Effect of FYM, Vermicompost and fertility levels on Yield attributes of Indian Mustard (*Brassica juncea* L.)

ABSTRACT

The field experiments were carried out during *Rabi* seasons of 2021 and 2022 at Student's Instructional Farm (SIF), Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, to study the Effect of FYM, Vermicompost and Fertility levels on growth and yield of Indian Mustard (*Brassica juncea* L.). The results from the research revealed that 100% RDF + 50% N through Vermicompost recorded significantly higher primary branches per plant, secondary branches per plant and also the total number of branches per plant at maturity stages. The same treatment also showed the highest number of siliques per plant (218.67) and highest weight of Silique / plant (16.30 g). The Length of Silique (6.50 cm) and number of seeds per siliques (16.40) was highest in the T_{14} treatment. Results from research also revealed that the treatment T_{14} also gave highest test weight of 6.40 grams.

Keywords: Vermicompost, Net returns, Indian Mustard, fertility levels

Introduction

Indian mustard (*Brassica juncea* L.) is the third most important source of edible oils in the world after soybeans and oil palms. There is a great deal of variation in Brassica sedge species in Central Asia- the Himalayas, with migration into India and China taking place **(Hemingway (1979).**

Traditional rapeseed oil contains 25–45% of erucic acid that is considered unsuitable for human consumption. Canola is distinct from traditional rapeseed due to its reduced levels of erucic acid and glucosinolates **(Iqbal *et al.*, 2008).** However, through extensive breeding programmes mustard has been developed into an edible oil crop with a fatty acid profile that is very similar to canola containing zero erucic acid **(Kirk and Oram, 1981)**, 55–60% oleic acid, 6.5% linolenic acid, 31–33% linoleic acid and glucosinolate concentration 0–20 µmol/g **(Gunasekera *et al.*, 2006).**

The estimated area, production and yield of rapeseed-mustard in the world was 36.59 million hectares, 72.37 million tonnes (mt) and 1980 kg / ha, respectively, during 2018-19. Globally, India account for 19.8 % and 9.8% of the total acreage and production (USDA, 2022).

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Total Oilseeds production in the country during 2020-21 is estimated at record 36.10 million tonnes which is higher by 2.88 million tonnes than the production during 2019-20. Further, the production of oilseeds during 2020- 21 is higher by 5.56 million tonnes than the average oilseeds production of 30.55 million tonnes. In India, annual oilseeds are cultivated over 26.67 million hectares of area. Total kharif oilseeds production in the country during 2021-22 is estimated at 23.39 million tonnes which is higher by 2.96 million tonnes than the average oilseeds production of 20.42 million tonnes. The area under kharif oilseeds during 2021-22 (as per Advance Estimates) is estimated at 194.19 lakh hectares. (Annual report 2021-22, DAC&FW).

Rajasthan, Maharashtra, Madhya Pradesh, and Gujarat are the major oilseeds producing states contributing more than 76% of oilseeds production in the country. Rajasthan is the largest producing state in the country. Rajasthan alone contributed 45.5% to the total area under rapeseed-mustard followed by Uttar Pradesh, Madhya Pradesh and Haryana and 48.6% to the total rapeseed-mustard production followed by UP, Haryana, MP, Gujarat and West Bengal. Together these states accounted for 94% of the rapeseed-mustard production in the country. More than 90% production of Rapeseed-mustard comes from 6 States namely Rajasthan (48%), MP (12%), Haryana (12%), UP (10%), West Bengal (6%) and Gujarat (5). Fifty-eight districts of Rajasthan (26), MP (8), Haryana (7), UP (6), West Bengal (8) and Gujarat (3) contributes more than 80% of total production of R&M in the country. (Annual report 2021-22, DAC&FW).

Uttar Pradesh (UP) is the second major mustard producing state in the country after Rajasthan and followed by Haryana, Madhya Pradesh, Gujarat and West Bengal. Uttar Pradesh contributes to about 11% to the country's total mustard production and around 4% to the net sown area in the state. In the state, Agra takes lead as the major growing district, with a share of about 13% to the state's total production, followed by Mathura (10%), Badaun (5%), Aligarh (3.97%), Ramabai Nagar (3.83%), Kheri (3.62%), Etah (2.95%), Etawah (2.77%) and Auraiya (2.61%). Percentage share calculation is for 10 years average production **i**.e., 2005-2014 (Ministry of Agriculture).

The long-term application of organic manures alone in the form of well- rotten and good quality farmyard manure (FYM) has been reported to make nutrients available gradually, in synchrony with plant needs. Besides improving the physicochemical properties of soil, the application of organic manures can also increase productivity while maintaining a better

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energy and environmental balance **(Singh *et al*., 2014).**

In addition to organic manure, Vermicompost also improves soil aeration, reduces soil erosion and evaporation losses of water, accelerates the process of humification, stimulates the microbial activity, deo-copurification of obnoxious smell, destruction of pathogens, detoxification of pollutant soil etc. **(Manna and Hazra, 1996)**

Farm Yard Manure helps in increasing microbes' population and their activities, which play an important role in easily availability of complex nutrients to the plants **(Kumar *et. al*., 2019).**

Agronomic practices, such as fertilizer management, irrigation, and pest control, can also influence grain quality by affecting the availability of nutrients and other resources for crop growth and development. Adequate and balanced fertilization is essential for ensuring optimal grain quality, as nutrient deficiencies or imbalances can lead to reduced growth, altered nutrient composition, or increased susceptibility to pests and diseases. **(Sachan *et.al.*, 2023)**

Materials and Methods:

Experimental Site

The experiment was conducted at 'Student's Instructional Farm, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur in the Rabi season of 2021-22 and 2022-23. The experimental field had an even topography and good drainage facility. Geographically, experimental site falls under the sub-tropical and semi- arid tract of North India of Indo- Gangetic plains and lies on the right bank of holy river Ganga. It is located on 260 28'36" N latitude, 800 18' 26" E longitude and at an altitude of 126 meters above mean sea level.

Edaphic condition

Soil samples were collected from different locations of the field before sowing and analysed for selected physio-chemical characteristics in the Laboratory, C.S. Azad University of Agriculture and Technology, Kanpur. The soil of the experimental field was clayey in texture and slightly alkaline in pH (8.12). The electrical conductivity (EC) of the soil was 0.39 (d S m^{-1}) estimated by Digital EC Meter. Organic carbon in the soil was 0.42% which was estimated by rapid titration method given by **Walkley and Black, 1934**. The available

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Nitrogen in soil was 189.12 kg ha^{-1}, which was estimated by the Alkaline permanganate method given by **Subbiah and Asija, 1956**. The available Phosphorus was 14.60 kg ha^{-1} estimated by Olsen's method given by **Jackson, 1967**. The available K was 167.31 kg ha^{-1} which was estimated by the Flame photometer method given by **Jackson, 1967.** The available S was 18.50 kg ha^{-1} which was estimated by the calcium extraction method given by **William and Steinberg, 1959.**

Treatment details

The experiment was laid out in Randomized Block Design with three replications. There were fourteen treatment combinations (T1) Control (No fertilizer and no organic source), (T2) 100% RDF (120:60:60:30 NPKS kg ha^{-1}), (T3) 75% RDF, (T4) 125% RDF, (T5) FYM alone (100% N through FYM), (T6) Vermicompost alone (100% N through Vermicompost), (T7) 75% RDF + 25% N through FYM, (T8) 100% RDF + 25% N through FYM, (T9) 75% RDF + 50% N through FYM, (T10) 100% RDF + 50% N through FYM, (T11) 75% RDF + 25% N through Vermicompost, (T12) 100% RDF + 25% N through Vermicompost, (T13) 75% RDF + 50% N through Vermicompost and, (T14) 100% RDF + 50% N through Vermicompost.

Seed Sowing and Spacing

The field was ploughed with a tractor drawn cultivator and after with the rotavator to obtain a fine tilth. The seed was sown at the spacing of 45 cm between rows and 15 cm between plant. The Mustard Variety **Azad Mahak** was sown and the applied seed rate was 5 kg ha^{-1}. Thinning and gap filling was done at 15 DAS wherever it was required for maintaining optimum plant population.

Land preparation

For proper germination of seed, a pre-sowing irrigation (palewa) was applied in the experimentation field and afterwards two ploughing with a cultivator was done. During sowing ploughing was done with a rotavator for well pulverized soil.

Application of FYM and Vermicompost

In the experimental field, well decomposed FYM and Vermicompost was applied by broadcasting method in individual plot and mixed with soil by hand plough according to required quantity of the particular treatment at the time of sowing after preparation of layout.

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Application of nutrients or fertilizers

In main plot, the crop was fertilized with Urea, DAP, MOP and Zinc Sulphate with different doses of RDF viz. 75%, 100%, 125%, (recommended dose 120:60:60:30 kg ha^{-1} NPKS). These doses are applied according to treatment wise.

Results and Discussion

Effect of treatment on Number of Primary branches/plants at Maturity

The data pertaining to Number of Primary branches/plants at Maturity presented in table-1. Table-1 indicated that highest number of Primary branches / plant (7.57) at Maturity of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior under the Control (T1), 75% RDF (T3), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), % RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 125% RDF (T4), 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest number of Primary branches / plant (3.867) at Maturity of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the plant height of mustard crop.

Table-1. Effect of treatment on Number of Primary branches/plants and Number of Secondary branches/plants at Maturity

Treatments	Number of Primary branches/plants at Maturity			Number of Secondary branches/plants at Maturity		
	2021-2022	2022-2023	Pooled	2021-2022	2022-2023	Pooled
T1	3.7	4	3.86	6.367	7.767	7.06
T2	6.5	7.4	6.96	14.8	17	15.9
T3	5.26	5.83	5.56	12.36	13.66	13
T4	6.6	7.6	7.1	15.3	17.7	16.5

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T5	5.36	6.06	5.7	12.56	14.43	13.5
T6	5.53	6.167	5.86	13.2	14.6	13.9
T7	5.7	6.3	6	13.36	14.83	14.1
T8	6.66	7.76	7.23	15.56	18.2	16.9
T9	6.13	6.9	6.53	14.46	16.3	15.4
T10	6.83	8.13	7.5	15.76	18.8	17.3
T11	5.86	6.56	6.23	13.76	15.36	14.56
T12	6.76	7.96	7.4	15.66	18.5	17.1
T13	6.26	7.1	6.7	14.66	16.7	15.7
T14	6.93	8.2	7.56	15.9	19.06	17.46
SE(m)±	**0.23**	**0.26**	**0.25**	**0.53**	**0.62**	**0.58**
CD at 5%	**0.68**	**0.77**	**0.73**	**1.57**	**1.81**	**1.69**

Effect of treatment on Number of secondary branches /plants at Maturity

The data pertaining to number of secondary branches / plants at Maturity presented in table-1. Table-1 indicated that highest number of secondary branches / plant (17.47) at Maturity of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior under the Control (T1), 75% RDF (T3), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), % RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 125% RDF (T4), 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest number of secondary branches / plant (7.07) at maturity of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the plant height of mustard crop.

Effect of treatment on Number of tertiary branches/plants at Maturity

The data pertaining to Number of tertiary branches/plants at Maturity presented in table-2. Table-2 indicated that The highest number of tertiary branches / plant (5.37) at Maturity of

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mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior over the Control (T1), with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 75% RDF (T3), 125% RDF (T4), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), % RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest number of tertiary branches / plant (1.50) at Maturity of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the number of tertiary branches / plants at Maturity of mustard crop.

The number of primary, secondary, tertiary, and total branches per plant at maturity increased significantly with treatments involving vermicompost, particularly T14 followed by 100% RDF and 50% N through FYM (T10) in both the year and pooled also. Whereas the lowest number of primary, secondary, tertiary, and total branches per plant at maturity was recorded over Control (No fertilizer and no organic source)-T1. This indicates that vermicompost not only enhances the vertical growth of plants but also encourages lateral branching, potentially leading to increased flowering sites and seed production. **Amit *et al*. (2014)** found that higher FYM levels (20 t/ha) resulted in improved growth parameters, including plant height, dry matter accumulation, primary and secondary branches per plant, and chlorophyll content in leaves.

Effect of treatment on total number of branches /plant at Maturity

The data pertaining to Number of tertiary branches/plants at Maturity presented in table-2. Table-2 indicated that highest total number of branches / plant (29.70) at Maturity of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior under the Control (T1), 75% RDF (T3), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), % RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 125% RDF (T4), 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N

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through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest total number of branches / plant (17.23) at Maturity of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the total number of branches / plant of mustard crop.

Table-2. Effect of treatment on Number of Tertiary branches / plants and total number of branches per plants at Maturity

Treatments	Number of Tertiary branches/plants at Maturity			Total number of branches per plant at maturity		
	2021-2022	2022-2023	Pooled	2021-2022	2022-2023	Pooled
T1	1.133	1.9	1.5	20.833	13.6	17.233
T2	4.4	5	4.7	26.367	29.5	27.933
T3	3.2	3.5	3.367	21.2	23	22.1
T4	4.467	5.133	4.8	22.1	30.433	26.3
T5	3.3	3.7	3.5	22.567	24.167	23.4
T6	3.367	3.7	3.533	26.8	24.5	25.667
T7	3.467	3.8	3.633	24.467	24.933	24.7
T8	4.6	5.3	4.967	27.433	31.267	29.367
T9	3.867	4.2	4.033	23.2	27.367	25.3
T10	4.8	5.633	5.2	27.133	32.6	29.9
T11	3.567	3.933	3.767	24.9	25.833	25.4
T12	4.7	5.467	5.1	27.7	31.933	29.8
T13	3.967	4.267	4.1	20.8	28.033	24.4
T14	4.9	5.8	5.367	26.367	33.1	29.7
SE(m)±	**0.157**	**0.172**	**0.164**	**0.901**	**1.066**	**0.981**
CD at 5%	**0.46**	**0.503**	**0.48**	**2.634**	**3.116**	**2.867**

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Effect of treatment on Number of siliques at harvest

The data pertaining to Number of siliques at harvest presented in table-3. Table-3 indicated that highest Number of siliques at harvest (218.167) at Maturity of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior over the Control (T1), with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 75% RDF (T3), 125% RDF (T4), FYM alone (100% N through FYM (T5),

Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 100% RDF + 25 % N through FYM (T8), 75% RDF + 50 % N through FYM (T9), % RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest Number of siliques (71.77) at harvest of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase Number of siliques at harvest of mustard crop.

Effect of treatment on Weight of Silique / plant (g)

The data pertaining to Weight of Silique / plant (g) presented in table 3. Table-3 indicated that highest Weight of Silique / plant (16.30 g) of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior over the Control (T1), with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 75% RDF (T3), 125% RDF (T4), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), % RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest Weight of Silique / plant (4.60 g) of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the Weight of Silique / plant (g) of mustard crop.

Table-3: Effect of treatment on Number of siliques at harvest and Weight of Silique / plant (g)

Treatments	Number of siliques at harvest			Weight of Silique / plant (g)		
	2021-2022	2022-2023	Pooled	2021-2022	2022-2023	Pooled
T1	65.6	77.9	71.767	4.2	4.967	4.6
T2	171.567	197	184.3	12.8	14.7	13.767
T3	146.4	161.3	153.867	10.333	11.3	10.833
T4	176.2	203.4	189.8	12.9	14.967	13.9
T5	148.5	166.5	157.5	10.4	11.933	11.167

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T6	152	171.667	161.833	10.833	12.1	11.467
T7	155.5	172.633	164.1	11.233	12.767	12
T8	180.867	210.967	195.933	13.567	16.2	14.9
T9	161.8	182.3	172.067	11.967	13.533	12.767
T10	196.3	232.833	214.567	14.367	17.133	15.767
T11	158.867	177.3	168.1	11.933	13.033	12.5
T12	188.7	218.233	203.467	14.067	16.6	15.333
T13	166.9	189.633	178.267	12.567	14.3	13.4
T14	198.7	237.6	218.167	14.8	17.8	16.3
SE(m)±	**6.316**	**7.295**	**6.798**	**0.47**	**0.543**	**0.504**
CD at 5%	**18.463**	**21.322**	**19.869**	**1.374**	**1.588**	**1.472**

Effect of treatment on Length of Silique

The data pertaining to Length of Silique (cm) of mustard crop presented in table 4. Table-4 indicated that highest Length of Silique (6.50 cm) of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior over the Control (T1), 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 75% RDF (T3), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), % RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par with 125% RDF (T4), 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest Length of Silique (cm) (2.07 cm) was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase Length of Silique (cm) of mustard crop.

Effect of treatment on Number of Seed / Silique at harvest

The data pertaining to Number of Seed / Silique at harvest of mustard crop presented in table 4. Table-4 showed that highest Number of Seed / Silique at harvest (16.40) of mustard crop at harvest of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior under the Control (T1), 75% RDF (T3), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75%% RDF + 25 % N through Vermicompost

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(T11), 75% RDF + 50 % N through Vermicompost (T13) while at par with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 125% RDF (T4), 100% RDF + 25 % N through FYM (T8), 75% RDF + 50 % N through FYM (T9), 100% RDF + 50 % N through FYM (T10), 75%% RDF + 25 % N through Vermicompost (T11), 100% RDF + 25 % N through Vermicompost (T12), 75% RDF + 50 % N through Vermicompost (T13) of the treatment in both the year and pooled also. The lowest Number of Seed / Silique (6.90) at harvest of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the Number of Seed / Silique at harvest of mustard crop of mustard crop.

Table-4: Effect of treatment on Length of siliques(cm) and Number of Seed / Silique at harvest

Treatments	Length of Silique(cm)			Number of Seed / Silique at harvest		
	2021-2022	2022-2023	Pooled	2021-2022	2022-2023	Pooled
T1	2	2.1	2.067	6.467	7.333	6.9
T2	5.1	5.8	5.467	14.5	16.6	15.567
T3	4.167	4.667	4.433	13.3	14.533	13.933
T4	5.5	6.3	5.9	14.567	16.867	15.733
T5	4.3	4.8	4.567	13.4	14.767	14.1
T6	4.4	4.9	4.667	13.5	15	14.267
T7	4.467	4.967	4.733	13.567	15.6	14.6
T8	5.633	6.5	6.067	14.7	17.1	15.9
T9	4.7	5.233	4.967	13.967	16.133	15.067
T10	5.833	6.867	6.367	14.867	17.6	16.2
T11	4.6	5.1	4.867	13.867	15.8	14.8
T12	5.667	6.7	6.2	14.8	17.367	16.1
T13	4.8	5.4	5.1	14.2	16.367	15.3
T14	5.933	7.033	6.5	14.9	17.9	16.4
SE(m)±	**0.184**	**0.213**	**0.21**	**0.516**	**0.597**	**0.563**
CD at 5%	**0.537**	**0.624**	**0.613**	**1.508**	**1.747**	**1.645**

Effect of treatment on Seed weight / plant (g)

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The data pertaining to Seed weight / plant (g) at harvest of mustard crop presented in table 5. Table-5 indicated that highest Weight of Silique / plant (15.30 g) / plant of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior over the Control (T1), with 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 75% RDF (T3), 125% RDF (T4), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), 75% RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest seed weight / plant (6.00 g) at harvest of mustard crop was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the Weight of Silique / plant (g) of mustard crop.

Effect of treatment on Test weight (g)

The data pertaining to Test weight (g) of mustard crop presented in table 5. Table-5 indicated that highest Test weight (g) (6.40 g) of mustard crop were measured in crop fertilized with 100% RDF + 50% N through Vermicompost (T14) was significantly superior over the Control (T1), 100% RDF (120:60:60:30 NPKS kg ha-1) (T2), 75% RDF (T3), FYM alone (100% N through FYM (T5), Vermicompost alone (100% N through Vermicompost (T6), 75% RDF + 25 % N through FYM (T7), 75% RDF + 50 % N through FYM (T9), 75% RDF + 25 % N through Vermicompost (T11), 75% RDF + 50 % N through Vermicompost (T13) while at par with 125% RDF (T4), 100% RDF + 25 % N through FYM (T8), 100% RDF + 50 % N through FYM (T10), 100% RDF + 25 % N through Vermicompost (T12) of the treatment in both the year and pooled also. The lowest Test weight (g) (2.00 g) of mustard crop (2.00) was recorded with control (T1). It is also clear from the table that application of increasing dose of fertility levels along with FYM and Vermicompost increase the Test weight (g) of mustard crop.

Table-5: Effect of treatment on Seed weight / plant (g) and Test Weight (g)

Treatments	Seed weight / plant (g)			Test Weight(g)		
	2021-2022	2022-2023	Pooled	2021-2022	2022-2023	Pooled

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T1	5.733	6.2	6	2	2.067	2
T2	12.7	14.6	13.667	5.2	6.033	5.6
T3	9.633	11.367	10.5	4.2	4.667	4.433
T4	12.767	14.8	13.8	5.467	6.367	5.9
T5	10.667	11.633	11.167	4.3	4.8	4.567
T6	10.767	11.833	11.3	4.367	4.9	4.6
T7	11.067	12.3	11.7	4.467	4.967	4.733
T8	12.867	15	13.933	5.567	6.5	6.033
T9	11.867	13.433	12.667	4.867	5.5	5.167
T10	13.8	16.4	15.1	5.8	6.867	6.3
T11	11.767	13.2	12.5	4.5	5.1	4.8
T12	13.367	15.767	14.567	5.667	6.7	6.2
T13	11.967	13.667	12.833	4.967	5.6	5.3
T14	13.933	16.7	15.3	5.867	7	6.4
SE(m)±	**0.449**	**0.521**	**0.484**	**0.195**	**0.218**	**0.206**
CD at 5%	**1.313**	**1.521**	**1.415**	**0.57**	**0.637**	**0.604**

Conclusions

The study showed that treatments involving vermicompost consistently resulted in higher primary branches per plant, secondary branches per plant and also the total number of branches per plant at maturity stages, highest number of siliques per plant (218.67), highest Weight of Silique / plant (16.30 g), Length of Silique (6.50 cm), number of seeds per siliques (16.40) and highest test weight of 6.40 grams. It is suggested that application of 100% RDF + 50% N through Vermicompost can give best results in mustard crop.

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