

Response of Large Seeded Bean to Fertility Levels in Brazilian Savannah

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Eighty five large seeded bean grouped in five commercial classes were evaluated at two levels of fertilization, 500 and 1000 kg of complete fertilizers of 4 : 30 : 16, at the Santa Fé farm in Santa Helena de Goiás (17° 48' S, 50° 35' W and 502 m a.s.l.) during winter season (May – Sept. 2000) on an Oxisol with irrigation. Each group was evaluated independently in a randomized block design with four repetitions and the net plot size was 5 m². The common checks were Irai (sugar bean market class), Pérola (leading cultivar of small seeded class) and Jalo Precoce (Manteigão market class). The white bean group comprises of 27 lines were also compared to two additional checks: Ouro Branco (the only large white seeded ever released in Brazil) and Alubia (leading white seeded grain type in the Brazilian market). The Calima with 19 lines has Constanza 1 and in Sugar bean group CD 8117 as check. The Dark Red Kidney and Light Red Kidney group with 23 lines, the Cranberry - Sugarbean with 9 lines and the Yellow with 7 lines have had no specific check.

Side dressing with N was applied at 18 kg ha⁻¹ N at 21 days after germination and weekly the field was irrigated with 40 mm. Chemical control was given at physiological maturity against mites.

The adaptation of these large seeded beans in Savannah agroecosystem was as good as 1999, but the unexpected frost took place during the pod filling stage caused yield reduction up to 40%. The incidence of BGMV and angular leaf spot was low and rust affected only some lines. Powdery mildew incidence was mild. White mold incidence was very low in this winter, presumably the *Brachiaria* mulch might have given some protection to bean against white mold incidence. Fertilization increased significantly the yield of the white seeded bean, Calima and Cranberry-Sugarbean class, but not in DRK-LRK and Yellow commercial classes. Interaction of fertilization and advanced breeding lines was found only in white seeded bean and Cranberry-Sugarbean market class.

The promising lines of each group are listed in Table 1. Among the white seeded WAF 83, WAF 33, WAF 124, WAF 74 were among the highest yielder, but in term of seed quality only WAF 75 and WAF 124 can compete with the Alubia bean from Argentina that dominates the Brazilian market for large white seeded bean. In the group of the Dark and Light Red Kidney DRK 19, AFR 831, XAN 122, DRK 18 and DRK 7 were outstanding lines. In the Calima, Guali and Pompadour group DOR 850, CAL 28, AFR 197, PVAD 791 and A 193 were the outstanding lines. The outstanding lines from the Cranberry/Sugar bean group were DOR 868, SUG 31, MAM 37 and AFR 245. The best seed quality was SUG 33, but yielded lower than the other SUG lines. The MAM 37 was the only Pinto type of Durango race. The outstanding lines in the yellow seeded bean are A 195, BAN 30, SIN 15 and A 463. It is expected than BAN 30 (large seeded cream type) and SIN 15 (small yellow) can compete with the local beans cultivars that command a substantial higher price than that the small seeded bean.

These results showed that even with mild frost incidence, it was still possible to produce good quality large seeded beans (with rejection percentage of 16%) under tropical growing conditions, provided it was planted on fertile soil in the cool dry season with irrigation such at the Farm in Santa Helena de Goiás. Large seeded bean required better soil fertility than the bean of Meso-american race commonly grown in Brazil. None of these lines tested possess any disease resistant to diseases prevalent in the bean production region. Therefore specific cultural practices, especially fertilization, spacing and plant density must be elaborated. Furthermore, studies are still needed to evaluate the performance of these beans in plant density to optimize the production. Market demand for these large seeded beans will be accessed in the future.

¹ Supported by CNPq fellowship

Table 1. Yield of outstanding bean lines at Santa Helena de Goiás, GOIÁS, Brazil during winter 2000.

Identification	Low fertility ¹	High fertility ²	Identification	Low fertility ¹	High fertility ²
White large seeded			Dark and Light Red Kidney		
WAF 83	2331	2856	DRK 19	2116	2474
WAF 33	2841	2155	AFR 831	1892	2690
WAF 124	1796	2807	XAN 122	2062	2376
WAF 74	2224	2275	DRK 18	2195	2136
WAF 75	1860	2606	DRK 7	2031	2063
WAF 90	2165	2283	AFR 331	1892	2141
WAF 73	2075	2331	DOR 837	1805	2003
WAF 69	1898	1891	DOR 764	1844	2065
Checks			Checks		
Ouro Branco	2015	2542	Pérola	1860	2080
Alubia	2213	1833	Jalo Precoce	1929	1855
Pérola	2004	2777	Irai	1889	2243
Jalo Precoce	1879	2597			
Irai	2114	1856			
Exp. Mean (30)	2046	2191	Mean (26)	1835	2022
LSD 5% = 684 kg ha ⁻¹ ; CV = 14.12%			LSD 5% = 562 kg ha ⁻¹ ; CV = 18.00%		
Calima, Guali and Pompadour			Cranberry and Sugar bean		
PAD 92	2226	2315	MAM 37	2082	2202
AND 670	1963	2442	SUG 31	1749	2174
PVAD 1184	1927	2341	AFR 245	1661	1991
PVAD 791	1924	2164	SUG 21	1552	1731
AFR 197	2074	1769	DOR 868	1640	1508
A 193	1945	1880	SUG 33*	1411	1605
PVA 109	1845	1949	SUG 4	1133	1675
PVA 992	2007	1771	SUG 3	1269	1433
Check			Check		
Constanza 1	1870	2244	CD 8117	1806	1655
Pérola	2050	2507	Pérola	1307	2517
Jalo Precoce	1845	2062	Jalo Precoce	1508	1485
Irai	1907	2286	Irai	1683	1991
Exp. Mean (22)	1850	1952	Exp. Mean (12)	1557	1857
LSD 5% = 617 kg ha ⁻¹ ; CV = 20.00%			LSD 5% = 439 kg ha ⁻¹ ; CV = 15.59%		
Large yellow (Manteigão and Enxofre)					
BAN 30	1809	2042	SIN 16	1534	1810
A 195	1639	2058	SIN 17	1458	1567
SIN 15	1569	1888	A 463	1814	877
Check					
Pérola	2123	1556			
Jalo Precoce	1812	1003			
Irai	1701	1771			
Exp. Mean (10)	1881	1328			
LSD 5% = 533 kg ha ⁻¹ ; CV = 20.05%					