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Assessment of growth and yield attributes of chilli variety Arka Khyati in Dima Hasao district of Assam

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Abstract
Chilli is an important spice crop of India, especially NE India, which contributes to the economic upliftment of the tribal farmers for its high value. The present study was carried in Dima Hasao district of Assam under Krishi Vigyan Kendra Dima Hasao during 2019-2021 to know about the performance of chilli variety Arka Khyati. Various growth and yield characters of the variety were studied in comparison with the local variety *Dungngangneh.* Arka Khyati exhibited higher plant height (77.86 cm), higher no.of branches per plant (9 nos.), lesser days taken for flowering (48.20), lesser days to 50% fruit ripening (105.81), higher fruit length (12.05 cm), higher fruit weight (6.45g) and higher green fruit yield (11.25 q ha^{-1}) than the local variety. Also, technology gap of 2.25q ha^{-1} and extension gap of 2.63q ha^{-1} was observed with a 21.80 percentage increase over farmers' practice indicating a positive response to yield attributes.

Keywords: Plant height, fruit weight, fruit ripening, technology gap

Introduction
Chilli is one of the major spices grown almost in every parts of the country. It belongs to the Solanaceous group with its origin in the Central America, most likely in Mexico (Salvador, 2002) [14]. India is the major producer, consumer, and exporter of chilli, participating in almost one fourth of the world production. Chilli contributes about 33% of the total spice export from India and holds for about a 16% share of the world spice trade. A total of 30 species comes under the genus 'Capsicum' out of which 05 (five) are well known *viz. C. annum, C. frutescens* L., *C. baccatum* L., *C.* pubescens and *C. chinense*. Chilli is a bushy plant which requires warm and humid climate for growth and development. It is used as culinary purpose or consumed either raw or cooked in Indian cuisines. It is also preferred as colorant. Preparation of pickles from Chillies is also very popular here. It has ample of potential from which many processing units and industries are making good amount of turnover every year. It is used in cosmetics (Bosland and Votava, 2003) [2] and medicines (Lahbib *et al.,* 2015) [7]. Chillies also carry antioxidant, antimicrobial, antiviral, anti-inflammatory and anticancer properties (Khan *et al.,* 2014) [5]. Moreover, a key component "Capsaicin" is present in Chilli which is responsible for its pungency (Parthasarathy *et al.,* 2008) [10] and thus makes it a noteworthy.

Dima Hasao is one of the 03 (three) hill districts of Assam. Here, the majority of the farmers belong to the tribal community and are do not follow any scientific cultivation practices and a very few of them use improved varieties and fertilizers in their farming practices. Some of the major vegetable growing areas are Harangajao, Diyungbra and Maibang. The district receives an annual rainfall of 1145 mm with an annual temperature range of 6.02°C to 14.7°C during winter and 14.31°C to 33.06°C during summer. Since, the crop is popular in the district but due to sufficient knowledge regarding improved varieties and management practices the productivity is facing a barrier to reach its maximum. Moreover, selection of a variety most suited for the locality is an immediate need of hour (Tembhurne *et al.,* 2008) [18]. Under such circumstances, a study has been conducted by Krishi Vigyan Kendra, Dima Hasao to evaluate the performance of a Chilli variety named Arka Khyati in some of the villages of the district following all the scientific standards.

Materials and Methods

The study on performance of chilli variety Arka Khyati was carried out at farmers's field in three locations of Dima Hasao district *viz.*, Haflong, Kalachand village and Retzawl village during 2019-20 and 2020-21. The technological interventions taken up in the study were as such: seed rate @ 600g ha^{-1}, spacing 45cm x 45cm, sowing time October, FYM @ 15t ha^{-1} and NPK @ 120:60:60 kg ha^{-1}. All the organic manures, half dose of urea, full dose of SSP and MOP were applied as a basal dose and incorporated in the soil 15 days before transplanting of seedlings. The remaining half dose of urea was applied at 30 days after transplanting as top-dress. In addition, trainings and awareness programmes were conducted for the farmers on scientific cultivation practices and disease management of chilli. The farmer's variety, *Dungngangneh*, which is a non-descript local variety cultivated through traditional practice was considered as local check. The observations for growth and yield parameters were made by using standard procedures and the recorded data of the two consecutive years were converted as an average for both the assessed variety and local check. The extension tools used in the study *viz.*, technology gap, extension gap and technology index were worked out using the formulae (Samui *et al*., 2000) [14] as below:

Technology Gap = Potential Yield – Demonstration Yield

Extension Gap = Demonstration Yield – Farmers' Yield

Technology index = {(Potential yield – Demonstration yield)/ Potential yield} x 100

The Increase (%) over farmer's practice is calculated with the formula given below:

Increase (%) over farmer's practice = {(Demonstration yield – Farmers' yield)/ Farmers' yield} x 100

Results and Discussion

Regarding the growth parameters, the results in Table 1 revealed that the plant height of 77.86 cm was observed in Arka Khyati which is higher than that of the local non descriptive cultivar (*Dungngangneh*) *i.e.* 53.68 cm. Arka Khyati exhibits higher no. of primary branches per plant (9 nos.) than local cultivar (6nos.) and this variation could be due to variation in plant height as well as photosynthetic ability of the each genotype. Similar results were found by Patil *et al.* (2002) [11] and Saravaiya *et al*. (2011) [15]. In case of days to 50 per cent flowering, Arka Khyati recorded the earlier days taken for flowering *i.e*. 48.20 days whereas the non-descriptive variety took 60.66 days to 50% flowering. This might be due to different genetic makeup of both the varieties (Rajamanickam, 2020) [12]. It is also observed that Arka Khyati took 105.81 days to 50% fruit ripening and the local check took 118.20 days to 50% fruit ripening. This variation might be due to the varietal make up of short vegetative phase incase of Arka Khyati which enhance its early flowering (Sha & Madhavan, 2016) [16]. The results are in accordance with the findings of Kumar et al. (2003) and Mishra *et al*. (2016) [9]. Similar type of trend was observed regarding the yield characters. In the study, it was revealed that Arka Khyati recorded higher no. of fruits per plant (68.60) than the local check (50.36). The fruit length of 12.05 cm and fruit weight of 6.45g were also found to be higher in Arka Khyati in comparison to the local cultivar with 6.78 cm fruit length and 4.82g fruit weight. Higher fruit weight might be attributed by higher fruit length and width. Similar results were found by Kavitha *et al.* (2018) [4] and Mantano & Cedeno (2002) [8]. Significantly, the higher green fruit yield recorded in Arka Khyati (11.25 q ha^{-1}) and lower green fruit yield recorded in the local cultivar (8.62 q ha^{-1}) might be due to higher individual fruit weight and yield potential governed by the genetic makeup. It might be also added by Chilli Mosaic Virus tolerance of Arka Khyati. This finding is in accordance with Bharadwaza *et al.* (2018) [1].

Table 1: Mean performance of Arka Khyati and Local cultivar in Dima Hasao

	Plant height (cm)	No.of primary branches	Days to 50% flowering	Days to 50% fruit ripening	No. of fruits per plant	Fruit length (cm)	Fruit weight (g)	Green fruit yield (q ha^{-1})
Arka Khyati	77.86	9	48.20	105.81	68.60	12.05	6.45	11.25
Local cultivar	53.68	6	60.66	118.20	50.36	6.78	4.82	8.62

The potential yield of Dima Hasao district is 13.50q ha^{-1}. Data presented in Table 2 depicted that there were technology gap of 2.25q ha^{-1} and extension gap of 2.63q ha^{-1} which might be due to varietal differences (Devi *et al.*, 2020) [3] and different cultivation practices. The technology gap may be attributed by high yielding variety, balanced fertilizer application, timely irrigation, timely weeding and proper plant protection measures. This result is in conformity with Singha *et al.* (2020) [17]. The percentage increase over farmers' practice was 21.80 % indicating a positive response to yield attributes.

Table 2: Yield gap and yield index analysis of the chilli var. Arka Khyati

	Average Yield (q ha^{-1})	Potential yield (q ha^{-1})	Increase (%) over farmer's practice	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
Arka Khyati	11.25	13.50	21.80	2.25	2.63	16.66
Local check	8.62	-	-	-	-	-

Conclusion

From the above observations, it can be thus concluded that Arka Khyati is suitable for Dima Hasao district of Assam for its high yield and return than the local variety *Dungngangneh* which can uplift the economic status of the tribal farmers.

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