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EFFECT OF ORGANIC AND INORGANIC SOURCES OF NUTRIENTS ON GROWTH AND YIELD OF INDIAN MUSTARD (*BRASSICA JUNCEA* L.)

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Abstract

Present experiment was laid out at Agriculture farm, Rama University Kanpur during 2020-21 1.: Plant Population, Plant height (cm), Number of branches plant^{-1}, 2. Post harvest studies: Plant character, Number of siliquae plant^{-1}, Number of seeds siliqua^{-1}, Siliqua length (cm), Seed weight / plant, Weight of Siliqua/plant, (ii) Yield Character, Biological yield, Seed yield (q ha^{-1}), Stover yield (q ha^{-1}) (iii). Test weight (g), iv). Harvest index, Economics:- Benefit: cost ratio. Gross income, Net income, Cost of cultivation The superior plant height and plant population registered from plot which was treated T_8 (75% RDF + FYM 20 t ha^{-1} + *Azotobacter +PSB).* In similar lines the grain and straw yield was also recorded highest for the same. The experiment was laid out in Randomized Block Design, the experiment consist of 8 treatments with three Replications. The minimum grain yield T_2(16.35 q/ha), minimum Stover yield T_2 (35.39 q/ha) and maximum grain yield is T8 (24.21 q/ha), Stover yield is (41.39 q/ha) of Mustard are respectively.

Keywords: Mustard, Pre harvest Studies, Plant height (cm), Number of branches plant^{-1}, 2. Post harvest studies: i. Plant character, Number of siliquae plant^{-1}, Number of seeds siliqua^{-1}, Siliqua length (cm), Seed weight / plant, Weight of Siliqua/plant, (ii) Yield Character, Biological yield, Seed yield (q ha^{-1}), Stover yield (q ha^{-1}) (iii). Test weight (g), iv). Harvest index, EconomicsPSB.

Introduction:

Agriculture is the backbone of Indian economy. Indian agriculture is characterized by 328.73 million hectares (Land use statistics, Directorate of Economics and statistics, 2015-16) geographical area. The gross cropped area recorded as 197.05 MH and net sown area was 139.51 MH (Land use statistics, Directorate of Economics and statistics, 2015-16).In the same lines the total cropped area recorded as 26.85 MH and net cultivated area 16.53 MH in Uttar Pradesh State in year 2018-19. Total oilseeds coverage area and

ISSN PRINT 2319 1775 Online 2320 7876

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productionwas recorded as 25.50 million ha 32.26 million tonnes in the country in year 2018-19 while the productivity of oilseed in the country was estimated as 1265 kg ha^{-1}in year 2018-19. The total area and production under Rapeseed and Mustard was recorded as 0.60 million ha and 0.73 million tonnes in year 2018-19. The Rape seed and mustard shares about 2.3 percent in area 2.2 percent production in year 2018-19 in the country. The highest production of Rapeseed and Mustard was recorded in in Rajasthan (44.97 %), Haryana (12.44 %), Madhya Pradesh (11.32 %) and Uttar Pradesh (10.60 %), respectively during 2018-19. Mustard are known by different names in different part of country e.g., sarson, rai or raya, toria or lahi. While sarson and toria (Lahi) are generally known as rapeseed, rai or laha is commonly known as mustard. The oil content varies from 37-49 %.

Oil is a good source of protein, sugar, minerals and even vitamins. Although oilseeds in general have good composition and quality, their domestic utilization as well as exports is restricted due to certain limitation and toxic factors. Mustard contains 37-49% oil, 25-32% proteins, 7% ash and 0.6% calcium, 1.45% phosphorus, 0.6% magnesium, 0.05% manganese and good source of various vitamins. There paper examines the effect of organic and inorganic sources of nutrient on the growth and yield of Indian mustard.

Methodology:

The experiment was conducted during *rabi* season of 2020-21 in at Agriculture farm, Rama University Kanpur during 2020-21 in alluvial soil. Soil of the experimental plot was sandy loam in texture and slightly calcareous having organic carbon 0.48%, total nitrogen 0.03%, available P_2O_5 12.6 Kg ha^{-1}, pH 7.3, electrical conductivity 0.34 dS m^{-1}, permanent wilting point 6.3%, field capacity 18.4%, maximum water holding capacity 29.6%, Bulk density 1.46 Mg m^{-3}, particle density 2.56 Mg m^{-3} and porosity 42.9%. The experiment was conducted in a randomized block design with 3 replications and 8 treatments i.e. 1.: Plant Population, Plant height (cm), Number of branches $plant^{-1}$, 2. Post harvest studies: Plant character, Number of siliquae $plant^{-1}$, Number of seeds $siliqua^{-1}$, Siliqua length (cm), Seed weight / plant, Weight of Siliqua/plant, (ii) Yield Character, Biological yield, Seed yield (q ha^{-1}), Stover yield (q ha^{-1}) (iii). Test weight (g), iv). Harvest index, Economics:- Benefit: cost ratio. Gross income, Net income, Cost of cultivation

Observations recorded:

To predict the effect of different treatments on growth and development of experimental crop, number of observations has been recorded were are selected from each plot at random leaving the border area and tagged for recording growth parameters viz. Plant population, fresh and dry weight, Plant height etc. 60, 120 days after sowing and at harvest stage, yield attributing characters were also recorded from the tagged plants. During the course of present investigation following studies were made on different plant traits:

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 02, 2021

d. Benefit: cost ratio

Benefit cost ratio or net return rupee^{-1} invested the calculated by dividing the net return (Rs. ha^{-1}) by the cost of cultivation (Rs. ha^{-1}).

$$\text{Benefit cost ratio} = \frac{\text{Net return (Rs./ha)}}{\text{Total cost of cultivation(Rs./ha)}}$$

If 'F' test was found significant at 5% level of significance then critical difference (CD) was calculated with the help of following formula:

$$SE\pm = \sqrt{\frac{\text{Error variance (VE)}}{r}}$$

$$CD = SEm \times t \text{ value at 5\% error d.f.}$$

Where

CD = critical difference

VE =Error variance

1. **Result and Discussion:** Growth attributing Characteristics 1. Plant Population The treatment T_8 (RDF 75% + FYM 20 t ha-1 +Azotobacter + PSB) recorded maximum number of plants (16.40) followed by T_5 (RDF 75% + FYM 25 t ha-1 +Azotobacter +PSB), which and T_7 (RDF 100% + FYM 15 t ha-1 +Azotobacter + PSB) which have 16.39 and 16.37 plant population in meter square. In contrast to this the minimum plant population was recorded in T1(RDF (80:60:40 N:P: K) followed by T2 and T3. 1.Plant Height, Total number of branches - It is evident from the data (Table 3) that plant height of mustard at 45, 60 and 90 DAS was significantly influenced by application of different organic and inorganic treatments. The maximum plant height at 60 DAS was recorded from T_8 which was at par with treatment T_7, However, minimum plant height at 45 DAS was recorded in T_2 (with RDF 75%). The maximum plant height at 90 DAS was recorded from T_8, which was at par with treatment T_7, however, minimum plant height at 45 DAS was recorded in T_2 (with RDF 75%). 2., The maximum total no. of branches at flowering stages was recorded from T_8 , which was at par with treatment T_7 and T_6. However, total no. of branches minimum at flowering was recorded in T_2 in which RDF 75%. The maximum total no. of branches at maturity stages was recorded from T_8 and proved significantly superior over all remains treatments. However, minimum number of total branches at flowering stage was recorded in T_2 in which RDF 75%. b) Yield attributing characteristics: The maximum grain yield, Straw yield (q ha^{-1}) and Biological yield (q ha^{-1})- was recorded from T_8, which was at par with treatment T_7. However, minimum Grain yield (q ha^{-1}) Straw yield (q ha^{-1}) and Biological yield (q ha^{-1})-was recorded in T_2 in which RDF 75% used (Table 3) Harvest index (%) The maximum harvest index was recorded from T_8 which was at par with treatment $T_5$and T_7. However, minimum harvest index was recorded in T_2

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 02, 2021

in which RDF 75% used (Table 3) Cost of cultivation (Rs. ha^{-1}) It is show that the highest cost of cultivation was observed in T_5 followed by T_8. However, minimum cost of cultivation was recorded in T_2 in which RDF 75%. Gross return ($Rsha^{-1}$) The maximum gross return was recorded from T_8 and T_7 respectively. However, minimum gross return was recorded in T_2 in which RDF 75% used. Net return ($Rsha^{-1}$) The maximum net return was recorded from T_8 and T_7 respectively. However, minimum net return was recorded in T_2 in which RDF 75% used. B:C ratio It is evident from the data that the B: C ratio of mustard was significantly influenced by application of different treatments. The greatest B: C ratio was observed in T_1 and T_2 respectively. However, minimum B: C ratio was observed in T_5.

Table 2:Effect of organic and inorganic sources of nutrients on growth attributing characters

S.N.	Treatments	Plant population at 30 DAS (m^2)	Plant height (cm)			Total Number of Branches/ Plant at Flowering	Total Number of Branches/ Plant at Maturity
			45 DAS	60 DAS	90 DAS		
T1	RDF (80:60:40 N:P: K)	16.18	88.59	122.11	126.21	18.36	9.15
T2	RDF 75% + FYM 10 t ha-1	16.23	84.16	119.14	124.14	17.10	8.67
T_3	RDF 75%	16.25	90.41	125.76	127.32	19.43	10.25
T_4	RDF 75% + Azotobacter + PSB	16.36	91.33	128.56	129.12	19.42	11.47
T_5	RDF 75% + FYM 25 t ha-1 +Azotobacter +PSB	16.39	92.38	131.86	135.20	20.60	11.51
T_6	RDF 100% + 10 FYM t ha-1 +Azotobacter + PSB	16.35	94.26	137.70	149.25	21.51	12.52
T_7	RDF 100% + FYM 15 t ha-1 +Azotobacter + PSB	16.37	95.42	143.40	153.46	22.17	12.91
T_8	RDF 75% + FYM 20 t ha-1 +Azotobacter + PSB	16.40	97.56	146.23	158.40	22.87	13.87
	SEm ±	0.44	2.46	3.566	3.67	0.53	0.30
	C.D.(P=0.05)	--	4.50	3.92	6.24	1.64	0.92

Table 3: Effect of organic and inorganic sources of nutrients on yield attributing characters

S.N.	Treatments	No. of siliqua $plant^{-1}$	siliqua length (cm)	No. of Seed per siliqua	Weight of siliqua $plant^{-1}$ (g)	Weight of Seed $plant^{-1}$(g)	Test weight(g)	Grain Yield (q ha^{-1})	Stover Yield(q ha^{-1})	Biological Yield(q ha^{-1})	Harvest Index (%)
T_1	RDF (80:60:40 N:P: K)	226.62	4.30	10.71	78.14	8.19	3.26	17.24	36.40	53.64	32.14
T_2	RDF 75%	223.42	3.85	9.97	76.17	7.66	2.78	16.35	35.39	51.74	31.60
T_3	RDF 75%+ FYM 10 t ha-1	227.48	4.46	11.77	79.40	9.47	3.49	18.52	38.01	56.53	32.76
T_4	RDF 75% + *Azotobacter* + PSB	238.51	4.42	11.79	89.56	10.26	3.78	19.65	39.87	59.52	33.01

ISSN PRINT 2319 1775 Online 2320 7876

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T_5	RDF 75 % + FYM 25 t ha-1 +*Azotobacter* + PSB	245.40	4.48	11.89	88.51	10.32	4.10	20.38	40.18	60.56	33.65
T_6	RDF 100% + 10 FYM t ha-1 +Azotobacter + PSB	248.36	4.75	11.98	95.70	11.62	4.41	22.14	40.82	62.96	35.16
T_7	RDF 100% + FYM 15t ha-1 +Azotobacter + PSB	251.32	4.92	12.05	98.62	12.71	4.77	23.52	41.27	64.79	36.30
T_8	RDF 75%+ FYM 20 t ha-1 +Azotobacter + PSB	255.76	5.01	12.20	101.67	13.10	4.96	24.21	41.39	65.60	36.90
	SEm ±	3.44	0.12	0.31	2.35	0.27	0.10	0.53	1.05	1.58	0.90
	C.D.(P=0.05)	5.93	0.36	0.94	7.21	0.84	0.31	1.64	3.21	4.85	2.78

Table 4: Effect of organic and inorganic sources of nutrients on economics of various treatments

S.N.	Treatments	Cost (Rs. ha^{-1})	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B: C Ratio
T_1	RDF (80:60:40 N:P: K)	25305	80666	55361	2.18
T_2	RDF 75%	24239	76527	52288	2.15
T_3	RDF 75% + FYM 10 t ha-1	35305	86618	51313	1.45
T_4	RDF 75% + Azotobacter + PSB	25405	91875	66467	2.+=561
T_5	RDF 75 % + FYM 25 t ha-1 +Azotobacter + PSB	49339	95267	45928	0.93
T_6	RDF 100% + 10 FYM t ha-1 +Azotobacter + PSB	35405	103451	68046	1.92
T_7	RDF 100% + FYM 15 t ha-1 +Azotobacter + PSB	40405	109368	68963	1.70
T_8	RDF 75% + FYM 20 t ha-1 +Azotobacter + PSB	45405	113076	67671	1.49
	SEm ±	--	--	--	00.05
	C.D.(P=0.05)	--	--	--	0.16

Conclusion:

Based on result obtaind during Present one year of experiment, it can be concluded that T_8(application of 75% RDF + FYM 20 t ha^{-1} + *Azotobacter* +PSB) that was at par with treatment highest compare to other treatment in all parameters of this experiment is Effect of organic and inorganic sources of nutrients on growth and yield of Indian Mustard (*Brassica juncea* L.) The experiment was laid out in Randomized Block Design, the experiment consist of 8 treatments with three Replications. **Tripathi*et al.*, (2011) Jadhav*et al.*, (2009)**The minimum grain yield T_2(16.35 q/ha), minimum Stover yield T_2 (35.39 q/ha) and maximum grain yield is T8 (24.21 q/ha), Stover yield is (41.39 q/ha) of Mustard are respectively. The highest cost of cultivation was observed in treatments T_5 (Rs. 49339 ha^{-1}) followed by treatments T_8 (Rs. 45405 ha^{-1}). However, minimum cost of cultivation was recorded in treatment T_2(Rs. 25305 ha^{-1}) which were 75% RDF. The maximum gross and net return were recorded from treatments T_8(Rs. 11, 3076 ha^{-1}) and treatments T_7 (Rs. 10, 9368 ha^{-1}), respectively **Mishra and Giri*et al.*, (2004)**. However, minimum gross and net return were recorded in treatment T_2 (Rs. 76,527 ha^{-1}) in

ISSN PRINT 2319 1775 Online 2320 7876

which were RDF 75% used. **(G. Nitin 2005)** The maximum benefit cost ratio was computed in treatments T_1(2.18:1). However, minimum B: C ratio was recorded in treatment T_5(0.93:1).So the application of treatment T_8 which comprised with 75% RDF + FYM 20 t ha^{-1} + *Azotobacter* +PSB exhibited best result in respect of growth, yield and net return of mustard crop followed by treatment T_7 (applied 100% RDF + FYM 15 t ha^{-1} + *Azotobacter* + PSB). **Selvi*et al.*, (2004).**

References

- **Land use statistics. Ministry of Agriculture and Farmers welfare** https://aps.dac.gov.in/LUS/Public/Reports.aspx
- **G.Nitin (2005).** Effect of biofertilizers on growth and yield of mustard (Brassica juncea L.).*Journal of Soils and Crops.* 15(1).160-162
- **Verma H.K et al (2014).** Response of Indian mustard (Brassica juncea L.) varieties to irrigation for better growth, yield and quality of mustard crop. *International Journal of Agricultural Sciences*. Volume 10, Issue 1 426-429
- **Abraham, T. and Lal, R.B. (2004).** Performance of blackgram (Vigna mungo L.) under integrated nutrient management (INM) in a legume based cropping system for the Inceptisols of NEPZ. *Indian Journal of Dryland Agricultural Research and Development* 19(1): 81-87.
- **Chand, S., Anwar, M. and Patra, D.D.(2006).** Influence of longterm application of organic and inorganic fertilizer to build up soil fertility and nutrient uptake in mint-mustard cropping sequence. *Communications in Soil Science and Plant Analysis* 37: 63-76.
- **Chand S. (2007)** Effect of integrated nutrient management on yield and nutrient use efficiency in mustard (Brassica juncea L.). *South Indian Asian Association for Regional Co - operation Journal of Agriculture*.; 5(2):100. 3.
- **Chandra K. (2005)** Organic manures, released on the occasion of 10 days training programme on "Production and Quality Control of Organic Inputs" Kottayam, Kerala. Ministry of Agriculture, *Government of India has launched a National Project on Organic Farming*. , 1 -19.