Journal of Tropical Agriculture 33 (1995) : 87-88

SESBANIA ROSTRATA, A PARTIAL SUBSTITUTE FOR CHEMICAL NITROGEN

Biological nitrogen fixation has the potential to meet the substantial portion of the nitrogen required by rice. *Sesbania rostrata* Biem. is a tropical, leguminous green manure, which has the capacity to produce both root nodules and stem nodules and possesses ability to grow in flooded as well as in dry condition. The average nitrogen yield of*Seslxmia rostrata* has been reported to be about 200 kg ha ' (Dommergues, 1983). Further, the plant has been reported to have the capacity to pick up *Rhizobia* even from a spray inoculant. Keeping the above facts in view a study was undertaken during the kharif season of 1992, at the Instructional Farm of the College of Agriculture, Vellayani, primarily to determine the influence of *in situ* raising and incorporation of *Sesbania rostrata* in conjunction with different rates of nitrogen, on the growth and yield of a succeeding rice crop. The influence of different methods of *Rhizobium* inoculation, on the growth and biomass productivity of *Seslxmia rostrata* in rice field was also studied.

Table 1. Yield and yield attributes of rice as influenced by different levels of nitrogen in conjunction with *Sesbania rostrata*

Treatment	Productive tillers/m^2 at harvest	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Thousand grain weight (g)
S. rostrata + no nitrogen	264	1655	4554	26.71
S. rostrata + 25% recommended close of nitrogen	333	1970	4298	26.77
S. rostrata + 50% recommended (lose of nitrogen	320	2011	4147	26.84
S. rostrata + 75% recommended dose of nitrogen	298	1863	4654	26.49
S. rostrata + 100% recommended dose of nitrogen	279	1719	4682	26.72
Control	313	2167	4111	26.80

Three levels of *Rhizobium* inoculation to *Seslxmia roslrata* (seed inoculation, stem inoculation and seed inoculation + stem inoculation), five graded levels of nitrogen to the succeeding crop of rice, raised after the incorporation of *Sesbania roslrata* (0, 25, 50, 75 and 100 per cent of recommended dose of nitrogen; the recommended dose of nitrogen is 70 kg ha^{-1}) and one control plot of rice treated as per the package of practices recommendatioas of the Kerala Agricultural University (KAU, 1989) were the treatments. The experiment was laid out in randomised block design with three replications. Seeds of *Sesbania rostrata* were sown broadcast in the individual plots (of size 5 x 4 m), at a seed rate of 30 kg ha^{-1}. Seed inoculation and stem inoculation were done as per the treatments. No fertilisers were applied to *Seslxmia roslrata.* The green manure crop was incorporated at the flowering stage, which occurred at about 45 days after sowing. The rice variety raised was Jyothi. P and K applications to rice were as per the package of practices recommendations (KAU, 1989).

The statistical analysis of the results revealed no significant effect for the different methods of *Rhizobium* inoculation, on the nodulation and biomass productivity *of Sesbania rostrata*. Hence, it was concluded that seed inoculation, which was the easiest method of inoculation, was sufficient for the satisfactory growth and nitrogen fixation of *Sesbania rostrata*. The present study also revealed that the growth and nodulation of *Sesbania rostrata* were not satisfactory under conditions of continuous submergence.

The different treatments did not show significant influence on the yield and yield attributes of rice. Further, the treatments did not differ significantly from the control. But when the trend of results was observed, it could be seen that the application of 50 per cent of the recommended dose of nitrogen along with the incorporation of *Sesbania rostrata* gave the highest yield. The lack of significant response to the applied nitrogen might have been due to the medium status of available nitrogen in the soil of the experimental site. Similar result has been reported by Dommergues (1983) who observed that using *Sesbania rostrata* as green manure could substantially increase rice yields only in nitrogen deficient paddy soils. The application of higher levels of nitrogen (above 50% of recommended dose of nitrogen) was found to depress grain yield. The extra nitrogen might have been utilised for straw production rather than for grain production. The economic optimum dose of nitrogen (in conjunction with incorporation *of Sesbania rostrata)* worked out to be 34.796 kg ha^{-1}. This showed that about half of the dose of chemical nitrogen recommended to rice could be substituted by *Sesbania rostrata.* The trend of results obtained in this study showed that considerable scope of economising nitrogen by the substitution of chemical nitrogen applied to rice with organic sources like *Sesbania rostrata* could be expected.

College of Agriculture
Vellayani 695 522, Trivandrum, India

P. Shalini Pillai
V. Muraleedharan Nair

REFERENCES

Dommergues, Y. 1983. Stem nodulated legumes and nitrogen fixing trees. *Advances in Nitrogen Fixation Research* (ed. Veeger, O. and Newton, N.E.). Proceedings of the 5th International Symposium on Nitrogen Fixation, Noosdurjkerhout, Netherlands, p. 321

KAU, 1989. *Package of Practices* ***Recommendations.*** Directorate of Extension, Kerala Agricultural University, Trichur, p. 1-40