



Title: Sustainable Livelihood through Integrated Tree-Crop-Livestock Farming System in Makueni County, Kenya

Target Audience: Farmers and Extension Agents

Introduction

Makueni County is located in Eastern Kenya and is generally semi-arid in nature. The average annual rainfall within the count is 600 mm while temperatures are 23⁰C. The soils are primarily sandy and acidic in nature. The County is characterized by a rapidly growing population, water scarcity, low food production, and low resilience to climate change. These challenges lead to food insecurity, low income, and malnutrition for many small holder farm families.

Mr. Jonathan Kituku, a farmer in Makueni County, Kibwezi sub-county is involved in integrated farming where he practices scale on-farm plantation development, fruit farming and pasture growing. Mr. Kituku owns about 95 acres of land much of which is under *Melia volkensii* (Melia) trees and mango orchard. The farmer selected *Melia volkensii* for woodlot development as the species is drought tolerant, grows fast, and is termite resistant. The farmer started tree farming in 1999 after receiving advice from KEFRI on Melia propagation procedures as well as tree nursery establishment and management.

Objectives

Objectives of integrated farming:

- To address challenges of inadequate food
- Improve income generation
- Avail pasture for livestock throughout the year
- Improve farm productivity

Approach

Over the years, rainfall in Makueni County has continued to decline leading to low crop production, hence the need for other investment alternatives such as tree growing, fruit farming, shift from free roaming to zero grazing of livestock rearing system. Melia growing was introduced on-farm after identification of the species as suitable for dryland conditions, and training of model farmers such as Mr. Jonathan Kituku by KEFRI.

Activities under integrated farming

- ***Melia volkensii* woodlot development**

To establish Melia, site preparation is carried out through; clearing of land, fencing, ploughing, harrowing and leveling. Planting holes measuring 45 cm deep x 45 cm wide x 45 cm long and spaced at 4 m x 4 m are dug. Melia seedlings are planted at the start of the rainy season. Management of the tree is undertaken through weeding, and pruning which is carried out through removal of buds (de-budding). Melia woodlot is long term enterprise.

The farmer also collects *Melia volkensii* seed from naturally growing mature trees on his farm and supplies to farmers and companies who require the seed. Melia growing constitutes part of the long-term enterprise.

- **Mango fruit orchard**

Mr. Kituku has an orchard of grafted mangoes which currently cover 17 acres. The mango trees are of different varieties with the main variety being apple, a variety favoured for export market. Due to water shortage, Mr Kituku also harvests run-off by collecting rainwater through terraces to improve mango crop productivity. Mango growing constitutes part of the mid-term enterprise.

- **Pasture growing**

The farmer harvests natural grass, bales, stores and sells to other farmers during the dry season. Much of the grass is harvested under the Melia plantations. The farmer ensures the hay is well stored till the next dry season and has therefore built a warehouse for this purpose. The warehouse can accommodate about 3,400 bales of hay.

The farmer also rears goats, cattle, poultry and donkey. Livestock rearing and pasture farming form part of the short-term enterprise for the farmer.

Impact

- Improved income for the farmer through; sale of Melia seed, seedlings, firewood, timber mango fruit and hay.
- Improved nutrition and food security from mangoes and vegetables produced

- Growing of Melia and mangoes crop has contributed to; soil and water conservation, improved soil fertility, enriched bio-diversity and improved resilience to climate change.
- Trees have also improved microclimate on the farm, aesthetic value and act as windbreak.

Innovations and Success Factors

- Melia growing, establishment of fruits orchards and pasture farming has been adopted by many farmers in Makueni County. This has been enhanced through training of farmers and raising seedlings in their own nurseries.
- In order to increase quality and volume of Melia timber, Mr. Kituku increased the tree spacing from initial 4 m x 4 m which was introduced by KEFRI to, 7 m x 7 m, and to 8 m x 8 m.
- The farmer also intercroops Melia trees with green-grams and natural pasture grasses maximizing land productivity
- Mango orchard contributes greatly to diversify income sources.
- The farmer has plans to add value to mangoes rather than selling them unprocessed,



Melia trees plantation established on-farm



Grass growing naturally under melia trees used for hay making

Constraints

Some of the constraints experienced by the farmer include:

- Shortage of water due to inadequate amount and poor distribution of rains.
- De-barking of Melia trees by goats negatively affecting tree growth.
- Retarded growth of Melia due to poor seed material used.
- Diseases incidences especially canker

Lessons Learnt

Some lessons learnt include:

- Intervention of extension agents is key in directing, and informing farmer's decisions.
- Growing drought resistance trees contributes greatly to livelihood improvement in the drylands.
- Livelihood improvement can be attained through tree nursery activities.
- Water harvesting is necessary for food and tree crop survival and productivity in the drylands
- Good management of mango orchards leads to a healthy orchard and high production.
- Intensified pasture grass production as an understory in Melia plantation gives livelihood sources for medium and long term.
- Good relation between model farmer and neighbouring community enhances farmer- to-farmer information dissemination
- Integrated farming is important in drylands to ensure food security and income generation for farmers.
- Melia is a tree species tolerant to drought and therefore grows well in dry areas
- Natural grass under Melia plantation can be managed for hay production thereby boosting income generation for farmers.
- Integrated farming enhances soil conservation and fertility.
- It is important to have a farm plan that involves short term (crop production), medium term (grafted fruits, livestock farming) and long term (tree farming) to ensure livelihood needs such food production and generation of income are met.

Conclusion

Growing of Melia, fruits crops such as mangos and pasture is a viable enterprise for small scale famers as it has potential to; improve farmer's income, conserve environment, and enhance mitigation and adaptation to climate change.

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