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NITROGEN AND PHOSPHROUS UPTAKE OF SOYBEAN WITH *Bradyrhizobiumjaponicum*MUTATED AND NON MUTATED STRAINS COMBINATION

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ABSRACT

Ten strains of *Bradyrhizobium japonicum w*here isolated from ten localities from Pravara area and labeled as B1, B2, B3, B4, B5 ……. B10 these isolates were tested to investigate the response of soybean variety to Mutated and Non mutated *Bradyrhizobium japonicum* inoculation o or dry weight, nitrogen and phosphorus content. The crop was evaluated in terms of dry weight; shoot nitrogen content, phosphorus content. The result revealed that the highest dry weight was recorded in T10 followed by T11 and T7 over the 100% RDF (T12).B1+B2+B4 combination with 15 second UV exposure was proved significant to improve dry weight of plant through their stages of growth. A significant increase in N. uptake followed by T10 non mutated,T11 and T12 recommended. The result supported that mutated B1+B2+B4 at 15 second UV exposure and non–mutated B1+B2+B4 combination proved significantly superior to the rest of the treatments that the mutated B1 + B2 + B4 at 15 second UV exposure proved significantly effective for total phosphate uptake.

Keywords: Dry matter, Nitrogen, Phosphorus,*Bradyrhizobium japonicum*

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INTRODUCTION

Soybean is one of the protein and mineral sources that is used for human food and livestock feed. Plant improvement generally seeks to increase the proportion of dry matter production that nitrogen is the most important nutrient element which limits yield in crop production to seed production. The nitrogen fixation process depends on a successful symbiotic relationship between a bacteria species and a host plant. Soybean acts as the host plant and recognizes different bacteria sp. *Rhizobium meliloti* can only fix nitrogen within an alfalfa crop. Therefore, it is not possible to use inoculants products across most crops. Soybean inoculated with *B. japonicum* will form structure called nodules on the plants roots. These nodules house the bacteria convert atmospheric nitrogen (N_2) in to ammonia (NH_3) this ammonia from compounds ureides it is a major from of nitrogen exported from soybean nodules and transported to the above around plant parts forever (Lori et al., 2006). Soybean is an important crop plant wildly cultivated in and around Pravaranagar (Taluka. Rahata) extensive use of chemical fertilization for soybean has rendered the soils of this area unfertile. In our present investigation wish to explore a viable alternative for these chemical fertilizers, preferably through use of nitrogen fixing bacteria and to enhance the efficiency of the effective combination of *B. japonicum* strains, mutation treatment was given by UV radiation. This experiment was studied from field trial suggested by Bose and Venkatraman (1962) and Gupta (1964).

MATERIALS AND METHODS

Nitrogen content of shoot and pod shell

The nitrogen content of dried shoot and pod shell was estimated by Micro-Kjeldahl's method (Jackson, 1971).The dried shoot and pod shell was powdered in a mixer. 0.5gm powder was taken in a digestion flask along with little quantity of catalyst mixture (1gm).To this 5 ml conc. H_2SO_4 and 5 ml of H_2O_2 were added. These digestion flasks were heated on a coil till the solution become clear. Discolored solution was diluted up to 50ml with distilled water and used as acid extract for estimation of nitrogen content.10 ml of 4% boric acid solution was pipetted in to 10 ml capacity beaker to this 3 drops of mixed indicator was added. Then this beaker was kept under the condenser and the tip of condenser was dipped in the boric

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acid solution, 10ml digest was poured in the distillation chamber followed by 5 ml of 50% NaOH. This was titrated against standard 0.02 N HCl till the colour changes to pink and persist for 30 seconds. Nitrogen was estimated from ml of 0.02 N HCl required and it was expressed as percent nitrogen.

Phosphorus content of shoot and pod shell

The phosphorus content in the dried leaves and seed was estimated by Vanado-molybdate method (Jackson, 1971). The digested samples used for estimation of nitrogen content were used for estimation of phosphorus content. 10ml of digest was taken in 50ml capacity volumetric flasks and 10 ml vanadomolybdate reagent was added. Final volume was make to 50 ml with distilled water. The contents were mixed and allow to developcolour for 30 minutes. The colour intensity was measured by spectrophotometer at 470 nm.

Total nitrogen and phosphorus uptake

Total nitrogen and phosphorus uptake of shoot and pod shell was estimated by following formula.

$$\textbf{Nitrogen/ Phosphorus uptake (\%)} = \frac{\text{\% Nitrogen/ phosphorus content x Dry matter}}{100}$$

$$\textbf{Total N/ P uptake(\%)} = \frac{\text{\% N/ P content of shoot + \% N/P content of pod shell /2 + Dry matter of shoot + Dry matter of pod shell/2}}{100}$$

RESULTS AND DISCUSSIONS

A) Dry weight of plant (gm)

At 90 days dry weight of plant differ significantly from treatment to treatment. The highest dry weight was recorded in T10(B1+B2+B4) followed by T11(B3 +B5+B6) and T7 (B1 + B5) over the 100% RDF (T12). Balsubramanian*et al.* (1980) also reported significant increase in dry matter with multistrain*Rhizobium* inoculation in cow pea.

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B) Dry weight of plant (gm)

The observation of dry weight supported that (B1+B2+B4) combination with 15 second UV exposure was proved significant to improve dry weight of plant through their stages of growth Fay et al.(1964) also reported the same finding in blue green algae.

Total nitrogen uptake

The results of total N. uptake/plant recorded at 90 days after sowing it was observed that in the treatment of mutated T10 at 15 second UV exposure (1.393 gm) a significant increase in N. uptake followed by T10 non mutated (1.183 gm), T11 (0.781 gm) and T12 (0.742 gm) recommended.

The result supported that mutated B1+B2+B4 at 15 second UV exposure and non–mutated B1+B2+B4 combination proved significantly superior to the rest of the treatments. Bailey et al. (1984) and Islam et al. (1987) also reported suitable strain combination were more effective in uptake and in supplement of nitrogen to the plant due to which total nitrogen uptake was increased.

Total phosphate uptake

Phosphate uptake was recorded at 90 days after sowing, it was seen that in the mutated T10 treatment at 15 second UV exposure (0.323 gm) followed by non-mutated strain combination treatment T11 (0.176 gm) and T10 (0.138 gm). Results also supported that the mutated B1 + B2 + B4 at 15 second UV exposure proved significantly effective for total phosphate uptake. Nelson et al. (1978); Ibrahim and Mohmad (1989) also reported particular*B. japonicum* strain combination for mineralization of nutrients in the rhizosphear soil, which improve total uptake of phosphate.

REFERENCES

1. Lori J. Roger W. Richard B. (2006) Soybean inoculation: Understanding the soil and plant mechanisms Involved : 1- 4
2. Gupta B.M. Kleczkowska(1964) A study of some mutation in a strain of Rhizobium trifolii. J. Gen. Microbiol. 35, 371- 380.

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3. Balasubramanian A.J.,PrabhakaranJ.Sundaram S.P(1980) a. Influence of single and multistrainrhizobial inoculants on nodulation, yield and nitrogen assimilation by green gram (Phaseolusaureus, Roxb.) Madras Agric. J. 67(2), 90-93.
4. Balsubramanian A.J. Prabhakaran J. Sundaram S.P. 1980 b. Influence of single and multistrainrhizobial inoculants on cowpea. Madras Agric. J. 67(8) 538-540.
5. Bailey L.D. Brahdan A.C. Manitoba C.(1984)Nodulation and N-fixation of group 'ooo'soybean as influenced by strains of *Rhizobiumjaponicum*,BNFNewsl.12(1),17- 18.
6. Bose P. Venkatraman G.S.(1972) Ultra violet light induced mutations in *Rhizobium leguminosarum* Ind. J. Microbio. 12, 79-86.
7. Fay P. Kumar H.D. Fogg G.E. (1964) Cellular factors affecting nitrogen fixation in the blue green alga. J. Gen. Microbiology 35, 351-360.
8. Ibrahim S.A. Mahmoud S.A. (1989) Effect of inoculation on growth, yield and nutrients uptake of some soybean varieties. Egyptian J. Soil Sci.29(2) , 133-142.
9. IslamA.B.Haugue M.S. Bhuiyan Z.H. (1987) Effect of different Rhizobium inoculants on soybean. Bangladesh. Agric 12(2),129-137. Jackson, M.L. 1971. SoilChemical Analysis.Prentic Hall of India (Ltd.) New Delhi.

Nitrogen and phosphorus uptake at 90 days

Treatment number	Dry weight (gm)		Mean Dry weight (gm)	Nitrogen content (%)		Mean N. Content (%)	Total N. Uptake (gm)	Phosphorus content (%		Mean P. Content (%)	Total P. Uptake (gm)
	Shoot	Pod shell		Shoot	Pod shell			Shoot	Pod shell		
T_1	11.279	30.84	21.06	2.52	1.26	1.89	0.397	0.24	0.18	0.21	0.044
T_2	14.605	39.37	26.99	2.94	1.54	2.24	0.604	0.24	0.19	0.22	0.056
T_3	11.921	46.49	29.21	2.80	1.12	1.96	0.531	0.29	0.18	0.24	0.067
T_4	11.765	36.11	23.94	2.24	1.33	1.79	0.425	0.29	0.18	0.24	0.055
T_5	14.777	44.99	29.88	2.38	1.12	1.75	0.522	0.30	0.19	0.25	0.071
T_6	13.553	43.62	28.59	2.10	1.19	1.65	0.468	0.30	0.18	0.24	0.068
T_7	15.848	47.41	31.63	2.80	1.33	2.07	0.651	0.38	0.21	0.30	0.091
T_8	13.281	35.51	24.40	2.52	1.47	2.00	0.485	0.33	0.18	0.26	0.060
T_9	11.691	35.66	23.68	2.38	1.33	1.86	0.437	0.35	0.20	0.28	0.059
T_{10}	19.296	83.21	51.25	3.08	1.54	2.31	1.183	0.69	0.29	0.49	0.138
T_{11}	17.216	54.79	36.00	2.94	1.40	2.17	0.781	0.63	0.27	0.45	0.176
T_{12}	12.727	57.01	34.87	2.94	1.33	2.14	0.742	0.58	0.28	0.43	0.156
T_{13}	12.849	42.94	27.89	2.24	1.40	1.82	0.507	0.44	0.27	0.36	0.119
Muteted T_{10}	16.944	94.56	55.75	2.97	2.03	2.50	1.393	0.78	0.38	0.58	0.326
T_{14} (Control	9.640	21.36	15.50	1.96	0.98	1.47	0.227	0.20	0.17	0.19	0.027
							SE ±	0.1449			
							CD 5%	0.4395			