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Effect of natural farming practices on growth and yield of black gram under pigeonpea + black gram cropping system

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Abstract
The experiment entitled "Effect of natural farming practices on growth and yield of black gram under pigeonpea + black gram cropping system" was conducted during the *summer* season of 2018 at the Crop Research Centre, Chirauri of Sadar Vallabhbhai Patel University of Agriculture and Technology, Meerut (U.P.). The soil of the experimental field was sandy loam in texture and slightly alkaline in reaction. The soil was medium in organic carbon, available phosphorus and available potassium but low in available nitrogen. The experiment was laid out in randomized block design with 16 treatments comprising either sole or a combination of natural farming components (Beejamruth, jeevamruth, mulching with diancha and green manuring) replicated thrice. The results revealed that natural farming practices have a positive influence on growth and yield attributes of black gram. Application of jeevamruth and beejamurth positively influenced all the growth and yield parameters of black gram. Application of Beejamrutha + Jeevamrutha + Mulching + Green manure treatment recorded significantly higher growth attributes *viz*., plant height (68.89 cm), leaf area index (1.94 at 50 DAS), number of branches (10.48) and dry matter accumulation (12.54 g/plant at harvest), yield attributes namely number of pods/plant (38.42), number of grains/pod (7.48), 1000-grain weight (5.94) and grain yield/plant (46.78) and grain yield (10.62 q/ha) and straw yield (19.16 q/ha) as compared to control.

Keywords: ZBNF, beejamrutha, Jeevamrutha, mulching, black gram, yield, natural farming

Introduction
Pulses being the protein-rich crops but they are still being cultivated in more than 78 percent of energy-starved rainfed conditions. Hence, the level of productivity of these crops in India is far below the average productivity of the world. According to the working group report, India will have a sufficient supply of food grains towards 2032–33 and beyond. However, there will be a marginal deficit of around 5–7 million tonnes of pulses and coarse cereals [1]. Per capita availability of pulses in India has declined from 64 g per day (1951-56) to 38 g per day (2014-15), as against FAO/WHO's recommendation of 80 g per day [2]. This has led to the crisis of shortage of Pulses in India, which has aggravated the problem of malnutrition.

Thus, there is an urgent need to increase the production of pulses to meet the requirement, by manipulating the production technologies appropriately. Pigeonpea is one of the major pulse crops of the tropical and subtropical regions. It is grown predominantly under rainfed conditions. In India, pigeonpea ranks second in both area and production, next only to Chickpea. Pigeonpea is grown in an area of 4.53 m ha with a production and productivity of 3.89 million tonnes and 859 kg ha^{-1} respectively and in Karnataka, it is grown in an area of 0.88 m ha with a production of 0.73 m tonnes [3]. However, about 2-3 million tons of pulses are imported annually to meet the domestic consumption requirement. Thus, there is a need to increase the production and productivity of pulses in the country through more intensive interventions. Pigeonpea being a legume, fixes atmospheric nitrogen and the leaf fall at maturity adds organic matter to soil [4]. However, Pigeonpea is a long durated and robust crop that requires more space to grow. Hence, intercropping of short-duration crops in the interspace between two rows of wide-spaced crops helps in better resource utilization and stabilizes crop productivity by reducing the impact of weather vagaries and increasing the cropping intensity. Intercropping is a common practice among farmers in many parts of the dryland agroecological systems of the world. These intercrops apart from providing biological insurance also ensure higher total yield advantages than sole cropping due to the efficient utilization of resources. Short duration crops like green gram and black gram can be grown as

intercrop.

Blackgram (*Vigna mungo* (L), Hepper) is well-liked for its short duration and excellent nutritional contents, which include high levels of seed protein (25–26%), carbs (60%) and fat (1.5%), as well as minerals, vitamins, and amino acids [5]. This crop can be grown on marginal lands as a rainfed crop. However, because of its short duration, it is widely used as a catch crop or intercrop. Being a pulse crop it does not demand higher nutrients but nutrient management has to be kept in view to obtain optimum yields.

However, nutrient management is a prime factor that governs production. Nowadays, farmers are shifting from chemical agriculture to chemical free agriculture *i.e.*, organic and natural farming. Among them, Zero Budget Natural Farming (ZBNF), a novel concept in sustainable development [6]. Similar to organic farming, it replaces the use of synthetic pesticides as well as the enormous amounts of compost and farmyard manure used in organic farming with cover crops, green manure crops, and the use of desi cow preparations. Eco-friendly organic preparations derived from cow byproducts include Beejamrutha and Jeevamrutha. The use of cow products has the power to stimulate the growth process by bringing the flow of cosmic energy [7]. They are rich in critical macronutrients, micronutrients, vitamins, vital amino acids, growth-promoting substances including IAA and GA, and healthy bacteria [8]. The use of these cow-based byproducts were found to increase the growth and yield of many crops. By keeping the above facts in view, the present investigation was carried out to study the effect of natural farming practices on the growth and yield of black gram under pigeonpea + black gram cropping system.

Materials and Method

The study entitled Effect of natural farming practices on growth and yield of black gram under pigeonpea + black gram cropping system was conducted during the *summer* season of 2018 at the Crop Research Centre, Chirauri of Sadar Vallabhbhai Patel University of Agriculture and Technology, Meerut (U.P.). The experimental field was located at a latitude of 29^0 40' North and longitude of 77^0 42' East with an elevation of 237 meter above mean sea level. The soil of the experimental field was sandy loam in texture and slightly alkaline in reaction. The soil was medium in organic carbon, available phosphorus and available potassium but low in available nitrogen. The experiment was laid out in randomized block design with 16 treatments comprising either sole or a combination of natural farming components (Beejamruth, jeevamruth, mulching with diancha and green manuring) replicated thrice. Certified seed of pigeonpea variety Pusa-2001 was sown @ 12-15 kg/ha. Black gram (Shekhar-2) was sown two weeks after pigeonpea @ 20-25 kg/ha with a row-to-row spacing of 30 cm. The data collected during the course of study were subjected to statistical analysis as mentioned by Gomez and Gomez [9].

Results and Discussion

Effect of natural farming practices on growth of Black gram

Data on growth parameters (plant height, leaf area index, number of branches/plant and dry matter accumulation) as influenced by different natural farming practices are presented in Table 1.

The natural farming treatments had a significant effect on black gram growth parameters. Significantly taller plants (68.89 cm) were recorded with the application of Beejamrutha + Jeevamrutha + Mulching + Green manure treatment which remained on par with rest of the treatment except control. The solubilization of nutrients in the soil and proper absorption of nutrients and moisture as a result of the application of jeevamrutha to the soil could be the cause of the improvement in growth characteristics. Similar findings were made by Somasundaram [10] in green gram, Selvaraj [11] in french bean.

Significantly higher leaf area index (1.94 at 50 DAS), number of branches (10.48) and dry matter accumulation (12.54 g/plant at harvest) was recorded with the Beejamrutha + Jeevamrutha + Mulching + Green manure treatment as compared to RDF and control plots. This might be as a result of the presence of cow dung in jeevamrutha, which serve as a medium for the growth of advantageous microbes, and cow urine, which supplies nitrogen necessary for crop growth and yield. There may also be a positive impact of growth hormones, which hasten the mobility of photosynthates which ultimately resulted in higher growth parameters *viz*., leaf area index, number of branches and dry matter accumulation. The results are in line with the findings of De-britto and Girija [12], Yogananda *et al*. [13] and Siddappa *et al*. [14].

Effect of natural farming practices on yield attributes of Black gram

Data on yield attributes *viz*., number of pods/plant, number of grains/pod and 1000-grain weight as influenced by different natural farming practices are presented in Table 2.

Treatment with Beejamrutha + Jeevamrutha + Mulching + Green manure recorded significantly higher yield attributes *viz*., number of pods/plant (38.42), number of grains/pod (7.48), 1000-grain weight (5.94) and grain yield/plant (46.78) which was on par with Beejamrutha + Mulching + Green manure treatment but significantly higher over control. The use of Jeevamruth has boosted black gram yield parameters for several reasons. The stimulation in the plant system may have been produced by Jeevamruth and beejamruth's abundance of growth regulators and beneficial microorganisms. This might have enhanced the entire cell system for further growth regulator production. Which increases the production and assimilation of photosynthates in the reproductive parts resulting in higher yield attributes. According to Kalarani [15] the activity of growth regulators in plant systems accelerated the required growth and development in plants, resulting in a higher yield. According to Selvaraj [11] the French Bean var. had the maximum pod yield when Panchagavya was given as a nutritious spray.

Effect of natural farming practices on yield of Black gram

Data on grain yield, stover yield, biological yield and harvest index of black gram as affected by different natural farming practices is presented in Table 3.

The highest grain yield (10.62 q/ha), straw yield (19.16 q/ha) and biological yield (29.78 q/ha) were recorded with the application of Beejamrutha + Jeevamrutha + Mulching + Green manure treatment which was followed by Beejamrutha + Mulching + Green manure treatment, but significantly higher over control. The harvest index was significantly higher (35.66 %) with the treatment Beejamrutha + Jeevamrutha + Mulching + Green manure as compared to the control. Beejamrutha + Jeevamrutha + Mulching+ Green manure reported a much greater grain yield, which can be

attributed to the combinations of natural farming component's improved yield-attributing characteristics, such as the number of pods per plant, pod weight per plant, number of seeds per pod, and test weight. Blackgram's increased grain and straw yield in response to natural farming practices may be attributable to higher nutrient availability throughout crop growth, which was further ensured by improved microbial activity in the soil. The results confirm the findings of Ugale [16], Kumbar *et al*. [17] and Sutar *et al*. [18].

Table 1: Effect of different natural farming treatments on growth parameters of black gram

Treatments	Growth parameters			
	Plant height (At harvest) (cm)	LAI (50 DAS)	No. of branches per plant (At harvest)	Dry matter accumulation (At harvest) (g/plant)
T_1-Control	61.16	1.02	6.90	7.46
T_2-RDF	65.04	1.50	8.59	8.41
T_3-Beejamrutha	65.18	1.52	8.86	8.72
T_4-Jeevamrutha	65.44	1.54	8.96	9.01
T_5-Mulching	65.62	1.59	9.10	9.29
T_6-Green manure	65.87	1.62	9.18	9.61
T_7-Beejamrutha + Jeevamrutha	66.23	1.68	9.24	9.89
T_8-Beejamrutha + Mulching	66.46	1.69	9.38	10.21
T_9-Beejamrutha + Green manure	66.75	1.72	9.52	10.52
T_{10}-Jeevamrutha + Mulching	66.92	1.75	9.69	10.84
T_{11}-Jeevamrutha + Green manure	67.29	1.78	9.82	11.10
T_{12}-Mulching + Green manure	67.47	1.87	9.91	11.37
T_{13}-Beejamrutha + Jeevamrutha + Mulching	67.78	1.88	10.06	11.64
T_{14}-Jeevamrutha + Mulching + Green manure	68.31	1.90	10.20	11.92
T_{15}-Beejamrutha + Mulching + Green manure	68.52	1.92	10.33	12.26
T_{16}-Beejamrutha + Jeevamrutha + Mulching + Green manure	68.89	1.94	10.48	12.54
SEm±	2.39	0.06	0.34	0.38
CD (P=0.05)	6.81	0.18	0.97	1.08

Table 2: Effect of different natural farming practices on yield attributes of black gram

Treatments	Yield attributes			
	No. of pods plant^{-1}	No. of grains pod^{-1}	Grain yield plant^{-1} (g)	1000 grain weight (g)
T_1-Control	19.71	3.68	3.87	37.38
T_2-RDF	27.63	4.48	4.26	43.79
T_3-Beejamrutha	28.96	4.66	4.39	43.91
T_4-Jeevamrutha	29.84	4.74	4.48	44.38
T_5-Mulching	30.08	4.89	4.57	44.64
T_6-Green manure	30.72	5.14	4.65	44.78
T_7-Beejamrutha + Jeevamrutha	31.58	5.26	4.76	44.93
T_8-Beejamrutha + Mulching	32.36	5.41	4.87	45.23
T_9-Beejamrutha + Green manure	32.78	5.59	5.10	45.43
T_{10}-Jeevamrutha + Mulching	33.18	5.73	5.18	45.68
T_{11}-Jeevamrutha + Green manure	33.92	5.88	5.30	45.79
T_{12}-Mulching + Green manure	34.48	6.27	5.41	46.08
T_{13}-Beejamrutha + Jeevamrutha + Mulching	35.28	6.44	5.58	46.22
T_{14}-Jeevamrutha + Mulching + Green manure	36.45	6.78	5.72	46.37
T_{15}-Beejamrutha + Mulching + Green manure	37.64	7.20	5.81	46.59
T_{16}-Beejamrutha + Jeevamrutha + Mulching + Green manure	38.42	7.48	5.94	46.78
SEm±	1.18	0.21	0.18	1.62
CD (P=0.05)	3.36	0.59	0.52	NS

Table 3: Effect of different natural farming practices on yield (q ha^{-1}) of black gram

Treatments	Yield (q ha^{-1})			Harvest index
	Grain	Straw	Biological	
T_1-Control	5.16	15.36	20.52	25.15
T_2-RDF	6.69	16.00	22.69	29.48
T_3-Beejamrutha	6.83	16.10	22.93	29.78
T_4-Jeevamrutha	7.25	16.18	23.43	30.94
T_5-Mulching	7.67	16.25	23.92	32.07
T_6-Green manure	7.89	16.37	24.26	32.52
T_7-Beejamrutha + Jeevamrutha	8.18	16.54	24.72	33.09
T_8-Beejamrutha + Mulching	8.43	16.68	25.11	33.57
T_9-Beejamrutha + Green manure	8.76	16.78	25.54	34.30
T_{10}-Jeevamrutha + Mulching	8.98	17.12	26.10	34.41
T_{11}-Jeevamrutha + Green manure	9.22	17.34	26.56	34.71
T_{12}-Mulching + Green manure	9.63	17.58	27.21	35.39
T_{13}-Beejamrutha + Jeevamrutha + Mulching	9.88	17.75	27.63	35.76
T_{14}-Jeevamrutha + Mulching + Green manure	10.18	18.63	28.81	35.33
T_{15}-Beejamrutha + Mulching + Green manure	10.42	18.88	29.30	35.56
T_{16}-Beejamrutha + Jeevamrutha + Mulching + Green manure	10.62	19.16	29.78	35.66
SEm±	0.32	0.62	0.93	1.21
CD (P=0.05)	0.90	1.75	2.65	3.43

Conclusion

The results revealed that natural farming practices have a positive influence on growth and yield attributes on black gram. Application of jeevamruth and beejamurth positively influenced all the growth and yield parameters of black gram. Combination of Beejamrutha + Jeevamrutha + Mulching + Green manure treatment recorded significantly higher growth and yield attributes along with yield.

References

1. Gulati A, Juneja R. Transforming Indian Agriculture. InIndian Agriculture Towards 2030: Pathways for Enhancing Farmers' Income, Nutritional Security and Sustainable Food and Farm Systems, Singapore: Springer Singapore; c2022, p. 9-37.
2. Gowda CLL, Chaturvedi SK, Gaur PM, Sameer Kumar CV, Jukanti AK. Pulses research and development strategies for India. In: Pulses Handbook 2015. Commodity India, Bangalore; c2015. p. 17-33.
3. Anonymous. Agriculture statistics at glance (2021). Ministry of Agriculture & Farmers Welfare Department of Agriculture & Farmers Welfare Directorate of Economics & Statistics, Government of India; c2022, p. 457. www.agricoop.nic.in & https://desagri.gov.in.
4. Das A, Ghosh PK. Role of legumes in sustainable agriculture and food security: an Indian perspective. Outlook on Agriculture. 2012;41(4):279-84.
5. Elangaimannan R, Anbuselvam Y, Karthikeyan P. Genetic diversity in Blackgram (*Vigna mungo* (L.) Hepper). Legume research. 2008;31(1):57-59.
6. Khadse A, Rosset PM, Morales H, Ferguson BG. Taking agroecology to scale: The zero budget natural farming peasant movement in Karnataka, India. The Journal of Peasant Studies. 2018;45(1):192-219.
7. Natarajan K. Panchagavya for plant Proc. Nation. Conf. Glory Gomatha, S. V. Veterinary Univ., Tirupati; c2007, p. 72-75
8. Chopra R, Singh A. Organic inputs: nutritious way for sustainable agriculture. Editorial Board, 2020, 32.
9. Gomez KA, Gomez AA. Statistical Procedure for Agricultural Research. John Wiley and Sons, New York; c1984.
10. Somasundaram E. Evaluation of organic sources of nutrients and panchagavya spray on the growth and productivity of maize- sunflower- Greengram system. Ph.D. Thesis (Unpub.), Univ. Agric. Sci. Tamil Nadu, India; c2003.
11. Selvaraj N. Organic farming at Horticulture Research station. Tamil Nadu Agriculture University, Ooty, India; c2003. p. 2-5
12. De Britto JA, Girija SL. Investigation on the effect of organic and inorganic farming methods on blackgram and Greengram. Indian J Agric. Res. 2006;40(3):204-207.
13. Yogananda SB, Devakumar N, Shruti MK, Ningaraju. Growth and yield of cowpea as influenced by different sources of organic manures, National. Symp. Org. Agric. for Sust. Food Sec. Challenges and Opp., Tamil Nadu, India, 2015, 113.
14. Siddappa, Murali K, Devakumar N. Organically grown field bean (*Lablab purpureus* Var. **lignosus**) using jeevamrutha and farm yard manure. National. Conf. on Sust. And Self-Sufficient Production of Pulses through an Integrated Approach, Bengaluru; c2016. 105-107.
15. Kalarani MK. Senescence regulation in soyabean (*Glycine max* (L.) Merill). M.Sc. (Ag.) Thesis, submitted to Tamil Nadu Agric. Univ., Coimbatore; c1991.
16. Ugale NS. Effect of different organic inputs with jeevamrut on yield, quality and soil properties in soybean-wheat cropping sequence (Doctoral dissertation, PhD Dissertation, Mahatma Phule Krishi Vidyapeeth, Rahuri, India); c2014.
17. Kumbar BA, Devakumar N. Effect of jeevamrutha and Panchgavya on growth, yield and microbial population of french bean (*Phaseolus vulgaris* L.). Advanced Life Sciences. 2016;5:3619-23.
18. Sutar R, Sujith GM, Devakumar N. Growth and yield of Cowpea [*Vigna unguiculata* (L.) Walp] as influenced by jeevamrutha and panchagavya application. Legume Research-An International Journal. 2019;42(6):824-828.