

## HOST VARIETAL SPECIFICITY OF RHIZOBIUM FOR NODULATION IN GROUNDNUT

Symbiotic N fixation is known to be influenced by the genetic variation of the macro and micro-symbionts. Several workers have reported the occurrence of such variation in crops like soybean, chickpea and groundnut (Muthuswamy, 1970; Balasundaram, 1971; Singh *et al.* 1976 and Caldwell and Vest, 1979). In the present investigation a pot culture experiment was conducted in order to study the response of seven different varieties of groundnut (*Arachis hypogaea* L.) to inoculation with homologous as well as heterologous isolates of rhizobia.

Seven groundnut varieties TMV 11, TMV 12, AK-12-24, Exotic 6, Spanish peanut and USA 123 and their homologous rhizobium isolates R<sub>1</sub> to R<sub>7</sub> respectively were used for the study. An isolate of *Rhizobium* obtained from a variety other than its homologous host variety was considered as heterologous for the purpose of this investigation.

The pot culture experiment was conducted under aseptic conditions in pots of 25 x 30 cm size. These were filled with a potting mixture of sand, garden soil and cowdung (1:1:2) at the rate of 10 kg per pot and sterilized by autoclaving at 121°C for 2 hours. The *Rhizobium* isolate from each variety was used for inoculating surface sterilized seeds of both homologous and heterologous host varieties. Uninoculated plants belonging to each variety served as the control. P and K fertilisers were applied uniformly prior to sowing at the rate of 50 kg P<sub>2</sub>O<sub>5</sub> and 40 kg K<sub>2</sub>O per hectare. The plants were irrigated regularly with sterilized tap water.

Data on nodule number, plant dry weight and percentage nitrogen content recorded on the 60th day of plant growth are presented in Tables 1, 2 and 3.

In general, a favourable response for different plant characters studied was obtained when an isolate of *Rhizobium* was used for inoculating its own homologous host variety. Thus, the isolates R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> and R<sub>7</sub> produced maximum number of nodules in their respective host varieties. These were 81.42, 128.03, 89.76, 79.50, 53.47 and 76.77 respectively (Table 1). However, a similar response for plant dry weight and percentage N content was obtained only with isolates R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> and R<sub>2</sub>, R<sub>4</sub> and R<sub>5</sub> (Tables 2 and 3). The positive effect of homologous association between some of the *Rhizobium* isolates and their host varieties studied during the investigation indicate an apparent host varietal specificity. Similar results were reported earlier by other workers (Muthuswamy, 1970; Sheth, 1979 and Wynne *et al.*, 1980). This is further supported by the fact that in certain other cases, the association of some of these isolates with their heterologous host varieties resulted in significant reduction in the number of nodules formed, plant dry weight and percentage nitrogen content (c. f. Table 1, 2, 3). Thus the isolate R<sub>1</sub> produced a

significant reduction in nodule number in all the host varieties other than in USA-123. The dry weight of plants due to inoculation with  $R_1$  in spanish peanut and isolates  $R_2$  and  $R_3$  in AK-12-24, was significantly low when compared to their respective host varieties. The percentage nitrogen content of plants due to heterologous inoculation was also significantly low with isolate  $R_1$  in varieties such as AK-12-24 and Ah-32 and with isolate  $R_4$  in variety, TMV-11.

Table 1

Nodule number as influenced by rhizobium isolates and groundnut varieties  
(mean of three replications)

Rhizobium isolate	TMV 12	USA 123	Exotic 6	Spanish peanut	TMV 11	AK 12-24	Ah32
$R_1$	81.42	54.40	48.00	60.67	58.50	44.26	54.17
$R_2$	92.67	128.03	99.43	80.33	88.43	53.97	71.33
$R_3$	85.77	79.56	89.76	69.67	87.40	46.00	64.10
$R_4$	59.70	79.50	59.87	79.50	59.70	30.00	36.86
$R_5$	61.55	65.77	47.17	59.07	61.55	46.87	54.67
$R_6$	30.00	47.00	37.97	46.20	31.00	53.47	35.10
$R_7$	61.58	68.93	68.93	68.20	2.83	35.40	76.77
Control	2.00	1.00	2.33	2.33	2.33	2.00	1.00

CD (0.05) for comparison of variety x rhizobium interaction 12.51

Table 2

Plant dry weight (g) as influenced by rhizobium isolate and groundnut varieties  
(mean of three replications)

Rhizobium isolate	Groundnut variety							Mean
	TMV 12	USA 123	Exotic 6	Spanish peanut	TMV 11	AK 12-24	Ah 32	
$R_1$	1.49	1.40	1.44	1.03	1.56	1.15	1.27	1.32
$R_2$	1.66	2.05	1.91	1.60	1.55	1.14	1.52	1.81
$R_3$	1.59	1.96	1.99	1.45	1.44	1.15	1.38	1.66
$R_4$	1.02	1.84	1.43	1.78	1.38	0.98	1.35	1.58
$R_5$	1.40	1.46	1.52	1.25	1.30	1.26	1.40	1.43
$R_6$	0.86	1.20	0.94	1.00	0.95	1.16	0.77	0.95
$R_7$	1.30	1.76	1.46	1.45	1.41	1.09	1.75	1.43
Control	0.63	0.42	0.40	0	0.55	0.27	0.36	0.42

CD (0.05) for comparison of variety x rhizobium interaction 0.42

Certain exceptions to the above apparent host-variety specificity were also seen during this investigation. The isolate R<sub>5</sub> produced maximum benefit due to inoculation in host varieties other than its homologous host variety, TMV 11. It produced maximum number of nodules in the variety USA 123, higher dry weight and percentage N content of plants in varieties such as USA 123, Exotic 6 and Ah-32 (Table 1,2,3). Such variations in symbiotic specificity of *Rhizobium* isolated from groundnut is reported earlier (Singh *et al.*, 1976). It appears that the benefits resulting from legume *Rhizobium* symbiosis is more of a host determined phenomenon (Vance, 1983).

Table 3  
Percentage nitrogen content influenced by rhizobium isolates and groundnut varieties (mean of three replications)

Rhizobium isolate	Groundnut variety							Mean
	TMV 12	USA 123	Exotic 6	Spanish peanut	TMV 11	AK12-24	Ah 32	
R <sub>1</sub>	3.15	3.70	3.16	2.81	3.05	2.54	2.75	2.99
R <sub>2</sub>	3.26	4.13	3.99	3.44	3.72	2.93	3.08	3.51
R <sub>3</sub>	3.14	3.78	3.57	2.90	2.90	2.49	2.95	3.10
R <sub>4</sub>	3.00	3.14	3.00	3.44	2.90	2.55	2.81	2.91
R <sub>5</sub>	2.76	3.44	3.18	2.39	3.08	2.38	3.05	2.89
R <sub>6</sub>	2.39	2.21	2.36	2.11	2.25	2.72	2.30	2.43
R <sub>7</sub>	3.05	3.23	3.10	3.40	2.86	2.37	3.02	3.01
Control	1.42	1.48	1.25	1.48	1.34	1.46	1.54	1.43

CD (0.05) for comparison of variety x rhizobium interaction 0.39

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