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MORPHOLOGICAL CHARACTERIZATION OF CHILLI GERMPLASM IN BANGLADESH

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Abstract

An experiment was conducted using 60 chilli germplasm in the experimental field of Plant Genetic Resources Centre (PGRC), Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur during winter 2013-14 to characterize the germplasm based on morphological traits. Data were recorded as per the descriptor developed by Biovarsity International (BI) and Minimal Descriptor of Agri-Horticultural Crops. The germplasm were collected from different parts of Bangladesh and evaluated for 22 qualitative and 5 quantitative characters. Distinct variation among the germplasm was observed in all the qualitative parameters except cotyledonous leaf shape and fruit persistence. The maximum variation was observed in fruit colour both at mature and immature stage. Fruit colour was observed in four categories, namely green, black, green with blackish blush and dark green. The germplasm AMS-42, AMS-45, RI-35 and AH-5 showed black coloured fruit indicating their high carotenoid content. Leaf pigmentation was found in AMS-39, AMS-44, AMS-45, AH-1and RI-2 germplasm. Purple coloured corolla observed in AMS-42, AMS-45, AH-1 and AH-2 showing their high pollen fertility. The highest quantitative variation was observed in yield per plant suggesting that the evaluated germplasm could be used in developing high yielding variety. Considering the yield and yield contributing parameters the germplasm AI-1, AI-2 and RI-2 were found better among the 60 germplasm.

Keywords: Characterization, chilli, germplasm, Bangladesh.

Introduction

Chilli is one of the important commercially grown spice crops in Bangladesh. The crop belongs to the genus *Capsicum* which includes 30 species, out of which five are domesticated: *C. annuum, C. frutescens, C. baccatum, C. chinense and C. pubescens* (Hernández, *et al*.,1999). Among them, *C. annuum and C. frutescens* have more economic importance since these species are widely distributed in the world. Now it is fact that without chilli spices, all Bangladeshi and Indian cuisine would be incomplete. Chilli is used with or without the stalks, whole or chopped, with seeds or deseeded. These are consumed in fresh, dried, powdered, pickled or in sauces as vegetables or spices. Most of the Bangladeshi usually intake chilli as either raw or cooked and used as additives in their stored food preparations (Pino *et. al.*, 2006). The fruits are an excellent source of health-

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related compounds, such as ascorbic acid (vitamin C), carotenoids (pro-vitamin A), tocopherols (vitamin E), flavonoids, and capsaicinoids (Marti *et al*., 2011). Chilli provides a number of health benefits such as relief pain, fight inflammation, reduce cardiovascular diseases, clear congestion, lose weight, boost immunity, lower the risk of diabetes, prevent stomach ulcers and stop the spread of prostate cancer (Maheshwari *et al*., 2014).

A number of chilli cultivars are grown in Bangladesh differing in habit, size, shape, color, pungency and yield which indicating their wide range of variability (Farhad *et al*., 2010). Chilli is grown practically all over the country but the yield is comparatively low due to the lack of improved varieties. To develop a variety through a hybridization program characterization is definitely significant for finding out genetic information. Not only that characterization is also a fundamental task to provide information for plant breeding programs (Lin, 1991). Morphological characterization is necessary to recognize the variability and to improve the local germplasm. It is also equally important for easy and rapid evaluation of collected germplasm. Plant breeders over the years have relied heavily on phenotypic characterization for cultivation (Elias *et al.*, 2001 and Zacarias *et al.*, 2004)

Morphological characterization is still used in crop improvement programme, particularly where the capacity to use molecular markers is not yet fully developed to carry out *in situ*. It is relatively inexpensive and easy to carry out (Hoogendijk and Williams, 2001). There are many released cultivars that are developed based on morphological descriptors (Asare *et al.*, 2011). Morphological characterization is a highly recommended preliminary step that should be made before more in-depth biochemical or molecular studies are attempted.

Different morphotypes of chilli are available in Bangladesh. Plant Genetic Resources Centre (PGRC) of Bangladesh Agricultural Research Institute (BARI) collected and conserved various types of chilli germplasm from different districts of Bangladesh. Chilli accessions, lines and old cultivars are important reservoirs of useful genes and can be used to enrich the commercial chilli cultivars with the desired genes for useful traits (Zeng *et al.*, 2003). However, landraces and accessions are heterogeneous and include several genotypes within a population (Frankel and Soule, 1981). Chilli germplasm are in threats of extinction due to the high competition with hybrid chilli varieties introduced by different seed companies. Therefore, the present investigation was carried out to characterize the collected indigenous chilli germplasm through qualitative and quantitative traits as well as to identify desirable genotypes of chilli for breeding programs.

Materials and method

The experiment was carried out in the experimental field of Plant Genetic Resources Centre (PGRC), Bangladesh Agricultural Research Institute (BARI),

Joydebpur, Gazipur during winter 2013-14. Sixty chilli germplasm collected from different parts of Bangladesh were included in this study. Twenty-seven agro-morphological traits including 22 qualitative and 5 quantitative parameters were evaluated. The germplasm or genotypes under study are listed in the Table 1.

Table 1. List of chilli genotypes used in characterization

Collectors' number	Cultivar/Local name	Areas (District)	Collectors' number	Cultivar/Local name	Areas (District)
AH-1	Unknown	Gazipur	AMS-11	Deshi morich	Patuakhali
AH-2	Unknown	Gazipur	AMS-12	Deshi morich	Barguna
AH-5	Unknown	Gazipur	AMS-13	Deshi morich	Barguna
AH-6	Unknown	Gazipur	AMS-21	Deshi morich	Patuakhali
AI-1	Bot morich	Jenaidaha	AMS-26	Deshi morich	Patuakhali
AI-11	Khalkuli morich	Magura	AMS-27	Deshi morich	Patuakhali
AI-12	Tengakhali	Magura	AMS-30	Deshi morich	Patuakhali
AI-13	Tenga khali	Magura	AMS-31	Deshi morich	Patuakhali
AI-14	Kalo zia	Magura	AMS-32	Deshi morich	Patuakhali
AI-15	Zia morich	Magura	AMS-33	Deshi morich	Barisal
AI-16	Tenga khali	Magura	AMS-35	Deshi morich	Barisal
AI-2	Unknown	Jenaidaha	AMS-39	Deshi morich	Jhalkati
AI-21	Charkheda	Magura	AMS-4	Deshi morich	Patuakhali
AI-22	Matukda	Magura	AMS-42	Zhia morich	Barisal
AI-23	Alamdanga morich	Magura	AMS-44	Local morich	Barisal
AI-24	Jamalpur	Magura	AMS-45	Local morich	Barisal
AI-25 (2)	Unknown	Magura	AMS-5	Deshi morich	Patuakhali
AI-25(1)	Kalo zia	Magura	AMS-6	Deshi morich	Patuakhali
AI-26	Ubda morich	Magura	AMS-7	Deshi morich	Barguna
AI-27	Toba morich	Magura	AMS-8	Khet morich	Barguna
AI-28	Sada zia	Magura	AMS-9	Khet morich	Barguna
AI-36	Chuto morich	Magura	AR-1	Unknown	Chittagong
AI-37	Kalo zea	Magura	RI-12	Bangla morich	Khagrachari
AI-39	Shariatpur morich	Magura	RI-15	Babujhuri	Khagrachari
AI-40	India morich	Magura	RI-2	Jhum morich	Khagrachari
AI-41	Mota morich	Faridpur	RI-21	Chittagong morich	Khagrachari
AI-42	Kalozea morich	Faridpur	RI-35	Bumbai morich	Khagrachari
AI-8	Baltu jhal	Jenaidaha	RM-4	Asham morich	Joypurhat
AI-9	Zia jhal	Jenaidaha	RT-20	Churi morich	Jamalpur
AMS-10	Deshi morich	Patuakhali	RT-22	Deshi morich	Jamalpur

Seeds were sown in well-prepared seed beds on 24 October, 2013. Thirty-five days old seedlings were transplanted in the prepared pits of main experimental field on 27 November, 2013. The unit plot size was 3m×2m. Each germplasm was planted in a plot of three rows having five pits in each row. Row to row and plant to plant distance was 70 cm × 60 cm. Fertilizer were used 10 t/ha cow-dung, 210 kg/ha Urea, 33 kg/ha TSP, 200 kg/ha MoP and 5 kg/ha Borax (Mondal *et al*., 2011). Weeding and mulching were done four times at 20 days interval starting from mid-December. Individual net was used per plot to avoid the cross pollination. Sevin 75 WP @ 0.1 g/pit, Sumithion 60 EC @ 2.5 ml/L and Vertimac 18 EC @ 1.2 ml/L were sprayed to control insect and mite, respectively. The data were collected from five randomly selected plants in each plot. Data on 22 qualitative and 5 quantitative characters were recorded from five randomly selected plants in each plot following the descriptor developed by the Bioversity International (IBPGR, 1983) and Minimal descriptors of agro-horticultural crops (Srivastava *et al.*, 2001).

Data analysis:

Mean values of germplasm were used for analysis. The data after compiling was statistically analyzed using MSTAT- C package version 1.2 and Least Significance Difference (LSD) test was applied to test the significance of genotypic differences at 5% level of probability.

Results and Discussion

Sixty germplasm of chilli were planted for morphological characterization. The germplasm were characterized on the basis of qualitative and quantitative characters.

A. Qualitative characters

A total of 22 qualitative characters were recorded and evaluated to know the variability among the studied germplasm (Table 2). All the characters showed distinct variation among the germplasm except cotyledonous leaf shape and fruit persistence. The maximum variation was observed in fruit colour at mature and immature stage.

Stem traits: Most of the germplasm exhibited as bushy plant since 80% of them were in compact growth habit. The remaining (20%) germplasm showed erect type of growth habit. The taller germplasm were AMS-42, AMS-44, AMS-45, AR-1, AI-13, AI-23, AI-24, RI-2, AI-28, AI-36, AI-42 and AI-26. Three categories stem colour such as green (75.00%), purple (6.67%) and their mixture (18.33%) were observed before transplanting. But after transplanting it was found only two categories such as green (15%) and purple (85%). Purple colour of chilli plant indicates the presence of high amount of anthocyanin content, which is an effective antioxidant for human body (Moon and Shibamoto, 2009).

The present study clearly revealed that in chilli plant anthocyanin content increases at maturity. For this reason, most of the stem of chilli germplasm exhibited as purple at mature stage. The germplasm having purple coloured stem at immature stage also remained purple at mature stage. These germplasm were AMS-44, RI-35, AH-1 and RI-2. Pubescence in plant part mostly acts as a defensive organ against pest (Novriyanti *et al.,* 2010). Glabrous, sparse and intermediate type stem pubescence was found where majority of the germplasm exhibited glabrous pubescence. Branching habit determines the canopy size of the plant. All the germplasm were found dichotomously branched but their habit was found as sparse (15.00%), intermediate (40.00%) and abundant (45.00%) types. Abundant branching habit showed higher fruit bearing capacity.

Leaf traits: Leaf shape exhibited as deltoid, ovate and lanceolate (Fig. 1) category, where lanceolate shape was found in the maximum germplasm (75.00%). The germplasm AI-11 showed deltoid type leaf shape only. Majority of the leaf exhibited as green colour (56.67%) and the rest were dark green (35.00%) and mixture of green and violate (8.33%). Germplasm AMS-39, AMS-42, AMS-44, AMS-45 and AH-1 showed mixture coloured leaf. Eighty percent of the germplasm showed glabrous and remaining 20.00% showed sparse type leaf pubescence. Out of 60 germplasm only 5 germplasm namely AMS-39, AMS-44, AMS-45, AH-1, RI-2 showed pigmentation in leaves.

(a) (b) (c)

Fig. 1. Different types of leaf shape: (a) deltoid, (b) ovate and (c) lanceolate.

Inflorescence and flower traits: At anthesis period majority of the accessions showed intermediate (55.00%) pedicel position. Pendant and erect type pedicel position were found in 23.33% and 21.67% of the germplasm, respectively. Corolla colour of chilli germplasm exhibited as white (43.33%) light yellow (50%) and purple with white margin (6.67%). This corolla colour is related to pollen fertility. Coloured corolla provides more fertile pollen than colourless one (Taylor and Mo, 1998). The germplasm AMS-42, AMS-45, AH-1 and AH-2 showed purple coloured corolla with white margin. It might be suggested that these germplasm have high pollen fertility than the others. Not only that these germplasm also have high percentage of delphinidin (a kind of anthocyanidin) content which is a good reducer of prostate cancer of human being (Freyre *et al.*, 2015). Only 6.67% germplasm showed dentate calyx margin and the rest (93.33%) were intermediate type. The germplasm those have dentate calyx margin were AH-2, AH-5, AH-6 and AI-1. Annular constriction was present in 65% germplasm and absent in the rest.

Fruit traits: Fruit colour, fruit shape and its nodal position of chilli were investigated. Fruit colour observed in four types viz. green, black, green with

blackish blush and dark green. Green colour observed in maximum germplasm (51.67%) at both stages (Fig. 2.).

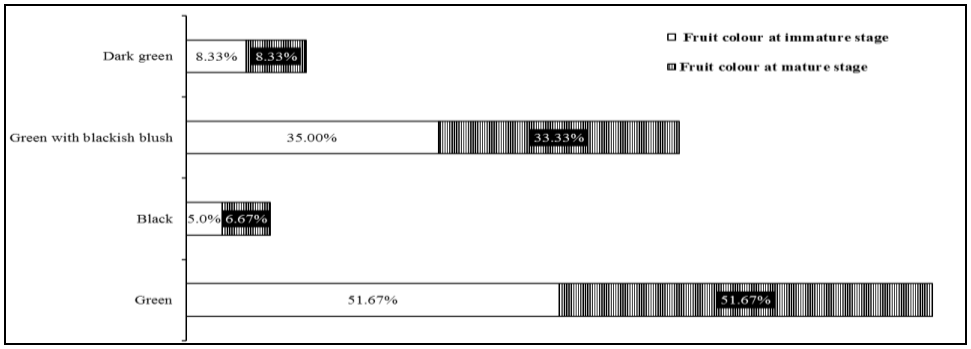

Fig. 2. Status of fruit colour in chilli germplasm at mature and immature stage.

Colour of chilli fruit is the result of a combination of pigments: chlorophylls, carotenoids, and anthocyanins accumulating in the fruit wall or pericarp of the fruit resulting in green, yellow, or purple fruit at physiological immature stages and yellow, red, or orange fruit at mature stages (Guzman *et al.*, 2011). Black or violet peppers metabolize and accumulate the anthocyanin delphinidin as both an aglycone and a glycosylated compound. The intense black pigmentation in pepper fruit is characteristic of high concentrations of delphinidin, chlorophyll, and carotenoids. Other than delphinidin, there are no other anthocyanins known to accumulate in peppers (Lightbourn *et al.*, 2008). In this investigation, the germplasm AMS-42, AMS-45, RI-35 and AH-5 showed black coloured fruit.

Fruit position varied in three categories viz. declining (43.33%), intermediate (50%) and erect (6.67%). The erect types have high level of pungency and are widely used in ornamental purposes (Stommel and Bosland, 2007). Two broad categories fruit shapes (Fig. 3) were observed such as elongate (75.00%) and conical (25.00%). Fruit shape near the peduncle attachment was mostly acute (71.67%) and the rest were obtuse (28.33%). Majority of the germplasm produce pointed shape (86.67%) at the base of the fruits and the rest were blunt (8.33%) and sunken (5.00%).

(a) (b)

Fig. 3. Different type of fruits shape: (a) elongate and (b) conical

The germplasm AI-2, AH-2, AH-5 and RI-35 produced erect type fruit. Eleven germplasm showed neck at the base of fruit but in the rest germplasm (49) it was absent.

Table 2. Variability of different qualitative characters in chilli germplasm

Fruit position varied in three categories viz. declining (43.33%), intermediate (50%) and erect (6.67%). The erect types have high level of pungency and are widely used in ornamental purposes (Stommel and Bosland, 2007).

Character	Descriptor state	Number of germplasm	% of germplasm
1. Cotyledonous leaf shape	Lanceolate	60	100.00
2. Plant growth habit	Compact	48	80.00
	Erect	12	20.00
3. Stem color before transplanting	Green	45	75.00
	Purple	4	6.67
	Mixture	11	18.33
4. Stem color after transplanting	Green	9	15.00
	Purple	51	85.00
5. Stem pubescence	Glabrous	41	68.33
	Sparse	13	21.67
	Intermediate	6	10.00
6. Leaf shape	Deltoid	1	1.67
	Ovate	14	23.33
	Lanceolate	45	75.00
7. Leaf colour	Green	34	56.67
	Dark green	21	35.00
	Mixture	5	8.33
8. Leaf pubescence	Glabrous	48	80.00
	Sparse	12	20.00
9. Leaf pigmentation	Absent	55	91.67
	Present	5	8.33
10. Branching habit	Sparse	9	15.00
	Intermediate	24	40.00
	Abundant	27	45.00
11. Pedicel position at anthesis	Pendant	14	23.33
	Intermediate	33	55.00
	Erect	13	21.67
12. Corolla colour	White	26	43.33
	Light yellow	30	50.00
	Purple with white margin	4	6.67

Character	Descriptor state	Number of germplasm	% of germplasm
13. Calyx margin shape	Intermediate	56	93.33
	Dentate	4	6.67
14. Annular constriction	Absent	21	35.00
	Present	39	65.00
15. Fruit position	Declining	26	43.33
	Intermediate	30	50.00
	Erect	4	6.67
16. Fruit colour at immature stage	Green	31	51.67
	Black	3	5.00
	Green with blackish blush	21	35.00
	Dark green	5	8.33
17. Fruit colour at mature stage	Green	31	51.67
	Black	4	6.67
	Green with blackish blush	20	33.33
	Dark green	5	8.33
18. Fruit shape	Elongate	45	75.00
	Conical	15	25.00
19. Fruit shape at peduncle attachment	Acute	43	71.67
	Obtuse	17	28.33
20. Fruit shape at blossom end	Pointed	52	86.67
	Blunt	5	8.33
	Sunken	3	5.00
21. Neck at base of fruit	Absent	49	81.67
	Present	11	18.33
22. Fruit persistence	Persistent	60	100.00

Quantitative characters

The chilli germplasm evaluated in the present study showed the variability for all the quantitative traits studied. Marked variation was observed for number of fruits per plant, fruit length (cm), fruit width (cm), individual fruit weight (g) and yield per plant (g). The quantitative data of chilli is presented in the Table 4 and their range, mean, standard deviation and CV% are presented in Table 3. The highest quantitative variation was observed for yield per plant (CV% 111.68) which was followed by number of fruits per plant (CV% 84.25) and fruit width (CV% 68.98). The minimum variation was observed in fruit length (CV% 29.24).

Number of fruits per plant: Significant differences were observed in number of fruits per plant. It ranged from 1.00 to 70.50 fruits with an average of 16.64 fruits

per plant (Table 3). The average fruit number/plant (168.85±9.54) reported by Manju and Sreelathakumary (2002) was greater than the present investigation. This variation might be due to the diverse genotypes and environment. However, the highest number of fruits per plant was observed in germplasm RI-2 (70.50), followed by AI-1 (55.14), AI-39 (52.00) and AI-26 (49.50) and the lowest in germplasm RM-4 (1.00) (Table 4).

Fruit length: The fruit length varied significantly among the studied germplasm. Fruit length ranged from 1.00 to 7.20 cm and the average fruit length was found 4.07 cm (Table 3). The maximum fruit length observed in germplasm AMS-13 followed by RI-15 while the minimum fruit length was in AMS-8 (Table 4). A similar findings for fruit length of chilli in Bangladesh was reported by Uddin *et al.* (2015).

Fruit width: Fruit width ranged from 0.54 to 5.0 cm with an average of 0.90 cm (Table 3). Manju and Sreelathakumary (2002) observed at least two times bigger width (5.27-10.37 cm) than the present record. The germplasm AI-16 (5.00 cm) and AI-15 (0.54 cm) showed the wider and narrowed fruit, respectively (Table 4).

Individual fruit weight: Wide variation was found in individual fruit weight. Fruit weight raged from 0.80 to 3.60 g (Table 3). The average fruit weight was found 1.77 g. The heaviest fruit was found in germplasm AI-40 and the lightest fruit in AH-1, AI-15, AI-21 and AI-25(2). Therefore, a wide variation was found in respect of individual fruit among the germplasm. Individual fruit weight in this investigation was found considerably higher than the record of Uddin *et al.* (2015) in Bangladesh and Manju and Sreelathakumary (2002) in India.

Yield per plant: Highly significant differences were observed for fruit yield per plant. Yield per plant ranged from 10.9 to 155.57 g (Table 3). The average yield was found 24.34 g per plant. The highest yield per plant was found in germplasm AI-1 (155.57 g) significantly followed by AI-2 (112.07 g) and RI-2 (91.83 g) (Table 4). The lowest yield per plant was found in RM-4 (1.09 g) preceded by AI-8 (2.09g). Manju and Sreelathakumary (2002) reported the yield 51.31-1649.72 g per plant in India. The maximum yield is much higher than that in the present study which indicated that the germplasms in present study are not good yielder. This variation might be due to the variation in genotypes and growing seasons.

Table 3. Quantitative variation of different characters in chilli germplasm

Character	Range	Mean	SD	CV%
No. of fruits per plant	1.00 -70.50	16.64	14.02	84.25
Fruit length (cm)	1.00 -7.20	4.07	1.19	29.24
Fruit width (cm)	0.54 – 5.00	0.90	0.62	68.98
Individual fruit weight (g)	0.80 – 3.60	1.77	0.61	34.76
Yield per plant (g)	1.09 – 155.57	24.34	27.18	111.68

Table 4. Quantitative characters of different chilli germplasm

Collectors' number	No. of fruits per plant	Fruit length (cm)	Fruit width (cm)	Individual fruit weight (g)	Yield per plant (g)
AH-1	27.36	3.1	0.76	0.8	27.57
AH-2	18.00	3.6	0.84	1.2	20.29
AH-5	1.64	2.5	0.70	1.6	3.45
AH-6	5.46	3.2	0.76	2.4	6.00
AI-1	55.14	4.2	0.98	2.4	155.57
AI-2	35.71	5.0	0.98	2.4	112.07
AI-8	1.27	4. 1	0.95	2.0	2.09
AI-9	24.64	3.1	0.80	1.2	61.82
AI-11	8.21	3.6	0.66	1.6	9.86
AI-12	1.77	6.4	0.78	2.0	2.77
AI-13	8.43	4.2	0.76	1.2	9.86
AI-14	15.71	5.0	0.79	1.6	38.29
AI-15	9.09	4.1	0.54	0.8	16.18
AI-16	3.80	4.1	5.00	2.4	9.47
AI-21	8.58	3.6	0.72	0.8	27.33
AI-22	10.21	4.1	0.84	2.4	17.29
AI-23	32.23	5.2	0.83	1.2	54.62
AI-24	28.55	4.1	0.98	1.6	38.00
AI-25(1)	8.50	4.3	0.76	1.2	10.17
AI-25 (2)	16.17	4.2	0.68	0.8	18.33
AI-26	49.50	5.2	0.64	1.2	50.67
AI-27	7.77	3.6	3.00	2.4	16.62
AI-28	8.08	3.8	0.83	1.6	11.69
AI-36	14.36	3.9	0.75	1.2	25.57
AI-37	34.13	3.7	0.93	1.6	40.27
AI-39	52.00	4.6	0.72	1.6	67.73
AI-40	16.31	5.3	0.79	3.6	22.85
AI-41	5.31	6.0	0.84	2.8	7.85
AI-42	18.85	4.5	0.75	1.6	31.23
AMS-4	3.93	3.4	0.84	1.6	6.57
AMS-5	9.00	4.5	0.72	1.6	12.43
AMS-6	14.64	4.9	0.78	1.6	17.64
AMS-7	15.73	3.3	0.88	2.4	18.93
AMS-8	13.77	1.0	0.76	1.6	20.46
AMS-9	18.00	4.5	0.79	2.2	17.25
AMS-10	13.21	1.2	0.83	1.2	12.57
AMS-11	4.47	4.2	0.74	2.7	4.00
AMS-12	20.00	3.6	0.77	2.0	22.92

Collectors' number	No. of fruits per plant	Fruit length (cm)	Fruit width (cm)	Individual fruit weight (g)	Yield per plant (g)
AMS-13	20.71	7.2	0.8	1.8	26.29
AMS-21	18.17	4.2	0.72	2.0	16.17
AMS-26	23.64	3.7	0.68	1.6	15.57
AMS-27	14.22	4.3	0.77	1.3	8.00
AMS-30	12.93	1.5	0.8	1.2	12.43
AMS-31	8.30	3.7	0.71	1.4	4.00
AMS-32	10.83	2.0	0.85	1.6	8.83
AMS-33	13.92	6.0	0.8	2.8	14.15
AMS-35	12.00	3.0	0.81	1.8	19.08
AMS-39	19.44	3.8	0.73	2.4	14.89
AMS-42	19.85	3.5	0.7	1.8	20.62
AMS-44	4.44	3.8	0.72	1	5.78
AMS-45	17.42	4.5	0.8	1.2	17.17
AR-1	1.62	6.4	1.2	2.6	6.00
RI-2	70.50	3.6	0.66	2.2	91.83
RI-12	6.25	3.5	0.84	2.7	7.67
RI-15	29.89	6.5	0.75	3.0	32.22
RI-21	9.17	4.8	0.84	2.0	28.00
RI-35	10.38	2.5	0.84	1.6	13.08
RM-4	1.00	4.2	0.72	1.6	1.09
RT-20	31.00	4.6	0.75	1.2	46.00
RT-22	3.45	3.9	0.77	1.2	3.09
SE(±)	4.02	0.74	0.32	0.38	3.24
LSD (0.05)	8.05	1.48	0.64	0.76	6.50

The results obtained in this study are in close agreement with those of Uddin *et al.* (2015), who recorded highly significant variability among different chilli genotypes in Bangladesh. The current results of morphological evaluation of chilli germplasm are supported by the study of Hill *et al.* (2013). The findings of Hornero-Méndez *et al.* (2002), Thul *et al.* (2009) and Ibiza *et al.* (2012) further strengthen the current findings, who also found valuable and highly significant and positive variability among their studied genotypes.

Conclusion

Based on the above discussion most of the qualitative characters showed distinct variation among the germplasm. The maximum variation was observed in fruit colour. Significant variation was observed in quantitative parameters and the highest variation was observed in yield per plant. The present finding shows the great genetic potential of the studied genotypes. The promising genotypes identified such as AI-1, AI-2, RI-2, AI-39, AI-9, AI-23 and AI-26 have the

potential to be used in future breeding programs for getting productive and quality traits. Moreover, the variability observed in the current study could be used in crop improvement program. In addition, the germplasm was also categorized into different groups following descriptor state on the basis of morphological variability. So plant breeders and horticulturists can choose germplasm according to their needs.

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