Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2021; 10(2): 1446-1449
Received: 15-01-2021
Accepted: 04-03-2021

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Effect of organic manures and inorganic nutrients on growth and yield of Gobhi sarson (*Brassica napus* L.)

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DOI: https://doi.org/10.22271/phyto.2021.v10.i2s.14027

Abstract
A field experiment was conducted in the experimental field of Sant Baba Bhag Singh University, Khiala to find out the effect of organic and inorganic manures on the growth and yield of Gobhi sarson. The experiment had seven different treatments viz; T1- RDF, T2- FYM @4t/ha, T3- FYM @2t/ha + 50%RDF, T4- FYM@1t/ha +25% RDF, T5- VC @1.4t/ha, T6- VC @0.7t/ha+50%RDF, T7- VC @0.35t/ha + 25% RDF with three replications. The experimental design was RBD. The results depicted that the integrated application of organic fertilizers along with inorganic fertilizers had better growth, yield and yield parameters. Among the treatments, T_6 (VC @0.7t/ha+50% RDF) showed better response with respect to growth and yield attributes.

Keywords: Gobhi sarson, growth, inorganic nutrient, organic manures, yield

Introduction
Gobhi sarson belongs to the category of Rapessed along with Taramira while Raya and African sarson are categorized as mustard. There are many states in India which produce high yield of mustard. Punjab produces more than 8 lakh tonnes of the total production of India. States like Rajasthan, U.P, and Haryana is 32 lakh, 8.48 lakh tonnes production in (2016-17) (Anonymous, 2016) [1]. Among all Rabi oilseed crops, mustard is major grown crop in India. The main oilseeds crops of the world as Soybean, sunflower, groundnut, and cotton. Mustard placed fifth in ranking after soybean. Groundnut is first and mustard is second most important oilseed crop of the world. NPK as major nutrients play an important role in yield and quality of mustard. The availability of adequate plant nutrients to produce more yield is dependent on the high yielding varieties of crop coupled with intensive cropping system has been depleted the soil fertility, resulting in multi–nutrient deficiencies in soil-plant system. Under such situation, use only one two primary nutrients will not be sufficient for maintaining the long term sustainability of crop production. A key component of the crop production technology is use of balanced fertilization. Productivity of mustard or any other crop can only be improved by integration of organic. Organic manures generally improves the soil physical and biological properties along with conserving the moisture holding capacity of soil and thus resulting in enhanced crop productivity. The supply of macro and micro nutrients makes the organic manures more utilizable (Arbad and Ismail, 2011) [2]. Organic manures like farmyard manure, Vermicompost and poultry manure are good source of nutrients required by plants for quality produce.

Material and Methods
The experiment was conducted at the experimental farm of Sant Baba Bhag Singh University, Khaila, during the Rabi crop season 2019- 2020. The experiment had seven different treatments and three replications. The soil sample was collected at the initial stages and the soil nutrients were found. The soil texture was sandy loam, pH- 8.1, EC- 0.13 dsm^{-1}, OC- 0.14%, Available Nitrogen- 442.88 kg/ha, Available Phosphorus- 9.3 kg/ha, Available potassium- 221.60 kg/ha. The organic fertilizers were applied one week before the sowing of the crop. The nitrogenous fertilizer was applied in three split doses and the other macro nutrients were applied as basal dose. Other intercultural operation such as weeding and thinning was also done when it was required. The cultivation practices were done as per the package and practice of PAU. The observations such as number of branches per plant, siliqua length (cm), siliqua number, 1000 seed weight (gm), grain yield (q/ha), stover yield (q/ha) and harvest index (%)

Result and Discussion

Growth and yield Parameters

Maximum plant height at 30 DAS was recorded in the plants which were provided with T1 (13.1cm). At 60 DAS, maximum plant height (25.02 cm) was recorded with the application of treatment (T_1) - 100% RDF. At 90 days the plant height was noticed highest under T2 treatment (40.14cm) which was fertilized with FYM @4t/ha. The plant height which was taken at 120 DAS indicates the maximum result in T7 (VC @0.35t/ha + 25% RDF) (53) followed by T6 (VC @0.7t/ha+50%RDF) (46.67). This is because of the potential of vermicompost which was applied at different doses along with recommended fertilizers at different levels (Panwar 2008) [9]. The plant height measured at 150 DAS showed maximum result in T6 (77.8) followed by T7 (75.14). The combination of vermicompost and 50% RDF was best at the last measurement of plant growth. The lowest plant height was found with the application of recommended dose of fertilizers. The numbers of leaves were superior at 30 DAS with the application of 100% RDF. At 60 DAS, maximum number of leaves (11) was recorded with the application of treatment (T_1) – 100% RDF. At 90 DAS, maximum number of leaves (14.0) was recorded with the application of treatment (T_5) - VC @1.4t/ha. Minimum number of leaves (9.67) was recorded in T_4(FYM@1t/ha +25% RDF). This may be because of the potential of inorganic source of fertilizers to release the nutrients in plant available form specifically nitrogenous fertilizers (Li 2003) [8]. The number of leaves counted at 120 DAS shows that the maximum number of leaves was present in T6- VC @0.7t/ha+50%RDF (25). The number of leaves counted at 150 DAS shows that the maximum number of leaves were present in T6- VC @0.7t/ha+50%RDF (28.3) followed by T4 (FYM@1t/ha +25% RDF) (26.14). The lowest number of leaves were found in T5 (VC @1.4t/ha) (18). The number of branches per plant were counted before harvesting and the number of branches was maximum in T6 (8.21) with the application of VC @0.7t/ha+50%RDF which is followed by T7 (VC @0.35t/ha + 25% RDF) and T3 (FYM @2t/ha + 50%RDF). The lowest number of branches per plant was found in T1 (100% RDF) (4). The result of (Singh and Totawat 2002) [10] indicates that the numbers of branches were increased due to the presence of nutrients present in vermicompost and the nutrients provided through 50% RDF. The maximum number of siliqua were obtained in T6 (115.00) with the application of VC @0.7t/ha+50%RDFwas used which is followed by T4 (111.00) and T7 (110.00) which was at par. The maximum length of siliqua was found in T6 (6.17) followed by T7 (6.07) while the lowest length of siliqua was found in T1 (3.83). (Jaga and Tripathi 2011) [5] also found in their experiment that the application of VC along with RDF improves the length of siliqua as well as number of siliqua in Gobhi sarson. The more number of grains in a siliqua can increase the grain yield but the weight of the seeds is conditional. The number of grains inside the siliqua were counted after the harvest and found that the maximum number of seeds were in T6 (VC @0.7t/ha+50%RDF) (21.00). This result was expected when the maximum length of the siliqua was more in the same treatment. T7 (VC @0.7t/ha+50%RDF) was also performed better. The lowest number of grains per siliqua was found in T1- RDF (14.00). The beneficial effects of VC and RDF on yield attributes were also resulted by (De and Sinha 2012) [4]. The weight of 1000 seed was taken after the harvesting of crop. The maximum test weight (4.77 g) was recorded in T_6 (VC @0.7t/ha+50%RDF), followed by T_7 (VC @0.7t/ha+50%RDF). However, 1000 seed weight found lowest in T1 (3.50 g) with the application of RDF. (Das *et al*., 2010) [3] support this result by their experiment that the integrated application of chemical fertilizers along with vermicompost could produce highest 1000 seed weight.

Yield

Grain yield which was calculated after the harvest indicates the best treatment among the all. From the data it is evident that highest seed yield (20.13 q/ha) was obtained in T_6 (VC @0.7t/ha+50%RDF), which is followed by T_7 (VC @0.7t/ha+50%RDF). The least seed yield (12.90 q/ha) was recorded in T_1 (RDF). Kumpawat 2004 [11] supports this result by proving that the application of vermicompost along with RDF produce good yield. He also suggested that this might happened due to the improved microbial activity with the application of vermicompost. It is clearly evident from the Table 1, that stover yield was significantly affected by various treatments. Among the treatments, T_6 (VC @0.7t/ha+50%RDF) gave highest stover yield (64.00 q/ha), which was statistically at par withT_7 (VC @0.7t/ha+50%RDF). Overall, RDF recorded least stover yield (45.17). Jat *et al*. (2013) support this result by explaining the role of vermicompost in increasing the overall growth and development of the plant. The data recorded on harvest index was significantly influenced by different treatments were presented in Table 1. Among the treatments, maximum harvest index (22.76%) was recorded under T_6 (VC @0.7t/ha+50%RDF) which was closely followed byT_2 (RDF 100%) (18.91).The minimum value of harvest index (18.91%) was recorded in T_1 (RDF). Kumar *et al*. (2016) [6] supports this result by their experiment where the significant effects of integrated use of organic and inorganic source of nutrients explained.

Table 1: Effect of organic and inorganic nutrients on Plant height of Gobhi sarson

Treatments	Plant height at 30 DAS	Plant height at 60 DAS	Plant height at 90 DAS	Plant height at 120 DAS	Plant height at 150 DAS
T1	$13.1^{a} \pm 1.01$	$25.02^{a} \pm 0.58$	$39.4^{a} \pm 1.33$	$41.5^{c} \pm 0.9$	$65.21^{d} \pm 1.53$
T2	$10.03^{b} \pm 1.19$	$23.1^{a} \pm 0.8$	$40.14^{a} \pm 1.35$	$44.21^{c} \pm 0.94$	$68.5^{c} \pm 1.55$
T3	$9.05^{b} \pm 0.98$	$21.6^{a} \pm 0.85$	$34^{b} \pm 1.32$	$43.57^{c} \pm 0.95$	$72.87^{b} \pm 1.54$
T4	$10.2^{b} \pm 1.5$	$22.57^{a} \pm 1.3$	$34.23^{b} \pm 1.41$	$43.12^{c} \pm 0.92$	$74.9^{b} \pm 1.52$
T5	$8.87^{b} \pm 0.8$	$21.23^{a} \pm 1.4$	$34.27^{b} \pm 1.43$	$42.27^{c} \pm 0.91$	$65.44^{d} \pm 1.61$
T6	$8.03^{b} \pm 1.2$	$20.3^{a} \pm 1.48$	$33.25^{b} \pm 1.39$	$46.67^{b} \pm 0.93$	$77.8^{a} \pm 1.53$
T7	$10.63^{b} \pm 0.9$	$23.8^{a} \pm 1.51$	$32.93^{b} \pm 1.34$	$53^{a} \pm 0.96$	$75.14^{b} \pm 1.3$
Sem	0.40	0.59	0.44	0.86	0.78
CD (0.05)	1.18	1.74	1.32	2.56	2.30

Table 2: Effect of organic and inorganic nutrients on Number of leaves of Gobhi sarson

Treatments	Number of leaves at 30 DAS	Number of leaves at 60 DAS	Number of leaves at 90 DAS	Number of leaves at 120 DAS	Number of leaves at 150 DAS
T1	$7^{a} \pm 0.5$	$11^{a} \pm 0.8$	$10^{a} \pm 0.29$	$15.5^{a} \pm 0.88$	$21^{a} \pm 0.51$
T2	$6^{b} \pm 0.41$	$7^{c} \pm 0.82$	$11.6^{a} \pm 0.35$	$21.3^{a} \pm 0.91$	$23.51^{a} \pm 0.53$
T3	$4.22^{c} \pm 0.68$	$9^{b} \pm 0.91$	$11.2^{a} \pm 0.31$	$18.00^{a} \pm 0.93$	$25.5^{a} \pm 0.51$
T4	$5^{c} \pm 0.65$	$7.8^{c} \pm 1$	$9.67^{a} \pm 0.4$	$22.67^{a} \pm 0.95$	$26.14^{a} \pm 0.5$
T5	$4.67^{c} \pm 0.61$	$6.67^{c} \pm 1.25$	$14.00^{a} \pm 0.46$	$17^{a} \pm 0.87$	$18^{a} \pm 0.6$
T6	$5.67^{c} \pm 0.7$	$8.44^{c} \pm 1.44$	$12.4^{a} \pm 0.28$	$25^{a} \pm 0.83$	$28.3^{a} \pm 0.53$
T7	$5.1^{c} \pm 0.75$	$7^{c} \pm 1.5$	$13^{a} \pm 0.31$	$20^{a} \pm 0.94$	$22^{a} \pm 0.54$
Sem	0.37	0.57	0.63	1.10	1.80
CD (0.05)	1.09	1.71	1.88	3.26	5.36

Table 2: Effect of organic and inorganic nutrients on growth and yield parameters of Gobhi sarson

Treatments	Number of branches / plant	No. of siliqua/plant	Length of siliqua	No. of grains/siliqua	1000 Seed weight
T1	$4^{a} \pm 0.5$	$87.33^{c} \pm 0.5$	$3.83^{b} \pm 0.36$	$14.00^{b} \pm 0.91$	$3.50^{c} \pm 0.49$
T2	$6.00^{a} \pm 0.41$	$94.00^{b} \pm 0.81$	$5.50^{a} \pm 0.30$	$18.33^{a} \pm 0.94$	$4.00^{b} \pm 0.51$
T3	$6.33^{a} \pm 0.71$	$95.00^{b} \pm 0.91$	$5.70^{a} \pm 0.35$	$17.00^{a} \pm 0.93$	$4.30^{b} \pm 0.5$
T4	$6^{a} \pm 0.56$	$111.00^{a} \pm 0.9$	$6.00^{a} \pm 0.4$	$19.00^{a} \pm 0.95$	$4.17^{b} \pm 0.52$
T5	$5.00^{a} \pm 0.72$	$93.00^{b} \pm 1.44$	$6.00^{a} \pm 0.45$	$18.67^{a} \pm 0.9$	$4.23^{b} \pm 0.53$
T6	$8.21^{a} \pm 0.65$	$115.00^{a} \pm 1.42$	$6.17^{a} \pm 0.34$	$21.00^{a} \pm 0.97$	$4.77^{a} \pm 0.47$
T7	$7.2^{a} \pm 0.69$	$110.00^{a} \pm 1.55$	$6.07^{a} \pm 0.35$	$19.67^{a} \pm 0.92$	$4.37^{b} \pm 0.55$
Sem	0.55	1.80	0.26	0.65	0.13
CD (0.05)	1.62	5.34	0.78	1.94	0.39

Table 2: Effect of organic and inorganic nutrients on yield of Gobhi sarson

Treatments	Grain Yield	Stover Yield	Harvest index
T1	$12.90^{d} \pm 10$	$45.17^{e} \pm 0.51$	$18.91^{c} \pm 1.32$
T2	$14.97^{c} \pm 1.2$	$54.13^{c} \pm 0.81$	$21.96^{c} \pm 1.31$
T3	$15.63^{c} \pm 0.85$	$55.40^{c} \pm 0.89$	$21.47^{c} \pm 1.35$
T4	$15.47^{c} \pm 10$	$51.83^{d} \pm 1$	$21.79^{a} \pm 1.4$
T5	$15.53^{c} \pm 0.82$	$56.43^{c} \pm 1.44$	$20.38^{c} \pm 1.41$
T6	$20.13^{a} \pm 0.99$	$64.00^{a} \pm 1.2$	$22.76^{b} \pm 1.33$
T7	$17.37^{b} \pm 0.9$	$60.33^{b} \pm 1.51$	$21.30^{c} \pm 1.35$
Sem	0.42	0.98	0.55
CD (0.05)	1.25	2.92	1.62

Summary and Conclusion

Rapeseed and mustard are the major Rabi oilseed crops of India and stand next to groundnut in the oilseed economy and its contribution to the total oilseed production In India is 26.0%. In Punjab crop *Brassica* are most important edible oilseed group of crops with predominance of mustard followed by toria and yellow sarson. Due to the intensive cultivation and use of unbalanced and inadequate fertilizer accompanied by restricted use of organic manure: have made the soils not only deficient in the nutrients, but also deteriorated the soil health resulting in decline in crop response to the recommended dose of NPK fertilizers in the region. Thus use of organic manures not only supply macronutrients but also meet the requirement of micronutrients, besides improving soil health. Growth parameters *viz.*, plant height (cm), number of branches and number of leaves were recorded maximum with application of treatment (T_6)- VC @0.7t/ha+50%RDF. Yield attributes *viz.* number of siliqua plant^{-1}, number of seeds siliqua^{-1} and test weight (g) were recorded maximum with the application of treatment (T_6)- VC @0.7t/ha+50%RDF.In case of number of siliqua/plant was recorded maximum with the application of treatment (T_6)- VC @0.7t/ha+50%RDF. Maximum seed and biological yield were recorded with the application of treatment (T_6)- VC @0.7t/ha+50%RDF. In case of harvesting index was recorded with the application of treatment (T_6)- VC @0.7t/ha+50%RDF.

In light of the experimental findings, it may be concluded that application of recommended doses of fertilizers with the application of vermicompost increased the growth and yield of Gobhi sarson. Among the treatments, T_6 (VC @0.7t/ha+50%RDF) showed better response with respect to growth and yield attributes. Yield attributing characters like length of siliqua, number of grains per siliqua and test weight were increased with VC @0.7t/ha+50%RDF (T6) as compared to other treatments.

Reference

1. Anonymous. State Indian Agriculture 2015-16. Govt of India Ministry of Agriculture & Farmers Welfare Dept of Agri, Cooperation & Farmers Welfare Directorate of Economics & Statistics, New Delhi 2016.
2. Arbad BK, Ismail S. Effect of integrated nutrient management on soybean (*Glycine max*) - safflower (*Carthamus tinctorius*) cropping system. Ind. J Agron 2011;56:340-345.
3. Das A, Patel DP, Munda GC, Ghosh PK. Effect of organic and inorganic sources of nutrients on yield, nutrient uptake and soil fertility of maize (*Zea mays*)-mustard (*Brassica campestris*) cropping system. Indian Journal of Agricultural Sciences, 2010;80(1):85-88.
4. De B, Sinha AC. Oil and protein yield of rapeseed (*Brassica campestris* L.) as influenced by integrated nutrient management. SAARC Journal of Agriculture 2012;10(2):41-49.

5. Jaga PK, Tripathi PN. Effect of integrated plant nutrient supply on productivity and economics of pearl millet-mustard crop sequence. Ann. of plant and soil research 2011;13(1):20-24.
6. Kumar V, Lehri S, Sharma AK, Meena PD, Kumar A. Image based rapeseed-mustard disease expert system: An effective extension tool. Indian Research Journal of Extension Education 2016;8(3):10-13.
7. Bandera AD. Phytochemical screening and return on investment of pechay (*Brassica napus* L. subsp. *chinensis* var. Black Behi) as influenced by inorganic fertilizers (ground and foliar application) and organic fertilizer. Int. J Agric. Food Sci. 2020;2(1):24-30. DOI: 10.33545/2664844X.2020.v2.i1a.31
8. Li XZ, Zhao QL. Recovery of ammonium-nitrogen from landfill leachate as a multi-nutrient fertilizer. Ecological Engineering. 2003;20(2):171-181.
9. Panwar AS. Effect of integrated nutrient management in maize (*Zea mays*)-mustard (*Brassica compestris* var *toria*) cropping system in mid hills altitude. The Indian Journal of Agricultural Sciences 2008, 78(1).
10. Singh R, Totawat KL. Effect of integrated use of nitrogen on the performance of maize (*Zea mays* L.) on haplustalfs of sub-humid southern plains of Rajasthan. Indian Journal of Agricultural Research 2002;36(2):102-107.
11. Kumpawat BS. Integrated nutrient management for maize (*Zea mays*)-Indian mustard (*Brassica juncea*) cropping system. Indian Journal of Agronomy 2004;49(1):18-21.