

Original Research Article

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Agronomic Evaluation of Mustard (*Brassica juncea* L.) Hybrids under Agroclimatic Conditions of Prayagraj (U.P.) in Rabi- 2019-2020

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ABSTRACT

Keywords

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The Agronomic investigation entitled Agronomic evaluation of Mustard (*Brassica juncea* L.) hybrids under agroclimatic conditions of Prayagraj (U.P.) was carried out during Rabi 2019-2020. The field experiment was laid out in Randomised Block Design, replicated four having 5 different variety as treatments. The finding of the experiment indicated that the growth parameters of 45S35 (Mustard) viz. Plant height (169.02 cm), Primary Branch/plant (8.5), Dry weight (37.0 g) and CGR (12.405 g/m²/day). as well as yield attributes like Number of siliqua/plant, (372/plant), Grain/siliqua (14.55), Test weight 5.85(g), Grain yield (1955 kg/ha) and Harvest index (36.96%) were also higher in 45S35. The genotype 45S35 was found to be the best for growing because it was found to be more productive (1955 kg/ha) as well as economic (1.61).

Introduction

Brassica juncea L. originally introduced from China into north east India, from it has extended into Afghanistan via the Punjab. Eastern Afghanistan, together with the adjoining north western India, is one of the independent centre of origin of Brown sarson (*Brassica campestris* var. brown sarson). In India the Brassica crops occupy the second largest position after groundnut, with 3.5 million hectares, production about 2 million tonnes of seed annually. The chief states producing them are Uttar Pradesh, Punjab, Haryana, Assam, Bihar, Madhya Pradesh,

Rajasthan, West Bengal, and Orissa. The production of rape seed in India is around 16.2 million tonnes which accounts for about 18 percent of the total oilseed production of the country. In U.P., rapeseed and mustard is one of the major grown crop occupying 0.56 million ha of area, with production and productivity of 0.699 million tonnes and 1248 kg/ha respectively [(India Statistics (Indiastat.com) (2014-15)]. Rapeseed–mustard is the third most important source of edible oil next to soybean and groundnut in India, and is grown in certain tropical and subtropical regions as a cold-season crop (Shekhawat *et al.*, 2012). The seed and oil of

mustard have a peculiar pungency due to presence of glucosinolate and its hydrolysis products such as allyl isothiocyanate (0.30-0.35%).

Materials and Methods

The experiment was conducted during the Rabi season of 2019 at the Crop Research Farm, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P). The Crop Research Farm is situated at 25° 39' 42'' N latitude, 81° 67' 56'' E longitude and at an altitude of 98 m above mean sea level. The soil was sandy loam in texture, low in organic carbon (0.15%) and medium in available nitrogen (35.55 kg/ha), phosphorus (9.8 kg/ha) and low in potassium (187.2 kg/ha). The climate of the region is semi arid subtropical. The experiment was laid out in Randomized Block Design replicated four. Recommended dose of fertilisers was applied with Urea, SSP, MOP. Seeds were sown at a spacing of 45cm X 10 cm.

Chemical analysis of soil

Collected soil samples were analysed for organic carbon by rapid titration method (Sparks, 1996), available nitrogen was estimated by alkaline permanganate method by (Subbiah and Asija, 1956) available phosphorous by Olsen's method as outlined by (Jackson, 1967), available potassium was determined by extracting with neutral normal ammonium acetate solution and estimating by using flame photometer (ELICO model) as outlined by (Jackson, 1973).

Statistical analysis

Experimental data collected was subjected to statistical analysis by adapting Fisher's method of analysis of variance (ANOVA) as outlined by (Gomez and Gomez, 1984). Critical differences (CD) were calculated with F-test was found significant at 5% level.

Results and Discussion

Germination (%)

As observation data show that there is medium percentage of more than 70 % in all hybrids of Mustard (*Brassica juncea* L.). In T2 (45S35), T5 (ANMOL), T3 (1604) and T4 (45S46) these variety have between 70 to 90 % germination. The highest germination % (96%) was observed in T1 (BULLET).

Plant height (cm)

At 100 DAS the significant and higher plant height (169.02 cm) was found in T2 [45S35]. However, T5 [ANMOL] and T4 [45S46] found to be statistically at par with T2 [45S35].

Height of a plant is determined by genetical character and under a given set of environment different variety will acquire their height according to their genetical make up. Das *et al.*, (2019). Similar finding are observed by Dongarkar *et al.*, (2005)

Number of primary branches

At 100 DAS the significant and higher Number of primary branches (8.5) was found in T2 [45S35]. However, treatment T1 [BULLET] and T5 [ANMOL], found to be statistically at par with T2 [45S35]. Different varieties of mustard had significant influence on flowering characters at productive part flowering developments stages which might be due to different crop growth maturity pattern in complete life cycle growth period (Kumar *et al.*, 2017).

Higher number of branches/plant is the result of genetic makeup of the crop and environmental conditions which play a remarkable role towards the final seed yield of the crop (Helal *et al.*, 2016).

Table.1 Effect of different hybrids on germination, growth, yield attributes, yield and economics of Mustard

TREATMENT DETAILS	Germination (%)	Plant height (cm)	Number of Primary Branches/Plant	Number of Secondary Branches/Plant	Plant dry weight (g)	No. of Siliqua /plant	Length of Siliqua (cm)	Seeds /Siliqua	Test Weight (g)	Seed Yield (Kg/ha)	Biological Yield (Kg/ha)	Harvest index (%)	B:C Ratio
BULLET	96	153.86	8.30	12.45	32.55	328.05	5.21	14.30	5.27	1917.5	6250.0	34.96	1.67
45S35	72	169.02	8.50	13.10	37.00	372.80	5.47	14.35	5.85	1935.0	6500.0	36.95	1.69
1604	84	157.09	7.75	9.97	29.00	288.20	4.95	12.65	4.35	1177.5	4375.0	21.82	1.03
45S46	88	158.44	8.02	10.30	30.82	317.35	4.99	13.05	4.68	1415.0	5250.0	26.92	1.24
ANMOL	76	166.81	8.12	11.65	32.10	322.35	5.00	14.05	5.15	1692.5	5500.0	27.25	1.47
F-test	-	S	S	S	S	S	NS	S	S	S	S	S	-
Sem	-	3.46	0.15	0.28	1.45	11.37	0.13	0.19	0.07	35.36	232.64	0.98	-
CD (P=0.05)	-	10.77	0.47	0.88	4.53	35.44	-	0.61	0.23	110.96	724.79	3.06	-

Number of secondary branches

At 100 DAS the higher and significant Number of Secondary Branches (13.1) was observed in T₂ [45S35]. However, treatment T₁ [BULLETT], found to be statistically at par with T₂ [45S35]. Different varieties of mustard had significant influence on flowering characters at productive part flowering developments stages which might be due to different crop growth maturity pattern in complete life cycle growth period (Kumar *et al.*, 2017).

Higher number of branches/plant is the result of genetic makeup of the crop and environmental conditions which play a remarkable role towards the final seed yield of the crop (Helal *et al.*, 2016).

Plant Dry Weight (g)

At 100 DAS the significant and higher plant dry weight (37.0 g) was found in T₂ [45S35]. However treatment T₁ [BULLETT], found to be statistically at par with T₂ [45S35]. At 20 DAS higher plant dry weight (0.35 g) was found in T₁ [BULLETT] through Non-significant. Similar finding given by Patel *et al* (2017).

Days to 50% flowering and Days to maturity

The significant variation in 50% flowering may be due to different genotype. However the significant and minimum days taken for 50% flowering was in treatment T₄ [45S46] 42.5 days while treatment T₃ [1604] and T₅ [ANMOL] was at par with T₄.

The significant variation in Days taken for maturity may be due to different genotype. However the significant and minimum days taken for maturity was in treatment T₄ [45S46] 102.25 days while treatment T₃ [1604] and T₅ [ANMOL] was at par with T₄.

No. of siliqua/plant

The data showed significant and higher no. of siliquae / plant (372.8) in Treatment T₂ [45S35] which was most significant among all the other treatments.

Length of siliqua (cm)

The data showed significant and higher no. of grain/siliquae (14.35) in T₂ [45S35]. However treatments T₁ [BULLETT] and T₅ [ANMOL] found to be statistically at par with T₂ [45S35]. Production of higher yield by different varieties might be due to the contribution of cumulative favorable effects of the crop characteristics viz., number of branches/plant, siliqua/plant and seeds/siliqua. Helal *et al.*, (2016)

Grains/siliqua

The data showed maximum length of siliquae (5.47 cm) was found in T₂ [45S35] though Non-significant.

Test weight (g)

The data showed significant and maximum test weight (5.85 g) was observed in T₂ [45S35] among all the treatments.

Seed yield (kg/ha)

The data showed significant and maximum seed yield (1935.0 kg/ha) was observed in T₂ [45S35]. However, T₁ [BULLETT] found to be statistically at par with T₂ [45S35]. All the growth and yield attributes which determined the seed yield of mustard crop, were adversely influence when the different nutrient management practise adopted, which might be resulted to poor growth and translocation of photosynthates from source to sink and ultimately lower yield was recorded. Kour *et al* (2017).

Biological yield (kg/ha)

The data showed significant and maximum biological weight (6500.0 kg/ha) was observed in T₂ [45S35]. However, treatment T₁ [BULLET] found to be statistically at par with T₂ [45S35]. As discussed earlier, the different hybrids have different yield potential, which is the reason for yield variation among different varieties. In contrast to the traditional OP varieties hybrids have bigger canopy structure and to explore optimum yield potential these hybrids needs wider spacing in comparison to OP varieties (Das *et al.*, 2019).

Harvest index (%)

The data showed significant and maximum harvest index (36.95) was observed in T₂ [45S35]. However, treatment T₁ [BULLET] found to be statistically at par with T₂ [45S35]. The highest biological yield might be on account of maximum seed yield than the other varieties (Das *et al.*, 2019).

Economic analysis

The Maximum gross return (₹ 91640/ha), the highest net return (₹ 37317/ha), Maximum benefit cost ratio of 1.69 was obtained from treatment T₂ (45S35).

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