuse bacterial exudates are seen on the corresponding lower side of the lesion and this is a striking feature of the disease. This exudates is creamy white and slimy when wet, but becomes waxy film or creamy white to yellowish flakes or fine granules or irregular mass on drying. The severe infection may cause partial or complete blighting of the leaf and the entire crown may be affected especially in the seedlings.

Management:

➥ Field sanitation practices include removal and destruction of the diseased plant parts will helps in reduction of the inoculum.

➥ Avoidance of closer spacing, frequent irrigation and intercropping with banana plants will reduces the disease.

➥ Prophylactic spraying of copper hydroxide (2g/l) can reduce the disease effectively and served as a curative measures too.

B). Disorders

1). Nut splitting: Improper drainage will cause nut split and fall.

Symptoms: Areca palms of 10-25 years old are more prone to this disorder. This is common in paddy converted fields as well as high water table gardens. It's severe in rainy season. Sudden flush of water after a prolonged period of drought leads to this disorder. Initial symptom appears as premature yellowing of nuts when they are half to three fourth mature. This is followed by splitting of nuts from either sides or the tips which expand longitudinally towards the calyx exposing the kernel.

Management:

➥ Improved drainage facilities in the garden will minimize this disorder.

➥ Application of potash fertilizers and spraying of Borax (0.2 per cent) in the early stage reduces the splitting.

2). Sun scorching: Continuous solar radiation causes scorching in stem.

Symptoms: The steady exposure of the stem to solar radiation causes this scorching effect. Young palms are more prone to scorching. Golden yellow patches appear on the exposed stem portions and later fissures develop. Further, colonization by saprophytic organisms and insects cause decay of the stem and such palms break during heavy wind.

Management:

➥ Adoption of planting in the north south direction will significantly minimize the damage due to sun scorch.

➥ Raising rapidly growing shade trees on south-western side of the garden will reduce the effects of sun scorching.

➥ Growing banana as a shade tree in young gardens and trailing pepper vines on palms will reduce the radiation effect.

- Covering the trunk with areca leaf sheath and painting with lime are being practiced in few gardens.

3. Hidimundige or Band disorder: Physiological disorder caused by improper drainage/ management/ imbalanced nutrients.

Symptoms: Small crinkled dark green leaves, tapering stem and reduced inter nodal length are noticed. Poor root formation is noticed. Roots are looking brittle, short and crinkled. Crown bending, choking and formation of oblique rings also noticed in majority of the gardens now.

Management:

- Proper drainage and improved soil management are vital to reduce this disorder.
- Removing the hard pan of sub-soil and application of micronutrients are effective to reduce this disorder.
- Balanced application of organic and inorganic fertilizers, macro and micro nutrients can be taken up after proper soil testing.

C. General precautions:

Some of the precautions should be considered during arecanut cultivation starting from nursery till harvesting. They are,

- Bordeaux mixture is still considered as the best fungicide to manage the *Phytophthora* spp. and no newer chemicals should be used as they washed off and low persistence on the nut surface due to heavy rains during monsoon period.
- Need based as well as recommended dosage of chemicals only should be applied (fungicides, insecticides and fertilizers).
- Proper safety measures have to be adopted while spraying the chemicals like covering the face with masks and wearing hand gloves and shoes.
- Spraying containers has to be properly and carefully discarded without any residues.
- There should be a gap between two successive spraying of fungicides
- While spraying the fungicides, bunches has to be targeted and the direction of the nozzles has to be thoroughly focused on the arecanut bunches.

References

Chowdappa, P., Sharma, P., Anandaraj, M., and Khetarpal, R. K. 2014. *Diseases of Plantation crops*. Indian Phytopathological Society, IARI, New Delhi. pp.269.

Saraswathy, N. 2004.Diseases and disorders. In: *Arecanut* (Eds. D. Balasimha & V. Rajagopal), CPCRI, Kasaragod, Kerala. pp 131-189.

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