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Research Article

Effect of Herbicides and Green Manuring on Soil Microflora during *rabi* Season in Rice Groundnut Cropping System

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ABSTRACT

A field experiment was conducted at the agronomy farm at Department of Agronomy Dr. B.S. Konkan Krishi Vidyapeeth Dapoli (Maharashtra) during kharif season rice crop to evaluate the effect of different herbicides vis a-vis different weed control measures and green manuring on survival and growth of bacteria,fungi,total free living nitrogen fixers and phosphate solubilizers in the rhizosphere soil. The all microbial parameters were found significantly higher in green manuring treatment as compared to the without- green manuring treatment at all the stages of the crops The all estimated microbial population except fungi in soil was significantly influenced by weed control measures at all the above mention stages of the crop. The population and other parameters in weedy check was at par with the rest of the herbicide which shows that the population is not decrease and not get disturbed due to application of both herbicides. It was also shows that management practices such as hand weeding increases the microbial population in soil. The interaction effects of green manuring and weed control measures were found to be non significant.

Key word: *Weeds Rabi, Groundnut, Herbicides, Green manuring, Microbial population.*

INTRODUCTION

The adoption of intensive cropping has resulted in large scale use of agrochemical.The agrochemicals in the form of weedicides are used to control weeds.The farmers were more reliance on herbicides in many crops all over the world as they are less expensive and convenient than manual labour, They are very effective and easy to use. Generally herbicides are not harmful when applied at recommended rates (Selvamani & Sankaran 1993), but some herbicides may affect benificial microorganisms (Latha & Gopal, 2010) such as bacterial population and fungal population, free living nitrogen fixers and phosphate solubilizers. They adversly affect the microbial population and their associated parameters such as microbial biomass carbon and basal soil respiration may reduce the performance of important and critical soil functions such as organic matter decomposition, nitrogen fixation and phosphate solubilisation which support the soil health, plant growth and in turn crop productivity.

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The present study was conducted with an objective to find out the effect of different herbicide on soil microbial population during *rabi* season in rice groundnut cropping system.

MATERIALS AND METHODS

A field experiment was conducted from 2011 onwards on long term herbicide trial in *rabi* groundnut Rice-*rabi* Groundnt cropping system at agronomy research farm of Dr.B.S.Konkan krishi vidyapeeth Dapoli (Maharashtra). The main plot treatment contain green manuring (*Sesbania rostrata* insitu application at 45 DAS) and without green manuring (control). The subplot treatments included weed control measures such as hand weeding at 20 DAS and 40 DAS. The fixed herbicide pretilachlor-S 0.75 kg/ha 3-7 days after transplanting (DAT) for rice crop and pendimethalin 1.0 kg/ha PE (pre emergence) for groundnut crop and different rotational herbicides (for rice crop, pyrezosulfuron 0.030 kg/ha at 8 to 10 DAT), and for groundnut crop Oxadiargyl 0.12 kg/ha at 0 to 2DAS, weedy check. The soil samples were collected from rhizo-sphere soil at 3 stages of plant growth, 30 DAT, 50 DAT and at harvesting stage of groundnut crop during first *rabi* season. It was used for all the microbial analysis.The microbial population estimated by using serial dilution and plate count method. The colony forming unit (CFU) of microbial population were enumerated. The microbial biomass carbon and basal soil respiration also estimated by standard methods. The media used were nutrient agar media (bacteria), Martins rose Bengal agar media (Martin, 1950) (fungi), Noories N free agar media (Noories, 1959) for N-fixers and pikovskaya media (Pikovskaya, 1948) (phosphate solubilizers). The exprimental data were subjected to analysis of variances (ANOVA) and treatments were compared. Significant difference were tested p=0.05 using split plot design (SPD) as given by panse and sukhatme (1985).

RESULT AND DISCUSSION

The population of bacteria, fungi and free living nitrogen fixers in soil was significantly influenced by green manuring as compared to without green manure at 30DAS, 50DAS and at harvesting stage of the groundnut crop. The green manuring treatment contain higher microbial population as well as associated parameters as compared to the without green manuring treatment. It is due to increase in soil organic matter which help in increase in soil microbial population (Tejada et al., 2008). However The number of nodule and dry weight of nodule of groundnut crop at 50DAS was not significantly influences by green manuring treatment as compared to without green manuring treatment. The total bacterial population free- living nitrogen fixers, phosphate solubilizers, microbial biomass carbon and basal soil respiration in soil was significantly influenced by weed control measures at all the above mention stages of the groundnut crop. They were found significantly higher in weed free treatment as compared to the weedy check and rest of the both herbicides namely fixed herbicide and rotational herbicide treatment at 30DAT, 50DAT and at harvesting stage of the rice crop. The higher population due to handweeding may be due to better soil aeration in soil which stimulate the microbial population. The population and other parameters in weedy check was at par with the rest of the herbicide treatment. These observation shows that the population maintain their status and not get disturbed due to application of both herbicides. This has been supported by Govekar Y.R et al**.** 2014 who reported that continuous use of herbicide (Oxidiargyl at 0.12 kg/ha) had no long term adverse effect on soil microbial population. The population of total fungi was not significantly influenced by weed control measure at 30 DAT, 50DAT and at harvesting stage of rice crop.It may due to their higher biomass and less in number. The number and weight of nodule of groundnut crop at 50 DAS was not significantly influenced by weed control measures. The interaction effects of green manuring and weed control measures were found to be non significant.

Table 1: Effects of green manuring and herbicides on bacterial, fungal and nitrogen fixers of rice crop during *rabi* season

Treatment Crop:-Rice	Bacteria x 10^6/gm of soil.			Fungi x 10^4/gm of soil.			Nitrogen fixers x 10^3/gm of soil.		
	30 DAT	50 DAT	At harvest	30 DAT	50 DAT	At harvest	30 DAT	50 DAT	At harvest
Main plots:- Green Manuring									
M_1 :- Green manuring	45.58	48.96	51.12	29.29	31.24	35.04	29.06	30.31	33.08
M_2 :-Without green manuring	41.47	42.62	45.41	25.45	26.84	28.21	26.02	26.67	28.31
S. Em ±	0.23	0.39	0.54	0.50	0.54	0.32	0.18	0.54	0.32
CD at 5%	1.41	2.37	3.31	3.04	3.30	1.93	1.11	3.27	1.96
Sub-Plots:- Weed control measures									
T_1:- Fix herbicide (Pendimethalin)	42.48	44.23	47.47	26.36	28.47	31.03	26.72	27.74	29.79
T_2:- Rotational herbicide (Oxadiargyl)	40.49	43.74	45.74	26.50	27.50	29.99	25.93	27.22	28.90
T_3:- Weed free	47.43	48.95	51.78	29.63	31.34	33.16	29.80	31.15	33.45
T_4:- Weedy Check	43.71	46.26	48.08	27.00	28.84	32.32	27.72	27.85	30.64
S. Em ±	1.14	0.85	0.97	0.92	1.85	0.94	0.64	0.69	0.88
C.D. at 5%	3.50	2.62	3.0	NS	NS	NS	1.97	2.12	2.71
Interaction effect									
S Em. ±	1.61	1.20	1.38	1.30	2.62	1.33	0.90	0.97	1.25
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2: Effects of green manuring and herbicides on nitrogen fixers, microbial biomass carbon and basal soil respiration of groundnut crop during *rabi* season

Treatment Crop:-Rice	Phosphate solubilzers x 10^3/gm of soil.			Microbial biomass carbon(µg/gm soil)			Basal soil respiration (µg/gm soil)		
	30 DAT	50 DAT	At harvest	30 DAT	50 DAT	At harvest	30 DAT	50 DAT	At harvest
Main plots:- Green Manuring									
M_1 :- Green manuring	29.06	30.02	32.34	238.44	259.06	281.44	220.94	241.52	270.69
M_2 :-Without green manuring	25.95	27.66	30.05	215.17	233.44	256.31	206.16	220.51	239.07
S. Em ±	0.23	0.21	0.21	2.62	1.30	2.29	1.49	3.20	3.34
CD at 5%	1.38	1.28	1.29	15.93	7.89	13.96	9.04	19.48	20.34
Sub-Plots:- Weed control measures									
T_1:- Fix herbicide (Pendimethalin)	26.72	28.27	30.67	221.20	240.44	264.48	208.54	225.84	249.05
T_2:- Rotational herbicide (Oxadiargyl)	25.93	26.80	29.24	214.55	234.97	257.59	205.50	219.96	245.89
T_3:- Weed free	29.80	31.41	33.54	243.70	263.02	285.24	226.28	246.89	269.84
T_4:- Weedy Check	27.58	28.88	31.35	227.78	246.58	268.20	213.88	231.38	254.76
S. Em ±	0.69	0.80	0.70	4.30	4.37	4.32	3.85	4.13	3.84
C.D. at 5%	2.14	2.48	2.17	13.25	13.45	13.33	11.87	12.72	11.85
Interaction effect									
S Em. ±	0.98	1.14	1.1	6.08	6.17	6.12	5.45	5.84	5.44
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 3: Effects of green manuring and herbicides on dry weight and number of nodule of groundnut crop during *rabi* season

Treatment Crop:-Groundnut	Dry wt of nodule (gm/plant) at 50 DAS	Number of nodule/plant (No.) at 50 DAS of groundnut crop
Main plots:- Green Manuring		
M_1 :- Green manuring	0.07	25.67
M_2 :-Without green manuring	0.06	18.92
S. Em ±	NS	2.58
CD at 5%	0.04	NS
Sub-Plots:- Weed control measures		
T_1:- Fix herbicide (Pendimethalin)	0.06	20.00
T_2:- Rotational herbicide (Oxadiargyl)	0.06	19.83
T_3:- Weed free	0.08	26.33
T_4:- Weedy Check	0.06	23.00
S. Em ±	0.01	2.42
C.D. at 5%	NS	NS
Interaction effect		
S Em. ±	0.01	3.42
C.D. at 5%	NS	NS

CONCLUSION

It can be concluded that the green manuring treatment stimulate significantly higher microbial population and their associated parameters such as microbial biomass carbon and basal soil respiration as compared to the without green manuring treatment in both the crops. The all microbial population dId not get suppressed with a present dose of both fixed as well as rotational herbicides during *rabi* season.It is also shows that management practices such as hand weeding increases the microbial population in soil.

REFERENCES

Govekar, Y. R., Mahadkar, U. V., Dahiphale, A. V., Pawer, L. G., Nevse, V. B., Mane, M. J., & Gosavi, S. P. (2014). Effect of different tillage systems and herbicide on soil microflora of lablab bean rhizosphere. *Indian journal of weed science 46*, 370-372.

Latha, P. C., & Gopal, H. (2010). Effect on herbicides on soil microorganisms. *Indian journal of weed science 42*, 217-22.

Martin, J. P. (1950). Use of acid, rose Bengal and streptomycin in plate method for estimating soil fungi. *Soil science 69*, 215.

Noories, J. R. (1959). Isolation and identification of isolates of Azotobacter. *Laboratory practices 8*, 239-240.

Panse, V. G., & Sukhatme, P. V. (1985). Statstical methods for agricultural worker, ICAR, New Delhi.

Pikovskaya, R. I. (1948). Mobilization of phosphorous in soil in connection with vital activity of some microbial species. *Microbiologia 17*, 362-370.

Selvamani & Sankaran (1993). Soil microbial population as affected by herbicides. *Madras Journal of Agriculture 80*, 397-399.

Tejada, M., Gonzalez, J. L., Garcia-Martinez, A. M., & Parrado, J. (2008). Effect of different green manures on soil biological properties and maize yield. *Bioresource Technology 99*, 1758-1767.