Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.8845

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2021) *9*(6), 8-12

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Research Article

Response of Organic Manure and Seed Rate on Growth, Yield and Quality of Linseed (*Linum usitatissimum* L.)

Harshita Tiwari[1*] and T. Singh[2]

[1]M. Sc. (Ag) Student, Department of Agronomy, AKS University, Satna (M.P.)

[2]Professor and head agronomy, AKS University, Satna (M.P.)

*Corresponding Author E-mail: harshitatiwari624@gmail.com

Received: 25.10.2021 | Revised: 6.12.2021 | Accepted: 14.12.2021

ABSTRACT

A field experiment was conducted to study the effect of organic manure and seed rate on growth, yield and quality of linseed at student instructional farm, department of Agronomy, Faculty of Agriculture, AKS University, Sherganj, Satna (M.P.) during rabi season of 2020-21. The experiment consisted of randomize block design having factorial arrangement with three replications. In this experiment, twelve treatments combinations were evaluated i.e. four levels of organic manures (Vermicompost @ 5ton/ha, FYM @ 5ton/ha, Compost @ 5ton/ha and Paddy husk @ 5ton/ha, and their seed rate i.e. 25kg/ha, 30kg/ha and 35kg/ha) were involved. Higher plant height at 90 DAS (54.57 cm) was obtained with application of vermicompost @ 5 t/ha with crop sown the seed rate of35 kg/ha, while maximum number of branches per plant at maximum crop growth stage of 90 DAS (7.40), number of capsules per plant (59.13), number of seeds/capsule (9.13), test weight (8.61 g) was obtained with application of vermicompost @ 5 t/ha with crop sown the seed rate of25 kg/ha. While maximum seed and straw yield (22.75 and 41.99 q/ha, respectively) as well as oil content (40.49 %) were recorded in plots treated with the application of vermicompost @ 5 t/ha with crop sown the seed rate of35 kg/ha. It was concluded from the results that application of vermicompost @ 5 t/ha with crop sown the seed rate of35 kg/ha improved yield and yield components of linseed.

Keywords: *Linseed, Branches, Capsule, Test weight, Straw yield.*

INTRODUCTION

Linseed (*Linum usitatissimum* L.), also known as flax is a member of genus Linum in the family Linaceae. It is commonly known as Alashi or Alsi. Every part of the linseed plant is utilized commercially, either directly or after processing. On a very small-scale seed is directly used for edible purposes. It contains 33 to 47% of oil. About 20% of the total oil produced is used at farmer's level and the rest 80% oil goes to industries in various forms such as boiled oil, borated oil, epoxidized oil, aluminates oil, urethane oil, isomerizes oil etc.

Cite this article: Tiwari, H., & Singh, T. (2021). Response of Organic Manure and Seed Rate on Growth, Yield and Quality of Linseed (*Linum usitatissimum* L.), *Ind. J. Pure App. Biosci. 9*(6), 8-12. doi: http://dx.doi.org/10.18782/2582-2845.8845

Crop productivity is still very low. On the other hand, there is increasing evidence that the uses of poor cultural practices as well as traditional cultivars and imbalance fertilization are the main yield limiting factors. Yet, the improvement of yield through manipulation of seed rate and balanced fertilization is possible. Accordingly, the research focused on detecting the suitable organic manure and seed rate on linseed under semi-arid region in the sandy soils.

The combined use of organic manure and inorganic fertilizers in crop production has been widely recognized as a way of increasing yield and improving productivity of the soil. Agricultural activities produce billions of tons of other materials long regarded as waste. Recycling agricultural wastes can help a developing country to reduce its dependence on foreign energy supplies and raise the standard of living in its rural areas. A process related to composting which can improve the beneficial utilization of organic wastes is Vermicomposting. Vermicompost's have excellent chemical and physical properties that compare favorably to traditional composts. The application of FYM does maintains not only soil health but also provide nutrients for long time due to its slow mineralization. In India, paddy husk is highly available amendment in large quantities. The paddy husk increases the soil pH, thereby increasing available phosphorous, it improves the aeration in the crop root zone and also increases the water holding capacity and level of exchangeable potassium and magnesium.

MATERIALS AND METHODS

The experiment was carried out at Agronomy instructional farm, Faculty of Agriculture, AKS University, Satna (M.P.) during *rabi* season 2020- 21. The experiment was conducted in randomize complete block design having Factorial concept with three replications. Different rates of organic manure and seed rate allocated to the plots as per treatments. Twelve treatment combinations including four levels of organic manure and treatments were OM_1- Vermicompost, OM_2- FYM, OM_3- Compost and OM_3- Paddy husk, while three seed rates were tested are S_1- 25 kg/ha, S_2- 30 kg/ha and S_3- 35 kg/ha. The gross and net plot size was 5.0 m x 3.5 m and 4.0 m x 3.0 m, respectively. Full recommended dose of phosphorus and potassium at the rate of 40 kg P_2O_5/ha and 40 Kg K_2O /ha, respectively was uniformly applied to each plot (except control plots) as basal dose before sowing. Nutrient, nitrogen was applied @ 60 kg/ha. Half dose of nitrogen and full dose of phosphorus and potassium was applied as basal dose and remaining half dose of nitrogen was applied in two equal splits during first and second irrigation. Fertilizers were applied by placement i.e., 5 cm away from seed row and of 5 cm below the seed zone. All the other agronomic practices were applied uniformly to all the treatments.

RESULTS AND DISCUSSION

The result shows that plant height, number of branches per plant, number of capsules per plant, number of seeds/capsule, test weight, seed, straw yield and oil content was influenced significantly due to different organic manure and seed rate and reported in Table- 1.

Statistical analysis of the data revealed that maximum Higher plant height at 90 DAS (54.57 cm) was obtained with application of vermicompost @ 5 t/ha with crop sown the seed rate of35 kg/ha, while maximum number of branches per plant at maximum crop growth stage of 90 DAS (7.40), number of capsules per plant (59.13), number of seeds/capsule (9.13), test weight (8.61 g) was obtained with application of vermicompost @ 5 t/ha with crop sown the seed rate of 25 kg/ha. While maximum seed and straw yield (22.75 and 41.99 q/ha, respectively) as well as oil content (40.49 %) were recorded in plots treated with the application of vermicompost @ 5 t/ha with crop sown the seed rate of35 kg/ha.

The increase in growth attributes with the application of vermicompost might be due to improved photo synthetically active leaf area for longer period during vegetative and reproductive phases, led to more absorption

and utilization of radiant energy which ultimately resulted in higher dry matter accumulation and significant increase in plant growth. Significant improvement in growth attributes was observed by the use of inorganic sources of nutrient in combination with vermicompost.

The combined application of NPK and vermicompost to the linseed increased the availability of major nutrients to plant as it might has enhanced early root growth and cell multiplication leading to more absorption of other nutrients from soil deeper layers ultimately resulting in increased plant growth. It is an established fact that organic sources of nutrients *viz.,* vermicompost improves the physical, chemical and biological properties of soil including supply of almost all the essential plant nutrients for growth and development of plants along with growth hormones and beneficial microbes which might have developed more favorable environment of nutrients in soil for longer period resulted in increased plant height, new shoots and increased dry matter accumulation. It is fact that organic matter acts as a chelate for nutrients and soluble chelates probably increase their availability and uptake to plants and mobility in soils. The findings of present investigation are in conformity with the findings of Sunil et al. (2018a) and Sunil et al. (2020).

In lower seed rate treatment, there was less numbers of plant per unit area which helps to grow the plants horizontally than vertically and that bears more numbers of branches and capsules ultimately increases the seed yield. This might be attributed due to sufficient space available to each plant for lateral development. The results were lending support to those reported Alam et al. (2017) and Jogi et al. (2018).

Yield attributing characters of linseed were significantly improved due to application of higher level of nutrients which are having in vermicompost compare to other organic sources. Application of vermicompost recorded maximum days required to first flower initiation as well as days taken to fifty percent flowering, number of capsules per plant, number of seeds per capsule, test weight, seed and straw yield. It may be attributed to the beneficial effects of higher growth parameters in this treatment. Large available of stored photosynthetic and translocated in to various yield attributes. Continuous mineralization and availability of nutrients as per the requirements during later stage of the plant growth might be the reason for higher values of yield attributes. The results are in close agreement with the findings of Murali et al. (2018), Devkota et al. (2020) and Nayak et al. (2020a).

The increase in yield attributes with the application of organic nutrient might be due to higher availability of balanced plant nutrients throughout the crop period specially at critical stages of plant, favourable C: N ratio, better utilization of nitrogen for reproductive growth rather than for vegetative growth, functional role of nitrogen in the plant body i.e. in multiplication, cell elongation and tissue differentiation. The increased yield attributes and yield might be due the increased supply of the major nutrients (NPK) by translocation of the photosynthates accumulated under the influence of the sources of inorganic nutrients. Further, the translocation and accumulation of photosynthates in the economic sinks, resulted in increased seed, straw and biological yields. Similar report has been recorded by Ashok et al. (2018), Singh et al. (2018), Kumar and Sood (2020) and Vinay Singh (2020).

The application of Vermicompost obtained significantly highest oil content in linseed. The increase in oil content under the application of vermicompost coupled with optimum levels of fertilizers could be assigned to the availability of all the essential nutrients which are present in organic matter and their continuous mineralization. These results are in line with findings Kumar et al. (2020), Bhaskar (2020), Vinay Singh (2020) and Singh et al. (2021).

Seed rate of 25 kg/ ha significantly increased the number of capsules per plant, number of seeds per capsules. Higher plant

density with lower seed rate increased the yield attributes per plant to a considerable extent due to less competition among the plants is more. Wherever, higher seed yield per plant was recorded with lower seed rate that might be due to healthy number of plants per unit area that will compensate the yield reduction per plant and resulted in overall higher yield per hectare. Almost similar findings were also reported by Ashraf et al. (2013).

Higher plant density with 35 kg /ha seed rate reduced the yield attributes per plant to a considerable extent due to competition among the plants is more. Wherever, higher grain yield per hectare was recorded with higher seed rate of 35 kg/ha that might be due to more number of plants per unit area that will compensate the yield reduction per plant and resulted in overall higher yield. The results are in agreement with those reported by Jogi et al. (2018) and Salih et al. (2021).

Table 1: Responce of Sulphur Levels and Varieties on Growth, Yield and Quality of Linseed

Treatment	Plant height (cm)	Number of branches/ plant	Number of capsules per plant	Number of seeds/capsule	Test weight (g)	Seed yield (q/ha)	Straw yield (q/ha)	Oil content (%)
	Effect of organic manure							
OM_1	51.97	6.56	57.11	9.02	8.31	20.81	39.67	40.25
OM_2	47.64	5.24	50.47	8.60	7.75	17.32	35.49	39.20
OM_3	45.35	4.40	45.49	7.80	7.55	14.54	31.46	38.26
OM_4	42.42	3.78	41.82	6.44	7.20	11.94	27.39	37.54
S. Em±	1.08	0.32	0.80	0.50	0.14	0.46	0.56	0.42
C.D.	3.16	0.94	2.35	1.46	0.41	1.36	1.65	1.22
	Effect of seed rates							
S_1	45.39	5.37	50.37	8.30	7.87	15.13	32.06	38.35
S_2	47.07	4.95	48.65	8.10	7.72	16.05	33.47	38.90
S_3	48.07	4.67	47.15	7.50	7.52	17.29	34.99	39.20
S. Em±	1.24	0.37	0.92	0.58	0.16	0.54	0.65	0.48
C.D.	3.65	1.08	2.71	1.69	0.48	1.57	1.91	1.41
	Interaction effect between organic manure and seed rates							
OM_1S_1	49.06	7.40	59.13	9.13	8.61	19.31	37.69	40.11
OM_1S_2	52.26	6.27	57.33	9.07	8.27	20.39	39.33	40.16
OM_1S_3	54.57	6.00	54.87	8.87	8.05	22.75	41.99	40.49
OM_2S_1	47.32	5.53	53.00	8.80	7.87	16.39	34.16	38.88
OM_2S_2	47.74	5.40	50.13	8.60	7.72	17.36	35.81	39.04
OM_2S_3	47.86	4.80	48.27	8.40	7.66	18.22	36.52	39.69
OM_3S_1	44.52	4.60	46.60	8.07	7.61	13.64	30.38	37.97
OM_3S_2	45.52	4.33	45.27	7.73	7.54	14.50	31.29	38.35
OM_3S_3	46.01	4.27	44.60	7.60	7.49	15.47	32.72	38.47
OM_4S_1	40.67	3.93	42.73	7.20	7.40	11.17	26.01	36.45
OM_4S_2	42.74	3.80	41.87	7.00	7.33	11.94	27.44	38.03
OM_4S_3	43.86	3.60	40.87	5.13	6.86	12.72	28.73	38.14
S. Em±	0.62	0.18	0.46	0.29	0.08	0.27	0.33	0.24
C.D.	1.29	0.38	0.96	0.60	0.17	0.56	0.68	0.50

Acknowledgement

Authors are thankful Dr. T. Singh Professor and head Agronomy for very kindly providing all the experimental facilities for successful conduct of the experiment as well as completion of thesis.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest

The author(s) declares no conflict of interest.

Author Contribution

All authors contributed equally to establishing the topic of the research and design experiment.

REFERENCES

Alam, M. J., Ahmed, K. S., Mollah, M. R. A., Tareq, M. Z., & Mottalib, M. A. (2017). Effect of seed rate and sowing method on the yield of mustard. *J. Environ. Sci*. *29*, 37- 40.

Ashraf, A., Mohsen, A. E., Amany, M., Abdallah, & Mahmoud, G. O. (2013). Optimizing and describing the influence of planting dates and seeding rate on flax (*Linum usitatissimum* L.) cultivars grown. *Journal of Applied Sciences Research* *9*(7), 4174- 4185.

Chakra, D., Bhattarai, B. P., Mishra, S. R., Ghimire, P., & Dipendra, C. (2020). Effect of integrated plant nutrient management on growth, yield and leaf

nutrient status of broadleaf mustard (*Brassica juncea* var. rugosa). *Horticulture International Journal*, *4*(3), 78- 81.

Ghimire, S., Adhikari, B., Pandey, S., Belbase, K., Lamichhane, S., & Pathak, R. (2020). Effect of Different Organic Manure on Growth and Yield of Radish. *Acta scientific Agriculture*, *6*(3), 1- 5.

Kumar, A., Kumar, A., Kumar, P., Yogesh, Yadav, L. K., & Rajesh, K. (2018). Effect of Organic Management Practices on Growth, Yield Attributes and Grain Yield in Mustard (*Brassica juncea* (L.) Czern. and Coss.). *Int. J. Curr. Microbiol. App. Sci. 7*(9), 3585-3590.

Kumar, N. B., Adhikary, S., Pattnaik, M., & Kumar, P. A. (2020a). Effect of Sulphur and zinc with combination of FYM on yield and uptake of nutrients in Mustard (*Brassica Juncea* (L.) under Alfisols of Odisha. *Journal of Pharmacognosy and Phytochemistry*, *9*(2), 2310- 2313.

Kumar, S., Meena, R. S., & Bohra, J. S. (2018a). Interactive effect of sowing dates and nutrient sources on dry matter accumulation of Indian mustard (*Brassica juncea* L.). *Journal of Oilseed Brassica*, *9*(1), 72- 76.

Kul, B. (2020). A review on the effect of organic manure in Brassica juncea (L.) Czern. with special reference to the productivity, nutrient uptake and soil fertility. *Journal of critical reviews*, *7*(6), 2811- 2816.

Murali, M., Umrao, R., & Hemant, K. (2018). Effect of different levels of organic manure on the growth and yield of mustard (*Brassica juncea* L.). under Jatropha (Jatropha circus L) based agroforestry system. *Journal of Pharmacognosy and Phytochemistry*. *7*(4), 955- 958.

Qamaruddin, J., Banglani, K. H., Kandhro, M. N., Anjum, R., Kalwar, Z. A., Mangi, A. R., Hullio, M. H., Abbasi, N. A., Vistro, R., & Shaikh, S. (2018). Effect of different seed rates on growth, seed yield and oil content of mustard variety Mehran Raya. *Pure Appl. Biol*. *7*(3), 1007- 1013.

Sunil, K., Meena, R. S., & Singh, J. S. (2020). Effect of sowing dates and nutrient sources on nutrient uptake of Indian mustard (*Brassica juncea*). *Indian Journal of Agricultural Sciences*, *90*(10), 1902– 7.

Salih Rabar, F., Ahmad, T., Qader & Bakr Zainab, S. (2021). Row Spacing and Seeding Rate Effect on Growth Parameters of Flax (*Linum usitatissimum* L.). *ZJPAS*, *33*(S1), 72-75.

Singh, H., Singh, R. P., Meena, B. P., Lal, B., Dotaniya, M. L., Shirale, A. O., & Kumar, K. (2018). Effect of integrated nutrient management (INM) modules on late sown Indian mustard [*B. juncea* (L.) Cernj. & Cosson] and soil properties. *Journal of Cereals and Oilseeds*, *9*(4), 37- 44.

Singh, L., Sharma, R., & Singh, N. (2021). Effect of Foliar Application of Sulphur and Integrated Nutrient Management on Yield, Quality and Economics of Bed Transplanted Canola (*Brassica napus* L.). *Indian Journal of Agricultural Research*, *55*(2), 192- 196.

Singh, V. (2020). Effect of integrated nutrient management on yield and uptake of nutrients in pearl millet (*Pennisetun glaucum*)- mustard (*Brassica juncea*) crop sequence. *Annals of Plant and Soil Research*, *22*(4), 349- 353.

Vipin, K., & Meenu, S. (2020). The performances of Linum usitatissimum on different organic manures and fertilizers under peach based Horti-medicinal system of agroforestry. *International Journal of Chemical Studies*, *8*(5), 572- 576.