Journal of Applied Horticulture, 22(1): 45-48, 2020
DOI: 10.37855/jah.2020.v22i01.09
Journal of Applied Horticulture
ISSN: 0972-1045

# Performance of a new chilli variety, LCA-620 in farmer's field of Telangana State in India

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## Abstract

India is the leading country for growing chilli with highest area, production, consumption and also for export. Telangana State is the second largest producer in India. Due to high fluctuations in market price and high cost of cultivation coupled with lower yields are leading to frequent low profits and even loss to the farmer. Targeting high profits, a new chilli variety, LCA-620 was assessed in the farmer's field for three consecutive years from 2016-17 to 2018-19 in Karimnagar district of Telangana State, India. Higher yields were recorded in the variety as identified by longer fruit length and high dry weight of fruit as critical factors. With overall superior performance by recording 9.6 % of yield increase and 4.5 % of cost saving, 28.6 % of high net return was achieved in the new variety, LCA-620 over control (Teja) with high B:C ratio of 2.3 compared to control (1.96).

**Key words:** B:C ratio, *Capsicum annuum* L., cost saving, dry fruit weight, fruit length, Karimnagar, LCA-620, net profit, red hot chilli, spices, Telangana

## Introduction

Chilli, *Capsicum annuum* L. is an important spice crop having worldwide demand for its various uses. It is mainly used as a vegetable and spice all over the world with varied consumer preferences. Red hot chilli is one of the types of chillies having unique place in diet due to its high pungency, specific taste and flavour with attractive colour. Dry red hot chilli powder is used as spice in curry, pickles, sauce, soups *etc.* Capsaicin extracted from chillies is used as an important ingredient in pain killers, balms and other homeopathic medicine. High pungency and attractive colour are the two important factors determining quality in chilli. In Indian agriculture, chilli crop occupy an important place with a wide geographical distribution in various climatic regions *viz*., tropical, sub-tropical and temperate (Hazra *et al.*, 2011). India is the leading country in the world in growing chilli with highest production, consumption as well as the highest export. It was grown in an area of 774.9 thousand hectare with production of 13.76 million ton per year which contributes 39.19 % to total world area and 36.57 % to the world production (Geetha and Selvarani, 2017). The statistics clearly signify the importance of chilli crop in India. Improvement in yield and quality of chilli is very much needed to meet the consumption requirement of the country and also for foreign trade.

In India, Telangana is one of the important states for chilli cultivation having second position in area and production after Andhra Pradesh. In Telangana, it was grown in an area of 78900 ha with the production of 279.8 thousand ton by contributing to 10.18 % of area and 18.75 % of production of the country. However, the yield levels were lower (3.55 t/ha) than Andhra Pradesh (4.58 t/ha) (Geetha and Selvarani, 2017). As the market price is much influenced by worldwide production and demand levels, the price fluctuation is high as compared to other crops. Hot red chilli with high pungency is in high demand for export whereas local verities with low-medium pungency are preferred for local consumption. Normally, medium-long fruits with bright red colour are preferred by consumers. When there is more demand for export, the price will rise for both local varieties and hybrids. Whereas, at low export demand, the price fall drastically for both types however there is a considerable high price for local varieties as it is preferred by local consumer.

As the chilli cultivation requires high cost of cultivation, in the years of lower yields coupled with low price and export demand leads to decline in profits even causing loss. High seed cost for hybrid is one of the major cost components of chilli cultivation. Sometimes there is an encounter of spurious seed problem with $F_1$ hybrids resulting in complete loss of crop. In the present circumstances, a variety having medium-high pungency, long fruit size with good colour can attract foreign as well as local consumers and can bring down the cost of cultivation and fetch considerable high price as it is preferred for local consumption. Hence, there is an increasing demand for varieties of red hot chilli suitable for both export and local consumption. As per the need Horticulture Research Station (HRS), Lam, Guntur of Andhra Pradesh has developed a new variety, LCA-620 which is under mini-kit trial yet to be proved for its performance in the farmer's field. Field performance of any new variety is critical for its location specific adoption. As the weather conditions vary from the conditions where the variety was developed and local conditions vary for soil and other resources, location specific performance of LCA-620 should be evaluated.

By taking the opportunity of available mini-kit variety LCA-620, experiments were carried out at farmer's field in a large scale for three consecutive years starting from 2016-17 to assess cost-economics and identify yield attributing factors. Present

study was laid at farmer's field in a larger area to represent realistic conditions of soil, weather and other resources under management skills of farmers aiming to draw results under real farming conditions.

## Materials and methods

Seed of chilli variety LCA-620 was procured from Horticulture Research Station (HRS), Lam, Guntur of Andhra Pradesh whereas, Teja $F_1$ hybrid seed was purchased from local dealer. The variety, LCA-620 was evaluated in each plot of 0.4 ha against Teja $F_1$ as control. Experiments were carried out in sandy loam soils with check basin irrigation system. Both treatment and control plot was maintained by each farmer by replicating 25 times through 25 selected farmers by covering a total area of 10.0 ha. For every replication, plot was divided in such a manner that maximum homogeneity between treatment and control plot for the soil, nutrient and other conditions was maintained. All cultural practices such as fertilizer schedule, inter-cultivation, irrigation schedule, pest management, disease control and other practices were maintained equally for both treatment and control.

To maintain optimum population stand, buffer stock of nursery was maintained at Krishi Vigyan Kendra (KVK), Ramagirikhilla farm and supplied seedlings whenever needed. To overcome the wilt problem, *Tricoderma viridi* was applied by inoculating in 200 kg of compost. To reduce the variation in soil fertility status and nutrient availability, soil test based fertiliser application schedule was practiced. For pest and disease management, uniformity was maintained by applying same chemical with same dose by all the farmers within the specified schedule period. The fields which were not up to the mark of treatment norms or failed due to other unavoidable conditions were discarded from the final data analysis. Fields were regularly visited to observe and record the selected parameters for the variety under assessment as well as control.

Data on different yield attributing factors such as plant height, number of primary branches per plant, days taken for 50 % flowering, number of fruits per plant, fruit diameter, fruit length and dry weight of fruit were recorded time to time. In each plot, ten plants were selected randomly to record observations on plant height, number of primary branches and number of fruits per plant. Plant height and number of branches were recorded at peak flowering and fruiting stage. The number of fruits was recorded on selected plants just before harvestings of the crop. For recording days for 50 % flowering, overall field view was taken in to consideration. Hundred fruits from each plot were collected after drying just before packing to take observations on fruit diameter, fruit length and dry weight of fruit. The assessment was carried out for three consecutive years starting from 2016-17 to 2018-19.

Data on yield, cost of cultivation and market price for both assessed variety (LCA-620) and control (Teja) were collected from the selected farmers. Gross returns, net profit and benefit-cost ratio (B:C ratio) were worked out from the collected data. Overall performance for yield and cost-economics over three years was assessed using original values for individual data pertaining to each year.

**Data analysis:** Mean and standard error was calculated for each yield attributing parameter and compared with control by using F-test. Cumulative mean and standard error was calculated with original values for each parameter of cost-economics over three years.

## Results and discussion

**Yield:** The detailed account of different yield attributing factors analysed for the assessed variety, LCA-620 against control, Teja are given (Table 1). Among different yield attributing parameters the number of primary branches per plant, fruit length and dry weight of fruit were significantly higher for the variety, LCA-620 when compared to control (Teja). Number of primary branches per plant, fruit length and dry weight of fruit were recorded for LCA-620 as 4.3±0.28, 9.6±1.1 cm. and 1.12±0.05 g, respectively as against 3.6±0.22, 7.3±0.8 cm. and 0.78±0.03 g, respectively for control. And the number of fruits per plant was significantly lower for LCA-620 (206.7±14.1) compared to control (253.2±16.3). However, there was no significant difference for the parameters *viz*., plant height, days taken to 50 % flowering and fruit diameter. Even though the number of fruits per plant was 22.5 % lower, LCA-620 dominated in yield due to higher advantage gained through 43.6 % increase in fruit weight over control. With the advantage of these higher yield attributing factors, the assessed variety, LCA-620 exhibited higher per plant yield of 231.5±11.3 g as against 197.5±12.1 g yield of control.

The results of present study are in line with the findings of Janaki *et al.* (2015) who reported high fruit weight as the dominating yield attributing factor for variety, LCA-625. Obidiebube (2012) reported significant yield differences in chilli from one cultivar to another due to variation in number of fruits and dry weight. Variation for dry fruit weight among 50 lines was also reported by Hasan *et al.* (2014). However, a high number of branches and number of fruits per plant were found critical for higher yields of variety, LCA-625 (Rohini and Lekshman, 2017). Similarly, Nagaraju *et al.* (2018) reported fruit number per plant as the maximum contributing character for genetic divergence for yield.

**Cost-economics:** During the first year of assessment (2016-17), an amount of Rs.5500/ha was saved towards cost of cultivation with the assessed variety, LCA-620 over control. In addition to cost saving, 6.3 % of yield increase was recorded in LCA-620 with which it achieved higher net returns (Rs.100100/ha) compared to control (Rs.78350/ha). An additional benefit of Rs.21750/ha over control resulted in higher B:C ratio of 1.6 compared to control (1.4). Similarly, for the successive years *i.e.*, 2017-18 and

Table 1. Different yield attributing factors of red hot chilli variety, LCA-620 assessed against $F_1$ hybrid, Teja

| Variety | Plant height (cm) | Primary branches/plant | Days taken to 50 % flowering | Number of fruits/plant | Fruit diameter (cm) | Fruit length (cm) | Dry weight of fruit (g) | Yield/plant (g) |
|---|---|---|---|---|---|---|---|---|
| LCA-620 | 78.6±4.3 | 4.3±0.28 | 33.6±3.41 | 206.7±14.1 | 1.46±0.13 | 9.6±1.1 | 1.12±0.05 | 231.5±11.3 |
| Teja | 74.3±5.6 | 3.6±0.22 | 31.2±2.95 | 253.2±16.3 | 1.52±0.18 | 7.3±0.8 | 0.78±0.03 | 197.5±12.1 |
| F (*P*=0.05) | NS | Sig. | NS | Sig. | NS | Sig. | Sig. | Sig. |

Values are with Mean±SE, NS-Non significant, Sig.-Significant

Table 2. Performance of red hot chilli variety, LCA-620 against $F_1$ hybrid, Teja assessed for yield and cost-economics for three years from 2016-17 to 2018-19

| Year | Variety | Yield (kg/ha) | Increase in yield (%) | Price (Rs/kg) | Cost of cultivation (Rs/ha) | Cost saving (Rs/ha) | Gross returns (Rs/ha) | Net returns (Rs/ha) | Additional income (Rs/ha) | B:C ratio |
|---|---|---|---|---|---|---|---|---|---|---|
| 2018-19 | LCA-620 | 5900 | 11.3 | 110 | 199700 | 12800 | 649000 | 449300 | 78800 | 3.2 |
| | Teja | 5300 | - | 110 | 212500 | - | 583000 | 370500 | - | 2.7 |
| 2017-18 | LCA-620 | 5948 | 10.2 | 60 | 174900 | 7600 | 356880 | 181980 | 62248 | 2.0 |
| | Teja | 5397 | - | 56 | 182500 | - | 302232 | 119732 | - | 1.7 |
| 2016-17 | LCA-620 | 4200 | 6.3 | 65 | 172900 | 5500 | 273000 | 100100 | 21750 | 1.6 |
| | Teja | 3950 | - | 65 | 178400 | - | 256750 | 78350 | - | 1.4 |
| Mean | LCA-620 | 5349±110 | 9.57 | - | 182500±1779 | 8633 | 426293±19313 | 243793±18046 | 54266 | 2.30±0.09 |
| | Teja | 4882±84 | - | - | 191133±2628 | - | 380661±16975 | 189527±15415 | - | 1.96±0.07 |
| F(*P*=0.05) | - | NS | - | - | NS | - | Sig. | Sig. | - | Sig. |

Values are with Mean±SE, NS-Non significant, Sig.-Significant

2018-19 an amount of Rs.7600 and Rs.12800, respectively was saved towards cost of cultivation. Yield also increased in both the consecutive years by recording 10.2 and 11.3 per cent yield increase over control. As a result, higher net returns of Rs.100100, 181980 and 449300 per ha were obtained through cultivation of LCA-620 compared to control where it was Rs.78350, 119732 and 370500 for the year 2016-17, 2017-18 and 2018-19, respectively. Overall superior performance of the assessed variety, LCA-620 was reflected with an additional income of Rs.21750, 62248 and 78800 per hectare over control for the year 2016-17, 2017-18 and 2018-19, respectively. Dual advantage of cost saving and increase in yield made LCA-620 superior over control with a higher benefit cost ratio of 1.6, 2.0 and 3.2 compared to control of 1.4, 1.7 and 3.2 for the year 2016-17, 2017-18 and 2018-19, respectively (Table 2). Superior performance of variety, LCA-620 might be due to suitable environmental conditions (Rekha *et al.*, 2016) and a good bearing habit (Asati and Yadav, 2004).

Cumulative mean analyses for three years showed marginal increase in yield with considerable cost saving for LCA-620. Even though there was no significant difference shown for yield and cost of cultivation as individual components, there was a significant difference for gross and net returns due to combined effect. As a result, variety LCA-620 fetched high net returns of Rs.243793/ha over control. Overall superior performance over three years with 9.6 % of yield increase and cost saving of 4.5 % facilitated to achieve 28.6 % higher net returns for the assessed variety, LCA-620. Mean B:C ratio obtained was 2.30±0.09 compared to 1.96±0.07 of control (Fig. 1). Results of Srinivas *et al.* (2017) also recoreded superiority of LCA-625 over other three varieties tested in Southern Telangana. In close agreement with present findings, Naganirmala and Mallikarjuna (2019) reported variability of different cultivars for fruit yield ranged from 83.95 g to 295.1 g per plant and found maximum yield in LCA-625 (295.1 g/plant) followed by LCA-620 (249.93 g/plant).

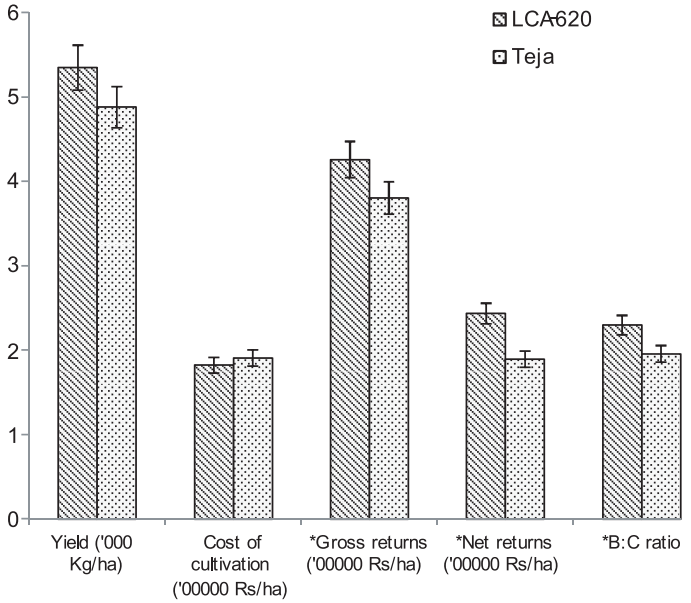


Fig 1. Yield and cost-economics of variety, LCA-620 against Teja

New chilli variety, LCA-620 was confirmed for location specific better performance over existing $F_1$ hybrid. It could be used as an alternative to the existing $F_1$ hybrids as it was proved on par for yields even superior for net profits with high B:C ratio.

## Acknowledgement

Financial help received from ICAR - ATARI, Zone X, Hyderabad Govt. of India is duly acknowledged.

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Received: September, 2019; Revised: November, 2019;
Accepted: December, 2019