

# **CONSTRAINTS, CHALLENGES AND PROSPECTS FOR DEVELOPMENT OF THE SQUASH EXPORT INDUSTRY IN TONGA**

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# CONSTRAINTS, CHALLENGES AND PROSPECTS FOR THE DEVELOPMENT OF THE SQUASH EXPORT INDUSTRY IN TONGA<sup>1</sup>

## 1. BACKGROUND

### 1.1. The Economy

The economy of Tonga continues to rely on the production of the agriculture sector, which provides by far the most important source of employment, foreign exchange earnings and food security. Over the past decade, agriculture (i.e., agriculture, forestry and fisheries) accounted, on average, for over 70 per cent of the total export earnings, about 30 per cent of employment and about 30 per cent of GDP, as shown in the tables 1 – 3 in Annex 1.

Tonga enters the new millennium with strong economic growth after the economic downturn in 1995/96. GDP has been steadily increasing over the past four years as shown in Table 1 below, and is estimated to have achieved an annual growth rate of 6 per cent in 1999/2000. While the primary sector has taken a longer period to recover from the 1995/96 economic shocks, it is expected that it will achieve a real annual growth rate of more than 7 per cent in 2000/2001.

### 1.2. Geographical Characteristics

The Kingdom of Tonga is made up of 172 coral and volcanic islands with a total land area of 747km<sup>2</sup> spread over 260,000km<sup>2</sup> of sea area between 15° and 23.5° S and 173° and 177° W. The climate is generally warm to hot temperatures, usually adequate rainfall, and a cooler climate in the winter months, that enables the production of a wide range of crops.

There is, however, climatic variation between island groups. It is generally cooler and drier in the south. Vava'u has an average rainfall of 2,300mm while that of Tongatapu and Ha'apai is 1,800mm. Most of the rainfall for the year occurs between January and April, with June – August being the driest months. The mean annual temperature is 23.7° C with monthly minimum values varying between 17.8° and 22.7° C.

Most of the islands consist of raised coral but in general, the soils are very fertile as they are derived from volcanic ash. They contain adequate levels of exchangeable potassium but in most, nitrogen is low and in some, plant growth responds to additions of phosphorus. The land base is favourable, with few areas of steep slopes. There is evidence of declining soil fertility and deteriorating soil structure due to increased mechanised agricultural activities and reduction in the fallow periods.

### 1.3. Government Objectives and Policies

The predominant development objective of Government since the Third Development Plan period (1975-1980) has been to achieve a sustainable rate of economic growth conducive to higher and more equitable distribution of income. The basic thrust of Government's economic policies were to diversify the economic base in order to break the reliance on a narrow range of crops; create additional employment opportunities; and to foster private sector development. These were pursued concurrently with policies to improve education, health and general welfare of the people.

In the 1980s emphasis has been on increasing economic growth by liberalising the economy and further development of the private sector. The Commodities Board Act was amended which saw the liberalisation of export marketing; land leases were freed up to increase land utilisation and a number of government operations were corporatised and quota systems abolished. The National Reserve Bank was set up in 1989 to increase government's role in managing the economy.

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<sup>1</sup> This paper has been prepared for the Regional Workshop on the Constraints, Challenges and Prospects for Commodity-based Development in the Pacific Island Countries, Nadi, Fiji, 18-20 September 2001.

In the 1990s intensification of activities initiated in 1970s and 1980s continued but at the same time efforts were directed at adjusting the economy towards a more globalised environment. The banking sector was opened up for competition with the entry of two commercial banks; interest rates were deregulated to encourage savings; and Tonga applied to be a member of the World Trade Organisation.

Widening disparities in income distribution among the island groups has been identified as a problem. A perceived lack of employment and income opportunities in the outer islands has led to out-migration to Tongatapu and beyond. In order to improve the situation in the outer islands, Government has embarked on a number of regional development programmes and has established regional development committees to identify development priorities and coordinate development efforts.

#### **1.4. Population and Development**

The 1996 population census shows that there is a slowing down in population growth. The inter-censal period, 1986-1996, showed an average growth rate of only 0.3 per cent compared to 0.5 in 1976-1986. This is due largely to emigration mainly to New Zealand, Australia and the United States. As pointed out by the World Bank (1993) while the high rates of emigration have generated a steady stream of remittances, it has also created the paradox of high dependency rates and skill shortages. This is due mainly to the fact that a significant proportion of those who have migrated overseas is of the well educated and of the productive age group.

There is also significant internal migration, particularly from the outer islands to Tongatapu. The 1996 census shows that Tongatapu has registered a net gain (0.5 per cent), especially the capital, Nuku'alofa. Vava'u and 'Eua also registered increases of 0.4 and 1.2 per cent, respectively while the population of Ha'apai and the Niuas have decreased by 0.9 and 1.5 per cent, respectively.

As a result, a considerable amount of agricultural land, particularly in the outer islands, is not used. In addition, there has been an acute shortage of labour, so much so, that the introduction of new crops resulted in the displacement of labour required for subsistence food production. As a consequence, labour wage rates have increased manifolds over the past few years.

Demographic changes have also had an adverse impact on fisheries. With population increase there has been a rise in demand for land for residential purposes. As a result, low-lying coastal areas of mangroves ideal for spawning of fish have been cleared and filled to make way for buildings.

Root crops are the staple foods of Tonga and occupy nearly two thirds of the land in agricultural production. Most households in the rural areas tend to produce a high proportion of their own food consumption needs, with the excess being sold in the local markets for cash. There has been a decline, albeit with fluctuations, in the total volume of agricultural products being supplied to the local markets between 1987/88 and 1997/98, with lowest volume being recorded in 1993/94. Despite this, the supplies of root crops and vegetables have registered a steady increase by more than 33 and 65 per cent, respectively.

Tropical cyclones and droughts are major threats to agriculture and food production. On average, Tonga has had one tropical cyclone in every four years over the last three decades. Droughts have a more long-term impact on agriculture and food production than cyclones due to the damage caused to both production and the supply of planting materials. Following a cyclone, food production is able to return to pre-cyclone level within six months whereas the impact of a drought could last for more than 12 months.

## **2. THE AGRICULTURE SECTOR**

### **2.1. Agricultural Export**

Agricultural export is dominated by a narrow range of fresh or semi-processed commodities, notably squash, vanilla, kava and a few traditional root crops (mainly yam, taro and cassava). This concentration has largely been a result of the collapse of the coconut industry due to falling world market prices, and a decline in banana and watermelon exports to New Zealand due to pest and disease problems.

Agricultural exports in terms of both volume and value have been on a declining trend over the past decade, albeit with fluctuations. This is mainly due to drought and cyclones. Tonga experienced one of the worst droughts in 1998, which lasted for over six months and was widespread throughout the island groups. This was followed by Tropical Cyclone Cora before the end of the year.

The main and established trading partners for both import and export are Australia, New Zealand, United States and Japan. Efforts to develop and expand trade with other Pacific island countries (mainly Fiji, Samoa and American Samoa) have been constrained by a number of problems including shipping, over-protective phytosanitary requirements and low export market volume resulting in high price fluctuations. Tonga's major trading partners are major agricultural exporters, except Japan. All these countries, including Japan, have an efficient agricultural and food production industry with a high reputation for the quality of their products for both domestic and export markets. In addition, they have efficient food quality control and quarantine systems in place to ensure the safety of their products, to protect the health of their consumers and to avoid the introduction of harmful pests and diseases.

## **2.2. Land Tenure and the Agricultural System**

The agricultural system is characterised by smallholder semi-subsistence production. Most of the land is divided into tax allotments of 8.25 acres, allocated to individual males over the age of 18 years. With population growth and the resultant demand on agricultural land for residential purposes, however, many adult males are now unable to own land. Many of the traditional 8.25-acre tax allotments are being sub-divided into smaller units as a means of fulfilling land demand. It is estimated that over the past five years, about 200 acres of farmland have been given up for residential and other purposes.

Root crops are the staple foods in Tonga, which occupy more than half of the land in agricultural production. They are important for traditional and cultural ceremonies and are also a measure of status and prestige. Traditionally, yam is the first crop to be planted in a newly cleared land intercropped with giant taro. Once harvested, taro and sweet potato is planted, followed by cassava before the land is fallowed. In the past, cultivation interspersed with relatively long periods of fallow, has been used successfully to maintain soil fertility. However, the traditional agricultural system is under pressure from demographic changes and higher aspirations for cash income, resulting in longer cropping periods and shorter periods of fallow. The length of the fallow period is now estimated to be less than 2.5 years.

Tonga has limited forestry resources and has always been a net importer of timber and wood products. There are only about 4,000ha of natural forests, which are found mainly on uninhabited islands and on slopes too steep for cultivation. The only established forest plantation of significant value is that on the island of 'Eua, which belongs to the Government and has been established under New Zealand government development assistance. Occupying about 1,034ha of the 16,000ha land area of 'Eua, this represents a significant land use.

There is, however, considerable potential for agro-forestry development in Tonga with 48,000ha of potential agro-forestry land, which at present is mainly planted with coconuts. Traditionally, the farming systems are fundamentally agro-forestry systems with a sequence of food crops being intercropped with coconuts and other trees before the land is left to fallow. The system has proved to be robust, productive and sustainable and has readily allowed for the incorporation of new commercial crops such as vanilla, kava and coffee.

The traditional farming system, however, has been under pressure from increased farm mechanisation and specialisation of production aiming at the export markets. A lot of the trees including coconuts have been removed to allow for commercial farming utilising agricultural machineries for land preparation, cultivation and pest and disease control. Consequently, there is acute shortage of firewood in most island groups except 'Eua, and signs of soil erosion have been observed throughout the island groups.

### 2.3. Women in Agriculture

While the traditional view that the role of women in the household excludes agriculture is still strongly held, a unique role has evolved for women who now play an important supporting role to men in agricultural development. Women are now directly involved in the production of raw materials (pandanus and paper mulberry) for handicraft making and are increasingly involved in the cultivation of cultural, ornamental, medicinal and timber trees.

The successful establishment of the vanilla industry has been largely due to the involvement of women, particularly in the area of pollination, harvesting, trading and curing. Women (and children) have also been heavily involved in the development of the squash industry in the areas of planting, harvesting and post harvesting handling, and quality control. A significant area of increased involvement of women in regards to agricultural development is marketing, and management and control of proceeds from sale of produce. Many women are now spending more time in the local produce markets selling their produce, leaving the men to continue with production activities. Some are now in charge of the marketing of family produce to overseas.

## 3. THE SQUASH EXPORT INDUSTRY

### 3.1. *The Socio-Economic Significance of the Industry*

The export of squash from Tonga to Japan is undoubtedly one of the few success stories of agricultural exporting operations from the South Pacific to developed countries. It demonstrates that growers can and will respond to export market opportunities when the returns are attractive.

The development of the squash industry has been principally a private sector initiative although there has been substantial government assistance and involvement. Being a high capital-intensive industry, the Tonga Development Bank (TDB) has been assisting the industry by catering for credit needs. Production research and extension support were provided by the Ministry of Agriculture and Forestry while the Ministry of Labour, Commerce and Industries has been responsible for market research and export marketing coordination. In addition, Government provided through the TDB an export diversification fund of \$1.05 million, which was used mainly for the development of the squash industry.

Commenced in 1987, the squash export industry has become a major foreign exchange earner for Tonga. During the period 1994 – 2000, it has accounted for about 40 per cent on average of Tonga's total export earnings and more than 70 per cent of the total value of agricultural export, as shown in Table 1 below. In the initial years of development of the squash industry, more than 2,000 squash growers were recorded. However, there has been a decline in the number of growers over the past years. A total of 1,061 growers were recorded in 1998, which decreased to only 780 in 1999. Despite this, there has been a steady increase in the average size of each grower's plot.

**Table 1**  
**Contribution of the Squash Export Industry to Total Export Earnings, 1994-1999 (T\$, 000)**

	1994	1995	1996	1997	1998	1999
Total Export	17,748	18,022	12,812	13,358	11,036	19,219
Total Value of Agricultural Export	13,127	13,053	10,484	9,090	8,581	12,708
Total Value of Squash Export	8,861	8,405	6,493	6,313	4,354	8,946
Value of Agricultural Export as % of Total Export	74	72	82	68	78	66
Value of Squash Export as % of Total Export	50	47	51	47	39	47
Value of Squash Export as % of Agricultural Export	68	64	62	69	51	70

Source: Foreign Trade Report, Statistics Department

In terms of employment, the introduction of squash had created significant employment opportunities. Being a very labour intensive crop, particularly during planting, harvesting and processing for export, it had a significant impact on the availability of farm labour during these periods, which are

June/July for planting and October/November for harvesting and export preparation. As a result, the cost of farm labour has increased more than three folds over the past decade. A significant impact of the industry on employment is the participation of women and children in the whole development process, particularly in planting, harvesting and post-harvest handling and packing. In fact the industry is heavily reliant on the contribution and active participation of women and children for its sustainable development. Although data on the number of people employed in squash export production is not available, the Ministry of Agriculture and Forestry estimates that for the 4,500 acres planted in Tongatapu in 2000, it took about 400 people to work full time (8 hours a day) to harvest, process and pack the squash produced, in order to meet the maximum holding period between harvesting until it is shipped to the export market.

Being a capital-intensive industry and in view of its importance to the Kingdom's economy there was a need to mobilise credit resources to assist farmers with their production efforts as well as with the development of the industry as a whole. In response, government had committed itself to assist the industry. Through the TDB, credit facilities were made available for squash production and marketing. An Export Diversification Fund facility was also set up with the TDB to promote export production and marketing, which enabled squash exporting companies to cover costs of shipping, the construction of pecking sheds and the bulk purchase of important inputs (fertiliser, chemicals and seeds). At the same time, individuals took the initiative to identify possible funding sources to assist with their own development efforts. Table 2 gives an indication of the outcomes of these efforts.

**Table 2**  
**Finance Sources for Squash Growers and Tonga Development Bank Loan Approval (T\$ million)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998
TDB borrowers	378	1021	867	1255	1425	833	727	331	599
Self financed <sup>1</sup>	14	714	212	N/A	10	81	N/A	69	1
TDB Loan Approvals	3.81	4.5	3.0	6.0	8.0	5.8	3.6	2.2	3.9

<sup>1</sup>. Includes growers who financed their own operation and those financed by their exporters

Source: Tonga Development Bank Annual Reports

### 3.2. *Production and Marketing*

Squash takes about 80-90 days from date of planting until harvesting, with planting beginning in June/July and harvesting in October/November. The volume and value of squash exported, and the export price received for the period 1987-2000 is given in Table 3 and Figure 1, respectively. As can be seen from this table, export production peaked at about 18,000 tons during the 1991 –1994 period and since then it has decreased to an average annual volume of about 12,000 tons. In terms of export price, there has been a steady decline from the high price during the 1990 –1993 period of more than \$700 per ton to about \$550 per ton. The highest price was obtained in 1995, which corresponded to a lower volume of squash exported than the level achieved in previous years. A long drought was experienced in 1998, which had an adverse impact on the squash export industry.

The table also shows that the lowest price was experienced in 2000 and was the first time the price ever dropped below the \$500 mark. It is interesting to note that this corresponds to the deliberate move by the industry to broaden the window of opportunity available in the Japanese market for Tongan squash, which resulted in an oversupply of the market and in turn a decline in the price received.

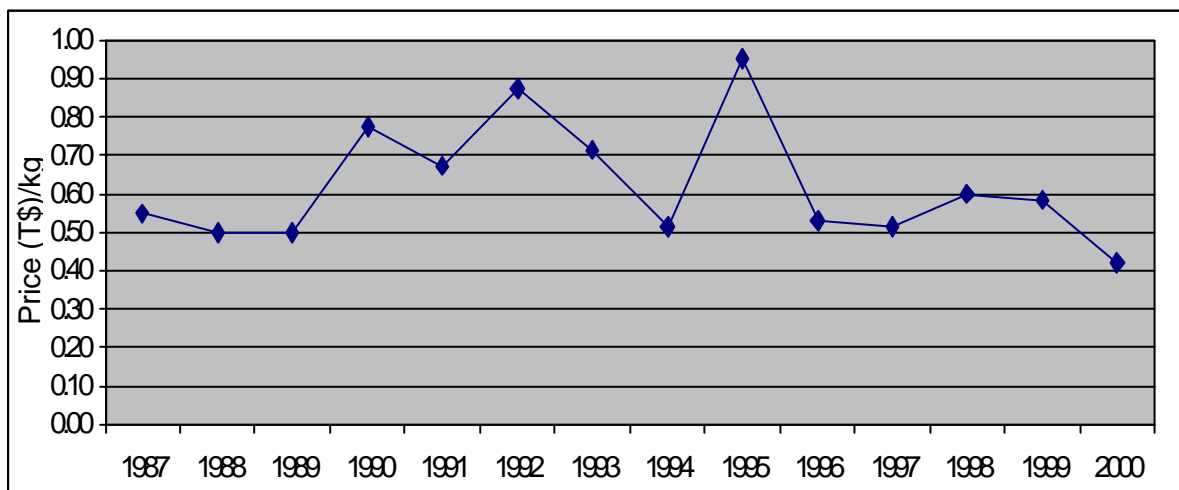
**Table 3**  
**Volume and Value of Squash Exports 1987-2000**

Years	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Volume (MT)	157	1,089	3,967	6,246	18,499	9,939	18,014	17,248	8,838	12,254	12,284	7,248	15,305	12,535
Value (T\$, 000)	86	544	1,983	4,838	12,444	8,674	12,873	8,861	8,405	6,492	6,313	4,354	8,946	5,265
Price per ton	550	500	500	770	670	870	710	510	950	530	510	600	580	420

Source: Foreign Trade Reports, Statistics Department

Squash for export is normally planted in three stages; the first planting is done within the first week of July, the second in the 3<sup>rd</sup> week and the third and final planting time is around the second week of August. Harvesting is then done in the first week of October, with the second in the third week and then the final harvest is in the second week of November. This is to ensure that the squash is shipped to Japan by the end of the month of November up to early December, for distribution to the Japanese market during December and January, the time when the supply of squash in the market is already declining. In 2000, however, some planting started in June, which resulted in the first shipment being made in early November. Although production and the quality was good, the arrival of the first shipment in early November instantly sent out a signal that there would be continuous supply and as a result, price remained low throughout the December/January period.

**Figure 1**  
**Export Prices for Squash During 1987 - 2000**



Squash seeds required for export production are imported, mainly from Japan. Six different varieties are being used with the two most popular varieties being *Kurijimann* and *Delica* due to their naturally larger sized fruits, which take 15 per cent less fruit to fill the squash bins compared to the other varieties. Although the decision on the variety of seeds to be used is often not determined by farmers, this is important since farmers are paid on the basis of the number of filled bins supplied rather than on the actual weight of the squash being exported, although it is estimated that one bin would weigh about 500kg when full.

Depending on the planting density, it is estimated that one kg of seed, which costs about T\$200, would be able to plant an area of up to 2 acres. Spacing adopted by farmers varies depending on the mode of production and the size of the plot. Most of the small farmers follow the recommended spacing of 1.5m x 1.5m with 2-3 plants per mount. These plots are normally planted and maintained (weeding) using manual labour. The larger farmers, on the other hand, are more mechanised with fertiliser application, planting (one plant per mount) and weeding being done with machinery, with a spacing of about 0.3-0.4m x 1.5m but only one plant per mount. A survey carried out of the 2000 season concluded that large farms with closer spacing were severely infested by diseases and as a result achieved lower yield per unit area. Possible explanations given included (i) closer spacing resulted in a more bushy undergrowth, which enhances or conducive to disease infestation and (ii) poor and improper usage of machinery in the control of disease.

The survey also showed that small size farms (up to 8 acres) achieved better yield with a mean exportable yield of 5 tons per acre as compared to the larger size farms, which only achieved an average exportable yield of about 3.5 tons per acre. Further, the survey found that there was no significant difference between plots with closer spacing and those with wider spacing in terms of total yield; the major difference, however, was in the percentage of exportable yield, which was lower in plots with close spacing by about 30 per cent.

The distribution of rainfall during the squash season is considered to be one of the main critical factors, which determines the overall volume of exportable yield. The most ideal rainfall distribution envisaged for optimum squash production are; low rainfall period during the land preparation period up to the application of the basal fertiliser; wet season during the planting up to the flowering period; a dry period during the fruitset period to allow maximum pollination, enough rain and sunshine up to the harvest time and a dry period for the harvest. The 2000 season ranked equal or better than the 1991 and 1994 seasons (Manu, 2001) in terms of the rainfall distribution.

Squash is produced exclusively for the Japanese market and thus it is important to have a full understanding of the requirements of the export market. Squash considered to be of exportable quality must be between 1.2 – 2.7kg per fruit, free from blemishes and skin distortions, and must be at the right stage of maturity. The squash is exported as a fresh produce and is therefore subject to quarantine requirements. These include: free from contaminants, must not be bruised and free from deformation caused by disease infestation.

To ensure that these requirements are met, the packing of shipping containers in the field is prohibited because of soil, plant and insect debris contamination. Thus, squash is required to be harvested and transported to a cool dry place where it is processed and graded first before it is transported to registered packinghouses for final grading and inspection for compliance with quality and quarantine requirements.

The industry started off with only two exporting companies being responsible for the export marketing of squash. This increased to 13 companies in 1994-1996. Thereafter, and following a more stringent control by government on the issuance of export license, there has been a decline in the number of exporting companies, albeit with fluctuations, as shown in Table 4 below.

**Table 5**  
**Number of Squash Exporting Company, 1989 - 2000**

<b>Year</b>	<b>No. of Exporting Company</b>
1989	2
1990	3
1991	8
1992	7
1993	7
1994	13
1995	11
1996	13
1997	8
1998	7
1999	7
2000	10

Source: Ministry of Labour, Commerce and Industries Annual Reports

#### *3.4. The Institutional Set-up of the Tongan Squash Export Industry*

Every exporter must obtain an export license, which is issued by the Ministry of Labour, Commerce and Industries, before it can be involved in export marketing. The process of licensing begins with the release of the criteria for the assessment of applications for export licenses, which in 1999 was made available in December for the 2000 season. The assessment and screening process is normally completed by January in order to allow adequate time for preparation and to enhance certainty and, ultimately, productivity in the industry.

In 1999, a Memorandum of Understanding between exporters and the Ministry of Labour, Commerce and Industries was enacted, continuing the efforts by the Ministry to stabilise the industry by encouraging a close working relationship and understanding amongst the major stakeholders and participants in the squash industry. To further encourage communication and inter-flow of reliable information, regular consultative meetings are being held with the major players in the industry and the outcomes of these meetings are filtered into the policy arena.

Because of the need to have a fairly accurate estimate of the volume it would export in order to facilitate negotiations with importing companies, the exporter requires its growers to be registered. To strengthen this requirement, exporters are now involved in the supply and distribution of inputs (seeds, fertiliser, chemicals, and even in the provision of machinery for land preparation), and in the provision of credit finance to growers and/or facilitating the approval of loans by the bank, by supporting/guaranteeing their loan applications. For some exporters, they require the growers to sign an agreement stating that all his/her exportable squash crop will be sold to the specified company.

Most exporting companies require financial assistance for its export marketing operations. Financing has mainly been provided by the Tonga Development Bank. However, with the more stringent lending policy of the Bank some exporting companies have taken up partnership agreement with overseas companies, mainly from New Zealand, who have agreed to provide the required financial support and, in return, for the overseas companies to become the agent for their squash. There were a total of 10 licensed local exporting companies in 2000. Table 5 below provides information on the volume of squash exported from Tonga by each exporting company, both local and overseas. The table shows that two local companies had been exporting all the squash that they have purchased from growers through a New Zealand agent. It also shows that 6 New Zealand-based companies have been involved in the marketing of the Tonga squash, however, it is not clear which local companies have been in partnership with these overseas agents.

**Table 5**

### Volume of Squash Exported in 2000, by Company

Exporter	Base Country	Volume Exported (MT)
Bearsley Produce Ltd	New Zealand	481.5
Friendly Islands Marketing Cooperative	Tonga	292.0
Ha'amo Growers Co. Ltd	Tonga	1,209.0
INDEX Limited	Tonga	212.0
International Produce Limited	New Zealand	1,648.0
Kaimata NZ Limited	New Zealand	58.0
Millennium Foods Group	New Zealand	3,765.0
Molisi Tonga Ltd	Tonga	821.0
Nishi Trading	Tonga	666.0
Squash Export Co. Ltd.	Tonga	1,558.0
Sunrise Coast NZ Ltd	New Zealand	67.0
Touliki Trading Ent. Ltd	Tonga	1,235.0
Tropical Exports-Imports Ltd	Tonga	154.5
Turners and Growers Int. Exports	New Zealand	2,533.0
<b>TOTAL</b>		<b>14,700.0<sup>1/</sup></b>

<sup>1/</sup> The volume of squash exported in 2000 reported here is based on the Quarantine Inspection records, which differs from that reported in Table 3.

Source: Ministry of Agriculture and Forestry Quarantine and Quality Management Division Report, 2000

As mentioned above, the Ministry of Agriculture and Forestry (Quarantine and Quality Management Division) is responsible for quality control and management. The process for quality assessment and control requires the farmer to carry out the necessary processing and grading before the squash is delivered to the packinghouse, which must first of all be registered with the Quarantine Service. For a packing shed to be registered, it must fulfill certain requirements including the need for the shed to be well ventilated and sheltered from sunlight, adequate space for storing, facilities and equipment for washing, grading and packing, and adequate space for storing prior to transport to wharf.

The exporting company is also required to have its own inspectors within the packinghouse to ensure that grading is in compliance with quality standards. After the squash has been graded and passed by the exporting company, the Quarantine Service then carries out its own inspection process, which involves the taking of random samples for inspection for both quality and quarantine compliance. For every bin of squash to be allowed to enter the holding area at the wharf awaiting shipment, it must have the stamp of the exporting company, which carries the company's name, the registration number of the grower, the squash variety and the country of origin, and the 'Quarantine Pass' sticker/label.

Two grades of squash are exported to Japan. Grade A is the main squash crop being exported, which comprised the fruits within the 1.2 – 2.7 kg range. Grade B, which is referred to as "baby squash", is the undersized fruits that are of export quality. This grade makes up only a very small percentage of the total volume of squash being exported. For example, the total volume of baby squash exported during the 1999 season constituted only 5 per cent of the total volume of squash exported.

It is estimated that between 20 and 30 percent of the total annual squash production are not of export quality. Investigations have been made into the processing of the non-exportable crop into powdered form, however, there has been very little progress made. Other possibilities include the processing of rejected squash for baby foods although this has yet to be investigated. The current use of this "excess" produce is mainly for human and animal consumption.

Although squash production is increasingly becoming more mechanised through the use of machinery for land preparation, fertiliser application, weeding and disease control, there has been very little progress made in developing appropriate technologies for harvesting and post harvest handling. Harvesting and post harvest processing is still done manually and this is a critical stage, which heavily relies on the

availability of labour and the weather. Women and school children are mainly employed during this stage. Some progress has been made in developing appropriate mechanised equipment and facility to assist in the cleaning, grading and packing, however, there is still much room for further development, which should significantly reduce labour requirement at this stage.

The Ministry of Agriculture and Forestry has played a lead role in research, training and advice to growers. However, with more and more well educated people participating squash farming and the fact that growers have accumulated a wealth of knowledge and experience over the last decade some, if not all, exporting companies are now involved in production research and training, and in the provision of extension services to farmers. This coincides with the restructure of the Research and Extension service of the Ministry of Agriculture and Forestry, which saw the research scientists and subject matter specialists making more direct contacts with farmers and in the provision of technical advice to farmers rather than having to go through the extension officers, who are now playing more the role of facilitators than technical advisers.

#### **4. CONSTRAINTS, CHALLENGES AND PROSPECTS FOR DEVELOPMENT**

While the squash industry has been established for more than 10 years, there are still a number of constraints and challenges to its sustainable development. The following is considered to be the major constraints to the development of the industry, and the challenges to be addressed.

##### **4.1. Production Research and Development**

Research programmes carried out by the Ministry of Agriculture and Forestry have largely been financed by foreign assistance. These programme are mainly based at the Vaini Research Station on the main island of Tongatapu, which has been equipped with appropriate facilities and equipment for soil analysis and testing, plant breeding, entomology and plant protection. Reduction in the total budget for research has had an adverse impact on the types of research being carried out, which are mainly reactionary in nature and concentrating on short-term problem solving and missing out on more important programmes that would in the long run have a significant positive impact on the development of agriculture and specific industries.

As mentioned above, seeds continue to be imported, which constitute a major cost component in the whole production process. To date, however, no work has been done to develop a seed research and development programme that would enable Tonga to produce seeds locally at a more affordable cost. Continuing research is also required to be carried out to establish optimum levels of inputs to be used so as to minimise costs of production, which should be supported by an efficient and effective information dissemination system. Seeds together with fertiliser and chemicals for pest and disease control constitute approximately 50 per cent of the total cost of production, excluding labour. Given this situation, there is always a tendency for some farmers to apply such inputs at levels far above the optimum level in the belief that it would further increase yield, and for some to apply at sub-optimum levels in order to minimise costs.

While rates of inputs recommended by the Ministry are based on results of on-station research there is a need to verify them through on-farm trials, and the provision of a soil testing service to farmers in order to determine soil nutrient levels and hence the exact types and levels of fertiliser required for each farm. This should in turn reduce the cost of production and ensure higher yields.

Labour is becoming a major constraints to the development of the squash export industry and many farms have suffered heavy losses due to inability to secure the required labour at the right time in order to carry out certain tasks including, weeding, disease control and in some cases harvesting and processing. Mechanisation of the production process is on the increase without proper testing of the appropriateness of some of these technologies. As mentioned above, higher incidences of disease and lower yields have been experienced by large farmers who have employed mechanised means of production. One possible explanation given was the lack of proper training on the use of these technologies and the appropriateness of some of these. This could be the result of the move to fully commercialise the

agricultural machinery hire service provided by the Ministry of Agriculture and Forestry, which accounts for more than 50 per cent of the demand for agricultural machineries and implements which, in turn, has diverted attention to the commercial viability of the whole service and little being given to testing the appropriateness of some of the machineries being used and to training on their proper use. While it is natural for such a commercial oriented venture to focus on its commercial viability, the fact that no one has taken up the responsibility of researching into these areas is a concern and it could undermine the sustainability of the industry and agriculture as a whole.

#### **4.2. Access to Credit and Production Inputs**

The supply and distribution of production inputs for squash is controlled mainly by the exporting companies and thus, they are able to regulate retail market prices. Coupled with the fact that these are provided to some farmers on credit there is a tendency for exporters to impose high profit margins on these inputs, which in turn keeps production cost at a relatively high level. The Ministry of Agriculture and Forestry estimates that the return to one Tongan dollar spent on squash production is only \$0.86 compared to about T\$2.08 and T\$3.57 for potato and taro, respectively. This also reflects the capital intensive nature of the squash industry.

Recognising this and as an attempt to broaden its revenue generating activities, the Tongatapu Machinery Pool Hire Service embarked on fertiliser import and retail distribution scheme in 1999 which was able to sell NPK and Urea fertilisers at a much lower prices (about 20 per cent lower) than those offered by exporters for their stock. As a result, growers were beginning to move away from exporters and started to purchase their fertiliser requirement from this new supplier. Consequently, exporters were forced to reduce their prices to below that offered by the scheme. This, perhaps, was a direct move by exporters to undermine the competition provided. Nevertheless, it demonstrated the fact that exporters were in control of the factor input market and that prices could in fact be brought to a much more affordable level.

As mentioned above, the Tonga Development Bank has been committed to the development of the squash export industry through the provision of credits to both farmers and exporters. Up until recently, the approval of a loan to a squash grower relied heavily on the recommendations of the exporting company under which the grower has registered. A major proportion of the loan proceeds is normally channelled directly to the exporting company and is held against the costs of inputs and services it supplies to the grower on the agreement that proceeds from the sale of the farmer's crop would be channelled back to the bank to cover the loan and any surplus is then paid by the Bank to the grower. This effectively means that the grower has little control over the proceeds of his/her loan, on the amount and value of the inputs used in the production process and on the returns to his/her crop. Also, such arrangements put the exporters at an "all win" situation, which in turn promotes inefficiency in the marketing process leaving the growers to bear the consequences.

In recognition of this, and the fact that loan defaults were at a very high level, the bank has changed its approach and is now approving loans to growers based on their individual merits. The positive impact of this approach is that it promotes greater efficiency among both growers and exporters; growers are now able to decide where inputs could sourced from based on best available prices and the exporters are now forced to ensure that their input supplies and other services offered to growers are at competitive levels. There is however a potential adverse impact on this approach in that it is likely to disadvantage small scale growers, particularly those with no sound collaterals or have had no previous business dealings with the Bank.

The study done by Manu (2000), which has been mentioned above, shows that the small growers are more efficient in their production. The challenge therefore rests with the Bank and government to ensure that such growers are not unfairly left out from participating in the development of the industry. From a government point of view, the continued participation of the small-scale semi-subsistence farmers would ensure a more equitable distribution of wealth and the benefits generated by the squash export industry. Thus, it has been suggested that export oriented financing schemes should be established to supplement what is being provided by the TDB. Such schemes should be aimed at increasing export of agricultural commodities including squash, as a mechanism for strengthening foreign reserves.

### **4.3. Organisation and Regulation of the Industry**

The industry has been heavily regulated by government during the initial stages of its development. In an attempt to influence the market, a quota system was imposed by government on the volume of squash exported every year, which was then split amongst the registered exporting companies. This proved to be very difficult to be managed and has created a lot of distrust and criticisms by exporters on almost every action taken by government. There were also deliberate moves by exporters to undermine each other's operations and efforts, so as to reduce the number of participating companies, in order to get a bigger share of the market.

Although government has deregulated the industry, the distrust amongst exporters seems to linger on, which is evident from the fact that it has been quite difficult to convince exporters of the benefits that would be derived from working cooperatively in certain areas rather than competing against each other. For example, joint and more organised efforts could effectively reduce the cost of inputs significantly through bulk purchase arrangements based on the economies of scale principle. This would also apply to shipping and export marketing, which at the moment each individual exporter is responsible for making its own shipping arrangements and negotiations on prices. This has resulted in important information being withheld by exporters, which would help guide policies and decisions made by government for the industry. Information relating to prices offered by the importing companies is not readily available to the general public and thus it is difficult to determine the actual cost of marketing and the profit margins imposed by exporters.

With the deregulation of the industry, particularly the uplifting of the quota system, the biggest challenge is to be able to control production through non-regulatory means, so as not to over-supply the market. This depends largely on the exporters and their willingness to set a range within which production should be targeted and that any decision to exceed the upper limit should be based on sound assessment of the market situation and not by the volume of squash being produced. The Ministry of Labour, Commerce and Industries considers the establishment of a squash council to be the best approach for the sustainable development of the industry. The council, which should comprise representatives of growers, exporters, government and support services, will be responsible for formulation of policies and decisions pertaining to the development of the industry. This set-up will depend on the willingness of all stakeholders to adhere to decisions set by the council.

Tonga's quarantine service is considered to be one of the well-established and effective services in the Pacific, apart from New Zealand and Australia. Most of its staff have undergone intensive training on proper quarantine operations procedures and have been certified as quarantine inspectors. Government has recently upgraded the quarantine service through the provision of appropriate facilities and the enactment of the plant quarantine legislation. There is still, however, a need to put in place an effective quarantine control programme to ensure the requirements of the export market are met. In addition, there needs to be regulations on food quality standards and safety as a legal framework for establishing effective food safety control infrastructure and ensuring compliance with quality standards demanded by the market. The experience from the 2000 season points to the need to maintain quality and supply in order for Tonga to maintain its share of the Japanese market.

### **4.4. Land Tenure and Utilisation Issues**

While the land tenure system ensures equitable access to land for food production, the smallness and fragmentation of the farming land constrains commercial agricultural development and in particular the development of the squash export industry. The out-migration and the emergence of absentee landowners had added further constraints to the development of the industry and agriculture in general. Although the land could be accessed through lease arrangements, farming practices by "tenant farmers" often result in increased soil degradation since their main concern is to maximise output and not on the long-term productivity of the land. For the same reasons, tenant farmers generally do not invest in the long-term development of the land.

A survey of the 704 farms established in Tongatapu during the 2000 season showed that at least 90 per cent of the farms, constituting approximately two thirds of the total area of squash were under 8 acres, which is the normal size of a tax allotment. The survey also recorded that about 3 per cent of the farms were more than 20 acres in size, which constituted about 20 per cent of the total area under squash (Manu, 2000). Unlike vanilla and kava, squash is grown as a mono-crop and with the increasing use of machinery for cultivation, farms are being cleared of trees (including coconut palms) to make way for squash.

The increasing level of chemicals used in the production of squash and its possible adverse impact on the environment, particularly on the island of Tongatapu, is a major concern. It is estimated that since the establishment of the squash industry the total quantity of chemicals used in agriculture have increased by more than threefolds. However, little work has been done to monitor its effect on the environment.

#### **4.5. Export Marketing**

The quality of the Tongan squash has significantly improved since the establishment of the industry in 1987. Despite this, it has yet to be established or recognised on the Japanese market based on its quality. Most of the squash produced by Tonga are being exported through New Zealand marketing agents and are treated as New Zealand produce when they enter the Japanese market. In other words, most of the Tongan squash is not presented as a Tongan product in the Japanese market. As shown on Table 5 above, about 60 per cent of the total volume of squash exported in 2000 were channelled through New Zealand marketing agents. The Ministry of Labour, Commerce and Industries reports that of the total volume of squash supplied to the Japanese market in 2000, only 500 tons were sold as Tongan squash.

The number of Japanese companies involved in the importation and distribution of Tongan squash within the Japanese market is considered to be too high. In 2000, there were a total of 19 companies involved in the importation and distribution of Tongan squash in the Japanese market. The price paid to the exporting company, therefore, depends on its ability to negotiate with the Japanese importer/distributor.

Given that fact that Tonga is one of the major suppliers of squash to the Japanese market during the December-January period, there is scope for Tonga to attract higher prices for its squash through promotion and product labelling in order to identify and differentiate it from the squash supplied by other countries. In view of this, the Ministry of Labour, Commerce and Industries is planning to put a label on all squash fruit produced and exported from Tonga. This will become of the requirements that exporters will have to comply with before its squash is accepted to be exported. Inspection of compliance with this requirement will be carried out as part of the responsibilities of the Quarantine and Quality Management Division of the Ministry of Agriculture and Forestry.

This undoubtedly will involve additional costs to the farmers and the exporters. Thus, the success of this would depend on whether Tonga will be able to fetch a more competitive price for its squash in the Japanese market. Also, Tonga would need to ensure that it is producing and supplying only premium quality squash according to the requirements of the Japanese market.

### **5. CONCLUSIONS AND RECOMMENDATIONS**

The historical development of the squash export industry provides interesting lessons, from which strategic directions and policies could be formulated to guide the development of squash and other industries in Tonga as well as in other Pacific Island Countries. The heavy reliance of the Tongan economy on squash export and the problems experienced in the past decade demonstrates the need to broaden the export base of the economy to provide a cushioning effect in the event that one industry collapses. The concentration of export on a single or a narrow range of commodities and to a few market destinations makes the economy vulnerable to external forces. Such experience was encountered when the coconut and banana industries collapsed in the late 1980s which could have caused catastrophic impact on the economy of Tonga had it not been for the timely introduction of squash.

Agricultural export is dominated by squash, kava, vanilla and root crops mainly to New Zealand, Australia and the United States of America. The problems experienced in 1994 (oversupply), 1998

(undersupply due to drought weather conditions) and in 2000 (oversupply) and their resultant impact on total foreign exchange earnings and on the economy as whole clearly indicate the need for Tonga to carry out research into potential new export commodities in order to broaden its export base. The situation in 2000 further demonstrates the fact that a niche market has a limited volume and lifespan and any deliberate attempt to broaden the window of opportunity available could easily cause significant adverse impact on the structure of the market.

The problems experienced during the initial stages of development of the industry due to direct government interventions lends support to the need for government to refrain from making such actions and to focus on playing a facilitative role and ensuring the equitable distribution of opportunities and benefits. This would not only encourage private sector development and participation in the development process but also allow government to stay focus on the need to provide strategic guidance on the directions of development and ensure that its policies are aimed to benefit all and just a few.

The commodity-based approach to development has allowed government to clearly identify the types of assistance and support required to be provided for the sustainable development of that industry. The development of the squash industry had allowed government to identify research programmes considered relevant and specific to the requirements of the industry. Infrastructural facilities including packing houses, agricultural machineries, and credit facilities have been established specifically to cater for the needs of the squash export industry.

Despite the achievements made so far, there remains a range of areas and issues for both government and the private sector to address in order to enhance development and overall efficiency of the industry. A number of areas have been identified include the need for research and development of appropriate production and post harvest technologies, as well as the development of processing facilities onshore to facilitate value adding activities. Such programmes would involve considerable costs and thus, the user pays principle should be investigated in order to raise the required funding for research and development.

As a way forward, the proposed strategy for the development of the squash export industry in Tonga is one that builds on the strengths and weaknesses of the industry and at the same time helps reduce risks and dangers associated with the weaknesses and constraints its faces. Removing the constraints imposed by the poor institutional set-up of the industry would promote improved efficiency in the supply of inputs and the marketing of squash, which would in turn help to promote further cooperative efforts by all.

**Agriculture Sector Contribution to GDP, Employment and Foreign Exchange Earnings**

**Table AI-1  
Contribution of Agriculture to GDP**

	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
GDP at Constant Prices	203,890	210,328	209,827	211,152	216,460	226,379
Agriculture, Forestry and Fisheries	56,903	58,005	53,249	54,531	54,674	53,007
Agriculture Sector Contribution to GDP (%)	28	28	25	26	25	23

Source: March 2000 Provisional Estimates of GDP 1993/94 to 1998/99 and Forward Estimate for 1999/00, Statistics Department

**Table AI-2  
Employed Population Aged 15 Years and Above by Industry, 1996**

Industry	Total		Male		Female	
	No.	%	No.	%	No.	%
Agriculture, Forestry Fisheries	9,953	33.8	9,834	53.4	119	1.1
Mining and Quarrying	43	0.1	38	0.2	5	0.0
Manufacturing	6,710	22.8	420	2.3	6,290	57.2
Electricity, Gas, and Water	504	1.7	407	2.2	97	0.9
Construction	500	1.7	485	2.6	15	0.1
Wholesale and Retail Trade	1,960	6.7	1,112	6.0	848	7.7
Hotels and Restaurants	546	1.9	239	1.3	307	2.8
Transport, Storage, etc	1,209	4.1	931	5.1	278	2.5
Financial Intermediation	536	1.8	244	1.3	292	2.7
Real Estate, Renting, etc	121	0.4	79	0.4	42	0.4
Public Administration & Defence	3,701	12.6	2,756	15.0	945	8.6
Education	1,721	5.9	756	4.1	965	8.8
Health and Social Work	510	1.7	135	0.7	375	3.4
Other Community, Social, & Personal services	1,133	3.9	864	4.7	269	2.4
Private households with employed persons	187	0.6	74	0.4	113	1.0
Extra-Territorial Organisation & Bodies	72	0.2	28	0.2	44	0.4
<b>Total</b>	<b>29,406</b>	<b>100</b>	<b>18,402</b>	<b>100</b>	<b>11,004</b>	<b>100</b>

Source: Population Census, Statistics Department, 1996

**Table AI-3**

**Value of Total Exports and Agricultural Exports during 1994-1999 (T\$, 000)**

	1994	1995	1996	1997	1998	1999
Total Export	17,748	18,022	12,812	13,358	11,036	19,219
Agricultural Export	13,127	13,053	10,484	9,090	8,581	12,708
Agricultural Exports as % of Total Exports	74	72	82	68	78	66

Source: Foreign Trade Report, Statistics Department

**Table AI-4**

**Real GDP Growth and Real Growth in Agriculture, Forestry and Fisheries, 1994/95 - 1999/00**

	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00
Real GDP growth	3.2	-0.2	0.6	2.5	4.6	6.1
Agriculture Forestry and Fisheries	1.9	-8.2	2.4	0.3	-3.0	9.0

Source: Foreign Trade Reports, Statistics Department

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