Cluster-based pre-scaling up of tomato technologies in harari region rural areas: Small holder farmers livelihood improvement

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Abstract
Small-holder farmers' livelihoods basically depend on agricultural products and other related activities. Based on this impression, Agricultural Extension Research team conducted cluster-based pre-scaling up of improved tomato variety (Malka shola) at Harari region in two kebeles (Aradas) Kile and Dodota with objectives of scale up the improved Tomato technologies for increasing the production and productivity for the improvement of small-scale farmers livelihood and strengthen the linkages among stakeholders on the promotion of tomato technologies for one year (2019/2020). For this research activity, 100 farmers with 40% (pre-harvest to post harvest) women composition were participated by grouping them in three clusters, from land preparation to marketing of their products. As a result, 21.88ton/ha at cluster1 12.37ton/ha at cluster 2 and 14.59ton/ha at cluster 3 were produced from the total 75 hectares of land by irrigation system at off season in which Agricultural Extension Research team provided all necessary inputs to targeted farmers according to the land size they own and know how. Throughout this research activity implementation the disease occurrence, ups and down of market price, shortage of seed supply and non-frequent advices from immediate local development agents were raised by farmers as challenges. Therefore, research institutes, government's development organizations, NGOs, and other stakeholders should jointly focus on plant protection, market linkage strengthening, facilitation, capacitating, monitoring and evaluate on ground situation at field and farmers level.

Introduction
Tomato (Lycopersicon esculentum Mill.) is one of the most widely grown vegetable crops in the world [1,2]. It is widely cultivated in all parts of the world and it is the largest in volume of production after potato and sweet potato. Currently, tomato mainly recognized as quality product for both local and export markets and providing a route out of poverty for small scale producers who live in developing countries in general and in Ethiopia in particular [3]. Tomato is a high value commodity which has the potential for improving the incomes and livelihoods of thousands of smallholder farmers in Ethiopia and diversifying and increasing Ethiopia's agricultural export exchange earnings [2].

Tomato is the most frequently consumed vegetable in many countries, becoming the main supplier of several plant nutrients and providing an important nutritional value to the human diet. It is also important source of vitamin A and C as well as minerals. It is widely consumed in every house hold in different modes including raw, as an ingredient in many dishes, sauce, salads and drinks [4]. Tomatoes can make people healthier and decrease the risk of conditions such as cancer, osteoporosis and cardiovascular disease.

People who ate tomatoes regularly have had a reduced risk of contracting cancer diseases such as lung, prostate, stomach, cervical, breast, oral, colorectal, esophageal, pancreatic, and many other types of cancer. The studies show that tomatoes and garlic should be taken together at the same time to have its cancer preventive effects [5].

Despite the importance of this crop, the production and...
productivity is constrained by different biophysical and socio-economic reasons, such as lack of adapted and improved tomato technologies, land shortage, inadequate knowledge on production and management (processing) systems, poor extension services, poor marketing system and proper utilization of the crop are a few to mention [1]. To address those problems, technology introduction, development, promotion and evaluation with farmers as participatory approach could have a marvelous impact sustainable production and improved the livelihoods of rural households.

**Objective**

To scale up the improved Tomato technologies for increasing the production and productivity for the improvement of small-scale farmers livelihood of AGP districts

To strengthen the linkages among stakeholders on the promotion of Tomato Technologies in AGP selected districts

**Materials and methods**

This cluster-based pre-scaling improved onion technology research activity was conducted in Harari Region at Kile and Dodota kebeles. This site was selected based on the potential onion production and accessibility of the market nearby the community residence and the site classified into different clusters. After site selection 100 (60 men) farmers in which 40% (40) women composition were selected by considering the clusters. After site selection 100 (60 men) farmers in which 40% (40) women composition were selected by considering the experience they have the know-how of the technologies, land availability and other cost-sharing issues. Then, the important training concern to the onion technology production was given for the targeted farmers and classified them into cluster according to the following Table 1.

**The research activity implementation**

The site was prepared and all the recommended packages were applied that were: row stretching between plants and rows, fertilizer application, and other agronomic practices were undertaken at each stage of onion production to harvesting and marketing.

**Result and discussion**

The total product obtained per cluster shows that as depicted on Table 2 the technology has got more attention by farmers in which individually farmers got 42651.42 birr up to 124,608 birr in average with 16 birr/kg in local price at that production time. This indicates that if farmers access with good price time and storage they can more benefit. Farmers used the obtained birr for different purpose in their livelihood strategies like food secures throughout the year, additional milk cow, fattening bull and small ruminants purchasing, schooling their children by covering all costs, and able to cultivate additional land for further production.

**Training**

Field day was organized at research site at time of the maturity stage; farmers, and other stakeholders suggested a couple of ideas and shared experience they have to one another concerned to the tomato varieties with its technology on the farmers land. The technologies exposed to different peoples by television, Radio FM, and written form of extension materials.

**Constraints farmers faced during production season**

Farmers suggested a couple of issues concerned to the technology as depicted on Table 3 that they have been facing challenges through the production of tomato start from planting to marketing, accordingly delay of inputs, market price fluctuation, diseases at germination and vegetative stages, lack of support from nearby Development Agents, lack of infrastructure, and storage harvest to long shelf life span of the product. And they suggested that if these problems solved early, they would be more benefit from the technology and improve their livelihood in strategic ways Table 4.

**Exit strategy**

The technology pre-scaling up process is a continuous process where the ‘end’ of pre-scaling up activity is the
Discussion

The activity was conducted in Harari region where tomato variety which called “Malka shola” is very adaptable and gave high yield throughout the cluster in the study area. The yields obtained were different because the populations in the cluster were different in number and the variety was very disease and pest resistance as depicted in Table 2. The training was for given 110 farmers, 11 Development Agents and 6 experts on couple of training title such as agronomic practices of Tomato, soil type and fertilizer application for Tomato, postharvest utilization of Tomato production, home utilization and seed systems as depicted on the Table 5. And the field day was prepared when Tomato production was on farmers’ field in which 104 farmers, 12 Development Agents and 5 experts in addition gave couple of ideas and suggestions on the Tomato production. Throughout the Cluster-based pre-scaling up the farmers raised the constraints as a whole that are in order delay of providing inputs, market price fluctuation diseases, lack of frequent support from Development Agent and other bodies, lack of centered station sell for vegetable production(infrastructures), lack of Storage technology.

Conclusion and recommendation

This research cluster-based pre-scaling up of tomato technologies was conducted in Harari Region by three clusters with seventy five hectare of land resulted with total productivity in average 12.37 ton/ha 21.88 ton/ha and average benefit farmers individually earned 4,265.42 birr 124,608 birr by local price at production time sixteen birr/kg. for this technology pre-scaling the field day prepared as good event for more promotion, as a result, farmers and other participants raised couple of issues as challenges – delay of input like pesticide, diseases appeared, market price and other; as experiences cluster form technology promotion is very appreciable and reach large farmers. Therefore, based on these all issues the following recommendation was derived: the inputs from concerned should be delivered in hand early to farmers, market opportunity should be access at this production and storages, and strengthening the cluster form technology promotion is very important and promoted to other areas.

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References


Table 5: Field day Organized and publicity

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<tr>
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<td>Home utilization and seed systems</td>
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