Systems Approach to Improve Breadfruit Exports in Fiji

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Abstract

A systems approach for breadfruit production and marketing is discussed. This involves farmer registration and advice on crop management techniques, crop harvesting, fruit grading, fruit inspection, high temperature forced air (HTFA) treatment, phytosanitary inspection and certification for export of breadfruit by different stakeholders in the private and public sectors in Fiji. The systems approach is undertaken to maintain continuous production, supply and quality control to reduce the rejection rate of the fruit. The post-harvest treatment using HTFA was negotiated under bilateral trade agreements and the “systems approach” ensures that Fiji meets the importing country’s requirements, as well as providing transparency and traceability.

BREADFRUIT EXPORTS AND PHYTOSANITARY REQUIREMENTS

Breadfruit, *Artocarpus altilis* (Parkinson) Fosberg, is one of the minor crops exported by Fiji with New Zealand being the main market. New Zealand, however, has one of the most stringent quarantine requirements for importation of plant and animal products. In Fiji, the crop is mostly cultivated by small holder farmers, who usually grow only a few trees. The trees are normally planted around the houses or in areas unsuitable for tillage as the tree can grow up to 10 m tall. The fruits provide an alternative source of staple food in many communities apart from taro and cassava. The main New Zealand consumers are the Pacific Islanders living there. The fruit can be handled by peeling the skin and storing in coolers and exported; however, many Pacific Islanders prefer fresh fruit.

Breadfruit is subject to attack by a number of pests and diseases, with fruit flies of the genera *Bactrocera* being the most important pests as they damage the pulp and seeds inside the fruit. Two species, *B. xanthodes* and *B. passiflorae*, are recorded attacking breadfruit in Fiji (Tora Vueti, 2000). Appropriate field management practices and treatment of fruit using acceptable methodology to minimize the risk of introduction of fruit flies and other associated pests and diseases are requirements of New Zealand in the current Bilateral Quarantine Agreement with Fiji.

A bilateral quarantine agreement (BQA) is often needed when trade negotiations are undertaken between countries for commodities of plant and animal origin that may harbour pests and diseases harmful to the importing country. A BQA was developed and agreed upon between New Zealand and Fiji for fresh commodities to be exported to New Zealand. This BQA required the installation of a structured system to maintain product quality, integrity and traceability, and to minimize the risk of injurious pests and disease entering New Zealand. The main concern was for fruit fly host commodities which posed a high risk unless stringent quality control and approved treatment protocols were enforced.

SYSTEMS APPROACH AND QUALITY MANAGEMENT

A systems approach was developed by the Fiji Ministry of Agriculture, Forestry and Fisheries (MAFF), with the assistance of consultant Keith Budd from AgriChain Centre of New Zealand. A trace-back system was needed in Fiji to identify gaps and faults in the breadfruit quality-management system should a pest or disease be intercepted.
by New Zealand Quarantine in one of the export consignments. Similar systems were needed for other horticultural commodities being exported, such as papaya, mango and eggplant. The rapid identification of such lapses is important so immediate corrective measures can be identified and appropriate action taken to maintain continued market access and supply. A ban would have a drastic effect on the livelihood and interests of the small farmers, exporters, etc., in the supply and service chain of the industry.

Internationally, quality management systems are an increasingly predominant form of controlling quality, consistency and best practices in the fresh produce sector, adding value to the product. Sanitary and phytosanitary (SPS) measures are becoming increasingly important barriers to trade for small, developing and least-developed countries. Countries that have been successful in exporting horticultural produce are those that are able to organize their internal production and marketing systems to maintain quality, product integrity and traceability.

The systems approach is an avenue whereby trade-restrictive issues, such as de-infestation treatments and prohibitions-based SPS measures, can be avoided. Importing countries, especially New Zealand and Australia, prefer offshore treatment as it minimizes the risk of pest-infested commodities landing in countries. The probability of a pest arriving with a commodity is lower when the required treatment is applied offshore in the exporting country. The systems approach has several components and this paper will summarize those applicable to breadfruit in Fiji.

Grower and Exporter Registrations

Breadfruit growers are registered through the MAFF Extension Service. After an application is made by the growers, the sites are visited to verify the production area and number of plants. Information, such as farmer family details, educational level, available farming machinery and implements, plant cultivar and source of planting material, are recorded and assessed. A map and details of the farm, farm records and contractual obligations to certain exporters are also considered. Farmers agreeing to keep to the terms and conditions of maintaining the field-required husbandry, pest management and quality-control practices sign a contractual agreement. This agreement can be terminated should a farmer not be able to manage his field in the appropriate recommended manner. Farmers are given an opportunity to reapply once corrective measures have been made and upon inspection by MAFF Extension and Quarantine Officers.

Exporter registrations are processed in a similar manner, requiring the exporter to have facilities for grading, inspection and storage. Transportation arrangements must be in place for picking up the fruit from farmers’ fields, transportation to packing houses and to the high temperature forced air (HTFA) treatment facility. The exporter must identify an importer and have adequate financial resources, including loss-of-business insurance coverage for unexpected circumstances. Exporters must understand SPS requirements of the importing country and have a trained quality controller to oversee the grading, sorting and packaging, and maintain farm and purchase records for inspection by MAFF Quarantine Officers.

Grower Field Control Measures

Breadfruit growers are required to maintain field hygiene. Scheduled visits are made by MAFF Extension Officers to provide advice and ensure that crop management practices are applied. Relevant crop management practices include control of weeds, scheduled application of protein bait spray for fruit fly control, pruning of branches and improving sanitation by removing fallen or overripe fruit. Fruits that have received appropriate sanitation methods at registered sites are harvested at maturity and taken to packing houses for sorting and grading by the exporters. Maximum care is taken to avoid injuring fruits during harvesting and packing.
Transportation to the Packing House

Harvested fruits are sorted and packed at packing houses approved by the MAFF Quarantine Division. Quarantine officials examine the daily harvest records supplied by farmers to ensure that no fruit from unregistered growers ends up at registered packing houses. All fruits are graded. The BQA with New Zealand requires that 450 fruits be inspected for shipments of <1,000 fruits, or 600 fruits for shipments of >1,000 fruits. Quarantine then certifies the exact weight and number of fruits inspected and transported to the HTFA treatment center by the exporter.

Grading/Inspection/Treatment

Breadfruit is treated at the HTFA plant at 47.2°C for 20 m. After treatment, it is subject to further inspection, weighed, packed and labeled. It is stored in a pest-proof facility at the treatment center to prevent re-infestation and contamination. Records for each treatment accompany the consignment for further checking and inspection by MAFF Quarantine Officers before a phytosanitary certificate is issued.

Phytosanitary Inspection

Phytosanitary certificates are issued by MAFF Quarantine Officers based at the HTFA treatment plant, who ensure that all necessary steps were taken. A computer printout showing that each treatment was done and a declaration is attached to the official phytosanitary certificate.

Audits

Fiji MAFF, through the Quarantine Division, formally audits fruit export pathways to ensure all exporters comply with New Zealand requirements as stipulated under the BQA. This agreement is reviewed and updated every three years. However, it is agreed that should a pest interception occur during inspection in New Zealand, the importing country has the right to take measures (e.g., fumigation or a temporary ban) as an appropriate level of protection until an investigation is conducted and the problem is identified and rectified. The systems approach enables traceability and, therefore, pest interception can be easily traced back to the source with by examining and assessing the documentation.

EFFECT ON EXPORT VOLUMES

The systems approach described above has ensured that there is minimal interception of breadfruit pests in New Zealand. When a consignment arrives in New Zealand, there is a sampling of 600 units per consignment. In the event of an interception, any treatments applied are charged back to the exporter. Therefore, it is critical to ensure no such interceptions are made. Since the systems approach was undertaken and implemented, there have been lower rates of product rejection due to poor quality. Similarly, no pest interception has been recorded, ensuring the importing country's continued acceptance of the treatment regime and produce. The volume of breadfruit exported has increased since the adoption of the systems approach (Fig. 1). Table 1 provides the number of breadfruit growers registered for export. The number of registered growers rapidly declined to only three growers during 2006, hence the low volume exported. A similar trend was recorded for chili peppers and mango.

DISCUSSIONS

Breadfruit exports from Fiji have been steadily increasing over the past 5 years. This is largely due to the systems approach which Fiji has developed and adopted to meet New Zealand quarantine requirements. This trend resulted from cooperation and collaboration between all sectors: growers, MAFF extension, research and quarantine staff, transport providers, packing houses, exporters and treatment providers, shippers and agricultural suppliers.
The acceptance of the systems approach by stakeholders (e.g., growers, exporters, transport providers and MAFF extension, quarantine and research) took about 8 years to fully adopt the recommendations and meet the requirements. It was gradually accepted and improvements were made as faults were identified and rectified. Stakeholder understanding and willingness to cooperate and collaborate is important. The current system has been successfully adopted and has increased the volume of breadfruit exported. Government agencies play an important part in monitoring and auditing, while the private sector adopts and implements the recommendations.

Literature Cited

Tables

Table 1. The number of breadfruit growers registered in Fiji compared to growers registered for other crops in the systems approach.

<table>
<thead>
<tr>
<th>Year</th>
<th>Chili Pepper</th>
<th>Eggplant</th>
<th>Pawpaw</th>
<th>Mango</th>
<th>Breadfruit</th>
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<tr>
<td>2003</td>
<td>52</td>
<td>65</td>
<td>36</td>
<td>40</td>
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<td>48</td>
<td>102</td>
<td>77</td>
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<td>2006</td>
<td>15</td>
<td>44</td>
<td>56</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Figures

Fig 1. Increase in exports volume of breadfruit from 2001-2006 from Fiji. Source: Fiji MAFF Quarantine.