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Madras Agric. J., 94 (1-6) : 124-126 January-June 2007

<https://doi.org/10.29321/MAJ.10.100647>

Research Notes

Influence of *Rhizobium* strains on nodulation and grain yield in chickpea (*Cicer arietinum* L.)

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Chickpea (*Cicer arietinum* L.) is an important pulse crop of Maharashtra state and occupied an area of 7.56 lakh ha (2001-2002) with an annual production of 4.51 lakh tones with an average productivity of 596 kg/ha (Anonymous, 2002). Studies under All India Co-ordinated Pulses Improvement Project (AICPIP) in different parts of the country has shown that seed inoculation with efficient strain of *Rhizobium* increases the grain yield of legumes (Rewari, 1985). Effectiveness of the symbiotic nitrogen fixation depends upon the proper establishment of inter-relationship between a particular legume and a specific strain of *Rhizobium* (Dart *et al.*, 1976). Variability among *Rhizobium* strains of the same species exists for biological nitrogen fixation (Khurana and Dudeja, 1981). Choice of the strain is very critical task for the success of bio-inoculant. Therefore, efficiency

of *Rhizobium* strains received from AICPIP, Kanpur was evaluated at Mahatma Phule Krishi Vidyapeeth, Rahuri (India) during *Rabi* 2000-'01 and 2001-'02.

A field trial with Randomized Block Design replicated thrice was laid out in medium black soil. The treatments consisted 22 *Rhizobium* strains, one un-inoculated control and two treatments consistent of 20 and 40 kg N/ha respectively without *Rhizobium* inoculation. The seeds of chickpea cultivar Vishal were inoculated with carrier based rhizobial inoculant @ 250 g /10 kg seed and sown at 30x10 cm spacing in the plots (4 x 1.8 m net plot size). Basal dose of 40 kg P₂O₅/ha was applied at the time of sowing uniformly. The vigour of the plants was maintained throughout the season by adopting proper agronomic management and plant protection

Table 1. Effect of seed inoculation with *Rhizobium* strains on nodulation, nodule dry weight and grain yield of chickpea cv. Vishal.

<i>Rhizobium</i> strains	Source	No. of Nodules/ Plant	Nodule dry weight (g)	Dry weight of 5 plants (g)	Grain yield (q/ha)	% increase over control
RG-3	Dholi	68.00	1.48	23.37	21.66	15.58
RG-48	Dholi	70.33	1.67	23.94	21.94	17.07
JGRS-92	Sehore	51.80	1.33	21.93	20.97	11.90
JGRS-80	Sehore	31.67	0.60	16.20	19.02	01.49
JGR-88	Sehore	32.10	0.64	16.53	19.16	02.24
G-33-97	IARI	60.47	1.35	23.20	21.25	13.39
H-65	Sheore	32.93	0.65	17.03	19.16	02.24
G-20-98	IARI	73.00	1.83	27.28	22.36	19.31
G-567-SMR	Varanasi	78.33	1.88	29.06	23.47	25.24
GHUR-15	Varanasi	70.53	1.68	23.99	22.08	17.82
GHUR-25	Varanasi	71.67	1.70	24.67	22.22	18.56
CH-1232	Hisar	63.27	1.45	23.10	21.38	14.08
CH-1233	Hisar	58.67	1.33	22.44	21.11	12.64
CH-458	Hisar	47.16	1.15	21.48	20.13	07.41
CH-91-16	Hisar	48.00	1.25	21.60	20.41	08.91
UASB-835	Banglore	50.33	1.25	21.76	20.87	11.36
T-4	Banglore	70.00	1.50	23.85	21.80	16.32
GD	Durgapura	45.03	1.09	20.60	19.58	04.48
SGN-95-1	Durgapura	31.00	0.55	16.09	19.02	01.49
GR-8	Gulberga	37.23	0.71	18.30	19.44	03.73
BCR-72	Badanapur	35.90	0.70	17.68	19.16	02.24
MPKV, Pune	Pune	71.33	1.80	25.00	22.22	18.56
20 Kg N/ha	—	46.26	1.11	21.16	19.86	05.97
40 Kg N/ha	—	63.47	1.47	23.53	21.52	14.83
Un-inoculated control	—	27.33	0.49	15.60	18.74	~
	SE±	5.64	0.05	0.28	0.54	--
	CD at 5%	16.04	0.15	0.79	1.55	--

measures. The observations regarding no. of nodules/ plant and dry weight of 5 plants (g) were recorded at 45 DAS. After harvesting grain yields were recorded and the data were subjected to statistical analysis.

The *Rhizobium* strains significantly influenced nodules number, nodule dry weight and grain yield (Table 1). The seed inoculation of chickpea with G-567-SMR *Rhizobium* strain recorded the maximum no. of nodules (78.33/ plant), dry weight of plant (29.06 gm/ 5 plants) and grain yield (23.47 q/ha). The grain yield increased 25 per cent due to seed treatment with G-567-SMR strain over un-inoculated control. This was followed by IARI *Rhizobium* strain G-20-98, MPKV, Pune and Varanasi *Rhizobium* strain GHUR-25 with 19.31, 18.56 and 18.56 per cent increase in grain yield over un-inoculated control respectively. The grain yield obtained due to seed inoculation with various *Rhizobium* strains were more or less equal and were at par with each other.

From the above results it was noticed that seed inoculation of chickpea with *Rhizobium* strain G-567-SMR / G-20-98 / MPKV Pune /

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GHUR-25 was best location specific technology to increase number of nodules and grain yield in chickpea.

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