NOTE ON PHYSIOLOGICAL STEM BLEEDING OF MATURE COCONUT PALMS

By

M. L. M. SALGADO, B.Sc. (Lond.), Ph.D. (Cantab.), Dip. Agric. (Cantab.),
SOIL CHEMIST, COCONUT RESEARCH SCHEME (CEYLON)

PETCH[1] discussing the stem bleeding disease of the coconut palm, mentions that " exudation of sap from the stem of the coconut may be caused by lightening or fire or root disease, as well as the attacks of *Thielaviopsis* ". He further mentions that " in general, however, the bleeding patches produced by the first three causes are numerous, small and permanently reddish brown, while those of ' bleeding disease ' usually occur singly or in small numbers and soon turn black. The liquid, too, always appears more viscid in the bleeding disease than in the other cases."

While the " bleeding disease " caused by *Thielaviopsis* (*Ceratostomella*) *paradoxa* is a pathological manifestation, the other types of bleeding may be primarily due to physiological causes.

Two further types of such physiological stem bleeding of mature palms, observed during the last few years, deserve notice.

(*a*) *Bleeding following manuring.*—Outbreaks of bleeding following manuring were noticed on two estates.

The first case was observed several years ago on an old neglected estate at Nattandiya which was manured with a mixture consisting of 2 lbs. Cyanamide, 4½ lbs. Bone meal and 1½ lbs. Muriate of potash. The estate was about 50 years old and the soil a sandy loam.

The second case, on which close observation was kept, occurred in 1940 on an estate at Lunuwila where a manurial experiment on the growing of fodder grass (Napier) between palms was carried out. The palms were about 40 years old and the soil a well drained loam overlying a heavier sub-soil.

The plots were manured in December, 1939, and in the course of differential manurial treatments imposed by the experiment some palms received very heavy manurial doses amounting to as much as a mixture of 6 lbs. Sulphate of ammonia, 4 lbs.

Saphos phosphate, and 3 lbs. Muriate of potash per palm. Manuring was followed by a prolonged drought, which was broken by a heavy South West Monsoon in May and June.

Bleeding was first noticed towards the end of July. The patches were reddish brown, and circular extending to a diameter of 2 or 3 inches, and commencing from about 2 to 3 feet from the base. The patches spread upwards spirally about half way up the stem, and was never noticed to reach the area close to the crown. The bleeding was also observed to be superficial.

At the first count taken on July 31, 1940, 85 palms were found to be affected out of 384.

No treatment, such as scraping the bark of the affected areas and tarring was carried out and the signs of bleeding gradually passed away.

The bleeding was possibly due to the excessive development of sap caused by the sudden absorption of a large supply of plant nutrients favoured by the rains following a period of drought. The vascular system being unable to transport the nutrient solutions absorbed from the soil with sufficient mobility to the growing points, the discharge of the sap would take place through the bark causing the bleeding patches.

(*b*) *Bleeding due to heavy rains following prolonged droughts with rise of water-table.*

Two distinct types of bleeding associated with physiological disturbances due to changes of water supply in the soil will be now considered.

1. *Bleeding following floods.*

A type of bleeding, more serious than the cases mentioned before, was first reported on an estate on the north of Chilaw in January, 1939. Bleeding was light at first, but was later found to be spreading and became severe in intensity.

The estate is on the northern bank of the Deduru Oya, which innundates the lands during the periodical floods, when water remains on the land for some time. The soil is on the heavy side and the sub-soil an impermeable clay and poorly drained.

It was noticed that the incidence of the bleeding was most pronounced on the lower portions of the estate where water remains for sometime.

The bleeding patches were reddish brown in colour, more extensive than in the cases mentioned before, and appeared up to a greater height on the stem. It was also not superficial but the affected tissues extended to the depth of about an inch and spread spirally in the path of the vascular bundles.

The affected tissues were examined for *Thielaviopsis* (*Ceratostomella*) *paradoxa* by Mr. L. S. Bertus, Acting Plant Pathologist, and proved negative.

Death of palms due to bleeding was not reported, as in the cases mentioned later.

2. *Bleeding on lands with fluctuating water-table in the Northern Province.*

Bleeding of an extremely severe type, often causing the ultimate death of the palms, was observed in three areas of the Northern Province.

(*a*) Mannar Peninsula.
(*b*) Veddakadu-Pooneryn area.
(*c*) Jaffna Peninsula South of Pallai.

In all these cases the bleeding patches were as before reddish brown, extensive, beginning close to the base and reaching almost the area near the crown. From the bleeding point the patches extend down to almost a foot. Several apparently healthy mature palms have been killed by this type of bleeding.

The climatic conditions of the three areas are very similar—low rainfall and long periods of drought. The South West Monsoon often fails and it is not uncommon for the estates to experience a drought of almost six months followed by heavy rains from October to January.

It was stated that bleeding is more prevalent towards the end of the wet season.

The following observations were made about the soil conditions of these areas in relation to the incidence of bleeding.

Mannar Peninsula.—The soil is wind blown sand overlying an impermeable estuarine clay sub-soil. This is true of practically the whole of the Mannar Peninsula. During the dry season the water-table is very low, but after the rains it rises very close to the surface. At Pesalai at the time of the visit in February the water-table was found to be barely two feet from the surface. At Mannar it was noted that only the palms in the lower portion of the estate were affected, while the palms in the higher sand dunes, with a deeper water-table, were immune and bearing excellent crops.

Veddakadu-Pooneryn area.—On the extreme point of the mainland of Ceylon, bounded on the north by the Jaffna Lagoon, there is a narrow fringe of coconut estates estimated to be about 10,000 acres extending to several miles between Veddakadu and Pooneryn, portions of which are severely affected by bleeding similar to that observed at Mannar. The incidence of the disease is greater in areas closer to the lagoon.

The soil is about 3 feet deep overlying a hard pan of limestone. The top soil is black in colour due to decaying organic matter, while the sub-soil is loose wind-blown sand. There is extreme fluctuation of the water-table during the dry and rainy periods.

Estates where the soil was deep and well drained were observed to be bearing excellent crops.

Jaffna Peninsula, South of Pallai.—In the Jaffna Peninsula, along a narrow strip close to the Western coast south of Pallai, severe bleeding was observed. Pallai forms the main coconut area in the Peninsula. The soil is loose sand overlying a limestone pan. Bleeding was particularly severe where the pan was close to the surface and water-logging occurs during the rains. Towards the North of Pallai and inland, where the soil is deep, no bleeding was reported.

The incidence of death of palms due to recurrent attacks of bleeding in these three areas were reported to be high.

Samples of bark taken from these areas were examined by Mr. L. S. Bertus, Acting Plant Pathologist, Dept. of Agriculture, for the presence of *Thielaviopsis* (*Ceratostomella*) *paradoxa* and found negative.

It is quite probable that bleeding in these cases is caused by physiological disturbances brought about by sudden changes in the water-table and the resultant supply of moisture and soil solution to the root system. It may be mentioned that on permanently water-logged lands such as occur in the estuarine areas of the Chilaw District, where the water-table is kept at a steady level by deep drains to remove water, bleeding of this type is rarely observed.

Remedial Measures.—The usual treatment of cutting out the diseased tissues and applying tar should be adopted.

At Mannar it was noticed that the palms were ring-barked above the bleeding patches with a view to preventing the bleeding spreading up the stem. As was to be expected this was ineffective.

It is suggested that adequate draining of such lands would be of prime importance. Deep drains, about 3 feet wide and 3 feet deep, should be cut so as to lower the water-table during the rains. The soil removed from the drains should be put round the palms so as to raise the ground level. In order to retain moisture during the drought, husks should be buried at the base of the palms in a circular trench or in shallow trenches about 1 foot deep between palms. Measures should therefore be so adopted as to avoid extreme fluctuations of the soil moisture conditions within the area through which the root system is distributed.

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REFERENCES

1. Petch, T. .. The bleeding disease of the coconut. Circulars and Agricultural Journal of the Royal Botanical Gardens, Ceylon, Vol. IV., No. 22, 1909.