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# Nutritional analysis of chilli (*Capsicum annuum* L.) germplasm

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**Abstract**

In the present investigation, 35 genotypes of chilli were analyzed over two seasons and pooled for nutritional, aspects namely; ascorbic acid content, chlorophyll content, capsaicin and capsanthin content. Wide variations were observed among the 35 genotypes for the four nutrient contents studied. Among the genotypes, high chlorophyll content (2.24%) was recorded in two genotypes, EC-402113 and EC-399535. The genotype IC-215012 recorded significantly higher ascorbic acid content than the check Pusa Jwala. Higher values of capsaicin and capsanthin were reported in IC-363993 and IC-561622, respectively among the 35 genotypes. Genotypes with high ascorbic acid content, chlorophyll content, capsaicin and capsanthin could be utilized in crop improvement programmes. Hence, the genotypes identified in this study are potential sources for developing new varieties with high nutritional value.

## 1. Introduction

Chilli is an important Solanaceous vegetable with high commercial value and is also an important source for nutrients and vitamins. Chilli fruits are used in both fresh and dried forms, while the green fruits are source of vitamin A, vitamin C and minerals; the dry chillies provide vitamin A and vitamin D (Khan *et al*., 2017). Unripe green fruits are used in fresh form and ripe red fruits are used in dried form in many culinary preparations. It is mainly used for its pungency and pleasant flavour (Saisupriya *et al.*, 2020). The accumulation of capsaicinoids, the unique alkaloids to the genus capsicum is the reasons for its pungency (Sun *et al*., 2015). These capsaicinoids are present in the fruits (Wahyuni *et al*., 2013). While, another chemical principle, capsaicin, 8-methyl-N-vanillyl-6-nonenamide had protective effects and reduces the obesity and high cholesterol levels in human beings (Kempaiah *et al*., 2005).

Red colour in chilli is due to capsanthin and capsorubin. Capsanthin has powerful antioxidant properties which fights cancer. It consists of many vitamins and minerals with numerous health benefits. Chilli pepper belongs to the crops that are cultivated throughout the world for their nutraceutical (nutritional and medicinal) and economic value (Rahman *et al.*, 2013). Red chillies are not only valued for their sensory attributes of color, aroma and pungency, but also have significant role in pharmaceutical applications (Ananthan *et al.*, 2016). Due to its antibacterial, anticarcinogenic, analgesic and antidiabetic properties, capsaicin is in high demand in pharmaceutical industry (Pallerla *et al.*, 2021). Red chillies also contain many nutrients including minerals, vitamins, phenolic acids and flavonoids which are bioactive health promoting components of human diet (Marin *et al*., 2004; Ogunlade *et al*., 2012; Ananthan *et al*., 2014). Chilli pepper is rich in fibres, proteins and lipids as well, including Ca, P, Fe, K and vitamins (Chigoziri and Ekefan, 2013). The vitamin C in fresh green chillies is greater than citrus fruits and its vitamin A is more than carrots as per the results reported by Chigoziri and Ekefan (2013). However, the nutrient composition and contents in chilli might differ greatly depending on the cultivar, harvest time, storage conditions, and preparation techniques (Katnar *et al*., 2016). Keeping the above in view, the present study was designed to study the ascorbic acid content, chlorophyll content, capsaicin and capsanthin content in 35 genotypes of chilli.

## 2. Materials and Methods

Thirty five genotypes of chilli which includes homozygous accessions obtained from NBPGR Regional Station, Rajendranagar, Hyderabad and one variety released from IARI, New Delhi and two released varieties from RARS, Lam, Guntur, Andhra Pradesh were evaluated in randomized block design with three replications in field conditions during Kharif, 2019, Rabi, 2019-20 and pooled.

The data on four nutritional parameters, namely; ascorbic acid content, chlorophyll content, capsaicin and capsanthin content were recorded in 35 genotypes. The ascorbic acid content of chilli fruits

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was estimated by using the procedure given by Ranganna (1986). The capsanthin content of fruits was measured in ASTA (American Spice Trade Association) units were determined using the procedure outlined by ASTA (1986). Following the colorimetric protocol proposed by Balasubramanian *et al*. (1982), capsaicin content was estimated.

## 3. Results

The mean sum of squares for genotypes was found to be significant for all the four characters studied, *i.e.*, ascorbic acid content (mg/ 100 g of fruit), chlorophyll content of green chilli, capsaicin content (%) and capsanthin content (ASTA units) indicating that there is lot variation among the genotypes studied.

**Table 1: ANOVA for nutritional parameters in 35 genotypes of chilli**

| S.No. | Character | Mean sum of squares | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Replications (df=2) | | | Treatments (df=34) | | | Error (df=68) | | |
| | | Kharif 2019 | Rabi 2019-20 | Pooled | Kharif 2019 | Rabi 2019-20 | Pooled | Kharif 2019 | Rabi 2019-20 | Pooled |
| 1 | Ascorbic acid (mg/100 g) | 0.16 | 4.53 | 3.20 | 5717.73*** | 5840.98*** | 11554.87*** | 2.38 | 1.95 | 2.50 |
| 2 | Chlorophyll content | 0.002 | 0.02 | 0.01 | 0.14*** | 0.21*** | 0.34*** | 0.009 | 0.02 | 0.01 |
| 3 | Capsaicin content | 0.00008 | 0.0001 | 0.0001 | 0.09*** | 0.08*** | 0.16*** | 0.0005 | 0.0009 | 0.001 |
| 4 | Capsanthin content | 0.70 | 0.08 | 0.63 | 7974.62*** | 7830.29*** | 15796.45*** | 5.40 | 3.76 | 5.36 |

*** Significant at $P = 0.01$ level.

The performance of 35 genotypes for four nutritional parameters is analysed and presented season-wise and pooled.

**Table 2a: Mean performance of ascorbic acid, chlorophyll, capsaicin and capsanthin in 35 chilli genotypes**

| S.No. | Genotype | Ascorbic acid | | | Chlorophyll | | | Capsaicin | | | Capsanthin | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Kharif | Rabi | Pooled | Kharif | Rabi | Pooled | Kharif | Rabi | Pooled | Kharif | Rabi | Pooled |
| | | **2019** | **2020** | | **2019** | **2020** | | **2019** | **2020** | | **2019** | **2020** | |
| **1.** | IC-347044 | 62.40 | 62.26 | 62.33 | 1.72 | 1.64 | 1.68 | 0.37 | 0.39 | 0.38 | 220.12 | 216.63 | 218.37 |
| **2.** | IC-363918 | 73.64 | 71.80 | 72.72 | 1.76 | 1.92 | 1.84 | 0.71 | 0.78 | 0.74 | 285.30 | 281.76 | 283.53 |
| **3.** | IC-363993 | 55.46 | 55.83 | 55.65 | 1.42 | 1.19 | 1.31 | 0.81 | 0.85 | 0.83 | 213.30 | 211.66 | 212.48 |
| **4.** | IC-561676 | 84.24 | 81.66 | 82.95 | 1.93 | 2.04 | 1.98 | 0.33 | 0.38 | 0.35 | 257.36 | 254.23 | 255.80 |
| **5.** | IC-561622 | 53.03 | 54.75 | 53.89 | 1.86 | 1.71 | 1.78 | 0.58 | 0.59 | 0.58 | 375.05 | 372.00 | 373.52 |
| **6.** | IC-610381 | 46.24 | 44.80 | 45.52 | 2.08 | 2.16 | 2.12 | 0.25 | 0.23 | 0.24 | 138.40 | 136.70 | 137.55 |
| **7.** | IC-505237 | 108.86 | 110.30 | 109.58 | 1.98 | 1.89 | 1.93 | 0.56 | 0.47 | 0.51 | 275.30 | 274.30 | 274.80 |
| **8.** | IC-447018 | 49.60 | 48.10 | 48.85 | 1.93 | 1.97 | 1.95 | 0.32 | 0.33 | 0.32 | 254.16 | 251.66 | 252.91 |
| **9.** | IC-572459 | 101.00 | 101.20 | 101.10 | 1.91 | 1.81 | 1.86 | 0.46 | 0.42 | 0.44 | 207.87 | 206.20 | 207.03 |
| **10.** | IC-610383 | 115.46 | 113.96 | 114.71 | 2.04 | 2.28 | 2.16 | 0.41 | 0.34 | 0.37 | 287.00 | 285.36 | 286.18 |
| **11.** | IC-214965 | 174.70 | 175.36 | 175.03 | 2.01 | 1.84 | 1.92 | 0.26 | 0.28 | 0.27 | 226.26 | 224.16 | 225.21 |
| **12.** | EC-402113 | 78.13 | 75.66 | 76.90 | 2.23 | 2.25 | 2.24 | 0.31 | 0.33 | 0.32 | 267.71 | 265.93 | 266.82 |
| **13.** | IC-410423 | 57.48 | 58.53 | 58.00 | 1.99 | 1.92 | 1.95 | 0.74 | 0.60 | 0.67 | 278.00 | 280.10 | 279.05 |
| **14.** | IC-526448 | 49.80 | 47.03 | 48.42 | 1.87 | 1.95 | 1.91 | 0.75 | 0.66 | 0.71 | 321.83 | 322.53 | 322.18 |
| **15.** | EC-399567 | 112.20 | 111.90 | 112.05 | 1.89 | 1.93 | 1.91 | 0.18 | 0.24 | 0.21 | 234.11 | 231.50 | 232.80 |
| **16.** | IC-561655 | 120.57 | 119.40 | 119.98 | 2.12 | 2.21 | 2.16 | 0.42 | 0.35 | 0.39 | 245.33 | 242.53 | 243.93 |
| **17.** | EC-390030 | 109.13 | 109.40 | 109.26 | 2.14 | 2.13 | 2.13 | 0.54 | 0.48 | 0.51 | 318.96 | 320.23 | 319.60 |
| **18.** | IC-528433 | 53.46 | 49.23 | 51.35 | 2.00 | 2.03 | 2.01 | 0.42 | 0.34 | 0.38 | 229.73 | 230.36 | 230.05 |
| **19.** | IC-528442 | 156.30 | 153.60 | 154.95 | 1.80 | 1.85 | 1.82 | 0.32 | 0.3 | 0.31 | 139.33 | 142.43 | 140.88 |

### 3.1 Ascorbic acid (mg/100 gm of fruit)

In Kharif, 2019, the quality character ascorbic acid content ranged from 45.86 to 192.30 mg/100 g with a total mean of 93.86 mg/100 g. Among the genotypes, IC-215012 showed maximum ascorbic acid content (192.30 mg/100g) followed by Pusajwala (191.56mg/100g) which was at par, while the minimum ascorbic acid content (45.86mg/100g) was observed in IC-319335. In *Rabi*, 2019-20, the quality character ascorbic acid content ranged from 43.33 to 191.30 mg/100 g with a total mean of 92.85 mg/100 g. Among the genotypes, IC-215012 and Pusajwala showed maximum ascorbic acid content (191.30 mg/100 g), while the minimum ascorbic acid content (43.33 mg/100 g) was observed in IC-526737. In pooled data, the quality character ascorbic acid content ranged from 44.71 to 191.80 mg/100 g with a total mean of 93.36 mg/100 g. Compared to Pusajwala (191.43 mg/100 g), out of 35 genotypes, IC-215012 with higher (191.80 mg/100 g) and IC-319335 (44.71 mg/100 g) with lowest ascorbic acid contents were observed.

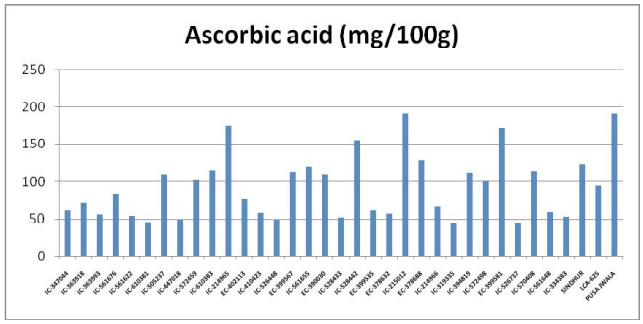


**Figure 1: Ascorbic acid content of 35 chilli genotypes based on pooled values of Kharif, 2019 and Rabi, 2019-20.**

**Table 2b: Mean performance of ascorbic acid, chlorophyll, capsaicin and capsanthin in 35 chilli genotypes**

| S.No. | Genotype | Ascorbic acid | | | Chlorophyll | | | Capsaicin | | | Capsanthin | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Kharif 2019 | Rabi 2020 | Pooled | Kharif 2019 | Rabi 2020 | Pooled | Kharif 2019 | Rabi 2020 | Pooled | Kharif 2019 | Rabi 2020 | Pooled |
| 20. | EC-399535 | 62.22 | 61.83 | 62.03 | 2.17 | 2.31 | 2.24 | 0.63 | 0.56 | 0.59 | 213.73 | 211.60 | 212.66 |
| 21. | EC-378632 | 57.74 | 54.83 | 56.28 | 1.87 | 1.75 | 1.81 | 0.42 | 0.38 | 0.40 | 311.86 | 310.43 | 311.15 |
| 22. | IC-215012 | 192.30 | 191.30 | 191.80 | 2.12 | 2.21 | 2.16 | 0.35 | 0.29 | 0.32 | 285.48 | 281.86 | 283.67 |
| 23. | EC-378688 | 129.36 | 125.96 | 127.66 | 1.99 | 1.95 | 1.97 | 0.33 | 0.29 | 0.31 | 198.80 | 200.03 | 199.42 |
| 24. | IC-214966 | 68.40 | 66.80 | 67.60 | 1.82 | 1.83 | 1.83 | 0.51 | 0.41 | 0.46 | 192.81 | 191.03 | 191.92 |
| 25. | IC-319335 | 45.86 | 43.56 | 44.71 | 2.17 | 2.04 | 2.10 | 0.75 | 0.64 | 0.70 | 205.14 | 201.20 | 203.17 |
| 26. | IC-394819 | 110.72 | 111.76 | 111.24 | 1.58 | 1.72 | 1.65 | 0.35 | 0.27 | 0.31 | 163.66 | 167.00 | 165.33 |
| 27. | IC-572498 | 101.89 | 99.60 | 100.74 | 2.00 | 1.96 | 1.98 | 0.25 | 0.22 | 0.24 | 255.20 | 251.63 | 253.41 |
| 28. | EC-399581 | 171.56 | 172.56 | 172.06 | 1.93 | 1.99 | 1.96 | 0.48 | 0.36 | 0.42 | 229.70 | 226.26 | 227.98 |
| 29. | IC-526737 | 46.72 | 43.33 | 45.03 | 2.04 | 2.02 | 2.03 | 0.27 | 0.24 | 0.26 | 187.46 | 185.26 | 186.36 |
| 30. | IC-570408 | 112.69 | 114.33 | 113.51 | 1.75 | 1.87 | 1.81 | 0.85 | 0.75 | 0.80 | 173.25 | 176.86 | 175.06 |
| 31. | IC-561648 | 60.75 | 58.06 | 59.41 | 1.86 | 1.78 | 1.82 | 0.54 | 0.46 | 0.50 | 224.46 | 220.36 | 222.41 |
| 32. | IC-334383 | 53.20 | 52.20 | 52.70 | 2.02 | 1.95 | 1.98 | 0.41 | 0.35 | 0.38 | 249.70 | 244.30 | 247.00 |
| 33. | SINDHUR | 123.33 | 122.70 | 123.01 | 1.54 | 1.48 | 1.51 | 0.40 | 0.30 | 0.35 | 242.58 | 239.33 | 240.95 |
| 34. | LCA-625 | 95.27 | 94.86 | 95.06 | 1.99 | 2.05 | 2.02 | 0.48 | 0.36 | 0.42 | 275.14 | 276.40 | 275.77 |
| 35. | PUSA JWALA | 191.56 | 191.30 | 191.43 | 1.17 | 1.09 | 1.13 | 0.43 | 0.39 | 0.41 | 246.44 | 241.20 | 243.82 |
| | MEAN | 93.86 | 92.85 | 93.36 | 1.90 | 1.90 | 1.90 | 0.46 | 0.42 | 0.44 | 240.87 | 239.28 | 240.08 |
| | CD (5%) | 2.51 | 2.27 | 1.80 | 0.16 | 0.23 | 0.14 | 0.03 | 0.04 | 0.04 | 3.78 | 3.16 | 2.63 |
| | SEM | 0.89 | 0.80 | 0.64 | 0.05 | 0.08 | 0.05 | 0.01 | 0.01 | 0.01 | 1.34 | 1.12 | 0.94 |

### 3.2 Chlorophyll content (%)

In Kharif, 2019, the mean values for chlorophyll content of green chillies ranged from 1.17% to 2.23% with the grand mean value of 1.90%. Maximum chlorophyll content (2.23%) was recorded in EC-402113, while the minimum content of chlorophyll (1.17%) was recorded in Pusajwala. Six genotypes, *viz.*, IC-319335 (2.17%), EC-399535 (2.17%), EC-390030 (2.14%), IC-561655 (2.12%), IC-215012 (2.12%) and IC-610381 (2.08%) recorded statistically at par values with EC-402113 (2.23%). Three genotypes, *viz.*, EC-402113 (2.23%), IC-319335 (2.17%) and EC-399535 (2.17%) recorded significantly higher chlorophyll content than the check LCA 625 (1.99%). In Rabi, 2019-20, the mean values for chlorophyll content of green chillies ranged from 1.09% to 2.31% with the grand mean value of 1.90%. Maximum chlorophyll content (2.31%) was recorded in EC-399535, while the minimum content of chlorophyll (1.09%) was recorded in Pusajwala. Six genotypes, *viz.*, IC-610383 (2.28%), EC-402113 (2.25%), IC-561655 (2.21%), IC-215012 (2.21%), IC-610381 (2.16%) and EC-390030 (2.13%) recorded statistically at par values with EC-399535 (2.31%). One

genotype EC-399535 (2.31%) recorded significantly higher chlorophyll content than the check LCA 625 (2.05%). The grand mean of 1.90%, with the range of 1.13% to 2.24% were registered by the genotypes in the pooled data. Maximum chlorophyll content (2.24%) was recorded in EC-402113 and EC-399535, while the minimum content of chlorophyll (1.13%) was recorded in Pusajwala. Six genotypes, *viz.*,IC-610383 (2.16%), IC-561655 (2.16%), IC-215012 (2.16%), EC-390030 (2.13%), IC-610381 (2.12%), IC-319335 (2.10%) recorded statistically at par values with EC-402113 (2.24%) and EC-399535 (2.24%). Two genotypes, *viz.*, EC-402113 (2.24%) and EC-399535 (2.24%) recorded significantly higher chlorophyll content than the check LCA 625 (2.02%).

### 3.3 Capsaicin content

In Kharif, 2019, the mean values for capsaicin content ranged from 0.18 % to 0.85% with a total mean of 0.46%. Among the genotypes, maximum capsaicin content (0.85%) was observed in IC-570408, while EC-399567 showed minimum capsaicin content (0.18%). Eleven genotypes, *viz.*, IC-570408 (0.85%), IC-363993 (0.81%), IC-319335 (0.75%), IC-526448 (0.75%), IC-410423 (0.74%), IC-363918 (0.71%), EC-399535 (0.63%), IC-561622 (0.58%), IC-505237 (0.56%), IC-561648 (0.54%) and EC-390030 (0.54%) recorded significantly higher values for capsaicin content than the check LCA 625 (0.48%). In Rabi, 2019-20, the mean values for the quality trait capsaicin content ranged from 0.22 % to 0.85% with a total mean of 0.42%. Among the genotypes, maximum capsaicin content (0.85%) was observed in IC-363993, while IC-572498 showed minimum capsaicin content (0.22%). Eleven genotypes, *viz.*, IC-363993 (0.85%), IC-363918 (0.78%), IC-570408 (0.75%), IC-526448 (0.66%), IC-319335 (0.64%), IC-410423 (0.60%), IC-561622 (0.59%), EC-399535 (0.56%), EC-390030 (0.48%), IC-505237 (0.47%) and IC-561648 (0.46%) recorded significantly higher values for capsaicin content than the check Pusajwala (0.39%). Ranges from 0.21 % - 0.83% having a mean value, 0.44% were registered by genotypes for capsaicin content in the pooled data. Among the genotypes, maximum capsaicin content (0.83%) was observed in IC-363993 followed by IC-570408 (0.80%) which was at par, while EC-399567 showed minimum capsaicin content (0.21%). Eleven genotypes, *viz.*, IC-363993(0.83%), IC-570408 (0.80%), IC-363918 (0.74%), IC-526448 (0.71%), IC-319335 (0.70%), IC-410423 (0.67%), EC-399535 (0.59%), IC-561622 (0.58%), IC-505237 (0.51%), EC-390030 (0.51%) and IC-561648 (0.50%) recorded significantly higher values for capsaicin content than the check LCA-625 (0.42%).

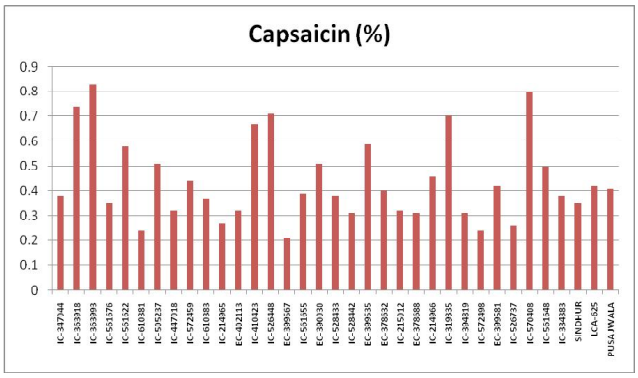


**Figure 2: Capsaicin content of 35 chilli genotypes based on pooled values of Kharif, 2019 and Rabi, 2019-20.**

### 3.4 Capsanthin content (ASTA units)

In Kharif, 2019, capsanthin content ranged from 138.40 ASTA units to 375.05 ASTA units with a grand mean of 240.87 ASTA units. Among the genotypes, IC-561622 showed maximum capsanthin content (375.05 ASTA units), while the minimum capsanthin content (138.40 ASTA units) was observed in IC-610381. Seven genotypes, *i.e.*, IC-561622 (375.05 ASTA units), IC-526448 (321.83 ASTA units), EC-390030 (318.96 ASTA units), EC-378632 (311.86 ASTA units), IC-610383 (287.00 ASTA units), IC-215012 (285.48 ASTA units) and IC-363918 (285.30 ASTA units) recorded significantly higher values for capsanthin content than the check LCA-625 (275.14 ASTA units). In Rabi, 2019-20, capsanthin content ranged from 136.70 ASTA units to 372.00 ASTA units with a grand mean of 239.28 ASTA units. Among the genotypes, IC-561622 showed maximum capsanthin content (372.00 ASTA units), while the minimum capsanthin content (136.70 ASTA units) was observed in IC-610381. Eight genotypes, *viz.*, IC-561622 (372.00 ASTA units), IC-526448 (322.53 ASTA units), EC-390030 (320.23 ASTA units), EC-378632 (310.43 ASTA units), IC-610383 (285.36 ASTA units), IC-215012 (281.86 ASTA units), IC-363918 (281.76 ASTA units) and IC-410423 (280.10 ASTA units) recorded significantly higher values for capsanthin content than the check LCA-625 (276.40 ASTA units).

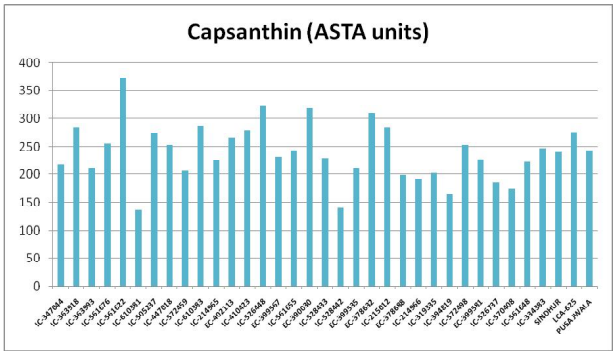


**Figure 3: Capsanthin content of 35 chilli genotypes based on pooled values of Kharif, 2019 and Rabi, 2019-20**

In pooled data, capsanthin content ranged from 137.55 ASTA units to 373.52 ASTA units with a grand mean of 240.08 ASTA units. The highest value of IC-561622 (373.52 ASTA units) and the lowest value of IC-610381(137.55 ASTA units) were observed for capsanthin content. Eight genotypes, serially IC-561622 (373.52 ASTA units), IC-526448 (322.18 ASTA units), EC-390030 (319.60 ASTA units), EC-378632 (311.15 ASTA units), IC-610383 (286.18 ASTA units), IC-215012 (283.67 ASTA units), IC-363918 (285.33 ASTA units) and IC-410423 (279.05 ASTA units) recorded significantly higher values for capsanthin content than the check LCA-625 (275.77 ASTA units).

## 4. Discussion

The present study reports that the ascorbic acid content in thirty five genotypes of chilli showed variation from one genotype to another. Similar results were reported by Aniel and Subba (2009) and Pradhan *et al.* (2018). IC-215012 with high ascorbic acid content (191.80 mg/100 g) could be useful in development of varieties with high nutritional quality. It is necessary to highlight the high ascorbic acid content of the genotypes which can be used as potential sources

for crop improvement and can be used as source of ascorbic acid for enriching human diets. The genotypes IC-215012 and IC-319335 can be recommended in breeding programs to produce high ascorbic acid content varieties. The genotypes with high chlorophyll content identified in this study, could be used to develop dark coloured varieties which are highly preferred by consumers.

The data obtained on capsaicin content from 35 chilli genotypes showed a diversified content of capsaicin among the genotypes. Similar genotypic difference in capsaicin content of different chilli cultivars has been reported earlier (Juliana *et al.*, 1997; Contreras-Padilla and Yahia, 1998; Mathur *et al.*, 2000; Gnayfeed *et al.*, 2001; Manju and Shreelathakumary, 2002; Antonious and Jarret, 2006; Sanatombi and Sharma, 2008; Bhagawati and Saikia, 2015).

The genotypes with high capsaicin content serve as potential sources in both the domestic and international markets and will be useful in development of highly pungent varieties. As capsaicinoids are of high importance in food and pharmaceutical industries, developing value added products from selected chilli cultivars with high pungency and high capsaicin content will prove useful in ensuring health security.

As people became health conscious, they are avoiding consumption of harmful chemical colours which cause health hazards, this highlighted the importance of natural colours. Chillies are an excellent source of natural color that could be used for edible and industrial applications (Zaki *et al.*, 2013). They have great value in market for its usage in textile and food industry. Oleoresin extracted from chilli permits better and uniform colour distribution. In this regard, genotypes with high capsanthin content identified in this study have great importance in food industry.

Compared to that of lighter shade coloured one, red colour chillies retain their colour under longterm storage (Krithika and Radhai Sri, 2014). Hence, the genotypes with high capsanthin content are useful for achieving the one of the important breeding objective, *i.e.*, improvement and retention of colour in dried chillies.

The genotypes with superior quality traits, *viz.*, IC-215012 for ascorbic acid (191.80 mg/100 g). EC-402113 ( 2.14% ) and EC-399535 ( 2-24% ) for chlorophyll content. IC-363993 for capsaicin (0.83%) and IC-561622 for capsanthin content (373.52 ASTA units) can be included in pedigree selection for further improvement. Better colour and capsaicin yielding varieties of chillies would help extraction industries and gives good returns to the farmers.

These genotypes could be exploited by pharmaceutical industries for manufacturing some remedies against cancer, diabetes, and cardiovascular illnesses. On the other hand, the consumption of fresh chilli whose fruits are rich in vitamin C is an ideal means of contributing to the problems of food insecurity and malnutrition.

## 5. Conclusion

The present study reports the ascorbic acid chlorophyll content, capsaicin and capsanthin contents of 35 chilli genotypes evaluated for two seasons and their pooled performance, which indicates the influence of genotype on the capsaicin content and pungency in chilli. The variability of ascorbic acid, chlorophyll content, capsaicin and capsanthin content presented in the chilli germplasm can be exploited for breeding cultivars with improved nutritional qualities. It is also very important to promote these chilli genotypes with high nutrient content, so that consumers do not get only quantity but also quality produce. Hence, the investigated genotypes can be regarded to be good sources of phytochemicals for future applications.

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## Conflicts of interest

The authors declare no conflicts of interest relevant to this article.

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