

## BIOMASS AND SEED YIELD OF BEANS IN SODIC-SALINE SOIL

J. Alberto Escalante Estrada<sup>1</sup>, Ricardo Vega Muñoz<sup>1</sup>, Ma. Teresa Rodríguez González<sup>1</sup>, and Mario Gutiérrez Rodríguez<sup>1</sup>.

Botany Program, Natural Resources Institute. College of Postgraduates. Km 36.5 road  
México-Texcoco. C.P. 56230

E-mail: jasee@colpos.mx, rvega@colpos.mx, mate@colpos.mx, and mariog@colpos.mx

### INTRODUCTION

In Mexico the soil of arid and semi-arid regions, contain different types of salts. The soil of the dry lake bed of Texcoco, Mexico, contains high concentrations of sodium salts and they limit bean growth; in the majority of cases the production is low or absent, because highly beans are sensitive to salts (Subbarao and Johansen, 1994). Studies of beans in this region have shown that cv. Negro Precoz and Ayocote had the highest seed yield and were related to changes in the number of pods and racemes (Escalante *et al.*, 1998). The objective of this study was seek bean cultivars that show the highest biomass and seed yield and determine their relation with yield components in this region.

### MATERIALS AND METHODS

The study was conducted in Montecillo, Mexico (19°N, 98°W and 2250 m of altitude) of dry climate (Bs) during the rainy season. Three cultivars of bush bean *Phaseolus vulgaris* L., Bayomex (BA) and Criollo (CR) of indeterminate type; Canario 107 of determinate type and one cultivar of *P. coccineus* L.; Ayocote (AY) of indeterminate type, were sown on June 19, 2000 at 12.50 (40\*25 cm) plants m<sup>-2</sup> in a dry clay soil with a pH 8 to 8.7, EC of 7 to 14 dS m<sup>-1</sup> and the percentage of exchangeable sodium of 9.73 to 37.0. When the soil is moist from rain, the EC is reduced to 2 dS m<sup>-1</sup>. The Criollo and Ayocote varieties are cultivate by farmers in nonsaline regions. The experimental design was a randomized block with 4 replicates. All experiments were fertilized with 100-100-00 N,P,K. At physiological maturity (final harvest) we evaluate, total, biomass, seed yield (8% humidity) its components and harvest index (seed yield/total biomass).

## RESULTS AND DISCUSSION

The beans cultivars showed different biomass and seed yield. Bayomex gave the highest biomass ( $398.7 \text{ g m}^{-2}$ ), seed yield ( $243.3 \text{ g m}^{-2}$ ) and harvest index (0.61) and the lowest was Canario 107, with  $148.1 \text{ g m}^{-2}$ ,  $73.2 \text{ g m}^{-2}$  and 0.41, respectively. The changes in the seed yield were related with changes in its components (Table 1). The seed yield of Ayocote and Criollo ( $122.2$  and  $109.5 \text{ g m}^{-2}$ , respectively) was similar to that of summer 1997 in saline soil (Escalante *et al.*, 1998). The differences in the growth and yield of the cultivars of bean under salinity conditions suggest an alternative for increasing the seed yield of beans in this region.

Table 1. Seed yield and yield components of *Phaseolus vulgaris* L. and *P. coccineus* L., to physiological maturity. Montecillo Mex. Summer 2000. Population density  $12.5 \text{ plants m}^{-2}$  and  $100-100-00 \text{ NPK ha}^{-1}$ .

Treatments	Dry Weight 100 Seeds (g)	Number ( $\text{m}^{-2}$ ) of:				Dry weight ( $\text{g m}^{-2}$ ) of:				Biomass	Harvest index
		Normal Seeds	Pods with Normal seed	Nodes	Racemes	Pericarp	Stem	Normal seeds	Empty seeds		
Bayomex	27.3b	877.6a	211.4a	462.3a	222.5a	77.6 <sup>a</sup>	76.9	243.3a	0.92	398.7a	0.61a
Ayocote	65.6a	230.5d	107.5b	308.8b	108.4c	48.8b	115.2	122.2bc	0.89	287.1b	0.41cd
Canario	23.0c	310.8bcd	104.6b	209.7bc	100.4c	37.3bc	35.0	73.2cd	2.59	148.1cd	0.49bc
Criollo	23.7c	453.1b	139.7b	497.8a	148.3b	42.4bc	97.4	109.5bc	0.94	250.2bc	0.43cd
<b>PROB. F</b>	<b>***(5.0)</b>	<b>***(107.7)</b>	<b>***(30.2)</b>	<b>***(65.1)</b>	<b>***(18.8)</b>	<b>***(12.7)</b>	<b>***(23.4)</b>	<b>***(37.2)</b>	<b>*(0.9)</b>	<b>***(65.7)</b>	<b>***(0.06)</b>

In the column values with different letters are statistically different.  $***P \leq 0.001$ . Tukey 0.05 inside parentheses.

## LITERATURE CITED

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