VALUE CHAIN INITIATIVES FOR DRAGON FRUIT (PITAYA) MARKET DEVELOPMENT

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ABSTRACT

During the period 2003 to 2005 high value export markets for Vietnamese dragon fruit in the United Kingdom and Europe were closing down because of global food safety issues. In 2005 Plant and Food Research undertook to implement an AusAID project, “Collaboration for Agriculture and Rural Development (CARD)” for the introduction of Good Agricultural Practices (GAP) at “Global Standards”. This project aimed to assist Vietnamese dragon fruit farmers to comply with, and gain certification for the then EUREPGAP Standard to enable the Viet Nam dragon fruit industry to re-enter the high value export markets. The success of the first project led to a second AusAID funded project for the extension of the original initiative. This paper covers, not only the AusAID initiatives, but also a subsequent NZ Aid programme initiative which aims to build on the original successes and to ensure the Vietnamese dragon fruit industry can resolve “value chain” constraints and continue to meet GAP Standard requirements for Safe, Legal and Quality product and remain a global leader in dragon fruit production technology and marketing.

Keywords: GAP, Good Agriculture Practice, EUREPGAP, Global GAP; Viet GAP, compliance, pitaya, dragon fruit, CARD; PFR, SOFRI

INTRODUCTION

This paper reports the implementation of several initiatives aimed at assisting the Viet Nam dragon fruit industry to develop GAP quality systems at global standards to re-open, and sustain access to high value export markets.

Prior to the 2005 the Viet Nam dragon fruit industry was facing increasing areas of dragon fruit production but contracting high value export markets, resulting in over-supply on the domestic market and a consequent drop in domestic market prices.

To date there have been several projects which have been specifically designed to assist the Viet Nam horticulture industry by implementing value chain initiatives aimed to re-open, expand and sustain high value export markets for Vietnamese dragon fruit:

2. The AusAID CARD Project (029/07VIE - 2008 to 2009): “Extending export opportunities to small-plot dragon fruit growers through Good Agricultural Practices”

The projects have been implemented by the New Zealand Institute of Plant and Food Research Limited (Plant and Food Research, PFR) through the Southern Horticulture Research Institute (SOFRI), My Tho, Viet Nam. This paper outlines the processes involved in two projects for the introduction and implementation of Good Agriculture Practices and the Viet Nam value chain initiatives undertaken for high value dragon fruit export market access by the PFR and SOFRI partnership with resourcing from Australian and New Zealand aid programmes.

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1. Project 1. Developing Good Agricultural Practices (GAP) Systems for dragon fruit producers and exporters in Binh Thuan and Tien Giang Provinces

At the commencement of the AusAID CARD project there had been many previous initiatives to introduce GAP systems into the Viet Nam horticulture industry, mostly in the public sector. Although considerable knowledge and capability had been introduced to various institutions very little had been done to implement GAP in the commercial sector. Indeed there appeared a reluctance by public sector “trained specialists” to engage with the private sector.

The AusAID GAP project became the catalyst for change from public sector theory to private sector commercial GAP implementation. National capability development, both in the public and the private sectors, was led and mentored by the senior author and was based on experience gained in the New Zealand commercial pipfruit and kiwifruit industries, which were operating GAP quality systems, at the appropriate level required by the Viet Nam dragon fruit industry.

It was a pre-requisite for donor support that the project would improve the livelihoods of Viet Nam small-holder dragon fruit growers. Most dragon fruit growers in Viet Nam are small-holder and have between 0.2 and 5 hectares in production (Figure 1). The target for the project included securing access to high value export markets particularly in the European Union by achieving compliance with and certification at the EUREPGAP standard. However it was acknowledged that the complexity and cost of implementing and maintaining certification to EUREPGAP standard was beyond the capacity of small-holder growers.
The project overcame the complex documentation requirements and high compliance costs issues for small-holder growers to access to GAP demanded by the high value export markets. Rather than trying to convince a lot of small growers of the value of certification, a strategy was adopted to establish a “pilot model” in association with a large producer to demonstrate the financial advantages of producing fruit to the new export standards and to allow benefits to flow on to his contracted growers. The commercial “Pilot Model” was established in the Binh Thuan Province.

The pilot model was developed in cooperation with a dragon fruit grower, postharvest operator and exporter of significant size and, who met the following criteria:

- Had a strong desire to implement the EUREPGAP Standard quality systems to regain lost access in high value export markets and to access other new markets
- Had significant volumes of production (market required critical mass), packing capacity and export volume and was already operating at a relatively high standard of management
- Had contracted medium and small-holder growers as suppliers
- Could manage the quality system to avoid / minimise the constraints of trying to implement the quality system directly among multiple small-holder growers who lacked the resources / capability to do so
- Had a scale of operation that meant that the compliance and certification costs would not be prohibitive (Table 1).
Compliance costs are significant and the project has encouraged each outreach unit being developed to generate as much production area as possible to ensure the cost per tonne of fruit remains manageable. The following table provides a comparison of compliance costs per tonnes for different grower number; production area; and yield.

<table>
<thead>
<tr>
<th>Certification Unit - Individual or Group</th>
<th>Number to be audited</th>
<th>CB cost - US$</th>
<th>Grounder No's.</th>
<th>Hectarea</th>
<th>Crop volume - tonnes</th>
<th>Compliance cost US$ per tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual grower</td>
<td>1</td>
<td>2000</td>
<td>1</td>
<td>30</td>
<td>450</td>
<td>4.17</td>
</tr>
<tr>
<td>Small group of growers</td>
<td>4</td>
<td>2500</td>
<td>16</td>
<td>12</td>
<td>192</td>
<td>11.96</td>
</tr>
<tr>
<td>Large group of small volume growers</td>
<td>10</td>
<td>2500</td>
<td>100</td>
<td>75</td>
<td>1290</td>
<td>2.08</td>
</tr>
<tr>
<td>Individual group of large volume growers</td>
<td>2</td>
<td>3000</td>
<td>4</td>
<td>400</td>
<td>9600</td>
<td>0.31</td>
</tr>
</tbody>
</table>

**Comments:** Square root of the total number of growers covered by the Certificate and externally audited

Approximate cost for the Certifying body to undertake verification and certification

Based on: 40 tonnes per hectare and 40% packout for small-holders, 16 tonnes per ha, 60% packout for large producers = 24 tonnes per ha

Table 1. Example of “Cost of compliance”

The pilot model was subsequently expanded during the first and second projects and replicated by SOFRI specialists and national capability to other similar grower / packer / exporter operations, cooperatives and farmer groups.

**Project delivery pathway to high value export market access:**

The project commenced with a benchmarking survey of dragon fruit growers in the Binh Thuan and Tien Giang Provinces by the SOFRI project team. The survey questionnaire was based on 140 questions, mostly from the then current EUREPGAP Check List with some 150 dragon fruit growers interviewed. On completion of the survey, data was analysed and presented by the project leader to SOFRI and to the industry as an out-put of the project.

Selection of the project “Pilot Model” operation was made and a programme of developing quality systems to meet the EUREPGAP standards for certification commenced.

Implementation of the pilot included:

- Using the information gathered in the benchmarking survey to formulate the approach and strategy needed for GAP implementation especially at the small-holder dragon fruit grower level
- Identification and documentation of each and every step of the dragon fruit value chain from the grower, through harvest and postharvest operations, including transport to export
- Training and mentoring of counterparts and subsequent delivery of training to other interested and appropriate groups in the Binh Thuan, Tien Giang, Long An and Can Tho provinces
Improving Pitaya Production and Marketing

- Introduction of a “market driven” process throughout the value chain
- Development of a documented quality system and its uptake by the project pilot model
- Development of a "Dragon Fruit Quality Manual" (Figure 2) for the project pilot which described the steps for the entire value chain and how they would need to operate to be in compliance with the EUREPGAP Standard. The manual was developed in English and subsequently translated into Vietnamese by the SOFRI specialist project team.

![Figure 2. Draft Fruit Quality Manual](image)

- Implementation of the GAP quality systems in the pilot model by embedding the EUREPGAP Standard Operations Manual in the packhouse management system and to ensure the contracted small-holder growers were assisted towards compliance and to minimise complexity
- Conducting internal audits of progress towards compliance with the standards
- External auditing by an internationally approved “certifying body” for compliance with the for EUREPGAP standard and certification awarded
- Advertising of the success of the certification and the availability of EUREPGAP certificated product to current and potentially new export market customers. Growing the volume of certified produce:
  - Increasing production and export sales of the pilot model to establish sustainability and reduce the cost of compliance per unit sold
  - Replication of the model in other dragon fruit export facilities and extension to other Viet Nam crops of importance
- Transition from EUREPGAP to Global GAP standards for recertification of the pilot model. This required:
  - Revision of the operations manual to bring it into line with the new Global GAP Standards. This was achieved largely by local staff that were now competent in the development of quality standards
  - Auditing by an internationally approved certifying body and certification to Global GAP Standard.
The project met or exceeded all project expectations in implementing a pilot programme for EUREPGAP and subsequently Global GAP certification of a pilot model.

2 Project 2. “Extending export opportunities to small-plot dragon fruit growers through Good Agricultural Practices”

This project was a continuation of the original AusAID project and was designed to utilize and enhance the national capability developed in the first project and to expand the pilot model operations to the wider dragon fruit industry and potentially to other crops of importance to Viet Nam.

The standout features of this project included:

- Continuation of the GAP programme at the project pilot model supported by the SOFRI GAP specialists and mentored by the project for continued compliance
- Implementation of the British Retail Consortium Global Standard - Food (BRC) in a “special” packhouse within the Pilot Model as an alternative option for “direct” access to elite high value export markets. The BRC standard was implemented but not certificated by the pilot owner at the time as a packhouse upgrade / replacement was in progress
- Collaboration between SOFRI GAP specialists and Department of Agriculture and Rural Development (DARD) / Ministry of Agriculture and Rural Development (MARD) for the development of the new standard, the Viet Nam GAP (VietGAP) standard for Vietnamese horticulture
- Establishment of infrastructure in support for the VietGAP initiative in the areas of leadership, training, certification, industry support. Many of the GAP quality systems documentation templates currently in use in Viet Nam horticulture have been developed by the SOFRI GAP specialists
- Steady progress in delivering GAP quality systems training to the Viet Nam dragon fruit industry and to other crops (pineapple, mango, longan) in Binh Thuan, Tien Giang, Long An and other provinces with GAP certification successes at the Global GAP and VietGAP levels.

The timing of the development of the Viet GAP Standard and its implementation amongst Viet Nam dragon fruit growers, especially in the Binh Thuan Province, was timely and was able to mitigate the effects of the closure of dragon fruit exports by China until specified conditions were met e.g. the registration of dragon fruit growers, product traceability, etc. All the China requirements had been covered in the VietGAP Standard.

The ability for Viet Nam to export dragon fruit to high value export markets began a rapid increase from 2008 onwards reflected in the increasing areas of dragon fruit planted. The trend in volumes of product exported and the value of those exports are shown in Figures 3 and 4. Exports of Vietnamese dragon fruit to the USA and Japan commenced during the second project. Each of these markets required quality systems and conditions over and above the GAP quality systems implemented by the project mostly in relation to biosecurity requirements e.g. some packhouse handling and packaging requirements: dragon fruit for the USA market is required to be irradiated; dragon fruit for the Japan market requires hot moist air disinestation, etc.
Figure 3. Area and production of dragon fruit in Viet Nam from 2000- to 2013. (No data available about 70-75% of dragon fruit produced are exported).

Figure 4. Value of dragon fruit exported from Viet Nam from 2005 to 2014
3. **New dragon fruit Industry Improvement Initiative**

The expansion of the dragon fruit industry, both on the domestic and export markets, and its increasing importance to the Viet Nam economy led to a new initiative, based on targeted research for the long term-support of the commercial dragon fruit industry of Viet Nam. The new initiative is in the form of a five-year NZ Aid project (2013 to 2017). The project is enhancing the capabilities of research institutes of SOFRI and the Sub-Institute of Agricultural Engineering and Post-Harvest Technology (SIAEP) to enable the dragon fruit industry to meet global standards, be market driven, sustainable and competitive. The aim of the aid initiative is to support the Viet Nam dragon fruit industry through world class research and development to ensure improved benefits are achieved and passed on to small-holder dragon fruit growers.

This project involves a team of experienced PFR specialists contributing across SOFRI research capabilities; including the implementation of a modern dragon fruit breeding programme; crop protection capability enhancement; agronomy and value chain improvement; harvest and postharvest systems; and improvements. It has a strong emphasis on cross-discipline cooperation and the focusing of research programmes on industry needs. The programme also includes the upgrading of SOFRI research facilities and equipment as required.

The programme covers the following key activities:

**Plant breeding:**
- Enhancing SOFRI's plant breeding capability to develop new superior dragon fruit varieties for release to industry
- Introduce modern plant breeding techniques and practices
- Implement a “Plant Variety Rights” programme to protect varieties developed by SOFRI.

**Crop protection:**
- Specialist plant pathology support for up-skilling and capability development in the control of dragon fruit diseases particularly dragon fruit canker (*Neoscytalidium dimidiatum*)
- Specialist support for the diagnosis of causes of post-harvest rots and their control as part of the programme to increase the storage and shelf life of dragon fruit
- Guidance and support as required for SOFRI research and control of pests affecting dragon fruit.

**SOFRI research farm development:**
- Implement the Global GAP Standard quality system in the SOFRI research farms
- Enhance the quality of management of the SOFRI research farms based on the New Zealand PFR research orchard model which allows the farms to function both as secure facilities for research while at the same time engaging in commercial production to generate revenue to support research
- Utilise the research farms as models for best practice for all aspects of dragon fruit production for demonstration to growers.
Pomology:
- Develop novel dragon fruit management systems to enhance production and fruit quality
- Coordinate training systems, plant spacing and canopy management research trials with plant pathology and the dragon fruit canker control programme for:
  - Value of orchard hygiene especially for canker infected cladode removal and disposal
  - Canopy management in relation to canker control spray programmes
  - Equipment type for the most effective and safe systems for delivering agrichemical spray programmes
  - Determining effect of fungicide programmes for canker control on the incidence of postharvest rots many of which infect the fruit in the field prior to harvest.
- Develop plant training systems, nutrient management, irrigation and orchard floor management to allow for mechanisation to mitigate a growing shortage of labour.

Postharvest:
- Develop postharvest handling systems
- Conduct research trials which lead to protocols for industry for dragon fruit handling, postharvest treatments and cool-chain management.

Industry support:
- Education and training for dragon fruit growers, postharvest operators and exporters as a delivery of the project products.

Challenges:
- To ensure dragon fruit research is accurate and appropriate and delivered to growers and industry in a form that is easy to understand and implement.

CONCLUSION
The Viet Nam dragon fruit industry has developed rapidly since the introduction of appropriate GAP quality system standards. The industry now needs to refine its operations through quality and targeted research to enable the industry to move forward in a sustainable, organised, safe, and legal way. This will ensure that Viet Nam retains a position of global leader in dragon fruit production and, with premium quality product, enable it to remain competitive in the face of increasing competition from neighbouring and other countries.

REFERENCES
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