Original Research Article

INFLUENCE OF SAGARIKA-LIQUID WITH INORGANIC FERTILIZERS FOR ENCHANING THE SOIL HEALTH AND YIELD OF GREEN GRAM (*Vigna radiata* L.)

ABSTRACT

An experiment was conducted on sagarika-liquid with inorganic fertilizers during *Zaid* season 2022 at the central research farm of Department of Soil science and Agricultural chemistry, to enhance the productivity. The design applied was 3x3 RBD having three levels of Sagarika-liquid @2ml, 3ml and 4ml L^{-1} and N P K @ 50, 75and 100%. The result obtained with treatment T_9[N P K @100%+ 2 Spray of Sagarika 4ml l^{-1}] that showed vermicompost in combination resulted in a slight change in soil pH at 0-15 cm and 15-30 cm were found 7.12 and 7.27and EC 0.35 and 0.32 dS m^{-1} respectively. The significant results were in pore space 47.90 and 45.52 %, water holding capacity 46.10 and 43.60 %, organic carbon 0.54 %, 0.44 %, and available nitrogen, phosphorus and potassium was found to be significant among other treatments in Green gram cultivation and soil quality improvement. The maximum yield regarding, gave the best results with respect to plant height 45.34 cm, number of pod $plant^{-1}$ 28.16, and number of seed pod^{-1} 8.45. It gave highest yield 1.96 t ha^{-1}. It was also revealed that the application with organic manures was excellent source for fertilization than fertilizers.

Keywords: Green gram, Inorganic Fertilizers, Sagarika-liquid, Seaweed extract, Soil health etc.

INTRODUCTION

Green gram (*Vigna radiata* L.) is one of the most ancient and extensively grown leguminous crops of India. It is valued for the protein enriched seed as an important dietary ingredient to overcome protein malnutrition of human beings. It occupies prime position among pulses by virtue of its short growth period, high biomass and outstanding nutrient value as food, feed and forage. It is an ideal source of protein and amino acids and its seed contain, 24.7% protein, 0.6% fat, 0.9% fiber and 3.7% ash as well as sufficient quantity of calcium, phosphorus and important vitamins. Due to cheaper protein source, it is designated as "poor man's meat" **Aslam *et al.*, (2010).** It does not produce heaviness or flatulence is fairly rich in carbohydrate and appreciable amount of riboflavin and thiamine. In sprouted seeds of green gram synthesized Vitamin C and it is consumed as salad and also after roasting. Looking to the food habit of majority of Indian population, which is vegetarian, it

becomes more important because it full-fill the protein requirement of the peoples. It is consumed as *dal*, *halwa*, *namkeen*, snack and many other preparations. It also provides nutritive and laxative green and dry fodder to cattle **Ghule *et al.*, (2020)**. Potassium is important for growth and development of plants. The quantity of K absorbed by roots is second to that of nitrogen for most of the cultivated plants. Due to intensive cropping, continuous manuring and limited or no use of K fertilizers, the available K status of the soils has depleted. Soils have begun to show response to K application particularly under intensive use of N and P fertilizers. Sufficient amounts of K is required for improving the yield and quality of different crops because of its effect on photosynthesis, water use efficiency and plant tolerance to diseases, drought and cold as well for making the balance between proteins and carbohydrates **Singh *et al.*, (2017)**

METHODOLOGY

The investigation on **"Influence of N P K and Sagarika-liquid for Enchaning the Productivity of Green gram (*Vigna radiata* L.)"** comprise of a field experiment which was carried out at the Soil Science Research Farm, Sam Higginbottom University of Agriculture Technology, Prayagraj during zaid season 2022. The details about the experiment site, soil and climate are described in this chapter together with the experimental design, layout plan, cultural practice, particulars of treatments, planting material and techniques employed for the parameters.

The experiment was conducted at research Farm of Soil Science at Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, the area is situated on the south of Prayagraj on the right side of the river Yamuna on the South of Rewa Road at a distance of about 6 km from Prayagraj city. It is situated at $25^0 57^{"}$ N latitude, $81^0 59^{"}$ E longitude and at the altitude of 98 meter above the sea level.

The area of Prayagraj district comes under subtropical belt in the South east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46^0C – 48^0C and seldom falls as low as 4^0C – 5^0C. The relative humidity ranged between 20 to 94 percent. The average rainfall in this area is around 1100 mm annually.

The soil samples will be randomly collected from one site in the experiment plot prior to tillage operation from a depth of 0-15 cm and 15-30 cm. The volume of the soil sample will be reduced by conning and quartering the composites soil sample will be air dried and passed through a 2 mm sieve by way of preparing the sample for physical and chemical analyses.

Table.1: Treatment combination of sagarika –liquid with inorganic fertilizers green gram

Treatments No.	Treatment combinations
T_0	Absolute control
T_1	[N P K @50% + 2 Spray of Sagarika 2ml l^{-1}]

T_2	[N P K @50%+ 2 Spray of Sagarika 3ml l^{-1}]
T_3	[N P K @50%+ 2 Spray of Sagarika 4ml l^{-1}]
T_4	[N P K @75%+ 2 Spray of Sagarika 2ml l^{-1}]
T_5	[N P K @75%+ 2 Spray of Sagarika 3ml l^{-1}]
T_6	[N P K @75%+ 2 Spray of Sagarika 4ml l^{-1}]
T_7	[N P K @100%+ 2 Spray of Sagarika 2ml l^{-1}]
T_8	[N P K @100%+ 2 Spray of Sagarika 3ml l^{-1}]
T_9	[N P K @100%+ 2 Spray of Sagarika 4ml l^{-1}]

RESULT AND DISCUSSION

Soil parameters

The composition Sagarika-liquid with iorganic fertilizers has significant increase on the soil parameters. The increase of pore space %, water holding capacity %, organic carbon, available nitrogen, phosphorus and potassium with the improvement of soil parameters, table.2 shown that application of different levels of NPK and Sagarika-liquid have significant roll, on soil. In treatment T_0 lowest data observed, pore space 48.32 and 47.08%, water holding capacity 44.03 and 42.53%, organic carbon 0.39 and 0.32%, nitrogen 219.31 and 212.11 kg ha^{-1}, phosphorus 21.63 and 20.49 kg ha^{-1}, potassium 132.32 and 130.07 kg ha^{-1} and T_9 shows the highest pore space 60.79 and 58.93%, water holding capacity 58.62 and 56.71%, organic carbon 0.54 and 0.44%, nitrogen 340.98 and 324.73 kg ha^{-1}, phosphorus 38.22 and 36.34 kg ha^{-1} and potassium 208.34 and 205.19 kg ha^{-1}, respectively in 0-15cm and 15-30cm depth of soil. Treatment T_9 is the maximum potential of soil parameters that improve the soil followed by T_8. It eventually shows that the NPK and Sagarika-liquid application is the beneficial effect on the soil that will maintain the soil. T_1 shows that lowest effect on the soil.

Treatments	Pore space (%)		Water holding capacity (%)		Organic Carbon (%)		Nitrogen (kg ha$^{-1)}$		Phosphorus (kg ha^{-1})		Potassium (kg ha^{-1})	
	0-15 cm	15-30 cm	0-15 Cm	15-30 cm	0-15 cm	15-30 cm	0-15 Cm	15-30 cm	0-15 cm	15-30 cm	0-15 Cm	15-30 cm
T_0	45.40	43.42	42.03	40.53	0.39	0.32	219.31	212.11	21.64	20.49	132.32	130.07
T_1	46.29	44.29	43.30	41.64	0.46	0.35	332.28	314.03	25.28	22.65	152.55	148.53
T_2	47.22	45.22	43.88	41.55	0.47	0.37	338.44	320.92	25.50	22.95	155.68	151.73
T_3	47.40	45.40	44.22	41.42	0.48	0.38	340.98	324.73	26.84	24.42	161.87	158.02
T_4	47.19	45.11	43.40	41.06	0.47	0.38	308.66	291.61	28.09	25.71	174.64	170.78
T_5	47.40	45.41	45.46	42.51	0.49	0.39	317.11	300.56	31.09	28.81	180.82	177.11
T_6	47.82	45.80	45.47	42.45	0.45	0.41	324.39	308.87	32.88	30.77	184.97	181.31
T_7	47.19	45.20	44.22	44.22	0.51	0.41	270.30	244.05	36.00	33.95	202.37	198.85
T_8	47.50	45.50	45.42	42.39	0.53	0.43	275.34	247.79	37.09	34.94	205.40	202.07
T_9	47.90	45.90	46.10	43.60	0.54	0.44	279.53	254.38	38.22	36.34	208.34	205.19

Table.2: Effect of different levels of sagarika –liquid with inorganic fertilizers on soil parameters

Table.3 Effect of sagarika –liquid with inorganic fertilizers on yield of Green gram

Treatment No.	Treatment Combination	Grain yield (t ha^{-1})
T_0	Absolute control	1.18
T_1	[N P K @50% + 2 Spray of Sagarika 2ml l^{-1}]	1.33
T_2	[N P K @50%+ 2 Spray of Sagarika 3ml l^{-1}]	1.38
T_3	[N P K @50%+ 2 Spray of Sagarika 4ml l^{-1}]	1.40
T_4	[N P K @75%+ 2 Spray of Sagarika 2ml l^{-1}]	1.50
T_5	[N P K @75%+ 2 Spray of Sagarika 3ml l^{-1}]	1.54
T_6	[N P K @75%+ 2 Spray of Sagarika 4ml l^{-1}]	1.64
T_7	[N P K @100%+ 2 Spray of Sagarika 2ml l^{-1}]	1.74
T_8	[N P K @100%+ 2 Spray of Sagarika 3ml l^{-1}]	1.88
T_9	[N P K @100%+ 2 Spray of Sagarika 4ml l^{-1}]	1.96

The result on table.3 depicted that the maximum grain yield (t ha^{-1}) of green gram was (1.96) found in T_9 [NPK@ 100%2 Spray of Sagarika-liquid 4ml l^{-1}] followed by T_8 [NPK 100%+ 2 Spray of Sagarika-liquid 3ml l^{-1}] and the minimum grain yield (t ha^{-1}) was found in T_1 (control) which was (1.18) respectively.

CONCLUSION

On the basis of above findings, it concluded that the treatment combinations of T_9[NPK@ 100%2 Spray of Sagarika-liquid 4ml l^{-1}] shows best results with respect to in comparison to other treatment combinations. It gives highest yield 1.96 t ha^{-1}. So, we can recommend farmer to apply NPK and Sagarika-liquid for profitable production of green gram and good for soil.

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