Nutrient Deficiencies Affecting Peanut Production in Soils of Northeast Thailand

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PEANUT is widely grown in the rainy season on upland soils (mostly Paleustults) in northeast Thailand. The nutrient status of these soils for peanut production has not been adequately assessed. Response to phosphorus, potassium, sulfur, and copper on a range of soil types of this region have been obtained in pot trials using pasture legumes (Wilaipon 1976). The present experiments were set up to identify nutrient deficiencies which could limit yield and kernel quality of peanut on an Oxic Paleustult (Khorat series).

Four omission design field trials were conducted in Khon Kaen province on three farmers' fields. At site 1, peanut was planted on the same plot in two successive years. Young folded and youngest fully expanded leaves were sampled at around day 30 and day 50 after emergence for nutrient analysis. Pod, kernel, and shoot dry matter yield as well as yield components were recorded at maturity. The percentage of kernels with hollow heart symptoms was also determined.

In the first year of planting, no yield responses were obtained at any of the three sites. Replanting at site 1 in year two without added potassium resulted in a 48% yield reduction. Yield of the unfertilised peanuts in year two was similar to those grown without added potassium. Yield reductions of 20% were found when plants were grown without added copper, however significant reductions ($P = 0.05$) were obtained at one site only. Leaf analyses showed that copper concentrations in young leaves were suppressed in the presence of basal fertilisers. This could be corrected by copper foliar sprays. Peanuts grown without added molybdenum appeared yellowish in foliage colour and had low leaf and shoot nitrogen concentrations.

Without added boron, hollow heart was found at site 1, in 9 and 34% of kernels in years one and two, respectively. Peanut kernels sampled from farmers' fields in the rainy season also exhibited hollow heart in 315 samples obtained from six villages in Khon Kaen province (hollow heart incidence ranged from 1 to 75%). Severe hollow heart incidence (>5% of kernels affected) was found at only 12 of those sites.

Based on two years experiments, it is concluded that potassium, copper, boron and molybdenum deficiencies may limit peanut production in an Oxic Paleustult in northeastern Thailand. More detailed surveys of farmers' peanut crops are needed to determine the distribution and severity of these deficiencies.

Wilaipon, N. 1976. Pasture Improvement Project Ann. Rep., Univ. of Queensland. St. Lucia, 75–77.

Boron Deficiency in Soybean and Peanut

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PEANUTS grown in the Chiang Mai region of Thailand produce kernels with a high incidence of hollow heart (Netsangtip et al., these proceedings), a disorder corrected by applications of boron. Soils in this region have very low levels of hot water soluble boron (Hiranburana and Chawachati, these proceedings). Hollow heart has also been reported from the Khon Kaen region and it appears likely that boron deficiency may limit the production of peanuts in extensive areas of northern Thailand. This work aims to develop plant analysis standards for the diagnosis of boron deficiency in peanut and soybean, two potentially important food legumes in Thailand.

Boron concentrations in leaves of both species vary with leaf age. In marginally deficient plants, older leaves may contain twice the boron concentration of young leaves (Table 1). Consequently for diagnostic purposes it is important to sample leaves at a defined stage of leaf development.

The most sensitive leaf for boron deficiency diagnosis is the youngest open leaf (YOL) in soybean and the young folded leaf (YFL) in peanut. In the varieties used in this work, vegetative growth was depressed when boron concentration in these tissues fell below 7–8 μg/g dry wt. and 3–5 μg/g dry wt., respectively. However, specific plant functions such as leaf elongation in soybean are impaired at much higher leaf boron concentrations. Investigations are proceeding to define a functional boron concentration for peanut and soybean.