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ORIGINAL RESEARCH ARTICLE



Varietal performance of Broad leaf Mustard during winter season in plain region of eastern Nepal

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ABSTRACT

The experiment was conducted in agriculture farm of Girija Prasad Koirala College of Agriculture and Research Centre Gothagaun, Morang to know the morphological and yield attributing character, disease severity and organoleptic test of Broad leaf Mustard. Four Variety of broad leaf mustard namely Khumal Chaudapat, Marpha Chaudapat, Manakamana and Mustard 101 with five replication was laid out in Randomized complete block design (RCBD) from October, 2020 to January, 2021. The length of leaf was superior in Kumal chaudapat (29.01 cm) as compare to other variety. The yield performance of Khumal chaudapat was better (27.10mtha^{-1}) followed by Marpha Chaudapat (24.50mtha^{-1}) and Manakamana (23.90mtha^{-1}). Lowest disease severity was recorded in Mustard 101 (26.7%), and highest disease severity in Marpha Chaudapat (37.85%). Overall, organoleptic test was good in Marpha Chaudapat.

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INTRODUCTION

Broad leaf mustard (BLM) is an important leafy vegetable of Nepal. In Nepal, broad leaf mustard is commonly known as 'Rayo'. It is cultivated from plain region to the mountainous regions in different season. Broad leaf mustard is considered as winter crop from terai/plain to the mid hills and summer crop for the high hills in Nepal. Among leafy vegetables grown, Broad leaf mustard production stands first and its young leaves are consumed as vegetable (JICA, 2016). Paudel *et al.* (2016) reported that 58 different accession of BLM and 92 different accessions of rapeseed has been characterized and evaluated in National Agriculture Genetic Resource center (NAGRC), Khumatar, Nepal. Niraula and Timilsina (2020) stated that Broad leaf mustard is commonly grown as a transplanted crop from the nursery. The common variation that is seen in different variety of BLM is presence or absence of trichomes, leaf size (length and width), leaf petiole size, taste of leaf etc. (Chalise *et al.*, 2020). The productivity of Mustard is profoundly affected by prevailing weather conditions throughout its lifecycle (Niraula and Timilsina, 2020). 'Khumal broad leaf', 'Khumal red

leaf', 'Marpha broad leaf' and 'Tankhuwa Rayo' are released varieties of BLM which have been cultivated since long time in Nepal (Shrestha *et al.*, 2021). Most of the research work on broad leaf mustard is confined in Mid-hills of Nepal. The research work on production possibility of leaf quality on different variety during winter season in plain region is quiet neglected. This research work mainly focus on production possibility of different BLM in plain region of eastern Nepal.

MATERIALS AND METHODS

Research site

The Field experiment was conducted at Girija Prasad Koirala College of Agriculture and Research Centre (GPCAR) farm in Gothgaun, Morang from October, 2020-January, 2021. The site is located at an altitude of 130 meter from the mean sea level. The research field was previously grown with Radish crop and was left uncultivated during summer-rainy season. The soil lab report revealed research plot has silty loam type soil. The two released variety of Nepal namely Khumal Chaudapat, Marpha Chaudapat and registered variety Manakamana along with

improved Japanese local mustard called as Mustard 101 was used in research purpose. The seed needed for the research work was brought from an Agro-vet located at the nearby university premises market of Gothgaun.

Design of experiment and treatment detail

The experiment was laid out in randomized complete block design with five replications. Four genotype of BLM namely Khumal Chaudapat, Marpha Chaudapat, Manakamana and Mustard 101 each were allotted in different plot of each replication. Seeds were sown in nursery bed on 21th October and 30 days old seedlings were transplanted in 3.06 m² experimental plots at 45 cm × 30 cm spacing containing 24 plants per plot.

Interculture operation

Fertilizer was applied at the rate of 80:40:40 kg NPKha⁻¹ (Manandhar, 2011). Similarly, 25 mtha⁻¹ of well rotten Farm Yard Manure (FYM) was applied two weeks before transplanting of seedling in main field. The full dose of phosphorus and potassium was applied as basal and nitrogenous fertilizer in three equal split dose at 30, 45 and 60 days of transplanting. Irrigation was provided at weekly intervals and weeding was done as necessary. Application of SAAF was done once in crop period at the rate of 2gm litre⁻¹ after 2 weeks of transplanting of seedling.

Observations

The leaf length and breadth was measured using the measuring scale. The total number of leaves per plant was counted. The fresh weight of leaf was measured by using a digital weighing machine. Multiple harvesting of leaf was done from 9th December (1st harvest) to 6th January (5th harvest) after 25 days of transplanting of seedling from the nursery in research plot.

For leaf data, 10 plants were selected from the inner side of the plot excluding the border plants. Disease severity percentage of *Alternaria* leaf blight was done from remaining whole plant leaf of each treatment immediately after 5th harvest of Broad leaf mustard. The severity of *Alternaria* blight was done on scale given by Bal and Kumar, 2013. Similarly, leaf quality was determined on the basis of 1-9 point hedonic scale (Peryam and Girardot, 1952; Peryam and Pilgrim, 1957).

Data analysis

The recorded data were entered replication-wise in each treatment in MS-Excel (2010) and analyzed by Gen Stat. Means comparison among significant variables was done by Duncan's multiple range test (DMRT) at 5% level of significance (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Morphological character of Broad leaf Mustard variety

The Breadth of leaf was observed non-significant among variety grown (Table 1). However, it varied from 12.06 cm in Mustard 101 to 15.56 cm in Marpha Chaudapat with the mean of 14.1 cm. The Length of leaf was found to be highly significant difference at 1 % level of significance among different variety (Table 1). The longest leaf was recorded in Khumal Chaudapat (29.01 cm) and the shortest in 'Mustard 101' (22.48 cm). However, similar leaf length was recorded in Variety Manakamana and Marpha Chaudapat. The number of leaf was observed non-significant among all variety (Table 1). However, released variety of Nepal such as Khumal Chaudapat, Marpha Chaudapat has slightly more number of leaves than hybrid variety Mustard 101.

Table 1. Morphological and yield attributing characters of different varieties of broad leaf mustard in GPCAR, Morang, 2021.

Variety	Leaf breadth (cm)	Leaf Length (cm)	Number of leaf	Yield (tha ⁻¹)
Khumal Chaudapat	14.73	29.01 ^a	5.41	27.10
Marpha Chaudapat	15.56	25.48 ^b	5.38	24.50
Manakamana	14.60	26.30 ^{ab}	5.61	23.90
Mustard 101	12.06	22.48 ^c	5.17	17.80
Grand Mean	14.10	25.82	5.39	23.33
SEm (±)	1.05	0.82	0.16	2.78
LSD(0.05)	Ns	2.49**	ns	ns
CV (%)	12.9	5.5	5.3	20.6

CV: Coefficient of variation; LSD: Least Significant Difference; SEm (±): Standard Error of mean; ns: non-significant; **: Significant at 1% level of significance; Values with same letters in a column are not significantly different by DMRT at 5 % level of significance.

Table 2. Disease severity of *Alternaria* leaf blight on different variety of BLM in GPCAR, Morang, 2021.

Variety	Disease severity percentage
Mustard 101	26.7 ^a (21.09)
Khumal Chaudapat	36.42 ^b (35.7)
Manakamana	36.55 ^b (36.05)
Marpha Chaudapat	37.85 ^b (37.82)
Grand Mean	34.40
SEm (±)	2.23
LSD(0.05)	7.71*
CV (%)	11.2

CV: Coefficient of variation; LSD: Least Significant Difference; SEm (±): Standard Error of mean; ns: non-significant; *: Significant at 5% level of significance; Values with same letters in a column are not significantly different by DMRT at 5 % level of significance. Values are arcsine transformation and values in parenthesis are original data.

Table 3. Effect of different variety of BLM on organoleptic test in GPCAR, Morang, 2021.

Variety	Organoleptic test (Hedonic scale 1-9)
Marpha Chaudapat	7.80 ^a
Khumal chaudapat	7.80 ^a
Mustard 101	7.60 ^a
Manakamana	6.20 ^b
Mean	7.35
SEm (±)	0.22
LSD	0.67**
CV (%)	6.60

CV: Coefficient of variation; LSD: Least Significant Difference; SEm (±): Standard Error of mean; ns: non-significant; **: Significant at 1% level of significance; Values with same letters in a column are not significantly different by DMRT at 5% level of significance.

Observation of Broad leaf Mustard Yield

Leaf yield is considered as an important parameter in Broad leaf mustard cultivation. All green leaf was harvested within (25-54) days of transplanting. Tender leaves should be harvested to obtain higher yield. The leaf yield was statistically non-significant (Table 1). However, the leaf yield varied from 27.10 mtha⁻¹ in Khumal chaudapat to 17.8 mtha⁻¹ in Mustard 101. But, recorded mean yield of green leaf was 23.4 mtha⁻¹.

Disease severity

Significant difference was observed among different varieties in disease severity of *Alternaria* leaf blight (Table 2). Lowest disease severity was observed in variety Mustard 101 (21.09%). Highest disease severity was observed in remaining other three varieties which are similar at par. Mehta (2014) stated that *Alternaria* blight in Indian Mustard (*Brassica juncea* L.) is progressed by temperature of (12-25) °C, relative humidity of more than 70%, presence of intermittent winter rainfall and wind speed around (2-5) Kmhr⁻¹.

Organoleptic test

The variety Marpha chaudapat and Khumal chaudapat was given priority by consumer than other variety (Table 3). The palpability and softness was recorded both in Marpha chaudapat and Khumal chaudapat by consumer than rest of the variety.

Conclusion

Broad leaf mustard is an important leafy vegetable of Nepal. The performance of Khumal Chaudapat was better in terms of yield and taste than other variety grown. The disease severity was low in Mustard 101. However, variety Mustard 101 does not show similar taste as of Khumal chaudapat and Marpha chaudapat in organoleptic test. Growing of Khumal Chaudapat fetch good price in plain region during winter season because of

yield performance, palatability and shiny appearance of leaf. It can be concluded that growing green leafy vegetable in winter season in eastern plain region of Nepal with released variety is important and satisfactory than improved and registered variety.

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