REPUBLIC OF KENYA

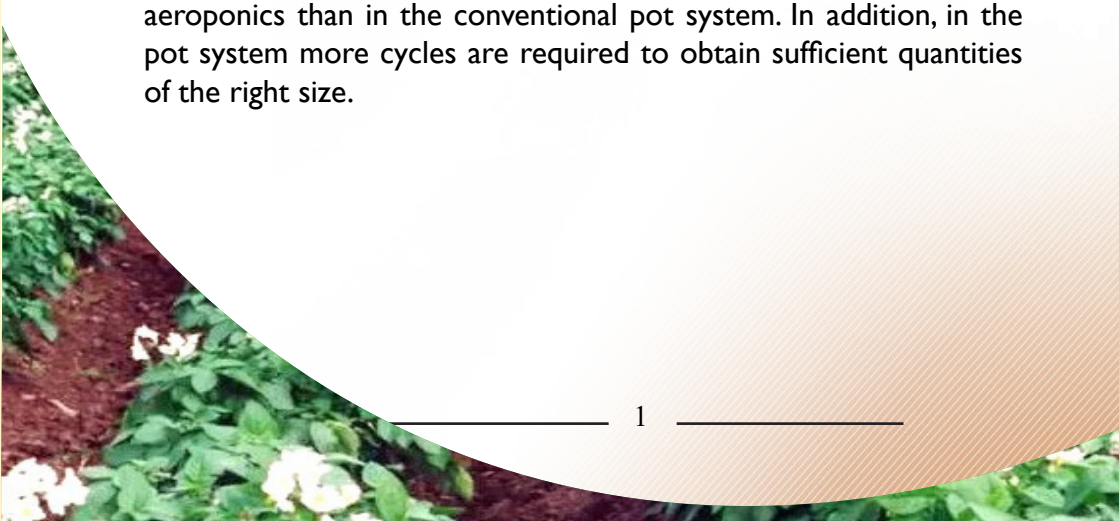
KALRO
Kenya Agricultural & Livestock Research Organization

NAVCDP
National Agricultural Value Chain Development Project
Transitioning from Subsistence to Commercial Farming

PRODUCTION OF MINITUBERS THROUGH AEROPONICS SYSTEM

Introduction

- Potato production is constrained by lack of clean planting materials that are not easily accessible to farmers. Every season there is acute demand for certified seed potato by small-scale farmers. Failure to satisfy this demand leads to recycling of seed potato or planting farm-saved or purchase of potatoes from market of undetermined quality.
- Production of certified seed potato starts with tissue culture process. After around six weeks, the plantlets are hardened and planted in conventional pots so as to produce minitubers, which are later planted in the field for up to three cycles (a cycle is about 3 months) to become basic seed potato.
- This process takes time and requires disease-free land which is a diminishing production factor. Aeroponics system may come in handy in increasing quantities of seed potato availed to potato farmers.
- It is an alternative method of minituber production in a soil-less culture. In this system, small plantlets are suspended inside a small hole while the roots hang downwards in an enclosed dark chamber and supplied with nutrient solution by way of misters.
- The number of cycles to attain the right size of minitubers is less in aeroponics than in the conventional pot system. In addition, in the pot system more cycles are required to obtain sufficient quantities of the right size.



Illustration

Advantages of Aeroponics System

1. High quality potato seed is produced free of soil-borne diseases such as tuber blight or bacterial wilt.

2. Offers higher yield per plant of up to 6 times more. Conventional pot method yields at a ratio 1:5 while aeroponics yields up to a ratio of 1:30 and more.

3. It prolongs the plant life cycle hence more production of up to 6 months as compared to conventional pot method which is a one-off harvest.

4. This system promotes air circulation which strengthens the roots boosting vigorous growth of foliage and stems and supporting high productivity.

5. Nutrient recycling in this system saves on water and resources.

This system does not require land to establish, hence eliminates the need for disease free land.

Disadvantages

1. It requires high capital to establish and operationalize.
2. It also requires highly skilled labour with special skills in crop management and fertigation to operate.

Flow chart of establishment of aeroponics system

Aeroponics unit construction system

Nutrient solution tanks storage

Preparing Plants for Aeroponics Planting

- Highly quality planting material are produced from tissue culture.
- These plantlets are removed from jars, washed under clean running water to remove agar on the roots and are then planted on to seedbeds containing sterilized planting media.
- The young plants are misted with a fine mist of nutrient solution using a hand sprayer for two weeks before being transplanted to the aeroponics unit.

Transplanting plantlets into the aeroponics unit

Crop establishment in aeroponics

After 6-8 weeks minitubers are mature for harvesting

Harvesting

Two months after transplanting, early maturing varieties such as Shangi start to produce minitubers. The tubers weighing more than 8g are harvested and stored awaiting breaking dormancy.

Bags of minitubers which have been harvested

Storage of minitubers

- The harvested minitubers are then treated with 0.1% Sodium hypoclorite solution and rinsed with clean running water to avoid bacterial contamination. They are cured by placing them in clean dry environment for 2-3 weeks before storage.
- They are then graded according to sizes. Very small tubers are placed in cold storage while larger tubers are stored in aphid-proof net enclosed diffused light stores. The smaller tubers can further be multiplied in pots with sterilized soil media for production of larger tubers

Field Production

Minitubers from aeroponics are taken directly to the field for basic seed potato production. These materials are registered and inspected by KEPHIS, when mature they are harvested, given labels and sold to seed potato farmers for onward multiplication and supplying to ware potato growers.

Field of healthy vigorous growing seed crop

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