Effect of Integrated Nitrogen Management and Irrigation Regime on Growth and Yield of Mustard (*Brassica junciea L.)*

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Abstract- A field experiment was conducted during *Rabi,* 2023-24 on clayey soil at the Agronomy Farm, Department of Agronomy, School of Agricultural sciences, G. H. Raisoni University, Saikheda, Pandhurna (M. P.), to study the Effect of integrated nitrogen management and irrigation regime on growth and yield of mustard (*Brassica junciea L.)* The experiment consisted of eight treatments which were replicated thrice in RBD Design. Result indicated that application of T_2 (75% RDF + 2t/ha vermicompost) significantly increased growth and yield attributes and economics of mustard and was found to be on par with treatment T_2 (60% RDF + 2t/ha vermicompost)

Key words: Sesame, Nutrients, RDF, Growth, Yield, FYM.

INTRODUCTION

Mustard *(Brassica juncea L)* was grown about 3000 BC in Indus Valley and use of its edible oil is recorded from the last few centuries of the pre-Christian era. Oil is now produced from mustard in every continent, but over half the crop area is in China and India. India is gifted an Abundance of vegetable oil research in the application of cultivated the annual and perennial plant species etc the cultivated annual mustard is the most important oil seeds crop and has a prominent place in the field of Agriculture and especially the oil industry of the country. It's the important one to supplement oil seed crops due to the increasing demand of oil.

The seeds of mustard and oil are used as a continent in the preparing of pickles and for flavoring curies and vegetable. Mustard oil is the part of human diet for several years and serve as an basic material. used for soapmaking products like. dhep , medicine, syrup. textile auxiliaries and pharmaceuticals. The oil cake is used for calf (dhep) and organic manure fertilizer and herbs stem and plant leaves is healthy sources of green fodder for calf particular animals only). The leaf of healthy plants are used as fresh green veggies as they supply a lot of minerals like Sulphur (s) and minerals in their diet. The herbs seeds have about 7 percent moisture and the oil content varies from 35 to 40 percent. The protein content also varies from 24 to 30 percent.

(Anonymous, 2023). At present mustard is grown in Maharashtra state as an intercrop of mixed crop with wheat during rabi season. Recently the interest, has been arising among the researchers and cultivators to grow sale crop of mustard in the state of Maharashtra. The earlier trials conducted at G H RAISONI UNIVERSITY SAIKHEDA MP indicated that the scope to increased the production of herbs under semi-arid tropic, The main factors responsible for the higher production are variety, nutrient management, irrigation scheduling, and another package of practices.

Proper management is important in increasing the production of any herbs. Among the cultural practices, irrigation management is one's important, practice for confidence, and production of mustard crops. It requires optimum quantities at appropriate times. There has been a constant shortage of irrigation water in many states of India including Maharashtra. An effective and planned utilization of available irrigation

water has therefore become once the important in agriculture .

Mustard (*Brassica juncea*) is a crucial oilseed herbs that plays important contribution in worldwide oil production for human and animals also, biofuels, and animal feed. Its large oil content, nutritional value, and power to diverse agro-climatic environment, mustard has become an integral component of agricultural systems in many countries. However, its production is often hampered by inadequate nitrogen (N) supply and water scarcity, leading to reduced yields, lower oil quality, and decreased profitability for farmers. The increasing pressure to meet global food security needs while minimizing environmental degradation necessitates the development of sustainable and resilient crop management strategies.

Integrated nitrogen management (INM) and efficient irrigation regimes have emerged as promising approaches to address the challenges facing mustard production. INM involves the judicious use of chemical and bio chemical (N) match crop demand, reduce N losses, and promote soil health. Precision irrigation, on the other hand, optimizes water application to minimize waste, reduce soil salinization, and mitigate the impacts of drought and waterlogging. While previous research has investigated the individual effects of INM and irrigation on mustard production, the synergistic interactions between these two critical factors remain poorly understood.

The knowledge investigate that combined effects the INM and irrigation regimes on the Expansion and Productivity, oil quality, and water productivity of mustard, with a focus on identifying optimal management practices that can enhance crop productivity, reduce environmental impact, and promote sustainability. By exploring the interactions between N management and water supply, this research seeks to contribute to the development of more resilient and productive mustard production systems, ultimately supporting the livelihoods of farmers and contributing to global food security.

The present production and Mustard output is substantially underwhelming because of improper management of water and fertilizers. Extensive research work has been carried out pertaining to irrigation and fertilizer management independently. However. Very mergine research work has been carried out in respect of irrigation regimes along with integrated plant nutrient systems. Hence, their Asia scope to enhance the production potential of mustard by using different irrigation regimes and integrated plant nutrient system

MATERIAL AND METHODS

The field experiment was conducted during *Rabi* 2023-2024 at the Agronomy Farm, Department of Agronomy, School of Agricultural sciences, G.H. Raisoni University, Saikheda, Pandhura (M. P.). The experiment was laid out in Randomized Block Design (RBD) with 8 treatments and three replications. The treatment consists of T_1- 100% RDF,2t/ha vermicompost, T_2- 75% RDF +2t/ha vermicompost, T_3- 60% RDF +2t/ha vermicompost, T_4- 50% RDF +2t/ha vermicompost, T_5-45% RDF +2t/ha vermicompost, T_6- 25% RDF +2t/ha vermicompost, and T_7- 10% RDF + 2t/ha vermicompost, T8- 10%RDF + 2t/ha vermicompost has done.

RESULT AND DISCUSSION

Growth attributes

Growth attributes like plant height, number of branches and No. of flower and No. of siliquae recorded significantly higher at application of 75 % RDF + 2t/ha vermicvompost (T_2). The data found on plant height recorded and analyzed is presented in Table 1. At harvest stage plant height showed that was significant. Application of 75 % RDF + 2t/ha vermicompost (T_2) recorded higher plant height (143.10 cm). It was at par with application of 60 % RDF +2t/ha vermicompost (T_3). This could be the result of greater nitrogden (urea) synthesis, a rise in the amount of chlorophyll in the growing area, improved photosynthetic activity, and eventually improved cell division, which would raise the rate of crop development. This was demonstrated by the research done by Narkhede *et al.* (2001).

The data on number of branches/plant were recorded and presented in Table 1. At harvest, 100% RDF + 2t/ha vermicompost (T_2) recorded significantly higher number of branches per plant (27.76). It was at par with application of 100% RDF + 2t/ha vermicompost (T_3). It's possible that adding organic manure to

chemical fertilizer to increase its nitrogen content also produced a rich supply of potassium. These findings concur with those Basnet (2005) and Arya *et.al* (2007)

Table 1: Growth attributes of sesame influenced by integrated nutrient management

Treatment	Plant height 110 (DAS)	No. of tertiary branches 110 (DAS)	No. of flowering 60 (DAS)	No. of Siliquae
T_1 100 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 400 mm irrigation	126.33	13.76	8.79	11.75
T_2 75 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 360 mm irrigation	143.10	27.76	19.64	12.81
T_3 60 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 330 mm irrigation	132.99	17.65	11.50	12.25
T_4 50 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 300 mm irrigation	131.55	16.43	10.52	12.28
T_5 45 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 260 mm irrigation	139.10	19.32	12.77	12.52
T_6 25 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 220 mm irrigation	139.66	21.23	14.45	12.57
T_7 25 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 200 mm irrigation	142.22	24.21	16.97	12.68
T_8 10 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 190 mm irrigation	125.5	16.20	9.50	11.5
Mean	135.0563	19.57	13.0425	0.695
S.E (d)	6.944681	4.630378	3.760812	0.034226
C.D at 5 ./.	5.142066	23.66059	28.83505	4.924624

The data found on dry matter production plant^{-1} recorded and analyzed is presented in Table 1. At harvest, application of 100% RDF + 1% foliar spray-humic acid (T_2) recorded significantly maximum (21.23). It was at par with application of 100% RDF + 1% foliar spray-fulvic acid (T_3). It's possible that adding organic manure to chemical fertilizer to increase its nitrogen content also produced a rich supply of potassium. These findings concur with those of Imayavaramban *et al.* (2002), Deshmukh *et al.* (2002), and Verma *et al.* (2012).

Yield attributes

Yield attributes *viz.,* number of siliquae plant^{-1} and grain yield kg ha^{-1} and straw yield kg ha^{-1} was recorded significantly higher at application of 75% RDF + 2t/ha vermicompost (T_2) but at par with 60% RDF +2t/ha vermicompost (T_3) (Table 2).

The maximum number of siliquae plant^{-1} were recorded with application of 75% RDF 2t/ha vermicompost (T_2) (60.5). It was at par with 60 % RDF +2t/ha vermicompost (20.95) (T_3) (Table 2).

The data found on yield recorded and analyzed is presented in Table 2. The maximum grain yield was recorded significantly with application of 75 % RDF + 2t/ha vermicompost (T_2) (22.72) kg ha^{-1}). It was at par with 60 % RDF +2t/ha vermicompost (T_3) (Table 2). The findings unambiguously show that the integrated use of organic and inorganic fertilizers, either alone or in different combinations, outperformed other methods in terms of mustard seed yield, stover yield, and biological yield. Mankotia and sharma (1997).

Table 2: Yield attributes of mustard influenced by integrated nitrogen management

Treatment	Grain yield (q/ha)	Straw yield (q/ha)	Biological yield (q/ha)	Harvesting index (q/ha)
T1 100 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 400 mm irrigation	19.15	57.45	76.60	25.00
T2 75 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 360 mm irrigation	22.75	79.26	102.41	22.72

T3 60 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 360 mm irrigation	20.95	71.23	92.18	22.72
T4 50 ./. RBD of Nitrogen , 2 ton per ha vermicompost, 300 mm irrigation	21.5	73.46	94.51	2.27
T5 45 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 260 mm irrigation	21.30	76.68	97.98	21.71
T6 25 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 220 mm irrigation	20.3	61.68	81.91	24.45
T7 25 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 200 mm irrigation	20.25	68.26	88.1	23.31
T8 10 ./. RBD of Nitrogen , 2 ton per ha vermicompost , 190 mm irrigation	20.12	65.48	83.24	22.34
Mean	20.79	69.1875	89.61625	20.565
S.E (d)	1.08901	7.452288	8.749846	7.471414
C.D at 5 %	5.238144	10.7715	9.763682	36.33073

Significantly highest straw yield kg ha^{-1} were recorded with application of 75% RDF + 2t/ha vermicompost (T_2) . It was at par with 100% RDF +2t/ha vermicompost (T_1) (Table 2). The findings unambiguously show that the integrated use of organic and inorganic fertilizers, either alone or in different combinations, outperformed other methods in terms of mustard seed yield, stover yield, and biological yield.

CONCLUSION

Application of 75% RDF +2t/ha vermicompost (T_2) recorded higher the growth attributes *viz.*, plant height, number of branches $plant^{-1}$ and dry matter accumulation $plant^{-1}$ of mustard and yield attributes of mustard *viz.*, number of capsules $plant^{-1}$, grain yield kg ha^{-1} and straw yield kg ha^{-1} over all other treatments but was at par with 60 % RDF +2t/ha vermicompost (T_3).

REFERENCES

[1] Jat *et al* (2000) was conducted the field experiment on mustard at jobner in Rajasthan and Reported that application of 20 t FYM + 30 kg N ad 20 kg PO ha significantly Increased plant height dry mater accumulation, number of primary and secondary Branches per . plant over the control

[2] Aulakh *et al* (2002) was conducted field experiment at Bathinda and noticed that plant height Of mustard well increased significantly with application of FYM @ 10 t ha'Sulphur @ 40 kg ha with either 100 recommended fertilizers or 75% recommended fertilizers Over 100 recommended fertilizers is lone, The growth attributing characters i.e man Shoot length, and secondary branches per plant increases significantly attributes such As plant height and branches per plant increases significantly with increase irrigation level

[3] Tigga *et al*. (2004) was conducted the field experiment on mustard and chickpea at Madhya Pradesh and reported the 50% RED 50% N as FYM obtained the highest values for plant height, dry matter accumulation and number of branches per plant as compared to RBD PSB and RBD alone.

[4] Basnet (2005) was reported that significantly higher of leaf area and particularly the total dry matter per plant of rapeseed was produced by the application of NPK fertilizers with FYM at all stages (24 to 87 DAS) of growth and development.

[5] Arya *et al.* (2007) was conducted the field experiment and results was revealed that integrated nutrient application (50% RDF FYM at 5 ta biofertilizers (Rhizobium + PSB) significantly enhanced the average plant of height, and crop biomass of chickpea and plant height and crop biomass in mustard as compared to control.