The Pharma Innovation Journal 2023; 12(5): 1395-1398

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(5): 1395-1398

www.thepharmajournal.com
Received: 02-03-2023
Accepted: 13-04-2023

Sunil A Kulkarni
Professor, Department of Plant Pathology, Campus Head, University of Agricultural Sciences, Raichur, Agricultural Research Station, Bidar, Karnataka, India

Shobharani M
Assistant Professor, Department of Agricultural and Entomology, Farm Superintendent, University of Agricultural Sciences, Raichur, Agricultural Research Station, Bidar, Karnataka, India

Sidramappa
Assistant Professor, Department of Plant Breeding, University of Agricultural Sciences, Raichur, Agricultural Research Station, Bidar, Karnataka, India

Baswaraj Biradar
Technical Officer, Gramin Krishi Mausam Seva, Project, University of Agricultural Sciences, Raichur, Agricultural Research Station, Bidar, Karnataka, India

Corresponding Author:
Sunil A Kulkarni
Professor, Department of Plant Pathology, Campus Head, University of Agricultural Sciences, Raichur, Agricultural Research Station, Bidar, Karnataka, India

Unleashing the hidden production potential of ginger (*Zingiber officinale* R.) through frontline demonstration in north eastern transitional zone of Kalyan Karnataka, India

Sunil A Kulkarni, Shobharani M, Sidramappa and Baswaraj Biradar

Abstract
Ginger is one of the Important Spice crop of Karnataka grown particularly during kharif, occupying about an area of 32,190 ha with the production and productivity of 2,97,315 Mt and 9.24 t ha^{-1} respectively. Bidar district alone contributes 7.5 percent of the total area. The productivity of ginger is low because lack of adoption of available newer technologies by the farmers. The concept of Frontline demonstration has been evolved by Indian Council of Agricultural Research, with the inception of the technology mission on Agriculture Crops. The frontline demonstration was conducted by the Krishi Vigyan Kendra, Bidar on ginger with deployment of improved package of practices at farmers fields successfully for two consecutive years. Results obtained clearly revealed that the variation in the percent increase in the yield was found due to fluctuations in the agroclimatic parameters. Other parameters involves technology gap, extension gap and technology index, were also analysed for the assessment of technology adoption rate, with extension activities and feasibility of demonstrated technologies at ground levels. Moreover the results clearly highlights the indications of positive impact of FLDs over the existing practices enhancing the productivity of ginger in the irrigated regions of Bidar district. Demonstrated technologies were proved most remunerative and economically feasible as against the traditional production systems. The average of two years pooled data from 2015 to 2017 reveals that demonstrated yield 19.5 t ha^{-1} and check plot yield 12.5 t ha^{-1} during the implementation period. Higher average ginger yield in demonstration plots over the years compare to local check; it's mainly due to their knowledge and acceptance of full package of practices.

Keywords: Extension gap, ginger, technology gap, technology index

Introduction
India is rightly called as "Spice bowl of the World" for its production of variety and superior quality spices. India is a major producer of ginger accounting for about 33 percent of the global share followed by China and Nepal. There are records about its various properties in Vedas as early as 6000 B.C. The spices are grown throughout the country from tropical to temperate climate. India has highest number of spice varieties in the world. Ginger is a popular spice originating from the rhizomes of the plant *Zingiber officinale*. Ginger has been used for centuries to treat a variety of maladies, related to health ailments and also used as a source of food supplements.

In India, the total area under ginger is 1,32,000 ha with the production and productivity of 6,55,000Mt and 4.49 Mt respectively.(National Horticulture Board,2014)[5]. In Karnataka, during 2015-16, the area under ginger was 32,190ha with the production and productivity of 2,97,315 Mt and 9.24 M t ha^{-1} respectively. In specific with reference to Bidar district, the area under ginger is 2,445 ha with the production and productivity of 33,772 Mt and 13.8Mt/ha respectively. (Horticulture Crop Statistics 2015-16).There lies better prospects concerned to ginger in Bidar, the area has increased substantially but not the expected yield levels. This mainly attributes to the biotic and abiotic factors, together accounts for major decline in the yield. Though the production potential of ginger is 25 t $ha^{-1.}$ Though many technologies have been developed for increasing ginger yield, farmers have hardly adopted a few of them and those in an unscientific way. Among the two factors, the abiotic factors, the other factor the biotic factor, is mainly responsible for causing a major nuisance to the crop in various growth stages. The biotic factor involves several pathogens, which causes leaf spot in ginger, but amongst all, the major one is the (*Phyllostictazingiberi* R.).

Sood and Dohroo (2005) [7] recorded 48.3 percent loss in mother rhizome and 65.9 percent in yield of fresh rhizomes when the severity of the *P. zingiberi* was 58.3 percent. The decline in yield mainly because of lack of adoption of Integrated Crop Management practices by the farmers in ginger ecosystem.

So In this Context, Frontline demonstrations (FLDs) were carried out during 2015-16 and 2016-17 at Krishi Vigyan Kendra Bidar, to identify the technological and Extension gaps, factors that are responsible for decline in the yield of Ginger, adoption levels of ICM practices, over farmers practice.

Materials and Methods

Frontline demonstrations were carried out in the farmers field to demonstrate the impactness of integrated crop management technology on ginger productivity over two years during *kharif* 2015-16 and 2016-17.Total 15 FLDs were conducted at 9 farmers field.The area under each demonstration was laid out at 0.6 ha and adjacent 0.6ha (farmers field).The selection of farmers was made in consultation with the local AAOs and Scientists of KVK of Bidar district, Karnataka. Procedure for site and farmers selection, lay out of demonstration and farmers participation etc were followed as per the methodology adopted by Choudhury (1999) [3]. The ICM technology consisted of the Improved varieties (Varada, Rio-de-genero, Suprabha), Proper land preparation, Seed rate, Sowing methods, selection of healthy seed material, Seed soaking with metalaxyl-MZ at the rate of 0.6 percent for half an hour. Application of neem cake (2.5q ha^{-1}) along with *Trichoderma* (2.5 kg ha^{-1})proper nutrient and pest management (Table 1).The Frontline demonstration was conducted to study the technology gap between the potential yield and demonstrated yield, Extension gap between demonstrated yield and yield under existing practice and technology index. Yield data was collected from demonstration fields and farmers practice by random crop cutting methods and analysed by using simple statistical tools. The technology gap, extension gap and technological index (Samui *et al*., 2000) [6] were calculated by using the formula as given below.

Table 1: The criteria's taken for improved practices over farmers practices for Ginger under frontline demonstration

Sl. No	Technology	Improved practices	Farmers practice	Gap (%)
1.	Varieties	Varada, Rio-de-genero, suprabha, suruchi	local	100
2.	Land preparation	Ploughing & harrowing	local	Nil
3.	Seed rate	15 q ha^{-1} rhizomes	20qha^{-1} rhizomes	High seed rate
4.	Sowing method	Planting done on raised bed	Planting is done on ridges & furrows	No gap
5.	Seed soaking treatment	Rhizomes dipped in 6 gm metalaxyl MZ 72 WP solution for 30 min followed by application of neem biofertiliser along with 1 kg *Trichoderma* for 1 hectare	Nil	Full gap
6.	Fertilizer dose	100:50:50 NPK kg ha^{-1}Neem: 2.5 q/ha	100:25:25 NPK kg ha^{-1}1.5 q ha^{-1}	Partial gap
7.	Plant protection	Integrated Pest & disease management practices	Indiscriminate Use of pesticides	Full gap
8.	Grading the produce	Grading followed	Not fully adopted	Partial gap

$$\text{Per cent Increase in yield} = \frac{\text{Demonstration Yield-Farmers Yield}}{\text{Farmers yield}} \text{X100}$$

Technology gap =Potential Yield-Demonstrated Yield

Extension gap = Demonstrated Yield-Yield under existing practice (farmers practices)

$$\text{Technology Index} = \frac{\text{Potential Yield-Demonstrated Yield}}{\text{Farmers yield}} \text{X100}$$

Results and Discussion

The gap between the existing and recommended technologies of ginger in Bidar district presented in Table 2 and Fig 1.Cent percent gap was observed in varieties, seed treatment and plant protection measures (Integrated Pest Management), partial gap was observed in fertiliser dose, bio fertiliser and grading of the produce. All the above gaps which clearly implies that, their exists a technological gap, mainly resulted in low potential yields. Farmers were not aware about the recommended technologies. Either they used local or old age traditional varieties, despite of the recommended improved varieties. Untimely availability of healthy rhizomes and lack of awareness, farmers used high seed rate, than the recommended improved varieties. These were the following reasons, responsible for the gap in the yield levels.

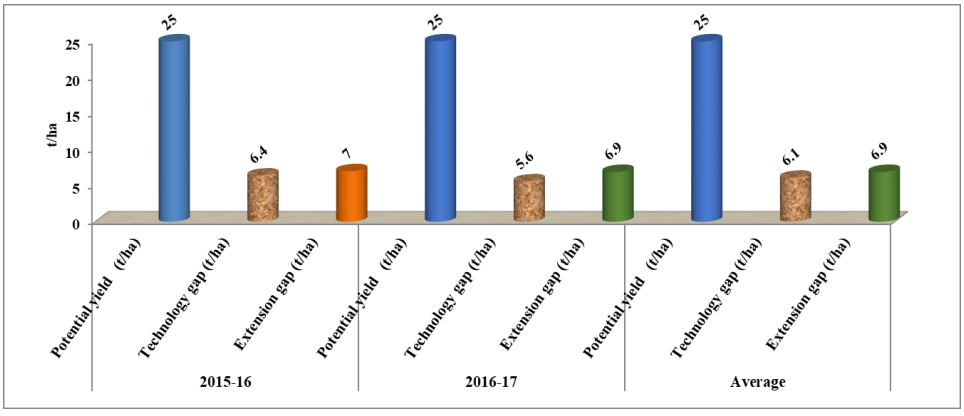

Fig 1: Yield gap analysis of Ginger (Varada) through demonstration of Integrated Crop Management technologies

Yield

Technology Gap

The pooled average data of Frontline demonstration results are presented in Table 2 and Fig 2a.The yields obtained in the demonstration plot during 2015-16 and 2016-17 was 19.6 and 19.5 tonnes per hectare respectively, with the average yield of 19.5 t ha^{-1} compared to the farmers practice, it was 12.5 and 12.6 t ha^{-1} with the average yield of 12.6 t ha^{-1} respectively. Similar findings were also found with Babu *et al*. (2015) who reported that an average yield of 12-15 tonnes per hectare ginger can be obtained. The average yield in the demonstration plots was found maximum over two years, compared to local check (farmers practice) due to knowledge and adoption of full package of practices, appropriate varieties such as Suprabha, Rio-de-genero and varada etc., timely sowing, use of healthy seed material, seed treatment with metalaxy lMZ, soil application with neem cake (2.5qtl) biofungicde (*Trichoderma*) 2.5 kg for one hectare, use of balanced dose of fertilisers (100:50:50 NPK kg ha^{-1}), method of sowing, need based plant protection and grading of Ginger. The technology gap, the differences that exists between potential yield and yields from demonstrated plots were 6.4 t ha^{-1} during 2015-16 while 5.6 t ha^{-1} in 2016-17. On an average technical yield gap under two year Frontline demonstrations programme was 6.1 t ha^{-1}.The gap observed may be attributed to non-homogeneity in the soil fertility status, agricultural practices and the local climatic situations.

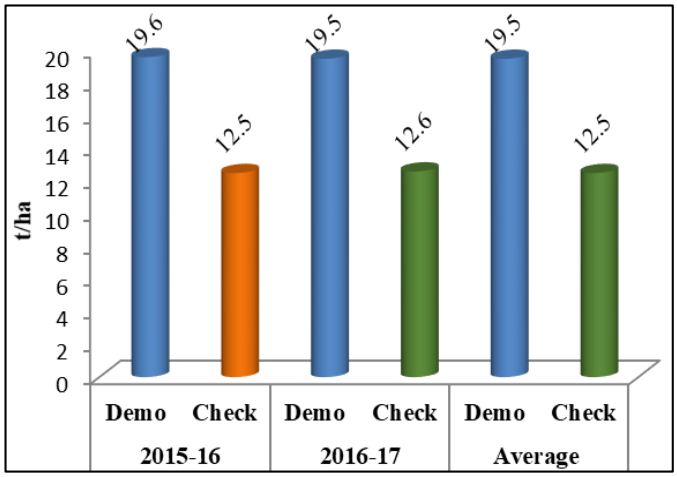

Fig 2 (a): Yield of Ginger (Varada) through demonstration of Integrated Crop Management technologies

Table 2: Performance of Ginger (Varada) through demonstration of Integrated Crop Management technologies

Year	No of demos	Area (Ha)	Yield (t ha^{-1})		% Income	Net returns (Rs/ha)		Benefit-cost ratio		Potential yield (t ha^{-1})	Technology gap (t ha^{-1})	Extension gap (t ha^{-1})	Technology Index (%)
			Demo	Check		Demo	Check	Demo	Check				
2015-16	5	5	19.6	12.5	55.86	560223	315538	4.89	3.32	25	6.4	7.0	25.76
2016-17	10	4	19.5	12.6	54.74	246283	115418	2.71	1.85	25	5.6	6.9	22.35
Average	7.5	4.5	19.5	12.5	55.3	403253	215478	3.8	2.58	25	6.1	6.9	24.05
Total	15	9											

Extension gap

Extension gap of 7.0 t ha^{-1} and 6.9 t ha^{-1} was observed during 2015-16 and 2016-17 respectively. On an average, extension gap under two year FLD programme was 6.9 t ha^{-1}, which emphasized the need to educate the farmers through various extension means i.e frontline demonstrations for adoption of improved production and protection technologies to mitigate the wide extension gap. More and more use of the latest improved production technologies with high yielding varieties would pave the way to minimise the extension gap effectively.

Technology index

The technology index shows the feasibility of the demonstrated technology at the farmers field. The technology index varied from 22.35 to 25.76 percent (Table 2).On an average, technology index was observed 24.05 percent during the two years of FLD programme, which show the efficacy of good performance of the technical intervention. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of ginger.

Economic return

It was noticed from Table 2 and Fig 2b, that during two years of FLD programme the average net returns obtained in the FLD plot was highest (Rs 4,03,253/-) as compared to the check (Rs 2,15,478/-). This may be due to higher yield obtained under improved technologies compared to local check. The above findings were in accordance with Kumar *et al*. (2012) who obtained an average net return of Rs 2,55,258/- from the recommended practice compared to farmers practice (Rs 1,31,677/-).

The FLD produced a significant positive results that provided an opportunity to the researcher to demonstrate the production potential and profitability of the latest technological interventions, under real farm situations, which they have been advocating farmers for long time. This could outwit some of the bottlenecks in the existing transfer of technology system in Bidar district of Karnataka.

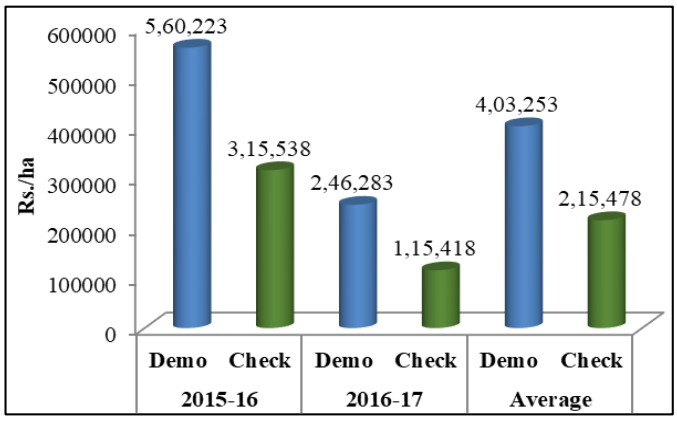

Fig 2 (b): Net return of Ginger (Varada) through demonstration of Integrated Crop Management technologies

Fig 3(a): Vegetative stage of ginger crop.

Fig 3(b): Selection of healthy ginger rhizomes.

Acknowledgement
The authors are highly grateful to scientists of Agricultural Technology Application Research Institute (ATARI Zone-VIII), Indian Council Of Agricultural Research, New Delhi and the University of Agricultural Sciences, Raichur, who have not only supported in terms of financial assistance, but also coordinated lot in carrying out the demonstrations effectively.

References

1. Anonymous. Horticultural Statistics at a Glance, Directorate of Horticulture Lalbagh, Bangalore, 2016.
2. Babu N, Tripathy PC, Shukla AK, Sahoo T. Traditional Practices of Ginger Cultivation in Odisha: A Critical Intervention for Sustaining Farm Productivity. Journal of Engineering, Computers &Applied Science. 2015;4:292-297.
3. Choudhury BN. Krishi Vigyan Kendra – A Guide for KVK Managers. New Delhi: Publication, Division of Agricultural Extension, ICAR; c1999.
4. Kumar A, Avasthel RK, Lepcha B, Mohanty AK, Shukla G. Impact of Frontline Demonstrations on Yield Enhancement of Ginger (Var:Majauley) in Tribal Reserve Biosphere of Sikkim Himalaya. Journal of Agricultural Science. 2012;3:121-123.
5. National Horticulture Board. Area, Production Statistics, 2014.retrievedfrom http:/nhb.gov.in/area%20_production.html.
6. Samui SK, Mitra S, Roy DK, Mandal AK, Saha D. Evaluation of frontline demonstration on groundnut. Journal of the Indian Society Coastal Agricultural Research. 2000;18(2):180-183.
7. Sood R, Dohroo NP. Epidemiology and management of leaf spot of ginger in Himachal Pradesh. Indian Phytopath. 2005;58(3):282-288.