KARI SOILS ARE OUT OF BOUNDS FOR ROOT (WILT)

Coconut palms growing on kari soil (peaty reclaimed soil) of Kerala do not seem to be affected by the dreaded root (wilt) disease. This interesting phenomenon is discussed here

By N. G. PILLAI
&
M. V. PUSHPADAS
Central Coconut Research Station, Kayangulam

ROOT (wilt) — the dread disease of the coconut palm in Kerala — is too well-known to need any introduction. Research workers are trying to unravel the mystery that envelops it and evolve ways and means to combat it. The discovery of any soil condition which would resist the development of

the disease would certainly provide a useful tool in tackling the disease. The *kari* or peaty soils of Kerala appear to offer some clues in this direction. This note presents some of the observations on the cultivation of coconut in the reclaimed *kari* soils of Kerala.

WHAT IS THE *kari* SOIL?

The soil owes its name to its black colour, the word *kari* meaning black in Malayalam. The peculiar properties of the *kari* soil are its peaty nature usually associated with high acidity and high contents of organic matter, sulphur and soluble salts. The pH of the soil in certain areas of the *kari* tract ranges from 3 to 4. The *kari* soils have a high water table that fluctuates on account of seasonal or tidal effects. The *kari* lands comprise mainly paddy fields and low-lying areas. The soil is derived mostly from decomposed wood. It contains such a high percentage of organic matter that a lightning-stroke or even a cigarette stump may start a fire on a *kari* reclamation and burn it leaving behind a greyish white ash. Wood in different stages of decomposition are met with when the deeper layers of the *kari* tracts are examined. Partially decayed wood obtained from *kari* areas is sometimes found to contain crystalline deposits of calcium sulphate. It is believed that in these places there were big forests once and that the trees probably fell and got submerged owing to some vagaries of nature such as sea erosion or earthquake. Forest trees like *thampakom*, *anjili*, *maruthu* and teak could be recognized among the decomposing wooden deposits. If the wood is only partially decayed it is used as fuel. Sometimes wood that is only slightly decayed is obtained from the deeper layers and used for building houses or country boats.

Wooden deposits dug out from Kari *land*

THE DISTRIBUTION OF *kari* LANDS

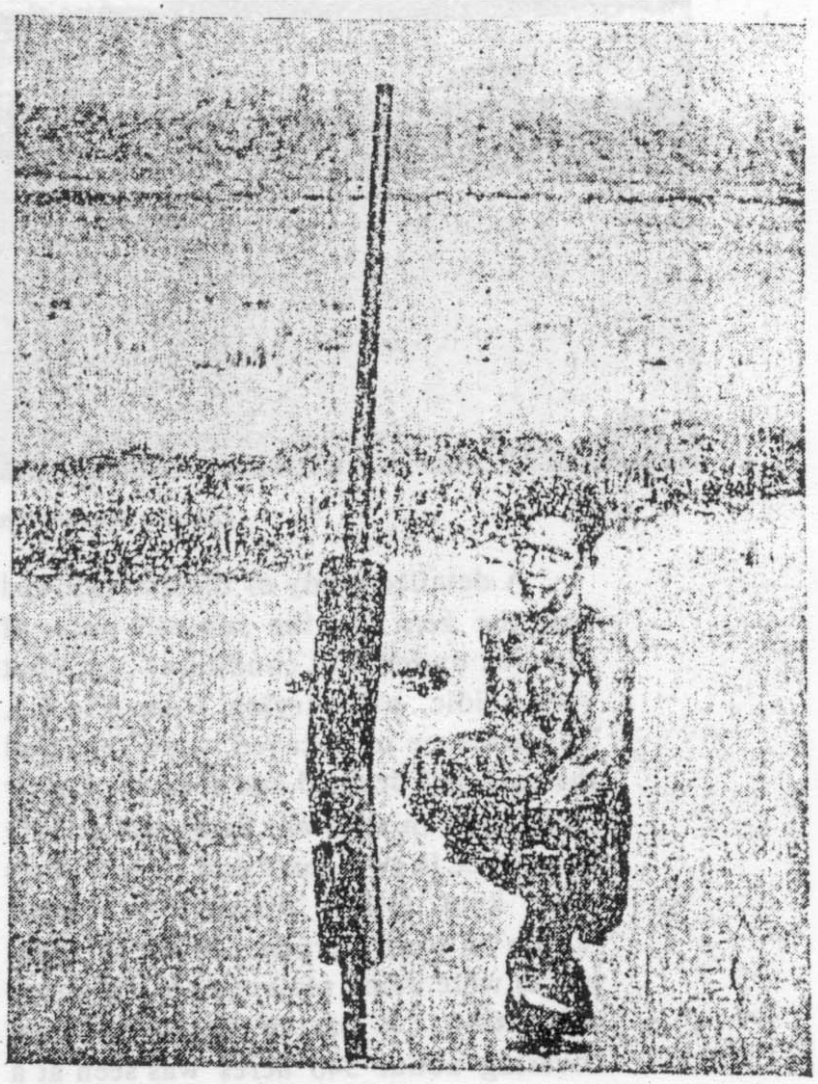
The *kari* lands are found mostly in the taluks of Karunagappally, Karthikappally, Ambalapuzha, Shertalay, Kuttanad, Vaikom, N. Parur and certain parts of North Kerala. It appears reasonable to assume that *kari* is a narrow, continuous strip of land extending all along the coastal tract but in many places it is probably remaining submerged having been covered up completely by other soils, with the result that the *kari* could be easily found only in low-lying areas like paddy fields.

The survey of *kari* lands reported in this note was, however, confined to the coconut-growing areas at Thottappally in Karthikappally and Ambalapuzha taluks, and Vechoor and Vaikom in Vaikom taluk.

RECLAMATION OF *kari* FOR PLANTING COCONUTS

The *kari* soils found in the different areas mentioned above vary in some of their chemical properties, particularly their acidity. The frequent failure of paddy crops in some of the acid *kari* tracts is attributed to the high acidity and salinity of the soil. In many of these places paddy cultivation is done in alternate years, the fields being kept inundated the year after cultivation to bring down the acidity and salinity of the *kari*.

Coconuts are found to withstand the acidity and salinity of the soil to a considerable extent and are, therefore, planted on reclaimed bunds of *kari* fields, or extensive reclaimed *kari* plots. *Kar* dug up from paddy fields is used along with sand for making heaps on which coconut seedlings are planted. Before planting, the heaps are sometimes allowed to weather for some time to get the excess acids and salts washed away. Usually one seedling per cent of land is the rate of planting. The gaps in between the heaps are slowly built up to form either bunds or plots in the course of about 5 years when the palms start bearing. The cost of bringing up a palm to bearing stage in this way is reported to come to about Rs. 50 to Rs. 100 depending on the distance between the source of the *kari* and the sand used for reclamation and the reclamation site.

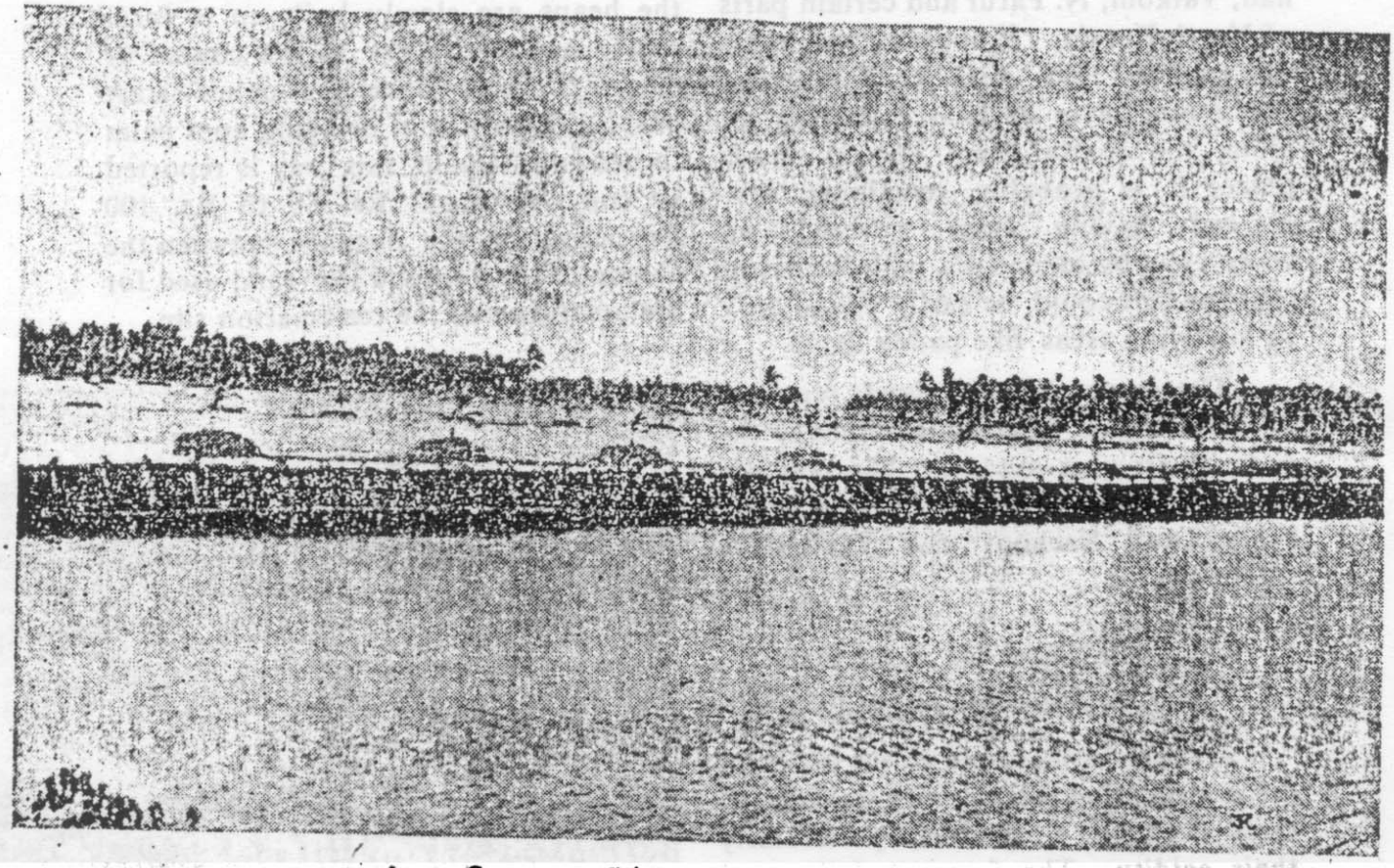


Kari *being dug up.*

The results of a survey of *kari* lands near Thottappally, Vechur and Vaikom are given below.

Kari LANDS AT THOTTAPPALLY

The extensive area on the south of the Thottappally spillway stretching from east to west, excluding the sandy sea shore, was found to be of typical *kari*. Excellent plantations of coconut seedlings, young palms and old palms could be seen within this area.



Coconut seedlings planted on Kari *mounds*

A detailed study of the area showed that the *kari* and the sub-soil water of the area under field conditions were not very acidic, pH varying from 6 to 6.5. The presence of decayed wood rendered the soil well drained and aerated. Paddy cultivation in adjacent fields was usually done once in two years and some lands were kept fallow owing to frequent failure of paddy crops. Most of these places were being reclaimed for coconut cultivation. A barren stretch of land covering about 340 acres was seen at a place called Lakshmithoppu. This was a submerged land noted for its good quality *kari* used for building bunds or manuring. The cost of *kari* obtained from Lakshmithoppu was said to be one rupee per ton, enough for application to two trees as manure.

Digging was the usual cultural operation practised in the coconut gardens of this area. Manurial practices included the application of sand and *kari* and in certain places of fish manure and half-burnt lime. The average annual

yield from a palm was said to be about 200 nuts obtained in six to eight harvests. This yield was steady for about 20 years after the regular bearing started.

ROOT (WILT) DISEASE

Coconut gardens in the *kari* tracts, especially the younger plantations, were free from the root (wilt) disease. The healthy plantations in the *kari* areas on the southern side of the Thottappally spillway and the heavily diseased ones in the sandy, loamy and clayey soils on the north-eastern side of the spillway offered a very striking contrast.

But even in this *kari* area, a pocket of root (wilt) disease was found about 3 furlongs away from the spillway. The affected garden was on the bank of the Quilon-Alleppey canal, and was in an old reclamation. An examination of the plot showed that it had lost the characteristic properties of the *kari* and that the root system of the palm had decayed. The disease was reported to have been prevalent for the previous 4 years. About 50 palms including some seedlings were seen affected. This observation would seem to indicate that even the *kari* may lose its favourable properties with time and long culture with coconut especially when proper soil amendments are not done regularly.

THE *kari* LANDS AT VECHOOR

Survey in this area was conducted along the sides of the Kottayam-Vechoor canal. The *kari* tract at Vechoor also contained excellent healthy plantations either on bunds of paddy fields or on extensive reclamations. Two typical reclaimed *kari* plots were studied in this area — one at Maniyanthuruthu and the other at Srampimattom.

Maniyanthuruthu was a patch of lateritic land about 35 acres in extent, situated in the middle of extensive *kari* paddy fields. There was a *kari* reclamation of about one acre contiguous to the mainland. The coconut palms in this plot were about 20 years old and free from root (wilt) disease. During an earlier survey of this plot some years ago the palms had been stunted in growth with inhibition of root growth and decay and discolouration of roots. These unhealthy symptoms were found to be mainly due to high acidity and concomitant toxicity on account of the presence of iron and aluminium. Drainage, too, had been poor. Subsequently, drainage channels had been opened and manures applied at the rate of 5 lb. of superphosphate and sufficient lime to correct the acidity. The palms were now found to show definite improvement and had started bearing profusely. The sub-soil water in this area had still a pH of 4.8 while the pH of the *kari* from the adjacent paddy fields varied from 2 to 4.

Thus it was clearly shown that the *kari* soil, even when highly acidic, could be made congenial to the growth of coconut by judicious soil treatments.

Srambimattom was an extensive old reclamation on the way to Vechoor from Maniyanthuruthu and comprised about 41 acres. There were about 3000 palms whose age ranged from 50 to 60 years. The whole area was in a neglected condition and most of the palms were highly diseased showing foliar yellowing, drying of leaflets and flaccidity. The reclamation had apparently lost the beneficial properties of the *kari* and the soil was found to be compact, without proper drainage facilities. The sub-soil

water was acidic and the lower layers of soil were lateritic. The deeper layers in the adjoining extensive paddy fields were also said to be lateritic indicating that they were probably hilly forests once, which got submerged somehow or other. The diseased condition of the palms again showed that the *kari* could degenerate with time and lose all beneficial properties unless regular *kari* amendments were made.

Proceeding by canal to Vechoor, excellent plantations could be seen at Valyaputhenkari. Moving away from the *kari* tract westwards and reaching Vechoor bridge, where the soil became sandy, one could notice incidence of root (wilt) disease, with increasing intensity, towards Kumarakom side where the soil changed to reclaimed clayey. One interesting observation made in the *kari* tract at Vechoor and also at Vaikom was that the water in the rivers and canals running through the *kari* had a pH of 4.5 and contained large quantities of soluble salts while the pH of water in the rivers and canals in the sandy, loamy and clayey areas surrounding the *kari* tract and where root (wilt) disease was prevalent was about 6.0, the soluble salt contents being very small.

THE *kari* LANDS AT VAIKOM

Here an extensive *kari* area consisting of about 2,500 acres called Mundra Estate was visited. Proceeding by Vaikom Puthenthodu canal it was noted that the water of the canal became more acidic, pH changing from 6.0 to 4.5 as the canal joined the Kariyar indicating the acid nature of the *kari* lands on the eastern side of the river. Most of the areas in Mundar Estate were used for paddy cultivation, but crop failures were very frequent here, due to the high acidity of the soil, which became very acute during certain years. The soil had such a potential reserve of acidity that even liberal application of lime for many years failed to bring its pH to a desirable range. Coconuts were, however, found to thrive well in this area and a large portion of the area had been reclaimed and brought under coconut cultivation. Root (wilt) disease was absent except for stray incidence of it in old plantations. Stunted growth of palms was also met with occasionally, most probably due to the high acidity of the soil.

As observed in other areas, root (wilt) disease was widely prevalent in other soil types beyond the *kari* at Vaikom.

SUMMARY

(1) Some typical coconut-growing *kari* tracts of Kerala *viz.*, Thottappally, Vechoor and Vaikom were surveyed. Comparatively healthy plantations of coconut could be noticed in these areas, and the spread of the root (wilt) disease was, in many instances, seen abruptly to stop at the borders of the *kari* lands.

(2) Stunted growth and poor performance of coconut in highly acid *kari* tracts could be remedied by proper addition of lime and superphosphate.

(3) Old plantations, especially when neglected, lost all beneficial properties of *kari* and became susceptible to root (wilt) disease.

SUGGESTIONS

Extensive *kari* lands like Lakshmithoppu at Thottappally, and Mundar Estate and proximities at Vaikom can be brought under coconut cultivation. The frequent failure of paddy crops in many of the acid *kari* tracts and the indicated resistance of the soil to root (wilt) disease suggest that these lands could be utilised in a better and more lucrative manner by resorting to coconut cultivation.

Application of *kari* as manure to diseased areas especially with sandy soil could be tried to find out how far the *kari* is responsible for checking new incidence of disease or improving already diseased palms.

The physico-chemical properties of the *kari* collected from different tracts are now being studied and the result will be communicated in due course.