E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; SP-7(12): 67-69
Received: 08-08-2024
Accepted: 20-09-2024

Trisha Banerjee
M.Sc. Scholar, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Aniket Singh
M.Sc. Scholar, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Dr. Umesha C.
Assistant Professor, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Trisha Banerjee
M.Sc. Scholar, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Application of solid and liquid organic manures on growth and yield attributes of mustard

Trisha Banerjee, Aniket Singh and Umesha C

DOI: https://doi.org/10.33545/2618060X.2024.v7.i12Sb.2095

Abstract
The field experiment was conducted during Rabi 2023 at Crop Research Farm, Department of Agronomy, SHUATS, and Prayagraj (U.P). The experiment was laid out in Randomized Block Design with ten treatments which are replicated thrice based on one year experimentation. The treatment combinations are T_1 Farm yard manure 10t/ha + Panchagavya - 5%, T_2 Farm yard manure 10t/ha + Vermiwash - 5%, T_3 Farm yard manure 10t/ha + cow urine - 2%, T_4 Vermicompost 6t/ha + Panchagavya - 5%, T_5 Vermicompost 6t/ha + vermiwash - 5%, T_6 Vermicompost 6t/ha + cowurine - 2%, T_7 Poultry manure 2t/ha + Panchagavya - 5%, T_8 Poultry manure 2t/ha + vermiwash - 5%, T_9 Poultry manure 2t/ha + cowurine - 2%, T_{10} Control (20:40:40) are used. Results obtained The application of Poultry manure 2t/ha + Panchagavya 5% recorded significantly higher Plant height (141.0 cm), Plant dry weight (43.13 g/plant), Significantly maximum number of siliqua per plant (77.7), siliqua length (7.2), Test weight (5.21 g), Seed yield (678.68 kg/ha), stover yield (698.04 kg/ha), Harvest index (49.29%), were recorded with the treatment of Poultry manure 2t/ha + Panchagavya 5%.
Higher gross returns (85.914.36INR/ha), net return (58.964.36INR/ha) and benefit cost ratio (2.18) was obtained in the treatment of Poultry manure 2t/ha + Panchagavya 5%.

Keywords: Cow urine, farm yard manure, mustard, vermiwash, panchagavya, farm yard manure, vermicompost

Introduction
Indian mustard (Brassica juncea) is popular with different names according to different regions like Chinese mustard, Rai or Loha, Raya, brown mustard, leaf mustard and locally known as khardal (Rafii *et al*., 2011) [3]. According to Sanskrit records dating back to about 3000 BC, mustard is one of the oldest and most domesticated spices. In Latin, the word mustard means "must or must." It belongs to the cruciferae family and is native to the Middle East, India and China. After palm and soy, mustard is the most important oil crop in the world. It is a cool season crop and follows the C_3 pathway and requires a temperature range between 06-26ºC. It has an efficient photosynthetic response at 15-20ºC. It is generally grown in rainfed, well-drained soils and moderately tolerant of acidic soil.
bio stimulant is vermiwash, which is mostly used as a foliar application. Contains N 0.29%, P 0.042%, K 0.143%, Ca 0.186%, Mg 0.11%, S 0.058%, Fe 0.466 ppm, Mn 0.406 ppm, Zn 0.11 ppm, Cu 0.18 ppm. It is a transparent pale yellow to brown biofertilizer and a mixture of excretory product and mucous secretion of earthworm and soil organic micronutrients which can be promoted as a potent biofertilizer for better growth and yield (Shweta et al., 2005) [4].. Vermicompost has approximately 1300 ppm humic acid, 116 ppm dissolved oxygen, 50 ppm inorganic phosphate, 168 ppm potassium and 121 ppm sodium (Haripriya and Pookodi, 2005) [2]. Due to these diverse ingredients, vermiwash is mostly suitable for every plant for better growth and yield. The main objective of this review is to determine the effects of these biostimulants individually and in combination with other applications on different crops as investigated by different researchers.
Cattle urine is a good source of nitrogen, phosphate, potassium, calcium, magnesium, chlorite and sulfate.

Application of cow urine has also been reported to correct micronutrient deficiencies, in addition to improving soil structure and acting as a plant hormone. Therefore, cow urine in an integrated livestock-based agricultural system seems to have great potential for use as a biofertilizer to save crop production.
Cow urine contains 95% water, 2.5% urea and 2.5% minerals, salts, hormones and enzymes. It also contains essential minerals such as iron, calcium, phosphorus, carbonic acid, potash, nitrogen, ammonia, manganese, sulphur, phosphates and potassium, urea, uric acid, amino acids, enzymes, cytokinin, lactose, etc. (Bhadauria, 2002) [1].

Materials and Methods

The experiments on the effect of Solid and liquid organic manures along with recommended dose of fertilizers (RDF) on the growth and yield enhancement of mustard were conducted at *Rabi* season of 2023 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj which is located at 25^0 24 42 N latitude, 81^0 50 56 E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Prayagraj Rewa Road about 5 km away from Prayagraj city. A composite soil sample was collected at a depth of 0-30 cm. It was air dried, crushed, and tested for physical and chemical properties. The soil was sandy clay loam in texture with soil reaction of (pH 7.3), 0.57 organic matter (0.63%), available nitrogen (152.6 kg/ha), phosphorus (9.27 kg/ha), potassium (149.40 kg/ha), sulphur (6.6 mg/kg), Zn (0.45 mg/kg) and available B (0.36 mg/kg).

Mustard variety: Varuna were selected for sowing. Seeds were sown in line manually on 2023. Seeds were covered with the soil immediately after sowing. The spacing adopted was plant to plant 10 cm and row to row 30 cm according to the treatment details and the seeds were drilled at 3-4 cm depth. Gap filling & Thinning was done at 8 DAS to maintain the plant population according to treatment in order to attain recommended plant population for proper growth and yield of crop.

Results and Discussion

Plant height

There was significant difference among the treatments. However, highest plant height (141.0 cm) was recorded with the application of Poultry manure 2t/ha + Panchagavya - 5%, whereas treatment Poultry manure 2t/ha + Vermiwash - 5% (136.3 cm) was found to be statistically at par with T_7, and minimum was reported in control (126.7 cm).

Plant dry weight

At 100 DAS there was significant difference among the treatments. However, highest dry weight (29.48g) was recorded with the application of Poultry manure 2t/ha + Panchagavya - 5%, whereas treatment Poultry manure 2t/ha + Vermiwash - 5% (28.84 g) was found to be statistically at par with T_7, and minimum was reported in control (24.44 g).

Number of siliqua per plant

Significantly Maximum number of siliqua per plant (77.7) was recorded with the treatment in application of Poultry manure 2t/ha + Panchagavya - 5% and minimum was recorded in control (64.1), whereas Poultry manure 2t/ha + Veriwash - 5% (74.9) was statistically at par with T_7.

Number of seeds/siliqua

Maximum number of siliqua length (7.2 cm) was recorded with the treatment in application of Poultry manure 2t/ha + Panchagavya - 5% and minimum was recorded in control (5.0 cm), whereas Poultry manure 2t/ha + Veriwash - 5% (7.1 cm) was statistically at par with T_7.

Seed yield (kg/ha)

Significantly Maximum seed yield (678.68 kg/ha) was recorded with the treatment in application of Poultry manure 2t/ha + Panchagavya - 5% and minimum was recorded in control (349.27 kg/ha) Whereas Poultry manure 2t/ha + vermiwash - 5% (620.42 kg/ha) was statistically at par with T_7

Stover yield (kg/ha)

Significantly Maximum stover yield (698.04 kg/ha) was recorded with the treatment in application of Poultry manure 2t/ha + Panchagavya - 5% and minimum was recorded in control (569.87 kg/ha), whereas Poultry manure 2t/ha + vermiwash - 5% (695.09 kg/ha) was statistically at par with T_7

Harvest index (%)

Maximum harvest index (49.29%) was recorded with the treatment in application of Poultry manure 2t/ha + Panchagavya - 5% and minimum was recorded in control (27.47%), whereas Poultry manure 2t/ha + vermiwash - 5% (47.48%) was statistically at par with T_7

Table 1: Effect of Solid and Liquid organic manures on yield attributes and yield of Mustard

S. No	Treatments	Number of siliqua/plant	Number of seeds/siliqua	Test weight	Seed Yield	Stover Yield	Harvest Index
1.	Farm yard manure 10t/ha + Panchagavya 5%	72.9	6.1	4.76	470.38	569.87	45.21
2.	Farm yard manure 10t/ha + Vermiwash 5%	71.5	6.0	4.39	424.51	593.42	41.70
3.	Farm yard manure 10t/ha + Cow urine 2%	69.7	6.1	4.11	392.32	591.38	39.88
4.	Vermicompost 6t/ha + Panchagavya 5%	68.2	5.2	4.00	428.24	678.36	32.60
5.	Vermicompost 6t/ha + Vermiwash 5%	67.2	5.1	3.88	396.50	668.03	30.74
6.	Vermicompost 6t/ha + Cow urine 2%	65.7	5.1	3.67	480.26	636.24	30.58
7.	Poultry manure 2t/ha + Panchagavya 5%	77.7	7.2	5.21	678.68	698.04	49.29
8.	Poultry manure 2t/ha + Vermiwash 5%	74.9	7.1	5.14	620.42	695.09	47.48
9.	Poultry manure 2t/ha + Cow urine 2%	70.7	6.3	5.09	534.85	632.17	45.48
10.	Control (FYM 10t/ha)	64.1	5.0	3.50	249.27	657.89	27.47
	F - Test	S	S	S	S	S	S
	SEm±	1.16	0.07	0.05	35.66	15.37	0.90
	CD (p=0.05)	3.43	0.20	0.15	105.97	45.68	2.70

Table 2: Application of solid and liquid organic manures on growth attributes Mustard

S. No	Treatments	At 100 DAS			During 60-80DAS
		Plant height (cm)	Plant dry weight (gm/plant)	Crop Growth rate (g/g/day)	Relative growth rate (g/g/plant)
1.	Farm yard manure 10t/ha + Panchagavya 5%	135.0	27.98	3.73	0.005
2.	Farm yard manure 10t/ha + Vermiwash 5%	133.5	27.33	3.83	0.005
3.	Farm yard manure 10t/ha + Cow urine 2%	132.3	26.34	3.81	0.005
4.	Vermicompost 6t/ha + Panchagavya 5%	131.9	26.21	3.85	0.006
5.	Vermicompost 6t/ha + Vermiwash 5%	130.1	25.78	3.75	0.006
6.	Vermicompost 6t/ha + Cow urine 2%	129.4	25.57	3.93	0.006
7.	Poultry manure 2t/ha + Panchagavya 5%	141.0	29.48	3.72	0.005
8.	Poultry manure 2t/ha + Vermiwash 5%	136.3	28.84	3.81	0.004
9.	Poultry manure 2t/ha + Cow urine 2%	135.1	28.09	3.80	0.004
10.	Control (FYM 10t/ha)	126.7	24.44	3.78	0.007
	F - Test	S	S	S	NS
	SEm±	1.85	0.35	0.24	0.0004
	CD (p=0.05)	5.51	1.05	0.72	0.005

Conclusion

It was concluded that for obtaining higher yield components with better quality of Mustard application of Poultry manure 2t/ha + Panchagavya - 5% was recorded significantly higher number of siliqua per plant (77.7), siliqua length (7.2) Seed yield (678.68 kg/ha), and benefit cost ratio (2.18) as compared to other treatments. Since, the finding based on the research done in one season.

Acknowledgement

I am grateful to my advisor as well as all the faculty members of Department of Agronomy for
their unwavering support and advice throughout the entire experimental research study.

References

1. Bhadauria H. Cow urine: A magical therapy. International Journal of Cow Science. 2002;1:32-36.
2. Haripriya K, Poonkodi P. Role of organic mulches and foliar nutrition on changes, nutrient uptake and residual soil fertility in tuberose. Advances in Plant Sciences. 2005;18(1):175-178.
3. Rafiei S, Delkhosh B, Shirani AH, Zandi H. Effect of sowing dates and irrigation regimes on agronomic traits of Indian mustard in semi-arid area of Takestan. Journal of Science. 2011;7(10):721-728.
4. Shweta A, Yadav K, Kumar K, Sharma M. Vermiwash: A liquid biofertilizer. Uttar Pradesh Journal. 2005;25(1):97-99.
5. Mahajan SS, Kumawat RN, Mertia RS. Organic seed production of cumin (*Cuminum cyminum* L.) with foliar application of panchgavya and plant leaf extracts in arid western Rajasthan. International Journal of Seed Spices. 2012;2(2):19-26.
6. Somasundaram E, Sankaran N, Meena N, Thiyagarajan TM, Chandragiri KK, Panneerselvam S. Response of green gram to varied concentrations of panchagavya (organic nutrition) foliar application. Madras Agricultural Journal. 2003;90:169-172.
7. Sridhar T. Effect of bio-regulators on black nightshade (*Solanum nigrum*). [MSc thesis]. Coimbatore: Tamil Nadu Agricultural University; c2003.
8. Yadav BK, Lourduraj CA. Effect of organic manures and panchagavya spray on rice (*Oryza sativa*) quality. Crop Research. 2006;32(1):6-10.
9. Ansari S. Efficiency evaluation of commercial liquid biofertilizer for growth of *Cicer arietinum* (chickpea) in pot and field study. Biocatalysis and Agricultural Biotechnology; c2014.
10. Ali MN, Ghatak S, Ragul T. Biochemical analysis of panchagavya and sanjibani and their effect on crop yield and soil health. Journal of Crop and Weed. 2011;7(2):84-86.
11. Baraker B, Jha SK, Wani SP, Garg KK. Effect of balanced fertilizer management practices on factor productivity in groundnut (*Arachis hypogaea* L.) cultivation. International Journal of Chemical Studies. 2017;5(4):1288-1291.
12. Bouyoucos GJ. Hydrometer method improved for making particle size analyses of soil. Agronomy Journal. 1962;54:464-465.
13. Chadha S, Rameshwar A, Saini JP, Paul YS. Role of panchagavya in production and protection of vegetable crops. Journal of Crop and Weed. 2013;35:45-50.
14. Chaudhary PB, Shah SK, Chaudhary MG, Patel JK, Chaudhary KV. Effect of potassium on growth, yield and quality of groundnut (*Arachis hypogaea* L.) grown in loamy sand soil. International Journal of Current Microbiology and Applied Sciences. 2019;8(9):2723-2731.
15. Deshapande VK, Kurdikeri MB, Shakunthala NM. Effect of seed hardening with organic substances on seed quality of Bengal gram. Karnataka Journal of Agricultural Sciences. 2008;21(1):118-119.
16. Deshpande AD. Neem as a seed protectant against storage pests of sorghum. [MSc thesis]. New Delhi: Indian Agricultural Research Institute; c2004.
17. Deshpande VK, Sibi VG, Vyakarnahal BS. Effect of botanical seed treatment against *Callosobruchus chinensis* on viability of black gram seed during storage. Seed Research. 2006;32(2):193-196.
18. Bekele G, Dechassa N, Tana T. Effect of inorganic and organic fertilizers on productivity of groundnut (*Arachis hypogaea* L.) varieties in East Hararghe, Eastern Ethiopia. International Journal of Current Microbiology and Applied Sciences; c2022.
19. Karunakaran V, Rammohan J, Chellamuthu V, Poonghuzhalan R. Effect of integrated nutrient management on growth and yield of groundnut (*Arachis hypogaea*) in the coastal region of Karaikal. Indian Journal of Agronomy. 2009;55(2):128-132.
20. Olsen SR. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. U.S. Department of Agriculture; c1954.