**Assessment of Chilli Hybrids for Higher Productivity in Kallakurichi District of Tamil Nadu, India**

**Abstract**

Chilli is an annual or perennial herbaceous plant with branches. The lone blossoms have an off-white hue. Berries make up the fruit, which can be green, yellow, orange, or red depending on maturity. It is not merely a culinary delight but an integral part of our traditions with significant links to agriculture and day today life. An on-Farm Testing (OFT) on Assessment of Chilli hybrids for higher productivity in Kallakurichi District of Tamil Naduwas carried out in 15 farmer’s field at five locations during 2022-23 and 2023-24. Among the hybrids tested, the maximum fruit length (9.96cm), fruit girth (1.46cm), number of fruits per plant (244.62) and maximum number of fruits per kg (142.96) were observed in Chilli hybrid TNAU Co (CH) 1. Further highest green chilli yield (21.26t/ha) was obtained from Co(CH) 1 than Arka Tanvi (15.41t/ha). Farmers also realized that the highest net profit (2.733 lakhs) with highest B: C ratio (1:2.6) from the cultivation of Chilli hybrid Co (CH)1 than Arka Tanvi (1.76 lakhs and 1:1.62). Based on the result obtained in OFT, the chilli hybrid Co (CH) 1 further popularized through Front Line Demonstrations in 10 farmers field, training and other awareness programmes in Kallakurichi District of Tamil Nadu. Apart from yield attributes, Chilli hybrid Co (Ch)1 fetches good market preferencespreference. The same hybrid was promoted under FLD programmes for popularization of this hybrid among the farming community. Therefore, it is feasible to suggest that this hybrid for commercial cultivation in Kallakurichi District.

**Keywords**

Hybrid Chilli, Yield performance, pungency, farming community

**Introduction**

A number of factors make hybrid chilies useful in agriculture, including higher yields, resistance to disease, consistency, improved quality, adaptability, financial advantages, and efficient use of resources. In general, hybrid chilies contribute significantly to increased profitability, sustainability, and productivity in the field of chili cultivation (Prasad et al., 2019). Chilli is one of the important vegetables cum spice crop in India. India is the major global producer, consumer, and exporter of chilli. In this country, Andhra Pradesh is the leading producer of green chilli, followed by Telangana, Karnataka and Maharashtra, with significant production also in states like Tamil Nadu, Bihar and Madhya Pradesh.  Tamil Nadu ranks eighth in Chilli cultivation. Annual production of Green Chilli in India in 2021-22 was 42,20,720 MT. The top 10 producing states accounted for 94.58% of Green Chilli production in India in the fiscal year 2021-22. “It has acquired the status of World’s most popular vegetable crop due to its wider adaptability to various agro-climatic conditions” (Gupta *et al.,* 2015). Chilli is not merely a culinary delight but an integral part of our traditions with significant links to agriculture and day-to-day life. Tamil Nadu boasts a rich history of chilli farming, with districts like Dindigul, Madurai, and Krishnagiri taking centre stage.  Kallakurichi District, comes under North Eastern Agro Climatic Zone of Tamil Nadu. Agriculture is the most predominant sector of this district economy, 30% of the population engaged in agriculture and other allied activities for their livelihood. In this district, Chilli is being cultivated in an area of 543 ha with a production of 10095 quintals of green chilli in 2022-23. Renowned for its distinctive pungency, flavor, and vibrant color, chilli stands as an indispensable spice in global trade, ranking second only to black pepper (Piper nigrumL.). Within India, it plays a pivotal role in daily cuisine and finds extensive use in the preparation of various condiments such as pickles and chutneys. “The characteristic pungency of chilli is attributed to capsaicin, a volatile alkaloid found predominantly in the fruit's placenta and pericarp” (Mutyen et al., 2024). “Private hybrids are ruling in the market as well as among the farmers, though these hybrids show less pungency. But the cost of private hybrid seeds is so high, which accounts for a larger proportion of the farmers expenditure towards cost of cultivation” (Malathi *et al.,* 2023). Here, 70 percent of the farmer cultivate private hybrids, but these hybrids are low-yielding, also showing less pungency, exhibit more flower shedding and are susceptible to high pest and disease incidence. Hence, an OFT was formulated to assess the performance of public sector hybrids Arka Tanvi and TNAU Chilli Hybrid Co(CH)1 for higher yield in farmers' field of Kallakurichi District during 2022-23.

**Materials and Methods**

A field experiment was conducted as an on-farm trial in fifteen farmers' field of five different locations of Moongilpadi, Keezhkuppam, Siruvangur, Nainarpalayam and Eriyur villages of Chinnasalem and Kallakurichi blocks in Kallakurichi district during Kharif season of 2022 - 23 in chilli using hybrids Arka Tanvi and TNAU Chilli Hybrid Co(CH)1 with Private Hybrid (drought and powdery mildew tolerant hybrid with medium pungency fruits of more than 11 cm long and diameter of 0.9 to 1.3 cm) as a check hybrid. The mean performance of different traits such as plant height, fruit length (cm), fruit girth (cm), fruit weight (g), number of fruits per plant, fruit yield per hectare (tonnes), net returns per hectare and benefit cost ratio have been recorded and data was subjected to statistical analysis (Panse and Sukhatme, 1985).

**Results and Discussion**

The special features of Chilli hybrid TNAU Co(CH)1 plants are semi-tall, spreading and highly branched. Fruits are smooth, elongated, tapering towards the tip and 10.5 – 12.0 cm long. Unripe fruits are light green in colour. The capsaicin and oleoresin contents were 0.58 % and 14.0 % respectively. It yields about 6.74 t/ha of dry pod and 28.10 t/ha of green chilli in a crop duration of 195-205 days. Ascorbic acid is 120 mg/100 g fruit. It is moderately resistant to fruit rot disease. Duration: 195-205 days, Season :June – July, September – October and January – February, Yield – Green fruit : 28.10 t/ha and Dry fruits : 6.74 t/ha. Similarly the special features of Arka Tanvi, it is a high yielding chilli F1 hybrid suitable for green and dry chilli market, plants are tall and spreading, fruits pendent, firm, medium pungent, green and turn deep red on maturity, smooth turn wrinkled on maturity, tolerant to chilli leaf curl virus, yield potential 80-100q green and 30-35 q dry chilli per 0.4 ha.

**Growth parameter**

**Plant Height**

The maximum plant height (Table 1) was observed in the private hybrid (77.43 cm) followed by TNAU Chilli hybrid Co(CH)1 (71.29 cm) and the minimum plant height was noticed in Arka Tanvi (62.07 cm). The variation in plant height might be due to basic growth features of hybrids, inherent properties, hormonal factor and vigour of the crop. Similar results were also reported by Arain and Sial., 2022 and Sharath *et al.,*2023.

**Yield parameters**

**Fruit length and Fruit girth (cm)**

With respect to fruit length and fruit girth (Table 1 and Figure.1.), the maximum fruit length was observed in TNAU Chilli hybrid Co(CH)1 (9.96 cm) followed by Arka Tanvi (9.02 cm). The least fruit length was noticed in private hybrid (6.92 cm). Similarly, fruit girth of the chilli was maximum (1.46cm) in Arka Tanvi, which is on par with TNAU Chilli hybrid Co(CH)1 (1.42cm). The least was observed in private hybrid (1.3 cm). This might be due to favourable climatic conditions and the genetic makeup of the hybrid for wider adaptability. In addition to the inherent genetic makeup of the plant, the length of the fruit is closely correlated with the quantity of nutrients consumed and the plant’s vegetative state. This is in accordance with the findings of Byneni Keerthana *etal.,*2024 and Sharath *et al.,*2023

**Number of fruits per plant and number of fruits per kg**

Regarding yield characters, Chilli hybrid TNAU Co(CH)1 recorded the maximum number of fruits per plant (244.62) and number of fruits per kg (142.96) and it was followed by Arka Tanvi (209.91&162.78), whereas the private hybrid registered lowest number of fruits (169.98) and number of fruits per kg (176.69) (Table 1&2, Figure.1 & 2.).This might be due to higher fruit length and fruit girth. Similar results were reported by Kavitha *et al.* (2018); Rajamanickam (2020); Verma *et al*. (2020); Malathi *et al.* (2023) and Sathish *et al*.(2024).

Fig.1.Fruit characteristics of chilli hybrids

Fig.2. Number of fruits and green chilli yield of chilli hybrids

**Green Chilli Yield (t/ha)**

In the present study, it was revealed that, Chilli hybrid TNAU Co(CH)1 recorded the highest green chilli yield of 21.26 tonnes per ha and it was followed by Arka Tanvi (15.41t/ha) and the lowest yield was recorded in the private hybrid (14.52t/ha). This might be due to more number of fruits per plant observed in TNAU Chilli hybrid Co(CH)1. Further, the fluctuation in chilli yield is likely caused by the differences in the accumulation of photosynthates that are transported from the source (leaves) to sink (fruits). Also, fruit weight at maturity varies according to cultivars, time of harvest, soil fertility and cultural management. Awasthi *et al.* (2021) and Jeevitha *et al.* (2021) found similar findings.

**Economics**

The highest net returns (2.73lakhs/ha) and B:C ratio (2.6) were recorded in Chilli hybrid Co(CH)1 compared to Arka Tanvi (1.76 & 1.62) and Private hybrid (1.44 & 1.31) respectively. This might be due to the high yield potential and genetic makeup of the individual hybrid. This conforms with the findings of Malathi *et al.,*2023 and Sathish *et al.,*2024

**Conclusion**

It was concluded that the Chilli hybrid Co(Ch)1 recorded higher yield and net return than Arka Tanvi and Private hybrid in Kallakurichi District of Tamil Nadu, which in-turn helped the farmers to improve their economic status. Apart from yield attributes, Chilli hybrid Co (Ch)1 fetches good market preference. The same hybrid was promoted under FLD programmes for popularization of this hybrid among the farming community. Therefore, it is feasible to suggest that this hybrid be used for commercial cultivation in Kallakurichi District.

**Table 1.** **Vegetative and Yield performance of Chilli hybrids**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Particulars** | **Plant Height (cm)** | | | **Fruit length (cm)** | | | **Fruit girth (cm)** | | | **No.of fruits per plant** | | |
| CoCH1 | Arka Tanvi | Private Hybrid | CoCH1 | Arka Tanvi | Private Hybrid | CoCH1 | Arka Tanvi | Private Hybrid | CoCH1 | Arka Tanvi | Private Hybrid |
| Mean | 71.29 | 62.07 | 77.43 | 9.96 | 9.02 | 6.92 | 1.42 | 1.46 | 1.3 | 244.62 | 209.91 | 169.98 |
| S.EM | 2 | 1.08 | 1.73 | 0.43 | 0.35 | 0.24 | 0.11 | 0.11 | 0.1 | 2.22 | 3.99 | 2.46 |
| CD @ 5% | 5.8 | 3.13 | 5 | 1.25 | 1.01 | 0.68 | 0.31 | 0.32 | 0.28 | 6.42 | 11.56 | 7.13 |
| S.Ed | 2.83 | 1.53 | 2.44 | 0.61 | 0.49 | 0.33 | 0.15 | 0.16 | 0.14 | 3.13 | 5.64 | 3.48 |

**Table.2.** **Green Chilli yield and economics of Chilli hybrids**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Particulars** | **No.of fruits per Kg** | | | **Green Chilli yield (t/ha)** | | | **Net returns (Rs in Lakh/ha)** | | | **B:C ratio** | | |
| CoCH1 | Arka Tanvi | Private Hybrid | CoCH1 | Arka Tanvi | Private Hybrid | CoCH1 | Arka Tanvi | Private Hybrid | CoCH1 | Arka Tanvi | Private Hybrid |
| Mean | 142.96 | 162.78 | 176.69 | 21.26 | 15.41 | 14.52 | 2.73 | 1.76 | 1.44 | 2.6 | 1.63 | 1.31 |
| S.EM | 2.72 | 2.42 | 4.47 | 0.8 | 0.5 | 0.41 | 0.13 | 0.08 | 0.07 | 0.08 | 0.03 | 0.05 |
| CD @ 5% | 7.87 | 7.01 | 12.94 | 2.32 | 1.44 | 1.19 | 0.38 | 0.23 | 0.19 | 0.24 | 0.09 | 0.15 |
| S.Ed | 3.84 | 3.42 | 6.32 | 1.13 | 0.7 | 0.58 | 0.18 | 0.11 | 0.09 | 0.12 | 0.04 | 0.07 |

|  |  |
| --- | --- |
|  |  |
| **Chilli hybrid Co(Ch)1 at 3 MAP** | **Yielding stage** |
|  |  |
| **Harvested chilli** | |
|  |  |
| **Performance of Chilli hybrids** | |

**Figure 3: Yield performance of Chilli hybrids**

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