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SHORT COMMUNICATION (II)

Performance of Groundnut *(Arachis hypogea)* and Mungbean *(Vigna radiata)* on Tin Tailings in Malaysia

INTRODUCTION

Tin tailings are tracks of artificially created wasteland as a result of mining activities, and generally consist of sand and slime tailings (Maene et al. *1975). Early studies of Brickenshaw (1931) and Mitchell (1959) indicate that these tailings are completely devoid of humus, organic matter and nitrogen. Furthermore their physical and chemical properties are not normally conducive to plant growth without soil amendments. With these limitations cheaper methods of using these 'soils' for food crop production must be found. Selection of suitable crops may, therefore, be more desirable if cropping on tin tailings is to be attempted.*

PENDAHULUAN

Tanah bekas lombong mengandongai pasir dan keliat (Maene et al., *1975). Kajian-kajian awal yang diusahkan olih Brickenshaw (1931) dan Mitchell (1959) menentukan tanah itu didapati kekurangan humus, bahan organan dan niterogen. Seterusnya, sifat-sifat fisika dan kemia juga tidak mengallakan tumbohsaran tanaman tanpa tambahan bahan pembaiki tanah. Dengan keadaan seperti ini, cara cara yang mudah mistilah diusahakan sekiranya tanah bekas lombong dikehendaki untok menanam tumbohan sumber makanan.*

MATERIALS AND METHODS

A short-term experiment was carried out to determine the adaptability and performance of two contrasting grain legumes-groundnut *(Arachis hypogea)* and mungbean *(Vigna radiata)* as test crops on slime and sand tailings amended with 'standard' NPK fertilizers.

Other experimental details used are similar to those given in an earlier study (Rahman Juhari, 1977).

RESULTS AND DISCUSSION

Groundnut

The growth of groundnut as indicated by plant height and measured at six and 12 weeks after sowing is significantly ($P \leqslant 0.05$) higher in both slime and sand tailings amended with 375 kg/ha of NPK fertilizers (Table 1a). Similarly, the yield of top, root or pods harvested at these two periods is significantly affected by NPK fertilizers in both growth media (Table 1b). At six weeks' growth, NPK amended slime and sand tailings produced approximately three times more dry matter than unamended tailings. After 12 weeks' of growth, amended slime produced about four times and sand about three ($P \leqslant 0.05$) times more total dry matter than unamended tailings respectively (Table 1c). These data show that slime is a slightly better growth medium for groundnut than the sand tailings possibly because of its high clay content. Under the conditions of this experiment both tailings lack one or all of the three major nutrients required for growth, which is consistent with the findings of Brickenshaw (1931).

Mungbean

Like groundnut, the growth of mungbean is significantly affected by fertilizers at both growth periods in both growth media (Tables 1a and 2a). The yield of mungbean tops after six weeks' growth from fertilized media increased by as much as 20 and 23 times more than that derived from unfertilized slime and sand tailings respectively (Table 2b). After 12 weeks, fertilized tailings produced 28 times more mungbean tops than unfertilized plots (Table 2b), strongly indicating that essential nutrients are lacking in tin tailing media used.

The yield of root at six weeks' under fertilized slime was higher than at 12 weeks' because more than 3/4 of the yield dried up and was incorporated into the slime parts; this was not so in the case of the sand fraction (Table 2b).

TABLE 1

Effect of NPK fertilizer on the growth and yield of groundnut grown on sand and slime tailings harvested six and 12 weeks after sowing

Weeks after sowing		SLIME		SAND	
		−NPK	+NPK	−NPK	+NPK
		(a) Plant height (cm)			
	6	15.1a	20.4ab	17.0bc	22.8a
	12	24.8q	31.4p	24.9q	30.9p
		(b) Yield of plant fraction (g/plot)			
Top	6	3.7b	9.3a	3.9b	11.3a
	12	4.7f	16.1e	4.6f	14.3e
Pod	6	1.2	4.8	1.7	3.1 NS
	12	2.5q	13.9p	2.6q	9.2p
Root	6	0.9	0.5	1.0	1.4 NS
	12	1.3	1.8	1.6	1.1 NS
		(c) Total dry matter (g/pot)			
	6	5.8a	14.8a	6.6b	16.3a
	12	7.3q	31.3p	8.7q	26.4p

Note: In Tables 1, 2, and 3, means within the rows with lower case letters are not significantly different at $P \leq 0.05$ level.

TABLE 2

Effect of NPK fertilizer on the growth and yield of mungbean grown on slime and sand tailings harvested at six and 12 weeks after sowing

Weeks after sowing		SLIME		SAND	
		−NPK	+NPK	−NPK	+NPK
		(a) *Plant height (cm)*			
	6	13.8b	23.7a	13.7b	23.2a
	12	17.0q	41.2p	16.2q	40.5p
		(b) *Yield of plant fraction (g/pot)*			
Top	6	0.7b	5.4a	0.6b	4.1a
	12	0.5q	14.0p	0.5q	6.9p
Pod	6	0.0u	1.0s	0.0u	0.6t
	12	0.3y	3.8x	0.2y	5.9x
Root	6	0.2t	1.2s	0.2t	2.1r
	12	0.5q	0.8q	0.3i	2.8p
		(c) *Total dry matter (g/pot)*			
	6	1.2	7.6	1.0	6.8
	12	1.3	18.5	1.0	15.6

TABLE 3

Economic yield of groundnut and mungbean pods grown on NPK fertilized tin tailings at first (12) weeks harvest

Legume crop	SLIME		SAND	
	−NPK	+NPK	−NPK	+NPK
	(g/pot)			
Groundnut	2.5d	13.9a	2.6d	9.2b
Mungbean	0.3e	3.8cd	0.2e	5.7c

Recovery of mungbean roots in slime or any heavy clay soil is always difficult (Taylor, 1969). In this study nutrients were found to be more important for legume growth than the physical conditions of the media (Table 2c).

In groundnut the economic yield is derived from pods which are in direct contact with either medium. In mungbean, on the other hand, the economic yield is determined by pods which are not in direct contact with the growth medium. Yield of mungbean pods at six weeks' is low as the crop is still young, but at 12 weeks', fertilized sand tailings produce about one and a half times more pods than those from slime (Table 2b), suggesting that heavy soil may not be suitable for the crop under the conditions prevalent in this study. In the comparison of economic yield, it was found that fertilized slime and sand tailings produced significantly ($P \leqslant 0.05$) more groundnuts than mungbean pods (Table 3). The practice by a number of smallholders cultivating groundnut commercially on old mining lands in Kinta Valley in Perak supports this finding. The use of mungbean as an economic legume food crop on tin tailings, however, may only be considered if cheap fertilizers or manures are available (Maene *et al.*, 1977) and when the high price of the crop on the local market justifies its cultivation.

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