However, based on field observations ten promising lines have already been distributed to farmers for evaluation.

The breeding research team of CNPAF is very optimistic about the materials that are being developed, based on the results obtained from these two tests performed in November of 1978 and July of 1979.

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SCREENING BEANS (Phaseolus vulgaris L.) FOR TOLERANCE TO ALUMINIUM AND MANGANESE

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A major problem in the use of 'cerrado' soils of Brazil is its acidity associated with high levels of aluminium or manganese or both. Beans (Phaseolus vulgaris L.) like most legumes are very sensitive to acid soils and the need to produce food is forcing Brazil to use these soils. Therefore, a program has been initiated to select cultivars tolerant to these soil conditions.

Thirty-eight bean (Phaseolus vulgaris L.) varieties were grown in nutrient solution under a factorial design of 4 replications using 4 levels of Al (0, 6, 12, 18 and 24 ppm) and 4 levels of Mn (0, 30, 60, 90 and 120 ppm). The pH was adjusted to around 4.5-5.5. After four weeks the plants were sampled, and subjected to multiple quadractic regression analysis. Using growth data it was possible to group the varieties into the three Al sensitivity levels of:

a) Tolerant - varieties whose maximum yield appeared in the presence of Al: 'jalo' (16 ppm), 'Mulatinho Paulista' (14 ppm), 'Ricobaio 1014' (14 ppm) and 'Roxo 750' (15 ppm).

b) Moderately sensitive - varieties whose minimum yield appeared in the presence of level higher than 10 ppm: 'Jamapa' (15 ppm) and 'Porrillo Sintetico' (14 ppm).

c) Sensitive - varieties whose minimum yield appeared in presence of level less than 10 ppm: 'Carioca' (6 ppm), 'Costa Rica' (4 ppm), 'Costa Rica 1031' (5 ppm), 'Cuva 168 N' (7 ppm), 'Goiano Precoce' (8 ppm), 'Rico Pardo' (7 ppm), 'Rio Tibagi' (9 ppm) and 'Tambo' (2 ppm).

By the same method it was possible to classify these varieties with respect to Mn effect:

a) Moderately sensitive - varieties showing minimum yield when the nutrient solution contained from 102 to 118 ppm Mn:

'Carioca' (109 ppm), 'CR 911' (105 ppm), 'Cuva 168 N' (102 ppm), 'Rico Pardo' (112 ppm) and 'Rio Tibagi' (118 ppm).

b) Sensitive - varieties showing minimum yield when the nutrient solution presented from 72 to 99 ppm Mn: 'Costa Rica 1031' (83 ppm), 'Goiano Precoce' (95 ppm), 'Jamapa' (90 ppm), 'Porrillo Sintetico' (72 ppm) and Rosinha' (99 ppm).

The remaining varieties could not be classified because the estimated value of Al or Mn levels which would allow either for maximum or minimum growth fell outside the experimental concentrations.

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EFFICIENCY AND SPECIFICITY OF Rhizobium phaseoli RELATED TO ITS HOSTS

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INTRODUCTION. The known specificity existing between Rhizobium and its hosts has distributed the latter into six distinct cross-inoculation groups and one non-distinct miscellaneous "cowpea" group. Fred et al (1932) defined them as "groups of plants within them the organisms are mutually interchangeable." However, it has been emphasized that even in each group there is a heterogenity of the strains to nodulate their respective hosts and so, it is important to know the degrees of "preference" that the organisms present in regard to their hosts, by observing the frequency of this association, as well as the nature of the nodulation and the efficiency of the N_2 fixation (Vincent, 1974).

Rhizobium phaseoli nodulates strictly plants of the genus Phaseolus, and more specifically Phaseolus vulgaris. Other species as P. lunatus, P. lathyroides, P. acutifolius and P. coccineus are included in this restricted group (Graham and Halliday, 1976). But it has been reported that two groups of rhizobia can nodulate Phaseolus species, one fast (R. phaseoli) and other slow (Rhizobium spp) growing bacteria (Buchanan and Gibbons, 1974).

The efficiency of this interaction has to be checked, as a high specificity restricted Rhizobium phaseoli to Phaseolus vulgaris to form a real and effective symbiosis.

The present paper describes tha abilities of four Rhizobium strains (three Rhizobium phaseoli and one Rhizobium spp) in nodulating different species of Phaseolus.

MATERIALS AND METHODS. In the previous trial, the Phaseolus species used were: P. vulgaris var. Carioca, P. lunatus, P. lathyroides and Siratro (Macroptilium atropurpureum). The strains of Rhizobium phaseoli were 127-K17, 3608 and C-84, respectively from Nitragin Co., U.S.A.; Rothamsted Exp. Sta., England and CENA, Piracicaba, Brazil; the Rhizobium spp strain was 3609 (Rothamsted Exp. Sta., England). The plants were cultivated in Leonard jars (four replicates per treatment) containing vermiculite and N-free nutrient