Project on Strengthening Technology Development, Verification, Transfer and Adoption through Farmer Research Groups (FRG Project)

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Farmers' participation is a key to agricultural innovation

Improved nursery management to ensure healthy and vigorous seedlings

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Background

Vegetable seedlings are prone to damping-off diseases caused by seed or soil borne pathogens during the first three weeks after sowing. Seedlings may be infected before or after emergence. If infected before emergence, the germinating seedlings become soft, brown, and decomposed. If infected after emergence, a water-soaked lesion from about 1 cm above or below the soil line develops and as a result the stem softens and cannot support the seedling and finally collapse and die. This has been a serious problem, especially in tomato and pepper growing area in Ethiopia and most often growers lost their seedlings from the very beginning on seedbeds (Fig. 1).

Fig. 1 Damaged pepper seedlings due to diseases

Moreover, factors such as contaminated seeds, sowing seeds in disease-infected soils, over watering, poor drainage, in adequate light, overcrowding, poor ventilation, and excess application of nitrogen to soil can also create favourable conditions for disease development. These unnecessary practices are common in most farmers' field. Apart from direct mortality and being reduced in growth, seeds that emerged poorly or infected seedlings right on the seed bed are also likely to spread the diseases to the fields after transplanting through irrigation or rainwater. Elsewhere, in modern vegetable production systems proper nursery management is a critical practice to achieve healthy seedlings and make the vegetable production systems profitable. Unfortunately, this practice is neither popularized nor adopted widely in Ethiopia. Thus, the aim of this brief report is highlighting the effort so far made to improve vegetable nursery managements through Farmers Research Group (FRG).

Materials and Methods

The Plant Pathology Section of Melkassa Research Centre with the support of JICA-FRG project demonstrated the advantage of improved nursery management as compared to the traditional nursery management practices under field conditions at Meki.

The improved nursery management includes:

- Seeds of tomato (Melkashola), pepper (PBC-600) and onion (Bombay Red) were treated with Apron star at the rate of 2.5g/kg seeds.
- Recommended seed rate of tomato (15g), pepper (25g) and onion (60g) per seed bed were used.
- Seeds were sown in rows with 15 cm spacing between rows.
- Seedlings were irrigated using water can.

The traditional practice includes:

- Untreated seeds of tomato (Melkashola), pepper (PBC-600) and onion (Bombay Red) were used.
- Traditional seed rate of tomato (55g), pepper (120g) and onion (120g) per seed bed were used.
- Seeds were broadcasted.
- Seedlings were irrigated using furrow irrigation.

Parameters collected:

- Four rows from each seed bed of the nursery were randomly selected.
- Fifty seedlings from each row were sampled.
- Each seedling was categorized into healthy and weak.
- Leaf numbers of each seedling were counted.
- Stem diameter or thickness, shoot and root length were measured using calipers.

Table 1. Effects of seed treatment on tomato, pepper and onion, at Meki in 2008

Crops	Treatments	Seedling rating					
		Vigor	Weak	Height (cm)	Root length (cm)	Leaf no.	Steam diameter (cm)
Tomato: Melkashola	TS+ SR (15g)+ RS	129.4	15.2	18.6	6.2	7.4	2.0
	US+SR (25g) + B	63.3	39.3	10.5	3.2	5.5	1.3
Pepper: Pbc-600	TS+ SR (60g)+ RS	113.0	28.1	20.0	6.8	12.7	3.3
	US+ SR(125g) + B	59.9	59.6	10.0	2.9	8.5	2.0
Onion: Bombay Red	TS+ SR (60g)+ RS	220.7	21.8	28.3	6.8	4.2	2.1
	US+ SR(120g) + B	85.5	105.8	15.8	3.5	2.9	1.3

TS: treated seed, US: untreated seed, SR: seed rate, RS: row sowing, B: Broadcasted.

Result and discussion

Result indicated that chemically treated seeds which sown in rows at lower rate per seed bed and watered with water can significantly increased seedling vigor of tomato, pepper and onion by 104, 88, and 158%, respectively as compared to the untreated seeds which was broadcasted at higher seed rate. Seedling height also increased by 77, 100 and 79% in tomato, pepper and onion, respectively. Increased seedling root elongation was also observed in tomato (93%), pepper (134%) and onion (94%) (Table1). Quite similar effects were also observed in increasing leaf number and steam diameter (Fig. 2).

Fig. 2 Effect of improved nursery management on tomato seedlings on the left and on the right seedlings raised by traditional practice

In contrast, significant reduction of seedling vigour, plant height, root elongation, leaf number and stem diameter, as well as increment of number of weak seedlings were observed in the traditional nursery management practices.

Currently, the effect of improved nursery management in improving seedling establishment is gaining importance among FRG and non-FRG members at Meki. The farmers have now gained experience and knowledge and are inclined to change their traditional practices. Primarily, farmers observed the apparent effect of the improved nursery management on increasing seedling vigour of tomato, onion and pepper. Secondly, they observed improvement in seedling establishment in the field after transplanting and appreciated labour cost reduction as the result of less damaged seedlings to be replanted. Finally, the practice seems to be more economical since it reduce seed amount as opposed to the traditional practice that demands excess amount of seeds. In summary, farmers are now willing to consider the improved practice as part of vegetable production systems to increase production and improve their livelihoods.

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An alternative approach to fill the seed gap: community based maize seed production, the case of Anano Kebele, Adami Tulu District

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Introduction

Millions of people depend on maize as a stable food in Ethiopia. In view of its high demand and high yield per unit area compared to other crops, maize has been among the leading food grains selected to achieve food self sufficiency in Ethiopia (Benti et al., 1993 quoted in Chimdo et al., 2001). Hence maize is one of the top priority crops to which substantial resources are being allocated by the national extension package program. Despite its importance, the national

average yield of maize is around 20 quintals/ha. This is merely a half of the world average. In general, maize is constrained by the traditional production practices and the low level of new technology use. The total cultivated area for maize is about 1.3million ha and only 25% of the area has been planted with improved seed (Chimdo et al., 2001). This clearly indicates that very few farmers have had the chance to use improved seed. As a result, a wide gap exists (30% to over 100%) between what research has achieved using improved seeds and what farmers actually produce on farm.

In order to fill the gap on the use of improved seeds for maize production, Adami Tulu Agricultural Research Centre (ATARC) with a farming community in Adami Tulu Jido Kombolcha (ATJK) District has attempted to establish a community based maize seed production.

Picture 1. Maize FRG farmer Mr. Denebo Abeti working on community based maize seed production

Objective

1. To establish community maize seeds production technology
2. To minimize the shortage of improved maize seed in the project area
3. To identify and strengthen sustainable mechanisms for farmer to farmer seed exchange

Study area

Anano is one of the 33 kebeles and accounts 4% of total households in the ATJK district (Table 1).

Table 1. Number of households in Adami Tulu Jido Kombolcha District and Anano Kebele

	Male HH	Female HH	Total
A/Tulu	19075	925	19100
Anano	691	34	725

Source: A/T/J/K office of Agriculture and Rural Development annual reports of 2006/7, Compiled by Wole K.

At Anano kebele, maize has the largest area for growing, productivity and production followed by haricot beans and tef (Table 2).

Table 2. Land allocation pattern by the household in Anano kebele in 2006/7 cropping season

	Total area (ha)	Area per HH (ha)	Yield (qt/ha)	Rank in land allocation
Maize	1172	1.6	55	1
Wheat	202	0.27	20-	4
Barley	30	0.02	20.6	6
Tef	250	0.34	9.27	3
Sorghum	143	0.19	28.43	5
Haricot beans	715	0.98	16	2

Source: A/T/J/K office of Agriculture and Rural Development annual reports of 2006/7, Compiled by Wole K.

Maize has been the most important crop for Anano kebele and, according to the wareda office data, the maize growing area has been increasing on average of 7% annually in recent years (Table 3).

Table 3. Trends of land allocation by farmers for maize production in the project area

Year	2003	2004	2006	Remark
Maize cropping area (ha)	949	1030	1172	An increasing trend

Data on 2005 is not available.
Source: A/T/J/K office of Agriculture and Rural Development annual reports of 2006/7, Compiled by Wole K.

Selection of participant farmers

The issue of improved maize seeds was raised at different occasions by many FRG farmers in ATJK District. However, multiplication of community based improved maize seeds was a new practice to the area and required special management making the practice difficult at farmers' level. Some of the difficulties related to improved maize seed multiplication at farmers' level are; site selection (due to very scattered land ownership patterns in the area the keeping isolation distance and agreement among many farmers difficult) and threshing. Taking the above issue into consideration, group approach was followed for this trial.

Accordingly, a village meeting was organized at the target kebele from where the request for maize seed multiplication was made. Together with the DA and kebele leader, a trial site and trial farmers were selected. Total of 10 households with 19 farmers (9 husband, 9 wives and 1 female household head) were organised into a seed multiplication trial group as a

sub-group of the existing maize FRG in the village. Selection criteria for the sub-group included the community's acceptance, willingness to work in group, to share costs and to share/sale produced seeds at affordable price to the surrounding farmers and communities.

Saving for next trial arrangement

During the village meeting, participating farmers were briefed with the need and importance of saving for following year production. The project procures necessary materials which were provided to the farmers for the first year. The farmers agreed to save the amount equivalent to 40% of the costs which would be collected at the harvest. The collected cash was pooled for purchasing necessary materials like fertilizers, chemicals and others for the next year trial.

Involvement of local government

The kebele and got leaders were involved in the important stages of the activity to ensure support from the community as the activity required collective actions to keep isolation distance and enable the group by-laws function within the community.

Materials used

A total of 2.5ha of consolidated area was contributed by the members of the group on equal bases for the study. Breeder seed (melkasa-2) were obtained from Melkasa Agricultural Research Centre (MARC). All the recommended management practices such as seed rate, row planting, fertilizer application, etc. were followed during implementation.

Seed need of farmers in Anano Kebele

In the study area (Anano) 1172 ha of land (1.6 was planted with maize in 2006. As the recommended seed rate is 25kg/ha, 293qts of maize seed is required for the entire community.

Summary of results

The group produced a total of 100qts of maize seed at the end of the first year trial from 2.5ha of land for which each member contributed 0.25ha. Isolation distance was kept properly as the community member understood the activity.

The produced maize seeds were sold to and/or exchanged with farmers within and surrounding communities at the premium price of 100Birr above the price of local maize. The volume produced the group was equivalent to more than 30% of the community's seed requirement.

With the recognition of the group's achievement by the community, the kebele's administration provided the group 6.5ha of land for the sustainable production of seed for the following year.

Conclusion & Recommendation

Our experience in Adami Tulu Jido Kombolcha District has shown that farmers can agree to work together and produce quality seeds for themselves and their community. Support of local government from the beginning is very essential to sustain and keep the seed quality and group activity under small land holding sizes. Further research is required to develop appropriate thrasher as there is seed loss by farmers' threshing practice.

References

Chimdo A. et.al., 2001. Research centre based maize technology transfer: effort and achievement. EARO, Addis Ababa, Ethiopia.

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Resources available

Extension materials in English, Amharic and Oromic are available on a number of technologies. Please contact the project office.

FRG UPDATE is a newsletter from the FRG Project for sharing experiences of researchers, extension agents and farmers who involve in participatory agricultural research through "Farmer Research Group" approach.

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