

From Laboratory to Market
Government-private sector contribution to improve sustainable development of
sweetpotato production

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Summary

Sweetpotato vegetative cuttings Abees cultivar were collected and serologically tested using ELISA and Western blot analysis techniques. Thermo-therapy followed by Meristem tip culture technique was used for virus elimination. The virus-free plants obtained by this methods, were subjected to micropropagation regime. Adaptation and acclimatization of *in vitro* sweetpotato plantlets were carried out in an insect proof greenhouse facility. After adaptation the clean material were used as a source of cuttings to assist Agro-food Co. for enhancing the final production through their bio-farming system.

Introduction

Sweetpotato is grown in Upper Egypt and at Nubaria, Kafr Elsheikh and Menofia (Delta). The area of the crop has reached 28.000 acres with an average yield of 12 tons/acre. During the last three years, the demand for sweetpotato export has been increased through the private sector reached 6000 tons that exported in 2004. However, cultivar characteristics and low yield due to virus diseases are limiting factors for productivity that needed to be overcome under Egyptian conditions. The

aim of this work is to improve the agronomic quality of deteriorated local cultivar of sweetpotato (Abees) by producing virus-free stock plants through tissue culture techniques.

Materials and methods

This experiment was performed during 2004-2006.

- Sweetpotato vegetative cuttings Abees cultivar was collected from Kafr El zyaf fields and kept under controlled conditions at AGERI greenhouse.

- Serological and molecular testes were conducted on the collected sweetpotato plants using, dot-ELISA and Western blot analysis. The samples were tested using antibodies raised against sweetpotato feathery mottle virus (SPFMV), sweetpotato chlorotic stunt virus (SPCSV), sweetpotato caulimolike virus (SPCaLV), sweetpotato mild speckling virus (SPMSV), sweetpotato latent virus (SPLV) and sweetpotato mild mottle virus (SPMMV). Antiserum was kindly provided by International Potato Center (CIP)
- Thermotherapy followed by meristem tip culture technique were used for virus elimination.
- Sweetpotato virus-free plants were re-tested for viral infection as described above followed by *in vitro* micro-propagation using nodal cuttings technique (Fig. 1).
- Adaptation and acclimatization of sweetpotato were carried out in the insect proof greenhouse facilities at Agro-food Company (Fig. 2, 3).
- Adapted plants were transferred into large plastic greenhouse (one acre) at Agro-food as a mother plants for a massive cuttings production (Fig. 4).
- Production and the quality of sweetpotato cultivar Abees were evaluated in different locations (Fig. 5).

Results

- The productivity of sweetpotato virus-free plants using tissue culture technique was improved.
- The production reached 15 to 20 tons/acre comparing to 10-12 tons/acre produced by commercial Abees roots. Results showed that the productivity may also affected by the location and type of soil table (1).
 - A routine viral detection method should be applied to detect infection in the fields and in the stock mother plants, which will be used as source of cuttings.
 - In comparative study among different viral detection methods, results revealed that direct-ELISA technique was sufficient for viral detection in quantitative bases, whereas, dot-ELISA was best method for virus monitoring in the fields as qualitative assay. RT-PCR is a very sensitive technique for testing the stock mother plants.
 - However it is an expensive and laborious method to be applied for routine work in the fields since it includes RNA extraction step (Ashoub *et al*, 2007).
 - The production of clean sweetpotato plants through tissue culture method and bio- farming system at Agro-food Co. enhanced the final product and increased the exportation to EU-Market.

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References

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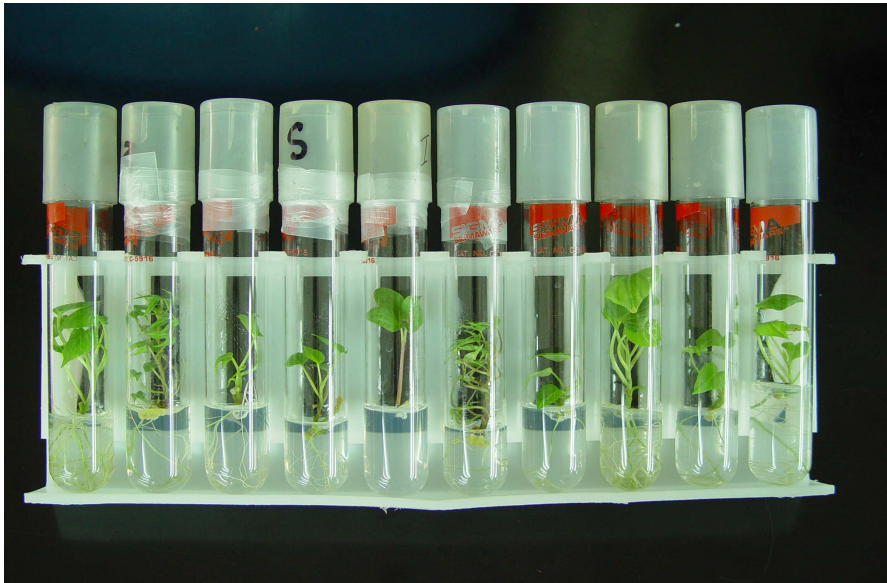


Figure (1) Reintroduction of sweetpotato cultivars into the tissue culture for their massive micropropagation.



Figure (2) Acclimatization of sweetpotato cultivar abees in the greenhouse



Figure (3) Acclimatization of sweetpotato cultivar. Abees in greenhouse of Agro-food farm.



Figure (4) Mother plants into the soil under the one-fedan greenhouse at Agro-food farm.



Figure (5) Growth of the virus-free abees cultivar in the open field at El-Nubaria (newly reclaimed area).

Table (1): Productivity of virus-free sweetpotato plants in different locations of Egypt.

Location	Total area/acre	Soil type	Yield/acre m/t
El-Fayoum	1	Heavy clay soil	20
El-Nubaria, Salah El-Abd	2.5	Sandy	15
El-Nubaria, El-Momennin	1.25	Sandy	18
El-Dakahlya, Banuob	1.25	Heavy clay soil	18
El-Nubaria, Rigwa	10	Sandy	15