

Cultivation practices for coconut -March

Collection and storage of seed nuts

Continue seed nut collection from the identified mother palms. Seed nuts should be carefully harvested and properly stored to prevent drying of nut water. Wherever the ground surface is hard, harvested bunch should be lowered to the ground using a rope.



Nursery management

Continue irrigation for the seedlings in the nursery.

Weeding has to be done wherever necessary. If termite infestation is noted in the nursery drenching with chlorpyrifos (2ml chlorpyrifos in one litre of



water) should be done. Spiralling white fly infestation is observed in coconut nurseries in many localities. Spraying of water on the lower surface of leaves of seedlings can be done against spiralling white fly attack.

Fertilizer application

In irrigated coconut gardens, apply one fourth of the recommended dose of chemical fertilizers to the coconut palms.



Irrigation

Irrigation has to be continued in coconut gardens. If basin irrigation method is adopted, provide irrigation once in four days @ 200 litres per palm. Drip irrigation is the ideal method of irrigation for coconut. The number of dripping points should be six for sandy soils and four for other soil types.

Moisture conservation

Scarcity of water for irrigation during the peak summer days will be a major problem in most of the coconut growing areas. Hence, it is imperative that



coconut growers judiciously use water for irrigation. Drip irrigation has to be adopted to save water. Mulching and other soil and moisture conservation practices should be adopted if not done earlier. In water scarce areas, wherever feasible, life saving/protective irrigation has to be provided to coconut palms. Mulched materials are to be removed in the basin before giving such life saving/protective irrigation and immediately after providing irrigation the basin should be covered again with the mulching materials.



Shading

Shade has to be provided for the newly planted seedlings, if not already provided.

Management of pests and diseases

The month of March remains dry throughout, however, some summer showers at random could reduce the heat intensity and accelerate some humidity favouring outbreak of pests. The sucking pests such as whiteflies as well as coconut eriophyid mite could increase during the period. The slug caterpillar endemic regions should be strictly monitored and precautions should be carried out to prevent expansive spread by destroying pest-laden older leaves. Rugose spiralling whiteflies will find weather conditions very conducive and therefore suitable health management approaches such as nutrition and watering is very critical to upkeep proper health so as to put forward extra foliage to counter pest attack. Coconut seedlings in nurseries should be strictly monitored for rugose spiralling whitefly and nesting whiteflies. The odour plumes of deteriorating palm residues in the cyclone affected areas of Andhra Pradesh and Tamil Nadu could orient the red palm weevil for egg laying in the standalone palms for which strict monitoring is warranted. Crop

residue burning on the palm basin should be avoided or it may soften trunk issues paving entry of stem bleeding and basal stem rot pathogens. March is thus known for strict monitoring days for maintaining good palm health and evading pest attack.

Red palm weevil (*Rhynchophorus ferrugineus*)

Incidences of rhinoceros beetle, would subsequently induce the invasive potential of the killer native pest, viz., the red palm weevil, which needs an injury for the weevils to orient towards the palm cue and lay eggs. Yellowing of leaves in mid whorl region, oozing of brown fluid, presence of bore holes, choking of spindle region and gnawing sound of grubs heard along the trunk are some early symptoms for timely diagnosis of pest damage. Farmers fail to detect the pest damage at an early stage due to concealed habitat of the pest. Dwarf genotypes and palms aged between 5-15 years are relatively more susceptible. All life stages of the pest were noticed inside the infested palms. Being a fatal enemy of palms, 1% action threshold has been fixed.



Adults weevils



Crown entry



Toppling of palm

► Management

- Avoiding palm injury is very critical to disorient the gravid weevils away from the field and therefore

leave out at least one metre from palm trunk when petioles are cut.

- Complete destruction of pest affected palms / crown toppled palms immediately
- Crop geometry and correct spacing is very crucial to reduce pest attack.
- Timely and targeted spot application of imidacloprid 0.002% (1 ml per litre of water) or indoxocarb 0.04% (2.5 ml per litre of water) on infested palms would kill the feeding grubs and induces recovery of palms by putting forth new spear leaf.
- Crop-habitat diversification (Ecological Bio-engineering) through coconut based cropping system strategy inciting defenders and pollinators would diffuse the palm-linked volatile cues and encouraged pest suppression. Diversified cropping system reduced pest incidence than mono-cropping.

Coconut eriophyid mite, *Aceria guerreronis*

Coconut eriophyid mite is the invasive pest reported from our country during 1998 and has been on the rise during post-winter season. It belongs to the spider family with two pairs of legs, sub-microscopic (200-250 microns size), lays about 100-150 eggs and the life cycle completed in 7-10 days. Mites infests the developing nuts immediately after pollination and are confined within the floral



Mite damaged nuts



Mite colony



Progression of mite damage

bracts (tepals) and feeds on the meristematic tissues beneath the perianth. Appearance of elongated white streak below the perianth is the first visible symptom. Within few days, yellow halo appears round the perianth, which turns as warts and finally develops as cracks, cuts and gummosis. Shedding of buttons, immature nuts, malformation of nuts are other indications of mite damage.

► Management

- a) Removal and destruction of dried spathes, inflorescence parts and fallen nuts to subdue the pest population
- b) Spraying 2% neem-garlic emulsion or azadirachtin 10000 ppm @0.004% or root feeding with neem formulation containing azadirachtin 10000 ppm at 10 ml with equal volume of water three times during March-April, October-November and December –January is recommended.
- c) Application of talc-based preparation of acaropathogen, *Hirsutella thompsonii* @ 20 g / litre/ palm containing 1.6 x 10⁸cfu three times in synergy with neem formulation.
- d) Kalpaharitha (a selection from Kulasekharam Tall) was found field tolerant to mite damage.
- e) Application of recommended dose of fertilizers, recycling of biomass, raising of green manure crops in palm basin and incorporation during flowering, summer irrigation including soil and water conservation measures improve the palm health and reduce the pest attack.

Rugose Spiralling Whitefly (*Aleurodicus rugioperculatus*)

This period could also witness the establishment of the invasive rugose spiralling whitefly (*Aleurodicus rugioperculatus*) in new areas as well as re-emergence in already reported areas. The pest population is increasing very high due to favourable weather factors of high day temperature and fall in relative humidity. Presence of whitefly colonies on the under surface of palm leaflets and appearance of black coloured sooty mould deposits on the upper surface of palm leaflets are characteristic visual symptoms of pest attack. In severe cases, advancement in senescence and drying of old leaflets was observed. Leaflets, petioles and nuts were also attacked by the whitefly pest and a wide array of host plants including banana, bird of paradise, *Heliconia* sp. were also reported. Continuous feeding by whiteflies cause health deterioration in palms for which agronomic care is very critical.

► Management

- In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.
- Ensure good nutrition based on soil-test recommendations and adequate watering to improve

the health of juvenile and adult palms. Agronomic health management of palms is very crucial including planting of intercrops wherever possible to diversify volatile cues and improve microclimate disfavoured flare up of whitefly.

- No insecticide should be used as this causes resurgence of the pest and complete kill of the natural aphelinid parasitoid, *Encarsia guadeloupae*. A pesticide holiday approach is advocated for the build up of the parasitoid.
- Installation of yellow sticky traps and conservatory biological control using *E. guadeloupae* could reduce the pest incidence by 70% and enhance parasitism by 80%.
- Habitat preservation of the sooty mould scavenger beetle, *Leiochrinus nilgirianus* could eat away all the sooty moulds deposited on palm leaflets and cleanse them reviving the photosynthetic efficiency of palms.
- A close scrutiny should be made for the presence of other whiteflies including the nesting whiteflies on coconut system.

Nesting whiteflies (*Paraleyrodes bondari* and *Paraleyrodes minei*)

In addition to the rugose spiralling whitefly, two more nesting whiteflies (*Paraleyrodes bondari* and *Paraleyrodes minei*) are found associated with palm leaflets. Nesting whiteflies are smaller in size (1.1 mm) than rugose spiralling whitefly (2.5 mm). The nymphs are flatter with fibreglass like strands emerging from dorsum whereas the nymphs of rugose spiralling whitefly are convex in shape. Adult nesting whiteflies construct bird's nest like brooding chamber and sustains in the chamber. *P. bondari* had X-shaped oblique black marking on wings with two minute projections on rod shaped male genitalia whereas *P. minei* is devoid of black markings on wings and possesses cock-head like genitalia. Nesting whiteflies compete with rugose spiralling whitefly and reduce the aggressiveness of rugose spiralling whitefly in many cases.

► **Management**

- In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.
- Ensure good nutrition and adequate watering to improve the health of juvenile and adult palms
- Effective nitidulid predators belonging to *Cybocephalus* sp. were observed on the palm system

and pesticide holiday is advised for conservation biological control.

Slug caterpillars (*Darna nararia*)

Emergence of slug caterpillar, *Darna nararia* in East Godavari district, Andhra Pradesh and Tumkur, Karnataka could happen as this period is quite conducive for the population build up especially on coconut palms planted along the river beds and brackish water zones. Several hundreds of caterpillars would congregate and feed from under surface of palm leaflets, causing glistening spots and in synergy with grey leaf blight disease complete scorching of leaflets could be observed. In severe cases, complete defoliation was realized and only midribs will be spared. High temperature and cool weather could be



Slug caterpillar infested field



Mature caterpillars on palm leaflet

one of the triggering factors.

Management

- Complete destruction of affected palm leaflets with caterpillar at early stages of infestation should be made immediately so that the pest build up is

suppressed. Care should be taken as the caterpillars cause extreme itching when contacted with human skin due to the presence of poisonous scoli.

- Establishment of light traps and spraying *Bacillus thuringiensis* 5 g/litre was found effective along with inundative biological control using the eulophid larval parasitoid, *Pediobius imbrues*.

Stem bleeding (*Thielaviopsis (Ceratocystis) paradoxa*)

This disease is mostly confined in the acid soils of Kerala and becomes quite explicit during the period. Conspicuous exudation of reddish-brown gummy fluid is visible on the trunk which turns black on drying. It could be observed initially as small bleeding patch along the longitudinal crack, which later coalesce and form extensive lesion. The tissues underneath show tremendous discoloration and decay subsequently. In advanced stage of infection, outer whorls of leaves turns yellow, dry and shed prematurely affecting the overall health of the palm. Invasion by scolytid beetles such as *Diocalandra* and *Xyleborus* would further weaken the stem.

Management

- Avoid burning of trash and palm residues near the trunk to avoid trunk/root injury
- Adequate irrigation and adoption of soil and water conservation measures is advised.
- Application of 5 kg of neem cake enriched with *Trichoderma harzianum* and soil test based nutrition.
- Application of paste of *Trichoderma harzianum* talc formulation on the bleeding patches on the trunk was also found effective in preventing the spread of stem bleeding.

Basal stem rot disease (*Ganoderma spp.*)

It is a destructive disease observed in all coconut growing regions and found very severe in soils with higher pH and moisture stress condition. The pathogen invades the root system during early stages of infection that are not visibly noticed. Very severe in areas of Thanjavur, Tamil Nadu, parts of East Godavari, Andhra Pradesh and Arsikara, Karanataka. The outer whorl of leaves turn yellowish, then gradually become brown and droop from their point of attachment and hang vertically downwards to form a skirt around the trunk apex. In course of time, the apex of the trunk shows tapering with the advancement of the disease, and bleeding symptoms may appear on the bole region. At the base of the



Basal stem rot disease



Bracket fungus

stem a characteristic reddish brown discoloration develops, accompanied by the exudation of a brown viscous gummy substance. These brownish patches may extend up to one metre from ground level and at times bark peeling was also observed. Sometimes fruiting bodies (basidiocarp) of the pathogen develop from the affected trunk.

Management

- Avoid burning of trash and palm residues near the trunk to avoid trunk/root injury
- Removal of dead palms and palms in advanced stage of the disease as well as destruction of the boles and root bits of the diseased palms to remove disease inoculum.
- Isolation of neighboring healthy palms, by digging isolation trenches (60 cm deep and 30 cm wide) around the affected palm (1.2 m away from the base of the trunk).
- Application of neem cake (5 kg) fortified with *Trichoderma harzianum* (CPTD 28) talc formulation (50 g) per palm per year at six monthly intervals reduced the disease intensity.
- Root feeding of hexaconazole @ 2% (100 ml solution per palm) and soil drenching with 0.2 % hexaconazole or with 40 l of 1% Bordeaux mixture in the coconut basin are recommended

Hence, sustained monitoring and prophylactic treatments would suppress the damage potential of pest and disease and suitable health management strategies need to be adopted at the appropriate time. Timely pest management strategies had to be implemented in March to upkeep sound palm health for ensuring sustained production and keep away from pest and disease infections.

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