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Refinement in Cultivar of Indian Mustard for Higher Yield Under Thermal Climatic Condition of Uttar Pradesh

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Abstract- The refinement and assessment based field experiment was laid out during Rabi season of 2002 and 2003 on farmers fields at Mainpuri district under National Agricultural Technology Project, Zonal Agricultural Research Station, Mainpuri. The main objective was to find out suitable variety of Indian mustard for sowing in early period under thermal condition and replace the local Indian mustard cultivar '*chhapka'*. The nutrient status of pilot area was low. Five high yielding varieties i.e. *Rohani, Varuna, Kanti, Urvarshi, Pusa Jai Kisan* were tested with local cultivar *Chhapka*. The tested varieties of Indian mustard did not much differ in growth parameters but cv. *Urvarshi* displayed the superiority over all varieties. The lowest seed weight/plant (15.85 /plant) and test weight (4.30 gram) were weighed in local cultivar *Chhapka*, while highest seed weight/plant (18.00 g/plant) and test weight (4.95 gram) were recorded in cv. *Urvarshi*. The highest seed yield of 30.80 q/ha was noted under tested cultivar *Urvarshi* and lowest noted under *Chaapka* (15.70 q/ha). The other tested varieties yielded seed between these two limits. The highest net return of Rs. 99667/ha and BCR (1:3.56) were computed under *Urvarshi* cultivar.

Keywords: *chhapka, fog & frost susceptible, fold, thermal climate, urvarshi.*

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I. Introduction

The South-Western tract of Uttar Pradesh is famous for cultivation of Indian mustard and has maximum area under cultivation in comparison to other part of U.P. The feedback received from the farmer's fields that the most of farming majority harvest the early planted Indian mustard on available residual moisture of sandy loam, sandy clay loam, light loam and loam sols and save the pre sowing irrigational water. About 1.44 lakh ha cultivation of Indian mustard is popularize with production of 3.55 lakh mt. and 14.00 q/ha productivity under aforementioned situation (Anonymous, 2012), which is about 20.40 per cent in area coverage and 40.06 per cent in production in comparison to total area and production of Indian mustard in Uttar Pradesh (Anonymous, 2020). Majority of farmers grow unreleased cv. Appressed mutant of Indian mustard locally known as "*Chhapka*", which mature in early period over other high yielding cultivars, but it is most susceptible to higher temperature, which harm to germination of seed. This practice of cultivation of Indian mustard reduces the seed yield. Mostly farmers grow the above variety during mid September. The higher temperature during second fortnight of September increase the mordility of germinated plants, therefore, the reduction in seed yield was noted from the farmer's field of this tract of Uttar Pradesh. Therefore, the thermal condition of this tract harm to the plant stand is the major problem for cultivation of early Indian mustard. For the refinement of this problem, the different released varieties of Indian mustard were compared with local variety of *Chhapka*. The suggestion was given to the participants of this study that the assessment will be done by you themselves.

The refinement and assessment of different varieties of Indian mustard is the subject matter of this manuscript.

II. Materials and Methods

The refinement and assessment based field experiment was conducted during autumn season of 2002 and 2003 on 25 farmers fields in Mainpuri district under National Agricultural Technology Project by scientists of Zonal Agricultural Research Station, Mainpuri. The main objective was to find out suitable variety of Indian mustard for sowing in early period and replace the local variety *Chhapka*. The soil of pilot area was sandy loam, having pH 8.2, organic carbon 0.29%, total nitrogen 0.02%, available phosphorus 9.20kg/ha and available potassium 279 kg/ha, thus, the nutrients of experimental area were analyzed low in organic carbon, total nitrogen, available phosphorus and high in available potassium. The pH was determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Colorimetric method (Datta *et al.,* 1962).Total nitrogen was analyzed by Kjeldahl's method as discussed by Piper (1950). The available phosphorus and potassium were determined by Olsen's method (Olsen *et al*., 1954) and Flame photometric method (Singh, 1971), respectively. Five high yielding cultivars i.e., *Rohani, Varuna, Kanti, Urvarshi, Pusa Jai Kisan* were tested with local cultivar

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Chhapka. All the varieties were sown in the 16 September and harvested at complete maturity. The recommended agronomical practices were followed in raising of Indian mustard cultivars as suggested by Singh and Rathi (1985). The irrigations were given to crop as and when required. The farmers were advocated for the assessment of seed yield but the growth, yield traits and economic study done by scientific team. The yield data was collected from the farmers and statistically analyzed as suggested by Gomez and Gomez (1984).

III. Results and Discussion

The growth, yield traits, seed yield and economic data were statistically analyzed and reported in Table-1 and discussed here under appropriate heads.

a) Effect of early sowing on growth parameters

The different varieties of Indian mustard did not much differ in plant height. The lowest primary branches was counted in local variety of *Chhapka* and other tested varieties displayed at par branches/plant. The insignificant response was recorded in production of siliquae/plant under different cultivars. The similar trend was also noted in weight of siliquae/plant (Table -1). The similar results have also been reported by Singh *et al.* (2019).

b) Effect of early sowing on yield traits

The lowest seed weight/plant was weighed in local cultivar *Chhapka* by 15.85 gram/plant and highest was found in cultivar *Urvarshi* (18.00 g/plant), but insignificant response was found under different tested varieties at early stage sowing. The lowest test weight of 4.30 g was noted under local cultivar *Chhapka*, while highest test weight by 4.95 g was recorded under cv. *Urvarshi*. The other varieties displayed the test weight values under these two limits. These results confirm the finding of Singh *et al*. (2019).

c) Effect of early sowing on seed yield (q/ha)

Results displayed that all the high yielding varieties were found effective in order to increase of seed yield of Indian mustard over local cultivar *Chhapka* (Table-1). The maximum increase in seed yield was recorded in cultivar Urvarshi (15.10 q/ha) closely followed by Rohani (11.65 q/ha) and Pusa Jai Kisan (11.30 q/ha) over local cultivar *Chhapka* under early sowing period. The cultivars *Urbashi* increased the number of siliquae/plant, weight of seed/plant and 1000-seed weight which were responsible for increasing the seed yield of Indian mustard. It is also worthwhile to mention here that the severe density of fog and frost during pod filling stage did not influence to the seed yield of *Urvarshi*. Therefore, cultivar *Urvarshi* proved thermo resistant cultivar and registered higher yield over local *Chhapka* and other improved cultivars. These results are commensurable to the findings of Singh *et al.* (2019)

d) Economic study

The gross return (Rs. 138600/ha), net return (Rs. 99667/ha) and BCR (1:3.56) were recorded higher in cv. *Urvarshi* as compared to other improved cultivars including local *Chhapka*. The lowest gross return (Rs. 70650/ha) net return (Rs. 31717/ha) and BCR (1:1.81) were computed under local variety *Chhapka*. The varietal performance was *Urvarshi* (Rs. 99667/ha) >*Rohani* (Rs. 84142/ha) >*Pusa Jai Kisan* (Rs. 82567/ha) >*Varuna* (Rs. 81442/ha) > *Kanti* (Rs. 80317/ha) and >*Chhapka* (Rs. 31717/ha). The higher and lower seed yield of different varieties were responsible for highest and lowest net income.

The variety *Urvarshi* also increased net income of farmers by 3.15 fold which was higher over other tested varieties.

IV. Conclusion

On the basis of experimental results, the farming community of South-Western and Central tracts of Uttar Pradesh may be advocated for sowing of cultivar *Urvarshi* in early planting period to obtain the higher seed yield, net income and more than three fold net income.

Farmers Reaction

The locality and visiting farmers appreciated the efforts of scientists and they followed the smart agronomy in cultivation of cv. *Urvarshi* of Indian mustard as suggested.

Feed Back

The demand of *Urvarshi* seed increased among farmers due to thermo-resistant, and resistant to fog and frost.

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Table 1: Growth parameters, yield traits, seed yield and economic studies under different treatments (Average data of twenty five participants)

Sl. No.	Variety	Plant height (cm)	Primary branches /plant	Siliquae /plant	Weight of siliquae / plant (g)	Weight of seed/ plant (g)	1000-seed weight	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	BCR	Net income increase in fold
1.	Rohani	223	13	231	32.34	17.10	4.75	27.35	38933	123075	84142	1:3.16	2.65
2.	Varuna	219	12	229	32.05	17.00	4.76	26.75	38933	120375	81442	1:3.09	2.56
3.	Kanti	217	12	228	31.90	16.90	4.73	26.50	38933	119250	80317	1:3.06	2.53
4.	Urvarshi	220	13	232	32.50	18.00	4.95	30.80	38933	138600	99667	1:3.56	3.15
5.	Pusa Jai Kisan	221	12	220	30.80	16.85	4.71	27.00	38933	121500	82567	1:3.12	3.05
6.	Chhapaka (Local)	185	10	219	30.60	15.85	4.30	15.70	38933	70650	31717	1:1.81	-
	C.D 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	4.14	-	-	-	-	-