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Awareness Creation, Scaling of Ginger *(Zingiber officinale Rosc.)* Landraces and Farmer Participatory Varietal Selection

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Abstract

Ginger (*Zingiber officinale* Rosc.) is an economically important spice crop widely used in herbal medicines and as a flavoring agent in foods and beverages. However in recent years, ginger bacterial wilt has major constraints pushed farmers to reduce ginger cultivation, causing changes in cropping systems. Hence, some participatory variety selection is one of the methods used to evaluate varieties through participation of users. Experiments were conducted at three villages in participatory variety selection were conducted during 2018/2019 in Boloso Bombe [(Farawocha (02/MT), Badaye (03) and AjoraKebele (04)]. Kebele of wolaita zone, farmers, development agency and woreda experts to solve the problem of the ginger production system, planting timely, no needs of N-fertilizer, should be know the history of land before the planting and agronomic management important. It is known that ginger is income generating source for the producers and also the foreign currency source for the country. farmers' understanding on ginger diseases, ways of transmission and spread As result practical based selection for ginger improvement could be based on rhizome weight per plant, plant height and rhizome length, but the rate of emerged shoots will also be rewarding for yield improvement For further characterization, using of molecular markers, action research should be performed to exhibit the tangible genetic diversity within ginger cultivars of Wolaita zone

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Keywords

Ginger, Germplasm, Selection, Farmer.

Introduction

Ginger (*Zingiber officinale* Rosc.) is an economically important spice crop widely used in herbal medicines and as a flavoring agent in foods and beverages. Ginger is native to South East Asia, and now it isgrown commercially in most tropical regions Palai and Rout (2007. It has a long and well -documented history of both culinary and medicinal use throughout world history, especially in Chinese, Indian and Japanese medicinal care. In recent years, ginger bacterial wilt has pushed farmers to reduce ginger cultivation, causing changes in cropping systems and dietary practices in ginger growing areas.

Diseases are one of the major constraints in the production of ginger of which bacterial wilt is one of the most serious, that inflicts serious economic losses on small and marginal farmers who depend on this crop for their livelihood (Kumar and Hayward, 2005). According to Kelman (Kelman, 1997), those races principally attack bananas, ornamental planes, potato, ginger and mulberries are race 1, race 2, race 3, race 4 and race 5 respectively. Unlike race 3 biovar 2A which have

relatively wide host range (Hayward *et al.*, 1967) race 4, of the pathogen has a narrow host range, and restricted to ginger (Kelman, 1997) and limits the production of ginger in the tropics (Paret *et al*, 2010) identified sixty two *R. solanacearum* strains from Ethiopia and 19 of them grouped in to biovar I and the rest of the strains to biovar II. It was further observed that biovar II strains had limited host range (affecting mainly potato) compared to biovarI strains (affecting eggplant, tomato and potato) but so far race 4 is not yet reported in association with ginger or other crops in Ethiopia.

Moslem Khani *et al.,* (2005) shown that BW is mainly both seed-borne and soil-borne disease as often spread through latently infected planting materials to new disease free areas or planting on an infected soil.Addressing the disease and improving ginger productivity are serious research and development issues in Wolaita zone, SNNPR.

Identify farmer's need Farmers' need in a variety was identified by participatory rural appraisal (PRA), conducted in 2018. A 12-member team was formed with scientists from different disciplines, extension and woredagovt. representatives and headed by an Economist. This team with randomly selected 15 farmers irrespective of wealth, caste and sex conducted PRA to collect base line information in relation to present situation, major constraints and future needs of ginger as well as agriculture of the area.

Experimentation in farmers' fields

This experiment was conduct in Farawoch Research station, farmer land which is nearest to Wolaita Sodo University Agricultural research fields, Experiments were conducted at three villages in [Farawocha (02/MT), Badaye (03) and Ajora Kebele (04)]. One more village was added in Ajora Model farmer. There were three kebele in designated by code 02(MT), code 03 and code 04 per village. There was one Code at on-station every year with 3 replications. Eight genotypes including "GH-06/95" as a check variety were tested in code 02(MT). Released variety "G-38/79(Volvo)" was tested in first two years. Each MT at farmer's field was considered as a single dispersed replication; therefore, there was different randomization. Main trials were designed by researchers and quantitative data were also taken by the researchers. However, the trials were evaluated by 30 farmers per village at physiological maturity and after harvest. Scoring was done for each character as well as for overall preference. Score was from 1 to 10. Score 10 was for the best and 1 was for the worst genotype. Research, extension and NGO personnel assisted farmers during scoring. The crop was grown with farmers' management at farmers' fields and under recommended management at on-station (Fig. 1).

Table.1 Farmers' understanding on ginger diseases, transmission and spread ways at three Kebeles

S.No	Variables	Farawocha (%)	Badaye (%)	Ajora (%)	Chi square test	Chi square P- value
1	Infected farm lands	0.24	4	13.7	69.8 - 3.27	
2	Land before planted taro, enset, tomato and sweet potato	27.9	30.3	47.7		
3	Contaminated farm tools	14	9.5	7		
4	Wind and human cases /by seed	1.5	5	11		
5	Late planting and N-fertilizer Application	2.2	26.8	12.5		
6	Not weed control and application of manure/dung	6	1.3	4		
7	No have idea	13.7	17	37.3		

Figure.1 Gingers accession multiplication site visiting

Achievements method/approaches

Assessment of ginger production constraints with 250 hhs

- ❖ Awareness creation and training on potentials and challenges of ginger production
- ❖ Identification of 49 volunteer farmers for participatory variety selection in case of(Farawoch, Badaye and Ajora)
- ❖ Candidate ginger rhizomes for selection by farmers:

✓ Released and recommended rhizomes (GI- 38/79 (Volbo), GI-36/79, GI-38/79, and GI-305/73 are the highest productive ones in their order.
✓ Selected farmers' rhizomes (four "GH-06/95" (2.86%),"HG-70/79" (2.22%),"G-38/79(Volvo)" (2.12%),"G-30/73" (2.06%)

▪ Criteria for rhizome selection include earliness, vigoursity, plant height, seed length, Rhizome thickness, and Yield per plot (YP).
▪planting of selected rhizomes
Ginger seeds multiplication for own use and income diversification in farawoch and Badaye Ajora kebele rising site, Wolaita zone, Ethiopia.
Farmers' understanding on ginger bacterial wilt etiology, transmission and spread Table 1.
▪ Mapping niches for scaling and strengthen scaling of validated ginger rhizomes and their management practices.
▪Yield and quality assessment of ginger products
▪Systematic beneficiary tracking
▪Capacitate villagers to multiply seeds and sell to other farmers.

- ❖ Contaminated tools, diseased plant debris, N-fertilizer application rate, animal dung and wind are the etiology of ginger bacterial wilt (Table 1).
- ❖ Improved rhizomes selected by farmers are "GH-06/95" (2.86%), (Disease tolerant), Gi-180/79, Gi-36/79, Gi-38/79, and Gi-305/73 are farmers preferred rhizomes for the variety selection.
- ❖ Farmers appreciate ginger bacterial wilt tolerance, good quality and quantity, early maturity of the improved as compared to the local rhizomes.
- ❖ More than 23Quitals seeds/rhizomes multiplied by the farmers within two year time (2017and 2018).
- ❖ Four famers sold 15Quital seeds and earned birr 37,500 (USD 962 at exchange rate of 1 USD= 39 birr) at Raya University and Mekelle Agriculture research center and for two Kebeles.

The improved ginger rhizomes scaled to more than 30 farmers through selling and provision of gift arrangements.

Future plan for 2021/22

- Selection for ginger improvement could be based on rhizome weight per plant, plant height and rhizome length, but the rate of emerged shoots will also be rewarding for yield improvement For further characterization, using of molecular markers can be performed to exhibit the tangible genetic diversity within ginger cultivars of Wolaita zone
- According to farmers' assessment seed/rhizome formation capacity of the improved ginger is high as compared to the local ones. On average farmers have 20 Quintal (variety Volvo) seeds and only 50- 80 Quintals from local market or from black market unknown source seed used.
- In Ethiopia there are numerous types of ginger cultivars (more than 74 accessions); but farmers of Wolaita zone uses limited cultivars. Due to the absences of disease resistance, widely adapted and productive ginger variety, the productivity of the crop is blow the potentials which is 295-459Qt/ ha.
- Weak partnerships along with collaboration work different research institute, to manage ginger bacterial wilt
- Lack of capacity for farmer and woreda DA with the Zonal experts.
- Lack of organized with better awareness on agronomic practices like over application N-fertilizer and time of planting.

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