

SEEDING THE JAMAICA MARKET

PROPEL facilitates production of clean plant tissue and cooperation among Jamaica's top research institutes
- August 2018

The Kingston-based **Scientific Research Council (SRC)** and the **Bodles Agricultural Research Station (Bodles)**, are Jamaica's two leading public sector agricultural research agencies. While each agency has a wide range of other responsibilities, both are producing disease-free plant tissue and seeds to combat diseases that are prevalent in the country and due to climate change, are on the increase. For both agencies, a key focus is the protection of crops that are economically important to the domestic market e.g. Irish (white) potatoes, sweet potatoes, yams and ginger. Crop yields can potentially increase significantly – from 30% to 80% -- when planting tissue/seeds are free of disease.



Laboratory staff at SRC carry out tissue propagation

The Promotion of Regional Opportunities for Produce through Enterprises and Linkages (PROPEL) project is Implemented by World University of Canada (WUSC), with the financial support of donors and from the Government of Canada through Global Affairs Canada (GAC).

A heightened priority has been placed on clean planting material for key crops in Jamaica, to increase food security and reduce foreign exchange spending.

“Traditionally what happens is the farmer retains material after each crop for propagation for the next season. The key crops, such as ginger, Irish potato, sweet yam and sweet potato, are particularly prone to various diseases -- bacterial, fungal and viral -- and by sharing material, and retaining material, the disease load is particularly high at the beginning of the season, and so by the end of the season the yield is significantly affected.”

Gillian Rowe, Tissue Culture Process Development Officer , SRC

The importance of the work of SRC and Bodles to the agriculture sector in Jamaica and the challenges that the agencies faced was recognized by the PROPEL Jamaican team early in the project. They then looked for ways to partner with the two agencies.

The goal of producing clean planting material/seeds in Jamaica is two-fold: 1) to make clean seeds and planting material readily and affordably available to farmers, so that crop yields can be maximized; and 2) to be more strategic on the importation of clean seeds and planting material for key crops, some of which are becoming increasingly difficult to source on the international market. However, as Michelle Sherwood, Deputy Research Director at Bodles, observes: *“In Jamaica, farmers are not used to buying plant material.”*



PROPEL’s involvement with the SRC, (an agency of the Ministry of Science, Energy and Technology) began in 2015 when it approached the lab to obtain clean planting material for sweet potato, sweet yam and Irish potatoes. At that time, SRC asked for help to screen some varieties of crops, grown in Jamaica, but not already in its gene bank. PROPEL obtained samples of the missing plant varieties and arranged for them to be screened for diseases in a US laboratory. To build SRC’s capacity, PROPEL also provided an Elisa machine for plant pathogen diagnosis.



Gillian Rowe in the tissue culture lab at SRC

“Irish potatoes alone may require 15 tests for viruses, bacteria and fungi,”

Gillian Rowe, Tissue Culture Process Development Officer , SRC

In the production of clean plant tissue, the SRC has been relying on an old method of using sterile glass jars, covered with tinfoil, in a room with controlled temperature and light exposure. This method has the added expense of imported purified agar (a part of the solution the plant tissue is grown in). SRC realized that it would benefit from a more efficient approach to growing clean plant tissue.



Gillian Rowe shows TIS equipment provided through PROPEL

PROPEL supported SRC to access a Temporary Immersion System (TIS) at a cost of under JMD \$3-million. For Irish potatoes, the TIS can grow not just plant tissue but also mini tubers, which are much more user-friendly for farmers. “Farmers are not necessarily equipped to harden or acclimatize the tissue culture plants,” Gillian Rowe of SRC observed. The TIS consists of 32 bioreactor units, with a control panel powered by software that provides intermittent immersion in liquid. Rowe enthused, “...it simulates what happens in nature. I am really excited about this system and what it can do...it can produce 50,000 to 60,000 micro tubers a year.” The SRC began using the TIS in early this year and Jamaica is the first Caribbean country to have this technology.

With its mandate to disseminate technology, the SRC plans to develop and share protocols for growing Irish potato micro tubers and now has the means to engage in commercial scale production of disease-free Irish potato plant material and micro tubers at a price that will help to further increase domestic production.

COOPERATION WITH SRC AROUND CLEAN GINGER

Ginger production in Jamaica has been seriously limited because of rhizome rot. PROPEL took on the challenge of increasing the production of clean ginger by first contracting SRC to grow 5,000 clean ginger plantlets. In addition, PROPEL partnered with organizations, such as Knockalva Agricultural School, where the clean plants could be grown carefully in greenhouses, in a contamination-free setting. PROPEL has also supported the creation of a guide for growing ginger in greenhouses.

Production of clean planting material for Ginger cultivation

Greenhouse production

A good start to production is ensured by using clean seed rhizomes planted in a disease-free greenhouse using a disease-free commercial growing medium. Control over growing conditions is assured when the growing area is secured and protected from weather throughout the growing season, reducing the potential for accidental introduction of disease.

Rhizomes for planting are selected from disease-free material. It is recommended that second generation (F2) seed from tissue culture origin be used as planting material. Seed pieces for planting should weigh between 25-50g each, having 2-3 good buds.

Production is “unitized.” In that each grow-bag is a production unit, allowing for quick removal from the area of a plant suspected of being contaminated. To minimize the likelihood of disease in the seed pieces (in the form of bacteria, fungi or nematodes), plants showing potential signs of disease (yellow spots, dying branches, etc) must be isolated from other ginger plants to be used as future seed material, while such rhizomes may still be adequate for consumption, only completely healthy plants should be selected for seed material.

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Although Bodles and SRC have worked to clean up the ginger planting material, some of the “clean” planting material the facilities have produced remains infected with rhizome rot. WUSC has therefore contracted with the Belgian company Vervit to completely clean three different varieties of Jamaican ginger. The cleaning process, already underway, is expected to take 9 months and PROPEL has funded half of the costs of the cleaning process.



PROPEL AND THE BODLES AGRICULTURAL RESEARCH STATION - A DIVISION OF THE MINISTRY OF INDUSTRY, COMMERCE, AGRICULTURE AND FISHERIES (MICAF)

The first collaboration between PROPEL and Bodles Research Station was around sweet potatoes. Bodles had imported tissue culture from South Carolina for the Beauregard sweet potato, a variety not commonly grown in Jamaica. However, it is in high demand locally for the tourist market (hotels) as well as the local market. Bodles cultivated the plant tissue until it reached a stage where it could be used by farmers.

“PROPEL came in because we needed support getting the material to farmers and to introduce farmers to this new variety”.

Michelle Sherwood, Deputy Research Director, Bodles

To support Bodles with this effort, a Memorandum of Understanding (MOU) was signed between the two parties in July 2015. Under the terms of the MOU, Bodles and PROPEL agreed to collaborate to establish a sustainable clean planting material programme to improve the competitiveness of local farmers and to provide them with access to clean planting material (slips), and technical advice to improve yields and



long-term prospects for profitability. PROPEL provided seed funding to allow Bodles to offer the slips free of cost to the first group of farmers for trials to plant the Beauregard variety, as well as provided technical assistance to the seed potato programme.

After the initial trials, PROPEL supported Bodles to partner with the Rural Agricultural Development Authority (RADA) to distribute the slips at a charge to farmers. With the proceeds from these sales, Bodles engaged a South Carolina laboratory to clean (eliminate diseases from) two local varieties of sweet potato, and also imported other varieties. Bodles recently moved its seed bed to the College of Agriculture, Science and Education (CASE), where students are engaged in the process of cultivating clean seeds and slips. Farmers have been quite happy with the productivity of these clean planting materials which have reinforced how such materials influence their bottom line.



Beauregard sweet potato trials in collaboration with Bodles and RADA

BODLES MICAFA SIGNS A SECOND MOU WITH PROPEL TO COLLABORATE ON VARIETAL TRIALS ON IRISH POTATOES

A set of five trials over two years (2 in 2016 and 3 in 2017), were conducted by the partnering agencies to determine how well 16 different varieties of Irish potatoes grew in local conditions in Jamaica. Members of the Potato and Onion Producers Association of Jamaica (POPA) arranged to import the seed potatoes from Holland and Canada. For the trials, PROPEL supported monitoring efforts in



Bodles Greenhouse

order to enable all parties to clearly measure the results of the trials. PROPEL also supported a trial to evaluate a new type of plastic cover for shade houses that is infused with pesticide and is considered pest resistant. Additionally, support was provided for a new lighting system for the Bodles Research Station laboratory, in order to facilitate the expanded capacity to grow more clean slips of sweet yam and sweet potato.

In exchange for the lighting, Bodles agreed to supply the clean slips to greenhouse farmers, from whom the seedlings would be distributed at a charge to farmers. In this way, PROPEL facilitated a link between Bodles and private sector greenhouse operators, a link that could be sustained on a cost-recovery basis – to the advantage of both parties – until the value of the supply of slips had equalled the cost of the new lights.

New linkages are vital to Bodles. “The linkage we are trying to create is so that farmers will come back and buy from us. The Permanent Secretary has mandated that Bodles is where people should come for planting material. We are trying to explain to farmers, that their crops will be more productive if they use our clean material,” says Michelle Sherwood. PROPEL has helped to create an intermediary between Bodles and farmers, by ensuring that clean planting material is grown in greenhouses, so farmers can buy clean slips locally.

As a result of its work with SRC and Bodles, PROPEL identified the need for further cooperation between the two entities and the Northern Caribbean University. Together with the Jamaica Social Investment Fund, PROPEL helped facilitate linkages among the institutions and the National Technology Working Group now meets regularly.

The contribution of SRC and Bodles to improving access to clean planting material and a changing culture to the utilization of such slips has laid a good foundation for improved yields, reduced cost of production and improved resilience of farmers to the realities of climate threats.



Dr. Petra-Gay Chang, Chief Post-Entry Officer in the lab at Bodles

“Because of PROPEL’s input we have built a relationship with producers, a linkage we never had before, and PROPEL has helped us build the foundation for that to happen.”

Michelle Sherwood, Deputy Research Director



A visit to the NCU lab with members of POPA and PROPEL