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1) Rhizobium japonicum inoculation on Glycine max in Vietnam.

Reference has been made to the culture of soybeans (Glycine max [L.] Merrill) in Vietnam by Louriro (1793) and Rumphius (1747) as far back as the eighteenth century. Wild soybean (Glycine laotica) is present in Vietnam, having been collected by Harmand (1877) in the area of Hue and the Bassac River in the 19th century. Kwon (1969) speculated that since the history of Vietnam is related closely with China, there is little doubt that soybeans have been grown for many centuries in this country. However, observation and discussion by the authors have failed to reveal any significant nodulation on soybeans grown in the specific area under consideration, that is, in the N.W. area of the Vietnamese Mekong Delta approximately delimited by 105° to 106° E longitude and 9°50' to 10°50' N latitude.

Producers in the area who grow soybeans presently fertilize with urea in amounts up to 500 kg/hectare. Smith (1971) in discussing soybean production in the Philippines, states that few persons understood or had knowledge of the role played by nodulating bacteria on the roots of plants. This observation also would be applied to Vietnam. Smith further comments that the use of nitrogen fertilizer on soybeans in the Philippines should be omitted, that the advantage of growing a legume is lost if the expense of applying nitrogen is added to production costs. In countries where soybeans are grown commercially on a large scale, the benefit of inoculation with R. japonicum is known and its practice recommended. Jackson (1971) states that research to date in the United States has revealed few benefits from applying supplemental nitrogen to well-nodulated soybeans.

Jackson recommends that soybean seed be treated with molybdenum at the same time as inoculation. Molybdenum is a trace element essential in the nitrogen-fixing process. Jackson reports that, in Georgia research trials, yields have been doubled by the use of only one ounce of molybdenum salt per acre. Georgia research has suggested that much of soybeans response to lime may be largely a response to molybdenum. This trace element is less available in acid soils. Liming to neutralize soil acidity makes molybdenum more available to the soybean plant.

Materials and methods: The soybean variety 'Palmetto' (a locally common variety) was planted in a randomized complete block design with four replications. Plot size was 6 m x 5 m, with 5 m rows spaced at 50 cm and an intrarow seed spacing of 5 cm. Planting was made on January 13, and plots harvested on April 15. Seed was hand-planted to a depth of 1.5 cm and all seed treatments were carried out immediately prior to planting. All plots were band fertilized 5 cm below and to the side of the seed at a rate of 0-60-60. TSP was the source for P2O5, and KCl the source for K2O.

Treatments were as follows:

a) control
b) molybdenum seed treatment
c) molybdenum seed treatment + Rhizobium inoculation
d) Rhizobium inoculation
e) 23-0-0 (urea source)
f) molybdenum seed treatment + 23-0-0
g) molybdenum seed treatment + Rhizobium treatment + 23-0-0
h) Rhizobium inoculation + 23-0-0

Where applicable, a solution of 1 gm of Na_2MoO_4 per kilo seed was used to wet the seed immediately before planting. Also where applicable, seed was inoculated with a commercial preparation (humus base) of 'Nitragin' for soybeans, supplied by the Nitragin Company, Milwaukee, Wisconsin. Sweetened condensed milk was used as an adhesive for the inoculum on the moistened seed. Seed was planted immediately after inoculation.

The experiment was planted on recent to semi-recent alluvium with a surface reaction of pH 5.0 $\pm$ 0.2, and a very heavy clayey texture. This brown alluvium is high in calcium and magnesium, while very low in phosphorus and predicted nitrogen. The area is subjected to annual continuous flooding during September, October and November. Soybeans are not extensively grown in

the area, nor is there evidence of established Rhizobium specific for soybeans. Therefore, inoculation was able to be included as a valid variable in the experiment.

Discussion: The intent of the experiment was to determine whether the present use of nitrogen fertilization on non-nodulated soybeans as practiced by the producers in Vietnam could be substituted by proper inoculation of the seed. Molybdenum was entered as a variable to determine its value on rhizobial activity in the acidic soil regime.

The results (Table 1) indicate with a high level of statistical significance that Rhizobium inoculation when combined with a seed treatment of molybdenum can produce yields of soybean higher than those from an application of N at 23 kg/ha. It would appear that, in these acid soils, the added molybdenum is essential for proper functioning of the Rhizobium, since inoculation alone did not give significantly higher yields over the control, yet produced adequate numbers of nodules.

Table 1

Treatment	Replication[a] I	II	III	IV	Mean
a	1.01	2.22	0.62	0.95	1.20
b	1.49	1.56	1.66	0.67	1.35
c	1.81	2.50	2.00	1.09	1.85
d	2.90	4.72	2.77	3.05	3.36**
e	1.46	4.03	2.83	1.19	2.38*
f	1.86	3.51	1.68	1.30	2.09
g	3.05	3.40	4.07	3.01	3.38**
h	1.29	4.71	1.27	2.44	2.43*

[a]Yield in kg/plot.

Table 2
Analysis of variance

Source of variation	d.f.	SS	Mean SS	F
Replications	3	13.04		
Treatments	7	18.68	2.67	20.91
Error	21	9.20	0.44	

$LSD_{(.01)}$: 1.33 kg/plot

$LSD_{(.05)}$: 0.98 kg/plot

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1) Inheritance of pubescence color and reactions to three viruses in the cross York x Lee 68.

Three viruses are prevalent on soybean in the peanut producing counties of Virginia. These are peanut mottle virus (PMV), peanut stunt virus (PSV) and soybean mosaic virus (SMV). Each may cause extensive yield losses among