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Effect of organic amendments and bio-agents against plant parasitic nematode on growth attributes and grain yield in green gram

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Abstract

An experiment was carried out during pre-kharif season of 2011 at central research farm of BCKV, Gayeshpur, Nadia, West Bengal with eight treatments including control replicated thrice to check the effect of organic amendments and bioagents against PPN on growth attributes and grain yield in green gram. It is observed that the maximum fresh and dry root wight per plant were observed in combine soil application of neem cake @ 100 g/m^2 at sowing and carbosulfan treated seed being, 7.74 g and 1.95 g, respectively. Neem cake in combination with either seed treatment by carbosulfan 25 DS or soil application of T. viride achieved higher grain yield being, 9.19 q/ha and 8.60 q/ha, respectively.

Key words: *Plant parasitic nematode, neem cake, vermicompost, bio-agents, grain yield and green gram.*

Introduction:

Diacoats,

Dicoats, best known as "poor man's meat", gives good quality protein source to vegetarian population. On an average, legumes contain 20-30 percent protein, which is very high as cereals. It has high nutritional value, as well as capacity to improve, fix the nitogen in soil andfertility status through BNF and thus play a vital role in sustainable agriculture (Asthana, 1998).

India is in first position to produce and consume of legumes in the world coverring 33 percent of the total area and 22 percent of production in the world.. Among different legumes*V. radiata* is anoldest and known legumeof Asian region, on account of its good nutrititivel profile and suitability.It is grown in India and Central Asia from ancent time due to its nativeand origin.Green gram has been in attention as "poor men's protein" (Mian, 1976). It contains 26,,51 10, 4 and 3% of protein, carbohydrate, moisture, minerals and vitamins respectively (Khan, 1981). It is widely grown throught Asia and Formosa but the productivity is very less. So, we

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have to increase our pulse production to feed the rapidly growing population of our country. Pulse grain yield is constrained by several biotic and abiotic factors. Pulses are liable to damage by many pests including arthropods, nematodes and acarians from starting to harvesting stage. It is attacked by a number of nematode pests. Among plant parasitic nematodes, *Meloidogyne* spp.) and*R. reniformis* have been found to cause very serious damage to the crop. Sasser (1989) estimated that plant parasitic nematodes cause an annual loss of 10 percent on global basis. Avoidable yield loss due to nematode is approximately 12% in the world while developed country assumes 9% as against 15% in the developing country. Recent statistics showed yield loss of 12% in vegetable crops, 10% in fruit crops and 8% in pulses and cereals due to plant parasitic nematodes. In our country, annual monetary crop loss due nematode is around 21 thousand million rupees (Jain *et al*., 2007).However, recent estimation in India revealed that nematodes are causing 8 percent in cereals and pulses. So, it is mandatory to find out the ecologically safe and commercially feasible management practices against nematodes infesting green gram.

Materials and methods:

The experiment was carried out during pre-kharif season of 2011 in a sick plot of phyto-nematodes, at Gayeshpur central research farm, BCKV , Nadia, W.B. with eight treatments including control replicated thrice. Treatment includes Neem cake,Vermicompost at the time of sowing and seed coating with carbosulfanas single dose, as well as combine application of Neem cake and Vermicompost with *T.viride* and Seed pasted with carbosulfanand untreated control.

Fresh and dry root weight (g)

Five plants/plot were randomly selected for taking these observations..Fresh root weight was recorded after separation of root from the stem in the field. All the roots were then brought to the laboratory and put into the oven for drying. When roots were oven dried completely then observation on dry weight was recorded.

Number of effective *Rhizobium* nodules /plant

Five plants/plot were randomly selected for taking this observation after last harvest. Selected plants were uprooted carefully, washed free of soil and recorded the number of effective (healthy) nodules per plant by naked eyes.

Yield (g/plot)

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Matured pods were harvested periodically from each plot; pods were then sun dried and grains were removed from the pods for taking grain weight.

Result and discussion

Effect of management practices against plant parasitic nematodes on growth attributes of green gram.

It has been clearly revealed from the table-1 that fresh and dry root weight of green gram did not vary significantly among treatments. Combined application of organic amendments with either seed treatments or bioinoculant perform better with regard to fresh and dry biomass production of root as compared to their solo application. The maximum fresh and dry root weight per plant were found in combine soil application of neem cake @ 100 g/m^2 at sowing + seed coated with carbosulfan 25 DS @ 3% being, 7.74 g and 1.95 g, respectively. This was closely followed by the apllication of neem cake in soil + *Trichoderma viride* @ 2.5 kg/ha at sowing combinely where fresh and dry root weight per plant were 7.53 g and 1.90 g, respectively.

Table: 1 Effect of management practices against plant parasitic nematodes on growth attributes of green gram

Treatments	**Fresh root wt. (g/plant)**	**Dry root wt. (g/plant)**	**Effective nodule (No./plant)**
T_1: Neem cake @100 g/m^2 at sowing	6.60 [a]	1.66 [a]	15.7 [bc]
T_2: Vermicompost @100g/m^2 at sowing	6.53 [a]	1.65 [a]	14.7 [bc]
T_3: T_1+ *Trichoderma viride* @2.5 kg/ha as soil application at sowing	7.53 [a]	1.90 [a]	19.0 [b]
T_4: T_2+ *T. viride* @2.5 kg/ha as soil application at sowing	7.23 [a]	1.82 [a]	18.0 [b]
T_5: T_1+ T_7	7.74 [a]	1.95 [a]	28.0 [a]
T_6: T_2+ T_7	7.11 [a]	1.79 [a]	16.7 [bc]
T_7: Seed treatment with carbosulfan 25 DS @ 3.0% a.i. (w/w)	6.91 [a]	1.74 [a]	16.3 [bc]
T_8: Untreated control	6.45 [a]	1.62 [a]	12.3 [c]
SEm (±)	**0.91**	**0.23**	**1.50**
LSD (p=0.05)	**NS**	**NS**	**4.56**

Note: Data marked by common letters are not statistically significant according to DMRT, NS= Non significan

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Mahanta and Phukan (2004) observed maximum fresh and dry biomass production of green gram when crop is treated with the mixed application of neem cake and VAM. In the present experiment author observed maximum fresh and dry root weight in when applied with both neem cake carbosulfan seed treatement. Mukhopadhyay and Roy (2007) observed maximum fresh and dry biomass of cowpea root in treatment received seed dressing of carbosulfan and carbofuran combinely. Neem cake and NSKE promote better root length of green gram. Neem gold provide betterresultof fresh shoot and root weight with 4.25 and 3.64 g/plant respectivelysucceeded by 2.65 and 2.36 g/plant of dry shoot and root weight of green gram (Singh*et al*., 2009). Barman and Das (1996) observed maximum fresh and dry root weight matter of green gram in combined treatment of carbofuran @ 3% w/w as seed dressing + neem cake @ 1t/ha. Their findings with regard to root biomass production of green gram are in conformity with the present observation.

The number of *Rhizobium* root nodule production in green gram varied significantly among treatments (Table 1). Maximum number of *Rhizobium* root nodule (28/plant) was observed when treated the mixed dose of neemcake and seed treatments by carbosulfan 25 DS. Application of (neem cake + *Trichoderma viride*) and (vermicompost+ *T. viride*) were also found to exhibit significant effect on root nodule production as compaire to control but they were at par with each other with regard to said parameter.

Effect of treatments on grain yield of green gram

The data pertaining to grain yield of green gram has been presented in table-2. Neem cake in combination with either seed treatment by carbosulfan 25 DS or soil application of *T. viride* achieved higher grain yield being, 9.19 q/ha and 8.60 q/ha, respectively.

They were found to perform better over other treatments with regard to the seed yield of green gram in this experiment. Yield of green gram in combined application of vermicompost with either *T. viride* or seed treatments by carbosulfan 25 DS were found at par with each other. Management of plant parasitic nematodes in green gram showed 47.3-65.3% increase in grain yield over control, the highest being (65.3%) (Table 2).

The grain yield of green gram cv. Sonali was recorded highest, being 9.19 q/ha in combine application of neem cake @100 g/m^2 at sowing + carbosulfan as a seed coating with 25 DS @ 3.0%in present study (Table 2). This observation is also in parity with the findings of Barman and Das (1996).

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42.1 to 93.4%avoidable yield lossis caused in field condition by*M. javanica*in *V. radiata* (Gupta and Verma, 1990). Mahanta and Phukan (2004) recorded 78.2% increase in yield of green gram over control due to application of neem cake +VAM against plant parasitic nematodes. Here, neem cake @100 g/m^2 at sowing + carbosulfan pastedseed25 DS @ 3.0% a.i.observed 65.3% yield increase over untreated control. The per cent avoidable yield loss due to phyto-nematodes in green gram varied from 47.3-65.3 in this experiment. Avoidable yield loss to the tune of 38.1-78.2% due to *M. incognita* in green gram has been reported by Mahanta and Phukan (2004). The present trial agrees with the previous findings reported by earlier workers.

Table: 2 Effect of management practices against plant parasitic nematodes on grain yield of green gram

Treatments	**Grain yield (g/plot)**	**Grain yield (q/ha)**	**% increase in yield over control**
T_1: Neem cake @100 g/m^2 at sowing	492.8 [c]	8.21 [c]	47.8
T_2: Vermicompost @100g/m^2 at sowing	491.2 [c]	8.19 [c]	47.3
T_3: T_1+ *Trichoderma viride* @2.5 kg/ha as soil application at sowing	516.2 [b]	8.60 [b]	54.8
T_4: T_2+ *T. viride* @2.5 kg/ha as soil application at sowing	502.9 [bc]	8.38 [bc]	50.8
T_5: T_1+ T_7	551.3 [a]	9.19 [a]	65.3
T_6: T_2+ T_7	502.7 [bc]	8.38 [bc]	50.8
T_7: Seed treatment with carbosulfan 25 DS @ 3.0% a.i. (w/w)	498.2 [bc]	8.30 [bc]	49.4
T_8: Untreated control	333.4 [d]	5.56 [d]	--
SEm (±)	**6.72**	**0.11**	
LSD (p=0.05)	**20.38**	**0.34**	

Note: Data marked by common letters are not statistically significant according to DMRT, NS= Non significant

Conclusion

Considering all the above observation it may be concluded that combined application of organic amendments with either seed treatments or bioinoculant perform better with regard to fresh and dry biomass production of root as compared to their solo application as well as it also helpfull to increase garin yield.

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