

## RESPONSE OF EFFECTIVE RHIZOBIAL STRAINS AND THEIR COMBINATION ON SYMBIOTIC TRAITS AND YIELD OF SOYBEAN UNDER RAINFED CONDITIONS OF M.P. (INDIA)

R. C. Jain

R. A. K. College of Agriculture, Sehore (India)

(Received: November 14, 2005; Accepted: December 18, 2005)

### ABSTRACT

Field experiment were conducted for three consecutive years in the Kharif season of 1998-99, 1999-2000 and 2000-2001 at Research Farm of R.A.K. College of Agriculture, Sehore (M.P.). The findings revealed that the combined inoculation of Pantnagar 2 + Delhi 2 + Bj-1 rhizobial strains yielded the significant highest symbiotic traits viz. nodule number, their dry weight and shoot dry weight/ plant alongwith seed index (100 seed weight) and seed yield of Soybean over uninoculated control. The dual inoculation of Pantnagar 2 + Bj-1 rhizobial strains produced the significant symbiotic traits alongwith seed index and seed yield except the nodule dry weight/plant. Amongst the alone strains, Delhi -2 strain, produced the significant highest nodule dry weight, seed index and seed yield while the significant higher nodule number and shoot dry weight have fetched through the incorporation of Bj-1 rhizobial strain alone over control in clay loam soil.

**Key words:** Rhizobial strain, Symbiotic traits, Soybean.

With the growing concern over food security and sustained agriculture all over the world, the need of ecofriendly effective rhizobial strains as bioinoculants for food production has now become imperative. Therefore, need of an evergreen revolution rooted in the principles of ecology, economics, equity and employment to achieve sustainable food security. The use of rhizobial strains has been found as the best option in view of effective ecotechnology for the achievement of desired revolution. Further, it has also been noticed that the inclusion of the effective rhizobial strains are beneficial and cost effective for sustainable production of Soybean under rain fed conditions (Dubey and Tomar, 1999). Therefore, the present study was laid out in clay loam soil.

Field experiments were conducted in randomized block design with three replications during 1998, 1999 and 2000 at Research Form of R.A.K. College of Agriculture, Sehore (India) with Soybean variety JS-335. The basal application of recommended nitrogen and phosphorous (@ 20 &

60 kg/ha respectively) through DAP and potash @ 20 kg/ha through muriate of potash uniformly applied to all the plots to meet out the initial requirement of growing plants. In all there were 08 (eight) treatments signly or in combinations of different rhizobial strains.

The soil in the experimental site was low in available nitrogen (190 kg/ha), low in phosphorous (10.25 kg/ha), high in available potassium (392 kg/ha) and low in organic carbon (3.12 g/kg). The electrical conductivity was normal 0.32 ds/m and pH was neutral (7.5).

The different effective rhizobial strains (Table -1) were applied through seed treatment @ 5 gms/kg seed just before sowing of the soybean seeds as per treatments during Kharif season of all the three years. Observations on different parameters were recorded at 50% flowering stage and physiological maturity stage of crop.

Results acquired on nodule number,

**Table - 1: Response of effective rhizobial strains and their combinations for locally recommended soybean variety grown under rainfed conditions (Average of 3 years, 1998 - 2000)**

S. No.	Treatment	At 50% flowering stages			100 seed seed yield	
		NN/Plant	NDW/Plant (mg)	SDW/Plant (g)	wt. (g)	(kg/ha)
1.	Pantnagar 2	55	175.53	3.67	8.94	1271.00
2.	Delhi 2	41.50	190.50	3.57	9.42	1653.50
3.	Bj 1	56.40	173.52	5.08	9.09	1648.50
4.	Pantnagar 2 + Delhi 2	52.50	179.25	4.72	9.14	1625.00
5.	Pantnagar 2 + Bj 1	59.30	175.60	4.91	9.35	1648.00
6.	Delhi 2 + Bj 1	53.50	181.00	4.79	9.20	1669.00
7.	Pantnagar 2 + Delhi 2 + Bj 1	63.90	198.20	5.27	9.40	1672.00
8.	Uninoculated control	37.75	114.85	3.39	8.82	1088.00
	S. Em. $\pm$	3.58	4.36	0.24	0.11	30.05
	CD at 5%	11.91	13.08	0.63	0.36	89.09

nodule dry weight and shoot dry weight at 50% flowering stage showed that combined inoculation of Pantnagar 2 + Delhi 2 + Bj-1 rhizobial strains observed to be the highest in significantly boosting the symbiotic traits over that of uninoculated control and Delhi -2 strain. While, this combined inoculation of three strains was noticed statistically at par with their single or dual inoculation which showed the synergistic effect of these three in sustainability of the symbiotic traits for better biological nitrogen fixation by soybean plants which inturn raised the nitrogen availability in the soil for succeeding crops. However, these findings are in close conformity with those of Dubey and Tomar (1999).

Seed index and seed yield enhanced significantly with the incorporation of mixed inoculation of these three rhizobial strains over that of Pantnagar -2 alone and uninoculated control showing their compatibility with each other and synergism in proving the conductiveness for

sustainability of Soybean productivity in clay loam soil of M.P. The similar results have also been reported by Dubey and Tomar (1999) and Annapurna (2001).

### Conclusion

The mixed inoculation of Pantnagar -2 + Delhi 2 + Bj-1 has been established effective and conducive to maintained the sustainability in symbiotic traits and soybean productivity in clay loam soil of Madhya Pradesh over that of uninoculated control and their alone or dual inoculation under rainfed conditions.

### ACKNOWLEDGEMENTS

Author is grateful to the higher authorities of J.N. Krishi Viswa Vidyalaya, Jabalpur (M.P.) and Dr. S.K. Dubey, (Soil Sciences) for required cooperation in successful conduction of the studies.

### REFERENCES

1. Annapurna, K. Field evaluation of commercial available rhizobial inoculants for Soybean under rainfed conditions. *Soybean Research (Microbiology)* AICRP on Soybean, I.A.R.I., New Delhi. 1-5 (2001)
2. Dubey, S.K. and Tomar, V.S. Comparative effectiveness of different species and strains of rhizobia in Soybean (*Glycine max*) grown on swell-shrink soil. Proc. World Soybean Res. Conf., VI, Chicago (USA), 5a96 (1999)