

Short report on apple production and management training in Debre Birhan, Ethiopia Temesgen Alene



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Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

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Summary

In its first phase (2012-2016), the Africa RISING project in the Ethiopian highlands tested and validated high value trees (HVT) including 5 varieties of **Avocado** (*Percia americana*), **Apple** (*Malus domestica Borkh*), 5 varieties of **Walnut** in its research sites. Research has been conducted to test and identify their suitability through on farm, experimental, laboratory trial, socio economic survey, and capacity building. A couple of awareness raising activities were also done through field visits, on pre and post planting tree management. The research identified promising high value species/varieties and management interventions. One of the key findings was capacity building gaps such as theoretical and practical trainings to scale high value trees to more farmers and areas.

Taking this gaps into consideration, Africa RISING project in the Ethiopian highlands in collaboration with Faji Apple farm in Debre Birhan organized series of trainings in July 2017. The training focused on Apple production and management. Scaling partners in three woredas (Basona Worena, Angolelana Tera and Tarmaber) of North Shewa Zone in the Amhara region participated in the training. The training covered both theoretical and practical aspects of apple farming. A total of 65 trainees including farmers, Kebele development agents (DAs), Woreda experts, and Zone experts attended the training.

Part one -Theoretical training session

Site selection, land preparation and planting

The training started with a theoretical briefing to make aware of the trainees on what best fertile ground should be available to grow Apple. Gurmessa Anissa from a private Apple farm led this session. Accordingly, apple does best in areas with altitude of 2400 m.a.s.l and above. It also needs fertile soil, protected site (fence) and wind break. Shade (barrier to sun light) and waterlogged areas should be avoided for apple production. As water is very critical to apple production it was clearly mentioned that any farmer who have a plan to plant apple seedling needs to have at least one source of water (irrigation from different source, pond, water harvesting structures etc.).

Land preparation should start 3-4 weeks before the actual planting time. Pit with 50 cm deep and diameter of 60 cm should be prepared. During soil excavation the top soil and soil from the inner part should be put in separate place (different edge of the pit). One week before the actual planting soil from top should be returned first and soil from the inner part mixed with compost or well decomposed cow dung should be placed at the top. This will help to improve the fertility of the soil as well as the soil structure.

Abiye Astatke, the lead trainer, covered topics on the types/varieties of apple suitable for high altitude and other areas, and how to plant and manage the seedlings for better survival, yield increase and income diversification. At planting the grafted point should be 10-15cm above the surface of the soil. While planting the seedling should be placed straight (90°) and it need also to tie with a supportive small peg placed near to it. He also reminded participants that if there are root which are not straight needs pruning before planting and defoliate most of the leaves by leaving only some on the seedling.

Types/varieties of apple

Apple varieties/types grouped into three depending of the chilling requirement. Low chill which needs 250-500 chilling unit and the varieties tested under our country from this group include Anna, Princissa, Dorsett Golden, and CP-92. The medium chill requires 550-1000 chilling unit and varieties like Gala, Fuji and Primicia were tested in Ethiopia. The high chill apple needs more than 1000 chilling units and they are not common in our country. Abiye further pointed out that low chill apples like Anna go to dormancy twice a year and continue in dormancy for 3-4 weeks. The low chill apples gives yield twice a year. However, medium chill apples like Gala go to dormancy once in a year and stay in dormancy for 4-5 months. Varieties from this group (Medium chill) gives yield once a year. Abiye said that farmers should know the variety which they planted in their field because this have serious impact on the management which they should have to follow on their apple trees.

Most of the apple varieties that have been planted in the zone are coming from Kalu area and are medium chill, which are not fitting/matching to the environment of most Woredas of north Shewa zone. Abiye from his experience advised most of the highlands of north Shewa have <600 chilling units which is best suited for low chill varieties. He reminded Woreda and Zone experts that great care must be taken while introducing of apple varieties from other areas like the case of Kalu.

Chilling requirement: The chilling requirement of a fruit is the minimum period of cold weather after which a fruit-bearing tree will blossom. It is often expressed in chill hours, which can be calculated in different ways, all of which essentially involve adding up the total amount of time in a winter spent at certain temperatures.

Chilling unit: Chilling unit in agriculture is a metric of a plant's exposure to chilling temperatures. Chilling temperatures extend from freezing point to, depending on the model, 7 °C (45 °F) or even 16 °C (60 °F).

Growth stages and cycle of highland fruits

Gurmesssa (apple grower)- clarified the eight growth stages of highland fruits and these are break of dormancy, sprouting, blossoming/flowering, fruit set, fruit and sprout development, fruit ripening, leaf drop and dormancy/rest period. He also covers the three growth cycle of highland fruits. Gurmesssa helped the trainees to understand the three cycle of highland fruits: vegetative phase, generative and dormancy period and also their features which they will observe during each phase. The key activity a farmer has to do in relation with the growth stage are leaf defoliation after 2-3 weeks of dormancy period; followed by pruning; and finally training of apple trees.

Watering/mulching

During dry season single ring will be made around each apple tree to retain enough water for the plant. The size of the ring depends based on the branching capacity of the tree. Mulching of apple tree will be done using different grasses available in the area. Abiye shared his experience of watering and mulching of apple trees for the trainees. He provides 50-60 liters of water for each apple tree per week. He advised the farmers to start with 30 liters of water for each apple seeding and gradually increase up to 60 depending on the growth of the apple tree. He reminded that apple needs enough moisture during flowering and fruit setting stages. Thus, giving water is critical at this two growth stages. Mulching has a double advantage in apple production (i.e. serves for weed control and to conserve moisture).

Budding/grafting

The main aim of this part of the training session was to give some highlights of apple seedling production. Gurmesssa highlighted root sock preparation from common once like M11, M106 and M7 apple varieties using layering and stooling propagation techniques. He also showed how grafting of scion on root stock can be done using wage-grafting, T-budding and inverted T-budding techniques. At the end, the trainees visited rootstock production and well prepared apple seedlings at Abiye's farm which is allocated at the outskirts of Debre Birhan town.

Fertilizer application

Both trainers (Abiye and Gurmesssa) emphasized that the use of organic fertilizer like compost and well-decomposed dung are better options rather than using chemical fertilizers for highland fruit production. Abiye from his experience advised trainees to add three bucket of well-decomposed dung or compost for each young apple tree. However, this amount should be doubled if the apple tree starts giving fruits. The best time to add organic fertilizers is when the plant ends its dormancy period.

Weed and pest management

Gurmessa stressed apple trees should be free of any weeds to avoid the competition for soil nutrients, water and sunlight between the tree and weeds. He also advised the trainees to cover the free space between apple trees with annual crops like garlic, onion, carrot, lettuce and beetroot. Additionally, it is also possible to cover the space with nitrogen fixing annual crops like faba bean and field pea but care must be taken with regard to fungal disease management. Gurmessa aware the trainees about the common pest on apple which includes aphids, apple red-mite, wooly aphid and scale insects. The best option to control pests are planting garlic on the free space and spraying of pyrethrum. The last option will be use of insecticides.

Disease control

The common fungal diseases on apple tree include powdery mildew, Downey mildew, rust, root rot, damping off, leaf curl and smut. These disease mostly attack leaf, stem, flower and fruit of the apple. Abiye and Gurmessa reminded that the control options for diseases are planting of apple seedling with appropriate space. If there is severe disease occurrence uprooting and burning infected trees is advisable.

Part two - Practical training session

Up on completion of the theoretical session, the trainees did practical demonstration on pit preparation; leaf defoliation; pruning; and training of apple trees which are very critical for apple tree establishment at Faji apple farm.

All the trainees from the three Woredas did practical pit preparation at the farm. They dug a pit with 50 cm deep and diameter of 60 cm. They also had practical exercise on soil excavation. The trainees practiced on how to put the top soil and soil from the inner part in a separate places (different edge of the pit).



Photo 1: Training participants from Basona Worena Woreda practicing on pit preparation (photo credit: ILRI/Temesgen Alene).



Photo 2: Training participants from Tarmaber Woreda practicing on leaf defoliation (photo credit: ILRI/Temesgen Alene).

The last round of training participants (from Tarmaber Woreda) did practical exercise on leaf defoliation. Abiye advised the trainees on how leaf defoliation should be done at the time of dormancy. He also advised to do it twice for low chill apples like Anna and once for medium chill apples like Gala.

There should be 20-25 cm space between two branches of apple tree. After leaf defoliation pruning must be done on each apple tree. The main advantages of pruning are to get enough sunlight, make the tree strong, encourages new branches to emerge, and controlling diseases and insect pests.



Photo 3: Abiye shows the Angolelana Tera Woreda trainees how to prune apple trees (photo credit: ILRI/Temesgen Alene).

Training of apple is a key activity during apple production and management. Abiye shows the participants how to do training. Training will be done after leaf defoliation and pruning. The branches should be trained in the arrangement of 45-60°.



Photo 4: Participants from Tarmaber Woreda in different groups doing training of apple trees (photo credit: ILRI/Temesgen Alene).

Reflections on the training

Farmers

Mekuriya Mengistie a farmer from Gudo Beret said "Before coming to this training I see apple seedling as a useless stick"

Yeshidagena Gidebe a model farmer from Bakello Kebele said "I tasted/ate apple for the first time in my life"

- Most of the farmers appreciated the whole arrangement of the training. They also pointed out that the training has helped them to have deep theoretical and practical knowledge on apple production and management.
- Farmers were very happy about the training manual and leaflet which they got from the trainers. They appreciated that it is well written in local language (Amharic) which is also a good reference for the future.
- Farmers from Basona Worena and Angolelana Tera witnessed the existence of a "serious awareness problem" on apple production in general and its management in particular.
- Some of the farmers expressed that the training helped them to have good knowledge on apple varieties, pruning, training and grafting/budding.
- Participants from Tarmaber Woreda (have experience on apple production) said that the training helped them to identify the management faults/gaps which is common in their area before the training. Some examples are non-fruiting apple trees, big trees of apple without any pruning, and not well trained apple trees.
- Leaf defoliation at the time of dormancy was a new thing for some of the farmers.
- Some farmers said they got practical answer from the field on the narrow spacing which they use on their field. They assured to use the recommended spacing between seedlings while planting.
- Farmers promised to put what they get from the training practically on their fields.

Kebele development agents (DAs)

- Most of the development agents (DAs) agreed that both the theoretical and practical training parts were valuable.
- One DA from Tarmaber Woreda said that the number of trainees which is 20 to 25 was ideal number for both the theory and field practice. She appreciated the free discussion, expressing own view, asking any kind of question, and sharing experience during the whole period of the training.
- Most of the DAs who were on the training appreciated the integrated farm of Abiye Astatke which include apple production, seedling raising, sheep and cattle production, and bee keeping. They pointed out that such kind of farm should also serves as to train practical integration at farm level.
- DA's from Angolelana Tera Woreda promised to facilitate training of other farmers using farmers who took this training.

Woreda and zone experts

Wubalem Mamo (Horticultural crops expert from Mojana Wodera Woreda) said “I have participated on apple training at different places of Amhara region (Kombolcha, Debre Tabor and Bahir Dar). However, most of them tended to the theoretical part and if they have some practical part it was only to show something at the end of the trainings day. She remarked this training is different as it equally combined theory in class and practice in the field.”

- Some Woreda experts gave credit to Africa RISING project for choosing appropriate place for the training (i.e. Abiye apple farm).
- Experts from different Woreda agreed that the training was different from other trainings on apple production in such a way that each theoretical session was immediately followed by practical session (i.e. learning by doing as well by seeing).
- Representatives from North Shewa zone office of agriculture (Askale Yifru, Afework Taddese and Hulumeyifer Taddess) clearly mentioned the importance of the training in filling the practical knowledge gap on apple production and management for farmers, Kebele DAs, Woreda as well as zone experts.

Final remarks from North Shewa zone office of agriculture

Belachew Nigussie (Deputy-Head of North Shewa zone office of agriculture) appreciated the organizer and also the trainers for conducting such a successful training sessions. He reminded farmer trainees that they have double-assignment up on completing this training. One is to apply the training on their farm to get the desired changes and second to serve as a model for other farmers which didn't get the chance to be part of this training. He finally said that there will be a close follow up and monitoring and this will be as a big assignment to be done by the respective Kebele DA's, Woreda and zone experts for scaling up of apple.