

Deficiency of Boron, a Possible Cause of the Leaf rot in Coconut palms*

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Leaf rot is a major disease of the coconut palm in Kerala. Menon and Nair (1951) and also Radha *et al* (1961) have reported that the disease is caused by *Helminthosporium halodes* Drechs., *Gloeosporium* sp., and *Gliocladium roseum* Bains. A series of inoculations conducted by the present authors with the above organisms, however, gave only negative results.

Copper fungicides are usually recommended for the control of the disease. But this treatment often failed to produce the desired results. The disease is characteristically a case of heart leaf rot. It is the soft tissues of the spindle leaves that are affected. The decay occurs even before the spindle leaf begins to emerge. Once the leaves unfold they are not susceptible to further decay. This was suggestive of a possible deficiency of boron. It is now well known that symptoms of boron deficiency in certain crop plants usually appear on the young leaves and meristematic tissues. This is so in the case of the heart rot of beets and mangolds. An attempt was therefore made to determine whether the diseased coconut palms would respond favourably to the application of boron.

Materials and Methods

Boron in the form of boric acid was given to selected diseased palms, 10 to 20 years old, at the Regional Coconut Research Station, Vytilla. The trees selected were in the early stages of the disease and had only less than 50 per cent of the leaf area damaged. The boric acid used was of commercial quality. In a preliminary experiment which was started in October, 1964, ten diseased palms were selected and one pound of boric acid dissolved in ten gallons of water was poured in basins around each tree. In addition, these trees received a 0.2 per cent aqueous solution of boric acid, sprayed on the crown in October, November, January and March at the rate of two gallons per tree each time. In a subsequent experiment, thirty diseased palms were selected in January, 1965. They were divided into three groups of ten palms each and each group received one of the following treatments.

1. One pound of boric acid dissolved in 10 gallons of water and poured in basins around each tree.

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2. 0.2 per cent aqueous solution of boric acid sprayed on the crown in January, February and April, at the rate of 2 gallons per tree each time.
3. Treatments 1 + 2.

Results

Nine out of the ten palms which received the soil application of boric acid in October, 1964 followed by four foliar applications in the first experiment, recovered; six in December, 1964, two in January and one in March, 1965. Out of the thirty palms treated in January, 1965, twenty six recovered; ten in March and sixteen in April. Palms which received the foliar application of boric acid with or without

the soil application began to recover in March, while those which received only the soil application recovered a month later (Table 1). Five of the treated palms, in the two experiments together, did not recover. They showed only some improvement in that the extent of decay of the newly formed leaves was considerably reduced.

Three of the recovered palms in the first experiment and thirteen of the recovered palms in the second experiment reverted to the diseased condition in July, 1965 after producing 6 to 8 and 3 to 5 healthy leaves respectively. The remaining palms also reverted in the succeeding months (Table 1).

TABLE I

Effect of application of boric acid on coconut palms affected by leaf rot

Treatment	No. of palms treated	Date of treatment	Date when recovery started	No. of palms recovered	No. of palms reverted in July 1965	No. of palms reverted later	No. of healthy leaves produced before reversion
1. Soil application of 1 lb boric acid + 4 foliar applications of 0.2% boric acid	10	Oct. '64	Dec. '64	9	3	6	6 to 8
2. Soil application of 1 lb boric acid + 3 foliar applications of 0.2% boric acid	10	Jan. '65	March '65	9	4	5	4 to 5
3. Soil application of 1 lb boric acid only	10	Jan. '65	April '65	8	4	4	3 to 4
4. Three foliar applications of 0.2% boric acid only	10	Jan. '65	March '65	9	5	4	3 to 5
5. Control-No treatment	20	..	April '65	5	5	—	1 to 2

Five palms in the control also showed recovery, but all of them reverted to the diseased condition after producing one to two healthy leaves.

Discussion

The diseased palms showed definite response to the application of boric acid, either on the foliage or in the soil. Foliar application, however, gave a quicker response as compared to soil application. Thirty five out of the forty palms treated with boric acid recovered and the remaining five palms showed some improvement. This indicates that the boric acid has exerted a beneficial influence. It is possible that the boron in the boric acid might have played a major role in the recovery of the palms since the disease is typically a case of heart leaf rot. The material used was of commercial quality and the impurities present in it could have influenced the results. Another important point to be noted is that whatever benefit which the palms derived out of the treatment was only short lived. All the palms which recovered reverted to the diseased condition after producing a maximum of eight healthy leaves. It therefore remains to be determined whether prolonged applications of boron could maintain the recovery indefinitely.

The present work is only of a preliminary nature and hence with the data now available it is not possible to draw any definite conclusions. Whether the disease is primarily caused by a deficiency of boron and whether other factors are also involved can be known only by further detailed studies.

A re-examination of the actual role of *Helminthosporium halodes* and other fungi in causing the disease is also necessary.

Summary

Coconut palms affected by the leafrot disease responded favourably when boric acid was given either as a foliar spray or as a soil dressing. Thirty five out of the forty treated palms recovered and the remaining five palms showed some improvement. Recovery was noted two to three months after the treatment. The recovered palms, however, finally reverted to the diseased condition after producing a maximum of eight healthy leaves. Though no definite conclusions are drawn, it is suggested that the boron in the boric acid might have acted beneficially.

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