Effect of Different Organic Manures with Combination of Inorganic Fertilizers on Transplanted Gobhi Sarson (Brassica napus L.)

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Abstract

To evaluate the effect of organic manures with or without combination of inorganic fertilizers on transplanted Gobhi Sarson (Brassica napus L.) on various growth and yield attributing traits of transplanted Gobhisarson. The experiment was conducted under Randomized Block Design with 8 treatments and three replication, during the rabi season (2018–2019) at Agricultural Research Farm, RIMT University, Punjab. The effect of eight treatments viz., (T1) 20 tha⁻¹ Farm yard manure, (T2) 10 ton ha⁻¹ Farm yard manure + ½ Nitrogen, (T3) 10 tha⁻¹ Poultry manure, (T4) 5 tha⁻¹ Poultry manure + ½ Nitrogen, (T5) 5 tha⁻¹ Farm yard manure + 5 tha⁻¹ Poultry manure, (T6) 5 ton ha⁻¹ Vermicompost, (T7) 40:12 (Recommended Dose of Fertilizer) and (T8) Control were studied on various growth and yield attributing parameters. The findings have revealed that upon various treatments combination, application of 5 tha⁻¹ Poultry manure + ½ Nitrogen, produced significantly higher growth attributes viz., survival % (89.81), plant height (147.0 cm), number of branches plant⁻¹ (8.3) and maximum yield viz., number of siliqua plant⁻¹ (303.0), siliqua length (8.56 cm), number of seeds siliqua⁻¹ (27.3), test weight (2.77 g), grain yield (2329.0 Kg ha⁻¹), straw yield (8592.2 Kg ha⁻¹) and consequently, harvest index (23.6 %). The combined effect of poultry manure and nitrogen were also produced quality green leafy vegetable because gobhisarson is also widely used as green leafy vegetable in Punjab state.

Keywords
Transplanted Gobhisarson, Organic manures, Inorganic fertilizers, Poultry manure, Nitrogen and yield attributes

Introduction

Gobhi sarson (Brassica napus L.) belongs to the family Brassicaceae, is an annual herb. The centre of origin for Brassica napus is Mediterranean Europe (OECD 2012; Rakow 2004). Its plant height is up to 1.5 m. Leaves are alternately arranged and hairless, which is widely used as green leafy vegetable in India specially Punjab state. Sepals are 4 having yellow colour with 1.5 mm broad 6 mm long and flowering at February- March (OECD 2012). In 1974, the first agronomically viable low-erucic acid / low glucosinolate variety was released in Canada and in 1978, the term "canola," derived from "Canadian oil," was adopted to identify these varieties (Canola Council of Canada, 2011; Daun, 1993). Canada, China and India are largest mustard producing countries in the world with 12 % of...
world’s total production. Organic manures, including animal manures such as poultry manure, sheep manure etc, residues of field crops, green manures and composts were traditionally and preferentially used in developing countries until 1960’s before the inorganic chemical fertilizers began to gain popularity, they can produce safe and nutritive food as well as increased the soil health (Ramesh et al., 2005). By recycling the bio-waste resources in the form of compost can be a way of means to meet the demands of organic manures and it could also help to clean the environmental pollution (Kumar, 2005). Because of these unbalanced used of chemical fertilizers and pesticides decreases the soil fertility and causes health problems to the consumers (Follet et al., 1981, Mandal, 2009). Sustainable farming looks for making the best use of natural resources without damaging the environment and indigenous agricultural knowledge is a vital part of the process of making agriculture sustainable (Ramprasad et al., 2009). The integrated use of organic fertilizers and inorganic fertilizers maintains harmful free ecological conditions on long-term basis and helps in achieving the economical need for the farmer’s (Kumar et al., 2007). It also helps to restore the deficiency of nutrients along with N, P and K as well as sustain soil fertility and crop productivity. The integrated nutrient management approvingly affects the environment of soils. Integrated nutrient supply with combination used of organic sources of nutrients and fertilizers presume greater significance (Roy, 1992). The application of poultry manure stimulation the soil microbial growth and activity, subsequent mineralization of plant nutrients, and increased soil fertility and quality and also considered as a good management practice in any agricultural production system (Arancon et al., 2006). The commercial organic farming as practiced today is still at an initial stage. According to survey of International Federation of Organic Agriculture Movement (IFOAM) and Shifting Oekologic and Landban (SOEL), India has 41,000 ha land under organic management, which is only 0.03% of total agricultural land (Anonymous, 2004).

Materials and Methods

The present field experiment entitled “Effect of different organic manures with combination of inorganic fertilizers on transplanted Gobhi sarson (Brassica napus L.)” was carried out at Agriculture Research Farm, School of Agricultural Sciences and Technology, RIMT University, Mandi Gobindgarh (Punjab). The experiment conducted during November - April, 2018-19, under randomized block design (RBD) with 8 treatments (T1: 20 t/ha Farm yard manure, T2:10 t/ha FYM + ½ N, T3:10 tha-1 PM, T4: 5 t/ha PM + ½ N, T5: 5 t/ha FYM + 5 t/ha PM, T6: 5 t/ha VC, T7:40:12 RDF and T8: control) and three replications. Seeds of Gobhi sarson were sown in nursery beds (40 m²) for rising seedling. After 35 days, seedling was transplanted in the prepared experimental field with 45 cm row to row and 15 cm plant to plant distance, in plots (1.65 × 2.00 m²). Growth and yield parameters were observed viz., per cent survival before harvesting, height of plants (cm), number of branches plant-1, number of siliqua plant-1, siliqua length (cm), number of seed siliqua-1, test weight, grain yield (kg ha-1), straw yield (kg ha-1) and harvest index (%).

Statistical analysis

The data was analysis through the statistical software OPSTAT, 1998 (Sheoran et al., 1998). One way ANOVA was applied for data analysis from Randomized Block Design according to the method given by Panse and Sukhatme (1985). The calculated ‘F’ value is compared with table F values at 5% level of significance for field data. If the calculated ‘F’
value is greater than the table value the difference is said to be significant and critical difference is calculated for further comparison.

**Results and Discussion**

The significant variations were observed among the treatments for growth and yield attributing parameters. Maximum survival % before harvesting (89.8 %), plant height (147.0 cm), number of branches plant\(^{-1}\) (8.3) was recorded in the T\(_4\) (5 tha\(^{-1}\) Poultry manure + ½ Nitrogen) followed by T\(_2\) (10 tha\(^{-1}\) Farm Yard Manure + ½ Nitrogen) whereas minimum number of silique plant\(^{-1}\) was recorded in T\(_8\) (control) 183.0 followed by T\(_3\) (10 tha\(^{-1}\) Poultry manure) 218.3. Maximum length of silique (8.56 cm) was recorded in T\(_4\) which was at par with T\(_2\) (8.56 cm) followed by T\(_7\) (8.47 cm). Minimum number of seed silique\(^{1}\) (22.9) was recorded in T\(_8\) followed by T\(_3\) (24.3). Maximum test weight (2.77 g) was recorded in T\(_4\) followed by T\(_2\) (2.66 g). Maximum grain yield (2329.0 kg ha\(^{-1}\)) was recorded in T\(_4\) followed by T\(_2\) (2245.5 kg ha\(^{-1}\)). Maximum straw yield (8592.2 kg ha\(^{-1}\)) was recorded in T\(_4\) followed by T\(_2\) (8592.2 kg ha\(^{-1}\)) whereas minimum harvest index (19.6 %) was recorded in T\(_5\) followed by T\(_1\) (19.5 %) (Table 1 and 2).

Poultry manure contains 13 essential nutrients which are used by plants for its better growth and development. Poultry manure is rich source of N, P\(_2\)O\(_5\), K\(_2\)O, S, Ca, Mg, Mn, Cu, Zn, Cl, B, Fe, and Mo, Barker (1990). Nowadays used of poultry manure is taking prime position among organic manures for organic production of agronomical and horticultural crops, it is also widely used in conducting research trials of agriculture field. Ogboghodo et al., (2004) reported that the application of poultry manure in crude oil polluted soil increased survival percentage growth and yield of *Zea mays*. Lim (2016) reported that the combination of poultry manure + Nitrogen increase plant height of mustard which was significantly higher than the other treatments combinations.

**Table 1** Effect of organic manure on growth parameters of transplanted Gobhi sarson

| Treatments                                      | Survival % | Plant height | Number of branches |
|------------------------------------------------|------------|--------------|--------------------|
| T\(_1\): (20 t/ha Farm yard manure)            | 85.2       | 143.7        | 7.0                |
| T\(_2\): (10 t/ha Farm Yard Manure + ½ Nitrogen)| 89.8       | 144.3        | 7.3                |
| T\(_3\): (10 tha\(^{-1}\) poultry manure)     | 72.2       | 137.0        | 5.3                |
| T\(_4\): (5 t/ha Poultry manure + ½ Nitrogen)  | 89.8       | 147.0        | 8.3                |
| T\(_5\): (5 t/ha Farm yard manure + 5 t/ha Poultry manure) | 78.7      | 142.0        | 6.0                |
| T\(_6\): (5 t/ha Vermicompost)                 | 78.7       | 140.3        | 5.7                |
| T\(_7\): (40:12 (Recommended dose of fertilizer)| 86.1       | 143.7        | 7.0                |
| T\(_8\): (control)                             | 62.0       | 128.3        | 5.0                |
| C.D (P=0.05)                                   | 2.7        | 8.6          | 1.8                |
| C.V                                            | 1.9        | 3.4          | 16                 |
Table 2: Effect of organic manure on growth parameters of transplanted Gobhi sarson

| Treatments | Number of silique plant$^{-1}$ | silique length (cm) | Number of seed silique$^{-1}$ | test weight | grain yield (kg ha$^{-1}$) | straw yield (kg ha$^{-1}$) | Harvest index (%) |
|------------|-------------------------------|---------------------|-------------------------------|-------------|--------------------------|--------------------------|------------------|
| T$_1$      | 291.7                         | 8.53                | 26.4                          | 2.52        | 1651.2                   | 6802.7                   | 19.6             |
| T$_2$      | 296.7                         | 8.56                | 27.2                          | 2.66        | 2245.5                   | 8592.2                   | 23.4             |
| T$_3$      | 218.3                         | 8.46                | 24.3                          | 2.39        | 1601.4                   | 4771.5                   | 20.7             |
| T$_4$      | 303.0                         | 8.56                | 27.3                          | 2.77        | 2329.0                   | 8592.2                   | 23.6             |
| T$_5$      | 268.7                         | 8.51                | 26.3                          | 2.45        | 1614.2                   | 5736.0                   | 19.5             |
| T$_6$      | 229.0                         | 8.47                | 24.8                          | 2.42        | 1608.4                   | 5320.9                   | 20.2             |
| T$_7$      | 292.7                         | 8.55                | 26.8                          | 2.54        | 1861.9                   | 6826.2                   | 21.4             |
| T$_8$      | 183.0                         | 7.35                | 22.9                          | 2.38        | 951.1                    | 2719.3                   | 21.2             |
| C.D(P=0.05)| 21.3                          | N/S                 | 4.08                          | N/S         | 88.0                     | 80.7                     | 2.4              |
| C.V        | 4.6                           | 6.62                | 8.34                          | 6.27        | 2.5                      | 0.7                      | 6.2              |

Similar findings were observed by Reddy and Singh (2018) that providing 80 kg N to mustard by supplying 50 kg N through urea and 30 kg N through poultry manure gave the higher yield attributes viz., number of silique plant$^{-1}$, number of seed silique$^{-1}$, test weight, seed yield, stalk yield and harvest index.

Ewulo et al., (2016) Observed and reported that the effects of urea and PM (50 kg Urea + 8 tha$^{-1}$ PM) significantly increase number of branches in tomato plants. Similar finding were observed by Adekiya and Agbede (2010) that NPK fertilizer + poultry manure mostly enhanced the growth parameters such as palm height, number of leaves and leaf area. These finding highly corroborated with the findings of Choudhary et al., (2011) they reported that integration of 50 % Recommended dose of nitrogen through inorganic fertilizer + 50 % nitrogen and other nutrients through poultry manure increased higher growth and yield attributes in fenugreek (Trigonella foenumgraecum) which pod length, seed pod$^{-1}$, pod plant$^{-1}$, and test weight. Similar finding were also observed by Khiiriya et al., (2003) the application of nitrogen through various source and their integration with organic manure enhanced growth and yield of fenugreek.

It can be concluded that the Treatment T$_4$ (5 t /ha Poultry Manure + ½ N) was recorded significantly higher growth performance, which is desirable parameter for production of transplanted Gobhi sarson for green leafy vegetable, and yield attributes (Seed production) of transplanted Gobhi sarson followed by T$_2$ (10 t/ha Farm Yard Manure + ½ N). These findings are based on one-season experiment.

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