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G.P.O. Box 1571, Canberra, A.C.T. 2601

Vinning, Grant. 1990. Marketing Perspectives on a Potential Pacific Spice Industry. ACIAR Technical Reports No. 15, 60p.

ISBN 1 86320 006 1

Typeset and laid out by: CPN Publications, Canberra.
Printed by: Goanna Print Pty Ltd., Canberra.
Cover photo: Grant Vinning

Marketing Perspectives on a Potential Pacific Spice Industry

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Foreword

ACIAR's South Pacific Smallholder Project included work on the economics of vanilla production. In the course of that work the difficulty of obtaining information on spices was apparent. In order to save others interested in spices in the South Pacific from seeking out data at source, ACIAR decided to undertake a small information-gathering project. Most of the material obtained is included in this Technical Report.

However, more detailed information on the nine species regarded as being of most relevance to the South Pacific has been put, unedited, into ACIAR's Working Paper series No. 27 (available from ACIAR at no charge).

Spices have been, and continue to be, mooted as the answer for South Pacific agriculture. We hope that the material contained in these reports will help South Pacific policymakers and entrepreneurs make decisions appropriate for the region.

G.H.L. Rothschild
Director, ACIAR

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CHAPTER 1

Introduction

Methodology

The basic approach used in compiling this report was an adaptation of the Rapid Market Assessment (RMA) technique. In turn, this technique is a variation of the Rapid Rural Appraisal technique common in Farming Systems Research.

In broad terms the objective of RMA is to describe the marketing system, estimate the quantity of product which can be marketed, and estimate the net price to producers. Market description usually includes the principal market channels; the number and size of producers, middlemen and retailers; barriers to entrance; marketing costs. Quantity estimates include the quantity currently marketed, estimates of the potential for expansion and the share of the market a new entrant could anticipate. Net producer price estimates should include consideration of ex-farm gate costs, principally transport.

The *product* 'spices' can be treated as a unitary, homogeneous product, or as a number of individual items. The *production area* can be viewed as a single entity of the South Pacific, as individual countries within the South Pacific, or as individual producers. *Market* can be viewed as the total global market, the market in individual countries, or the market for a specific spice in a specific country.

To handle these phenomena it was decided to study the problem at two levels.

One level concentrated on the unidimensional, or macro, elements. Thus spices were treated as a homogeneous product produced from a homogeneous area and marketed into a homogeneous market. Chapter 2 examines global production and marketing of 13 spices. Chapter 3 identifies the spices relevant to the South Pacific which are the focus of detailed analysis. The chapter looks at spices in the South Pacific, their production history and the thrust of current research and development.

The second level, the micro approach, is common to the studies undertaken by the Overseas Development Natural Resources Institute (ODNRI)[1], the International Trade Centre (ITC)[2], and the series published in CRC Critical Reviews in Food Science and Nutrition (CRC)[3]. Chapter 4 examines the potential of individual spices for the South Pacific. The detailed data originally planned for this chapter is contained in ACIAR Working Paper No. 27, copies of which can be obtained either from ACIAR or the author.

The study recognises that RMA fails to fully appreciate that the product the farmer grows is invariably not the product that is marketed. Often considerable on-farm processing occurs. This can involve person-days of effort rather than the actual outlay of capital and operating expenses: the curing of turmeric and vanilla are common examples. Additionally, there can be considerable transport and other to-market costs. The studies of ODNRI, ITC and CRC ignore such pre- and ex-farm gate costs. Chapter 5 recognises that a number of spice ventures have been initiated in the South Pacific with limited success. The chapter presents two case studies involving three spices in three countries. Using these case studies, Chapter 6 establishes a number of marketing issues which must be addressed when considering the market potential of a spices industry in the South Pacific. Chapter 7 takes a wider view and examines a number of other issues which should be addressed when commencing a spice industry. Chapter 8 examines in detail Australia, the nearest large market to the South Pacific.

The final chapter presents the conclusions and recommends which spices present the best market prospects in the Pacific.

Definition of 'Spice'

The subject matter 'spices' covers an extremely wide array of product. Whilst over 100 plants are

[1] Anand and Smith (1986); Anand (1983, 1982); Green et al. (1980); Greenhalgh (1980, 1979b, 1979c); Robbins (1985, 1983a, 1983b, 1982b); Robbins and Greenhalgh (1979a,b,); Smith (1986, 1982a, 1982b); Smith and Anand (1984).

[2] ITC (1989, 1986, 1982, 1978, 1977, 1970).

[3] Govindarajan (1985a, 1985b, 1982a, 1982b, 1980, 1977); Govindarajan et al. (1982); Maga, (1975); Sampathu et al. (1984).

used as spices, many are highly localised in their production and use.

Verrill (1940 p.29) used a broad identification: 'spice is usually a form of species or kind...[of] fragrant or aromatic and pungent to taste'. Purseglove (1972, 1974) defined spices botanically. Another approach has been to classify spices in terms of product characteristics such 'hot,' 'aromatic' and 'mild.' Some definitions combine aspects of botanic and product characteristics: 'one or other of the various strongly flavored or aromatic substances of vegetable origin obtained from tropical plants, commonly used as condiments or employed for other purposes on account of their fragrance and preservative qualities'(Plantation Crops[4]).

Parry (1969) goes one step further. He does not define the term but lists 40 products which he calls 'spices'. His list contains many plants usually considered as herbs but omits vanilla considered virtually everywhere else as a spice:

allspice	anise	capsicum	caraway
cardamom	cassia	cayenne	celery
chervil	cinnamon	cloves	coriander
cumin	dill	fennel	fenugreek
garlic	ginger	laurel leaves	mace
marjoram	mint	mustard	nutmeg
onion	origanum	paprika	parsley
pepper	poppy seeds	rosemary	saffron
sage	sesame	star anise	tarragon
thyme	turmeric		

Finally, the United States Food and Drug Administration define 'spices' as: 'aromatic vegetable substances used for the seasoning of food. They are true to name and from them no portion of any volatile oil or other flavoring principle has been removed.'

This study adopted a very pragmatic approach in defining 'spices'.

The study was a marketing analysis. It was interested in production, trade and prices. At the same time it recognised it is common practice to equate world spice production with world spice trade. There are three reasons for this;

(i) Spice production invariably occurs through smallholders in developing countries, thereby making the collection of reliable production data extremely difficult. The only 'spice' production statistics published by the Food and Agricultural Organisation Production Yearbook are 'chillies + pepper, green.'

(ii) With the exception of most spices in India and cloves in Indonesia, the production of spices is basically for export and not domestic consumption.

(iii) Import statistics into developed countries are collected consistently and tend to be somewhat readily available.

For these reasons this study viewed 'spices' from the perspective of the international trading community. More precisely, the product 'spices' was that which was identified in the import statistics of the 27 major trading countries.

Twelve individual spices and one group of spices (excluding the catch-all grouping of "Not Elsewhere Included") are commonly identified in import statistics:

cardamom	cinnamon	cloves
curry	ginger	mace
nutmeg	paprika	pepper
pimento	tumeric	vanilla

The grouped spices usually include the spice seeds of:

anise	badian	caraway
coriander	cumin	fennel
juniper		

Other spices noted separately and irregularly in import data are bay leaves, capsicum, cassia, chillies, saffron, and thyme.

Data

Data were assembled from a number of sources for the three RMA foci of production, markets and prices.

Production

As indicated above, spice production data are invariably difficult to establish.

The exception is pepper. Pepper production and trade data are produced on a regular basis. For over two decades the annual Commodity Review and Outlook of the Food and Agricultural Organisation (FAO) has produced broad production statistics and outlook data for pepper. The International Pepper Community publishes an annual Pepper Statistical Yearbook and a monthly newsletter. The study noted that pepper is arguably the spice most

[4] Published annually by the Commonwealth Secretariat, London, from 1933-1970. Provided some production, trade and price data on crops grown in a plantation manner in the tropical countries of the then Commonwealth including spices. Superseded by Fruit and Tropical Products published twice a year. Coverage of spice crops gradually diminishing.

widely studied by economists. Reference was cited to eight pepper studies by the Economic and Social Commission for Asia and the Pacific (ESCAP)[5], one by FAO[6], and five by the Tropical Products Institute[7]. The International Pepper Community and UNCTAD have commissioned the Free University of Amsterdam to model the production, consumption and trade in the world pepper industry (ESI-VU 1988). As a consequence greater store is now being placed on reliable pepper statistics. Academics who have worked in Asia suggest that there are a number of postgraduate economic theses which also examine pepper. However, notwithstanding its importance and the attention it receives, pepper statistics are not always in concert.

A great variety of sources were used to establish the production status of individual spices. Many of the sources were in conflict. Where relevant the conflicts are noted.

Over the period studied (1979-89), there was an increasing acceptance of spice production statistics from the developing world. This is attributed partly to most spice producing countries attending meetings of the International Spice Group. At these meetings the countries are required to produce 'country papers' outlining production and trade information. This discipline is yielding better data. High reliance was placed on the figures emanating from the papers presented at the two meetings of the International Spice Group[8] because the papers were presented by officials of either the country's agricultural department, or the relevant marketing authority. Additionally, the General Agreement on Tariffs and Trade process concentrating on Tropical Products is probably also helping.

Markets

Papers delivered at the two meetings of the International Spice Group were used as a source of production and trade data. Again, there were conflicts between these figures and those of the most commonly cited sources (U.S. Spice Trade, published by the United States Department of Agriculture, and Fruit and Tropical Products published by the Commonwealth Secretariat).

A caveat must be noted when using Fruit and Tropical Products statistics. Frequently the figure used within the one publication differs substantially. Consider Table 1.1 below which shows exports of chillies from India;

Table 1.1. Chilli exports (tonnes) from India — fruit and tropical products.

Source	1983	1984	1985	1986
Table 11: "Trade in certain other spices"	10520	9250	875	5000
Table 12: "India: Exports of spices"	14010	10461	1492	n.a.

The difference is explained by reference to different means of calculating the year, be it calendar or the various definitions of financial year. This paper uses figures derived on a calendar basis in order to achieve comparability between countries.

By defining spices in terms of the available trade statistics, especially import data, the work of the International Trade Centre/GATT at Geneva proved invaluable. On three occasions the International Trade Centre collated spice import statistics from 27 major trading countries (ITC, 1989, 1986a, 1982, 1977). Whilst there are a number of inconsistencies between reporting countries, most countries use the same classification: Australia, for example, groups cardamom with nutmeg and mace, and a number of countries aggregate turmeric and fenugreek. Japan aggregates turmeric with ukon.

An additional complication is that not all countries delineate the 'ground' from the 'unground' product. It is noted that the United Nations' International Trade Statistics Yearbook has a three-digit SITC classification 'Spices.' However, spices are one of the few products not disaggregated further into four- and five-digit classifications. Consequently, United Nations statistics were ignored even for the macro analyses.

[5] ESCAP (1978, 1979, 1981a, 1981b, 1981c, 1981d, 1983, 1984).
[6] FAO (1986).
[7] TPI (1980a, 1980b, 1981a, 1981b, 1981c).
[8] See (a) Report of the First Meeting of the International Spice Group New Delhi, 24-29 November, 1986. Commonwealth Secretariat: London, (b) Report of the Second Meeting of the Second Meeting of the International Spice Group, Singapore, 6-11 March 1989. Commonwealth Secretariat, London; International Trade Centre, Geneva; Singapore Trade Development Board.

Prices

Spice price and market information is available from a number of sources but not in a consistent and available form which encourages ready comparisons between markets and between products. This point is explored in Chapter 7. Further, many of the sources are in conflict. Finally, none of the major price reporting bodies maintains a data bank of prices older than 4 years, although steps are underway to rectify this.

The price data supplied by U.S. Spice Trade and Fruit and Tropical Products, whilst too old for current trading strategies, is adequate for the longer term, that is 10 years, focus of this paper.

Presentation

There are several methods of presenting analyses of spices.

First, there is the botanic approach (Verrill 1940; Parry 1969; Purseglove 1972). However, this approach is rejected because of the general lack of knowledge of the scientific basis for categorising genus, species, and varieties.

Second, trade data on spices are usually presented in an order than can only be followed by someone familiar with the four-digit SITC categories:

pepper
capsicum
pimento
paprika
vanilla
cinnamon and cassia
cloves
nutmeg and mace
cardamom
seeds: anise, badian, caraway, celery, coriander, cumin, dill, fennel, juniper, poppy,
saffron
ginger
turmeric
fenugreek
curry paste and curry powder
thyme and bay leaves,
spices 'not elsewhere included'

Even here there are groupings peculiar to the one country, e.g. only Australia categorises cardamoms nutmeg and mace, whilst only Japan categorises turmeric with ukon. Further, not all countries follow the same strict ordering.

This study used a third approach, categorising all spices alphabetically. This approach was used because it was considered that readers would be unfamiliar with the first two approaches.

CHAPTER 2

Spices: Global Production and Trade

World Trade

World trade in spices has shown a consistent upward trend over the past 20 years, (Table 2.1).

Table 2.1. World trade in spices

Year	Tonnes
1970-75	220 000
1978-80	296 000–327 000
1981-85	350 000– 370 000

The estimates in Table 2.1 are net of the import and export figures for the entrepots of Singapore and Hong Kong in order to avoid double counting.

It is argued that this upward trend will continue and that spice consumption will continue to grow at a rate greater than population growth.

In arguing this cognisance must be made of the major past and continuing changes in consumption.

In developing countries spices tend to be consumed as a household item, as in developed countries with about 60% of all spices being so consumed. Household usage was, and still is, concentrated on pepper, nutmeg, cinnamon and cassia, paprika and vanilla. Additionally, very small volumes are consumed by the pharmaceutical and perfumery industries. Some spice seeds are used predominately in the alcoholic beverage industry.

However over the last two decades there has been a significant shift. Today in the United Kingdom and the United States about 60% of all spices are consumed in the industrial sector. This sector comprises food processors, the institutional sector of hospitals, canteens, and catering for the armed forces, and the service sector of restaurants. Industrial usage is dominated by the meat industry, followed by canned products, bakery goods, fish, and prepared and convenience foods.

Average household consumption in the developed world varies enormously. United Kingdom consumption is estimated at five packets annually compared with 10 packets for the United States, and 20 packets each for Germany and the Netherlands.

Increased usage in this field is expected to fuel the increase in the demand for spices at a rate greater than population growth.

Oligarchical structures predominate the world spice trade, with three spices constituting about one-half of all spices traded (Table 2.2).

Table 2.2. Major spice crops traded

Crop	1983-87 tonnes
Pepper[a]	94 000–132 000
Spice Seeds	55 000–60 000
Capsicum[a,c]	55 000–60 000
Cinnamon and cassia[b]	33 000–34 000
Turmeric[a]	15 000–20 000
Ginger[b]	15 000–16 000
Nutmeg and mace[a]	12 000–15 000
Cardamom[a]	9 000–10 000
Curry powder[b]	5 000–6 000
Cloves[a]	3 000–4 000
Pimento[b]	3 000–4 000
Vanilla[b]	2 000–3 000

[a] See Chapter 4
[b] I.T.C. (1989)
[c] Paprika, chillies and cayenne pepper

Within this trade there are a number of other oligarchical features:

* three countries (United States, Germany,F.R., and Japan) take over half of all spice traded;
* entrepots – two entrepots trade about one-quarter of all spices;
* United States – takes about one-third of all spices traded;
* Soviet Union – takes about one third of traded pimento;
* Mexico – dominates the imports of cinnamon and cassia;
* Middle East – takes about 80% of traded cardamom;
* Indonesia – about 80% of the world's clove production goes into the Indonesian 'Kretek' cigarette industry;

Traded Product

About 90% of the world spice trade occurs in the unground form. Other forms are (a) spice oleoresin, (b) spice essential oils, and (c) ground spice.

Oleoresins

Oleoresin trade grew in the late 1970s but its rate of growth appears to have levelled off. The attraction of this form of traded product is elimination of bacterial contamination;greater consistency in the final product; more economic transport and storage costs; minimisation of loss of volatile oils during storage.

Spice oleoresins can be employed in the following ways:

Spice	Oleoresin Use
Pepper	meat products, condiments, sauces, dressings, soups, snacks
Paprika	colouring agent
Capsicum	pharmaceutical products
Ginger	meat products, bakery products, beverages, condiments
Cardamom	meat products, condiments, curries
Cinnamon	bakery products, confectionery products, condiments, prepared mince meat
Clove	meat products, condiments, bakery products
Nutmeg	meat products, condiments, some perfumery products
Turmeric	colouring agent

To a pepper-producing country there is the advantage of greater utilisation of all pepper grains. Immature grains or 'floaters' which would usually be rejected are high yielders for oleoresin extraction purposes. To some extent this explains the shift in oleoresin production away from the developed countries back to the producing countries. India and Singapore are now major oleoresin producers.

However there appears to be considerable overcapacity in oleoresin extraction facilities. Govindarajan (1985b) stated that because there is a buyers' market returns on investment are not very satisfactory. He estimated the global market for spice oleoresin at 1600–1800 t. Paul (1989) estimated that India has an installed capacity of 900t. Any price movement which makes investment in new oleoresin extraction facilities attractive would be doubly attractive for the existing facilities.

Oleoresin usage has increased due to the need to accommodate the massive increase in the ownership of microwave ovens and ethnic-oriented food. Demand is increasing at an estimated rate of 8-10% per annum (Chemical Marketing Reporter, 23 May 1988). United States imports have increased nearly 70% in the period 1984–87 (451 t and 760 t, respectively). However it is recognised that paprika alone accounts for 50% of oleoresin imports. The extent of possible growth in this market can be gauged by appreciating that 70% of US homes now own a microwave (Adweek's Marketing Week, 30 May 1988).

Retail Packs

An earlier thrust was for spices to be traded in the bulk form combining both processed and unground product. Trade in retail and other processed packs was, and still is, encouraged by the apparent huge margins between the import price of the unprocessed product and the price of the retail pack. Govindarajan (1977, 1985b) cites retail margins of four- to eight-fold increases over imported pepper and five- to ten-fold increases for capsicum. Whilst Govindarajan (1985b) adds that these margins depend upon packaging, market sector and unspecified marketing inputs, such a simplistic approach ignores the fact that the retail margins are high to compensate for the slow turnover in the product. In the United Kingdom for example retail pack suppliers are required to pack the supermarket shelves themselves and not depend on supermarket staff. In some cases packers have to supply the stands (see also Pande 1986).

Growth of this trade has since been handicapped by the reluctance of importers and retailers to handle retail pack product. This stems from previous experience with retail packs from the developing world which were heavily adulterated (Govindarajan 1977; Button 1986). One consequence of this has been for spice importers to specify adulteration testing procedures for retail packs.

Encapsulated Form

An emerging trend has been trade in the encapsulated form. Because of the bacterial contamination problem associated with natural spices as well as the flavour loss in both grinding and storage industrial users are increasingly favouring encapsulated spices.

Tariff and Nontariff Barriers

With developed countries tariffs are not seen as influencing the direction of trade. Instead, the preference on importers is of prime importance. In contrast, tariffs in developing countries can be extremely high. Here, tariffs are rationalised on the grounds of management of scarce foreign reserves,

protection of domestic production, and government revenue raising.

In contrast, nontariff barriers are seen as influencing the pattern of trade. Both are detailed below.

Tariffs

As a broad rule whilst there are insignificant tariffs on raw and unground spices, some tariffs exist for ground spices, spice products and retail packs. Tariffs on processed products can lead to tariff escalation with the tariff increasing as the degree of sophistication increases, such as moving from the raw and unground spice in bulk to raw and unground product in 1 kg packs. Protection of local processors is clearly the intent of such actions.

For the European Community, spices from affiliated ACP[1] countries enter duty free. However, the following selected spices from developing countries attract some tariff:

badian, bay leaves, cloves, capsicum, pepper, pimento, saffron, seeds, thyme, unground miscellaneous spices, vanilla.

Some other European countries have quite high tariff levels. The United States, the second largest spice importer, generally has minimum tariffs on ground and unground products. Japan, the third largest importer, has a series of low MFN and GSP tariffs for imported spices: tariffs for processed products are higher than those for the raw product. Eastern Europe, an emerging market, tends to have trade flows determined by bilateral agreements. Developing countries tend to have higher levels of tariffs, the existence of which is rationalised on the grounds of foreign exchange enhancement and revenue raising.

As part of the Uruguay Declaration and the GATT Negotiating Group on Tropical Products most countries have agreed to liberalise tariff barriers on all spices.

Nontariff Barriers

Nearly all countries have some form of nontariff barriers for imports[2]. It is argued that as tariff concessions are granted, nontariff barriers are increased: it is estimated that the incidence of nontariff barriers doubled in the 1970s and 1980s and currently affect 50% of world trade.[3]

Nontariff barriers range from packaging and labelling requirements, import licencing and quality specifications, and sanitary and quarantine requirements. An example of packaging and labelling barriers involves some Middle East countries requiring spices to have a shelf life of 3 years and this fact must be printed on the labels. However, India, the main supplier of spices to the region, will only issue a certificate for 2 years of shelf life. Consumer health protection is the accepted reason for sanitary and quarantine requirements. As it is considered the most important non-tariff barrier and the one most likely to grow in importance, sanitary requirements will be noted in more detail in Chapter 7.

Artificial Spices

Spices result in flavours. Hillyer (1989) suggested that flavours can be categorised as:

* natural flavours composed of natural aromatic raw material obtained by physical methods;

* nature-identical flavours which are flavouring substances found in nature but obtained through chemical processes[4];

* artificial flavours which contain at least one substance not found in nature.

It must be noted that these terms are not unique: they are likely to be incorporated into forthcoming amendments to Australia's Food Standards Code.

Delineation between an artificial product and a modified or restructured form of the natural product is extremely difficult without knowledge of constituent parts. An example is 'Mildspice,' a mixture of natural spices, oleoresins, and essential oils (Dzieza 1988). On the other hand it could also be considered an artificial product because it is incorporated into a dry stable matrix[5]. Another development is that of a cell immobilisation continuous culture process to produce capsaicin, the pungent ingredient in chillies (Biotechnology News, 7:4, 1987).

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[1] Former African, Caribbean and Pacific colonies of EEC member states.

[2] See Hillman (1978) for an examination of nontariff barriers.

[3] From the Trade Policy Research Centre, London, quoted in Australian Financial Review 3 April 1989.

[4] See Van Brunt (1985) 'The Promise of Plants,' Bio/Technology 3, 6, 1985.

[5] Developed by a German firm, the products currently exist for black and white pepper, cinnamon with both high and low oil content, and nutmeg. It is claimed to have the advantages of: (i) more precise control over flavour profiles; (ii) final product consistency; (iii) improved stability and storage life; and (iv) can be used over a greater array of products (Dzieza 1988).

The costs of developing artificial and nature-identical flavours are very high. Of all spices only vanilla has an artificial substitute acceptable in terms of costs and flavour.

Nevertheless the move towards synthetics has strong imperatives. Bacterial contamination, instability of prices and supply, variability of quality, loss of flavour profiles in grinding and storage, and greater precision in product specification are encouraging industrial food processors to move towards synthetics.

Despite the appeal, synthetics face two major obstacles. Firstly, the cost of producing a new product is higher. Establishing efficacy, wholesomeness and safety are the greatest cost aspects. Secondly, in a marketing environment increasingly accentuating 'naturalness,' the use of a synthetic product may be unacceptable (see Chapter 7).

CHAPTER 3

Spices in the South Pacific

Spices are not new to the South Pacific. A surprisingly wide number have been experimented with over a wide geographic area over a relatively long period of time.

Each of the five major countries has had experience with different spices. Further, each country has plans for the development of a different suite of spices.

This chapter gives a brief history of each spice and details the current thrust of spice research and development in the major island nations of Fiji, Solomon Islands, the Kingdom of Tonga, Western Samoa, and Vanuatu.

Fiji

Previous History

Cardamom

Elettaria cardamom was successfully introduced in the government agricultural stations in 1939 but the plants were destroyed in a subsequent storm (Parham 1944). There appeared to be no further effort to cultivate the spice until recent times.

Chillies

The 1944 Annual Report of the Department of Agriculture[1] noted that experimental work was being conducted on chillies but failed to specify what type of work. As chillies are an integral part of Indian cuisine the crop is widespread as a garden crop. The most common chillies are the tabasco types, especially Birds' Eye.

Cinnamon and Cassia

Fiji has experimented with a considerable range of *Cinnamomum* species, especially *C.cassia* types. The 1941 Agricultural Journal (Fiji) reported that the following types of cassia cuttings could be obtained from the Nasinu Agricultural Station; *Cassia siames, C.siamea, C.fistula, C.nodosa,* and *C.javanica. Cinnamomum zeglanica* cuttings were also offered for sale.

Little commercial activity seems to have eventuated from these efforts. However, cinnamon has become feral, being considered something of a nuisance. Its bark is used as a perfume. Whilst local varieties were unable to be identified, they were considered a 'false' cinnamon.

Cloves

Some effort was made to popularise cloves by making planting material available from the Nasinu Agricultural Station in the late 1930s. However, after 1941 no further references appear in the Agricultural Journal (Fiji).

In 1956 the South Pacific Commission's Conference on Regional Plant Introduction recommended cloves as a spice worthy of further study (Agricultural Journal (Fiji), 27, 1 and 2, 59–62).

Ginger

Ginger is one crop that Fiji has successfully commercialised. At the same time the current commercial success has had a long background of research and development.

Jack (1938) reports ginger being grown at the Sigatoka Government Station. The 1938 Agricultural Journal (Fiji) reports that ginger was exhibited at the New Zealand Centennial Exhibition. Samples sent to the United Kingdom for evaluation in the same year met the standards of the British Pharmacopoeia. In 1939 the Government Chemical Laboratory prepared samples of preserved ginger for evaluation in the U.K. Green ginger was exported to New Zealand in the same year, a figure that rose to 32 t by 1944. However by 1954 green ginger exports ceased. A 1958 experiment about the practicality of marketing dried ginger resulted in considerable concern over the labour requirement. This was despite the high pungency levels and encouraging results from samples sent overseas (Sills 1959). In 1959 Fiji had hopes for its preserved ginger (Sills 1959). It is this product which became the focus of the Fijian ginger (Sills 1970; Haynes 1973; Sivan 1979). In the 1980s fresh and dried ginger production have experienced substantial growth (Table 3.1).

[1] Throughout this Chapter the generic term 'Department of Agriculture' is used to describe across countries and across time the government department which has the primary responsibility for agriculture.

Table 3.1. Fijian ginger production (tonnes).

	1981	1982	1983	1984	1985
Mature	233	419	647	618	600
Immature	2940	4900	4930	3512	3270

Source: Fiji's Ninth Development Plan 1986–90; Policies, Strategies, and Programs for the Next Decade. 1985.

Nutmeg

The nutmeg *Myristica fragrans* was introduced from Trinidad in 1939 but failed to germinate (Parham 1944). Further efforts are not evident. Nutmeg was one of the spices recommended in 1956 for further investigation by the South Pacific Commission (Agricultural Journal (Fiji), 27, 1 and 2, 59–62).

Pepper

Pepper is not a new crop to Fiji: Parham (1954) cites Stonehewer (1888) as stating that Fiji was exporting pepper as early as 1888. After that, however, the crop appears to have disappeared from official records. However, unlike, say, turmeric in the Solomon Islands and ginger in Samoa, pepper does not appear to have become feral.

It is common to trace the development of the modern Pacific pepper industry to plots established at Naduruloulou Experimental Station in Fiji in 1951 when cuttings of five 'high yielding strains' were donated by the Director of Agriculture from Sarawak. Parham (1954) stated that the Sarawak cuttings were required because pepper was not to be found in Fiji. He also said that the crop was 'suitable for smallholders'. In 1955, the South Pacific Commission's Conference on Regional Plant Introduction decided that 'Further introduction and selection work should be carried out on pepper ... ' (Agricultural Journal (Fiji), 27, 1 and 2, 59–62) but gave no reason as to why this should be done. Sills (1960, 1962) reported in some detail on a number of production issues including the preference for living supports for the vines and how to dry the crop.

Parham (1954) gave no marketing imperative as to why pepper should be introduced to the Pacific other the fact that, for Fiji at least, production could be absorbed locally. Sills (1960) noted the wide price variations to which pepper was subject, an indication that the industry could move beyond Parham's view of merely a local one. Sills (1960) recommended that Fiji should produce black rather than white pepper because of the trend in the United States meat industry and the fact that the small differences between black and white pepper prices did not warrant the extra effort to produce white pepper. He also stated that the local product met required United States standards. Finally, he noted that the London market priced Fijian sun-dried black pepper marginally below that of Sarawak pepper, a difference Sills attributed to the indifferent method of preparation and not quality. Later, Sills (1962) noted a series of pepper price-yield combinations, albeit not in comparison with other crops.

Turmeric

Silas (1938) stated that 'Turmeric is found growing wild in many hilly parts of Fiji. It is so plentiful that rarely, if ever, is any planted as a crop'. No authority notes that turmeric is indigenous to Fiji, thus it is likely that, first, turmeric was introduced by immigrant Indians and, second, after its introduction the spice became feral. 'Considerable quantities of the dried prepared root is used in Fiji' (Silas 1938) with local uses being identified as an ingredient in curry making for Indians and as a decorative item for Fijian dancers. There appeared little effort to establish the curcumin content of the local product.

Fiji also produces a white variety of turmeric. Whilst white turmeric is consumed in local curry uses because of its flavour, there appears little use for the red variety.

Fresh turmeric is also exported 1983, 1 t; 1984, 37 t; 1985, 23 t; 1986, 21 t; 1987, 26 t.

(Source: Chief Plant Quarantine Officer, Ministry of Primary Industry, Suva).

Exports are primarily to the United States and Canada with small supplies going to New Zealand. The product is understood to be used within the pharmaceutical industry.

Vanilla

There are some parallels between the Fijian pepper and vanilla industries in that both crops were introduced about 100 years ago but fell into decline at the turn of the century.

Vanilla was introduced into Fiji in 1881 (Fiji 1986). Samples sent to London were criticised mainly on the method of preparation and not quality. Exports of 5 t went to Australia, New Zealand, Hawaii and Canada. It was stated that 'after 1904 there were no records on production, exports etc and it appeared that the industry failed for unknown reason' (Fiji 1986, p.1). Whilst Capus and Bois (1912) state that Fiji exported 5 t in 1908–09, there is no doubt that the industry disappeared in

the early part of this century.

There appeared to be some revival of interest in the industry in the 1930s. Suckling (1939) stated that despite the artificial vanilla industry 'a demand for the genuine product does exist and its possibilities as a subsidiary crop are good'. In the early 1940s vanilla cuttings were available from Government stations for one shilling each. Jack (1940) provided some details on the curing of Tahitian vanilla beans. In 1956 the South Pacific Commission's Conference on Regional Plant Introduction stated that 'The spread of diseases in other parts of the world may make vanilla an important crop in the Pacific' (Agricultural Journal (Fiji), 27, 1 and 2, 59–62).

Current Interest

Fiji is currently concentrating on four spices; cardamom, ginger, pepper, and vanilla. Of these ginger is well established, and vanilla, whilst somewhat established, is currently having a major disease problem.

Pepper and cardamoms have been identified as spices for the future. It is anticipated that they will appear in the tenth Development Plan commencing in 1991.

Cardamom

No reason was given as to why cardamom has been chosen as a spice with potential. Admittedly, about 10 t were imported in 1985. However there appears little planting material available and little research and extension knowledge.

Ginger

The planned expansion of the Fijian ginger industry is shown in Table 3.2 below.

Table 3.2. Fijian ginger production plans (tonnes).

	1986	1987	1988	1989	1990
Fresh					
Production	4500	4480	4400	4400	4570
Export	2700	2800	2900	3000	3200
Immature					
Production	900	1300	1600	1700	1770
Export	130	920	1140	1220	1275
Dried					
Raw	975	1500	2040	2985	2920
Dried	152	236	328	487	564

Source: Fiji's Ninth Development Plan 1986–1990; Policies, Strategies, and Programs for the Next Decade. 1985.

Fiji's exports of preserved ginger go largely to the United Kingdom and other EEC countries. A preferential tariff arrangement assists it to compete against the market leader Australia.

Fresh ginger exports have been built on supplying the west coast of North America. McGregor (1988) estimated the North America market for fresh ginger at 11 000 t. He argued that Brazil, Fiji's major competitor in that market, is handicapped in terms of price competition because of high overland transport costs. McGregor is optimistic about the potential for Fijian fresh and preserved ginger in the United States and EEC markets. His optimism is related to Fiji being able to supply the northern hemisphere in that hemisphere's off-season production period, augmented by a complementary marketing arrangement with Hawaii. Whilst McGregor stated that the United Kingdom is the biggest buyer of fresh ginger, he gave no figures. McGregor does not mention dried ginger exports from Fiji. Efforts to market fresh ginger into Japan have been handicapped by the alleged presence of nematodes. The Japanese response has been to encourage the use of vapour heat disinfestation techniques. However Fiji has been able to enter into arrangements with the Japanese dealing with ginger in a preservative solution. This could lead to Fiji providing the value-added product of sliced ginger.

As Table 3.2 shows, dried ginger, the ginger product usually considered as spice, is seen as providing the smallest sector of the total ginger market.

It is considered that Fiji has in place adequate production knowledge to deal with any aspect of the ginger industry. Further, through the National Marketing Authority of Fiji the industry has in place an experienced marketer. Admittedly, the Authority's expertise is based on crystallised and fresh ginger, not dried ginger, but its proven experience in ginger marketing should stand the industry in good stead.

Pepper

It appears that the Agricultural Commodities Committee had designated pepper as a spice to be developed. No reason was given as to why pepper was designated and certainly no marketing imperative was noted.

Planting stock appears to be available. An expatriate farmer has developed considerable plantings of pepper over the last 8 years. He has expressed his

willingness to make cuttings available. However little is known about the piperine and fibre content of his varieties.

Vanilla

After the introduction of the crop in the late 19th century plantings of *Vanilla plantifolia* and *V.tahitensis* were maintained privately. A private sector revival in the late 1960s faltered with the destruction caused by the 1972 cyclone. Official interest recommenced in 1971 with smallholder plots being established on the main island. By 1978 only one plot was being maintained. Expatriate planters continued with the crop during the 1970s and early 1980s. Official interest recommenced with the training of an officer in Tonga in 1979. From that officer's efforts the current plantings of four blocks each of 0.2 ha supply most of Fiji's planting material. By June 1989, Fiji had a total of 62 000 vines planted by 443 farmers. It is estimated that 24% of the vines are producing; of this amount, 16% were bearing for the first time in 1988 with the rest being planted as early as 1983. More up-to-date figures were to be released in late 1989 as part of a survey dealing with potyviruses. Production for the years 1985–87 is shown in Table 3.3.

Plans are for a production of 500 kg of cured beans by 1990.

Table 3.3. Fiji vanilla production.

Year	Area (ha)	Green (kg)	Cured (kg)
1985	5.7	30	8
1986	13.6	130	28
1987	13.6	300	60

Source: Ministry of Primary Industry.

Marketing occurs largely through the Ministry. It buys the green beans from the farmers (at F$9/kg, green bean), cures and then markets the dried bean, mainly to a representative of the United States spice manufacturer McCormick and an American chemist who makes an annual buying trip to the Pacific. The price, F$60/kg, cured bean, is the same as that being paid to Tonga producers.

In mid 1989 further plantings were not being encouraged (Vanilla Extension Officer, pers. comm.). Potyvirus infection is now widespread leading to a recommendation that further planting material not be imported from other countries (Pearson 1989).

Solomons Islands

Previous History

Spices have a long history in the Solomons.

It is unproductive to debate whether turmeric and ginger are indigenous or endemic to the Islands. Instead it is necessary only to note that turmeric has traditionally been used to 'provide clothing and hair dye' (Badcock 1946) and that ginger has long had a number of medicinal uses. Wild varieties of both spices, as well as chillies and vanilla, are relatively common throughout the Islands. In the latter case, however, introduction can be traced to the activities of Dutch and Swedish expatriates in the 1950s.

Commercialisation of spices in Solomon Islands has been the subject of detailed studies in recent years. Badcock (1946) commented on ginger and turmeric production; Gollifer (1973) reported on the progress in the 1960s on chillies, turmeric, ginger and nutmeg, praising in particular the high quality of the Solomons' cinnamon quills; and Purseglove (1971) noted the commencement of scientific evaluation of local material. More recently turmeric, chillies, cardamom and vanilla were selected for development in a report which also examined allspice, pepper, cloves, nutmeg and mace, and cinnamon (AACM 1983). After assessing the 1983 recommendations, the Tropical Development and Research Institute established a detailed plan for the commercialisation of vanilla, cardamom, chillies, turmeric and ginger (Green 1985). The economics of smallholder vanilla, cardamom, chillies, turmeric and ginger production were established as part of the South Pacific Smallholder Project funded by the Australian Centre for International Agricultural Research (Patten and Fleming 1988, pers. comm.). To this must be added the publications from the country's research station (Caiger 1987a, b; Solomon Islands 1983).

Previous commercialisation efforts concentrated on turmeric and chillies.

Turmeric

Gollifer (1973) noted attempts in the 1960s to commercialise turmeric and Green (1985) commented on another major effort in the early 1980s. Patten and Fleming (pers. comm.) also noted briefly the 1980s attempt but offered no new information.

The 1980s experiment with turmeric was based in northern Malaita. The Dala Research Station had conducted a number of trials and some production

data were available. An individual commenced commercial production with around 16 ha, the exact area being difficult to determine because of the smallholders involved as outgrowers. The venture failed within 2 years. Green (1985) attributed the main causes of failure as: inadequate internal marketing systems; change of direction by the Department of Agriculture; poor market reception.

The following additional points are offered. Selection of the production area was related more to the ability to command such an area for commercial production away from traditional landholding rather than for reasons of agronomic suitability. Further, the area chosen was distant from a suitable port on Malaita, let alone from the main export point of Honiara. Transportation became a major problem. Finally, it is suspected that wild varieties were used by the outgrowers and the central estate, a factor leading to poor market reception.

Chillies

Commercial chilli growing also commenced in the 1970s. Enough produce was exported to Europe then for the samples from the 1988–89 crop to be greeted with a degree of familiarity. Production knowledge was underpinned by research at Dala Research Station. Green (1985) attributed part of the failure of the venture to the conflict in effort between caring for the chillies and caring for traditional food crops.

Current Interest

Current research and development efforts in Solomon Islands are concentrating on turmeric, chillies and cardamom. Ginger, vanilla, and pepper are of a lesser priority. Efforts are headed by the Spice Development Officer based at the Dodo Creek Research Station on Guadalcanal.

Turmeric

Research on turmeric is based on an Alleppey type, *Curcuma longa* var. *cokuma*. A number of plots are maintained, albeit not all with the same degree of care. It is noted that the current plots of commercial turmeric are in poor shape. The variety appears to have died back prematurely but the causes are not known with confidence. However, it is known that premature die-back has adverse implications for the development of colour. One of the major plantations on Guadalcanal has been encouraged to plant a small plot.

Chillies

Green (1985) recommended that, because of market prospects, Solomons Islands concentrate on chillies with high pungency. As a result, current chilli research and development is concentrating on three pungent varieties: Nepalese Akabare (*Capsicum annuum*), Chinese Fukien (*C. frutescens*) and R.J. Reynolds (*C. chinese*).

Some plantings have occurred on two major plantations on the Guadalcanal Plains and some villages. Drying techniques using copra driers and various fuels are being explored.

Kingdom of Tonga

Previous History

Tonga's previous spice experience has been with vanilla, pepper and ginger.

Vanilla

Tonga's vanilla industry has existed for over 30 years. Tiollier (1980, 1983) remains the seminal authority on production aspects but DeQuarie (1979) and Sorin (1986) are other production-type sources. Fa'anunu (1984, 1985), Faletau (1985), and Menz and Fleming (1989) have commented on economic issues. Rathsmann and Rathay (1981) evaluated competition between various crops destined for export.

The Annual Reports of the Department of Agriculture maintain a tone of optimism about the industry. In 1960 'the future of the crop remains most encouraging and most profitable ... It is now clear that the people of Vava'u are taking vanilla culture into their normal cropping practices' (Annual Report, 1960, p.2). In the same year Stace (1961) noted that Tonga sought external assistance to help it with the industry. Trial exports commenced in 1965 with commercial exports commencing the next year. In 1970 the Department was able to state that it can 'give very sound advice on all phases of field management and curing' (Annual Report, 1970).

Pepper

Whilst not as detailed as with vanilla, Tonga has had some experience with pepper.

It appears that pepper was introduced to the Vaini Experimental Farm on Tongatapu after the Second World War. In the early 1950s Tonga received some of the Sarawak cuttings from Nadurulou Experimental Station in Fiji. Research recommenced in the mid 1970s at the Vaini Research Farm on Tongatapu. The reasons for evaluating pepper were given as: the relatively long harvest

period ensured a lengthy cash flow; suitability to intercropping under coconut; nonperishability after proper drying insulates the weakness of unreliable inter-island shipping; the crop's labour intensiveness would address underemployment in the rural sector. (Department of Agriculture Black Pepper Report, 1980, 1981,1982).

The thrust of the research was the identification of appropriate supports and the collection of yield data. A similar but much smaller project commenced at the same time on Vava'u. Pepper trials began on 'Eua in 1988. By 1980 research had established that Ponga, *Cyathea rugosula*, from 'Eua was the best support. However the relative scarcity of the tree and the high cost of transport required an examination of other likely supports. Recent trials using live 20–25-year-old coconuts and breadfruit, *Artocarpus altilis*, have been successful. Yield evaluation commenced with the harvest after 4 years of the vines planted in 1977 (Table 3.4).

Table 3.4. Yield of Pepper (kg).

Year	Av. yield per plant	
	Green Corn	Dry Corn
1980	4.3	1.4
1981	7.8	2.6
1982	11.4	3.4

Whilst these yields are high compared with those of other countries, the data are handicapped by the lack of specific variety identification. Further, there appears to have been little market-based evaluation of the quality of the pepper.

Ginger

Another crop whose commercial production was actively explored in the early 1960s was ginger. Samples sent to the United States in 1959 were held to be of 'first quality and attractive in appearance...As the crop is obviously well suited to the Kingdom, some research in local processing is indicated so that a finished product may be profitable' (Annual Report 1960). Three years later 400 cases (size unspecified) of fresh ginger were exported: ginger 'is gradually developing to become one of the major cash crops' (Annual Report 1963, p.4). A sample of sun-dried ginger was well received in the United States in 1963. However the entire project was seen as uneconomic: the 1963 sample was valued at only 25 cents/lb f.o.b. There were also concerns with the costs of hand-peeling and the risk of moisture induced diseases in the sun-drying process. By 1965 the project was discontinued in both the green and peeled sun-dried form.

Current Interest

As to be expected, vanilla continues to be of special interest in the Kingdom.

Pepper

Pepper also continues to be a major thrust in research and development. The extension division of the Department has targeted black pepper as one of the three spices it intends to promote amongst growers.

Ginger

Ginger is sold locally at the markets indicating some local production and consumption interest. However commercial interest is being revived: the 1984 Annual Report noted 0.25 acres (0.1 ha) was harvested on Tongatapu. It has also been targeted by the extension division for promotion with Vava'u seen as being the most suited for production.

The EEC has indicated its willingness to fund a ginger development project but only on the proviso that the project incorporate some form of processing outlet. This could be for drying although mention has been made of crystallised ginger.

Unofficial comments were that Tonga could benefit from the present lack of security which appears to be surrounding production of ginger in Fiji, and the need for Fiji to be able to maintain supplies to the markets which have been successfully developed over the years.

Chillies

Chillies are relatively widespread in Tonga; the market at Nuku'alofa had a number of vendors selling Bird's Eye types and a cayenne type. Further, in 1987 the Tongan Commodities Board manufactured 'IFO Chilli Sauce,' a mixture of 1% chilli and 99% tomato; the venture did not operate in 1988 and 1989 because of the lack of tomatoes. Using personal connections in Africa, South America and the Caribbean for planting material, the Spice Project Officer has in a nursery several species of *Capsicum frutescens* and *C. annuum*. Dried Tabasco type chillies have been sent to Australia for evaluation.

Chillies are the third spice targeted by the extension division, with Tongatapu being the favoured production centre.

Chillies have also been targeted by Tonga as a

means of assisting the pepper industry. The Spice Project Officer has encouraged the Tongan Commodities Board to guarantee chilli prices in order to fill the cash void in the 3 years before pepper will bear results.

Other Spices

The Spice Project Officer has also expressed interest in working with a number of other spices. These include the following:

- CINNAMON. It appears that cinnamon was introduced to the northern islands by missionaries but there are no records of subsequent commercial or scientifc interest. Planting material has been sought from overseas but with little success.
- CLOVES. Planting material has been sought but with no success.
- NUTMEG. Tonga has the nutmeg species *Myristica inutilis* which has all the outward appearance of *M.fragrans*. However, when dried, it has no taste. On the other hand it appears to set fruit twice a year. It is possible that this species is indigenous to the Kingdom: after all, Flach (1961) argued that *M.argentea* was indigenous to (then) Netherlands New Guinea. If this is the case then it has been suggested that the species could act as the root stock for the development of commercially accepted varieties. Planting material has been sought from overseas but with little success.
- PIMENTO. Tongans have traditionally used pimento leaves as a decorative item, especially during dances. Trees are distributed by the Forestry Department. Some experimental work is being conducted with low technology driers and some evaluation trials are being conducted.

Vanuatu

Previous History

With the exception of pepper, Vanuatu has had little previous experience with spices.

Pepper trials commenced in 1965. Douglas (n.d.) stated that the introduction of pepper was based on the following factors: relatively simple agronomy and processing; in a country of considerable land pressure on the populated islands, pepper's intensive production has appeal; problems of inter-island transportation require a crop which can be stored and/or has a high value-low volume ratio which encourages the use of air freight.

In 1983 a detailed study was made of the potential of non-traditional agricultural exports in the early 1980s (Hassall and Associates, 1983). Seven spices were analysed in detail: cardamom, garlic, ginger, kava, pepper, turmeric, and vanilla.

Garlic was omitted from the more detailed product price derivations (Hassall and Associates, 1983; Table 2, p.23), an omission which has been reflected in the subsequent lack of interest in the spice.

Current Interest

Since the 1983 Hassall report, research and development efforts have concentrated on pepper and vanilla, with chillies gaining some recognition.

Pepper[2]

Phase I of the Pepper Development Project commenced in 1982. Aspects have been: varietal plots being developed on targeted islands with population pressure[3]; evaluation of varieties from Fiji, Papua New Guinea and Pohnpei; the training of Pepper Development Officers[4]; the evaluation of shade species.

Phase I could not be considered a success: very few producers actually entered commercial production and much of the pepper deteriorated because of poor storage by the farmers. Deterioration was a result of much of the pepper being stored in plastic bags causing the pepper to sweat and go mouldy.

Phase II commenced in the second half of 1988 with the aim of assisting approximately 1100 smallholders to establish and manage a total of 40 ha over a 4-year period. It is envisaged that nearly 18 000 cuttings from Tagabe Research Station, near Port Vila, will be distributed.

The Extension Service of the Department of Agriculture buys the whole black dried pepper which is on-sold to the local restaurant trade; the price of 800 vatu/kg, set in September 1988, seems high in relation to existing world prices and may create false expectations by local producers. No scientific assessment of the pepper appears to have been carried out.

[2] The officer responsible for the recommencement of interest in pepper in Tonga in the early 1980s is currently based in Vanuatu.

[3] Paama, Futuna, Shepherds, Banks and Torres. Phase II additionally involves Pentecost, Santo/Malo, Ambae/Maewo, and Efate.

[4] Two officers completed short courses at Pohnpei.

Vanilla

It is uncertain when or why Vanuatu commenced vanilla trials. However, it does appear to be before the movement to Vanuatu by Tonga's vanilla expert.

The plantings at Tagabe Research Station were damaged by Cyclone 'Uma'. With the rehabilitation of those vines it is anticipated that cuttings will be available for sale to producers. Small nurseries are also being established on the islands of Paama and Futuna to generate further planting material.

It is noteworthy that the Department cites in a positive manner the conclusions of Menz and Fleming (1989) in regard to vanilla's physical, economic and social suitability for production in the South Pacific.

Chillies

Tagabe Research Station is conducting varietal and yield trials on chillies. The varieties are a combination of Tabasco and Indian types.

Western Samoa

Previous History

Of the countries visited Western Samoa has had the least experience with spices. It also has the least developed spice program.

A Food and Agricultural Organisation Mission conducted a major analysis in 1986 but the report was not sighted. Spices are not mentioned in the Asian Development Bank's two volume 1985 Western Samoa Agriculture Sector Study. Samoa has also made a number of unsuccessful requests to aid bodies for assistance to develop a spice industry.

Current Interest

The country has the potential to develop a local *Chilli* industry. Commercial bottling in Apia of a local chilli sauce appears to have been successful but is currently in limbo because of lack of supplies. Little is known about the capsaicinoid content of the chillies other than 'very hot'. Samples have been sent to Australia with favourable results. Both Tabasco and Indian type chillies are sold at the major market in Apia. Indian types may be cropped but Bird's Eye varieties appear to be wild harvested rather than planted. The University of the South Pacific Alafua Campus is conducting an evaluation of the production parameters of Fukien rice chillies, Bird's Eye, and the Indian 'Bihar' variety (F.Opio, pers.comm. June 1989).

Ginger is grown locally but no effort appears to have been made to develop a fresh, dried or crystallised industry.

Pepper has been grown on research stations for a considerable period. It is understood that samples sent to Australia were not considered favourably.

Samoa claims that it grew *Vanilla* before Tonga. Whilst that may be the case there has been little development of the industry. Some localised effort is being made by the Methodist church to develop the crop. It is envisaged that production will be sold locally to the bakery trade and for the production of 'Polesi,' a porridge-like dish.

Comment

Most spice research and development effort in the South Pacific has been production oriented. However, whilst in the minority, nonproduction research has not been forgotten.

In *Solomon Islands* production research and development effort has centered on spice varieties which have been identified as having preferred market characteristics. This was established by having analysed the particular attribute of each spice. The turmeric variety on which Solomon Islands is concentrating has a curcumin content of 5.1–8.5%, a relatively high content by world standards. Researchers explain the content variation by reference to the time of harvest. The chilli varieties have been identified as having capsaicin contents ranging from a very high 1.3% down to the more common 0.5%. However, even with varieties with lower capsaicin levels, the other desired market attribute of colour has been identified. Considerable research has also gone into the economics of production, especially person-days of effort required for harvesting, curing, and drying. Small-scale turmeric and cardamom dryers have been designed. At the same time the need to develop a core of commercial producers whilst the smallholder sector expands has also been planned. Equally importantly, thought has been given to possible organisational structures for processing, quality inspection, and marketing once production commences. Finally, the likely marketing institution, the Solomon Islands Commodities Export Marketing Authority, is gaining experience by exporting a small volume of chillies on behalf of a nonsmallholder producer.

Tonga has also devoted considerable attention to the forms by which pepper could be marketed within Tonga. Ground and whole black and white

pepper, and whole green pepper are currently marketed to the restaurant trade. Local supermarkets have also been approached with some success. Of note is the fact that a ground green pepper has been successfully developed (Perinet 1989). Analyses by Laboratoire Interregional Marseilles for ash, essential oils and piperine content show that Tongan pepper meets French standards. Tongan production researchers are also working with the extension service. As noted, the assistance of the Tongan Commodities Board has been sought to guarantee chilli prices as a prerequisite to the development of the pepper industry. However, it would appear that, compared with Solomon Islands, not as much thought has been given to external marketing.

Vanuatu has also given some thought to marketing, with the local restaurant trade being approached to accept locally grown pepper. External marketing has been discussed but only in so far as the Vanuatu Commodities Marketing Board has eschewed any involvement until its enabling legislation is amended accordingly. There is close cooperation between production researchers and the extension service: for pepper, extension officers have been trained, field days have been held and extension media developed.

Identification of Spices for Detailed Study

Table 3.5 summarises the spices currently being considered for further production-oriented research and development in the South Pacific. From this table the following spices will be analysed in more detail: cardamom; chillies; cinnamon; cloves; ginger; nutmeg; pepper; pimento; turmeric; vanilla. In analysing these spices it will be necessary to also consider cassia when discussing cinnamon, mace when discussing nutmeg, and curry when analysing turmeric.

Table 3.5. Spices for development identification of interest: selected South Pacific countries.

Fiji	Solomon Islands	Tonga	Vanuatu	Western Samoa
Major	*Major*	*Major*	*Major*	*Major*
cardamom	chillies	chillies	chillies	chillies
ginger	ginger	ginger	pepper	ginger
pepper	turmeric	pepper	vanilla	pepper
vanilla		vanilla		vanilla
	Minor	*Minor*		
	cardamom	cinnamon		
	cinnamon	cloves		
	vanilla	nutmeg		
		pimento		

It is noted that many countries in the study's target production area produce kava, *Piper methysticum*. It is tempting to treat kava as a spice because it belongs to the genus *Piper*, an inclination which is followed in some of the island nations. However, after Lebot and Cabalion (1988), kava will be treated as a beverage and a pharmaceutical raw material rather than a spice.

CHAPTER 4

Marketing Prospects for Spices

Seven criteria are used to analyse the market prospects for each spice.

Botany. The purpose of this criterion is to establish the preferred soil and climatic requirements of each spice and its susceptibility to disease and insects. The period to first harvest and the economic life of the spice is also established as these factors will influence the generation of cash and grower perception of the riskiness of a crop.

Use. It is necessary to establish how a spice is used because the number of outlets it has will influence its ability to withstand market downturns in any one market.

Preparation for Market for most spices differs. The need to dry, clean, grade, and invest in specialised storage and shipping are factors which will influence the likelihood of a crop being adopted.

Production, Exports and Imports have to be examined in order to establish the size of the industry, the extent of domination by any one market participant, and likely movements in the market. Likely *Price* movements follow from analysing production, exports and imports. The analysis should also establish any lag relationship that may exist between a price move and reaction by the producers.

The analyses of the spices using the above criteria are shown in ACIAR Working Paper No. 27 (Vinning 1989). This Chapter contains just the summary of the prospects for each of the spices.

Cardamom

Despite the comparatively high price received for cardamom, the crop's future marketing prospects are not considered strong.

The main weakness is the thinness of the market. Over 85% of imports go to the Middle East. Whilst the Nordic countries of Finland, Sweden, and Norway have been traditional consumers, and are comparatively high per capita consumers the actual volumes involved are relatively small and the rates of import increases relatively static. Further the degree of concentration in the market has increased. As recently as 30 years ago the Middle East took only 50–60% of the world trade (Chandrasekhar 1986).

Nearly 30 years ago the potential for further use of cardamom as a confectionery in Sweden was mooted by the India Spice Enquiry Committee (Plantation Crops 1960), an intention still being explored (Chandrasekhar 1989). At the same time the Nordic countries are relatively high consumers of coffee. It has been suggested by the International Trade Centre (ITC 1982) that this raises the possibility of introducing Gawha coffee. However, this would require considerable promotion. At the moment there is no group of cardamom exporters available to take on the promotion campaign and the potential advantages accuing to free riders discourages any one individual country from undertaking the necessary expenditure. One possibility is the formation of an international selling organisation (Financial Express 10 March 1987). Portents for this approach are mixed: the International Pepper Community seems to be working, the vanilla organisation largely works, but the nutmeg cartel is in disarray. Another option is to use a third party: the Indian Spices Board is reported to have gained International Trade Centre assistance to popularise cardamom-based drinks in the Middle East (Public Ledger, 22 April 1989).

On the positive side, the declining prosperity of the Middle East has seen it willing to reduce its quality requirements rather than reduce its consumption. This suggests that the market will become price-sensitive. Since the production of a bold green product in tropical conditions is a difficult task the lowering of standards in the Middle East will be welcomed. For this reason the Public Ledger (7 November 1987) has suggested that a two-tier market could emerge. One market would be the high-priced Middle East and the other would be spot purchases from other buyers.

From the production perspective there are all indications that a number of countries have increased plantings. Production from these plantings have not yet fully reached the market. Whilst India is striving to reclaim its position as the world's largest producer, it is likely that an increasing percentage of this will be consumed domestically (Chandrasekhar 1989). The same cannot

be said for the other countries planning increases.

Chillies

It is possible to take an optimistic view of the prospects for chillies.

After all, the growth of convenience food is likely to result in a greater use of chillies as a flavour enhancer and product delineator. The growing popularity in the developed countries for 'ethnic' styles of food such as Mexican, Italian, and Asian will ensure the continued use of low to moderately pungent chillies. Finally, oleoresin use will continue to grow for reasons of uniformity of quality and absence of microbiological contamination of powders.

However, it is considered that the overall mood should be one of pessimism not optimism.

To begin with, with the exception of Japan and the United States, import growth has not been strong. Moreover, prospects for these markets must be tempered with the knowledge that both have considerable domestic production, Nevertheless, the smaller pungent types of chillies for the while have not lent themselves to mechanical harvesting, a cost area which may slow the growth of domestic production.

Overhanging the sluggish growth in imports has been the potential of traditional exporters such as India and some African states to expand production.

The niche market of the highly pungent chillies is considered one marketing option. Market size is estimated to be about 1000 t (Smith 1982b). Whilst Govindarajan (1985b) noted favourably the prospects of product from Solomon Islands and Papua New Guinea, it is clear that his comments were based on 1970s data. The stop-start reputation of the two countries will not assist efforts to recommence exports. Indeed, Papua New Guinea has recognised this: 'exporters now report that it is becoming increasingly difficult to find overseas markets for Papua New Guinea chillies despite the improving trend of f.o.b. prices' (Baulch 1987, p.69). Further the ability of China to expand exports of its highly pungent Fukien rice chillies and Africa to expand production of its even more highly pungent Mombassa chillies suggest that caution must also be exercised in being overly optimistic about the niche market for the highly pungent types.

Govindarajan (1985b) was pessimistic about the prospects for chilli oleoresin. His views were based on: the variety of sources of supply; the fact that the United States, one of the major importers, is also a large producer of chillies, including medium to pungent types; and the lack of relationship between domestic capsicum oleoresin production and capsaicinoid content caused by importers blending high-priced domestic oleoresin of low pungency with imported oleoresin of high pungency whose price has been driven down.

Cinnamon and Cassia

The keys to future prospects for cinnamon and cassia lie in two directions.

On the demand side, apart from the increased imports from the emerging entrepots of the United Kingdom and the Netherlands, import demand has only increased significantly in the United States. Here, imports are dominated by cassia. In recognising the increasing demand for 'cinnamon' buns in the U.S. fast food diet, it is considered that this trend is likely to continue. No such comparable increase is seen occurring with cinnamon. Whilst there has been some export diversification over the years into the Middle East market the increase in demand from the region has not been strong.

The other direction relates to supply. Here, Indonesia holds the key. Its ability to regulate the supply of cassia is likely to dictate the spice's price internationally. Indonesia's record in management of such issues is not a strong ground for optimism, an inclination supported by the proximity of the energetic entrepot Singapore. New exporters of cassia must also be conscious of China and the speed at which it could expand production back to traditional levels.

Combined, the two thrusts suggest that within the basically overall pessimistic outlook the prospects for cassia are better than those for cinnamon.

Cloves

Indonesia is the key to prospects in the clove industry. If it is able to generate some small surplus then this will depress even further the international prices. As it is, once Indonesia achieves self-sufficiency in all types of cloves another segment of the international market will disappear. However, reports persist of clove disease problems in the country, suggesting that the self-sufficiency goal may still be a distant one.

The general consideration is that, contrary to the Western model, Indonesia is not experiencing de-

creasing cigarette consumption. On the other hand Indonesia has had little success in its efforts to export kretek cigarettes.

Other users of cloves tend to be stable in their demand and unresponsive to price drops.

Ginger

Anand (1982 p.42) concluded that the prospects for market growth for ginger were 'moderately good'. After considering the general Indian-type market and the specialist high-pungent market this paper confirms that opinion.

On the production side India is both the world's largest producer and (volume) consumer of ginger. With yield variation between varieties and production regions being in the order of seven-fold, India has the potential to increase production. As Anand (1982) and later Chandrasekhar (1989) confirmed, increased production is government policy. On the surface, India has the potential to increase exports. However Chandrasekhar (1989) leaves the impression that increased production will be largely consumed domestically. Further, India's thrust will be to export value-added products such as ginger squash and ginger candy. However, a number of countries, especially Nigeria and Ghana, intend expanding exports. The list of countries which have exported between 1981 and 1987 more than 50 t of ginger in any one year to the one destination indicates the number of potential countries which could expand back into exports should prices rise sufficiently.

From the market perspective, growth in the major markets has been steady, if unspectacular. In the 1970s, growth in ginger-derived products, such as ginger beer, ginger ale and baked ginger products, was not matched by growth in dried ginger. Instead growth occurred through ginger oil and ginger oleoresin. Since then two phenomena have occurred. First, the United Kingdom and the United States have had sizable growth in total ginger imports. More importantly, imports of fresh and processed ginger have increased at a rate greater than population growth. The flavour of ginger has become more widely known, suggesting that the market for all ginger products may also grow. Second, growth in the ginger oil and ginger oleoresin sectors seems to have slowed. This suggests that there could be a resurgence in the imports in the dried product.

The above supports Anand's (1982) comment of moderately good prospects.

However, cognisance must be made of Jamaica and Sierra Leone abandoning the niche high grade sector. This is only a limited market, probably around 1000 t annually. Jamaica has shown the adverse consequences of over-supplying such a market. Moreover, the margins that Jamaican ginger attract varies considerably, albeit not as much as the other grades. Cognisance must be made of Nigeria and Ghana's planned expansion into the pungent market.

Nutmeg and Mace

The prospects for nutmeg and mace are not encouraging.

Production has tended to increase although the position of Indonesia, the world's largest producer, is not certain. There are persistent reports of expanded plantings but also consistent reports of disease and management problems.

Imports have remained static over the decade showing that consumption has not maintained its growth in per capita terms.

The situation of the cartel is hard to determine at the time of writing. Collapse seems likely, putting in jeopardy any cooperative plans to mount promotional campaigns to increase consumption.

Pepper

It is common to consider that pepper has a highly variable supply but a relatively stable demand. In the face of inelastic demand small variations in supply cause large changes in prices. Prospects therefore tend to be pessimistic with growth depending upon population increases and per capita income growth (Bade and Smit 1989).

Analysis of data does not support this view (see ACIAR Working Paper No. 27). If it is assumed that exports constitute demand then over the period 1970–87 demand has fluctuated greater than supply: world production varied by 55% — from the low of 100 460 t in 1970 to the high of 155 645 t in 1985; whereas exports varied by over 107% — from the low of 64 418 t in 1970 to the high of 133 653 t in 1983. In the period since 1981, when B razil joined the IPC, production has varied by 25% and exports by 41%. This behaviour can be explained by recognising that demand for pepper is a derived demand. As Chapter 7 will show the products incorporating pepper are rising at a rate greater than population growth. For this reason it is anticipated that pepper imports will continue to grow and that

the prospect for pepper are relatively favourable.

A number of caveats are needed.

1. *Prices.* Pepper prices will continue to fluctuate for a number of reasons. First, there is the susceptibility of the crop to climatic influences, and pests and diseases. Second, demand for pepper is in a large number of forms: black, white, ground, unground, dehydrated, freeze-dried, oleoresin, and oil. Within this there is a variety of grades. Each form and each grade has its own demand imperatives which influence price. Finally, being a derived demand product, pepper has a series of marketing services; assemblers, brokers, grinders, packers, wholesalers and retailers. Again, each service has its own supply and demand imperatives. Whilst the trend has been to shorten the marketing chain this has operated largely at the export level, not the import one.

2. *Market* access. Despite its being the world's largest traded spice and despite the United States being the world's largest importer, spice trading occurs across a surprisingly narrow range of countries. The established exporters, especially the IPC members, dominate trade. The trend for exporters to cooperate with importers in promotional activities militates against new and small origins. Whilst the trade speaks energetically about the desire for new origins, the demands they place upon such sources do match their words.

3. *Exports* size. The major markets trade pepper in lot sizes greater than those which new origins could be expected to assemble. This point receives further comment in Chapter 7. This suggests that new origin exporters should look to second tier importers rather than to the major importers. It also confirms the merit of trading through one of the entrepots, in this case Singapore, which are experienced in assembling small lots.

Pimento

Pimento has limited prospects under current production knowledge. Unless considerable production-based research occurs then it seems destined to remain a Latin American product. Within the region Jamaica has in train plans to revitalise the industry, including the identification of varieties with high oil content, improved propagation techniques, and better disease control (Jamaica 1986).

Market prospects are limited. Consumption is static, caused to a large extent by pimento's declining demand, in the face of increased use of refrigeration, as a preservative. However its place as a traditional flavouring agent, such as in some German hams and in the Scandinavian herring industry, will ensure the continuation of some demand.

Turmeric

The major factors influencing the turmeric market in the 1980s, that is the move towards ethnic foods and the strong move into natural food dyes, are held to continue for some time to come.

Thus the prospects for turmeric with high curcumin content is considered favourable.

Offsetting this basic optimism is the awareness that traditional formulations of turmeric users in both the curry and colouring sectors will be hard to alter. This suggests that new origins must offer the same quality (measured in curcumin content) but at a lower price. The tug of traditional suppliers was evident during 1978 when India temporarily halted exports; other sources were used but importers reverted to Indian suppliers once the ban was lifted.

There is no doubt that India could meet any surge in world demand by itself. After all, the country exports less than 10% of its current production and, as Govindarajan (1980) showed, the range in yields alone indicates the potential to expand. However the impression is gained that Indian production will be increasingly consumed domestically. This suggests that importers would welcome a new origin shipper.

Finally, within this macro picture of good prospects one must delineate between types of turmeric. Madras types consititute the bulk of the export trade. To some extent there is safety in size with a new origin facing fewer penetration challenges. On the other hand the more attractive market is considered the Alleppey type.

Vanilla

From a marketing perspective, the prospects of the vanilla industry are linked to labelling legislation in the importing countries and the increasing consumer preference for natural foodstuffs. However, the 1965 U.S. Food and Drug Administration's labelling requirements did not stabilise imports of vanilla. Further, until the majority of importing countries adopt preferential labelling requirements comparable with that of the United States and France, it must be doubted if the occasional promo-

tional efforts of the Vanilla Bean Association of America and Univanille can do much to halt the inroads made by the cheaper synthetic substitute. Immediate action on such legislation could be unduly optimistic; over a decade ago the International Trade Centre stated 'it is hoped that, in order to guarantee a better future for the natural product, other countries will also replace present regulations that permit artificial flavourings such as vanillin to be considered as a natural flavour' (ITC 1977, p.48). Whilst the requirement to ensure uniformity of legislation for the 1992 unification of the European Economic Community should result in some decision, it must be noted that France is the only member of the Community requiring such labelling. On the other hand, cognisance must be taken of Correll's (1953) important analysis of the industry wherein he did not mention the danger posed by synthetic vanillin.

The main outlet for natural vanilla is in the ice-cream industry, especially in the United States. However demand is highly seasonal. In 1988 the U.S. based International Ice Cream Association commenced a promotional campaign to convince ice-cream users to consume ice-cream year round (Advertising Age 59:1 1988). Should the campaign be successful then vanilla consumption would expand. Greater expansion could occur by developing a wider array of uses. This would require considerable promotional effort. Such a campaign would have to concentrate on the natural attributes of vanilla compared with the synthetic product.

From a supply perspective, it is most likely that production will increase. Madagascar has clear plans to increase production as does Mexico. Mexico's plans have certainly resulted in increased exports to the United States. Little is known about the intentions of the world's second largest exporter, Indonesia. Finally, there is the spectre of another synthetic competitor produced through plant tissue culture.

Other Spices

Saffron

Despite its very high price, saffron is not considered as having strong market prospects.

Saffron faces three major problems.

1. *Production.* Saffron is extremely labour-intensive, a clear reason why the Spanish are having trouble with lack of labour. Apart from the volume of labour required is the commitment. Harvesting takes about 4–6 weeks and, like vanilla, must be done in the morning. Harvesting, separating the stigmas and drying requires 'abundant labour, care and patience' (Sampathu et al. 1984).

Of relevance to the South Pacific are the agroclimatic conditions. From the description Sampathu et al. (1984) give of harvesting conditions, saffron requires a relatively dry summer, not a relatively wet summer. This would handicap production in most parts of the South Pacific.

2. *Substitutes.* Turmeric and tartrazine have made inroads into saffron's use as a colourant in the food market. Synthetic dyes have replaced it in nonfood colouring uses. Saffron's high prices encourage the cause of synthetics. There may a slight resurgence in demand because of increasing concerns about artificial foodstuff dyes, especially the potential carcinogen tartrazine. However, the trade reports that synthetic methods of producing safranal, the major component of saffron aroma, have been developed.

3. *Knowledge.* Sampathu et al. (1984) state that a major hindrance to the spice's future is the lack of understanding of the effects of postharvest processing on quality and the lack of objectivity in the analysis of sensory properties. Their claim is implicitly backed by Morocco (1989) whose report stated that nonsystematic taste tests of 'Moroccan true saffron' show that is superior to Spanish saffron. Production knowledge in the South Pacific seems nonexistent.

Seed Spices

Celery Seed

Celery seed may be produced from the vegetable celery but celery seed imported into the United States usually comes from the small bitter plant smallage. Production is widespread, varying from Sweden to North Africa and India. The seed is very small with well over one million to the kilo. The spice celery seed was used mainly in pickling, pickles, relishes, and sauces. Whilst that use has continued, it is also used in salad dressings, soups, and snack foods.

About 95% of United States imports come from India although Chinese supplies have been increasing in recent years. Total United States imports for the period 1981–87 was 15 561 t with an average annual import of 2223 t.

Prospects relate to the growth in the United States market. Indications are that this market will maintain steady growth.

Coriander

For a spice seed, world trade in coriander is high, probably between 30 000 to 40 000 t (Smith 1982a). Nevertheless, production of coriander is much greater with Indian production regularly exceeding 150 000 t.

Prospects for coriander are mixed. Because it is a low-priced spice, its use as a bulk ingredient in the processed meat products trade and in the spice blending and curry sectors is encouraged. However, countries with proven expertise in large scale mechanised farming, such as Australia, Canada, and New Zealand, have shown an interest in the spice. They could expand production readily and maintain the pressure for low prices. Further, they also have the ability to meet the increasing demands for quality specification and cleanliness.

Cumin seed

Cumin is used mainly as a flavouring and aromatic agent in chilli powder, curries, and sauces. The increased popularity of 'ethnic' food, especially 'Tex-Mex' in the United States (see Chapter 7 Future Consumption), has seen a rise in its usage. The American Spice Trade Association estimates that consumption has increased 50% in the United States in recent years.

India is the world's largest producer but it is also the world's largest consumer. Production varies enormously. Iran has traditionally been the largest supplier to the United States but exports dropped dramatically in the early 1980s.

Fenugreek

Fenugreek seed is used in most blends of curry powders and in some spice mixes. With the rising popularity of ethnic foods it is finding increasing outlets in North America and Europe with North African and Egyptian cuisine. Other uses are as a flavouring agent in coffee, chutney, tobacco, and, principally, artificial maple syrups. Elujoba and Hardmann (1985) describe its medicinal properties of an antipyretic, laxative and antidiabetic.

India produces about 10 000 t (India,1986). Exports from the sub-continent vary considerably as do the estimates of these exports.

The demand for fenugreek is stable. Some expansion could be expected in the Middle East market with the influx of Asian workers. This should be considered a one-off event and increases will quickly level off. It also suggests that should the Middle East embark upon a program to repatriate workers that trade could reduce.

Smith (1982a) noted the possibility of using fenugreek as a source of diosgenin, an ingredient in the production of contraceptives (Fazli and Hardmann, 1968). In this regard it is worth noting that this was the reason that the spice was introduced into Australia. However, problems with the extraction process has seen interest in the crop switch mainly to its production as a high protein forage crop (Vinning, 1988c), the Greek word 'fenugreek' meaning hay.

CHAPTER 5

Case Studies in Pacific Spice Production

Recommending the market prospects for a product has two elements. The first relates to a micro analysis of the product in isolation. Such an analysis was conducted, and the details are included in ACIAR Working Paper No. 27. The second element is an analysis of the product in situ. This requires consideration of a number of aspects of the country wherein the product is to be grown.

Any analyses of the market potential for spices in the South Pacific must be cognisant of previous experiences. An analysis of some of these experiences should provide guidelines for final recommendations. One means of conducting such analysis is to use the case study approach.

Two case studies are presented. One outlines the experience of one country with two spices and the other outlines the experience of a third spice in two other countries. The case studies are: chillies and turmeric in Solomon Islands; and vanilla in Tahiti and the Kingdom of Tonga.

Chillies and Turmeric in Solomon Islands

Chillies

Currently Solomon Islands is concentrating on chillies with high pungency. However, as Chapter 3 shows, previous experiences with high pungency chillies have not been favourable. From the producer's perspective Tabasco-type chillies produce a number of challenges.

Length of Activity

Patten and Fleming (1988) state that, in the Solomons, Indian long red chillies have a harvest period of 32 weeks whereas the Tabasco varieties have a lengthier 50-week harvest. The former has a growing period of 4–5 months whereas the latter requires 6–7 months. The growing and harvesting of Indian-type chillies ties up a farmer's land for about 1 year whereas the latter occupies the land for nearly 17 months. From a producer's perspective, the shorter crop is preferred for reasons of cash flow, opportunity costs, and extended risk.

Yield

Yield estimates for Tabasco chillies range from 7.5 t/ha, fresh basis (Patten and Fleming 1988), to 6 t/ha (Green 1985) to 4 t/ha (Caiger 1987a). All estimates are below that of 10 t/ha for long red chillies (Patten and Fleming 1988).

A more important question is the time taken to harvest a given volume of chillies. Tabasco-type chillies, especially the Bird's Eye varieties, are significantly smaller than Indian types.Smaller varieties would take longer to harvest the same volume. This results in higher picking costs. A priori, producers prefer the larger variety chilli.

Tabasco-type chillies must have a considerable margin above that of less pungent type chillies to compensate for the longer use of the land (that is 17 months against 12 months), and the higher labour costs associated with picking the smaller chillies. A minimum margin would be 40%, the opportunity costs of the land. Apart from their smaller size, the higher pungent chillies are unpleasant to harvest. An additional margin of 30% is therefore required compared with the Indian type.

Drying

It must be recognised that producers do not export fresh chillies. Instead they market a dried product.

Green (1985, p23 and 61), Caiger (1987a), Patten and Fleming (1988), and Bennett (pers.comm. 1989) use estimates of dried yield ranging from 1.0 to 2.5 t/ha. Although the differences have substantial impact on final gross income calculations, of greater importance here is the time spent in drying the chillies.

Caiger (1987a) stated that picking should be done every 2 weeks and should yield 150 kg fresh basis at each picking. If dryer capacity matches the picking rate then drying will take a year for the production of 4 t/ha fresh basis. Both Green (1985) and Caiger (1987a) use larger-capacity dryers of 120 kg/week and 350 kg/fortnight, respectively. Even the higher capacity system will require 23 weeks of effort to dry the crop.

Additionally, recognition must be made of the effort required to collect the necessary fuel. Bennett (pers.comm. 1989) estimated that gathering fuel-

wood and drying takes 56 person-days (8-hour days) compared with the estimate of 14 person-days by Patten and Fleming (1988). Both estimates are well below the 444 person-days estimated by AACM (1983) for picking and drying Tabasco-type chillies but only 77 person-days for the long red varieties.

Turmeric

Solomon Islands is currently concentrating on turmeric with high curcumin content, it being considered that this is where the best market prospects lie. Again, as Chapter 3 shows, the country's previous experience with turmeric has not been good.

It is recommended that turmeric be cured by boiling in order to increase the speed of drying and to enhance colour (Pruthi 1989; Shankaranarayana and Krishnamurthy 1986; Govindarajan 1980).

Using a 200–l drum, a fresh turmeric yield of 15 t/ha (Green 1985[1]), and allowing two hours[2] to boil the tubers, it would take 187 person-days to boil the crop produced on 1 ha. The time spent in boiling is directly related to the number of drums used. Thus, a five drum owner could boil his crop in 37.5 person-days. However, Green (1985) recommends 3 hours of boiling. Thus the boiling process for 1 ha crop of 15 t fresh basis would take 250 person-days with one drum and 50 days for a five drum owner. Bennett (pers. comm. 1989), using a fresh yield of 17 t/ha and a five drum operation of 25 kg/drum, estimated that drying would take 28 person-days.

Drying is additional to curing. Green (1985) considered a batch dryer of 2 t operated twice a week. On that basis, drying would take 4 weeks for a 15-t crop, fresh basis. To meet this target an owner would have to have 10 drums for boiling.[3]

As with the drying of chillies, the gathering of fuel becomes a major activity. Green's (1985) estimate of 30 person-days spent on 'harvesting and processing' is the same as AACM (1983); Caiger (1987b) estimated that 225 person days are required for this step; Patten and Fleming (1988) merely averaged the two estimates. Bennett (pers.comm. 1989) estimated drying at 99 person-days. However, she explicitly allowed 28 days for boiling and 28 days for collecting fuel. Her estimate of 175 person-days spent in processing therefore seems more reasonable than that of Green (1985) and Caiger (1987b).

The above comments on the gathering of fuel suggest that fuel for the boiling of turmeric, and the drying of chillies and turmeric will become an issue in the future. Despite current apparent abundance, timber will become scare. Certainly, fuelwood availability in the immediate vicinity of turmeric and chilli production will become an issue. Even if entrepreneurs emerge to supply fuelwood in the face of rising collecting costs of a previously 'free' item (in Solomon Islands firewood is now sold at the Honiara market), the costs of curing and drying will increase. All of this suggests that attention should be given to cost-effective ways, within the economies of scale envisaged, of reducing curing and drying costs.

Vanilla in Tahiti and the Kingdom of Tonga

Tahiti

Despite its name *Vanilla tahitiensis*, vanilla is not indigenous to Tahiti[4]: it was introduced from the Philippines by Admiral Hamelin in 1848 (Correll 1953). Obviously the crop was well suited to local conditions because by 1908–09 Tahiti was the largest producer in the world (Table 5.1).

Table 5.1. Vanilla production: 1908–09 (tonnes).

Country	Production
Tahiti	200
Mexico	100
Reunion	68
Comoros	68
Madagascar	55
Seychelles	22
Antilles	6
Java and Ceylon	6
Fiji	5

Source: Capus and Bois (1912).

[1] Green (1985) used 15 t/ha fresh basis for smallholder production, but cited yields of up to 23 t/ha. His estimated dry yield of 2.5 t/ha for smallholders is considerably above that of Govindarajan (1980) but below that of Davis (1987).

[2] Govindarajan (1980) stated that 1 hour should be sufficient for an unspecified 'small charge.' This corresponds with Caiger (1987b) who recommended that the boiling 'should take the same time as sweet potato,' that is an hour.

[3] Based on 20 kg of tubers/drum, four batches/day, and a 6-day week.

[4] Strictly speaking, French Polynesia comprising Tahiti, Moorea, Raiatea, Tahaa, Huanhine, Bora Bora. The generic term 'Tahiti' will be used.

Over the 30-year period 1920–50 exports averaged around 200 t with the highest volume being 852 t in 1924. Exports started to decline in the mid-1960s, falling dramatically in the 1970s (Table 5.2).

Table 5.2. Vanilla: Exports from Tahiti, selected years: 1936 to 1985 (tonnes).

1931	n.a.	**1941**	216	**1951**	195	**1961**	195	**1971**	n.a.	**1981**	1
1932	n.a.	**1942**	n.a.	**1952**	190	**1962**	n.a.	**1972**	n.a.	**1982**	1
1933	n.a.	**1943**	123	**1953**	137	**1963**	n.a.	**1973**	n.a.	**1983**	6
1934	n.a.	**1944**	184	**1954**	130	**1964**	165	**1974**	10	**1984**	2
1935	n.a.	**1945**	125	**1955**	n.a.	**1965**	132	**1975**	n.a.	**1985**	3
1936	94	**1946**	280	**1956**	162	**1966**	16	**1976**	7	**1986**	n.a.
1937	n.a.	**1947**	272	**1957**	177	**1967**	n.a.	**1977**	9	**1987**	n.a.
1938	n.a.	**1948**	169	**1958**	174	**1968**	n.a.	**1978**	3	**1988**	n.a.
1939	205	**1949**	300	**1959**	177	**1969**	55	**1979**	3		
1940	120	**1950**	205	**1960**	n.a.	**1970**	28	**1980**	2		

Source: Correll (1953); Pacific Islands Yearbook, various years.

Notwithstanding the lack of data for the critical decade 1961–71, Table 5.2 makes clear the dramatic and complete collapse of the industry from the 1960s onwards. Little comment was found analysing the collapse. Stace (1961) was too early. In fact, the tone he gave to the study was one of optimism; he anticipated a boom in the market with the (then) forthcoming passage in the United States of the legislation favouring natural vanilla, going so far as to query if natural producers can increase production in step with the possible increase in U.S. requirements. The Pacific Island Yearbook stated that there was a 'lack of interested manpower' (Twelfth Edition, with respect to 1974), and the 'disinterest by growers' (Thirteenth Edition, with respect to 1976). What makes the collapse all the more intriguing is the collapse occurred in the face of quite outstanding gains in the per unit value of exports (Table 5.3).

Table 5.3. Vanilla exports from Tahiti per unit value (FRS CFP/t).

1931	n.a.	**1941**	290	**1951**	203	**1961**	912
1932	n.a.	**1942**	n.a.	**1952**	232	**1962**	n.a.
1933	n.a.	**1943**	170	**1953**	393	**1963**	n.a.
1934	n.a.	**1944**	168	**1954**	929	**1964**	647
1935	n.a.	**1945**	196	**1955**	n.a.	**1965**	949
1936	n.a.	**1946**	246	**1956**	602	**1966**	993
1937	n.a.	**1947**	287	**1957**	727	**1967**	n.a.
1938	n.a.	**1948**	207	**1958**	942	**1968**	n.a.
1939	115	**1949**	116	**1959**	1268	**1969**	1186
1940	162	**1950**	216	**1960**	n.a.	**1970**	n.a.

Source: Pacific Islands Yearbook, various years; Stace (1961)

Table 5.3 shows that there is no obvious relationship between Tahitian export prices and the per unit price of vanilla. It also shows that there is no evidence of a 3-year lag between export prices and Tahiti's export volumes.

Stace (1961) did note that the comparative price movements of vanilla and vanillin put the natural product in a bad light. Over the period 1949–59 vanilla prices moved between US$8 – 16/pound compared with vanillin's price movement of US$0.25–3.00/pound. In relative terms, vanillin's price movement was greater than that of vanilla's.

Correll (1953) showed that the decline shown in Table 5.2 was in the face of rigid government control to maintain quality: approval required to harvest; dryers and curers nominated; weighing of green beans; harvest and sales to occur on fixed dates; quality inspection at the sale point; inspection of payments to growers; occasional regulating of prices.

These controls paralleled steps in Madagascar, the country which replaced Tahiti as the major exporter: tattooing of beans for identification; set sales dates; transportation, receival and marketing to occur on prescribed dates; destruction of poor quality beans by government inspectors; inspectors empowered to enter curing sheds; inspection at point of export.

Both sets of control were designed to ensure high quality exports. The level of prices for the cured beans encouraged theft of the green bean. Producers responded to this threat by harvesting immature beans in order to be able at least to harvest something. This is the same problem currently bedeviling Indonesia (Tiollier, pers.comm.). The controls sought to encourage producers to pick fully matured beans. Thus, even with steps in place to ensure the export of a quality product and thus some assurance of income for the growers, albeit varying, exports declined dramatically.

Kingdom of Tonga

Whilst not as long standing as the Tahitian industry, and certainly not showing signs of collapse, after 30 years of sustained government effort one must question the performance of the Tongan vanilla industry.

First, producer numbers have been declining; in 1960 there were 881 growers on Tongatapu (Annual Report, 1960) but only 214 in 1984 (Annual Report, 1984) These figures ignore the 1696 growers on Vava'u (Annual Report, 1985). Unfortunately, a

comparative figure for the early 1960s could not be established. Additionally, the distribution of production was highly concentrated: in 1985 four growers on Tongatapu produced 50% of the island's crop. This suggests that, contrary to the 1960 Annual Report's optimism, vanilla production, at least on Tongatapu, is not widely integrated into normal cropping practices.

Second, exports have not shown a consistent upward movement (Table 5.4).

Table 5.4. Tonga: Vanilla exports, 1975–1987 (tonnes).

1975	1	**1980**	4	**1985**	4
1976	4	**1981**	5	**1986**	20
1977	11	**1982**	12	**1987**	12
1978	8	**1983**	9		
1979	2	**1984**	12		

Source: Ministry of Agriculture

The Annual Reports clearly indicate substantial government support for the industry: in 1964, 20 000 cuttings were distributed free of charge to villagers (Annual Report, 1964); in 1969 prices were increased by 30% in order to 'encourage farmers to give their best attention to the management of vanilla and expand their plots' (Annual Report, 1969); two curing sheds were provided for grower use in 1974; an additional curing shed and adequate planting material were provided in 1976; finally, in 1984, the Asian Development Bank funded the Vanilla Development Fund in order to establish 300 ha and upgrade the existing 250 ha of plantings (Annual Report, 1984).

An answer to the question of nonperformance could come from an analysis of effort comparable with what was developed in analysing the chilli and turmeric ventures in Solomon Islands.

No writer on vanilla has underplayed the crop's labour requirement; the training or looping of the vines, pollination, curing, and grading all require considerable effort. AACM (1983) has expressed the labour requirements of vanilla in terms of person-days of effort for Vanuatu. However these should not differ greatly for Tonga. Whilst their estimates were based on Vanuatu, the estimates are not expected to be much different for Tonga. For a 1-ha smallholder vanillery it is estimated that a one-off effort of 100 person-days is required to prepare the land, prepare the shade, and plant the vanilla. For the maintenance phase of weeding, shade pruning, and looping they estimate a near constant 115 person-days of effort. Pollination is estimated to require a peak of 150 person-days and an average annual effort of 100 person-days over the estimated 10 years of the crop. Whilst not taxing, the key to pollination is commitment.

Pollination commitment has three elements. First, pollination must be done on a regular basis as vanilla flowers last only a day and only a few flowers on each cluster open each day. Second, pollination must be done in the morning, preferably well before noon whilst the pollen is still moist and sticky. Finally, pollination should be done every day throughout the 2-month flowering season.

Fa'anunu (1984) suggests that harvesting is not taxing. However, like pollination, it requires commitment throughout the April–August period. AACM (1983) did not estimate the labour requirements of harvesting. Similarly, whilst curing is also not labour-intensive activity, Davis (1983 p.24) does state that this 'calls for attention to detail' . Curing requires about 2 months. Thus, from the beginning of harvesting to the end of curing can take 4 months. This has implications for cash flow.

CHAPTER 6

Commercialisation of Spices in the Pacific

The case studies developed in Chapter 5 produce a number of economic and marketing implications for South Pacific countries contemplating the introduction of a spice. These implications are explored below as a means of identifying lessons which must be considered when analysing the market prospects for spices in the South Pacific.

Returns to Effort

Calculations of returns must be based on producing a marketable product and not merely selling the harvested crop. Producing a marketable crop usually requires considerable effort on behalf of the smallholder. Returns for effort are usually expressed in terms of labour costs measured in person-days. Imputed smallholder labour costs are based on local wage rates.

The concept of person-day effort has been widely used in the Pacific. Fairbairn (1985), Fernando et al. (1984), Opio (1984), and Chandra (1978), use the concept in terms of general Pacific agriculture, whilst Patten and Fleming (1988), Green (1985), Caiger (1987a), Hassall and Associates (1983) and AACM (1983) make specific calculations for spice. Patten and Fleming (1988) illustrate use of the approach for Solomon Islands (Table 6.1):

Table 6.1. Returns to labour per day, Solomon Islands: selected crops (SI$)

Coconuts[a]		Cocoa[b]	Chillies[c]	Turmeric[c]
(d)	(e)			
4.89	3.91	14.56	1.20	11.20

[a] After nine years
[b] After eight years
[c] After one season
[d] Without fertiliser
[e] With fertiliser
Source: Derived from Patten and Fleming (1988).

However such analyses do not take into account the actual commitment by labour to the task at hand. Each of the spices analysed in Chapter 4 require intensive use of labour, albeit at different stages;

* cardamom – harvesting, drying
* cassia – preparing bark for market
* chillies – harvesting, drying
* cinnamon – preparing bark for marketing
* cloves – harvesting, drying
* ginger – scraping for drying, drying
* mace – shelling
* nutmeg – shelling
* pepper – harvesting, drying
* pimento – harvesting, drying
* turmeric – curing, drying
* vanilla – looping, pollinating, harvesting, curing

Without commitment to that stage a marketable crop will not be produced.

Table 6.2 outlines the estimated labour requirements for each of the nine identified spices. These are ranked with the highest score being the least favourable. An additional score is made for the commitment required to produce the marketable crop. Again, the highest ranking in the three level ranking of 'high' (3), 'medium' (2) and 'low' (2) is the least favoured.

Table 6.2. Labour requirements and labour commitment.

Spice	Labour requirement		Labour commitment	
	Person-days	Rank[g]	Effort	Score
Cardamom[a]	150	1	high	3
Cassia	n.a.		high	3
Chillies				
Tabasco[b]	645	7	high	3
Indian[b]	278	4	high	3
Cinnamon	n.a.		high	3
Cloves	n.a.		medium	2
Ginger[c]	458	6	high	3
Mace	n.a.		medium	2
Nutmeg	n.a.		medium	2
Pepper[d]	178	3	low	1
Tumeric[e]	309	5	high	3
Vanilla[f]	160	2	high	3

[a] Average of Hassall and Associates (1983) and AACM (1983). Based on Hassall and Associates 12-year annual average.

[b]Derived from AACM (1983) for production and Bennett (pers.comm.) for harvesting. Figure is average of grassland and bush site.
[c]Based on Hassall and Associates (1983). Patten and Fleming (1988) estimate is incomplete for production and drying.
[d]Hassall (1983). Annual average total for 15 years.
[e]Average of Green (1985) and Caiger (1987a) until drying stage then Bennett (pers.comm.).
[f]From Hassall and Associates (1983). Annual average for 15 years. Ignores curing stage.
[g]Based on the six spices for which details are available.

A final comment is required on the definition of 'person-day'. Some writers for example, Bennett pers. comms., have explicitly estimated that a person-day is 8 hours of work; whilst others imply an 8 hour day. Opio (pers. comm., University of the South Pacific, Alafua Campus, Western Samoa) suggests that on work he has done, a person-day is really only 3 hours. If his estimate is correct then the calculations above expand enormously, seriously jeopardising most commercial ventures.

Crop Risk

Coupled with price risk and cash flow implications is the perception of crop risk. This is related to age-to-first-bearing and longevity of the crop. Production and marketing risk are greater the longer the crop takes to bear and the greater the life of the crop. The length of the harvest period also has its risks: the longer the period the greater the risk of failure.

Tree crops were considered more risky than annual crops. Thus, chillies, turmeric, ginger, and cardamoms were favoured over pepper, vanilla, cinnamon, nutmeg, and cloves. Within the chillies, Indian types are favoured over Tabasco types because of their shorter life.

Table 6.3 gives a crop risk rating in terms of the above comments, with the highest rating indicating the highest risk.

Crop Affinity

Crop risk can be related to familiarity with like crops. Whilst none of the spices are indigenous to the Pacific, it is argued that some have an affinity in production technology with traditional crops.

The Pacific's tradition of root crop production is likely to accept more readily those spices such as cardamom, ginger and turmeric with comparable root crop systems. In the same vein it can be argued that the Pacific has a tradition of tree crops, thus having a predilection for cloves, mace and nutmeg.

Table 6.4 gives a scoring for the affinity of the spices with traditional agriculture in the Pacific. A low ranking indicates little affinity.

Table 6.3. Crop risk.

Spice	First harvest[a] Year	Rank	Harvest period Period	Rank	Longevity Years	Rank
Cardamom	>3	=5	months	=8	>15	6
Cassia	>4	=8	short	=1	>50	=10
Chillies						
– Tabasco	1	4	months	=8	annual	=1
– Indian	<1	=1	months	=8	annual	=1
Cinnamon	>4	=8	short	=1	>10	5
Cloves[b]	>6	=11	months	=8	>70	13
Ginger	<1	=1	6-10 m	13	annual	=1
Mace	>6	=11	short	=1	>50	=10
Nutmeg	>6	=11	short	=1	>50	=10
Pepper						
– black	>3	=5	short	=1	>25	=8
– white	>3	=5	short	=1	>25	=8
Turmeric	<1	=1	short	=1	annual	=1
Vanilla	>4	=8	5 months	12	>13	6

[a]First bearing. Full maturity can occur several years later.
[b] Variable bearing. Bumper crop expected only every fourth year (Purseglove 1974).

Table 6.4. Affinity with traditional agriculture.

Spice	Basis	Score
Cardamom	root crop	3
Cassia	tree crop	1
Chillies	shrub crop	2
Cinnamon	tree crop	1
Cloves	tree crop	1
Ginger	root crop	3
Mace	tree crop	1
Nutmeg	tree crop	1
Pepper	intermediate	1
Turmeric	root crop	3
Vanilla	intermediate	1

Cassia, cinnamon, cloves, mace, and nutmeg are given low ranking despite their being tree crops. This is because their product is essentially preserved and/or processed, not a traditional use for tree crop products in the Pacific. Chillies are rated 2 because their shrub characteristics are not uncommon in the region.

Planting Material

Adequate suitable planting material must be available prior to commercialisation. Failure to do

so could tempt the use of unsuitable feral material leading to unsatisfactory marketing results. This was the case in Solomon Islands with the turmeric venture in the late 1970s.

Availability of feral material is a greater problem for some spices than others. Table 6.5 indicates which spices are feral in the various countries.

Nutmeg in Tonga is a particular problem. As Chapter 8 will show, the type of nutmeg feral in the Kingdom, that is *Myristica argentea*, is specifically prohibited by the Food Standards Code in Australia.

Table 6.5. Availability of feral material.

Spice	Country where feral	Score
Cardamom	n.a.	1
Cassia	n.a	1
Chillies	Fiji, Solomon Islands, Tonga	3
Cinnamon	Fiji	2
Cloves	n.a.	1
Ginger	Fiji, Solomon Islands, Tonga, Vanuatu, Western Samoa	3
Mace	Tonga	1
Nutmeg	Tonga	2
Pepper	n.a.	1
Pimento	Tonga	2
Turmeric	Fiji, Solomon Islands	3
Vanilla	Solomon Islands	1

Suitability for Intercropping

Crops which can be intercropped are valued because of their economic use of space. Intercropping provides two other benefits. First, it encourages better husbandry practices as the producer is able to monitor several crops at once. Second, and depending on the crop, it may provide cash flow whilst waiting for a longer term to generate cash.

Whilst spices in general are suitable for intercropping, not all spices can be intercropped. With the longer term tree crops, such as cloves and nutmeg, the emphasis should be on their ability to host subsidiary intercropping. Spices requiring shade and support trees do not as readily lend themselves to intercropping. This handicaps pepper and vanilla. The shrub spice of chillies is suitable to be intercropped as are the root crop spices of cardamom, ginger and turmeric. Table 6.6 scores the suitability of the spices for intercropping; the high score indicates poor suitability.

Table 6.6. Suitability for intercropping.

Spice	Score
Cardamom	1
Cassia	2
Chillies	1
Cinnamon	2
Cloves	3
Ginger	1
Mace	3
Nutmeg	3
Pepper	3
Turmeric	1
Vanilla	2

Pepper is given a high ranking partly because of the shade issue mentioned above and partly because of the issues raised by Hassall and Associates (1983) regarding the similarity of the major diseases of *Phytophthora palmivorta* and *Corticium salmonicolor* in intercropped cocoa and pepper.

Processing

Most of the spices noted in Chapter 4 require some form of processing, such as drying of cardamom and the curing of vanilla.

It costs money to construct appropriate processing facilities. Some of these costs can be reduced by incorporating low level technology such as the sun dryer being developed in Tonga. Solomon Islands has devoted considerable effort to the issue of drying, designing dryers suitable for an individual spice (Solomon Islands 1983) or a series of spices (Walton 1987).

Another means of reducing processing costs is by lowering construction costs by having the facility constructed centrally by either the private or public sector. Central facilities have been suggested for chilli, ginger and turmeric drying in Solomons Islands, and vanilla curing in Tonga (Menz and Fleming 1989). The success of cooperative action in the South Pacific is not unambiguous, suggesting that this is a suitable area for further research.

Table 6.7 gives a score for the degree of processing involved. Simple 'more' (2) or 'less' (1) criteria are employed.

Table 6.7. Degree of processing required.

Spices	Score
Cardamom	2
Cassia	1
Chillies	2
Cinnamon	1
Cloves	1
Ginger	1
Mace	1
Nutmeg	1
Pepper	2
Pimento	1
Turmeric	2
Vanilla	2

Other Issues

Perishability

All the spices discussed in this study are held to be capable of being stored for relatively long periods provided they are dried properly. Two aspects are relative.

First, *sensitivity of the drying process.* Mould can be a problem in most of the spices. However, some of the spices are more susceptible to mould formation during the drying process than others. Pepper and chillies are particularly sensitive.

Second, *storage sophistication.* Whilst all the spices can sustain lengthy storage periods, some spices do deteriorate during this process.

Land

Any site chosen for commercial spice development must be chosen on a number of criteria. The following are suggested: agronomic suitability; freedom from traditional land owning requirements; proximity to transport.

Whilst careful not to trespass on the landmine of land tenure (Crocombe 1987) and mindful of the *api* system in the Kingdom of Tonga, it is obvious that commercialisation of spices cannot be introduced randomly throughout the various countries. A precondition for successful commercial introduction is a land tenure system which enables private gains to be made on what was previously common land.

Marketing Infrastructure

Marketing infrastructure involves the physical requirements of adequate roads and adequate shipping to the point of export. As Green (1985) correctly stated, the commercialisation efforts in turmeric and chillies in Solomon Islands in the early 1980s failed largely because of the nonexistence of simple physical infrastructure such as roads and convenient interisland shipping. The later is of greater concern to the countries with widely spread production areas. Solomon Islands and Vanuatu are the common examples, but efforts to establish a spice industry on Tonga's distant Niua Fo'ou and Niua Toputapu means that Tonga must give thought to this problem.

Suitable storage space is another issue. This is dealt with more fully in Chapter 7.

CHAPTER 7

Marketing Issues

Future Consumption

In the three major spice-consuming regions of the EEC, North America and Japan the population is aging and incomes are rising. Three outcomes stem from this: (i) health consciousness is rising; (ii) demand for quality is increasing; and (iii) convenience is becoming a significant consideration.

Health consciousness, the so-called 'Green Wave', has two aspects. The obvious aspect is the positive one of food having desirable attributes. The other aspect is the negative one of the food having an absence of harmful substances. This is dealt with more fully below. A midway point is the minimum presence of certain undesirable aspects. For example, McCormick and Company have developed a range of salt-free spices (Focus, October 1986).

A number of implications follow from the aging population and rising income phenomena.

First, cost consciousness will recede as a dominant factor in buying decisions.

Second, food processors are responding to the two imperatives by increasing the array of products available; Meyers (1987) estimated that over 2000 new food items were introduced into United States supermarkets in 1986 whilst Hillyer (1989) estimated that the average USA supermarket carried 24 000 items, an increase of 60% in 3 years. Product variation has become critical to their marketing strategies. Spices help delineate flavour and aroma differences. As a result there will be a demand for higher specified product to achieve the required subtle differences in taste and presentation. For example, the H.J.Heinz Company is trying to enhance its 'dull soup' image (Marketing Week, 11:2 1988, p.8) and appeal to younger consumers by using spices. Consequently, food processors will set more precise specifications to their suppliers. This will require suppliers to undertake greater analysis of their product in order to meet these specifications. Overall, the demand for spices will increase but the specifications will become more exacting.

Third, the 'naturalness' of spices will be an increasing attribute in a health-conscious society. Two elements are involved. One, the food preserving properties of spices are being increasingly recognised. Two, the distinction between 'natural' and 'artificial' will become regulated through labelling requirements. Already the United States requires that if a processed product is to be termed a natural product then more than 50% of the flavouring is to come from that natural product. 'Vanilla' ice cream is a case in point. The Europeans are expected to follow this trend, a trend likely to keep the appeal of synthetics at bay.

Fourth, rising incomes, amongst other factors, is leading to an increase in the consumption of food away from home. McCraken and Brandt (1987) estimated that in the United States the number of fast-food establishments more than tripled over the last 30 years. Their study suggested that increased incomes resulted in significantly increased expenditure at restaurants but not other fast-food facilities. Nevertheless they concluded that fast-food facilities and not restaurants will benefit from the increasing trend of eating food away from home. This suggests a continuation in the growth of the industrial and institutional spice-using sectors, reinforcing the demand for a quality product. Further, the reduction in the market share of the less quality conscious sector will increase the pressure to produce a quality product.

Fifth, the importance of convenience. Convenience is one of the major marketing thrusts of the 1980s. Spices have seen direct consumer usage drop in the United States by 20% (Forbes, 139:2, 1987, p.38). One response has been that of McCormick and Company which has introduced convenience spice lines, redesigned its packaging, and reduced the type and size of many containers (Advertising Age, 58:24, 1987,). The latter approach, of using smaller bottles, is designed to have low volume users such as single people replenish their spices more regularly, thereby ensuring that the spices stay fresher longer.

Six, ethnic foods. Greater leisure and rising income combined with a more cosmopolitan population has resulted in a marked increase in the desire to explore other countries' foods. This has seen the

rapid rise in use of 'ethnic' fruit and vegetables (Vinning 1988b) and ethnic styles of cooking such as Indian, Italian and Mexican. The Italian food market in the United States is estimated to reach US$8.3 billion by 1990 compared with US$5.8 billion in 1985 (Food and Beverage Marketing, 6:1, 1987). In the United States the regional style cooking of 'cajun' and 'Tex-Mex' foods are both strong growth areas and heavy users of spices. To illustrate that this is not just a U.S. phenomenon, in the United Kingdom a food manufacturer has had to distinguish its Chinese range of ingredients from its Indian range of packaged foods (The Grocer, 29 September 1987). Cajun seasoning is also sold in the United Kingdom. Spices are an integral part of this. A typical response is that of McCormick and Company which has established an ethnic food section (Advertising Age, 58:24, 1987).

Standards

Current Situation

Despite the spice trade being dominated by sale by sample, products imported into the United States must comply with the standards of the American Spice Trade Association (ASTA). Specifically, the standards are ASTA Cleanliness Specifications for Unprocessed Spices, Seeds and Herbs (Foreign and Domestically Produced) (see Vinning 1989 for details).

Originally introduced in 1969, the standards have been subject to a number of revisions. Pointedly, the Association accepts that the initial standards were based on trade experience and not statistical evaluation. Subsequent revisions have increasingly used laboratory data from ASTA-approved laboratories.

The United States is the world's largest importer of spices. The ASTA Standards are a supplementary part of ASTA's import contract. Nevertheless domestically produced spices must comply with them. The Standards have tended to become the standards for the rest of the importing world.

At the moment the Standards accentuate physical aspects, referred to as 'macroscopic'.

Six cleanliness specifications apply:

* whole insects, dead: by count;
* excreta, rodent: by count;
* excreta, other: by mg/lb;
* mould: % by weight;
* insect identified: % by weight;
* extraneous matter: % by weight.

Twenty nine spices, seeds and herbs are covered: allspice, anise, sweet basil, caraway, cardamom, cassia, cinnamon, celery seed, chillies, cloves, coriander, cumin seed, dill seed, fennel seed, ginger, mace, laurel leaves, marjoram, nutmeg, oregano, pepper, poppy seed, rosemary leaves, sage, savory, sesame seed, tarragon, thyme, and turmeric.

The Standards also detail the sampling procedure to be used and the analytical technique to be employed, including apparatus and the reagents to be employed.

At the same time the Food and Drug Administration has its own set of standards, Current Levels For Natural Or Unavoidable Defects In Spices For Human Use That Present No Health Hazard. Twenty spices, seeds and herbs are specified (Vinning 1989).

Two issues are noted when comparing the two Standards. First, there are differences in the products listed. With the exception of capsicum and chillies the differences are not important. The FDA lists capsicum, ASTA doesn't, but the latter lists chillies whereas the former doesn't: it is noted that the United States is an important producer of both products and ASTA claims that its standards refer to domestic as well as imported product. Second, and more importantly, ASTA standards are more rigorous that those of the FDA. Basically, whereas the FDA standards use either an absolute count or a percentage, ASTA uses both criteria.

ASTA is concerned about the quality of the products imported into the United States. Its Standards relate to *cleaned* product: ASTA prefers *clean* product. ASTA's concerns are real; whilst rodent hair and faeces, and bacterial and fungal loads can be reduced or even eliminated, mycotoxins cannot be destroyed. To this end ASTA will continue to conduct training courses in its standards in exporting countries. Its approach requires that the importing country show commitment by accepting some of the costs involved. Financing of the first course conducted in India in January 1989 was shared by ASTA, the International Trade Centre in Geneva, and the Indian Government.

Reconditioning

Whilst the above emphasises ASTA's approach to *clean* spices, the issue of reconditioning unclean spices must be addressed.

Reconditioning relating to macro standards is relatively straightforward. The Americans allow macroscopic reconditioning to occur within the

United States where the reconditioned product can be assessed by a recognised laboratory. The Europeans appear not to have firm views on the issue.

Micro standards relate to the fact that nearly all spices imported into western countries experience some degree of microbiological contamination. Counts of *Aspergillus* are disturbingly high. Whilst the need to sterilise has always been appreciated by food manufacturers, the increase in the variety of ready-to-eat and chilled foods now makes decontamination imperative. Important issues surround the techniques used to recondition microscopically unacceptable product.

Two techniques are utilised: irradiation and ethylene oxide. Reaction amongst the importing countries to the two techniques varies significantly with the debate relating to the political acceptability of irradiation in the food processing industry and the carcinogenic properties of ethylene oxide residues.

Irradiation of food products is currently approved in 33 countries. The decontamination of spices by irradiation is approved in 20 countries: Bangladesh, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, German D.R., Hungary, India, Indonesia, Israel, Netherlands, New Zealand, Norway, Pakistan, South Africa, Thailand, and the United States.

Noteworthy is the variation in approval levels. Whilst a generic dose of 10 kGy applies in nearly all countries the actual range approved varies substantially from 8 to 30 kGy (Vinning 1988a).

The current trend in the United States is to shy away from irradiation because of its unpopularity with consumers. The appeal of the technique has been damaged by the conviction of a prominent operator for safety violations. Whilst industry sources state that the technique is the most appropriate for their industry, users are not willing to risk facing public condemnation in being identified as a user. No one seems willing to predict the future of the technique.

Europe presents a confused situation with there being no pattern of approvals between countries: some members approve in toto, some specifically prohibiting its use, and a number are ambivalent. The situation will become more complicated with the 1992 unification of the European Economic Community.

Ethylene oxide is currently used in the United States and a number of European countries to decontaminate spices.

Two issues are involved. First, the question of carcinogenic residues remains unanswered. This puts doubt on the long run use of the technique. Second, there are questions about the efficacy of the process when the product has low moisture levels of around4–8%.

Within Europe the Federal Republic of Germany bans the technique and Denmark banned the process in early 1986. Germany is the world's second largest individual importer of spices; its opinion will be critical with the 1992 unification of laws.

An alternative to irradiation and ethylene oxide currently being explored is encapsulation. The process involves giving the spice a protective coating prior to heat treatment as a means of preventing the loss of important sensory properties (Sorensen, 1987).

Future Standards

Future standards will relate increasingly to 'microscopic' issues. The major microscopic standards are seen as being microbiological contamination and pesticide residues.

The United States Food and Drug Administration and the United States Environmental Protection Agency have detailed the tolerance action levels for pesticides and herbicides associated with herbs and spices (see Vinning 1989). Postharvest fumigants are a particular target.

Whilst the application of the microscopic standards occurs in the United States it is clear that British authorities will also adopt them. For no real reason a 5- year time frame was generally considered.

Issues Arising from Increasing Standards

There are a number of implications for spice producers of the increasingly stringent micro and macro standards for imported product.

First, whilst there exist existing suites of detailed macroscopic standards, some variations do occur between importers. However these should be ignored. Exporters should pitch their standards to the higher levels in order to increase their flexibility among potential importers. Second, exporters will be obliged to monitor the macro-and microscopic standards of the importing countries. This will be eased by joining industry associations such as:

— United States: American Spice Trade Association, 580 Sylvan Avenue, Englewood Cliffs, New Jersey 07632

— United Kingdom: The International General Produce Association, Wigham House, 1st.Floor, 16/30 Wakering Road, Barking IG11 8PG

— Australia: The Spice Association of Australia, P.O.Box 104, St.Leonards, New South Wales 2065

The former body is very active in advancing the cause of clean and cleaned spices and advising its members.

Third, exporting countries may be required to issue a statement of standard with each shipment. This means they should have their own approved laboratory or be able to gain access to an approved laboratory prior to export. Not to do so could mean that the shipment will be reconditioned at the point of import. Whilst this means that the exporter faces unknown costs, it also means that he can be faced with a reduced bargaining position as the cost of removal to another market could be uneconomic.

Fourth, new exporters should consider requesting ASTA to conduct a training course in cleanliness standards and techniques. This will require the exporters to seek some form of funding to assist conducting the course.

Fifth, confusion will remain over the appropriate technology to recondition contaminated spices. This leads to the suggestion that the most appropriate approach will be to eliminate microbiological contamination before export. Target areas of concern are the production and postharvest preservation phases. These will have to be increasingly without recourse to unacceptable chemicals. Given that the European Community is the world's largest importer of spices but the United States is the largest individual importer, exporters must hope that after 1992 the two blocs do not have conflicting standards on reconditioning techniques.

Minimum Size of Exports

There is considerable variation as to what constitutes a minimum size parcel to export.

Within the United States brokers suggest a minimum 15-t parcel, that is, one container. They claim both that this is the industry standard and for them to deal in parcels below this is not cost effective. However this claim is dismissed as self-serving on two counts.

First, an analysis of individual import figures which are aggregated into the United States Department of Agriculture's Foreign Agricultural Service U.S. Spice Trade commonly shows imports significantly smaller than 15 t. Further, if re-exports are ignored, a number of spices are imported in lots less than 1 t. Second, commission relates to value. With prices for spices varying up to 20-fold there seems little merit in the idea that all spices require the same minimum parcel.

However, exporters must recognise that brokers/agents require commission and that various shipping costs must be met and that the *value* of the parcel must be high enough to absorb these costs. Further, the energy that a broker/agent will put into marketing the parcel will relate to the amount of commission that will be made.

British traders are prepared to deal in much smaller parcels. Some suggested that they were prepared to deal in lots of 100 kg. Several sources mentioned the potential role of the Singapore entrepot market. It was suggested that several agents in Singapore specialise in accumulating small parcels into larger more economic shipments. At the same time the aggregation process enables grading to be achieved at an economic level. Whilst the exporter may not receive the full economic benefit of such services, the exporter does not suffer undue discounts for small size.

Method of Marketing

Spices are marketed through two basic routes; agency sales and directly to end users.

Direct sales refers to sales directly from the supplier to the end user, in this case processors, grinders and/or packers. They tend to occur after an exporter has proved himself/herself over many years. In this period the user has had time to adjust recipes and the supplier has proved reliable in terms of consistency and quality. As such, direct sales seem out of the question for new exporters. Sales direct to wholesalers and retailers appear to be relatively small due to the problem of adulteration mentioned earlier. Direct sales as a percentage of total sales is unknown.

Nondirect marketing occurs through *agents and brokers*. This method has been traditionally favoured because:

* direct sales to an end user reduces the opportunity to assess other market prices;
* whilst it is accepted that users in the industrial sector are slow to change, there are always supply problems.

Users continually seek alternative sources. An efficient means of achieving this is to seek the opinion of agents rather than use their own resources:

- agents make their living from commission sales, so they serve their own best interests in seeking higher markets;
- agents act as a conduit for information from the trade to the producer, from the producer to the trade, and from one producer to another;
- users utilise agents in order to take responsibility for issues such as (a) failure to honour contracts, especially when the prices rise beyond the contract level (a very typical occurrence with the most recent pepper crop); (b) failure of the commercial shipment to match sample; (c) reconditioning of shipments which fail to meet prescribed standards; and (d) commercial risks relating to the likes of letters of credit, etc.

Despite these appeals it appears that the number of agents and brokers is declining globally. This is especially true in London, once the centre for most of the world's spice trade.

The decline in this sector reflects the global trend towards concentration in the food sector where the number of processors and retailers is declining but the size of those remaining is increasing. As part of this aggregation there has been a blurring of traditional roles. Grinders are becoming flavour compounders (Hillyer 1989) and closer links are being forged with suppliers in order to achieve the quality differentiation needed in the industry. This suggests that the previous ability of agents to establish a market amongst a host of users is declining. Declining outlets and increasing quality standards will require greater performance of spice exporters.

Price and Market Information

Spice price and market information is available but not in a consistent and readily available form which encourages ready comparisons between markets and between products.

Spice Market Data Sources

In a list which does not purport to be definitive, six major sources of spice market data are noted.

International Trade Centre The Market News Service of the International Trade Centre (ITC) in Geneva publishes weekly average market prices for 11 spices in eight major world markets.

The spices covered are: cardamom, cassia, chillies, cloves, ginger, mace, nutmeg, pepper (black), pepper (white), pimento, and turmeric.

Eight major markets are covered: Bahrain, Germany F.R., Holland, Japan, Kuwait, Singapore, United Kingdom, and the United States

An extensive system of phone contacts is used, there being several calls to the one market in order to cross-check. Prices quoted can be spot and forward, with trading terms such as 'c.i.f.,' 'f.o.b.,' 'ex-store' and 'ASTA standard' noted where relevant.

The ITC also publishes weekly prices for 51 fruits and vegetables. Included within this report are the spices, chillies and ginger. A special report on the weekly prices for over 50 fruits and vegetables on just the North American market is produced. This report includes chillies and ginger. The weekly spice report is available on a subscription basis.

Public Ledger Published weekly in London, The Public Ledger's Commodity Week covers nearly the same suite of spices as does the International Trade Centre's Market News Report. Additionally, it publishes major articles where relevant to the trade.[1]

The paper provides weekly price information on the following spices: cardamom, cassia, lignea, chillies, chili powder, cinnamon bark, cloves, ginger, mace, nutmeg, pepper, pimento, and turmeric.

It also provides comparative prices ('this week,' 'last week,' 'last year') for Cochin ginger, Madagascar cloves, Sarawak white pepper, Sarawak black pepper, Indian turmeric, cinnamon quills, and Indian cumin seed.

United States Department of Agriculture The USDA's Foreign Agricultural Service's U.S. Spice Trade publishes annually approximate New York spot prices as of early March for 37 spices, herbs and seeds. The prices are obtained by the USDA's spice desk officer phoning a series of trade contacts. Because they are only collected annually the data have little trade value. However the publication does describe import trends into the United States over the 12-month period as well as major movements in the major spices over the same period.

The Hawaiian Department of Agriculture publishes annually Hawaii Ginger Root which describes

[1] For example, 'Pepper- a sting in the tail', October 10, 1987; 'Indonesia and Grenada join forces on nutmeg and mace,' April 4, 1987; 'Clove prices tumble on Indonesian crop prospects,' November 22, 1986; 'Surplus weighs on cardamom price,' November 8, 1986; 'Sri Lanka blames hydro-power station for poor spice cultivation,' October 25, 1986.

production, values and outlook data for the State's growing ginger industry.

Commonwealth Secretariat The Commonwealth Secretariat publishes biannually Fruit and Tropical Products which includes a substantial section on spices. The document presents very little original data. This is especially true for price data which appears to be drawn from the Public Ledger. However it does have the advantage of amalgamating a series of trade data derived from the import and export statistics of a number of countries into the one document.

Private Sector Trade Journals There are a number of specific trade journals that include some spice price and market information. Just one is noted. Chemical Marketing Reporter[2] contains general articles on 'perfumes and flavorings' and weekly New York spot prices for a number of spices.

Other Private Sector Sources There are a number of specific price and market information sources which are usually made available to clients or on a service fee basis.

There are two types of the fee-for-service information. One type is the newsletter[3] which provides up-to-date market information but no analysis of past trends.

The other type of fee-for-service is the database provided by MINTEC,[4] England. A subscription provides access to weekly updated prices on nine spices (in addition to a host of other agricultural and financial databases) as well as a series of analytical tools to assist interpretation of the data. MINTEC provides the only known 10-year weekly price database for spices. The USDA does not provide the same facility and, as of March 1989, the ITC database includes data only from 1984.

Issues when Examining Spice Market Data

Three issues are noted in regard to examining price information.

Uniformity of Price Data Many price data sources do not refer to exactly the same product or grade of product. Further, not all sources quote on exactly the same suite of products. Frequently the differences reflect the historical connections with the product and therefore the different trading patterns: England has always traded West Indian nutmeg and not Indonesian whereas the United States trade is the opposite.

Cardamom, chillies, cloves, pimento and pepper appear to have the most common forms of quotation. Cinnamon, paprika, and vanilla beans are the least quoted.

Trade Movement Much of the price data is quoted without reference to the movement of product at that price. In this regard the caveat of Chemical Marketing Reporter is noteworthy: *Note that posted prices do not necessarily represent levels at which transactions actually may have occurred. They do not represent bid and asked prices nor a range of prices over the week.*

Spot prices do not represent total trade at that price. Most trade may have occurred at higher or lower prices and the spot prices are the residuals of trade activity.

Of particular concern is the fact that very little information exists on stocks.

Import Data It is inaccurate to use import volumes and values for any specific period to establish per unit values of specific products. Frequently contract prices are set in one period and delivery occurs in another. Whilst longer periods, such as the annual estimates published by the USDA's U.S.Spice Trade, may average out the lag issue the figure so derived must be considered merely as indicative rather than definitive.

Shipping Aspects

Shipping has several dimensions. Obvious ones are number of lines, destinations and origins, and frequency of service. On these grounds most of the South Pacific countries are well served, some better than others. In Solomon Islands, for example, eight lines service Europe, Australia, the Far East, and other Pacific ports at least monthly. Most of the countries receive a major line about once a week. Singapore does not seem to be a frequent destination.

Another dimension to shipping is preshipment storage. Such storage is necessary in order to assemble cargoes. Preferably, there needs to be storage of a prerequisite standard of cleanliness, darkness, and freedom from transmitted off-odours in an accumulator's position near the major exporting wharf. Tonga, Solomon Islands and Vanuatu share the common challenge of a central export point

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[2] Schnell Publishing Company, Inc., 23/80 Broad Street, New York, NEW YORK 10004-2203 U.S.A. Incorporates Oil, Paint and Drug Reporter.

[3] Examples are; A.A. Sayia & Co. in New Jersey; Mueller Co. in New York.

[4] MINTEC Limited, 121 Yarmouth Road, Slough, Berkshire SL1 4HY United Kingdom.

servicing widely scattered production centres. However, the quality of the facilities between these countries varies enormously. Tonga's Queen Salote Wharf has considerable storage space. At Port Vila there are a number of on- and off-wharf storage facilities. Solomon Islands is the least endowed: on-wharf storage is virtually dedicated to bulk copra storage, leaving a facility of questionable quality for spices. Other off-wharf storage is minimal. Fiji has arguably the best storage facilities.

A less obvious dimension relates to the type of shipping container offered. In this regard shipping is a problem for the South Pacific countries, with the problem relating to the phenomenon of spice moisture migration during shipping.

Studies by the Overseas Development Natural Resources Institute show that a major build-up of moisture occurs when containers of spice move from a ship to the dock. The Institute has termed the phenomenon 'thermal shock.' Gough et al. (1989) state that thermal shock is accentuated when the container is off-loaded during the northern winter. With the majority of spices being shipped from tropical countries to temperate ones thermal shock is of real concern. The build-up of moisture is detrimental to the quality of the spices as well as assisting the development of mould. Moisture build-up did not occur with bulk-break and open-hold shipping: moisture could egress and vent to the atmosphere. The movement into containerisation has eliminated this practice.

Accepting that reversion to traditional open-hold shipping is unlikely to occur, the preferred shipping container is the open-sided container. Such a preference recognises that open-topped containers are impractical in a tropical environment and that ventilated containers do not have good head-space ventilation performance (Gough et al. 1989).

All the countries in the targeted production countries receive the general box type of container, the least preferred type of container for spices because of moisture problems.[5] It was not ascertained if the shipping lines could supply open-sided containers. However this is not seen as too great a problem after the short term. Vanuatu's solution is worthy of consideration: a general box container is used but the doors are bolted open and the whole container enclosed in a wire mesh. This arrangement gives security whilst allowing moisture egression.

The unavailability of appropriate containers raises another problem. Since the spices may have to be shipped bulk-break, exporters will have to know with what other cargo the spice(s) will share the hold. This is because of possible migration of off-flavours from other cargoes. There is little to guide the exporters with what other cargoes spices should and should not be mixed. Further research is needed in this area.

Marketing Institutions

Many trade sources expressed concern about the type of organisation which would be undertaking the export of new spices. Their concern was based on the need to be confident that the exporter was experienced in a range of export functions. These include understanding the all-important need that the sample represent the entire parcel; shipping documentation; quality control, and packaging.

They suggested that initially at least exports should originate through a known exporter of other products. There was surprising support for the involvement of statutory marketing authorities. In this regard the performance of the Vanuatu Commodity Marketing Board, Samoa's WESTEC, and the Solomon Islands' Commodities Export Marketing Authority was noted by a number of traders in a positive light. The appeal of a statutory marketing authority is that there is a degree of permanency and an ability to trace back problems through established channels. In this regard many trade sources noted with considerable prejudice the performance of private sector merchants who reneged on contracts during the sudden increase in pepper prices in the late 1980s.

The thrust of the spice program within the South Pacific is the smallholder. Smallholder institutional marketing options include the following:

— Market through existing corporate enterprises. In Solomon Islands these could be Levers-Solomons and Solomon Islands Plantation Ltd. (a Commonwealth Development Corporation joint venture). In Vanuatu it could be such as established plantations or the sea products company. In Tonga it could be the larger vanilla exporters.

— Market through a group. The various

5 The English buyer of the Solomon Islands 1989 trial chillies shipment specified that a box type container shall not be used.

cooperatives marketing Tongan vanilla were cited as examples.

— Market through local Chinese or Indian merchants who have traditional links with Singapore or Hong Kong. Relevant for Solomon Islands, Vanuatu and Fiji.

— Market through an existing statutory marketing authority. These are:–

- Fiji : National Marketing Authority of Fiji
- Solomon Islands : Solomon Islands Commodities Export Authority
- Tonga : Tonga Commodities Board
- Vanuatu : Vanuatu Commodities Marketing Board
- Western Samoa : Copra Marketing Board, Cocoa Marketing Board.

— Market through a government department.

This paper supports the option which involves using known exporters. In most cases in the South Pacific these would be the statutory marketing authorities. This option is supported because with new origin produce the credibility of the exporter is critical. The various authorities are known exporters, albeit for copra and cocoa in Solomon Islands, Tonga, Vanuatu and Western Samoa, and ginger (amongst other products) in Fiji. With spices invariably being sold on a sample basis, experience with sale-by-sample techniques and the deriving of the sample is important. Familiarity with necessary documentation and foreign exchange is also required. As buyers in Britain and the United States pointed out, the statutory basis of an exporter doesn't assure them of marketing performance but at least it does assure them of a degree of permanency with which to redress potential problems. Whilst the above attributes could be acquired by private sector marketers (with the exception of the statutory backing) it would be a lengthy experience.

Associated with the sale-by-sample approach is the recognition that the American Spice Trade Association's standards are rapidly becoming the industry's standards. New exporters would be expected to comply with these standards probably more so than existing suppliers. Most of the statutory authorities have inspectors who are experienced in testing for macro standards. With training they could test spices. Whilst anyone with training could do this, the use of the authority inspectors should make the training easier and provide operational economies of scale.

Equipment

Associated with the issue of quality testing is the issue of appropriate equipment.

Quality testing has two aspects.

First, each of the main spices contemplated has a particular marketing attribute such as capsaicinoids content in chillies, curcumin content in turmeric and piperine content in pepper. Since spices are sold on a sample basis buyers will specify the particular attributes they require. Chapter 8 details the general requirements that Australian spice importers require. Exporters will need to know what they are exporting.

Second, increasingly, spice imports have to meet health specifications. These are the 'micro' standards of ASTA noted in this chapter. The next chapter details the relevant minimum requirements of the Australian health authorities. Unless exporters can satisfy the various health authorities that their products comply with the requirements their produce may be refused entrance.

The ability to test for these aspects appeared limited on two counts. First, there seemed to be an absence of specialised equipment. In this regard Tonga's Commodities Board seemed the exception. Second, the training of technicians in the appropriate techniques seemed limited. This point has two aspects. The first is the knowledge needed to keep abreast of the current requirements. This can be addressed to a large extent by joining the various country spice associations whose addresses were noted earlier. The second point is the need for the testing authority to keep abreast of the latest techniques in the field. At the very least this requires subscription to various scientific journals and at best regular attendance at training courses, seminars, conferences, etc.

As a starting point for appropriate testing equipment reference is made to the recommendations made by Green for Solomon Islands (Green 1985).

CHAPTER 8

Australian Spice Market

From the South Pacific's perspective Australia is the nearest large market. A priori Australia could absorb the entire spice production of the South Pacific for some time to come. For this reason it is worth studying the Australian spice market.

Australia categorises imported spices at the three digit SITC level (075.00.00). Nine individual spices and three groups of spices in the ground and unground form are identified. This compares with the identification of 12 individual spices 10 years earlier.

The nine individual spices identified are: cinnamon, cloves, curry, ginger, paprika, pepper, pimento, turmeric, and vanilla.

The grouped spices are: (a). cardamoms, nutmeg and mace ; (b). seeds; anise, badian, caraway, coriander, cumin, fennel, and juniper; and (c). spices 'Not Elsewhere Included' but usually including thyme and bay leaves.

Whilst there are some minor differences in number coding and aggregation compared with other importing countries' statistics, by and large Australia's statistical treatment of spices is consistent with that of most other countries.

Australia has a considerable spice industry. Over 4000 t annually are consumed, nearly all of which is imported. The mere size of the market has provided a spur for attempts to replace locally the imports. At the same time the country exports about 4000 t of spices. This Chapter examines, first, the importation of spices into Australia and, second, outlines the progress of the emerging local industry.

Australian Spice Imports

Table 8.1 shows that in the decade 1978–87 Australian spice imports have maintained a consistently slow upward trend.

Six issues emerge from the Table.

Overall Increase

Total imports are increasing at an annual rate of about 4–5%, well above the rate of growth in population.

The comparatively high rates of consumption can be attributed to two causes.

First, there has been a marked increase in the consumption of convenience and 'fast foods.' These foods are high users of spices. The move in Australia towards the consumption of spices as an industrial item and away from its consumption as a household item mirrors the same trend in Europe and North America. Household consumption was always an area of slow moving growth, typified by the high retail mark-ups.

Second, there has been a rapid increase in the popularity of ethnic foods which are traditionally high users of spices.

Variation

The import figures show considerable variation on a year-to-year basis. This is true for both total imports and for individual spices.

Movements of the order 20-50% have been common in the cinnamon, the grouping 'nutmeg, mace and cardamom,' curry and turmeric, and the grouping 'not elsewhere included,' Fluctuations in the order of 60-100% have occurred in the vanilla and ginger industries. Movements in ginger imports can be explained by supply movements in the domestic crop[1]. An equally convenient explanation cannot be used for large import variations in the other spices.

These movements suggest that the Australian market is an opportunistic one, with importers and manufacturers taking advantage of low world prices to build stocks.

Given this conclusion, analysis of the figures should be over a slightly longer term in order to even out year-to-year variations. Table 8.2 shows the 2 year moving average for total spice imports for the period 1977-78 to 1986–87. Two years was taken as the appropriate time frame as this allows an importer time to place an order in the low price year for importation in the next.

[1] Drought reduced the 1978 crop resulting in high imports in 1979. The 1987 crop was also drought-affected but supplementing imports were made during the year. The latter drought was evident early in the crop year thereby enabling a same-year response by importers.

Table 8.1. Australia: imports of spices, 1978–87 (tonnes).

Spice	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Cinnamon[ab]	299	185	202	172	171	197	269	210	207	226
Cloves	44	37	42	41	39	44	50	47	48	40
Curry[c]	310	287	319	376	229	358	230	438	423	440
Ginger[a]	56	197	59	90	93	96	63	101	77	234
Nutmeg, mace[ad]	148	148	138	160	135	163	187	161	151	190
Paprika	291	245	258	373	221	404	326	406	463	430
Pepper	1097	1042	960	1009	1002	1016	987	1183	961	1153
Ground pepper[e]	181	280	233	319	267	343	530	534	703	511
Pimento	43	25	31	81	38	75	99	150	104	80
Seeds[f]	238	275	234	156	150	227	234	248	215	198
Turmeric[a]	173	196	114	140	87	141	203	172	187	246
Vanilla	24	25	7	9	5	13	7	7	7	5
Spices NEI[g]	204	315	214	311	260	281	337	307	268	371
TOTAL	**3108**	**3257**	**2810**	**3238**	**2697**	**3357**	**3522**	**3965**	**3876**	**4124**

[a] Combines ground and unground form.
[b] Includes cassia.
[c] Defined as curry paste and powder
[d] Includes unground nutmeg (075.24.01), unground mace (075.24.02), unground cardamoms (075.24.03), and 'nutmeg, mace, cardamoms, ground' (075.24.09).
[e] 'Pepper, pimento, ground, excl.paprika' (075.10.07).
[f] Ground and unground anise, badian, caraway, coriander, cumin, fennel and juniper (075.25.).
[g] Includes thyme and saffron.
Source: Australian Bureau of Statistics.

Table 8.2. Two Year Moving Average of Total Spice Imports.

Period	Imports tonnes
1977-78	2964
1978-79	3182
1979-80	3033
1980-81	3024
1981-82	2967
1982-83	3027
1983-84	3439
1984-85	3743
1985-86	3920
1986-87	4000

The Table shows a more consistent upward movement in imports over the decade 1978–87.

The exceptions are the periods 1979–80 and 1981–82. With the former, actual imports for 1980 were about 400 t less than in 1979. However this decrease was shared nearly equally by the four spice groups: pepper (111 t), ginger (138 t), turmeric (82 t) and 'other spices' (101 t). The decrease of nearly 500 t from 1981 to 1982 was not as evenly spread with curry and the pepper group (consisting of ground paprika, pepper and pimento) constituting 70% of the total decline.

Composition

The overall composition of Australian spice imports has remained approximately in the same proportion over the decade.

The pepper group dominates imports. Over the decade their share of total imports has been around 60%. Within the group, ground pepper products (of paprika, pepper, and pimento) constitute one - third of all spice imports. Imports of unground black and white pepper have consistently fallen over the period. Turmeric and curry constitute approximately 16% of imports. Cinnamon is the other significant second tier import. The two consolidated groups of 'Seeds' (anise, badian, caraway, coriander, cumin, fennel and junipers) and 'Spices Not Elsewhere Included' are major contributors to total spice imports, constituting about 15% of the total over the decade. Of the two groups, 'Spices Not Elsewhere Included' have been steadily increasing.

Imports can be analysed in terms of 'ground' and 'unground.' Since 1981 the following spices have been delineated between the ground and unground form: pepper, pimento, cinnamon, nutmeg, mace and cardamom, ginger, turmeric, seeds, and spices 'not elsewhere included.'

Table 8.3 shows the steady decline in the percentage of total imports in the unground form.

Table 8.3. Unground Spices as a Percentage of Total Imports.

Year	Percent
1981	51
1982	59
1983	52
1984	54
1985	47
1986	41
1987	43

Understatement of Total Imports

The method of reporting imports understates total spice imports into Australia. This is because ground imports are not converted into unground equivalent. With ground imports making up more than half of all imports the full equivalent of the actual spice would be much higher.

Curry is treated as a spice on its own. Given that curry imports have nearly doubled over the period and now constitute 11% of total imports, the statistics understate the consumption of turmeric, the main spice ingredient in curry. Further, turmeric is also reported in ground and unground form with the ground form consistently three to five times greater than the unground form. This suggests that Australian imports of turmeric are substantially higher than actually reported.

Origin of Imports

Two significant features emerge from an examination of the origins of Australian spice imports.

The first relates to the composition of exporters supplying the Australian market. Basically this mix of imports has remained constant over the decade. The only significant changes have occurred with (i) vanilla imports where Tongan imports have replaced those from Madagascar, (ii) cardamoms where the Papua New Guinean product has replaced the Indian product, and (iii) ground ginger where Fiji has emerged as the major supplier.

The other significant feature is the role of Singapore which supplies nearly the whole range of spices imported into Australia. In a large number of cases Singapore is a major supplier. Further, frequently Singapore has been the leading supplier for a specific spice in particular years. With ground spices, Singapore is the dominant supplier.

The following details the changes in the origin of imports over the decade for the eight spices under consideration.

Cinnamon Sri Lanka has maintained its position as the major supplier of cinnamon to the Australian market. Indonesia is the only other major source of the raw product. The United States, the Netherlands, and Germany have been consistent sources of supplies of the ground product, albeit at a fluctuating level. Imports of ground cinnamon suggests that the total market is considerably higher than just the unground market.

Cloves Five to six countries have consistently supplied Australia with cloves, with Madagascar, Tanzania and Singapore supplying the bulk of the imports over the decade. Brazil and France have emerged as second tier suppliers in recent years. Despite its now being a net supplier, Indonesia has not emerged as a significant supplier into Australia. Its exports are obviously handled through Singapore which, in some years, has been Australia's largest individual supplier.

Ginger India's position as the major source of ground dry ginger imports has been captured by Fiji. Australia imports fresh ginger from Singapore, Hong Kong, China, Indonesia and Fiji, with the former being the major supplier.

Nutmeg, Mace and Cardamoms Over the decade Indonesia and Singapore have consistently supplied more than 80% of nutmeg and mace imports. Within 3 years of entering the Australian cardamoms market, Papua New Guinea replaced India as the major supplier. It has consistently strengthened its position since the early 1980s.[2]

Pepper In the early 1970s Malaysia supplied about 80% of Australia's pepper imports. This reflected Australia's high usage of white pepper. Other suppliers were Indonesia and Singapore. During the late 1970s Malaysia's share halved with Indonesia picking up what Malaysia lost. Malaysia now supplies around 50% with Indonesia and Singapore constituting most of the balance. Actual figures in any one year appear to depend upon prices with Singapore supplies in 1 year exceeding those from Indonesia.

Turmeric and Curry India dominates the supply of ground and unground turmeric, in some years supplying more than 90% of the total. Singapore is the only other consistent supplier of note.

[2] Further analysis is not possible due to the amalgamation of statistics in 1983. The category 'Other Countries' is undefined after 1983 but separate Papua New Guinea statistics are kept.

Indian supplies of curry powder and curry paste have rarely dropped below 70% of the total over the decade. Because total curry imports are increasing, the traditional suppliers of the United Kingdom and Singapore have been able to maintain their volume of exports in the face of increasing supplies from Thailand and Malaysia.

Vanilla Madagascar has declined from being nearly the sole supplier to providing about a third. Tonga now supplies over 50% of imports.

Tariffs and Nontariff Barriers

Australia has no undue barriers on the importation of spices. Three issues are relevant.

First, all spices enter duty free. Because of Australia's commitment to the GATT process of liberalising trade this situation is unlikely to change even if a small spice industry does get established.

Second, all spices are subject to quarantine inspection for pests and diseases. The diseases are of plant origin. No spice is currently subjected to the requirement of prior approval to import. Turmeric was subjected to this requirement around 1984, but this has since been relaxed. Australia does not have in place a national system of human health quarantine-based measures. Thus whilst pepper of Indian origin was 'blocklisted' or subject to Food and Drug Administration inspection in the United States in July 1987 no such action occurred in Australia. On the other hand the health authorities have specifications for the content of spices (see below).

Third, packaging and labelling can be a nontrade barrier. Australia's major packaging and labelling regulations relate to:

- pure foods, or the prohibition of certain ingredients;
- deceptive packaging;
- date stamping;
- ingredients labelling; the identification of the common name of ingredients;
- uniform or common size packaging regulation;
- designation of country of origin.

Australia has the trade body The Spice Association of Australia which provides regular information on all aspects of tariff and nontariff regulation on a newsletter basis. Membership is open to all interested parties. Addresses of the 1989 members of The Spice Association of Australia are given in Vinning (1989).

Australian Spice Usage: General

In the late 1970s Australia's industrial and retail sectors accounted for about 90% of total spice consumption with the institutional sector taking the balance (ITC, 1982). Retail sales are for household consumption.

If it is assumed that the Australian food sector follows the trend of the United States then industrial usage is greater than that of the household sector. However, cognisance must be made of the composition of the Australian population, that is, basically of British stock with large postwar emigration from Europe. The International Trade Centre (ITC, 1982) stated that the patterns of spice consumption from select European countries from where relatively large numbers of immigrants have originated are:

- Yugoslavia: 70% retail sector;
- United Kingdom: 53% retail sector;
- Italy: 50% retail sector;
- Spain: 40% retail sector.

Given that these emigrants (and their descendants) maintain to a large extent their consumption patterns in Australia, then it is possible that Australia's ratio for industrial-retail use is more likely to approximate 50:50 rather than the United States 60:40 ratio.

However, since the International Trade Centre's survey a decade ago, there has been an expansion of the fast-food industry and the rapid rise in the popularity of 'ethnic foods' which have a high spice component. The expansion of the fast food industry is expected to continue. The potential is underlined by the fact it is estimated that Australians currently eat only four to five meals a week away from home compared with 12 to 14 in the United States (Australian Financial Review, 12 April 1989). As a result it is estimated that the food manufacturing sector consumes more than half of Australia's spice imports. Moreover, it is estimated that this sector will expand more rapidly than the retail sector. However, it is considered that retail sector will continue to grow in absolute terms. Finally, consistent with the issues raised in Chapter 7, it is expected that the industrial sector will impose increasingly stricter quality and product specifications but not be as price-conscious with the reverse being the case for the retail sector.

Australia offers a large number of marketing channels for importing spices: specialist importers; specialist wholesalers; grinders and/or packers; food manufacturers.

Some operators combine a number of operations. The majority of operators are located in either Sydney or Melbourne. In recent years the volume of spices imported directly into Western Australia has grown. This reflects its proximity to the major spice entrepot of Singapore.

There is a wide demand for both raw and processed spices. Natural spices appear to be preferred to oleoresin. Pande (1986) reported that Australia imported from India alone five types of spice oleoresin (pepper, capsicum, chillies, ginger and turmeric) and five types of spice oils (pepper, ginger, nutmeg, celery seed and other spice oils).

Home buyers appear to lack the quality discrimination of the industrial buyers. This suggests that the main marketing factor for them is price. However the rise of the industrial sector price, along with consistent quality and regularity of supply, are expected to be the dominant factors influencing demand.

Australian Spice Usage: Detailed

The following details the usage and requirements for those spices under consideration and for which statistics are available. Reference to 'health specifications' are drawn from Part J1 - Spice of the Food Standards Code 1987 issued by the National Health and Medical Research Council.[3]

Chillies

Irrespective of local trade names, Australia imports Bird's Eye and Indian-type dried chillies.

Health specifications refer to Cayenne pepper as 'the dried fruit of the species of capsicum powdered or ground.' It shall not contain less than 15% of extractable matter soluble in ether or more than 6% of ash.

Import specifications usually cover:

- variety: *Capsicum frutescens*, and *C.annuum*;
- colour: usually uniform red with no yellowing;
- size;
- moisture;
- nonvolatile ether extract;
- crude fibre;
- ash: acid insoluble ash, total ash;
- plate count.

[3] Canberra: Australian Government Printing Service 1987.

Cinnamon and Cassia

Cinnamon and cassia are imported into Australia in the following forms:

- cinnamon bark and quills;
- ground cinnamon and cassia;
- cassia.

Cinnamon is used in the food manufacturing sector and the bakery industry. As in the United States, cassia is preferred in the bakery sector because of its stronger flavour.

There are different health specifications relating to cinnamon and cassia. Cinnamon is the dried inner bark of *Cinnamonium zeylanicum*. Cassia and cassia buds are the products of *Cinnamonium cassia*.[4] Powdered cinnamon shall:

- not contain any cassia;
- not contain any foreign vegetable substance;
- not contain more than 8% total ash;
- not contain more than 2% ash insoluble in hydrochloric acid.

Importer specifications cover:

- size;
- colour;
- moisture;
- volatile oils;
- ash: acid insoluble ash and total ash;
- total plate count.

Cloves

Clove buds imported into Australia are used in food manufacturing and spice blending.

Health specifications define cloves as the dried flower buds of *Eugenia caryophyllata*. They are not to contain any exhausted or partly exhausted cloves[5] nor more than 5% clove stems.

Nutmeg, Mace and Cardamoms

Australia imports ground nutmeg, whole nutmegs and broken mace for use in the bakery and pastrycook industries. Mace is used when higher quality is required.

Nutmeg is defined by the health authorities as the dried seed of *Myristica fragrans*. Mace is defined as containing only *Myristica fragrans*.

The regulations specifically prohibit the arillus of *M.malabarica*, *M.fatua* ('Bombay mace'), and *M.argentea* ('wild mace').

Importer specifications for nutmeg and mace include the same criteria as used for cinnamon and

[4] Earlier Food Standards Codes referred to cassia products being derived from C. burmanii.

[5] 'Exhausted' not defined.

cassia as well as reference to crude fibre content, nonvolatile ether extracts, and particle size.

Cardamoms are imported in the pod, seed and ground forms for use in food manufacturing and special spice blends. Importer specifications involve the same criteria as for nutmeg and mace.

Ginger

Dried ginger is imported into Australia in the ground and unground form. Use is in food manufacturing for drinks and sauces, and bakery and pastrycook industries. Some powdered product is distributed through the retail sector.

Health requirements are more precise than for the other spices. They relate to washed and dried ginger, and limed or bleached ginger. Washed and dried ginger is the rhizome form *Zingiber officinale* and must not contain:

- any exhausted or partly exhausted product;
- more than 7% total ash;
- more than 5% of ash insoluble in cold water;
- more than 1% lime;
- less than 12% cold water extract.

Limed ginger must not contain more than 10% ash, not more than 4% calcium carbonate and conform in general with the standards for washed and dried ginger.

Importer specifications cover:

- size;
- colour;
- moisture;
- volatile oils;
- ash: acid insoluble ash, total ash, water soluble ash;
- total plate count;
- cold water extract;
- crude fibre;
- calcium.

Pepper

Australia imports pepper in the form of whole black and white berries; specials, mainly pinheads and lightweights; and ground black and white product.

White pepper constitutes about 70% of the total. This figure appears to be changing as Australian importers find that black pepper has a more comparative stability in prices and volume. Whilst the manufacturing sector is the largest user, there is considerable retail trade. Imports are generally in the unground form with manufacturers preferring to purchase from local grinders as a means of ensuring quality control.

Health specifications are the same for black and white pepper — dried immature berries of *Piper nigrum*. Specifications for ground black and white pepper differ slightly.

Black Ground Pepper shall contain:

- not less than 6% of extractable matter soluble in ether;
- not less than 8% of extractable matter soluble in absolute alcohol;
- not more than 7% ash.

White Ground Pepper is defined as the dried immature berry of *Piper nigrum* from which the outer coating has been removed. It shall contain:

- not less than 6% of extractable matter soluble in ether;
- not less than 7% of extractable matter soluble in absolute alcohol;
- not more than 3.5% ash;
- not more than 5% of crude fibre.

Importer specifications usually cover:

- colour;
- grade : can be either ASTA or Agmark;
- moisture;
- non-volatile ether extracts;
- volatile oils;
- ash: acid insoluble ash and total ash;
- piperine content;
- total plate count;
- weight per litre.

Turmeric and Curry

Australia imports ground and whole turmeric. It is difficult to determine if the whole product are fingers or bulbs. Madras types are preferred but Alleppey types are also imported. Turmeric destined for the retail and catering sectors are usually in the ground form. To meet manufacturers' specifications, unground product is preferred.

Turmeric is defined in the A5-Colourings section of the Foods Standards Code not J1-Spice. Both turmeric and curcumin are defined as 'natural colouring substances'.[6]

Importer specifications involve:

- size;
- grade;
- moisture;
- volatile oil;
- ash: acid insoluble ash and total ash;

[6] The only synthetic yellow shade colouring substances permitted are: C1 15985 sunset yellow FCF; C1 19140 tartrazine; and C1 18965 yellow 2G.

— total plate count;
— curcumin: for Madras types around 2.2%, for Alleppey types up to 6.5%.

Curry is imported as curry powder and curry paste, the latter being the less popular. Most curry powder is for retail outlets. Indications are that Australians are increasingly consuming locally blended curry powders.

Vanilla

The main outlets for vanilla in Australia are food manufacturers for confectionery and desserts, soft drink manufacturers, and the retail sector.

The only health regulations relating to vanilla beans are in O6 - Essences where they are identified as the 'properly cured and dried fruit pods of *Vanilla plantifolia* and *V. tahitensis*.' Health specifications relate to vanilla oleoresin which is defined as the concentrate obtained from vanilla beans. Added vanillin and added ethyl vanillin are specifically prohibited. Vanilla essence has a similar definition. It is only through the labelling laws relating to essences does Australian legislation enhance the position of natural vanilla. This is in contrast to the more direct United States approach of defining 'vanilla' in product use such as 'vanilla ice cream.'.

Australian Spice Production

An analysis of spice production in Australia is handicapped by the absence of official statistics. The Australian Bureau of Statistics (ABS) stated that Australia now exports about 4000 t of spices per annum. However, with the exception of ginger, there are no ABS estimates of local spice production. The discrepancy is explained by the method by which ABS collects its data. Individual units of production are too small to warrant collection even though the aggregate is considerable. Continued growth in some of the seed spices may result in changes in the reporting system.

Industry sources indicate that the main spices currently being produced are the Mediterranean-type seed spices such as coriander and cumin and a number of the spice herbs such as basil, oregano, rosemary and sage. Most of these are produced in South Australia, Victoria and New South Wales.

Apart from ginger, Australia has not traditionally been a producer of spices. Along with herbs and spice seeds, and the nascent pepper industry in North Queensland, the Australian ginger industry will be briefly noted.

Ginger

Australia has had a ginger industry for nearly 50 years. By world standards production is very small (Table 8.4).

Table 8.4.Australian Ginger Production: 1985–88.

Year	Area (ha)	Production (tonnes)
1988	125	5516
1987	129	5141
1986	114	4154
1985	131	3910

Source: Queensland Department of Primary Industries.

Local production is dedicated to the confectionery market. Australia, through the industry's highly centralised Cooperative, is a major supplier of high quality crystalline, candied and preserved ginger. This reflects the fact that Australian ginger is not as strongly flavoured as many overseas varieties.

For the while there is little interest by local producers to enter the dried ginger market, in this case defined as the ginger from the second and third harvests. Returns received from the processed sector are far greater than those likely to be received from drying; over the 5 year period 1983–87 the Cooperative's average net return to producers was A $0.39/kg. Consequently, over 60% of production goes into the processed product. Interest in the fresh market is growing with exports increasing to 353 t in 1988.

The local industry is subject to production variation. Drought is a particular problem. Imports occur in the years that the local crop is reduced. Moreover, final imports may be in excess of local requirements as imports are used to fulfill overseas contracts. In those years that imports are used the industry is prepared to pay a premium for quality fresh product. The concerns about quality and price explain the reluctance to import fresh ginger but a greater willingness to import lower quality dried product. For these reasons there will always be a precise market for imported ground ginger.

Herbs and Spice Seeds

Locally produced herbs and spices are increasing in both variety and volume. Parsley, chives, mint, basil, coriander and cumin are the major crops with lesser supplies of watercress, thyme, lemon thyme, rosemary, and tarragon. Fresh herbs are sold primarily through the wholesale fruit and vegetable markets. Dried herbs go primarily to

food processors whose requirements are estimated at 500–600 t annually.

Production of some of the seed spices is considerable. Cumin exports are estimated at 2000 t. Trade sources in Singapore praised the quality of Australian coriander exports.

There are a number of difficulties in producing and marketing herbs and spices seeds locally.

Production Most imported herbs are basically Mediterranean in origin, being grown in a climate of wet winters and dry summers. This limits production to the southern nontropical parts of the country. It is also noted that some of the locally grown herbs have different tastes and aromas compared with imported varieties.

Marketing Herbs have a very precise market demand. Whilst some producers may make profit, a few additional producers easily lead to oversupply and low returns. As a result Australia exports a surprising range of herbs and spices, albeit in small quantities.

Pepper

Pepper has long been grown in the tropical areas of northern Australia as a decorative back-yard plant. There are now some efforts to develop the crop commercially.

It is possible that some of the local North Queensland varieties can be exploited. As it grows in clusters comparable with grapes the crop will probably be hand-harvested initially. However, given Australia's experience in adapting crops to trellising in order to aid mechanisation, it is likely that pepper will be similarly adapted.

Local producers consider that the variations in overseas pepper prices and concern about quality standards in the imported product will enhance their market prospects with Australian manufacturers. In regard to quality associated with drying, it is noted that Australia, especially the tropical north, has considerable experience with the mechanical drying of a host of crops.

About a quarter of a hectare is currently under production with further expansion planned for the next season. All of the 1988 crop was sold at prices in excess of the average imported value.

Australian Spice Exports

Table 8.5 shows the substantial growth which has occurred in the export of spices since the mid-1980s.

Table 8.5. Australia: Exports[a] of Spices[b], 1979–87

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Tonnes	255	330	289	308	420	994	1096	2250	3890

[a] Excludes re-exports
[b] Includes inconsistent time series treatment of fresh and dried ginger.
Source: Australian Bureau of Statistics.

Separate figures have only been recorded for ginger since 1985. Since then they have shown a massive growth from 6 t to 535 t. Industry sources indicate that the bulk of spice exports are cumin and coriander.

Re-exports have declined. Initially they were as high as 10% of total exports in the late 1970s but have since been reduced to less than 1%.

Another trend of equally significant change relates to export destination. The United States and the United Kingdom's position of dominance has been replaced by the Asian countries of Hong Kong, Singapore, Malaysia, and Indonesia, as well as Fiji. Whilst exports to individual countries vary markedly between years, the total tends to be consistent. Exports of fresh ginger to the United Arab Emirates account for over 80% of exports for the 2 years that the data are available.

Comments

Two additional issues are worth noting.

Quarantine Problems

As a significant importer of spices Australia has faced two types of quarantine problems.

First, there is the traditional issue of pests. In the past Australia used ethylene oxide to disinfest product. Whilst not banned yet, in all likelihood it will be. The country is exploring the use of irradiation (Vinning 1988a) and vapour heat treatment as alternate quarantine treatments. Special attention continues to be paid to tropical products. Current research is also emphasising methods of detecting irradiated food. Whilst a number of individual techniques have been shown to have success for individual product groups, for example thermoluminescence for spices and Electron Spin Resonance Spectroscopy for chicken, no omnibus technique has been developed (Mitchell 1988). Importers can expect to experience increasingly stricter inspection procedures. Unlike the United States, Australia does not have a large reconditioning industry. Further, the existing industry is very expensive.

Spice exporters are well advised to ensure that their product meets specifications before export.

Second, Australia is concerned about the existence of microbial contamination of its spice imports. Sterilisation is of significant importance with most major food manufacturers conducting their own tests in direct imports and those supplied by grinders. In this regard Australia is merely reflecting the trend outlined in Chapter 8. Some local research has been undertaken on the decontamination of ground ginger and mould inhibition on fresh ginger but the results have been ambivalent. The concluding comment in the above paragraph can also be applied here.

Price Quotations

Australian importers usually have prices quoted to them in US dollars on a 'C and F' basis. Movements in the Australian dollar may encourage a preference for price quotations in Australian currency.

Conclusion

The importation of spices into Australia is increasing at a rate greater than the rate of population growth. This indicates that there are good prospects for import opportunities. However the market is highly price-sensitive and opportunistic. Trade sources always emphasise that there are always market opportunities for suppliers of a consistent quality product which is well packed and presented, and competitively priced.

Whilst Australia has underway a number of programs to increase local spice production it is suggested that these efforts will be confined to herbs and some of the spice seeds.

CHAPTER 9

Prospects for Spices in the South Pacific

It is foolhardy to think that there can be a recommended 'one best spice for the South Pacific.' As the preceding chapters showed, a large number of factors influence market prospects. Two groups of factors exist:

(1) those relating to the market;
(2) those relating to producing economically a marketable product.

Before noting some of the issues which impact upon market prospects it is necessary to define the spices under consideration.

Pimento is not considered further because of the inability of the spice to bear fruit outside the Caribbean.

Saffron is also not considered further because, drawing on Chapters 5 and 6, its very high labour requirement suggest it very unlikely to be accepted in the South Pacific.

Spice Seeds are not considered further because any discussion must be on an individual basis and data do not exist equally across all spice seeds to make a sound judgement.

Marketing Perspectives

Five marketing issues are noted, the most important of which is price.

Prices

Table 9.1 below shows the high and low March spot prices on the New York market for 10 of the 11 spices under consideration for the 6-year period 1983–88. An average of all price observations is included. The eleventh spice, chillies, is not quoted on the New York market. The London quotation in pounds/tonne has been converted to United States dollars/kilogram.

Where several quotations are available because several grades or varieties are marketed, e.g. cardamom has six quotations, ginger has four, and most spices have at least two, whereever possible the lower grade/variety price is used. Three reasons are advanced for this:

(1) new origins are unlikely to have properly tested suitable varieties readily available;
(2) new origins would not have the experience to consistently produce and grade for top quality;
(3) whilst top qualities may be attainable for a percentage of the crop the balance of off-grades will still have to be marketed, thus lowering the average price.

Table 9.1. Annual spot prices of spices New York market Low, High and Average 1983–88 (US $/kg).

Spice	Low	High	Average	% Variation around average
Cardamom[a]	3.94	25.35	9.38	228
Cassia[b]	0.94	1.19	1.09	23
Chillies[c]	2.94	6.80	4.10	94
Cinnamon[d]	1.87	3.31	2.49	58
Cloves[e]	3.31	9.81	5.88	110
Ginger[f]	1.43	3.42	2.25	101
Mace[g]	4.81	14.99	10.05	159
Nutmeg[h]	1.76	7.41	3.56	117
Pepper				
black[i]	1.41	5.63	3.60	107
white[j]	1.78	6.61	4.49	107
Turmeric[k]	1.15	2.54	1.81	76
Vanilla[l]	67.2	81.6	75.6	19

[a] Based on Guatemalan mixed greens. Based on 72 monthly observations.
[b] Chinese. Based on 6 observations.
[c] Tabasco types. English pounds per/t converted to US$/kg by constant factor. Based on 41 observations for which prices were quoted.
[d] Ceylon No.2. Based on 6 observations.
[e] Brazilian. Based on 6 observations.
[f] Cochin. Based on 6 observations.
[g] #2 Siauw siftings. Based on 72 observations.
[h] West Indian whole. Based on 72 observations.
[i] Malabar. Based on 72 observations.
[j] Muntok. Based on 72 observations.
[k] Indian Alleppey. Based on 6 observations.
[l] Madagascar. Based on 6 observations.

The Table illustrates well the problems of identifying a spice with a desirable price behaviour. It is not possible to state that high-priced spices have high degrees of variability or that low-priced spices have low price variability.

Table 9.2 ranks the prices of the spices and the extent of their variability. Rankings are based on highest prices and highest variability. Rankings for price variability are the equivalent of risk. A desired combination would be a high ranking for price and a low ranking for variability.

Table 9.2. Spices: ranking by price and variability of prices.

Spice	Price ranking	Variability Ranking
Cardamom	3	1
Cassia	10	11
Chillies	6	8
Cinnamon	9	10
Cloves	4	4
Ginger	11	7
Mace	2	2
Nutmeg	8	3
Pepper		
– black	7	=5
–white	5	=5
Turmeric	12	9
Vanilla	1	12

Care must be taken in interpreting the Table. Mace has the second highest price of the spices but has a low ranking for variability. But mace cannot be produced without harvesting nutmegs which have a favourable ranking for price variability but a comparatively poor ranking for actual prices.

The decision as to the relative merits of price levels and risk must be taken in the context of each South Pacific country.

Changes in Market Destinations

Spices having only a few importers have a great impact made on them when some of those importers reduce demand. Where importers' altered demand has had major adverse effects is evident in cloves from Indonesia.

This is not to say that the market has disappeared totally. Rather, with the removal of the main outlet suppliers now depend on just a few markets.

Unfortunately the indications are that few other countries are increasing their demand to add alternate market outlets for these products.

Thinness of the Market

Oligarchical structures dominate the spice industry on both the supply side and the demand side.

Spices which depend upon a few countries for the bulk of their trade are: cassia, North America; cinnamon, Mexico; pepper, United States, Western Europe.

Potential Changes

For some spices positive changes in importing countries could have major effects upon their prospects. The changes considered are likely to be induced by legislation and not be market led: turmeric : most western countries; vanilla, Western Europe.

Turmeric changes will relate to health aspects and will involve foodstuff dyes whilst vanilla changes will relate to labelling laws. Changes to the former are considered more likely than changes to the latter.

Organised Marketing

Some spices have their marketing better organised than others. The organisation occurs at two levels: at the domestic export level, and internationally.

Domestic Exports A number of countries have organised the exporting of their spices. Several issues flow from this:

- ability to negotiate with own government, e.g. success of India in having its government boost assistance to the industry;
- ability to negotiate with external organisations for the promotion of their industry internationally e.g. India having the International Trade Centre fund market development of cardamom;
- financing of promotion in importing countries, e.g. promotion of pimento in the United States by the Jamaican Government Clearing House;
- negotiation of international marketing agreement, e.g. Grenada Cooperative Nutmeg Associations joining with Indonesia's ASPIN.

International Organisations A number of spice exporters have formed international marketing organisations. Although with varying objectives, they all seek to increase the price of their products. Described variously, the perception they evoke in the market place is one of a cartel. They exist for pepper, nutmeg and mace, and vanilla.

Their success at enforcing price and export levels varies but generally their record has been less than encouraging. However, they appear to have some success at setting standards which make it harder for new entrants to penetrate the market. On the other hand they have raised the ire of users who see cartels as commercial blackmail.

One result has been for users to actively encourage alternative origins in a series of innovative

'sweetheart' arrangements. It must be said that one must doubt such long-term marriages once the cartel has been broken.

Outlet for Product

Different spices have varying market uses. The fewer the number of uses then the more subject that spice is to market reversals. The following indicates broadly the number of uses for the spice: cardamom, few; chillies, many; cassia, many; cinnamon, few; cloves, few; ginger, many; nutmeg, few; mace, few; pepper, many; turmeric, many; vanilla, few.

Overall Prospects

Table 9.3 combines the various rankings and scores devised in Chapters 6 and 9.

It takes the rankings from the previous Tables and converts them to a score by taking their reciprocal. Scoring is based on 10 with a high score being a positive attribute. Since the rankings were of poor attributes then a comparatively high ranking, such as Tabasco-type chillies having the highest labour requirement (see table 6.2) becomes the lowest score of 1. Previous scores, such as affinity with traditional agriculture (Table 6.4), which were on a '1,2,3,' basis, become 10, 6 and 1.

Mace and nutmeg are considered synonymous. No distinction is drawn between black and white pepper.

Table 9.3 illustrates well the story of vanilla. Vanilla has the highest direct marketing score but a comparatively low indirect marketing score. The two scores go some way to explaining the failure of the vanilla industry to take off in Tonga.

Final Views

Table 9.3 confirms some general comments by the trade in New York, London, Singapore and Australia. It also aligns with the opinions of non-trade but extremely well informed officers of the International Trade Centre in Geneva and the Overseas Development Natural Resource Institute in London. In succinct form these views were:

- avoid cloves because of Indonesia;
- mace and nutmegs have quite limited prospects;
- cassia, cinnamon, cardamoms and vanilla have limited prospects but these are less limited than those of mace and nutmegs;
- pepper and turmeric have good prospects
- chillies and dried ginger prospects lie between those of cassia, etc., and those of pepper and turmeric.

Table 9.3. Spices prospects.

Criteria	Card.	Cass.	Chil.	Cinn.	Clov.	Ging.	M&N	Pep.	Turm.	Van
Direct Marketing										
Price height	9	7	3	4	8	2	5	6[a]	1	10
Price variation	1	9	6	8	3	5	2	4[b]	7	10
Outlets[c]	5	10	10	5	5	10	5	10	10	5
Indirect Marketing										
Labour	10	–	1	–	–	3	–	7	5	8
Commitment[d]	2	2	2	3	6	2	6	10	2	2
First Harvest	8	6	10	6	3	10	3	8	10	6
Harvest Period	10	8	10	8	10	9	8	10	10	10
Longevity[d]	7	1	10	8	1	10	1	5	10	7
Affinity[d]	10	2	6	2	2	10	2	2	10	2
Feral Material[d]	10	10	2	6	10	2	6	10	2	10
Inter-cropping[d]	10	6	10	6	2	10	2	6	10	6
Processing[c]	5	10	5	10	10	10	10	10	5	5

[a] Average of scores of 7 and 6, see Table 9.2.
[b] Both ranked 5.
[c] "Many" scores 10, "few" scores 5.
[d] High scores 2, medium scores 6, and low scores 10. See Tables, 6.2, 6.4, 6.5, and 6.6

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