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Effect of Composite Cultures of *Rhizobium* on two Pulse Crops

By

G. OBLISAMI[1], K. BALARAMAN[2] and T. NATARAJAN[3]

ABSTRACT

The composite culture of *Rhizobium* inoculant consisting of the strains from blackgram, greengram and groundnut performed better over the single strains in greengram recording the maximum grain yield whereas it was not consistent in blackgram.

INTRODUCTION

It is well known that efficient strains of *Rhizobium* increase the yields of various leguminous crops (Rangaswami and Oblisami 1962; Ramaswami and Nair, 1965; Sundara Rao, 1971). Inoculations of multistrains of rhizobia performed better with crops like soybean, and French-bean over the single strain inoculations (Bhargava *et al.*, 1975; Das and Bhaduri, 1975). It is believed that composite culture of rhizobial inoculants might be beneficial to different leguminous crops under agro-climatic conditions; atleast one of the varied strains in the inoculant could cause effective nodulation on various pulses crops (Rangaswami, 1975). The performance of composite cultures of *Rhizobium* from the legumes belonging to cowpea micellany on two pulse crops is reported in this paper.

MATERIALS AND METHODS

Efficient strains of *Rhizobium* from blackgram (Pm 1), greengram (Pa 1) and groundnut (Ah 6) belonging to the cowpea miscellany were employed for the preparation of composite culture inoculant. The performance of the composite culture was tested and compared to that of the individual strains as well as the combination of two strains each on nodulation, dry matter production and yield of grains in a field trial with Co. 2 greengram (*Phaseolus aureus* Roxb.) and Co. 3 black gram (*Phaseolus mungo* L.). The uninoculated seeds served as control. The field trial which was randomized and replicated, was conducted at the Millets and Pulses Breeding Station, Coimbatore, under upland conditions.

RESULTS AND DISCUSSION

The results on the effect of composite culture of rhizobia on Co. 2 greengram are presented in Table I. The composite culture gave the maximum grain yield and combinations of the rhizobial strains gave higher yield than that of individual strain bringing out the compatible nature of the strains in increasing the production of grains in greengram. When compared to the uninoculated control, the composite cultures gave the maximum in-

1-3 : Department of Biology, Tamil Nadu Agricultural University, Coimbatore-641003.

TABLE I. Effect of composite cultures of rhizobium on plant parameters and grain yield of Co. 2 greengram

Treatment	Nodule number/plant			Plant height (cm)			Dry weight/plant (g)			Grain Yield (Kg/ha)
	20th day	40th day	60th day	20th day	40th day	60th day	20th day	40th day	60th day	
Control	2	3	2	17.4	28.9	33.8	0.23	15.3	31.0	412
Rhizobium sp (Pm_1)	7	8	9	23.0	33.8	42.8	0.66	22.7	51.0	435
Rhizobium sp (Pa_1)	7	11	17	24.2	34.5	41.2	0.47	23.3	52.0	414
Rhizobium sp (Ah_6)	7	9	11	22.7	32.6	36.6	0.52	17.7	46.0	467
Pm_1+Pa_1	8	9	10	23.7	36.6	41.2	0.30	21.0	46.0	477
Pm_1+Ah_6	6	8	9	22.4	33.4	36.9	0.69	18.0	59.0	503
Pa_1+Ah_6	5	9	12	23.1	35.8	39.5	0.54	20.0	55.0	494
$Pm_1+Pa_1+Ah_6$	6	9	13	23.4	33.6	38.8	0.69	24.7	45.0	547

crease (32.8 per cent) in the grain yield. Not much significant variations occurred in the number of nodules and plant height at periodical intervals. Maximum dry matter production was recorded in the treatment with composite culture.

The results on the effect of composite culture of rhizobia on blackgram are presented in Table II. Compared to uninoculated control all the treatments (either with individual strains or combination of strains) gave better nodulation, plant height, dry matter and grain yield which varied from 28.6 to 139.4 per cent. Among the rhizobial strains not much variations in the nodule number, plant height and dry matter production were observed. Considering the grain yield, maximum grain yield was recorded in the treat-

TABLE II. Effect of composite cultures of rhizobium on plant parameters and grain yield of Co. 3 Blackgram

Treatment	Nodule number/plant			Plant height (cm)			Dry weight/plant (g)			Grain Yield (kg/ha)
	20th day	40th day	60th day	20th day	40th day	60th day	20th day	40th day	60th day	
Control	4	4	4	19.7	53.0	61.8	0.20	15.5	39.7	213
Rhizobium sp (Pm_1)	6	9	11	22.7	58.7	72.8	0.93	17.4	46.7	274
Rhizobium sp (Pa_1)	9	14	16	26.1	56.5	68.9	0.37	17.3	80.2	391
Rhizobium sp (Ah_6)	7	8	11	23.2	61.5	66.9	0.83	16.3	71.5	510
Pm_1+Pa_1	8	8	9	24.8	62.3	68.8	0.67	18.5	53.5	291
Pm_1+Ah_6	5	9	10	23.5	61.3	68.3	0.73	15.8	58.1	424
Pa_1+Ah_6	7	6	12	26.7	58.8	67.5	0.70	17.2	66.6	503
$Pm_1+Pa_1+Ah_6$	8	9	12	24.3	61.9	64.5	0.67	25.4	60.5	285

ment with individual strain from groundnut rather than the host strain. Groundnut strain in combination with any one of the other strains gave higher yield whereas the composite culture gave the lesser yield.

The present study indicated that certain of the closely related crops might respond favourably to the composite cultures whereas certain other crops might respond to single strains. However, detailed studies are needed to understand the performance of the composite cultures under varied agroclimatic conditions.

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