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Evaluation of bird's eye chilli (*Capsicum frutescens* L.) accessions for quality traits

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Abstract
Thirty six bird's eye chilli accessions (*Capsicum frutescence* L.) were evaluated at College of Horticulture, Mudigere (Karnataka), India, to select the promising accessions for qualitative traits *viz.* capsaicin, vitamin C, oleoresin and capsanthin contents. The analysis of variance revealed significant differences among the accessions for all the characters. Among thirty six accessions, maximum capsaicin content was recorded in Acc.15 (1.86 %), whereas the least capsaicin content was recorded in Acc.20 (0.65 %). Maximum ascorbic acid and oleoresin contents were recorded in Acc.30 (159.05 mg/100g and 11.36 % respectively), while minimum ascorbic acid content was recorded in Acc.10 (53.03 mg) and oleoresin content in Acc.14 (0.65 %). Accession.27 reported maximum capsanthin content of 436.05 colour units, while the minimum was registered in Acc.20 (251.75 colour units).

Keywords: bird's eye chilli, *Capsicum frutescens*, capsaicin, capsanthin, ascorbic acid, oleoresin

Introduction
Bird's eye chilli is botanically called as *Capsicum frutescens*, belongs to the family solanaceae and having the diploid chromosome number of 2n=2x=26. It is one among the five cultivated species of the genous solanaceae and closely related to the *Capsicum chinense* Jacq. It is called by many other synonyms like African pepper, chilli pepper, goat's pod, Mexican chilli, red pepper, Tabasco pepper, Zanibar pepper and Cayenne pepper. It is native to South America and introduced to India towards 16th century by Portuguese [1]. It is widely distributed in all tropical and sub-tropical countries and still grows wild today. In India it is grown as a homestead crop and consumed widely across malnad regions of South Karnataka, Kerala, Tamil Nadu and in north-east India, particularly in the states of Mizoram and Manipur. The north-eastern hill (NEH) region, being one of the hot-spots of biodiversity in the Indian gene centre, is also known for its richness in ethnic diversity and traditional culture [2].
Capsaicin (8-Methyl-N-vanillyl-trans-6-nonenamide) and di-hydro capsaicin (DHC) are major contributors to pungency and form about one-third (69%) of the total capsaicin. whereas non-di-hydro capsaicin (NDC), homo-capsaicin and homo-di-hydro capsaicin are minor capsaicinoid, which also contribute to its pungency. The capsaicin content ranges from 0.26 to 1.21% w/w or 1,00,000-1,50,000 scoville heat units (SHU). Carotenoids control fruit colour. The red colour in fruit comes from carotenoids, capsanthin and capsorubin, while the yellow orange colour is from beta carotene and violaxanthin, Capsanthin, the major carotenoid in ripe fruits, contributes up to 60% of the total carotenoids. Capsanthin and capsorubin increase proportionally with advanced stages of ripeness [3]. Like all other chillies, it is also rich in ascorbic acid (vitamin C) and contains tocopherol (vitamin E), also contains moisture, protein, fat, minerals, fibres and CHO in minute quantity [4].
Most bird's eye chillies are processed to extract the oleoresin for food and pharmaceutical industries. It is used in the preparation of curry powder, pickle, curry paste and hot sauces *etc.* The fruit is eaten as raw or in processed form as powder. It is also used for medicinal purposes and in the control of pest and diseases. In medicine, the bird's eye chilli was traditionally used to cure arthritis, rheumatism, dyspepsia, flatulence, toothache and it stimulates appetite [5]. Despite its wide usage, bird's eye chilli is yet to draw considerable attentions from the farming community.

The availability of data on pungency, vitamin and colour are important criteria for selection of genotypes from a gene bank for use in crop improvement. However, data on these quality parameters or systematic research regarding any aspects on bird eye chilli are currently limited as compared to the commercial species *annuum*. Because of its huge medicinal value, this study becomes important to know the nutritive status of the crop. Thus, the major objective of this study was to evaluate bird's eye chilli accessions for qualitative traits *viz.* ascorbic acid (vitamin C), capsaicin, oleoresin and capsanthin contents.

Meterial and Methods

The investigation was carried out during 2015- 16 at Department of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Mudigere, Karnataka with 36 bird's eye chilli accessions (*Capsicum frutescens* L.) in a Randomized Complete Block Design with two replications. The seeds were sown in protrays with suitable potting mixtures and 45 days old seedlings were transplanted to a main field at a spacing of 1m x 1m. FYM and fertilizers were applied as per the recommendations. The other cultural practices like irrigation, weeding and plant protection operation were carried out as and when required. Each row consisted of 12 plants, of which five competitive plants were selected at random for collecting the fruit samples to estimate qualitative traits *viz.* ascorbic acid (mg/100g), capsaicin (%), oleoresin (%) and capsanthin contents (colour units).

Fruit samples were harvested at full ripe stage except for vitamin-C, for which mature green fruits were harvested. The red ripen fruits were sun dried and ground in an electronic grinder and passed through a 0.5 mm sieve. By using chilli powder the following biochemical constituents were measured. Capsaicin was estimated by the procedure proposed by Palacio (1977) [6]. Ascorbic acid content of mature green fruits was estimated by volumetric (2, 6-dichlorophenol indophenol dye) method described by Thimmaiah (1999) [7]. The oleoresin content was estimated as per the procedure given by Ranganna (1986) [8]. Total extractable colour of fruits (ASTA- American Spice Trade Association units) was estimated as per the procedure given by Reddy and Sasikala (2013) [9]. Analysis of variance was carried out as per the procedure given by Panse and Sukhatme (1957) [10].

Result and Discusion

The analysis of variance (table 1) revealed significant differences among the accessions for all the four characters studied indicating the presence of genetic variability in the accessions and considerable scope for their improvement. The characters showing wide range of variation provide an ample scope for selecting superior types and the selected accession can be used in breeding programme for introgression of their desired genes into the high yielding varieties [11, 12].

Table 1. Analysis of variance six qualitative characters in chilli (*Capsicum frutescens*

Sl. No.	Sources of variation / Characters	Replications	Treatments (Accessions)	Error	S.Em ±
1	Ascorbic acid content (mg/100 g)	94.34	1457.36**	6.29	1.74
2	Capsaicin content (%)	0.006	0.08**	0.002	0.03
3	Oleoresin content (%)	0.59	15.26**	0.03	0.12
4	Capsanthin content (colour units)	2251.09	2481.09**	2001.19	1.06

Note: * & ** indicates Significant @ 5 % and 1 % level respectively.

The maximum ascorbic acid content was recorded in Acc.30 (159.05 mg), followed by Acc.28 (152.71 mg), whereas minimum ascorbic acid content was recorded in Acc.10 (53.03 mg). This difference in ascorbic acid content might be attributed to the fruit size and genetic makeup as that long fruited types were rich in ascorbic acid content than short types [13, 14].

The capsaicin content varied significantly and exhibited high variability among the accessions. Maximum capsaicin content was recorded in Acc.15 (1.86 %) followed by Acc.28 (1.36 %), whereas the least capsaicin content was recorded in Acc.20 (0.65 %). Oleoresin content was significantly maximum in Acc.30 (11.36 %) followed by Acc.4 (10.19 %). The least was in Acc.14 (0.65 %). The data indicated that among different accessions, Acc.27 reported maximum capsanthin content of 436.05 colour units, followed by Acc.28 (419.09 colour units), while the minimum was registered in Acc.20 (251.75 colour units). This might be due to genetic makeup of the respective accessions [13, 15, 16, 17 & 18].

Table 2. Mean performance of bird's eye chilli (*Capsicum frutescens* L.) accessions for quality components.

Accessions	Ascorbic acid (mg/ 100g)	Capsaicin content (%)	Oleoresin content (%)	Capsanthin content (Colour units)
Acc.1	75.15	1.04	4.03	387.72
Acc.2	83.10	0.86	6.35	341.26
Acc.3	79.91	0.79	6.38	387.13
Acc.4	112.06	0.85	10.19	373.32
Acc.5	69.03	0.99	1.62	360.88
Acc.6	85.88	0.99	4.92	410.75
Acc.7	70.27	0.80	2.15	331.01
Acc.8	108.89	1.03	4.83	343.14
Acc.9	70.06	0.99	3.91	363.13
Acc.10	53.03	1.08	0.29	352.75
Acc.11	67.33	1.09	1.30	348.87
Acc.12	84.01	1.03	6.59	373.80
Acc.13	80.68	1.06	5.63	374.27
Acc.14	55.98	1.01	0.65	358.68
Acc.15	144.00	1.86	3.15	349.22
Acc.16	87.02	0.90	6.22	353.90

Acc.17	120.63	0.97	8.05	379.47
Acc.18	79.07	0.69	1.78	350.77
Acc.19	81.38	0.89	3.94	389.72
Acc.20	83.24	0.65	3.55	251.75
Acc.21	85.14	0.80	1.95	380.78
Acc.22	65.74	0.91	1.62	402.88
Acc.23	73.35	0.81	0.94	362.68
Acc.24	83.76	0.95	4.42	341.61
Acc.25	85.34	0.71	1.65	348.70
Acc.26	106.14	0.69	1.29	366.82
Acc.27	118.55	0.91	7.72	436.05
Acc.28	152.71	1.36	6.55	419.09
Acc.29	132.33	0.93	0.94	392.43
Acc.30	159.05	0.91	11.36	371.41
Acc.31	78.34	1.09	1.87	360.92
Acc.32	86.92	0.82	5.97	322.75
Acc.33	87.92	0.83	1.99	392.16
Acc.34	146.18	0.97	2.55	350.98
Acc.35	103.75	0.95	6.46	391.49
Acc.36	102.73	0.86	2.74	359.08
S. Em±	1.74	0.03	0.12	1.06
CD @ 5%	5.09	0.10	0.37	3.03

Fig 1. Top performed bird's eye chilli accessions for (a) capsaicin, (b) capsanthin and (c) oleoresin content

Acknowledgment
It was evident from the study that considerable degree of variability exists among the accessions for quality characters. The most promising accessions for vitamin-C and oleoresin contents were recorded in Acc.30. Accession 15 registered maximum capsaicin content and Acc.27 recorded maximum capsanthin content.

References

1. Chatterjee R, Chattopadhyay PK, Chongtham T, hnamte V, Ray SKD, Munsi PS. Quality bird's eye chili production: a retrospective, Int. J. Bio-resour. and Stress Management. 2012; 3(3):412-414.
2. Dutta SK, Singh AR, Boopathi T, Singh SB, Singh MC, Malsawmzuali. Effect of primingon germination and seeding vigour of bird's eye chilli (*Capsicum frutescens* L.) seeds collected from Eastern Himalayan region of India. Int. J Life. Sci. 2015; 10(1):279-289.
3. BOSLAND PW. An effective plant field cage to increase the production of genetically pure chili (*Capsicum spp.*) seed. Hort. Sci. 1993; 28:1053.
4. Blum E, Liu K, Mazourk M, Yoo EY, Jahn M, Paran I. Molecular mapping of C locus for presence of pungency in capsicum. Genome. 2002; 45(4):702-705.
5. Nkansah GO, Ofosu-Budu KG, Ayarna AW. Growth and yield performance of bird eye pepper in the forest ecological zone of Ghana. J Appl. Biosci. 2011; 47:3235-3241.
6. Palacio JJR. Flavers and non-alcoholic beverages spectrophotometric determination of capsaicin. J.A. O.A.C. 1977; 60(4):970-972.
7. Thimmaiah RR. Standard method of biochemical analysis, *Kalyani publishers*. New Dehli, 1999, 307-308.
8. Ranganna S. Manual of analysis of fruits and vegetable products. Tata Mc Graw Hill Publishing Co. Ltd., 1986, 441-495.
9. Reddy MVB, Sasikala P. Capsaicin and color extraction from different varieties of green and red chilli peppers of Andra Pradseh. Int. J Adv. Sci. and Tech. Res. 2013; 2(3):554-572.
10. Panse VG, Sukhatme PV. Statistical methods for agricultural workers, ICAR, New Delhi, 1985, 381.
11. Kumar D, Bahadur V, Rangare BS, Singh D. Genetic variability, heritability and correlation studies in chilli (*Capsicum annuum* L.). Hortflora Res. Spectrum, 2012; 1(3):248-252.
12. Naresh P, Madhavi RK, Shivashankara KS, Christopher GM. Genotypic variation for biochemical compounds in capsicum. Indian J Hort. 2013; 70:43-47.
13. Karak PK, Pariari A, Karak C. Varietal evaluation of chilli in the saline belt of West Bengal. J Crop Weed. 2015; 1:86-89.
14. Chowdhury MSN, Hoque F, Mehraj, Uddin JAFM. Vegetative growth and yield performance of four chilli (*Capsicum frutescens*) cultivars. American-Eurasian J Agric. and Environ. Sci. 2015; 15(4):514-517.
15. Singh Y, Sharma M. Evaluation of chilli genotypes for quality traits. Himachal J Agric. Res. 2011; 37(1):39-44.
16. Samnotra RK, Arun S, Gupta N, Sandeeep C. Evaluation of chilli pepper genotypes for yield and reaction to field diseases. J Res. 2012; 10:55-62.
17. Datta S, Chakraborty G. Studies on influence of genotypic diversity on yield, quality and incidence of white fly and yellow mite in *Capsicum annuum* L. J Appl. Nat. Sci. 2013; 5(2):350-356.
18. Tilahun S, Paramaguru, Rajamani B. Capsaicin and ascorbic acid variability in chilli and paprika cultivars as revealed by HPLC analysis. J Plant Breed. Genet. 2013; 1(2):85-89.