MAKING MONEY FROM FRESH FOOD IN THE KAINANTU AREA
2. GROWING AND MARKETING FOOD CROPS

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INTRODUCTION

This article describes the growing and marketing possibilities for individual root crops, fruit and vegetables in the Kainantu area. Special mention will be made of seasonal differences in supply. The general rule is to plant when most other growers are not planting. This usually means planting from February to September. In the Kainantu District, irrigation may be necessary in the driest months (June, July and August). In general, yields will be lower than those from plantings made at the beginning of the wet months (October to December). The advantage of out-of-season planting is that the grower can benefit from higher prices and easier sales.

ROOT CROPS

Sweet potato

Sweet potato will grow well anywhere in the Kainantu area. Best results are obtained on well-drained soils.

Supply is not very seasonal, but it can be interrupted especially in a drought. The lowest supply is usually from October to February. Large growers should plant from February to June to take advantage of this. Any grower who plants sweet potato on a heavy wetter soil during a severe drought is almost certain to make a lot of money when he harvests the crop. Further information is given in articles by Akus (1982) and Bourke (1982b).

Marketing has to be done directly to the consumer, e.g. Kainantu High School will take up to 2 tonnes/week. Central Highlands Food Co-operative and Niugini Produce Marketing did not take sweet potato at the time of writing.

Profit margins for the grower are much less than for most of the other crops discussed here.

Potatoes and sweet potatoes for sale in a highlands market. There is very good potential for further production and marketing of potatoes. More sweet potato could be sold to institutions in Kainantu itself.

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The advantage of sweet potato is that it is almost problem free in the Kainantu area, yields are reliable from crop to crop, and highlanders are very familiar with growing it.

Potato

Potatoes do better at higher altitudes (above 1600 m) and on well-drained soils.

It costs about K2000 to grow a hectare of potatoes with mechanical cultivation. At a yield of 20 tonnes/ha and a selling price of 30 toea/kg in Lae, this leaves a margin of K4000 per hectare for transport, overheads, management. Clearly potatoes are very profitable. At the moment, lack of planting material is the main problem. If the seed supply was available, the market demand could be supplied, but other problems would then appear.

The first problem would be seasonal oversupply. Potatoes are in best supply in January, February and March and there are even too many in some years for short periods. From May to about July the supply is very low. The situation then becomes more variable from year to year. Usually a second smaller flush occurs in August to October. In some years there is a second period of low production in about November-December. In other years production continues to rise to the new flush in the new year. This seasonality of supply can be broken by extra plantings in February to April or May.

The second problem for the growers would be that prices would drop, though even at 20 toea/kg potatoes are a very profitable crop. It can be noted that Australian potatoes can often be landed in Papua New Guinea for less than locally produced potatoes (25 to 35 toea/kg for imported potatoes). If prices fall, the Kainantu grower has a better chance of making a profit than a grower from Western Highlands or Enga who faced higher transport costs.

Information on the present supply and demand is summarized in Table 1.

The Kainantu area is well supplied. 4.5 tonnes/week are imported into Lae. Provincial Enterprises would buy 15 tonnes /week at 20 toea/kg. Central Highlands Food Co-operative would buy 10 tonnes/week at 20 toea/kg. Other outlets are Buambub Plantation, Lae; Kainantu Service Station; and KES Holdings in Lae.

Large scale commercial production is not likely in the Wau area because of the lower altitude. The Kainantu area is thus well placed to become a major supplier of potatoes. Information on growing potatoes is given in the article by Siki (1979).

Onions

All the large buyers are prepared to take large quantities of onions, e.g. Central Highlands Food Co-operative and Niugini Produce Marketing.

Despite the large market demand, almost no onions are grown locally in Papua New Guinea, except at very high altitudes (above 2500 m). Experimental crops in the highlands and near Port Moresby have yielded well. If yields of 15 tonnes/ha could be achieved, onions would be quite profitable at a selling price of 30 toea/kg.

The best places are those with a dry season each year, as drier weather is needed for the maturing crop. The Arona Valley and places near Kainantu

TABLE 1. APPROXIMATE SUPPLY AND DEMAND OF POTATOES TO SOME COMPANIES AND INSTITUTIONS IN KAINANTU, MARKHAM VALLEY AND LAE (MARCH, 1983).

Company/Institution	Stated requirements (kg/week)	Present supply: Imported (kg/week)	Present supply: Local (kg/week)	Price paid for local potatoes (toea/kg)
KAINANTU AREA (1)				
Aiyura National High School	750	0	750	30
KKB supermarket, Kainantu	100	0	100	25-30
SIL supermarket, Ukarumpa	200	0	200	35-40
Ayaho store, Kainantu	150	0	150	30
KSS kiosk, Kainantu	1500	0	1800 (2)	30
Dillingham mess, Kainantu	100	0	100	35
Kainantu Lodge	80	0	80	30
LAE/MARKHAM (3)				
Niugini Produce Marketing	4500	0	4500	30
Lae Fish Supply	1650	1650	0	-
Topspot Food Bar, Lae	1500	1500	0	-
Buambub Plantation (Donegan's store)	1350	1350	0	35
The Wok, Lae	1100	0	1100	35
Provincial Enterprises	15000	0	1300	35
Ampan Development Co., Mutzing	700	0	700	30-40
Take Away Food Bar, Lae	50	0	50	40
KAINANTU TOTAL	2880	0	3180	25-40
LAE TOTAL	25850	4500	7650	30-40
KAINANTU AND LAE TOTAL	28730	4500	10830	-

1. *The average price of potatoes at SIL and Kainantu markets was 27 toea/kg in 1981-1983.*
2. *KSS buys more than their requirements. The surplus goes to Ramu Sugar.*
3. *KES Holdings will pay 30 toea/kg for highlands potatoes in Lae, but were not buying potatoes at the time of the survey. Other buyers of highlands potatoes in Lae are the larger supermarkets.*

seem suitable for onions. They should be planted between April and July so that the crop grows and matures in the drier period of the year.

The choice of variety is important, because only short day varieties are suitable for Papua New Guinea conditions. Hunter River Brown has done well at Aiyura and Hunter River White at Kuk in the Western Highlands. Yellow Granex F1 and Texas Early Grano are the varieties for the Port Moresby area (Bull, 1983). These varieties could be tried at lower altitude locations, such as the Arona Valley.

Commercial production of onions needs experimentation before a large industry could develop. With suitable varieties planted at dryer locations, an industry could develop in the Kainantu area. For further information see article by Bull, Blackburn and Voight (1983).

Taro

Taro is very expensive in the highlands. For example it sells for about 80 toea/kg in Goroka market. It grows best on very fertile soils high in organic matter and nitrogen. It does best at lower altitudes (below 1400 m).

For people who have access to forest land at lower altitudes, such as the area to the south of the Arona Valley, it could be a profitable crop. At this altitude taro blight is absent. For others it is possible to get very high yields by placing coffee pulp or compost around the growing plants. Marketing would have to be through local markets to obtain the best price. See the article by Rangai (1977) for further information on taro.

Yams

Yams are an important subsistence crop in the Kainantu area, although only small quantities enter the local markets. They grow best below 1600 m and require well drained soils with a good texture. They are a crop of the grasslands. Hence they are well suited to areas such as the Konkua area. Prices and yields are both fairly high, but yams are a labour intensive crop because they need staking and weeding. Yam production for sale in highlands markets would be quite profitable. Varieties of the greater yam *Dioscorea alata* are most suited to the Kainantu area.

CITRUS

Oranges and mandarins

Oranges and mandarins grow best in Papua New Guinea between 800 and 1400 metres. The other important requirements are well drained soils and not too much cloud cover. Parts of the Arona Valley and the areas to the south (Binumarien-Arau) are well suited to oranges and mandarins. Already mandarins are a very important cash crop for some Gadsup and Binumarien people.

In Kainantu, large quantities of mandarins are sold in local markets during the season (May-July). All of the large wholesale buyers of fresh food would take large quantities of oranges and mandarins.

Gross returns for oranges of K4000 per hectare could be expected (16 tonnes/ha/year yield; 25 toea/kg wholesale price). For mandarins it would be less (K2500/ha at 10 tonnes/ha/year and 25 toea/kg). For growers selling mandarins directly in the fresh food markets, returns would be much higher (K5000 per ha at present Kainantu prices). These returns compare very favourably with coffee.

The main season for both oranges and mandarins in the Kainantu area is in May, June and July. Orange production is spread throughout the year, whereas mandarins are more seasonal. It may be possible to extend the season by the use of a mixture of varieties.

Attention should be given to use of suitable rootstock/scion combinations; foliar spraying with zinc and possibly iron fertilizer; control of pink and white wax scale; and possibly artificial ripening of fruit. If this were done, possibilities for a large scale orange and mandarin industry at lower altitudes in the Kainantu area would appear very favourable. See the article by Bourke and Tarepe (1982) for further information on citrus production.

Grapefruit, limes and lemons

These three types of citrus all grow well in the Kainantu area. They are imported into Papua New Guinea in limited quantities. Grapefruit and limes grow best below an altitude of 1400-1500 m. Lemons are suited to higher altitudes than the other citrus species. The demand for these three types is much less than the demand for oranges and mandarins. The Lae market is fairly well satisfied. Many other lowlands markets are undersupplied.

CHFC would buy more of all three types of fruit. Madang still imports its supply of the three types.

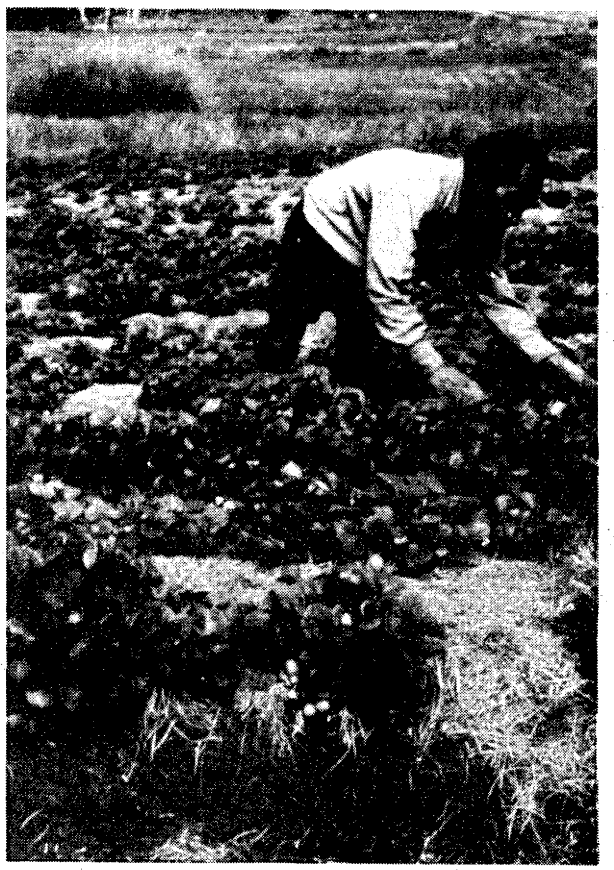
Horticulturist Tevo Tarepe with a pineapple crop at Aiyura. There is a demand for more pineapple fruit in highland and lowland centres. Pineapples are suited to warmer parts of the Kainantu District. They are easy to grow and are a profitable crop, especially produced out-of-season.

OTHER FRUIT

Information about growing and marketing possibilities for some other fruits in the Kainantu area is given in Table 2.

VEGETABLES

See Table 2 for information about vegetables. All highland vegetables are in short supply at the Ramu Sugar township and in Madang. This is not mentioned for each crop. Information on vegetable growing is given in papers by Anderson (1976), Bull (1983), Dever and Voight (1976) and Bull, Blackburn and Voight (1983).



A well managed crop of strawberries. There is a good demand for strawberries in lowland towns. Packing and handling of fruit must be done very carefully.

PROBLEMS

A number of problems could stop the fresh food industry reaching its full potential.

These are:

1. The market is fairly small for many items and it is easy for it to be under or oversupplied. Hence the

TABLE 2. PRODUCTION AND MARKETING POSSIBILITIES FOR SOME FRUITS AND VEGETABLES IN THE KAINANTU AREA

	Production	Marketing possibilities	Notes
FRUIT			
AVOCADO	Does well on well-drained sites below 1600 m. Best production February-April.	Provincial Enterprises (PE), Lae; Central Highlands Food co-operative (CHFC), Mt. Hagen.	Fruit are often picked too green. Limited potential only.
BANANAS	'Cavendish' type grows well in Kainantu area. Assume 1 bunch per clump every 2nd year at 100 fruit per bunch.	Aiyura National High, and Kainantu Schools would buy more.	Can be artificially ripened (see Tarepe, 1982). For more information on growing, see Heenan (1976), and Bourke (1982a)
GUAVA	Best quality fruit grows at 1400 m or under. In highlands April-May is best season.	SIL market is undersupplied with good quality fruit.	
PASSION-FRUIT	Grows well everywhere in the District. Leaf spot disease can be a problem on large blocks. Most fruit ripen in January-March.	High demand for highland purple passionfruit in the lowland centres. Niugini Produce Marketing (NPM) and CHFC will take more.	Best grown at low density climbing on casuarina trees.
PAWPAW	Good quality pawpaws grow in lowlands and up to 1400 m. Arona Valley is suitable.	There is demand at SIL and Kainantu markets.	It would be better to bring fruit up from Markham Valley.
PINEAPPLES	Best rough leaf pineapples 500-1200 m; best smooth leaf, below 1500 m. Good potential at lower altitudes in Kainantu area. Best supply is between Nov. and March, but varies from year to year. Out-of-season production possible using Phymone applied between October and April.	In short supply in highland centres and Lae. Highest prices April-November. Out-of-season fruit would sell easily on retail and wholesale markets.	For more information on production, see Bourke (1976a,b). A trial at Aiyura by T. Tarepe yielded 61 tonnes/ha in 4½ years after planting.
STRAW-BERRIES	Grow best at 1600 m and above, on fertile soil. Variety 'Redlands Crimson' has done well in trials at Aiyura, but not in commercial plantings near Okapa (1800 m).	Kainantu well supplied. All lowland markets undersupplied. Wholesalers in Lae and Mt Hagen will buy more. Wholesale price is K2 per kg. The retail price is much higher.	Packing and handling are very important. Must be picked early morning, packed in punnets and transported immediately in cartons. See Tarepe (1979).

TREE TOMATO	Do well on well-drained soils in all areas. Main supply March-April, but trees fruit all year.	Limited market in lowlands. PE, Lae will buy more.	
BLACK RASPBERRIES	Good quality fruit is produced at lower altitudes, e.g. in Arona Valley.	Arona Valley produce could sell at SIL, Ramu Sugar and elsewhere.	Markets are not certain
CHERRY GUAVA	Grows well around Kainantu.	Possible lowlands markets.	
NARANJILLA	Grows well on well-drained soils at Aiyura.	Easily sold at SIL market.	A new fruit in the highlands. See Tarepe (1982a).
VEGETABLES			
BEANS	Grow everywhere in Kainantu area. Production not seasonal.	PE, Lae, and CHFC, Mt. Hagen will buy more.	
BEETROOT	Grows best above 1600 m.	Limited demand at SIL, NPM, Lae and CHFC, Mt. Hagen.	
BROCCOLI	Grows best above 1600 m, but will grow anywhere in District with suitable varieties. Insect pests less serious at higher altitude. Best supply Sept. - December.	Large demand at SIL & Kainantu markets and the lowlands. All large buyers will take more.	Should be promoted as a cash crop.
CABBAGE	Grows everywhere in area. Diamond-back moth is less of a problem at higher altitudes.	Most markets are oversupplied. Ramu Sugar could take more.	See Thistleton (1982) for details about Diamond-back moth control.
CAPSICUM	Grows best well below 1500 m in Kainantu District. Supply reduced March-September.	In short supply in Kainantu. PE, Lae will take up to 500 kg/week.	
CARROTS	Grow everywhere, but better above 1600 m. Soils should be well-drained, not too fertile. Supply variable, not seasonal.	Often in short supply at SIL. Always short in Kainantu and coastal towns. NPM would buy up to 500 kg/week; CHFC state they would buy up 200 kg/week.	More should be planted for sale. The fungal disease *Alternaria* reduces yield. Commercial growers can control by dusting seed with 2 teaspoons of thiram or captan per kg seed; then spray seedlings with thiram or captan at 30 g per 15 litre knapsack of water, every 5 days.

TABLE 2. - Continued

	Production	Marketing possibilities	Notes
CAULIFLOWER	Grown mostly at above 1800 m, but suitable varieties can grow anywhere. Best supply is in August-November.	A demand in Kainantu and Lae. CHFC could take a lot more each week.	Choice of variety is important. The Takii varieties, Extra Early Nozaki and Snow Queen are best. Others are Snow Peak and 45 days.
CELERY	Grows anywhere in Kainantu area. Best results at 1600 m or above. Preferred product is crisp (snaps easily if bent) and white. This is obtained by adding manure or compost to the soil, and placing a length of bamboo over the growing clump. Production is not seasonal.	A demand in Kainantu area and lowlands. Provincial Enterprises and CHFC will buy celery.	Product grown now tends to be too stringy and green. There is a large market for good quality celery.
CHINESE CABBAGE	Grows everywhere in the District. Weakly seasonal with best supply July-October.	Some demand in the lowlands (CHFC).	
CHOKO FRUIT	Grows well every where in the District. Best supply Feb.-March.	Small, unsatisfied demand in Lae (NPM).	
CORN	Grows everywhere in the District. Best supply Jan.-March. Growers should plant April to August to supply off-season.	More could be sold at SIL market and Aiyura National High School.	Expatriate market requires very tender corn.
CUCUMBERS	Grow well anywhere below 1700 m. Best supply Dec.-Feb. Out of season planting between Feb. and Sept. are possible.	In August-Sept., prices in Goroka can be 3 times the in-season prices. PE and CHFC will take more.	
EGG PLANT (Aubergine)	Suited to warmer places below 1500 m. Best supply Dec.-Feb.	Little demand apart from Ramu Sugar township.	
LEEKS	Do best above 1700 m.	CHFC would take 200 kg/week.	
LETTUCE	Grows anywhere in Kainantu area on well drained soils. Lowest supply January-May.	Demand in lowland towns. PE say they will take 2000 kg/week, NPM 1000 kg/week.	Handling is a problem. Lettuces should be packed in cartons, not bags.
MINT	Grows well everywhere.	PE would buy a regular small supply.	

NASE/MOKU	Grows well everywhere.	Some sold to highlanders living in lowlands. More could be sold.	
PARSLEY	Grows well in the District.	PE would take 100 kg/week.	
PEAS	Grows best at above 1900 m.	Could be sold in Kainantu and lowlands.	
PUMPKIN	Grows well everywhere. Best supply December-March.	Market oversupplied. CHFC would buy Queensland Blue, not local types.	
RADISH	Grows well in the District.	CHFC would buy 300-400 kg/week of Fireball (round, red variety).	
RHUBARB	Grows well everywhere. Best above 1700 m. Reduced supply June-Oct.	Kainantu oversupplied, CHFC would take more.	
SILVERBEET	Grows well everywhere in the District.	PE would take 500 kg/week, CHFC 300-400 kg/week.	
SPRING ONIONS	Grow well anywhere in Kainantu area.	Small demand in Lae; PE would take up to 200 kg/week.	
TOMATOES	Grow best at under 1500 m. Suited to dryer Arona Valley. Peak season Jan.-March. Lowland production difficult at this time.	Kainantu and Lae would take more. NPM, PE and CHFC would each take up to 1000 kg/week more.	Quality of most fruit sold locally is poor.
TURNIPS	Grow anywhere in District.	PE would take limited quantity regularly.	
ZUCCHINI	Do best in dryer places (e.g. Arona Valley).	All wholesalers will take more small zucchini.	Most zucchini are allowed to grow too big.

Abbreviations used in this table: *CHFC - Central Highlands Food Co-operative, Mt. Hagen*
NPM - Niugini Produce Marketing, Lae
PE - Provincial Enterprises, Lae
SIL - Summer Institute of Linguistics, Ukarumpa

figures that the large companies claim they would buy need to be treated with caution. This is less true of the foods that Papua New Guineans eat, such as sweet potato, oranges, mandarins or local greens. However the market is not fixed. It expands as production expands and especially if prices are at reasonable levels.

2. Poor handling and inadequate transport is a major problem at the moment.

3. Some of the produce has a poor appearance because there is little chemical control of pests.

4. Growers often have unrealistically high expectations for prices.

5. Some consumers are unwilling to use locally grown food because the supply of imported food is usually more reliable and sometimes cheaper.

6. There is often a poor supply of seed of suitable varieties in stores; or no seed at all of certain popular vegetables.

7. There is no wholesale buyer of fresh food in Kainantu. Small growers face very high transport costs in getting their food to markets in the lowlands because PMV owners charge high prices to transport produce. Until a system of wholesalers is developed, the small grower will always be disadvantaged.

Didimen inspect a small commercial crop of lettuce in a village in the Aiyura Valley. There is a good demand for more broccoli, carrots, cauliflower, celery, lettuce and tomatoes in most centres.

CONCLUSIONS

Growing and selling fresh food is already a significant industry in the Kainantu area. The area is well situated to benefit from expansion of this industry. Potential for expansion is very good for oranges, mandarins, potatoes, pineapples, carrots and tomatoes. There are small markets for broccoli, cauliflower, celery and almost all other vegetables. Onions may also be a large future industry. Support is needed at many levels so that this expansion can occur.

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