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ABSTRACT

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Lentil (*Lens esculenta* Medik.) is an important pulse crop with high protein content, has the potential capacity to combat nutritional deficiencies in developing regions and countries. The experiments were carried out with six mutants of lentil *viz.* LMI-3, LMM-4, LMM-5, LMM-6, LMM-7, LMM-9 and a check variety Binamasur-8 at different locations during November 2019-March 2020 and November 2020-March 2021. The locations were BINA sub-station farms, Ishurdi and Magura and farmers' field at Ishurdi, Magura and Jhenaidah. The experiments were laid out following a randomized block design with three replications. Results revealed that almost all the studied parameters were significantly different among the genotypes. Higher number of pods was found in LMI3 and LMM-7. All the mutants out yielded the check variety Binamaur-8. However, LMM-7 produced the highest seed yield in all the locations.

Key words: *lentil, mutant, yield, location*

INTRODUCTION

Lentil (*Lens esculenta* Medik.) is an important pulse crop with high protein content, has the potential capacity to combat nutritional deficiencies in developing regions and countries. High temperature and water stress are significant abiotic stresses that limit production worldwide (Sehgal *et al*. 2017; Gaur *et al*. 2015). It is commonly grown under rain fed condition, conserves moisture from preceding monsoon season and usually faces water stress (Islam and Ferdousi, 2006; Helali *et al*. 2002; Salam and Islam, 1994). High temperature affects crops through either: (i) above-optimum temperatures for an extended period, which increases supply of assimilates but reduces grain filling period and yield; or (ii) heat wave responses, which is a short period of high temperature (>32ºC) that causes non-recoverable reduction in grain set and yield potential (Vadez *et al*. 2012). Together these abiotic stresses, estimated to cause up to 50% yield loss per annum in pulse crops globally (Gaur *et al*. 2014). Lentil requires low temperatures during vegetative growth, while at maturity, warm temperatures required; the optimum temperature for its best growth has been reported to be 18-30ºC (Roy *et al*. 2012). Lentil is particularly sensitive to high temperature (>30ºC) during the reproductive phase, causing pod and flower abortion and significant reduction in grain yield and quality (Sita *et al*. 2017). Yield was reduced by 87% for lentils grown in pots under field conditions with high temperature during the reproductive phase (38ºC day time, 23ºC night) (Bhandari *et al*. 2016), and grain set was observed to be the most sensitive yield component (Bhandari *et al*. 2016; Gaur *et al*. 2015). In Bangladesh, lentil sowings occasionally get postponed because of the delayed harvest of the preceding crop, mostly T. Aman rice. The lentil crop is then adversely affected by the high approaching summer temperatures, leading to low grain yields and poor grain quality (Islam and Haque, 2020; Tickoo *et al*. 2005). Efforts can be made to increase area as well as yield of lentil crops by the lentil varieties adapted to different environments. So the experiment was conducted to evaluate six lentil mutants with a check variety Binamasur-8 at different locations.

MATERIALS AND METHODS

The experiments were carried out with six mutants of lentil *viz.* LMI-3, LMM-4, LMM-5, LMM-6, LMM-7, LMM-9 and a check variety Binamasur-8 at different locations during November 2019-March 2020 and November 2020-March 2021. The lentil mutants were developed in the project "Developing plant ideotype of lentil, mungbean, sesame and tomato for high yield, quality and stress tolerance under changing climate" of Crop Physiology division, BINA, Mymensingh. The experiments were laid out following a randomized block design with three replications having a unit plot size 4m × 5m. Row to row and plant to plant distances were 30 cm and 5-7 cm, respectively. Recommended doses of fertilizers were used and proper cultural practices were done as and when necessary. Data on morphological, yield and yield attributes were recorded at harvest from 10 randomly selected plants in each plot and yield was taken from whole plot and converted into ton ha^{-1}.

RESULTS AND DISCUSSION

Results revealed that almost all the studied parameters were significantly different among the genotypes (Table 1-8). Higher number of pods was found in LMI3 and LMM-7. All the mutants out yielded the check variety Binamaur-8. However, LMM-7 produced the highest seed yield in all the locations. The results are in conformity with Islam *et al*. 1998 and Islam *et al*. 1993.

Table 1. Morphological attributes and yield of lentil mutants at BINA sub-station, Magura in 2019-20

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed Yield (tha^{-1})
LMI-3	43.9a	6.0	179a	1.77	4.48	21.0a	6.61a	2.84b
LMM-4	41.0b	5.5	172b	1.73	4.43	21.5a	6.69a	2.80c
LMM-6	43.6a	6.1	145c	1.73	3.81	21.4a	5.20b	1.88f
LMM-7	38.9c	6.9	181a	1.8	4.45	21.5a	6.75a	3.01a
LMM-9	39.8c	5.7	138d	1.77	3.75	20.8a	4.98b	2.70d
Binamasur-8	44.5a	5.3	139d	1.73	3.84	19.7b	4.97b	2.29e

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

Table 2. Morphological attributes and yield of lentil mutants at farmer's field, Magura in 2019-20

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed yield (tha^{-1})
LMI-3	39.7a	5.53bc	201a	1.73a	4.08bc	20.2b	7.06a	2.87c
LMM-4	33.0c	5.20bc	178b	1.70a	4.08bc	20.7a	6.32a	2.92b
LMM-6	31.0d	5.13bc	198a	1.67a	3.87c	20.1b	6.60a	2.80d
LMM-7	38.3b	5.60b	171b	1.73a	4.25b	20.6a	6.18a	3.02a
LMM-9	38.6b	6.13a	202a	1.73a	4.81a	20.5a	7.13a	2.88bc
Binamasur-8	31.0d	5.00c	157c	1.57b	4.08bc	19.2c	4.77b	2.50e

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

Table 3. Morphological attributes and yield of lentil mutants at BINA sub-station, Ishurdi in 2019-20

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed Yield (tha^{-1})
LMI-3	40.7b	6.5b	210a	1.83	4.2bc	21.1b	8.5a	2.91b
LMM-4	39.4c	6.2bc	190b	1.77	4.5b	21.9a	7.5c	2.93b
LMM-6	36.3d	7.0a	183c	1.77	5.5a	21.6a	7.1d	2.83c
LMM-7	42.7a	7.2a	208a	1.77	4.4bc	21.5ab	8.0b	3.06a
LMM-9	41.3b	6.2bc	170d	1.83	4.4bc	21.1b	6.5e	2.93b
Binamasur-8	41.5ab	5.9c	172d	1.73	4.1c	20.0c	6.2f	2.59d

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

Table 4. Morphological attributes and yield of lentil mutants at farmers field, Ishurdi in 2019-20

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed yield (tha^{-1})
LMI-3	39.4cd	6.6abc	253a	1.57b	4.4cd	19.89	8.0a	2.89c
LMM-4	39.0d	6.2c	244b	1.63ab	5.0b	19.66	7.9a	2.98b
LMM-6	49.6a	6.5bc	236c	1.73a	6.0a	19.79	7.9a	2.87c
LMM-7	40.9bc	7.3a	255a	1.62b	4.0d	19.96	8.0a	3.08a
LMM-9	40.1cd	7.2ab	240bc	1.57b	4.4c	20.03	7.8a	2.95b
Binamasur-8	41.8b	6.6abc	162d	1.73a	4.6c	19.30	5.6b	2.57d

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

Table 5. Morphological attributes and yield of lentil mutants at BINA sub-station, Magura in 2020-21

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed yield (tha^{-1})
LMI-3	40.73a	6.45b	159.33ab	1.65b	3.68b	21.41c	5.46c	2.67bc
LMM-4	38.55b	5.63d	158.67ab	1.65b	3.95a	22.71b	5.73b	2.86ab
LMM-6	40.39a	6.13c	152.67b	1.73a	3.95a	21.22c	5.37c	2.69bc
LMM-7	40.77a	6.90a	157.33b	1.70ab	3.88a	22.81ab	5.95a	2.98a
LMM-9	41.77a	6.38b	170.00a	1.66b	3.80ab	21.29c	5.73b	2.86ab
Binamasur-8	40.87a	5.73d	130.67c	1.64b	3.84ab	23.61a	5.11d	2.55c

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

Table 6. Morphological attributes and yield of lentil mutants at BINA sub-station, Ishurdi in 2020-21

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed yield (tha^{-1})
LMI-3	42.60a	6.46b	167.33ab	1.64a	3.86b	21.39c	5.73c	2.80a
LMM-4	40.54b	5.50c	166.67ab	1.65a	4.14a	22.67b	6.02b	2.85a
LMM-6	42.46a	6.31b	160.00b	1.73a	4.14a	21.29c	5.64c	2.82a
LMM-7	42.47a	6.91a	164.67b	1.75a	4.07a	22.82b	6.36a	2.95a
LMM-9	43.43a	6.39b	178.67a	1.64a	3.99ab	21.29c	6.02b	2.84a
Binamasur-8	42.54a	5.75c	137.33c	1.66a	4.03a	23.67a	5.37d	2.57b

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

Table 7. Morphological attributes and yield of lentil mutants at farmer's field, Magura in 2020-21

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed yield (tha^{-1})
LMI-3	41.70a	6.49b	166.67ab	1.64a	3.86b	21.39c	5.69c	2.73ab
LMM-4	39.58b	5.50c	167.33ab	1.65a	4.14a	22.67b	6.03b	2.80a
LMM-6	41.59a	6.31b	160.67b	1.73a	4.14a	21.29c	5.66c	2.80a
LMM-7	41.62a	6.84a	163.67b	1.75a	4.07a	22.82b	6.31a	2.90a
LMM-9	42.57a	6.39b	176.00a	1.64a	3.99ab	21.29c	6.03b	2.82a
Binamasur-8	41.62a	5.73c	137.33c	1.66a	4.03a	23.67a	5.38d	2.54b

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

Table 8. Morphological attributes and yield of lentil mutants at farmer's field, Jhenaidah in 2020-21

Mutants /variety	Plant height (cm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	Straw wt. plant^{-1} (g)	1000-seed wt. (g)	Seed wt. plant^{-1} (g)	Seed yield (tha^{-1})
LMI-3	40.78a	6.42b	159.00b	1.65b	3.68c	21.41c	5.45c	2.66bc
LMM-4	38.57b	5.61d	158.67b	1.65b	3.95a	22.71b	5.73b	2.86ab
LMM-6	40.42a	6.13c	151.67b	1.73a	3.94ab	21.22c	5.37c	2.68bc
LMM-7	41.13a	6.88a	156.67b	1.69ab	3.88ab	22.81ab	5.94a	2.97a
LMM-9	41.74a	6.36bc	169.67a	1.66b	3.79bc	21.29c	5.72b	2.86ab
Binamasur-8	40.85a	5.69d	131.00c	1.63b	3.84abc	23.61a	5.10d	2.55c

Values having common letter(s) in a column do not differ significantly at 5% level as per DMRT

CONCLUSION

All the mutants out yielded the check variety Binamaur-8. LMM-7 produced the highest seed yield in all the locations and may be released as a variety.

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