

International Journal of Agriculture Extension and Social Development

Volume 9; Issue 4; April 2026; Page No. 214-219

Received: 22-02-2026
Accepted: 25-03-2026

Indexed Journal
Peer Reviewed Journal

Enhancing turmeric productivity through KVK interventions in Chamarajanagar District

¹Mohan Kumar AB, ²Yogesh GS, ¹Pompanagouda B and ¹Rajath HP

¹ICAR Krishi Vigyan Kendra, Chamarajanagar, Karnataka, India

²Univeristy of Agricultural Sciences, Mandya, Karnataka, India

DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i4c.3474>

Corresponding Author: Rajath HP

Abstract

During last decade ICAR KVK Chamarajanagar has addressed low productivity (3.12 t/ha) of turmeric (>9750ha area) through technological interventions viz., OFT, FLD & seed production through PPP mode. OFT's (2012-14) suggests that IISR Pratibha is high yielding (>36 t fresh rhizome), good quality (high curing >20%, Curcumin >5%) and suitable to Chamarajanagar area. Front line demonstrations (2014-15 to 2023-24) results confirmed the consistent superiority of IISR Pratibha over Salem local and witnessed the distribution among the farmers. Large scale (2020-21) seed production was initiated through FPO's, total 10,87,581 kg's of IISR Pratibha seed rhizomes was produced and distributed by involving different agencies in last five years. This accounts to direct spread of IISR Pratibha to an area of >1359 - 1500 acres. Apart from it was estimated that IISR Pratibha was spread over >4500 ha area at farmer level indirectly by private seed distributors and growers, through sharing the seed materials to neighbouring farmers etc. IISR Pratibha is suitable for *doubling the farmers income* concept. The infusion of variety in to farmer's level is evident through improving productivity of turmeric in the district, the productivity has reached to 4.1 t/ha (2023-24).

Keywords: *Curcuma longa*, IISR Pratibha, front line demonstrations, fresh rhizome yield, curing percentage

Introduction

Turmeric is a major spice in India, valued for culinary and medicinal uses, and popularly known as haldi or Indian saffron. India is the largest producer, consumer, and exporter, contributing >70% of global trade and ~80% of world production (~11 lakh tonnes annually), followed by China (8%), Myanmar (4%), Nigeria (3%) and Bangladesh (3%). Major producing states include Maharashtra (3.30 lakh t), Telangana (1.14 lakh t), Tamil Nadu (1.04 lakh t), Karnataka (1.02 lakh t), Madhya Pradesh (0.91 lakh t), Odisha (0.74 lakh t) and West Bengal (0.53 lakh t) (Anon, 2023).

In Karnataka, Chamarajanagar district cultivates turmeric on >9,750 ha as a commercial crop (Anon, 2016). Productivity has been lower than national levels—3.12 t/ha in 2011-12, 3.40 t/ha in 2014-15, but improved to 4.1 t/ha by 2023-24 due to ICAR-KVK interventions. The main reasons for earlier low productivity were reliance on local cultivars (Salem, Kadapa, Erode, Chamarajanagar types) with poor yield potential (15–20 t/ha), low curing (16–18%), and low curcumin (2–2.5%). In addition, farmers lacked awareness of improved varieties and access to quality seed rhizomes (Vinay *et al.*, 2023) ^[18].

Table 1: Productivity of Turmeric crop

SL. No.	Year	Chamarajanagar district Productivity (t/ha)	National Productivity (mt/ha)	Karnataka state Productivity (t/ha)
1	2016-17	3.72	4.80	-
2	2017-18	3.60	5.00	-
3	2018-19	3.72	5.64	-
4	2020-21	3.90	5.65	-
5	2021-22	4.00	5.10	5.67
6	2022-23	3.70	-	6.10
7	2023-24	4.10	-	6.26

Source: Turmeric Outlook Report 2021 & ANGRAU Turmeric outlook-June-May 2023-24

Other areas of concern are; Farmers face constraints such as erratic rainfall (>40% deficit), poor irrigation water, shortage of organic manure

due to declining cattle population, increasing saline/alkaline soils, and lack of skilled labour. Faulty agricultural operations further affect quality (Biswajith Sahoo *et al.*,

2023)^[14].

To address these, ICAR–KVK Chamarajanagar has intervened since 2012–13 through participatory research and extension: on-farm trials (2 ha, 10), front line demonstrations (10 ha, 50), method demonstrations (54), trainings (72), and seed production via PPP mode. Emphasis was on promoting the high-yielding, good-quality variety IISR Pratibha (IISR, Calicut).

Materials and Methods

Ten on-farm testing (OFT) trials were conducted jointly by scientists and farmers during 2012–13 and 2013–14 at Byadmudlu and Dollipura villages, covering 2.0 ha to assess suitable turmeric varieties for Chamarajanagar district. Trials were laid out in RCBD during kharif season with observations recorded on yield and economics. Five treatments were evaluated: T₁- Chaithanya (Odisha, 260–280 days, yield ~30 t/ha, curcumin 3%, curing 18%), T₂- IISR Prabha (IISR Kozhikode, 230–240 days, yield ~35 t/ha, curcumin 5%, curing 21%), T₃- IISR Pratibha (IISR Kozhikode, 230–240 days, yield ~38 t/ha, curcumin >5%, curing 21–22%), T₄- IISR Alleppey Supreme (IISR Kozhikode, 230–240 days, yield ~38 t/ha, curcumin >5%, curing >22%), and T₅- Salem local (Chamarajanagar, 270–280 days, yield 15–20 t/ha, curcumin 2–3%, curing 16–18%).

From 2014–15 to 2024–25, KVK Chamarajanagar conducted 50 front line demonstrations on 10 ha to disseminate IISR Pratibha variety among farmers and seed producers. Demonstrations emphasized Integrated Crop Management practices including timely sowing, seed rhizome treatment with Mancozeb @ 2 g/litre, spacing of 45 cm × 30 cm, organic mulching at sowing and 45 DAS, integrated nutrient management with FYM @ 10 t/acre + 60:50:100 kg NPK/acre + foliar spray of Turmeric Special @ 5 g/litre at 60, 90, and 120 DAS, integrated pest and disease management practices, and harvesting at proper stage. Each participating farmer received quality seed rhizomes with intercultural operations conducted under supervision. Capacity building programs and exposure visits to advanced seed production blocks were organized to strengthen seed producers.

The details of Front line demonstrations conducted by KVK Chamarajanagar are as follows;

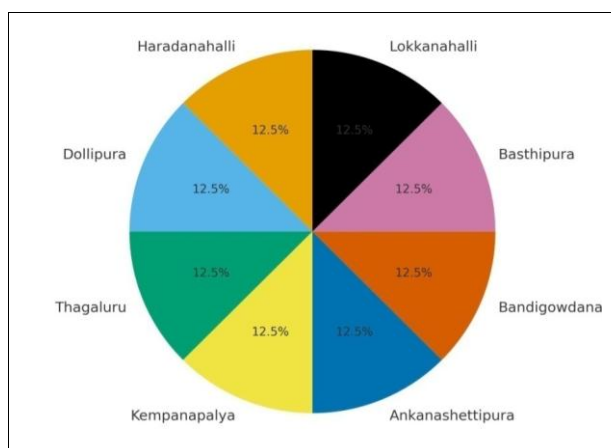


Fig 1: Distribution of demonstrations across villages (2014–15 to 2024–25)

Large-scale seed production of the improved turmeric variety *IISR Pratibha* was carried out from 2020–21 to 2024–25 with NABARD, Bengaluru support. The programme covered 150 acres and involved over 350 farmers across the district through different Farmer Producer Organizations (FPOs) and progressive growers.

Farmer participation included: Souharda FPO, Ankanashettipura (250 farmers), Kamadhenu Arishina Belegarara Sangha, Hardanahalli (20), HFPCL Udigala (20), HFPCL Gundlupet (40), HFPCL Kollegala (20), along with individual farmers such as Syed Nasir Ahmed and Abdul Nabil. Each farmer received 200 kg of quality *IISR Pratibha* seed rhizomes. Six monthly capacity-building programmes and fortnightly field visits were conducted for technical support.

Farmers were selected based on criteria: FPO membership, at least three years of turmeric experience, adoption of Good Agricultural Practices (GAP), maintenance of seed logbooks, and regular linkage with KVK.

Key GAPs (Anon., 2020) included green manuring 60 days before sowing, use of healthy rhizomes, Mancozeb seed treatment (2 g/L for 20 min), raised-bed planting at 45 × 30 cm spacing, irrigation at 10-day intervals, and weeding at 25, 45, and 90 DAS. Nutrient management consisted of 25 t/ha FYM and 150:100:250 kg NPK/ha with potassium top-dressed at 45 DAS. “Turmeric Special” was applied at 60, 90, 120, and 150 DAS. IPDM was followed, with genetic purity ensured by rouging and avoiding admixtures. Harvesting was done only after full maturity.

This effort enabled large-scale production and district-wide distribution of quality *IISR Pratibha* seed rhizomes.

Results and Discussion

The superiority of the improved variety *IISR Pratibha* is conformed with the OFT’s in both the season. The results clearly shows that among the different varieties *IISR Pratibha* excelled with Fresh rhizome yield in both the season (37.48 t/ha; 31.61 t/ha and 34.54 t/ha at 1st, 2nd season and pooled data respectively) followed by *IISR Alleppy supreme*. A similar result was reported by Sasikumar. B., (2005)^[16], highlighted the high yield potential of *IISR Pratibha*. Least fresh rhizome yield was recorded with Salem local (21.65 t/ha; 23.46 t/ha and 22.55 t/ha at 1st, 2nd season and pooled data respectively). Overall 53.17% higher fresh rhizome yield was observed from *IISR Pratibha* compare to check Salem local variety (Table 2).

Curing percentage is higher in Alleppy supreme (22.32%) (Table 2) followed by *IISR Pratibha* (20.42%). Very low curing was observed with Chaithanya (16.90%) and salem local (17.31%). The cured rhizome yield is high in Alleppy supreme (7.23t/ha) followed by *IISR Pratibha* (7.04t/ha). Least was observed with Chaithanya (3.84t/ha and salem local (3.97t/ha). Apart from high yielding *IISR Pratibha* is 41 days earlier than local cultivar Salem with 53.17% higher yield potential, which is evident in both the season.

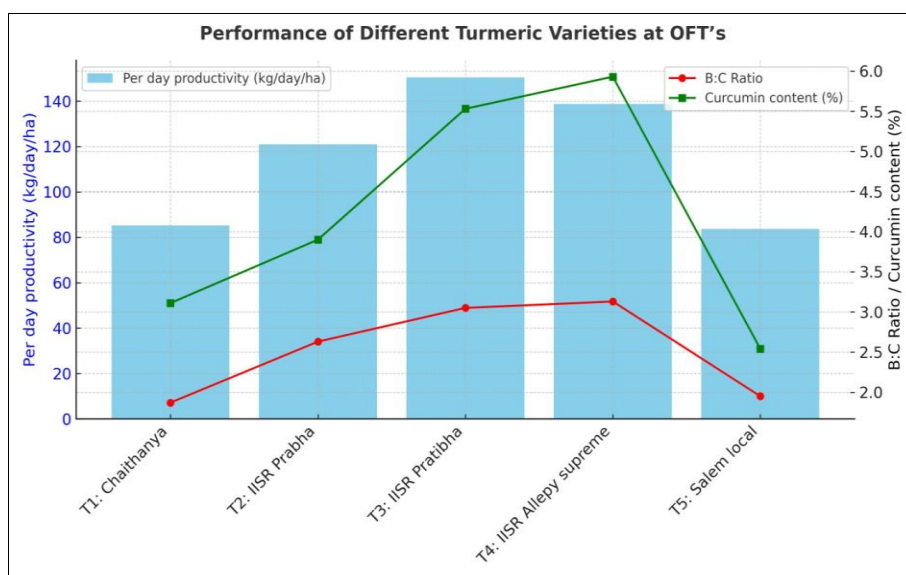
The results are in accordance with Kumar *et al* (2017)^[11] for superiority and wider adoptability of *IISR Pratibha* in Chamarajanagar district. Vinay *et al* (2023)^[18] confirmed the suitability of *IISR Pratibha* for southern dryzone-6 Mysore region through introduction to farmers.

Table 2: Fresh rhizome yield, curing yield parameters of different turmeric varieties

Genotypes	Fresh rhizome yield (t/ha)			Curing percentage			Cured rhizome yield (t/ha)		
	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled
T ₁ : Chaithanya	21.97	23.19	22.58	16.98	16.84	16.90	3.78	3.90	3.84
T ₂ : IISR Prabha	31.43	29.01	30.21	20.12	19.86	19.99	6.32	5.79	6.05
T ₃ : IISR Pratibha	37.48	31.61	34.54	20.26	20.59	20.42	7.57	6.51	7.04
T ₄ : IISR Allepy supreme	34.78	30.10	32.44	22.15	22.45	22.32	7.70	6.75	7.23
T ₅ : Salem local	21.65	23.46	22.55	17.16	17.46	17.31	3.85	4.10	3.97
CV	3.38	2.16	2.90	2.66	2.80	2.68	5.82	3.69	4.85
SEM+/-	0.49	0.30	0.19	0.26	0.27	0.12	0.17	0.10	0.06
CD @ 0.05	1.51*	0.92*	0.56*	0.80*	0.84*	0.35*	0.52*	0.31*	0.18*

Table 3 clearly shows the high quality characters of IISR Pratibha, as it is medium duration (230.06 days) variety approximately 41 days earlier compared to Salem local (271.81 days). Earliness is always appreciated as it reduces the crop growth period and production cost indirectly. With respect to Curcumin, IISR Allepy supreme had high curcumin content (5.93%) consistently (5.70% and 6.16% in

2012-13 & 2013-14 respectively), followed by IISR Pratibha (5.26% and 5.81% in 2012-13 & 2013-14 respectively). these findings are in line with the findings of Sasikumar. B., 2005 ^[16]. Salem local had recorded least Curcumin content (2.54%) in both the season (2.85% and 2.23% in 2012-13 & 2013-14 respectively).

**Fig 2:** Duration and other parameters of different turmeric varieties at OFT's

Highest Per day productivity of 150.41 kg/day/ha was evident with IISR Pratibha, followed by IISR Allepy supreme (138.69 kg/day/ha), least was recorded with Salem local (83.65 kg/day/ha). The highest cost benefit ratio was recorded with IISR Allepy supreme (3.13), followed by IISR Pratibha (3.05) and least was with Chaithanya variety (1.87) (Figure 2). The results are encouraging; the varieties like IISR Pratibha and IISR Allepy supreme are suitable for *doubling the farmers income* concept.

Even though IISR Allepy supreme is having highest curing percentage and Curcumin content the adoptability of IISR Pratibha is far superior compared to Allepy supreme. IISR Pratibha is quite hardy and having wider adoptability, very good performance at different growing conditions and having higher fresh rhizome yield. With these observations, farmers accepted IISR Pratibha over other varieties for front line demonstrations and large scale seed production.

The results of OFT are in accordance with the findings of (Sasikumar. B., 2005) ^[16]; Kadam *et al* (2023) ^[9] in Konkan condition of Maharashtra. Vinay *et al* (2023) ^[18] at Mysore district of Karnataka. Both the researchers found high yield,

high net income, high B:C ratio of IISR Pratibha compared to low yield and low B: C ratio of Salem variety confirmed by Chandu *et al* (2024) ^[6], Dinkar *et al* (2012) ^[8].

Front Line Demonstrations

Front line and large-scale demonstrations of IISR Pratibha were conducted in Chamaraanagar district from 2014-15 to 2024-25 to disseminate the variety and promote seed production under PPP mode. Integrated crop management practices were also included. Results (Table 4a) highlight the wider adoptability and superiority of IISR Pratibha over Salem local.

In 2014-15, IISR Pratibha recorded 22.13% higher rhizome yield, with 21.5% curing, 5.21% curcumin, and was 44 days earlier. Similar results were seen in subsequent years: 30.38% higher yield in 2016-17, >30% higher yield during 2017-18 & 2018-19, with consistent curing (~20%) and superior per day productivity (137–150 kg/ha/day vs 90–102 kg/ha/day in Salem local). Comparable trends continued up to 2024-25.

Curing percentage of IISR Pratibha remained consistently

higher (20–21.5%) than Salem local (Table 4b). With >25% higher yield, good curing, and higher curcumin, IISR Pratibha is a potential game changer for the turmeric industry in Chamarajanagar. Companies like Synthate, Arishina Life Sciences, CCGD, Guvaiddan, Tata, and Plant Lipids are already procuring it for curcumin extraction.

Notably, Synthate and Arishina Life Sciences initiated contract farming in 1200 acres and 350 acres respectively during 2021-22 at Gundlupet. These efforts through OFTs, demonstrations, and technology dissemination by KVK have transformed crop dynamics, benefitting both farmers and industry.

Table 3: Superiority of IISR Pratibha over Salem local at Chamarajanagar in Front line Demonstrations.

Observations	2014-15		2015-16		2016-17		2017-18		2018-19	
	IISR Pratibha	Salem local	IISR Pratibha	Salem local	IISR Pratibha	Salem local	IISR Pratibha	Salem local	IISR Pratibha	Salem local
Plant height (cm) at final stage of the crop	126.75	115.37	133.25	115.32	131.18	108.45	118.25	112.50	121.80	115.15
Number of clumps per plant	6.2	6.12	6.8	6.10	6.5	5.65	6.50	5.81	6.15	5.10
Fresh rhizome yield (t/ha)	34.87	28.85	33.21	26.12	35.28	24.15	33.25	24.75	35.72	26.80
Percentage increase in yield over local cv.	22.13	-	27.28	-	30.38	-	34.34	-	33.28	-
Duration (Days)	237.00	283.00	230.00	264.00	235.00	268.00	242.00	265.00	245.00	270.00
Number of days shorter than the local cv.	44.00	-	38.00	-	29.00	-	23.00	-	25.00	-
Curing (%)	21.50	18.50	20.85	17.70	21.00	18.65	20.00	18.50	20.00	17.50
Cured rhizome yield (t/ha)	7.49	5.33	6.92	4.58	7.40	4.50	6.86	4.57	7.14	4.69
Cost of cultivation (Rs./ha)	1,38,250	1,58,500	1,36,750	1,75,700	1,42,500	1,20,500	1,45,000	1,35,000	1,42,500	1,33,750
Gross income (Rs./ha)	3,74,500	2,66,500	3,46,000	2,29,000	3,70,000	2,25,000	4,11,600	2,74,200	4,28,400	2,81,400
Net income (Rs./ha)	2,36,250	1,08,000	2,09,250	99,083	2,27,500	1,04,500	2,66,600	1,39,200	2,85,900	1,47,650
B:C ratio	3.45	2.46	3.19	1.55	3.41	2.07	2.82	2.03	3.00	2.10
Per day productivity (kg/day/ha)	147.13	101.94	144.39	98.79	150.12	90.11	137.39	94.46	145.79	99.25
Curcumin content (%)	5.21	2.52	5.31	2.35	5.12	2.15	-	-	-	-

As IISR Pratibha records higher yield and higher curing, it directly reflects on the B:C ratio, IISR Pratibha had highest B:C ratio in all the demonstrations consistently. During 2014-15 B:C was 3.45, 2015-16 is 3.19 and in 2016-17; 2017-18 & 2018-19 consistently 3.41; 2.82 and 3.00 B:C ratio was recorded. This trend continuous in 2019-20

onwards also. Salem local has shown lower B:C compared to IISR Pratibha in the demonstration consistently. This clearly shows the economic importance of IISR Pratibha over Salem local, just by replacing a variety farmer is benefitted with higher yield, good curing, higher per day productivity with higher B:C ratio.

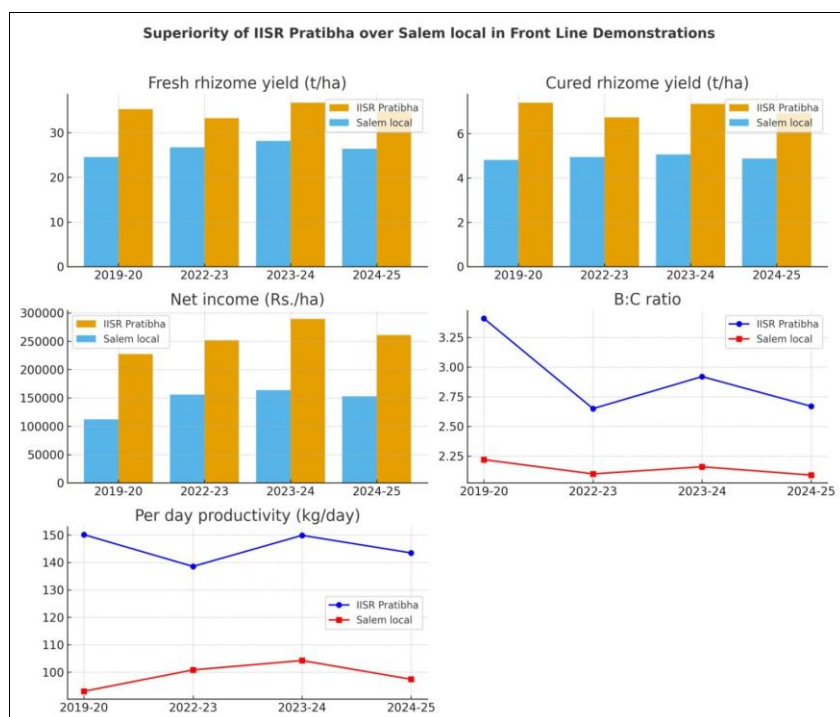


Fig 3: Superiority of IISR Pratibha over Salem local at Chamarajanagar in Front line Demonstrations

Similar demonstrations were conducted and reported by Kamal Kant *et al* (2020) ^[10] Bhagalpur District of Bihar and Abhimanyu Chaturvedi *et al* (2024) ^[7] in Tirap District of

Arunachal Pradesh, found that higher net income and B:C ratio over farmer practice (Meena *et al.*, 2021) ^[12].

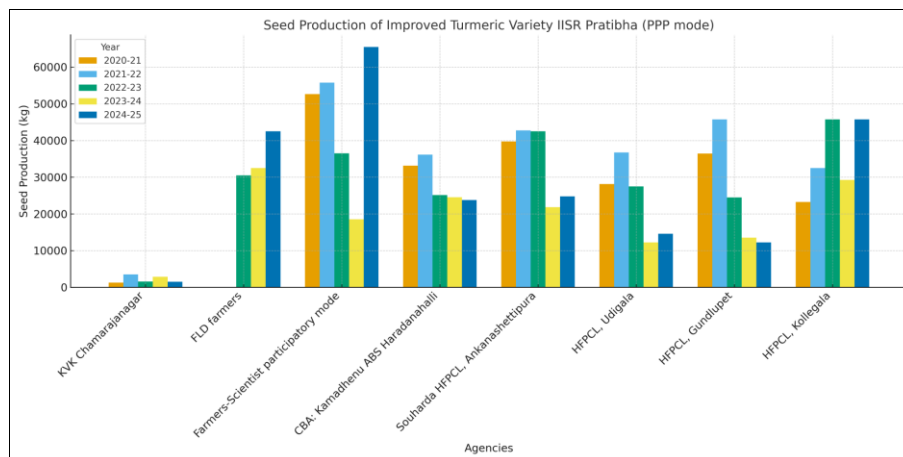
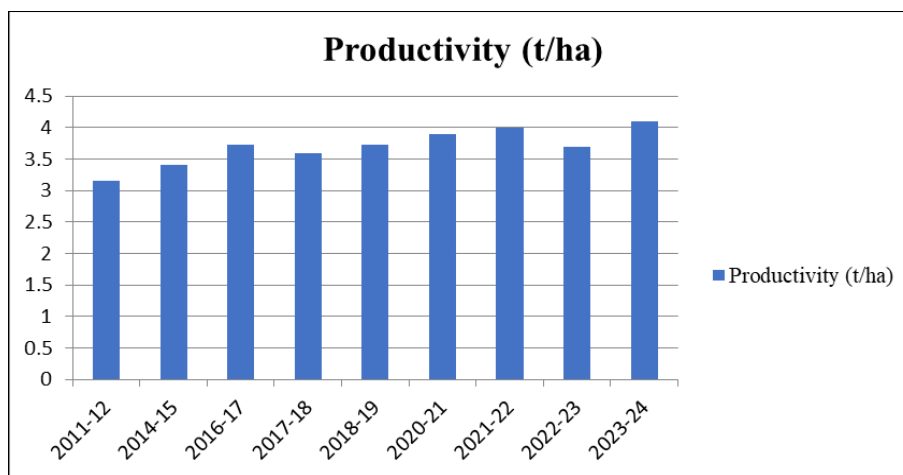


Fig 4: Seed production of improved turmeric variety IISR Pratibha (PPP mode) at Chamarajanagar district

By looking in to the adoptability of the IISR Pratibha and suitability of the technology, large scale seed production activities are initiated in PPP mode by involving turmeric growers of FPO's at Chamarajanagar district. The figure 4 has clearly shows volume of quality seed rhizome produced and disseminated to other farmers over a period of 05 years. Overall during 2020-2025 total 10,87,581 kg's of IISR Pratibha seed rhizomes was produced and distributed at Chamarajanagar district by involving FPO's and different agencies. This accounts to direct spread of IISR Pratibha to an area of 1359 acres to 1500 acres. This activity not only helps to disseminate the Pratibha variety through the district also promotes Good agriculture practice to farmers

level. Apart from direct spread it was estimated that IISR Pratibha turmeric variety is spread to > 4500 ha area at farmer level by private seed distributors and growers sharing the seed materials to neighbouring farmers etc. Similar spread of demonstrated variety in Pulse crops was recorded by Uma sha *et al.*, 2021 ^[17] in Bundhelkhand of Uttar Pradesh.

The infusion of a variety in to farmer's level is evident through improving productivity of turmeric crop in the district. During 2011-12 the productivity was 3.12 t/ha, 2014-15 it is 3.40t/ha. gradual improvement in the productivity is visible and now it has reached to 4.10 t/ha during 2023-24 (Figure 5).



Source: Annual report, Department of Horticulture. ZP, 2024

Fig 5: Change in productivity of Turmeric crop in Chamarajanagar district

Gradual improvement in the productivity of Turmeric is reported several times in the Annual report of Department of Horticulture, ZP, Chamarajanagar in recent past (Anon, 2024). Acknowledged the huge demand for the quality seed rhizomes of IISR Pratibha from the farmer side. Similar productivity enhancement of Blackgram through ICM practices in farmers field is evident from the studies of Saravana kumar *et al.*, 2021.

The scenario clearly denotes that there is a huge demand for seed rhizomes of IISR Pratibha, it is one of the popular turmeric variety majority of the farmers are cultivating next to Salem local. May it will replace the dominance of Salem local in coming years. The advantage of higher yield, high quality with earliness of the IISR Pratibha needs to benefitted to farmer, because price fluctuation, increased cost of cultivation, low yield and long duration of the

existing variety needs to be addressed.

Conclusion

From the present study, it can be concluded that Turmeric productivity is enhanced through KVK interventions viz., OFT, FLD, Method demonstrations, Capacity building programmes and Large scale Seed rhizome production at PPP mode in Chamarajanagar district.

IISR Pratibha is suitable for *doubling the farmers income* concept, indirect benefits clearly shows that additional 10 q of cured rhizomes per acre worth of 0.5-0.6 lakh rupees, considering the larger area of >4500 ha, it is estimated that an additional 60-70 crore additional income generated to the farmers of the district in a season. *Availability of the quality seed rhizomes of IISR Pratibha locally; Improvement in Turmeric productivity; Enhancing the farmers income through additional yield are other advantages.* "It is the beginning of precision farming through seed production, inturn it will help to enhance the productivity".

Authors' Contribution

Conceptualization of research (Mohankumar A. B.); Designing of experiments (Mohankumar A. B., Yogesh G. S.); Contribution of experimental materials (Mohankumar A. B., Yogesh G. S.); Execution of field/lab experiments and data collection (Mohankumar A. B., Yogesh G. S.); Analysis and interpretation of data (Rajath H. P.); Preparation of manuscript (Rajath H. P.).

Declaration

The authors declare that they have no conflict of interest.

Acknowledgment

The authors did not receive any financial assistance or external support for this study.

References

1. Anonymous. Annual report of Department of Horticulture, ZP, Chamarajanagar; 2016.
2. Anonymous. Package of practice of horticulture crops. UHS, Bagalkote; 2020:173-175.
3. Anonymous. Turmeric outlook report 2021; 2021.
4. Anonymous. ANGRAU turmeric outlook report June-May 2023-24; 2023.
5. Anonymous. Annual report of Department of Horticulture, ZP, Chamarajanagar; 2024.
6. Chandu GS, Srinivas P, Neeraja Prabhakar B, Sathish G. Evaluation of yield, dry recovery percentage and curcumin content of different turmeric (*Curcuma longa* L.) varieties suitable to Telangana state. *International Journal of Advanced Biochemistry Research*. 2024;8(9):1099-1102.
7. Chaturvedi A, Chandramani Singh B, Gerik Bagra. Yield gap analysis and impact of demonstration on turmeric in Tirap district of Arunachal Pradesh, India. *European Journal of Medicinal Plants*. 2024;35(6):150-155.
8. Dinkar M, Singh J, Chaurasia PC. Evaluation of turmeric (*Curcuma longa* L.) genotypes for yield and quality attributing traits under agro-climatic conditions of Chhattisgarh plains. *Journal of Plant Development Sciences*. 2012;4(4):639-644.
9. Kadam JH, Khapare LS, Jadhav RM, Shirke GD. Evaluation of turmeric cultivars for curcumin under Konkan condition, Maharashtra, India. *Indian Journal of Ecology*. 2023;50(5):1440-1442.
10. Kamal Kant, Ghanshyam SK, Gupta SK, Pathak AB, Patel Sanoj Kumar, Amit Kumar R, *et al.* Effect of varietal replacement demonstration on the yield and economics of turmeric (*Curcuma longa*) cv. Rajendra Sonia in Bhagalpur district of Bihar, India. *International Journal of Current Microbiology and Applied Sciences*. 2020;9(2):1842-1848.
11. Kumar MAB, Yogesh GS, Navi SS, Naresh NT, Chandrakala Hanagi. Varietal performance of turmeric (*Curcuma longa* L.) in Chamarajanagar district of Karnataka. *Journal of Krishi Vigyan*. 2017;6(1):217-220.
12. Meena ML, Pushpa Singh, Kundlu MS. FLD turmeric (*Rajendra soniya*) in Muzaffarpur, Bihar: Adoption, horizontal spread and satisfaction level. *Indian Journal of Extension Education*. 2021;57(4):1-7.
13. Reshma HM, Vishwanath YC. J. Pharmacognosy and Phytochemistry. 2020;9(4):1198-1203.
14. Sahoo B, Dhakre DS, Saha A, Sahoo SL. Perceived constraints of organic turmeric farmers in Kandhamal district of Odisha. *Indian Journal of Extension Education*. 2023;59(1):107-111.
15. Sarvanakumar S, Alagesan P, Premalatha A, Srinivasan RD, Thirumoorthi M. Productivity enhancement in blackgram (*Vigna mungo* L.) through improved crop management practices on farmers field. *Indian Journal of Extension Education*. 2021;57(4):1-6.
16. Sasikumar B, Johnson George K, Saji KV, John Zachariah T. Two new high yielding high curcumin turmeric (*Curcuma longa* L.) varieties IISR Kedaram and IISR Alleppey Supreme. *Journal of Spices and Aromatic Crops*. 2004;14(1):71-74.
17. Uma Sha, Dixit GP, Hemant Kumar, Jitendra Ojha, Mohith Katiyar, Vikrant Singh, *et al.* Dynamics of pulse scenario in Bundelkhand region of Uttar Pradesh: A temporal analysis. *Indian Journal of Extension Education*. 2021;57(4):1-8.
18. Vinay GM, Divya HV, Prasad YP, Rajanna JG. Introduction of turmeric (*Curcuma longa*) high yielding cultivar IISR Pratibha in Mysore district of Karnataka, India. *Pharma Innovation Journal*. 2023;12(7):1413-1416.