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Enhancing productivity of ginger through scientific production technologies

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Abstract
Ginger is important cash crop for small and marginal farmers, but due to various manageable biotic and abiotic stresses its productivity is low. To improve the productivity of this crop through scientific production technologies front line demonstration was conducted. Farmer practices were considered as check and compared with demonstration fields. In demonstration field blanket application of neem cake, rhizome treatment, rhizome rot complex management, leaf spot and shoot borer management and micronutrient spray were demonstrated. In demo field yield increased by 18 per cent over check. Benefit cost ratio of 3.22 in demo field and 2.95 in check field were recorded. Demonstration of scientific production technologies revealed that with the adoption of recommended technologies yield can be enhanced.

Keywords: Front line demonstration, Ginger, biotic stress

1. Introduction
Ginger (*Zingiber offcinale* Rosc.) belongs to the family Zingiberaceae is an important cash crop. It is a major cash crop cultivated by the most of the small and marginal farmers. The rhizome is used worldwide as spice for flavouring in a number of foods and food-products and also used in medicine (Bhati *et al*, 2020) [2]. The total area under this crop in the district is 372 hectare with the productivity of 26 tons/hectare. Although the soil and agro-climatic conditions of the district are well suited for the cultivation, the productivity of ginger crop is low. The low productivity of ginger crop is mainly due to various biological stresses *viz*., rhizome rot complex, leaf spot, shoot borer and deficiency of micro nutrients. Soft rot, yellows and bacterial wilt are generally found together in the same field affecting the same plant parts and their symptoms often get mixed up (rhizome rot complex). The disease usually caused by fungi *Fusarium oxysporium*, *Pythium* sp. and bacteria *Ralstonia solanacearum* (Smith) and plant parasitic nematode *Pratylenchus*.
Leaf spot in ginger caused by *Phyllosticta zingiberi* starts as a water soaked spot and later turns as a white spot surrounded by dark brown margins and yellow halo. The lesions enlarge and adjacent lesions coalesce to form necrotic areas. The disease spreads through rain splashes during intermittent showers. The shoot borer (*Conogethes punctiferalis*) is the most serious pest of ginger. The larvae bore into pseudo stems and feed on internal tissues resulting in yellowing and drying of leaves. Usage of micronutrients for ginger crop is very meager or absent in the district leading to low yield. Front line demonstrations (FLD) are mainly conducted to transfer the new technologies to farmers field. Keeping these points in view FLD was conducted with the objective of demonstration of rhizome rot complex, leaf spot, shoot borer and micro nutrient deficiency management in ginger.

2. Materials and Methods
Demonstration of scientific production technologies was undertaken at Gudnapura village of sirsi taluk, Uttara Kannada district. For conducting the demonstration 5 farmers were selected after conducting participatory rural appraisal followed by the group meeting. Sowing of Himachal variety rhizomes was done on first fort night of June month after the onset of south west monsoon. Each demonstration was of 0.2 ha area and in demo field the nutrition management was taken up based on soil test results. In the present FLD before sowing rhizomes were treated in a cupper oxy chloride (0.3%) and streptocycline (0.05%) solution for 20 minutes followed by shade dried for ten minutes. Blanket application of 25 kg of neem cake by mixing with farm yard manure was done. After the appearance of rhizome rot complex during the crop growth stage drenching with bleaching powder (0.2%) 33% and metalaxyl Mz (0.2%) was done to a disease affected places to prevent the further spread of disease. Shoot borer management through spray of Dimethoate 30 EC @ 1.7 ml/l was demonstrated.

To manage micronutrient deficiency spraying ginger special spray @ 5 g/liter and for leaf spot Hexaconazole (0.1%) was sprayed in demo field. In a check field farmers were applied the fertilizers without soil test and application of neem cake was not taken up with farm yard manure. Rhizome treatment was absent in check field where farmers usually will not take up rhizome treatment. During the incidence of rhizome rot and wilting of plant, copper oxy chloride (0.3%) was drenched to soil.

To manage shoot borer and leaf spot farmers were sprayed with profuse amount of chemicals and micro nutrient deficiency was not attended in check field. One day on-campus and off campus training programme was conducted to the same farmers to give detailed information of technological interventions. Observations on germination per cent, incidence of rhizome rot (%), leaf spot (%) and shoot borer (%) were recorded from demo and check field. Per cent incidence of rhizome rot was recorded by counting the number of infected plants divided by total number of plants examined and converting that into per cent. First observation was recorded during middle of September at tiller initiation stage. After a fortnight, second observation was recorded at active tillering stage. Third observation was recorded during middle of October at the middle of rhizome bulking stage. Mean of these observations recorded as per cent disease incidence. Leaf spot disease severity was recorded on fifteen randomly selected leaves from control and demo field using 1-9 point scale and per cent disease index was calculated. The percentage of shoot borer was calculated on the basis of total number of healthy shoots and infected shoots.

Growth, yield and disease and pest incidence data were collected at appropriate time throughout the demonstration. Information on cost of cultivation and selling price was also recorded for economic evaluation of demo and check crop. Fresh rhizome yield was recorded at the time of harvesting and then it was converted into projected yield in t/ha. The yield data were collected from both demonstration and farmer practice to workout extension gap (Demonstration yield-farmer's yield).

3. Results and Discussion

Table 1: Yield performance, pest and disease incidence and economic analysis in frontline demonstration of ginger

Particulars	Germination (%)	Incidence of rhizome rot (%)	Leaf spot (PDI)	Shoot borer (%)	Yield (t/ha)	Gross cost (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C ratio
Demo	88.45	10.66	14.23	16.55	29.50	178500	575354	396854	3.22
Check	79.11	18.22	27.65	22.10	25.00	165300	487643	322343	2.95

The results revealed that highest germination per cent in demo field (88.45%) when compared to check field (79.11%). The highest germination demo field may be due to treatment of rhizome with 0.3 per cent copper oxy chloride and 0.05 per cent Streptocycline solution followed by neem cake application to soil. Low per cent (10.66) of rhizome rot complex in demo field than check may be due to drenching of soil with Bleaching powder (2g) 33% and Metalaxyl Mz (2 g). Leaf spot per cent in demo and check plot was 14.23 and 27.65 per cent respectively. In demo and check plot shoot borer incidence was 16.55 and 22.10 respectively. Low incidence of leaf spot and shoot borer in demo field attributed to spraying of hexaconazole and dimethaote at right stage of incidence. In check field, the farmers practice was spraying of botanicals and spray was taken up in later stage of incidence. There was 18 per cent increase of yield in demo compared to check. The effect of technological intervention indicated the yield enhancement in demonstration field over check field. Mukherjee (2003) [4] had reported that the innovative intervention may have superior implications in enhancing the productivity. Similar results were also reported by Mishra *et al*. (2009) [5], Tiwari *et al*. (2003) [8] and Shukla *et al*. (2015) [7].

Various economic indicators like gross cost, gross return, net return and B:C ratio of FLD are presented in Table 1. Economic analysis of demonstration indicated that the net returns from the demo field was substantially higher than farmer practice. Net returns from recommended practice was observed to be Rs. 3,96,854/hectare in comparison to farmers practice (Rs.3,22,343/ha), hence an increase in income of Rs. 74,511/hectare was obtained. These benefits mainly attributed to technological intervention leading to reduction in rhizome rot disease and other biotic stress in ginger. The benefit cost ratio of demo plot (recommended practice) was also higher than check plot (farmers practice). These results are in conformity with the findings of Kumar *et al*. (2012) [3] and Babu *et al*. (2015) [1] in ginger. Realization of high net returns and benefit cost ratio by the farmers in their own field greatly helped in convincing the farmers about new scientific technologies. Extension gap which was 9.34 t/ha emphasized the need to educate the farmers through various means for adoption of improved scientific technologies in ginger. Yield gap analysis by Pal and Pratap (2018) [6] also emphasized the need to motivate the farmers to fill up the wide extension gap.

To obtain high yield in ginger it is essential to adopt an integrated crop management practices which includes rhizome treatment, soil test base nutrition management, timely spraying of plant protection chemicals and micro nutrient management. High benefit cost ratio also advocates the economic viability of the demonstration.

4. References

1. Babu N, Tripathi PC, Shukla AK, Sahoo T. Traditional practices of ginger cultivation in odisha: A critical intervention for sustaining farm productivity. J. Engineering computers and applied sci 2015;4(12):292-297.
2. Bhati D, Raghuvanshi RS, Jukaria S. Current uses and future prospects of ginger processing and entrepreneurship development among farm families. *J Krishi Vigyan* 2020;8(2):308-312.
3. Kumar A, Avasthe RK, Lepcha B, Mohantty AK, Shukla G. Impact of frontline demonstrations on yield enhancement of ginger (var.Majauley) in tribal reserve biosphere of sikkim. Himalaya J Agri Sci 2012;3(2):121-123.
4. Mukherjee N. Participatory Learning and Action. New Delhi: Concept publishing company 2003.
5. Mishra DK, Paliwal DK, Tailor RS, Deshwal AK. Impact of frontline demonstration on yield enhancement of potato. Indian Research journal of Extension Education 2009;9(3):26-28.
6. Pal SM, Pratap SR. Yield gap analysis of ginger in Champawat district of Uttarakhand. Journal of Hill Agriculture 2018;9(2):203-208.

7. Shukla A, Gupta SK. Management of rhizome rot of ginger under mid hill conditions of Himachal Pradesh. J Krishi Vigyan 2015;3(2):102-104.
8. Tiwari RB, Singh V, Parihar P. Role of frontline demonstration in transfer of gram production technology. Maharashtra Journal of Extension education 2003;22(3):19.