The performance of promising advanced breeding lines in no till farming system

H. Aidar, I. P. de Oliveira, J. Kluthcouski, M. Thung [1], M. J. Del Peloso, D.M. Soares
Embrapa Arroz e Feijão. Cx. Postal 179. 75.375-000 Santo Antônio de Goiás, Brazil

The traditional farming system in the Savannah region of Brazil the land is prepared by normally by diskplow or diskharrow. The use of chemical fertilizer and extensive plant protection is essential for the success of this cropping system. Annual crops such as soybean, bean, sorghum, maize and cotton are the most common planted in the region. Bean is the most important component of the rotation because it gives the highest return when planted under irrigation during winter period. After several years of intensive production of three crops per year, the proliferation of pest and disease increased. In some irrigated area, planting bean become a risky activity. Some traditional crops are now being routinely tested in no till farming system in order to obtain the best crop rotation sequences, in the light of phytosanitary and economy. Practicing no till farming and the use of mulch on the degraded land may recover this risky area and turn into a sustainable and profitable bean production land. It was reported that using *Brachiaria* as a cover crop reduced the incidence of soil born diseases in bean production and yield is better than in those area with traditional bean practices. Until white-mould resistant lines is available to the farmers direct planting or no till farming and using mulch is the most viable alternative.
The objective of this experiment was to evaluate the performance of 16 advanced breeding bean lines in the no till farming system at Santa Helena-GO, Brazil. Table 1 shows the commercial classes of these lines.

Table 1 – Identification and commercial classes of the cultivar/lines.

Number	Identification	Commercial class	Number	Identification	Commercial class
1	Corrente	Cream	9	CNF 7145	Black
2	CNF 7552	Pink	10	CNF 8118	Cream
3	CNF 7160	Cream	11	Valente	Black
4	Iraí	Stripped	12	Diamante Negro	Black
5	Safira	Purple / Pink	13	CNF 7564	Carioca
6	CNF 7119	Cream	14	CNF 7546	Pink
7	CNF 7624	Black	15	CNF 7603	Stripped
8	Onix	Black	16	CNF 8223	Stripped

The soil chemical characteristics of the experimental area is shown in Table 2. The bean was planted with 45 cm between row spacing and 10 plant m^{-1}. Basal application was 250 kg ha^{-1} of complete fertilizer 4-30-16 (N-P-K).
The results are presented in Table 3. The yield of advanced breeding lines varied from 2566 to 3500 kg ha^{-1}. The yields are at least 3 folds than the national average, which is around 700 kg ha ^{1} or at least 50% better that the bean yield obtained from irrigated field which is around 1600 kg ha^{-1}.

[1] Supported by CNPq fellowship

The yield of these advanced breeding lines could have been at least 50 % higher, if the frost would have not occurred during the pod filling stage. White mould incidence was insignificant due to the good soil surface cover by *Brachiaria* mulch. The outstanding lines are: Corrente (cream), CNF 7552 (pink), CNF 7160 (cream), Iraí (cranberry) and Safira (purple). These outstanding lines had normally higher number of pods per plant and slightly higher number of seeds per pod.

Table 2- Soil characteristics of the experimental site at Santa Helena de Goiás - GO. Brasil

Soil depth (cm)	pH (water)	$mmol^c\ dm^{-3}$			$mg\ kg^{-1}$					$g\ kg^{-1}$
		Ca	Mg	Al	P	K	Cu	Zn	Mn	MO
0-20	5,9	52,1	21,7	0,80	29,10	164,8	2,6	7,53	61,2	25,3

Table 3 Yield and yield components of the lines tested on fertile soil at Santa Helena-GO, Brazil.

Identification	Final plant population (plants/m)	Pods/plant	Seeds/pod	100 seeds weight (g)	Yield ($kg\ ha^{-1}$)
Corrente	14.66 c-e*	14.48 a-d	4.66 a-b	21.10 c-e	3500 a
CNF 7552	16.36 b-d	13.24 a-d	4.98 a	20.42 c-f	3119 a-b
CNF 7160	9.76 h-i	19.92 a	4.14 a-d	20.03 c-f	3053 a-b
Iraí	7.64 i-j	13.84 a-d	3.32 d	44.51 a	2989 a-b
Safira	11.46 h-g	14.36 a-d	4.28 a-d	18.32 d-f	2915 a-b
CNF 7119	12.62 ef-h	10.68 b-d	4.52 a-c	23.12 c	2815 a-b
CNF 7624	11.04 g-h	17.68 a-b	4.32 a-d	21.46 c-d	2717 a-b
Onix	13.98 c-g	12.20 a-d	4.52 a-c	17.92 e-f	2691 a-b
CNF 7145	14.12 c-f	16.40 a-c	4.14 a-d	18.55 d-f	2690 a-b
CNF 8118	24.00 a	9.44 d-c	3.42 d-c	17.91 e-f	2685 a-b
CNF 7560	18.30 b	15.72 a-c	3.80 b-d	20.09 c-f	2673 a-b
Diamante Negro	16.56 b-c	13.32 a-d	4.20 a-d	20.72 c-f	2619 a-b
CNF 7564	13.42 d-g	14.88 a-d	4.08 a-d	22.25 c	2487 b
PR 93201472	5.66 j	14.500 a-d	3.42 d-c	40.80 b	2418 b
CNF 7603	10.40 h-i	7.88 d	3.26 d	39.94 b	2294 b
CNF 7546	18.40 b	14.66 a-d	4.14 a-d	17.86 f	2266 b
CV (%)	10	25	12	6	16
LSD 5%	2.98	7.80	1.14	3.24	1009
Mean	13.65	13.88	4.11	24.00	2746

The means in the same column followed by the same letters do not differ significantly at $P \leq 0.05$.