Madras Agric. J. 77 (7 & 8): 285-290 July-August 1990
https://doi.org/10.29321/MAJ.10.A01952

EFFECT OF SEED DRESSING CHEMICALS ON THE SURVIVAL OF RHIZOBIUM SP. AND GROWTH, NODULATION AND GRAIN YIELD OF GREENGRAM AND BLACKGRAM

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ABSTRACT

When the seed dressing chemicals are used at the recommended levels on seeds of greengram and blackgram, they reduce the rhizobial population on the seed surface. However seeds treated with carbendazim and monocrotophos at the recommended levels have not only reduce seed borne pathogens and harbouring pest but also significantly enhanced the plant growth, population and grain yield of greengram and blackgram over the other chemicals and an untreated control.

KEY WORDS: SEED DRESSING, GREENGRAM, BLACKGRAM, RHIZOBIUM, SURVIVAL, GROWTH, YIELD.

The establishment and colonization of Rhizobium near the spermosphere and rhizosphere of legumes is of greater significance . Sometime, the seed protectants have not only eliminate the pests and disease incidence but also found to enhance the plant growth,population and efficiency of legume Rhizobium symbiosis. The influence of various plant protection chemicals on legume rhizobium symbiosis, plant growth and yield attributes of legumes have been studied by several workers (Prasad and Ramani, 1976; Graham *et al*., 1980, Rennie and Dubetz, 1984).The effect of certain seed dressing fungicides and insecticides on the survival of rhizobia and their effect on plant growth, population and grain yield in greengram and blackgram inoculated with *rhizobium* sp.are reported in the present investigation.

MATERIALS AND METHODS

A pot culture and a laboratory experiments were conducted during Kharif 1987-88 season with greengram (PS-16) and blackgram (T-9). The following seed dressing chemicals were in the present investigation: Carbendazim (bavistin) at 2 g/kg of seed, carbosulfan (Marshal), Chloripyriphos (Corobon), Phosphomidon (Dimercon), Metasystox, Dimethoate (Rogor) and Monocrotophos (Nuvacron) each at 5ml/kg of seed were applied after which *Rhizobium* sp. (Strains GMBS-1 for greengram and BMBS P47 for blackgram) were treated as peat based inoculant. The initial cell load of 108 cells/g of peat and after seed treatments and rhizobial seed bacterization on 24 hours interval, the survival of rhizobial cells on the surface of greengram and blackgram seeds were assessed in Waksman 79 medium by following the standard serial dilution plate technique. From the observations per cent of reduction due to the impact of seed dressing chemicals was worked out. The treated seeds were then immediately sown in the pots and each treat-

Table 1. Effect of seed dressing chemicals on the survival of **Rhizobium** on seed surface of greengram (PS-16) and Blackgram (T-9)

Treatments	Dosage	Greengram Rhizobial population (10^4/g of seed)	% of reduction	Blackgram Rhizobial population (10^4/g of seed)	% of reduction
Carbendazim (50% WP)	2 g/kg of seed	395	67.33	790	95.73
Carbosulfon 35%	5 ml/kg	30	97.16	90	99.46
Chloripyriphos 20% Ec	5 ml/kg	25	97.64	140	99.15
Phosphomidon 80%Wsc	5 ml/kg	60	94.10	5	99.96
Metasystox 20% Ec	5 ml/kg	30	97.16	25	99.84
Monocrotophos 36% SL	5 ml/kg	270	74.50	190	98.88
Dimethoate 30% Wc	5 ml/kg	10	99.00	20	99.87
Rhizobium only	5 ml/kg	(10.6×10^6)	-	(16.5×10^6)	-
Untreated control	-	-	-	-	-

Table 2. Effect of seed dressing chemicals on the growth, noduletion in greengram (PS-16) inoculated with **Rhizobium** at 30 and 45 DAS

Treatments	Plant dry weight (g/pl)		Nodule number (no/pl)		Nodule dry weight (mg/pl)	
DAS :	30	45	30	45	30	45
Carbendazim	2.580	4.380	30	26	121	79
Carbosulfon	2.420	3.610	22	23	89	65
Chloripyriphos	2.270	3.340	18	19	73	55
Phosphomidon	2.280	3.510	20	18	83	51
Metasystox	2.230	3.260	17	15	69	44
Monocrotophos	2.670	4.120	18	36	130	121
Dimethoate	2.630	3.410	19	19	78	55
Rhizobium only	2.750	4.720	49	52	161	170
Untreated control	1.920	2.980	15	13	63	41
CD	0.231	N.S	6.1	3.9	24.5	15.2

Table 3. Effect of seed dressing chemicals on the growth, nodulation in blackgram (T-9) inoculated with Rhizobium at 30 and 45 DAS.

Treatments	Plant dry weight (g/pl)		Nodule numbers (No/pl)		Nodule dry weight (mg/pl)	
DAS :	30	45	30	45	30	45
Carbendazim	2.305	4.260	43	24	131	83
Carbosulfon	2.150	3.810	32	18	98	59
Chloripyriphos	2.215	3.520	29	14	84	39
Phosphomidon	2.300	3.610	40	13	118	30
Metasystox	2.260	3.250	35	20	110	58
Monocrotophos	2.690	4.100	52	32	171	105
Dimethoate	2.580	3.380	37	20	118	61
Rhizobium only	2.890	4.860	72	68	225	183
Untreated control	1.601	3.060	28	13	75	31
CD	0.287	N.S	10.9	4.72	13.3	15.1

Table 4. Effect of seed dressing chemicals on the grain yield greengram and blackgram.

Treatments	Greengram Seed Yield (g/pl)	Percent increase over control	Blackgram Seed Yield (g/pl)	Percent increase over control
Carbendazim	4.61	41.4	3.89	32.3
Carbosulfon	3.82	17.2	3.11	7.9
Chloripyriphos	3.66	12.3	3.30	14.6
Phosphomidon	3.72	14.1	3.56	23.6
Metasystox	3.61	10.7	3.15	9.4
Monocrotophos	4.12	26.4	4.11	42.7
Dimethoate	3.44	5.5	3.18	10.4
Rhizobium only	4.82	47.8	4.67	62.1
Untreated control	3.06	-	2.88	-
CD	N.S		0.71	

Table 5. Correlation and regression equation

Independent variable	Dependent variables	Coefficient of correlation 'r'	Coefficient of regression 'b'
GREENGRAM (PS-16)			
Nodule weight	Nodule number (30 DAS)	0.989**	2.877
Plant dry weight	"	0.749*	0.018
Seed Yield	"	0.873**	0.046
Nodule weight	Nodule number (45 DAS)	0.996**	3.477
Plant dry weight	"	0.865**	0.042
Seed Yield	"	0.743*	0.036
BLACKGRAM (T-9)			
Nodule number	Nodule number (30 DAS)	0.891**	2.161
Plant dry weight	"	0.791*	0.049
Seed Yield	"	0.869**	0.067
Nodule dry weight	Nodule number (45 DAS)	0.883**	3.074
Plant dry weight	"	0.816**	0.061
Seed Yield	"	0.952**	0.035

* Significance at 5%
** Significance at 1%

ment was replicated four times. For assessing the effect of seed dressing chemicals on plant growth (g/pl), population and nodule dry weight (mg/pl) were recorded at 30 and 45 DAS (Days After Sowing). At harvest, grain yield was recorded. Correlation and regression equations were out.

RESULTS AND DISCUSSION

The result on the effect of seed dressing chemicals on the survival of rhizobia is given in Table 1. The results have clearly indicated that all the seed dressing chemicals treated have drastically reduced the rhizobial population on the surface of legume seeds which was ranging from 67.33 to 99% in greengram and 99.96% in blackgram respectively. However, the treatments with carbendazim and monocrotophos have comparatively recorded less reduction in rhizobial population ((67.33 and 95.73 and 74.5 and 98.8% in greengram and blackgram respectively) than other chemicals.

The results on the effect of seed dressing chemicals on the plant growth, population and nodule dry weight of greengram and blackgram at 30 and 45 DAS are presented in Tables 3 and 4. The rhizobial inoculation with various seed dressing chemicals has significantly enhanced plant growth, nodulation and nodule dry weight over untreated control. Although the seed dressing chemicals have reduced the rhizobial population to a considerable level they have significantly increased the above said biometric observations at 30 and 45 DAS. Among the chemicals tested, carbendazim and Monocrotophos on both the legumes effected better symbiotic performance by not only restricting the seed borne pathogen and harbouring pesticides on seed but also favour a better enviornment for rhizobium legumes symbiosis; thereby it reflects on enhancing growth and nodulation in host legumes over other chemicals applied.

Konde *et al.* (1980) observed that the application of eleven different pesticides prior to rhizobial inoculation inhibited the growth of rhizobia in varying degrees. Similar trend was also observed in the present investigation in which all the treated chemicals had drastic effect in reducing the rhizobial population on the seed surface of the greengram and blackgram.

The effect on the seed dressing chemicals with rhizobial seed bacterization on the grain yield of greengram and blackgram is given in Table 4. Due to rhizobial seed bacterization and seed dressing chemicals there was significant increase in grain yield of greengram and blackgram over untreated control. Rhizobium alone has effected 47.8 and 62.1% increased grain yield over control. Among the seed dressing chemicals treated, carbendazim has resulted in 41.4 and 32.3 in the two legumes respectively. Sundaram and Oblisami (1979 a & b) observed that the application of certain fungicides (Ceresan, Captan and brassicol) and pesticides (thimet, furadon and endrin) and their combination have decreased plant growth, nodulation and DMP in greengram, blackgram and redgram but they have not affected the grain yield. The present investigation also is in agreement with this report in the relation to grain yield. The correlation and regression (Table 5) between nodule number and other biometric and yield attributes were found to be significant.The carbendazim is reported to have a cytokinin like effect on plants in which it reduces the retardation of chlorophyll and enhances plant growth. Monocrotophos is an organo phosphorus compound which provides 'P' source for the better Rhizobium symbiosis in legume plants.

REFERENCES

GRAHAM, P.H., CAMPO., G.O. RUIZ, L.D. and DUQUE, A. 1980. Survival of **Rhizobium phaseoli** in contact with seed protectents. **Agron. J., 72;** 625-627.

KONDE, B.K. MUNDATE, D.L. and MORE, B.B. 1980. Effect of different pesticides on growth of peanut rhizobia and on germination of peanut seeds. Abstr. In: National Symposium on Biological Nitrogen Fixation in relation to crop production, TNAU, Coimbatore,p 86.

PAREEK, R.P. and GAUR, A.C. 1970. Effect of DDT on nodulation,growth, yield and nitrogen uptake of **Pisum sativum** inoculaed with **Rhizobium leguminosarum. Indian J. Microbi.,9;** 93- 100.

PRASAD, N.N and RAMANI, E.E. 1976. Effect of certain pesticideson nodulation and nitrogen fixation by Rhizobium spingroundnut.Madras Agric. J, 63; 646-650.

RAGHAVAREDDY, H.R, MAHALINGAM, G. and PATIL, R.B. 1980. A note on the effect of fungicidal seed treatments on rhizobial b inoculation of peas **(Pisum sativum).** In: Aspects of Biological Nitrogen Fixation, USA Tech series No.28. 153-154.

SUNDARAM, SP. and OBLISAMI, G. 1970a. Influence of combination of pesticide on symbiotic activity of **Rhizobium** with blackgram and greengram. Abstr. In: State level workshop on microbial inoculants, TNAU, p 12.

SUNDARAM, SP. and OBLISAMI, G. 1979b. Influence of seed dressingand soil applied chemicals on **Rhizobium** groundnut symbiosis. Ibid., p 16

Madras Agric. J. 77 (7 &8): 290-294 July-August, 1990

INFLUENCE OF NITROGEN LEVELS AND PLANT POPULATIONS ON THE INCIDENCE OF RICE STEM BORER *Scirpophaga incertulas Walker*

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ABSTRACT

The influence of green manure, nitrogen levels and plant population with insecticide treatment on the incidence of rice stem borer (**Scirpophaga incertulas** Wlk.) in kharif and rabi seasons revealed that combination of green manure and plant population had no influence on the incidence of dead heart, but 150 and 200 kg N/ha applied plots recorded significantly higher dead hearts. White ear incidence was significantly higher at high nitrogen levels and at the population level 80 hills/m^2 which was on par with 100 hills/m2 as compared to 66 hills/m^2.

KEY WORDS: RICE STEM BORER, GREEN MANURE, NITROGEN LEVELS, PLANT POPULATION.

The damage by yellow stem borer, *Scirpophaga incertulas* (Walker), the predominant one in India, ranged from 3 to 95 per cent (Ghosh *et al.*, 1960) In recent years it was found that high nitrogen levels (up to 200 kg N/ha) and high population (100 hills/sq.metre) have resulted in high yields upto 8 tons/ha in rice (TNAU, 1987). Experiments conducted to study the effect of application of green manure, high plant population levels and high level of