Production of Groundnuts on Tin-tailing Soils in Malaysia

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AN estimated 200 000 hectares of wasteland has resulted from tin mining operations in Malaysia. These tin-tailing soils are mainly of sand texture and have very poor physical characteristics and nutritional status. The rehabilitation of such soils would provide additional area for crop production.

The productivity of the sand tailing was investigated for the cropping of groundnuts. Supplements in the form of fertilisers (12 N:12 P_2O_5:17 K_2O: 2 Mg 0 + trace elements) at 400 kg/ha and chicken manure at 10 t/ha were applied. Comparisons were made between the untreated tin-tailings and tailings supplemented with inorganic fertiliser or chicken manure or both, and with loam soil supplemented with inorganic fertiliser.

TABLE 1. Effect of fertiliser and chicken manure on the growth and yield of groundnut on tin-tailing soil and a loam soil.

Treatment to tin-tailing soil	Height cm	Branches per plant	Dry matter g/plant	Pod no. per plant	Pod yield g/plant	Shelling per cent
Untreated tin-tailing (TT)	11.6	0.45	1.4	2.0	1.2	67.0
(TT) + fertiliser (F)	27.2	3.2	12.8	11.3	10.3	76.2
(TT) + chicken manure (CM)	33.4	4.3	20.9	20.6	20.6	76.6
(TT) + (F) + (CM)	38.9	4.55	21.1	22.9	23.4	74.9
Loam soil + fertiliser	30.8	4.95	33.8	33.0	33.3	78.1
LSD P-0.05	4.9	0.65	4.8	5.3	4.6	2.7

The growth and yield of groundnuts improved significantly with the use of inorganic or organic supplements. The improvement was seen in the increased size of plants (height, number of branches and dry matter) which resulted in higher production of pods (number, weight and shelling percentage). The untreated tin-tailing soil was unsuitable for growing groundnuts and the plants only managed to survive. Inorganic fertiliser was not as effective as chicken manure. The beneficial effect of chicken manure was such that no further growth and yield response was obtained with further supplement of the inorganic fertiliser. However, in spite of the improvements achieved with the addition of chicken manure, the growth and productivity of the groundnut plants were still poorer than that of loam soil. Further investigations are necessary in order that groundnut yields on tin-tailing soils can be brought to the level of normal soils.

Ascorbate Oxidase Activity in Peanut: Relation to Copper and Growth

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THE copper metallo-enzyme, ascorbate oxidase (AO), has been used as an indicator of plant copper status in citrus (Bar-Akiva et al. 1969) and subterranean clover (Loneragan et al. 1982). In the present study, the activity of AO in peanut cv. White Spanish was examined in relation to copper supply, plant growth and tissue copper concentration.

AO activity was measured on crude leaf homogenates (extracted in 67 mM KH_2PO_4; 3 mM Na_2EDTA) using an O_2 electrode. A simplified semi-quantitative procedure for measuring AO activity was also developed using a test strip to determine the concentration of ascorbic acid remaining in the assay mixture after a 20 min. incubation period. For AO assays, the youngest folded leaf (YFL) was sampled when blade length was 50–100% of the length of the enclosing stipules.

AO activity increased substantially with increasing copper supply in peanut (Table 1). Increases in AO activity were closely related to increases in shoot yield and in pod number per plant. Reduced growth in peanut was associated with <1.7 $\mu g/g$ copper in the youngest open leaf, the critical concentration reported by Robson et al. (1980). AO was more responsive to increasing copper supply than copper concentration in the youngest open leaf. The strip test for AO activity was effective in differentiating between copper-deficient and copper-adequate peanuts. Further studies are required to determine the specificity of AO activity for copper supply.

TABLE 1. Effect of copper supply on growth, leaf copper concentration and leaf AO activity in peanut.

Cu supply (mg/pot)	Shoot yield (g/pot)	Pod no./ plant	Cu conc. (μg/g)	AO activity in YFL	
				0_2 uptake (nmol/leaf/min)	Strip test (μg/ml)
0	13.7	3.8	1.3	47	900
300	13.2	3.6	1.6	33	850
1000	17.3	4.7	2.0	134	250
3000	17.5	5.8	3.8	360	150
SE	0.4	0.3	0.3	27	150

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A Field Survey of Boron Deficiency in Peanuts Grown in the Chiang Mai Valley

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HOLLOW heart is a boron-specific disorder of peanut kernels (Cox and Reid 1964) which renders the crop especially sensitive to boron deficiency. Using the incidence of hollow heart as an indicator of boron deficiency, a survey of farmers' peanut crops in the Chiang Mai valley was conducted in the dry season 1985. Sites were widely distributed in the Chiang Mai valley and surrounding uplands, including 88 locations in seven districts. The percentage of kernels with hollow heart was determined by visual assessment and samples were rated according to severity of the disorder, as follows:

Nil — zero kernels with hollow heart;
Mild — 0.1–5.0%;
Severe — 5.1–20%;
Very severe — >20%

Hollow heart was found in peanut kernels from half the sites and rated as severe at 32% of sites surveyed (Table 1). A high incidence of hollow heart was found in Hang Dong (80%), Doi Saket (38%) and San Kamphaeng (31%), the districts where most intensive sampling took place. Upland sites had a higher incidence of hollow heart (85% of sites) than the lowland sites (40%). Kernels with hollow heart contained <13 μg/g boron.

These results, together with studies on the boron status of major soil series in northern Thailand (Hiranburana and Chawachati, these proceedings), suggest that boron deficiency may be widespread in northern Thailand. Further research should now define soil and environmental factors associated with boron deficiency in peanut and other crops and develop fertiliser practices for correction of the deficiency.

TABLE 1. Number of sites in the Chiang Mai valley at which hollow heart disorder was observed in peanut kernels from farmers' fields. (Lowland sites <350 m elevation).

	Severity of hollow heart			
	Nil	Mild	Severe	V. Severe
Lowlands	41	11	13	3
Uplands	3	5	10	2
All Sites	44	16	23	5

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