Boron Deficiency in Grain Legumes

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Low levels of hot water soluble boron (Hiranburana and Chawachati, these proceedings) have been found in many series of the major soils of northern Thailand. Boron deficiency has been identified in farmers' peanut crops throughout the Chiang Mai Valley (Netsangtip et al., these proceedings). However, the four major food legumes of northern Thailand — green gram, black gram, soybean and peanut — have been found to differ significantly in their response to boron deficiency.

In a soil of San Sai series (coarse-loamy, mixed, isohyperthermic, Typic Tropaqualf) in which sunflower yield was markedly reduced by boron deficiency (Rerkasem, in press) the yields of black gram and green gram were also reduced; but no yield response has been observed in soybean and peanuts (Table 1).

TABLE 1. Effects of boron application on the yield and some yield attributes of four legumes.

a. Black gram, soybean and peanuts.

Borax (kg/ha)	Grain yield (g/m^2)			% Hollow heart in peanut	Boron in peanut kernels ($\mu g/g$)
	Soybean	Peanut	Black gram		
0	166	120	78	34	13.2
10	182	138	145	0	23.3
20	149	147	130	0	25.0
40	149	116	130	0	24.4
LSD (P = 0.05)	58	58	58	—	2.2

b. Green gram.

Dry matter and yield components	Borax applied (kg/ha)		Significant difference
	0	10	
Dry matter (g/m^2)	169	311	*
Pod bearing (nodes/plant)	4.5	8.0	*
Pods/plant	7.1	13.1	*
Pod size (seeds/pod)	8.8	13.0	*

Deficiency symptoms in green gram and black gram included chlorosis of leaf margins, shortened internodes and inhibited reproductive development. Although peanut showed no yield response, without added boron a large proportion of the kernels exhibited the hollow heart, a disorder specific to boron deficiency. The incidence of hollow heart correlated very closely with boron concentration in the kernels.