



# Response of Date of Sowing and Varieties on Growth and Yield of Mustard (*Brassica juncea* L.) under Humid Climatic Conditions

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

The present study aims to study the Response of date of sowing and varieties on growth and yield of mustard (*Brassica juncea* L.) under humid climatic condition. The experiment was conducted with (FRBD) design having three replications and nine treatments combinations, comprising two factors with three dates of sowing viz., D<sub>1</sub>: (19<sup>th</sup> November), D<sub>2</sub>: (3<sup>rd</sup> December) and D<sub>3</sub>: (17<sup>th</sup> December) and three varieties viz., V<sub>1</sub>: (GM-3), V<sub>2</sub>: (GDM-4) and V<sub>3</sub>: (GDM-5). Significantly highest plant height

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(183.09 cm), number of primary (7.10) and secondary (17.08) branches per plant, number of siliques per plant (309.07), number of seed per siliquae (14.06) and seed yield (2261 kg ha<sup>-1</sup>) was recorded with treatment D<sub>1</sub> (19<sup>th</sup> November) at harvest. Significantly highest number of primary (6.39) and secondary (16.27) branches per plant, number of siliques per plant (283.58), number of seed per siliquae (13.50) and seed yield (2087 kg ha<sup>-1</sup>) was recorded with treatment V<sub>2</sub> (GDM-4) at harvest maturity.

**Keywords:** Crop yield; date of sowing; mustard; varieties.

## 1. INTRODUCTION

Mustard is the second important oilseed crop in India, next to ground nut, having almost one fourth share in both area and production. In India, the mustard crop is widely cultivated in Rajasthan, Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh, Assam, Bihar, Orissa, Punjab, West Bengal, Andhra Pradesh, Tamil Nadu and Karnataka. In India mustard-rapeseed growing area 6.8 MH with annual production of about 9.1 MT and annual productivity 1345 kg ha<sup>-1</sup> (2019-20). In India, three largest producing states Rajasthan (4.22 MT), Haryana (1.15 MT) and Uttar Pradesh (0.96 MT) (Directorate of Economic & Statistics, Department of Agriculture, Cooperative and farmers Welfare [1]) In India, mustard is cultivated in 59.77 lakh ha. having yearly production of 8.42 million tonnes and an average productivity of about 1410 kg ha<sup>-1</sup>. It is growing in area of 63 lakh ha having a production of 80 lakh tonnes and 13.24 q ha<sup>-1</sup> productivity. There existing large gap between productivity of world (20.47 q ha<sup>-1</sup>) and India's (13.24 q ha<sup>-1</sup>) (Rana et al 2020). It is mainly cultivated in the districts of Banaskantha, Patan, Sabarkantha, Mehsana, Ahmedabad, Jamnagar, Rajkot, Kutch, Kheda and Amreli.

Mustard (*Brassica juncea* L.) also known as Raya, Rai or laha is an important oilseed crop, among the *Brassica* group of oilseeds in India. Oil and protein percent in mustard is 40-45 % and 20-25 % respectively [2]. It also rich in two essential fatty acids viz., linoleic and linolenic, which are not found in other edible oils. The seed of mustard are more nutritive which contains erucic acid (37-58 %), linoleic acid (6-13%) and oleic acid (26 %) (Patel et al., 2017). The contents of crude protein 26-30 %, nitrogen 5%, phosphorus 1.7-2.0 % and potassium 1.0-1.3% presents in mustard oil cake [3-6].

Cool and dry weather reflected into good amount of bright sunshine indirectly increases yield of oil. Mustard required high temperature for its vegetative growth (21-33 °C) and clear sky and cool temperature at time of reproductive growth

and maturity. Due to C<sub>3</sub> mustard plant higher assimilation of carbon. Although, it has better photosynthetic reaction at 16 °C to 20 °C temp. Rapeseed–mustard crops are sown in different climate ranging from north-eastern and north-western hilly area to down south irrigated, timely or late-sown and saline soils. Production capacity of mustard will be fully utilized under these climatic conditions having appropriate agronomic practices and varieties. Among the various agronomic practices, optimum time of sowing is very vital for mustard production (Mondal et al. 2011).

## 2. MATERIALS AND METHODS

The present investigation was carried out at the College Farm, Navinchandra Mafatlal College of Agriculture, Navsari Agricultural University, Navsari during *rabi* season of the year 2019-20. South Gujarat soil is also known as “Deep Black soils” and the soil of Navsari where the experiment conducted was fall under the great group of *Ustochrepts* and has been placed under Jalalpur soil series. Three varieties viz. GM-3 (V<sub>1</sub>), GDM-4 (V<sub>2</sub>) and GDM-5 (V<sub>3</sub>) were used to know their performance on three dates of sowing viz. 19<sup>th</sup> November (D<sub>1</sub>), 3<sup>rd</sup> December (D<sub>2</sub>) and 17<sup>th</sup> December (D<sub>3</sub>) [7-10]. This experiment was carried out under randomize block design with factorial concept (FRBD) having three replications and two factors which are date of sowing and varieties. The mustard crop was fertilized with a recommended dose of N, P and K 50 kg ha<sup>-1</sup>, 50 kg ha<sup>-1</sup> and 00 kg ha<sup>-1</sup>, respectively and Urea and DAP were used to apply nitrogen and phosphorus. Crop was sown on different dates having 4 kg ha<sup>-1</sup> seed rate for each variety and sowing was done manually. Five irrigations, intercultural operation at 15 DAS. Observations regarding growth like plant population, plant height (cm), no. of primary and secondary branches, length of siliquae, no. of siliqua per plant, no. of seed per siliquae, seed and stover yield. Carried out harvesting operation for each plot at physiological maturity stage when yellowish brown colour was observed on siliquae.

Mustard crop was harvested when it's 75 % pods are turned yellowish brown coloured and then after harvested plants were sun dried for 10 to 12 days at threshing floor after proper tagging. The dried bundle weight of net plot was recorded separately.

### 3. RESULTS AND DISCUSSION

#### 3.1 Growth Attributes of Plant

Plant stands at 30 days after sowing and at harvest was found statistically non-significant influenced through date of sowing. Significantly maximum plant stands at 30 days after sowing and at harvest (6.86, 6.65, respectively), Plant height at 30 DAS found non-significant and at harvest was found statistically highly significant with different date of sowing. Significantly higher height of plant at harvest (183.09 cm) and primary as well as secondary branches per plant showed significant with different sowing dates. At harvest significantly maximum number of primary (7.10) and secondary (17.08) branches per plant was recorded with sowing at 19<sup>th</sup> November (D<sub>1</sub>) [11,12].

Different varieties not significantly influenced plant stand at 30 DAS and at harvest of crop. Significantly maximum plant stand at 30 days

after sowing and at harvest (6.75, 6.59, respectively), height of plant at 30 DAS and at harvest was found statistically non-significant due to varieties. Significantly higher height of plant at 30 days after sowing and at harvest (40.36 cm, 175.99 cm, respectively) and Primary as well as secondary branches per plant found non-significant with varieties. At harvest significantly highest number of primary and secondary branches per plant (6.39, 16.27 respectively) were observed with variety GDM-4 (V<sub>2</sub>).

#### 3.2 Yield Attributes and Yield

Length of siliqua (4.36 cm), silique number per plant (306.07), number of seed per siliquae (14.06) were found significantly influence by different date of sowing. Seed yield was found significantly influenced by different sowings date of mustard. Sowing of mustard at 19<sup>th</sup> November (D<sub>1</sub>) recorded significantly highest seed yield (2261 kg ha<sup>-1</sup>).

Length of siliqua (4.01 cm), silique number per plant (283.58), number of seed per siliquae (13.50) were found significantly recorded with GDM-4 (V<sub>2</sub>) mustard cultivar. In same trends significantly highest seed yield (2087 kg ha<sup>-1</sup>) was found with sowing of GDM-4 (V<sub>2</sub>) over rest of cultivars.

**Table 1. Effect of date of sowing and varieties on growth attribute of mustard**

| Treatment                                  | Plant population |            | Plant height |            | Number of branches per plant at harvest |                              |
|--|------------------|------------|--------------|------------|---|------------------------------|
|  | 30 DAS           | At harvest | 30 DAS       | At harvest | Number of primary branches              | Number of secondary branches |
| <b>(A) Date of sowing</b>                  |                  |            |              |            |   |                              |
| D <sub>1</sub> : 19 <sup>th</sup> November | 6.86             | 6.65       | 40.64        | 183.09     | 7.10                                    | 17.08                        |
| D <sub>2</sub> : 3 <sup>rd</sup> December  | 6.71             | 6.50       | 40.05        | 169.63     | 6.13                                    | 16.12                        |
| D <sub>3</sub> : 17 <sup>th</sup> December | 6.54             | 6.19       | 38.67        | 159.77     | 5.48                                    | 14.58                        |
| S. Em. ±                                   | 0.11             | 0.12       | 0.57         | 4.34       | 0.26                                    | 0.56                         |
| C.D. at 5%                                 | NS               | NS         | NS           | 13.02      | 0.77                                    | 1.69                         |
| <b>(B) varieties</b>                       |                  |            |              |            |   |                              |
| V <sub>1</sub> : GM-3                      | 6.66             | 6.50       | 39.23        | 166.23     | 6.11                                    | 15.57                        |
| V <sub>2</sub> : GDM-4                     | 6.75             | 6.59       | 40.36        | 175.99     | 6.39                                    | 16.27                        |
| V <sub>3</sub> : GDM-5                     | 6.69             | 6.25       | 39.77        | 170.27     | 6.21                                    | 15.93                        |
| S.Em. ±                                    | 0.11             | 0.12       | 0.57         | 4.34       | 0.26                                    | 0.56                         |
| C.D. at 5%                                 | NS               | NS         | NS           | NS         | NS                                      | NS                           |
| C.V. %                                     | 4.80             | 5.67       | 4.33         | 7.62       | 12.33                                   | 10.64                        |
| <b>Interaction (DxV)</b>                   |                  |            |              |            |   |                              |
| S.Em. ±                                    | 0.19             | 0.21       | 1.00         | 7.52       | 0.44                                    | 0.98                         |
| C.D. at 5%                                 | NS               | NS         | NS           | NS         | NS                                      | NS                           |

**Table 2. Effect of date of sowing and varieties on yield and yield attributes at harvest of mustard**

| Treatment                                  | Yield attributes    |                             |                             | Yield (kg ha <sup>-1</sup> )   |                                     |
|--|---------------------|-----------------------------|-----------------------------|--------------------------------|-------------------------------------|
|  | Siliqua length (cm) | Number of Siliqua per Plant | Number of Seeds per Siliqua | Seed yield kg ha <sup>-1</sup> | Stover yield (kg ha <sup>-1</sup> ) |
| <b>(A) Date of sowing</b>                  |                     |                             |                             |                                |                                     |
| D <sub>1</sub> : 19 <sup>th</sup> November | 4.36                | 309.07                      | 14.06                       | 2261                           | 4968                                |
| D <sub>2</sub> : 3 <sup>rd</sup> December  | 3.74                | 256.14                      | 12.98                       | 1971                           | 4709                                |
| D <sub>3</sub> : 17 <sup>th</sup> December | 3.31                | 217.18                      | 11.87                       | 1666                           | 4093                                |
| S. Em. ±                                   | 0.16                | 8.32                        | 0.36                        | 65.63                          | 135.85                              |
| C.D. at 5%                                 | 0.49                | 24.95                       | 1.08                        | 196.76                         | 407.28                              |
| <b>(B) Varieties</b>                       |                     |                             |                             |                                |                                     |
| V <sub>1</sub> : GM-3                      | 3.57                | 244.31                      | 12.52                       | 1846                           | 4451                                |
| V <sub>2</sub> : GDM-4                     | 4.01                | 283.58                      | 13.50                       | 2087                           | 4721                                |
| V <sub>3</sub> : GDM-5                     | 3.83                | 254.51                      | 12.89                       | 1965                           | 4598                                |
| S. Em. ±                                   | 0.16                | 8.32                        | 0.36                        | 65.63                          | 135.85                              |
| C.D. at 5%                                 | NS                  | 24.95                       | NS                          | NS                             | NS                                  |
| C.V. %                                     | 12.76               | 9.57                        | 8.30                        | 10.01                          | 8.88                                |
| <b>(c) Interaction (D x V)</b>             |                     |                             |                             |                                |                                     |
| S. Em. ±                                   | 0.28                | 14.41                       | 0.62                        | 113.67                         | 235.30                              |
| C.D. at 5%                                 | NS                  | NS                          | NS                          | NS                             | NS                                  |

#### 4. CONCLUSION

Based on one year data it can concluded that for getting highest seed yield and profitability per hectare mustard should be shown on 19<sup>th</sup> November either using GDM-4 or GDM-5 or GM-3, crop variety.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Anonymous 2019-20. Production details of India in mustard. (Source: Directorate of Economic & Statistics, Department of

2. Agriculture, Cooperative and farmers Welfare.). Alam MM, Begum F, Roy P. Yield and yield attributes of rapeseed mustard (*Brassica*) genotypes grown under late sown condition. Bangladesh Journal of Agricultural Research. 2014;39:311-336.
3. Afroz MM, Sarkar MAR, Bhuiya MSU. Effect of date of sowing and seed rate on yield performance of two mustard varieties. Bangladesh Journal of Agriculture University. 2011;9:5-8.
4. Akhter MT, Mannan MA, Kundu PB, Paul NK. Effects of different sowing dates on the phenology and accumulated heat units in three rapeseed (*Brassica campestris* L.) varieties. Bangladesh Journal of Botany. 2015;44: 97-101.
5. Azam MG, Akter R, Rahman MS, Mahmud S, Alam MR, Faruq MO, Rahman MM. Optimization of sowing time of BARI Sarisha 14 & BARI Sarisha 15 in Chittagong region. Journal of Bioscience and Agriculture Research. 2018;17:1431-1435.
6. Aziz MA, Chakma R, Ahmed M, Rahman AKMM, Roy K. Effect of sowing dates on the growth, development and yield of mustard in the hilly areas. Journal of Bioscience and Agriculture Research. 2011;2:33-36.

7. Chinmay B, Ravindra S, Kumar PV. Dynamics of white rust disease in mustard (*Brassica juncea*) in relation to date of sowing and weather parameter., Indian Journal of Agricultural Science. 2011;81:1187–90.
8. Chouksey H, Sardana V, Sharma P. Variability in Indian mustard (*Brassica juncea*) genotypes in response to applied phosphorus. Indian Society of Agronomy. 2017;62:374-377.
9. Devi M, Sharma HK. Effect of sowing date on flowering and seed set of mustard (*Brassica juncea* L.). Journal Entomol Zool Stud. 2017;5:1534-1537.
10. Dinda NK, Ray M, Sarkar P. Effect of sowing date vis-a-vis variety of rapeseed and Mustard on growth, yield and aphid infestation in Gangetic plains of West Bengal. The Ecoscan. 2015;9: 21-24.
11. Ferdous J. Growth and yield responses of rapeseed-mustard varieties grown with different sowing times (doctoral dissertation, department of agronomy, Sher-E-Bangla Agricultural University); 2018.
12. Gawariya SC, Chopra NK, Chopra N, Harika AS. Effect of date of sowing and crop geometry on growth and yield parameters of forage mustard (Var. Chinese Cabbage). African Journal of Agricultural Research. 2015;10: 3292-3295.

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