Areca palm showing aerial roots due to waterlogging

DRAINAGE AND ITS IMPORTANCE IN ARECANUT

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DRAINAGE is the device by which excess of water from either the soil surface or soil profile is eliminated. Excess of water otherwise is harmful to crops and is an impediment to farming operations. Continuous supply of oxygen to the roots is important for the growth and development of plants. If conditions of climate, topography, soil and irrigation combine to cause waterlogging and restrict oxygen diffusion for extended periods, loss of yield or even crop failure is likely to follow.

Areca gardens located in low lying areas are prone to flooding when rivers are in spate. In the regions where ground water flow takes place by hydraulic slopes there is always the problem of waterlogging. Cultivation of arecanut is commonly confined to the basins of valleys and to the sides of rivers and streams and stagnation of water during monsoon is a perpetual problem. In most parts of Malnad tracts of Karnataka and West Coast there is heavy rainfall during the monsoon resulting in flooding of rivers, streams and tanks. Most of the gardens therefore require protection against external water and provision is to be always made for its rapid removal. In some areas, there will be underground water springs which may cause waterlogging.

Since the system of drainage removes the excess of water, maintains soil structure, improves aeration and activates aerobic reactions within the soil, it plays an important role in arecanut cultivation. Areca palms, particularly in seedlings stage, are very sensitive to waterlogging. Continuous stagnation of water results in gradual yellowing, reduction of crown size and tapering of palms. This may also result in drastic yield reduction. In severe cases, waterlogging may even be detrimental to the palms.

Aerial roots. In ill-drained soils

A corridor view of an areca garden. Note waterlogging

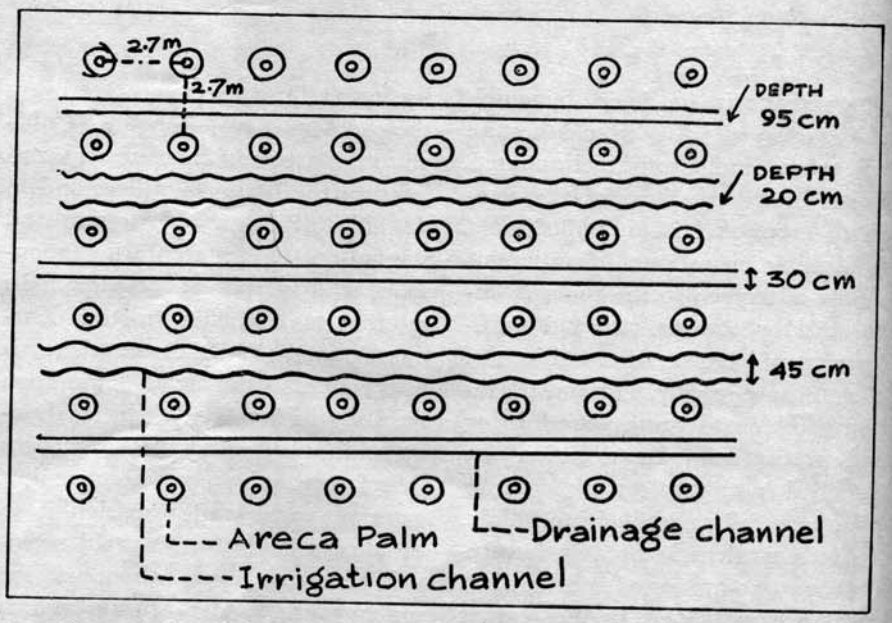
there is a tendency of areca palms to produce aerial roots. As there is restricted air movement due to poor drainage, there is a reduction in oxygen diffusion rate which limits the root growth. In a bid for survival in such cases the palms produce aerial roots in the basal region. General growth and vigour of such palms are always poor and as the trees develop the situation further aggravates and they finally collapse.

Ill-effect of Bad Drainage

In nurseries and young plantations, if proper attention for drainage is not given, the seedlings are subject to collar rot and root decay. It is also accepted fact that the areca seedlings require more time for establishment after planting if drainage is poor. It is reported that diseases like root rot (*Rhizoctonia* sp. and *Fusarium* sp.) Anabe (*Ganoderma lucidum*) and 'Band' (Hidimundige) are more prevalent in the gardens where there is poor drainage and stagnated water. The incidence of white grub (*Leucopholis bermesteri*) is much more severe in the soils of poorly drained plantations. Poor drainage and high humidity conditions are congenial for the rapid spread of Mahali disease (*Phytophthora arecae*). High humidity favours the quick multiplication of fungal spores and its subsequent spread.

Lack of oxygen supply due to improper aeration, release of toxic substances like hydrogen sulphide, accumulation of excess amount of Fe and Mn in soluble forms, reduction of nitrates into nitrites and ammonia resulting in loss of nitrogen from the soil, and adverse anaerobic biochemical reactions rendering the plant nutrients to unavailable forms are some of the complications likely to crop up if proper attention is not paid for drainage. For these reasons drainage in arecanut garden constitutes a part and parcel of a complete plantation management system. However, it has failed to attract adequate attention of areca growers. Though areca palms are unable to withstand water stagnation for a prolonged period, the growers at present are not paying proper attention for providing drainage and even if some growers pay a little attention they are not scientifically managed. In most of the cases, the channels provided are not deep enough to drain away the accumulated water from the root zone of the plants.

Edaphic conditions, environment and water situations are the important factors to be taken into consideration for providing drainage. These include physical, chemical, and biological properties of soil in relation to the stage of growth of the palms and should be integrated with soil and water table. A balance between recharge and discharge of water in the soil is important. Drainage channels of 95 cm depth and



Layout of an irrigation and drainage channels in an areca garden

30 cm width and of required length are recommended in alternate rows of areca palms. It is preferable to open the channels prior to the planting of seedlings. The depth and width may also vary depending upon the local situations, depth of water table, soil conditions, depth of root zone, etc. A main channel will have to be provided as an outlet for the accumulated water to drain out of garden. Under certain conditions of topography and soil there are possibilities of collecting water in the planting pits. If the soil is impermeable or if it is of hard laterite in nature, drainage of water from such pits becomes very difficult. To overcome such situations each pit will have to be connected to the adjacent drainage channels by providing sub-channels for facilitating the easy flow of water into the drainage channel.

In certain localities due to poor structural nature of the soil deepening of channel becomes impracticable and in such places earthen pipes may be used as an underground drainage system. Earthen pipes of about 15 cm radius and 60 cm length with perforation giving a slope of $\frac{2}{1000}$ to $\frac{3}{1000}$ mm may be buried in the required depth. A gap of 2 to 3 mm may be provided in the joining regions of two pipes in order to facilitate the accumulated water to flow out. In some areca growing locations there may not be any possibility to provide drainage due to lack of soil depth. Gradual raising of gardens by the application of fresh earth from external source is the only way out in such situations.

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DISEASE PROBLEMS

have shown that Redonil and Alliott are promising.

It is well known that anabe, if diagnosed early, can be tackled effectively. But so far this has been a major handicap in controlling the disease. Recent research is to concentrate on the development of a sensitive serodiagnostic or biochemical method to identify the potentially inefective soil or palm in initial stages of infection. Field trials are presently in progress in a heavily infected garden at Hirehalli, Karnataka have indicated encouraging results with captan (0.2 per cent) as soil-drench.

Yellow leaf disease has so far eluded a solution because of its complex nature and lack of knowledge on etiology. However, proper management of the diseased palm seems to be the only solution for the present for this, as well as other diseases of unknown etiology to minimise the losses.

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VARIETAL IMPROVEMENT

front. It is, however, considered to be a valuable breeding material with a scope for improving its yield by hybridisations. How this type and its hybrids in several combinations of crosses would react to disease situations with special reference to Yellow-leaf disease may have to be watched with interest. This is because, this diease is posing a threat to areca cultivation in the southern tracts of Kerala and the landlocked districts of Karnataka and eludes the possible chemical control measures. This situation as such now poses a challenge to the breeder and the possible solution is the evolving of types resistant to it.