SYMPTOMS OF DISORDERS IN COCONUT ARE AIDS TO DIAGNOSIS AND TREATMENT

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Correct diagnosis makes an efficient physician; the right choice of drugs or medicines makes an effective treatment. This is equally true in our efforts to cure plant disorders. Disorders in plants arise, as a rule, out of inheritance of undesirable traits, poor nutrition and damage due to pests and diseases. These disorders are identified through the symptoms shown by the plants. In coconut, diagnosis becomes difficult when similar symptoms are exhibited by more than one kind of disorder. Yellowing of coconut, for example, may be caused by waterlogging, scarcity of water, inadequate availability of magnesium to the palm or attack of insects like the scales and white grubs. A foul smell of the crown may be the result of decaying tissue following bud rot or red weevil attack. The former is a fungal disease and the latter is insect infestation. A brown fluid may ooze out of stems in the case of both stem bleeding and red weevil infestation. The marginal necrosis occurring associated with root (wilt) disease is different from the irregular leaf margins resulting from feeding by the ash weevil. Defoliation of coconut palm may be caused by black headed caterpillar or slug caterpillar or leaf rot. It goes without saying, therefore, that a thorough and intimate knowledge of the decisive symptom of the different disorders in coconut is an essential pre-requisite to the choice of the right type of treatment.

Genetic disorders like barren nuts, button shedding and poor bearing are usually beyond correction. In such cases, there is no alternative except replacing such palms with seedlings of good genetic quality. It is desirable that the parentage of the seed is known to avoid any risk of the planting material eventually turning out to be poor. In perennial crops like the coconut, needless to say, one cannot afford to cultivate the wrong planting material.

Nutritional deficiency is generally indicated by poor vegetative growth, general weakness and declining yield. Manurial inadequacy can be made good by the supply of proper fertilizers just like improving the health of undernourished children through prescribed, balanced diet.

Damage due to pests and diseases can be minimised by adopting the correct protection methods—preventive and curative. Just the same way as giving medicines meant for indigestion to a patient suffering from fracture of bone may not serve any purpose, spraying a fungicide may not help when injection with a particular insecticide is the right type of pesticidal operation required.

An account of the symptoms helpful in the correct diagnosis of the major disorders in coconut and the details of treatment recommended in each case are therefore given in the tabulation below:

No.	Symptoms of disorder	Diagnosis	Treatment	Remarks
1.	Open leaves present characteristic cuts of leaflets (fig. 1); leaf sheath shows holes (fig. 3); spathes do not open, but dry up (fig. 2); chewed fibres are thrown out in loose bundles from the spindle; the spindle may break and hang down at the point of bite (fig. 3).	rhinoceros or black beetle attack	(i) periodically hook out the beetle from the crown of palms with a half metre long iron rod pointed at one end with a catch to prevent the escape of the beetle while pulling out and a ring or handle at the other end (fig. 7). (ii) fill the innermost three axils with 0·5% BHC/Chlordane dust + sand in equal proportions by volume at 250g insecti-	can be combined with harvest to reduce cost of extraction of the beetle.

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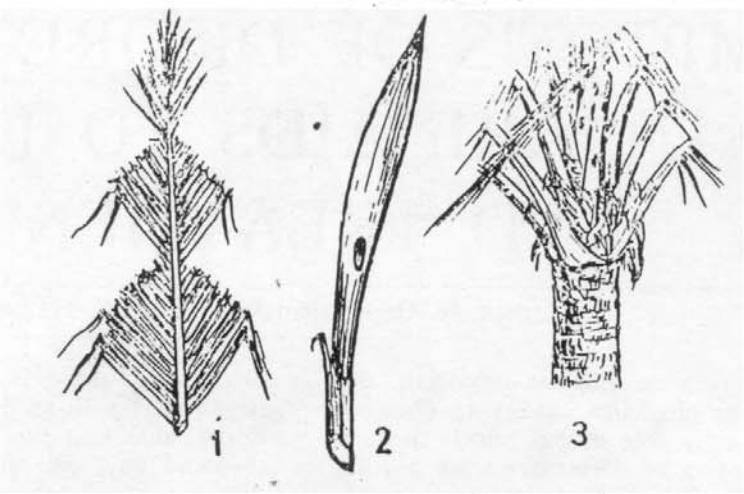
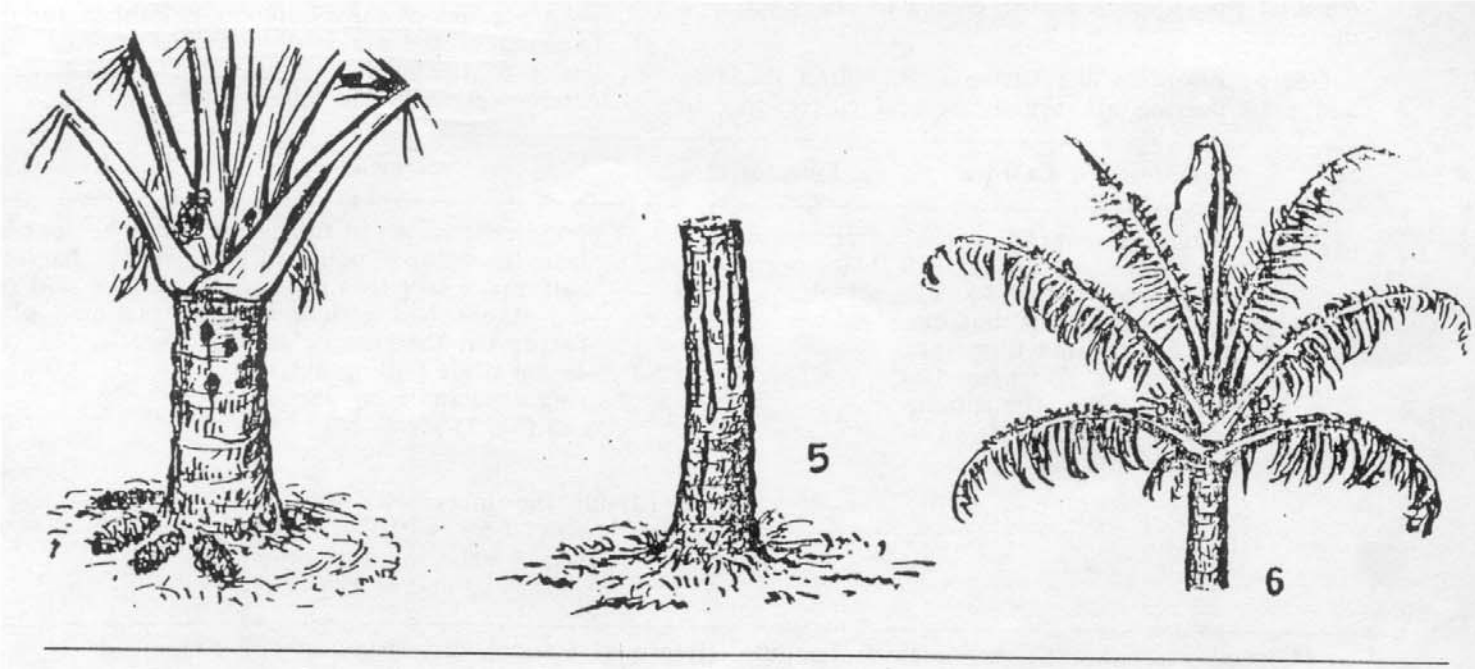


cide per palm per application, thrice a year, before and after the monsoons, say in April/May, August/September & December/January.

(iii) spray cowdung heaps with 50% Sevin/BHC, wettable powder suspended in water at the rate of 1.25 kg per cubic metre (8 lb. per 1000 c.ft.) of cowdung (fig. 8).

The percentage concentration works out to be 0·01 on a weight basis between insecticide and cowdung at an estimated wt. of 40 lb. per cubic foot of fresh cowdung. The quantity of water may be fixed as sufficient to form a dilute spray field and may be increased while spraying dry cowdung heaps.



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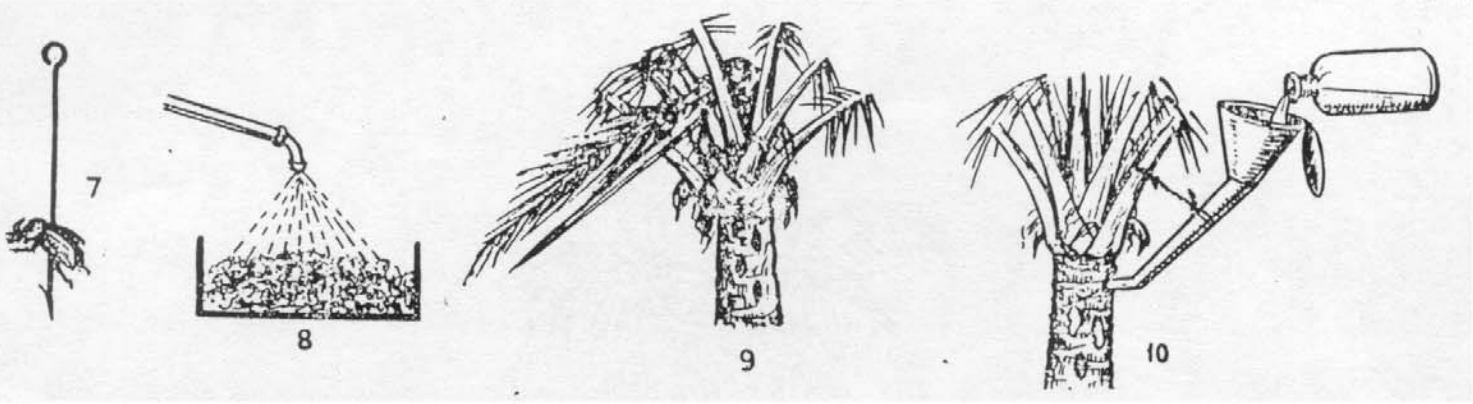

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2.	Stems present small holes especially at leaf scars; chewed up fibres and/or brownish fluid cozes out through these holes (fig. 4); inner leaves turn yellow while outer leaves are still green; these green leaves may come off when pulled; the bases of such green leaves may show longitudinal splits (fig.4); characteristic feeding sounds of the grub can be heard; pupae may be noticed in leaf axils or at the base of infested palm as intertwined bundles of coconut fibres (fig. 4); foul small may be given out from the infested palms.	red weevil infestation	fill all the leaf axils as in (ii) as a preventive measure; avoid making steps on stem and cutting green leaves of young palms (when green leaves are to be cut, cut at a distance of 120 cm. from the base of leaf ie. leaving a few leaflets on cut end and apply tar/BHC on wounds) When infestation is detected on the stem, inject 1% Pyrocon-E(10 to 15 ml. in 1 to 1.5. litres water) or Sevin (20 to 30 g. 50% wettable powder in 1 to 1.5. litres water) through a funnel (after closing all the holes with mud/cement) inserted through an artificial hole made above the level of the topmost hole with an auger (fig. 10). If the infestation is from the top, dress the crown by cutting across so as to clean the crown of all infested tissue and pour the insecticide to kill any stage of the pest remaining on the crown unnoticed. In an infested garden, adults can be trapped into split coconut petioles/toddy.	one or more symptoms may be noticed. Toppling down of crown is an indication of death of the palm as a result of red weevil infestation. Cut and burn all such young palms to avoid breeding and spread of the pest (fig. 9). Insecticidal injection may be done at two or three points around the stem to ensure that the chemical reaches all the insects within.
3.	Leaf blade is brown, presents galleries of caterpillars; they nibble the green colouring materials within the galleries, later the leaves show a scorched appearance with the mid-rib alone standing out from the rachis as the leaf blade parts are scattered away in wind.	leaf-eating caterpillar	(i) spray with 0·2% BHC (1 lb. 50% wettable powder suspended in 25 gallons or water for 50 palms) on the undersurface of leaflets or alternatively with 0·05% malathion for quick control (fig. 11).	the infestation is usually confined to coastal and backwater belts.
			(ii) about a fortnight after insecticidal spray, continue liberating the natural enemies (larvel & pupal) — (fig. 12.)	the natural enemies (larvel and pupal parasites) are available free of cost from the various parasite breeding stations.

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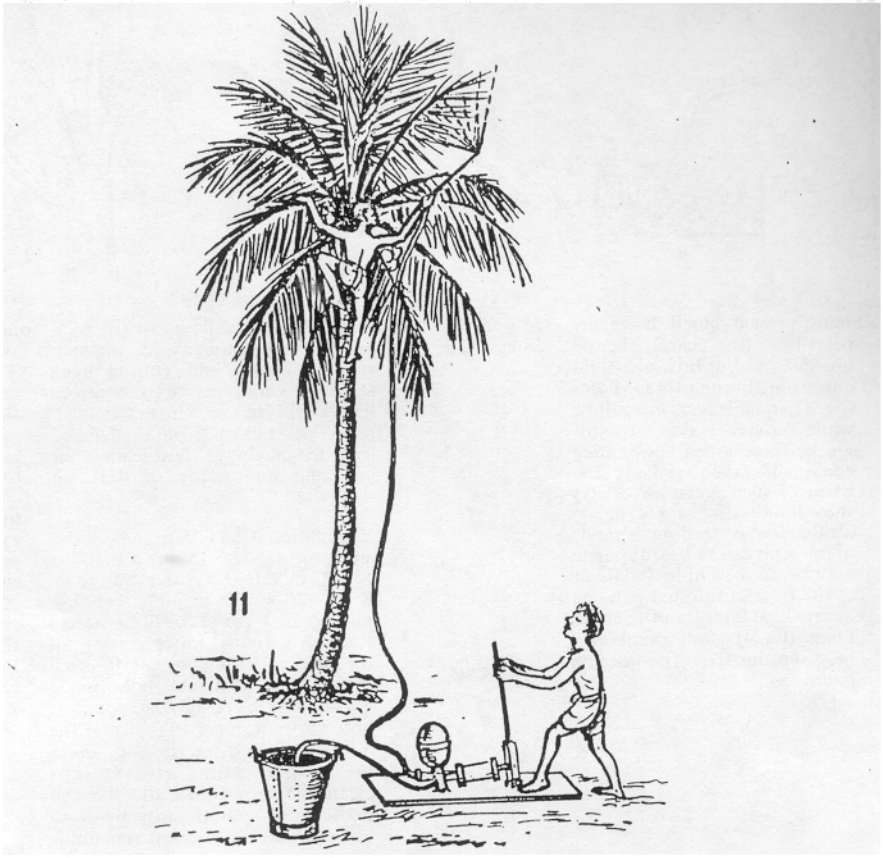

4.	Yield gets reduced to nil; leaves turn yellow; white grubs inhabit the soil; tender roots show biting marks at their tips.	cockchafer attack	broadcast 120 kg. 5% BHC/Aldrin per hectare and plough twice a year in May and November.	
5.	One or two young leaves surrounding the spindle turn pale or yellow; spindle withers and droops down; infested palms give out foul smell as the tender leaf bases and the soft tissues of the crown rot into a slimy mass of decayed material.	budrot	dress the crown by cutting across to remove all infested tissue; apply 1% Bordeaux paste, cover with polythene bag or mud pot to prevent rain water on wounded parts (fig. 13); spray unaffected palms with 1% bordeaux mixture (1 kg. copper sulphate crystals dissolved in 50 litres water poured gradually into a solution of milk of lime (1 kg. quicklime in 50 litres water and well stirred during mixing). This would suffice for spraying 50 palms.	usually prevalent after the rains set in. Bordeaux paste can be prepared by dissolving 100g. copper sulphate and 100g. quicklime each separately in 500 ml water and mixed together.
6.	Distal ends of leaflets in the central spindle and in some younger leaves blacken and	leafrot (fig. 6)	cut and burn badly affected leaves; spray the palms with 1% Bordeaux mixture or any other copper fungi-	usually found superimposed on root (wilt) affected palms.

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	shrivel up; later the affected portion becomes brittle and breaks off in bits giving the infected leaves a fan-like appearance; the symptoms gradually spread to outer leaves.		cide such as 0·5% Pytolan or 0·3% Dithane M-45 after removing all affected leaves in December/January, April/May and September/October or at least twice a year before and after the monsoons.	Deterioration of such palms is quicker and fall in yield is greater.
7.	Leaflets curve inward presenting a ribbed effect; immature nuts and outtons shed; leaves may show yellowing; leaflets exhibit marginal necrosis; roots of infected palms decay and deteriorate; inner leaves yellow; spadix shows necrosis; copra deteriorates in quality.	root (wilt) disease (fig. 14)	Remove all palms which yield below ten nuts a year, as it is not economical to maintain them, and replant. Replace any young palm contracting the disease before flowering with another plant. Start underplanting in disease affected gardens. Protect the yielding, but diseased palms from leafrot by scheduled spraying and adequate supply of manures.	while replanting, select only good seedlings of known parentage with good genetic qualities of high yield.
8.	Reddish brown liquid exudes through growth cracks on the lower part of the trunk; on drying, the liquid hardens and turns black; tissues beneath the bleeding decay.	stem bleeding (fig. 5)	Remove completely the affected tissues with a clean chisel and dress the wound with hot coaltar or Bordeaux paste. Ensure good drainage, regular cultivation and sufficient manures.	
9.	Buttons and immature nuts shed	fungal infection potash deficiency root (wilt) disease genetic quality	Spray the buttons with 1% Bordeaux mixture, add more potash-rich manures (ash) and irrigate well. see 7 above. Replace with good quality seedling.	
10.	Palms show poor vegetative growth and lack of vigour; yield declines, leaves yellow with no other apparent disease symptoms.	nutritional deficiency	Normal recommended dose of fertilizers for adult palms for good management is 0·5 kg. nitrogen (N), 0·32 kg. phosphoric acid (P_2O_5) and 1·2 kg. potash (K_2O). This is available from (a) 0·54 kg. Urea, 1·6 kg. Ammophos and 2 kg. Muriate of potash, (b) 2.5. kg. Ammonium Sulphate, 2 kg. Superphosphate (ordinary) and 2 kg. Muriate of potash, calculations may be made for the fertilizer requirement of the palm from the percentage contents of component fertilizers given below so that the available ones can be applied to meet the nutritional need of the palm: Nitrogen source: Ammonium sulphate : 20%N; Urea: 46% N Potash source: Muriate of potash: 60% K_2O; Phosphorus source: Factomphos: 16% N and 20% P_2O_5;	

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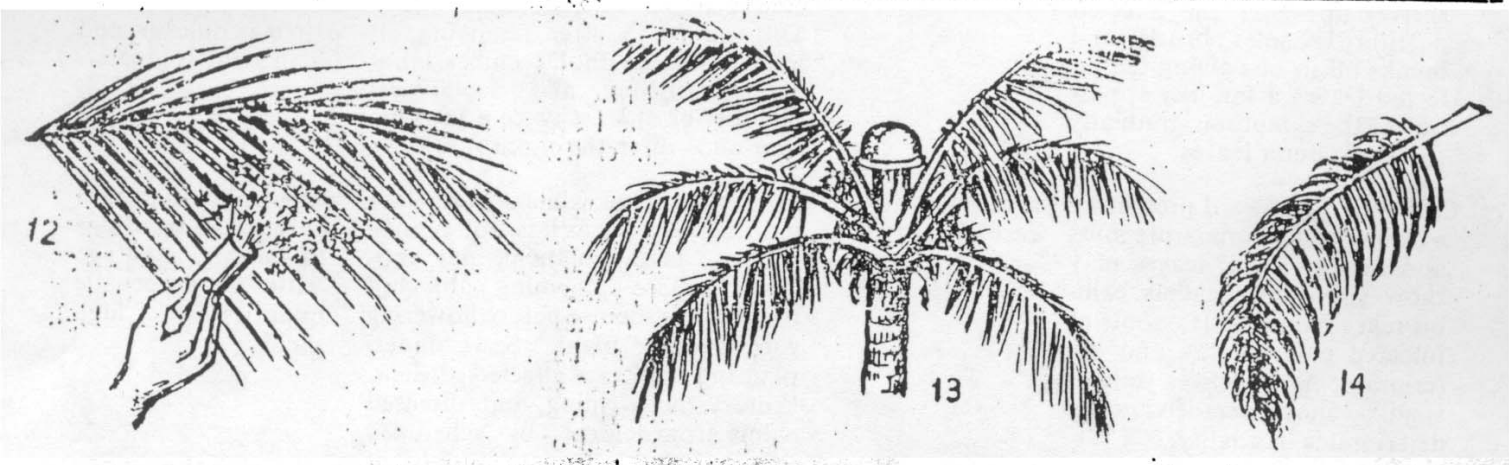

Superphosphate: 16% P_2O_5: Ultraphos (powdered rockphosphate) 30% P_2O_5.

Readily mixed coconut manures are also available in the market; 6 kg. 8:8:16 mixture may be applied per palm per year. NPK is supplemented with Calcium (Ca) and Magnesium (Mg) either as 1 Kg. lime and 0·5 kg. Magnesium sulphate ($MgSO_4$) or 2 kg. Dolomite per palm per year. The fertilizers may be applied in two split doses, 1/3 the dose in April/May after the pre-monsoon showers spread around the base within a radius of 1.8 metres and forked in; circular basins of 1·8 metres may be opened in July/August to a depth of 25 cm. and 50 kg. green leaf or compost added and partially covered; the remaining fertilizers may be spread over the green leaf or compost in August/September and basins completely covered. If instead of straight fertilizers, organic manure is added, give 50 kg. cattle dung for nitrogen and phosphorus and 30 kg. wood ash for potash (to be applied two weeks after applying cattle dung) per palm per year and supplement with green leaf or compost, or, 7 kg. poonac (oilcake) for nitrogen, 1 kg. bonemeal for phosphorus and 30 kg. wood-ash for potash + green manure/compost.

Give Ca. and Mg. in either case.

1/10 the adult dose may be given for freshly planted seedlings 3 months after planting, 1/3 the adult dose one year after planting, 2/3 adult dose 2 years after planting and full dose from the third year onwards.