

to Mo fertilization. Responses were obtained after the pH was raised above 5.4. In the present work several soils were tested to study the extent of this problem. The separate effects of pH and calcium were also studied in one soil.

In early experiments, with red yellow podzolic soil, alluvial soil, and two red latosol soils from the "cerrado," good results were observed when both lime and Mo fertilizer were added together. The fourth soil, with an initial pH = 5.9, showed a good response to Mo without liming. No additional response to the Mo fertilizer was observed with liming. One latosol soil from "cerrado" with poor plant growth showed less response to the Mo fertilizer.

The addition of calcium (CaSO_4) at low pH benefited plant growth more than N_2 fixation, with or without Mo addition. Without calcium addition, both plant growth and N_2 fixation increased with increasing pH, reaching highest values above pH 5.8.

FIELD SELECTION OF STRAINS OF Rhizobium japonicum

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Every year this laboratory has to provide industry with strains of Rhizobium japonicum to be used as commercial inoculants of Glycine max, which so far have been polyvalent.

A field test of selection in Glycine max (vars. CTS-18 and Hill) included 6 strains of R. japonicum of different origins, a nitrogen treatment and a control without inoculation and nitrogen application. The determinations included: number, weight and size of the nodules, percentage of N at different stages of crop development and grain yield. The results obtained stress the need for periodic field evaluations of the potentially useful strains, as well as greenhouse studies.

POTENTIAL OF FIXATION OF N_2 AND INCORPORATION OF MINERAL-N IN SOYBEANS

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The capacity of soybean (Glycine max L. Merrill) to incorporate N_2 through symbiosis with Rhizobium in comparison to the incorporation of mineral-N was studied with greenhouse grown plants. Plants were grown in large pots (6 kg soil) on mobile benches to expose the plants to free air during the day. Assuming that the integrated nitrogenase activity gives an estimate of the amount of N_2 fixed the following conclusions can be made.

In well-nodulated plants without mineral-N, the total-N incorporated into the plants and seeds was equivalent to the value estimated by acetylene reduction (i.e. 1.44 g N/pot), but in the poorly nodulated cultivar, 70% of the N was obtained from the soil. When 75 ppm of N was applied (in 3 applications), the N_2 fixed was equivalent to two-thirds of the total N incorporated (1.5 g N/pot) and was similar to the amount incorporated by the well-nodulated cultivar. The poorly-nodulated cultivar with 75 ppm of N also incorporated 1.5 N/pot, half of it being obtained from the soil and half from the symbiosis. With 150 ppm of mineral-N the well-nodulated cultivar behaved similarly to the poorly-nodulated cultivar with 75 ppm but seems to have incorporated a little more than the mineral-N application.

Nitrogen application reduced nodulation and specific activity but had no significant effect on plant weight or N content. Mineral-N in high doses (75 and 150 ppm) resulted in a higher incorporation into the seeds and therefore increased yields. It is suggested that these results be confirmed with N^{15} and a study of the physiology of the transference of the assimilated N, from different sources, to the seeds be made.

STUDIES ON BIOLOGICAL FIXATION OF NITROGEN BY THE ASSOCIATIVE SYMBIOSIS AZOTOBACTERIACEAE-GRAMINEAE IN ARGENTINA

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(Summary not received)

INTERACTION OF NITROGEN FERTILIZER WITH NITROGEN FIXATION (C_2H_2) IN SORGHUM

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The potential for nitrogen fixation in Sorghum vulgare was estimated by the acetylene reduction method in intact soil plant systems and in excised roots. Effects of increasing levels of mineral nitrogen fertilizer (0, 30, 60 and 90 kg N/ha) were studied on excised roots of eight cultivars planted in the field with 60 kg P_2O_5 and 20 kg K_2O as basic fertilizer. Nitrogen was applied as ammonium sulphate, one-third at planting and two-thirds 60 days later. Four assays were performed during the growth cycle of the plants. Significant differences between cultivars ($p = 0.01$) were observed and the interaction of N levels with cultivars and of growth cycle with cultivars was also significant ($p = 0.05$). Plant breeding for N_2 fixation and simultaneous use of nitrogen fertilizer seems therefore possible.