Indian Cocoa, Areconut & Spices Journal III (2): pp. 43

A LOOK INTO THE ZINC NUTRITION OF COCOA (*THEOBROMA CACAO. L)*

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With increase in the area under cultivation of cocoa, it has become imperative to know the nutritional requirements and the disorders due to their deficiencies. Though the shortages of the major nutrients are overcome by direct application of fertilisers, the deficiencies of micro nutrients are corrected mostly by manipulating the soil reaction, relative proportion of ions and to larger extent by direct supply of the deficient element itself.

As seen in other crops, zinc plays an important role in the nutrition of cocoa plant. The limited zinc supply affects the net photosynthetic area causing a net reduction in the source-zinc relationship.

Etiology

Though zinc disorders are not well specified earlier in cocoa nutrition, this malady, as suspected to be a viral infection, a general description of phytological malformations was made as early as in 1930 by Ceferri. These disorders were later named as narrow dented leaf virus of cocoa. Based on the physical abnormalities of the leaf, it was renamed as "sickle leaf" disease of cocoa. Similar disorders were observed in Gold Coast, Nigeria and Ivory Coast from 1940 onwards.

Soil fertility in relation to cocoa nutrition was looked into by Hayfron (1951) and Green Wood *et al.,* (1951) who observed that these disorders were associated with high degree of soil reaction and higher contents of available P and K. Later, working with water culture, they could also produce symptoms similar to "sickle leaf" in the absence of zinc. After confirming these observations a systematic description of the zinc deficiency symptoms were attempted by Maskell *et al* (1953).

Symptomatology

Deficiency symptoms are noticed on the leaf in the early stages of development. The veinlets are prominent and are frequently dark red or red in colour. With severe deficiency, the veinlets are distorted considerably towards the base of the leaf. The interveinal areas between the distorted veinlets are pale in colour in the young leaves. On hardening, the prominent vein symptoms and chlorotic areas persist. The width of the leaf decreases with increasing deficiency. The margin of the leaf is fluted or wavy and the whole leaf may be spirally twisted. In the intermediate range of deficiency, many of the leaves may show a distinct waist near the base or may show unequal development of lamina on opposite sides of the mid rib, resulting in a curved leaf which is sickle shaped with chlorotic patches. On severe deficiency, leaf lamina and leaf length are affected. The leaf may be reduced to ½ inch width, with a distinct wavy margin. In mild deficiency, the leaf shows an abnormally high ratio of length to width and chlorotic areas are distinctly associated with the vein, forming a symmetrical rows on each side of the mid rib and main laterals. Zinc deficient leaves have a shorter life than leaves nourished normally.

Soil factors also influence the degree of this malady to a larger extent. Higher degree of soil reaction is likely to cause temporary shortages of Fe and Zn. Green Wood *et al.,* (1951) suggested that in soils of high pH, the K/Ca ratio may decide whether the predominant symptoms shall be those of Fe or Zn deficiency. Later working on zinc nutrition of Cacao, Spector (1964) found normal leaves in the fields to lie in the range of 80-170 ppm and 16 ppm in the leaves showing sickle shape.

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