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Effect of plant growth regulators and biofertilizers on productivity of fenugreek (*Trigonella foenum-graecum L.*)

Bhanuja Dwivedi and PKS Gurjar

Abstract

A field experiment was conducted for two consecutive *Rabi* seasons during 2019-20 and 2020-21 on sandy loam soil at Department of Horticulture, College of Agriculture, Gwalior (Madhya Pradesh) to study the Effect of plant growth regulators and biofertilizers on productivity of fenugreek. Results revealed that the maximum plant height (cm), number of branches per plant and number of leaves/plant at 30, 60 and 90 DAS in first, second year and in pooled was recorded in treatment T3 (Seed inoculation with 50% Rhizobium + 50% PSB), whereas the minimum plant height (cm), number of branches per plant and number of leaves/plant at 30, 60 and 90 DAS in first, second year and in pooled was observed in treatment T0 (Distilled water spray). The maximum seed yield per plant (g), number of seeds per pod, 1000 seed weight (g), seed yield (kg/ha) and biological yield (kg/ha) in first, second year and in pooled was recorded in treatment T3 (Seed inoculation with 50% Rhizobium + 50% PSB), whereas the minimum seed yield per plant (g), seed yield per plant (g), number of seeds per pod, 1000 seed weight (g) in first, second year and in pooled was observed in treatment T0 (Distilled water spray). The maximum gross returns (Rs./ha), net returns (Rs./ha) and B:C ratio in first year, second year and in pooled was recorded in treatment T3 (Seed inoculation with 50% Rhizobium + 50% PSB).

Keywords: Fenugreek, biofertilizer, regulators and yield

Introduction

Fenugreek belongs to *Fabaceae* family; it was named, *Trigonella*, from Latin language that means “little triangle” due to its yellowish-white triangular flowers. It is an annual herbaceous legume, the plant is erect or branched and, generally, grows to a height of about 30-60 cm, depending on the variety. It is a diploid species and considered as the oldest known medicinal plant in recorded history. Fenugreek seeds can go beyond rendering a spellbinding aroma and a distinct flavour to your meals, if used earnestly, the ingredient can promise good health and a revved up immune system. Fenugreek possesses pharmacological properties such as antimicrobial, carminative, emollient, febrifuge, laxative, restorative, uterine tonic, expectorant, galactagogue, anticarcinogenic, anti-inflammatory, antiviral, antioxidant, demulcent and hypotensive (Singh *et al.* 2018) [14]. Fenugreek is spread across the world because of its ability to survive in vast range of temperatures and soil types. One more reason can be abundant use of fenugreek such as pickle, as flavoring agent, as herb and spice, as breast milk enhancer etc. The seed is produced as a spice, as forage for cattle, and for medicinal purpose. Methi seeds contain many substances like protein (6.3%), fat (9.5%), carbohydrates (42.3%), vitamin-A (1040 IU) and calories (370/100 g). Besides, methi contains alkaloid trigonelline (0.13-0.35%), diosgenin (0.78-1.9%) and a trace trigogenin. Beside its medicinal value, it is also used as a part of various food product developments as food stabilizer, adhesive, and emulsifying agent.

Plant growth regulators is one of the main factors influence plants growth and their primary and secondary metabolites pool and enhancing the production of crop has been recognized and now this low cost technology has emerged as a boon in enhancing the agriculture production at an unrivalled rate and in a short duration crop like fenugreek it will be very advantageous. Growth hormones play a very important role in maintaining physiological processes and source-sink balance (Godara *et al.* 2017) [8]. The PGPR promote and enhance some growth parameters such as seed germination, seedling vigor, emergence, plant stand, root and shoot growth, total biomass of the plants and seed weight. *Rhizobium* as PGPR is a key factor for establishment of symbiosis with legumes. Their role in nitrogen fixation makes them a main component and biological nutrient source in sustainable agriculture (Anandhi *et al.* 2019) [2].

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Inoculation of legumes with these bacteria increases biological nitrogen fixation in agriculture, especially in N depleted soils. Microbes used as biofertilizers are generally regarded as plant growth promoting rhizobacteria (PGPR) that positively influence plant growth by colonizing the plant roots, increased multiplication in rhizosphere, competing with other microflora, counteracting soil borne plant pathogens, increasing the availability of nutrients (nitrogen, phosphorous), and production of plant growth regulators like IAA, gibberellins and cytokinins (Badar *et al.* 2016)^[5].

The increasing use of chemical fertilizer, pesticides and weed control chemicals has damaged soil quality, ecology, environment and most importantly human health. Use of inorganic nitrogen fertilizer always bears a risk of contamination of underground and surface water resources through leaching or run off (Nair *et al.* 2021)^[9]. In recent years, continued and imbalance application of chemical fertilizers with little or no use of organic manure is leading to poor nutrient use efficiency and low yield of crops. At the same time its increasing cost of production, changing trend towards increase environmental sensitivity and consumer's preference towards organic products are commonly realized now a days. Hence it has become important to search for other complementary resources and fertilizer of biological origin for integrated nutrient management in fenugreek. Thus to sustain the productivity and being a legume to enhance soil fertility of hungry soil, judicious use of fertilizer with integration of bio-fertilizers is important and to regulate physiological processes for balancing source and sink to enhance flowering and pod setting exogenous application of plant bioregulator, particularly brassinosteroid plays vital role (Arunprasad *et al.* 2018)^[6]. Microbial fertilizers play an important role as these are eco-friendly, low cost non bulky agricultural inputs. Use of bacterial fertilizers as a source of N and P can also minimize dependence on chemical fertilizers. Rhizobium has potential to fix atmospheric nitrogen, while PSB has the capacity to solubilize and mobilize P and micronutrients present in non-available form in the soil (Dutta *et al.* (2017)^[7].

Materials and Methods

An experimental was conducted at college of agriculture, Gwalior is situated on 26°13' north latitude and 78°18' east longitude at an altitude of 208.0 meters from mean sea level in central part of Madhya Pradesh and enjoy semi-arid tropical climate during *Rabi* seasons during 2019-20 and 2020-21. The average rainfall varies from 751.0 mm concentrated mostly from the month of second week of June and remains active up to end of October less rainfall occurs during the winter season also. The minimum and maximum temperature during crop growth period varied 5.900C to 21.200C and from 19.700C to 40.400C, with season's average values of 10.670C and 27.720C, respectively. The morning and evening relative humidity ranged between 56.50 to 98.30% and 24.40 to 57.70% with season's average of 84.05% and 39.86%, respectively. The evaporation varied from 1.0 to

9.20 mm with an overall average of 3.39 mm. The soil was sandy clay in texture and slightly alkaline in reaction (pH 7.7 & 7.7) with electric conductivity 0.14 & 0.15 dS/m, low in available N (211.5 & 219.0 kg/ha), and medium in available P (16.56 & 16.12 kg/ ha), available K (187 & 194 kg/ha). A combination of 14 treatments, *viz.*, Distilled Water Spray,

Seed inoculation with 100% Rhizobium, Seed inoculation with 100% Phosphorous solubilizing bacteria, Seed inoculation with 50% Rhizobium + 50% PSB, GA3 (Foliar spray) - 25 ppm, GA3 (Foliar spray) - 50 ppm, GA3 (Foliar spray) - 75 ppm, GA3 (Foliar spray) - 100 ppm, NAA (Foliar spray) - 5 ppm NAA (Foliar spray) - 10 ppm, NAA (Foliar spray) - 15 ppm, NAA (Foliar spray) - 20 ppm, BR (Foliar spray) - 0.30 ppm and BR (Foliar spray) - 0.60 ppm were tested in a randomized block design and replicated thrice. Fenugreek 'RMT-1' was sown at 30 cm × 10 cm spacing on 2019-20 and 2020-21. The recommended dose of fertilizers is as per treatments. Nitrogen and P2O5 were applied through urea and single superphosphate, respectively. The initial plant stand was counted 15 days after sowing.

Results and Discussion

Growth parameters

The maximum plant height (cm) (Table 1), number of branches per plant (table 2) and number of leaves/plant (Table 3) at 30, 60 and 90 DAS in first, second year and in pooled was recorded in treatment T3 (Seed inoculation with 50% Rhizobium + 50% PSB), whereas the minimum plant height (cm), number of branches per plant and number of leaves/plant at 30, 60 and 90 DAS in first, second year and in pooled was observed in treatment T0 (Distilled water spray). Similar results for most of the growth characters were also reported by Al-hassany *et al.* (2019)^[11], Anandhi *et al.* (2019)^[2], Singh *et al.* (2018)^[14] and Saxena *et al.* (2019)^[13].

Yield and yield attributing parameters

The maximum seed yield per plant (g) (Table 4), number of seeds per pod (Table 4) and 1000 seed weight (g) (Table 4), in first, second year and in pooled was recorded in treatment T3 (Seed inoculation with 50% Rhizobium + 50% PSB), whereas the minimum seed yield per plant (g), seed yield per plant (g), number of seeds per pod and 1000 seed weight (g) in first, second year and in pooled was observed in treatment T0 (Distilled water spray). Similar results for most of the yield characters were also reported by Raiyani *et al.* (2018)^[11], Anitha *et al.* (2016)^[3], Pawankumar *et al.* (2018)^[10], Badar *et al.* (2016)^[5] and Anitha *et al.* (2019)^[4].

The maximum seed yield (kg/ha) (Table 5) and biological yield (kg/ha) (Table 5) in first, second year and in pooled was recorded in treatment T3 (Seed inoculation with 50% Rhizobium + 50% PSB), whereas the minimum seed yield (kg/ha) and biological yield (kg/ha) in first, second year and in pooled was observed in treatment T0 (Distilled water spray). Similar these results for most of the yield attributing were also reported by Nair *et al.* (2021)^[9], Godara *et al.* (2017)^[8], and Dutta *et al.* (2017)^[7].

Economical parameters

The maximum gross returns (Rs./ha), net returns (Rs./ha) and B:C ratio in first year, second year and in pooled was recorded in treatment T3 (Seed inoculation with 50% Rhizobium + 50% PSB). However, the minimum gross returns (Rs./ha), net returns (Rs./ha) and B:C ratio in first year, second year and in pooled was recorded in treatment T0 (Distilled water spray) (Table 6). Similar these results for most of the economic and profitability were also reported by Nair *et al.* (2021)^[9] and Balakrishnan and Arunprasad (2018)^[6].

Table 1: Effect of plant growth regulators and biofertilizers on plant height (cm) at 30, 60 and 90 DAS of fenugreek

Treatments detail	Plant height (cm)								
	Ist Year			IInd Year			Pooled		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T0: Distilled Water Spray	6.11	26.80	45.00	6.24	25.74	44.80	6.17	26.27	44.90
T1: Seed inoculation with 100% Rhizobium	9.61	35.87	52.30	9.45	37.32	52.44	9.53	36.59	52.37
T2: Seed inoculation with 100% Phosphorous solubilizing bacteria	9.53	35.70	51.76	9.26	35.91	51.86	9.39	35.80	51.81
T3: Seed inoculation with 50% Rhizobium + 50% PSB	11.49	39.70	56.14	12.33	40.74	55.81	11.91	40.22	55.98
T4: GA3 (Foliar spray) - 25 ppm	7.27	31.14	46.80	6.79	32.23	45.70	7.03	31.69	46.25
T5: GA3 (Foliar spray) - 50 ppm	7.99	33.33	48.16	7.95	33.79	48.67	7.97	33.56	48.42
T6: GA3 (Foliar spray) - 75 ppm	8.61	34.90	51.23	8.31	34.86	51.09	8.46	34.88	51.16
T7: GA3 (Foliar spray) - 100 ppm	11.34	38.62	55.54	11.72	40.02	55.77	11.53	39.32	55.66
T8: NAA (Foliar spray) - 5 ppm	6.63	27.75	45.79	6.32	29.19	45.37	6.48	28.47	45.58
T9: NAA (Foliar spray) - 10 ppm	7.37	32.52	47.49	7.43	32.73	47.33	7.40	32.63	47.41
T10: NAA (Foliar spray) - 15 ppm	8.46	34.79	50.53	8.27	34.76	50.66	8.37	34.77	50.59
T11: NAA (Foliar spray) - 20 ppm	10.57	38.50	54.56	11.11	39.56	55.06	10.84	39.03	54.81
T12: BR (Foliar spray) - 0.30 ppm	8.11	34.48	49.67	7.96	34.38	49.44	8.03	34.43	49.55
T13: BR (Foliar spray) - 0.60 ppm	10.42	37.12	53.00	10.91	38.74	54.50	10.67	37.93	53.75
S.Em ±	0.199	1.035	0.174	0.306	0.697	0.351	0.183	0.624	0.196
CD 5%	0.579	3.008	0.506	0.890	2.027	1.021	0.518	1.771	0.556

Table 2: Effect of plant growth regulators and biofertilizers on number of branches per plant at 30, 60 and 90 DAS of fenugreek

Treatments detail	Number of branches per plant								
	Ist Year			IInd Year			Pooled		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T0: Distilled Water Spray	1.30	5.54	12.06	1.37	5.38	12.11	1.33	5.46	12.08
T1: Seed inoculation with 100% Rhizobium	2.36	6.90	14.76	2.27	6.75	14.65	2.32	6.83	14.71
T2: Seed inoculation with 100% Phosphorous solubilizing bacteria	2.24	6.84	14.52	2.26	6.58	14.37	2.25	6.71	14.45
T3: Seed inoculation with 50% Rhizobium + 50% PSB	2.81	7.59	16.04	2.78	7.40	16.15	2.79	7.49	16.09
T4: GA3 (Foliar spray) - 25 ppm	1.86	5.61	12.64	1.87	5.61	12.52	1.86	5.61	12.58
T5: GA3 (Foliar spray) - 50 ppm	2.05	6.05	13.66	2.12	6.04	13.63	2.09	6.04	13.65
T6: GA3 (Foliar spray) - 75 ppm	2.24	6.83	14.11	2.26	6.57	14.04	2.25	6.70	14.08
T7: GA3 (Foliar spray) - 100 ppm	2.68	7.51	15.73	2.66	7.38	15.63	2.67	7.45	15.68
T8: NAA (Foliar spray) - 5 ppm	1.75	5.56	12.37	1.79	5.59	12.28	1.77	5.58	12.33
T9: NAA (Foliar spray) - 10 ppm	2.00	5.95	13.09	2.01	5.64	13.02	2.00	5.79	13.06
T10: NAA (Foliar spray) - 15 ppm	2.18	6.21	14.07	2.20	6.16	14.00	2.19	6.18	14.03
T11: NAA (Foliar spray) - 20 ppm	2.63	7.27	15.11	2.62	7.21	15.08	2.63	7.24	15.09
T12: BR (Foliar spray) - 0.30 ppm	2.16	6.17	13.91	2.15	6.13	13.88	2.16	6.15	13.89
T13: BR (Foliar spray) - 0.60 ppm	2.55	7.25	15.04	2.57	7.10	15.06	2.56	7.17	15.05
S.Em ±	0.065	0.239	0.129	0.066	0.180	0.070	0.046	0.149	0.073
CD 5%	0.190	0.693	0.374	0.191	0.522	0.203	0.131	0.424	0.208

Table 3: Effect of plant growth regulators and biofertilizers on number of leaves per plant at 30, 60 and 90 DAS of fenugreek

Treatments detail	Number of leaves per plant								
	Ist Year			IInd Year			Pooled		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T0: Distilled Water Spray	6.11	17.95	42.78	6.05	17.85	43.02	6.08	17.90	42.90
T1: Seed inoculation with 100% Rhizobium	10.81	25.14	47.44	10.90	25.03	47.34	10.86	25.09	47.39
T2: Seed inoculation with 100% Phosphorous solubilizing bacteria	10.35	23.61	47.06	10.24	23.62	47.00	10.29	23.62	47.03
T3: Seed inoculation with 50% Rhizobium + 50% PSB	12.01	28.49	50.08	12.10	28.41	49.84	12.06	28.45	49.96
T4: GA3 (Foliar spray) - 25 ppm	7.23	18.98	44.44	7.13	18.91	44.38	7.18	18.95	44.41
T5: GA3 (Foliar spray) - 50 ppm	8.70	20.15	45.80	8.58	20.09	45.82	8.64	20.12	45.81
T6: GA3 (Foliar spray) - 75 ppm	10.06	23.30	46.85	9.95	23.14	46.96	10.00	23.22	46.90
T7: GA3 (Foliar spray) - 100 ppm	10.98	28.28	49.64	10.67	28.23	49.82	10.83	28.25	49.73
T8: NAA (Foliar spray) - 5 ppm	6.68	18.33	43.69	6.53	18.48	43.73	6.60	18.41	43.71
T9: NAA (Foliar spray) - 10 ppm	8.12	19.75	45.48	8.30	19.48	45.65	8.21	19.62	45.57
T10: NAA (Foliar spray) - 15 ppm	9.42	22.98	46.44	9.35	21.51	46.55	9.39	22.25	46.50
T11: NAA (Foliar spray) - 20 ppm	10.97	27.03	48.79	10.48	26.49	48.25	10.72	26.76	48.52
T12: BR (Foliar spray) - 0.30 ppm	8.70	21.92	46.05	8.62	21.11	46.11	8.66	21.51	46.08
T13: BR (Foliar spray) - 0.60 ppm	10.97	25.29	48.03	10.33	25.79	48.21	10.65	25.54	48.12
S.Em ±	0.451	0.301	0.118	0.087	0.290	0.161	0.229	0.209	0.100
CD 5%	1.310	0.874	0.342	0.252	0.844	0.469	0.651	0.593	0.283

Table 4: Effect of plant growth regulators and biofertilizers on seed yield/plant, number of seeds/pod and 1000 seed weight (g) of fenugreek

Treatments detail	Seed yield per plant (g)			Number of seeds per pod			1000 seed weight (g)		
	Ist year	IInd year	Pooled	Ist year	IInd year	Pooled	Ist year	IInd year	Pooled
T0: Distilled Water Spray	4.17	4.30	4.24	8.67	9.00	8.83	11.03	11.12	11.08
T1: Seed inoculation with 100% Rhizobium	7.96	7.45	7.70	11.67	11.00	11.33	13.02	13.14	13.08
T2: Seed inoculation with 100% Phosphorous solubilizing bacteria	7.57	7.33	7.45	11.33	11.00	11.17	12.94	13.01	12.98
T3: Seed inoculation with 50% Rhizobium + 50% PSB	11.07	10.70	10.88	13.67	13.33	13.50	13.95	14.00	13.98
T4: GA3 (Foliar spray) - 25 ppm	5.11	5.21	5.16	9.67	10.33	10.00	11.57	11.53	11.55
T5: GA3 (Foliar spray) - 50 ppm	5.98	5.86	5.92	10.33	10.33	10.33	12.23	12.33	12.28
T6: GA3 (Foliar spray) - 75 ppm	7.08	7.03	7.06	11.33	11.00	11.17	12.85	12.88	12.87
T7: GA3 (Foliar spray) - 100 ppm	10.31	9.74	10.02	13.33	13.00	13.17	13.65	13.51	13.58
T8: NAA (Foliar spray) - 5 ppm	4.78	4.86	4.82	9.67	10.00	9.83	11.34	11.29	11.32
T9: NAA (Foliar spray) - 10 ppm	5.57	5.54	5.56	10.33	10.33	10.33	11.83	11.94	11.88
T10: NAA (Foliar spray) - 15 ppm	6.61	6.48	6.54	10.67	10.67	10.67	12.71	12.76	12.74
T11: NAA (Foliar spray) - 20 ppm	9.61	9.24	9.43	13.33	13.00	13.17	13.46	13.43	13.45
T12: BR (Foliar spray) - 0.30 ppm	6.45	6.20	6.32	10.67	10.33	10.50	12.54	12.76	12.65
T13: BR (Foliar spray) - 0.60 ppm	8.65	8.18	8.41	12.33	11.67	12.00	13.22	13.26	13.24
S.Em ±	0.235	0.365	0.217	0.374	0.472	0.301	0.063	0.065	0.045
CD 5%	0.682	1.061	0.616	1.087	1.372	0.854	0.183	0.189	0.129

Table 5: Effect of plant growth regulators and biofertilizers on seed and biological yield (kg/ha) of fenugreek

Treatments detail	Seed yield (kg/ha)			Biological yield (kg/ha)		
	Ist year	IInd year	Pooled	Ist year	IInd year	Pooled
T0: Distilled Water Spray	1036.73	1040.73	1038.73	3213.86	3226.26	3220.06
T1: Seed inoculation with 100% Rhizobium	1602.33	1605.30	1603.81	4903.88	4913.71	4908.80
T2: Seed inoculation with 100% Phosphorous solubilizing bacteria	1587.12	1584.33	1585.73	4684.44	4711.15	4697.79
T3: Seed inoculation with 50% Rhizobium + 50%PSB	1794.58	1783.82	1789.20	5306.33	5312.90	5309.61
T4: GA3 (Foliar spray) - 25 ppm	1251.27	1256.01	1253.64	3628.68	3642.42	3635.55
T5: GA3 (Foliar spray) - 50 ppm	1365.52	1373.10	1369.31	4096.56	4119.29	4107.93
T6: GA3 (Foliar spray) - 75 ppm	1532.52	1527.87	1530.19	4602.66	4604.53	4603.60
T7: GA3 (Foliar spray) - 100 ppm	1720.66	1724.11	1722.39	5204.29	5173.08	5188.69
T8: NAA (Foliar spray) - 5 ppm	1151.09	1143.65	1147.37	3280.61	3259.40	3270.00
T9: NAA (Foliar spray) - 10 ppm	1306.35	1312.69	1309.52	3723.10	3741.17	3732.13
T10: NAA (Foliar spray) - 15 ppm	1487.12	1495.60	1491.36	4597.55	4594.57	4596.06
T11: NAA (Foliar spray) - 20 ppm	1684.55	1686.63	1685.59	4967.22	5008.62	4987.92
T12: BR (Foliar spray) - 0.30 ppm	1434.35	1438.92	1436.63	4589.92	4583.60	4586.76
T13: BR (Foliar spray) - 0.60 ppm	1655.37	1669.54	1662.45	4966.10	4976.42	4971.26
S.Em ±	29.565	18.307	17.387	88.161	54.418	51.802
CD 5%	85.944	53.217	49.341	256.279	158.191	147.004

Table 6: Effect of plant growth regulators and biofertilizers on economical parameters of fenugreek

Treatments detail	Economical parameters								
	Ist Year			IInd Year			Pooled		
	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
T0: Distilled Water Spray	82938	42938	2.1	83258	43258	2.1	83098	43098	2.1
T1: Seed inoculation with 100% Rhizobium	128186	87986	3.2	128424	88224	3.2	128305	88105	3.2
T2: Seed inoculation with 100% Phosphorous solubilizing bacteria	126970	86670	3.2	126747	86447	3.1	126858	86558	3.1
T3: Seed inoculation with 50% Rhizobium + 50% PSB	143567	103317	3.6	142706	102456	3.5	143136	102886	3.6
T4: GA3 (Foliar spray) - 25 ppm	100102	58902	2.4	100481	59281	2.4	100291	59091	2.4
T5: GA3 (Foliar spray) - 50 ppm	109242	66842	2.6	109848	67448	2.6	109545	67145	2.6
T6: GA3 (Foliar spray) - 75 ppm	122601	79001	2.8	122229	78629	2.8	122415	78815	2.8
T7: GA3 (Foliar spray) - 100 ppm	137653	92853	3.1	137929	93129	3.1	137791	92991	3.1
T8: NAA (Foliar spray) - 5 ppm	92087	51287	2.3	91492	50692	2.2	91790	50990	2.2
T9: NAA (Foliar spray) - 10 ppm	104508	62908	2.5	105015	63415	2.5	104762	63162	2.5
T10: NAA (Foliar spray) - 15 ppm	118970	76570	2.8	119648	77248	2.8	119309	76909	2.8
T11: NAA (Foliar spray) - 20 ppm	134764	91564	3.1	134931	91731	3.1	134847	91647	3.1
T12: BR (Foliar spray) - 0.30 ppm	114748	72948	2.7	115113	73313	2.8	114931	73131	2.7
T13: BR (Foliar spray) - 0.60 ppm	132429	88829	3.0	133563	89963	3.1	132996	89396	3.1

Conclusion

Based on the results of two years for economically profitability, it was concluded that Plant height, branch number per plant and leaf number per plant at 30, 60 and 90 days after sowing was found to be maximum when the seeds of fenugreek were inoculated with 50% Rhizobium+ 50% PSB (T3) during the first year and second year. Among the yield attributing traits, it was noted that higher number of pods/plant, number of seeds/pod, test weight, seed yield and biological yield the seeds of fenugreek were inoculated with 50% Rhizobium+ 50% PSB (T3) during the consecutive two years.

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