BEAN IMPROVEMENT FOR LOW FERTILITY IN AFRICA (BILFA): II. LOW SOIL PHOSPHORUS AVAILABILITY

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Low soil P availability is estimated to cause annual losses of bean production in Africa of 1.0 million tons. The first cycle of the BILFA, which consisted of 280 entries, was evaluated for low P at Nakasongola and Ikulwe in Uganda at moderate stress levels, and at Mulungu, Zaire under severe stress. N and K fertilizers were applied to ensure adequacy of these nutrients. Yield under stress was the main selection criterion.

The check varieties, which are all well-adapted varieties with good yield potential in Uganda, varied in performance under low P conditions (Table 1). MCM 5001 and Carioca performed relatively well compared with the varieties selected for tolerance to low P. K20 performed poorly under low P stress. The more promising varieties for low P tolerance are BAT 25, RAO 55, XAN 76, and MMS 224. Several of the promising varieties also performed well under a complex of low N and P in Malawi. In Zaire, under conditions of extremely low P availability, and probably with some Al toxicity, performance was poor and the local check cultivar (7/4 ACC), which is tolerant of high Al conditions, gave the best yield. However, several varieties selected for tolerance to less severe levels of stress at moderate pH gave comparable yields.

A number of varieties are of special interest as they appear to have tolerance to a number of edaphic stresses including BAT 85, 433, XAN 76, RWR 382, and RWK 5.

REFERENCES

Aggarwal, V.D. Mughogho, S.K., Chirwa, R. and Mbvundula, A.D. 1994. Results of low pH complex testing in Malawi. In: *Bean Improvement for Low Fertility Soils in Africa: Proceedings of a Working Group Meeting, Kampala, Uganda, 23-26 May, 1994*. Wortmann, C.S. (Ed.). Network on Bean Research in Africa, Workshop Series No. 25, CIAT.

TABLE 1. Performance (kg ha^{-1}) under low P stress of 24 of 33 varieties selected for tolerance from a set of 280 adapted entries, plus three well-adapted check varieties.

Variety	Nakasongola 92b	Ikulwe 94a	Mulungu[1] 94a	
BAT 85	667	225	23	[3]
BAT 25	658	543	4	
443	650	340	62	[3]
RAO 55	575	447	21	[3]
XAN 76	515	670	58	
MMS 243	500	369	40	
MMS 224	492	505	62	
DOR 375	450	297	63	
AFR 544	233	701	5	
A 321	225	699	19	[3]
OBA 1	175	567	8	[3]
RWR 382	408	458	130	[3]
RWR 136	212	553	78	
Ikinimba	160	527	56	
RWR 221	242	350	3	
RWK 5	402	489	130	[3]
G 5058	158	392	69	
AFR 88	358	529	59	
RAB 445	375	368	47	
DOR 375	450	301	63	
PAD 114	325	585	51	
Black Dessie	392	426	11	
PAI 112	358	507	47	
PEF 14	417	322	122	
MCM 5001 (check)	608	343	29	[3]
K 20 (check) [2]	212	214	137	
Carioca (check)	367	629	78	
Mean of 36 entries	359	427	44	
LSD (0.05)	222	289	89	

[1] The site at Mulungu, Zaire had very low available P and possibly toxic levels of Al.

[2] The local check in the Mulungu trial was 7/4 ACC, a Zairean cultivar with tolerance to Al toxicity.

[3] These varieties were in the top 10% of 350 varieties screened at Bembeke, Malawi on a site severely deficient in N and P during the 1993-4 season (Aggarwal *et al.*, 1994).