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Strategies for the Development of a Competitive Pyrethrum-based Pesticide Sector in Kenya

A study financed by the Commonwealth Secretariat

FINAL REPORT

Prepared by Natural Resources Institute

July 2002



**Natural
Resources
Institute**



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Strategies for the Development of a Competitive Pyrethrum – based Pesticide Sector in Kenya

Final Report

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Acronyms and abbreviations

AEC	African Economic Community
AEZ	Agro-economic zone
Aventis	Aventis Crop Science Kenya Limited
Bayer	Bayer East Africa Ltd
BCC	PBK's collection centres
CBK	Central Bank of Kenya
Coil Products	Coil Products (K) Ltd
COMESA	Common Market for East and Southern Africa
CTB	Central Tender Board
DGB	Duncan Burnett
EAC	East African Community
EPC	Export Promotion Council
EPZA	Export Promotion Zone Authority
EU	European Union
FCS	Farmers' Cooperative Societies
GDP	Gross Domestic Product
GF	Graham Farrell
GOK	Government of Kenya
ICI	Imperial Chemical Industries
IPC	Investment Promotion Centre
IPM	Integrated Pest Management
JW	Johnson Wax
KACA	Kenya Anti-corruption Authority
KAM	The Kenya Association of Manufacturers
KAPI	KAPI Limited
KARI	Kenya Agriculture Research Institute
KCC	Kenya Cooperative Creameries
KIPPRA	Kenya Institute for Public Policy Research and Analysis
Kshs	Kenya shillings
MK	Mary Kiiru
MOA	Ministry of Agriculture
MOF	Ministry of Finance
MRL	Maximum residue level
MTTI	Ministry of Tourism, Trade and Industry
NDP	Eighth five year National Development Plan: 1997
NIC	Newly Industrialised Country
PBK	Pyrethrum Board of Kenya
PCPB	Pest Control Products Board
PGA	Pyrethrum Growers' Association
POPS	Persistent organic pollutants
RB	Reckitt Benckiser East Africa Limited
Sara Lee	Sara Lee Household and Body Care Kenya Ltd
SHG	Self help groups
Stanbic	Stanbic Bank Kenya
TBA	To be advised
TCI	Twiga Chemical Industries Ltd
Tegemeo	Tegemeo Institute of Egerton University

TOR	Terms of Reference
UN	United Nations
UV	Ultra Violet
WRI	World Resources Institute
WTO	World Trade Organisation

EXCHANGE RATES

Kshs/US\$ 1 = 78/1

Kshs/£1 = 110/1

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EXECUTIVE SUMMARY

Introduction

At the request of the Ministry of Tourism, Trade and Industry (MTTI) of the Government of Kenya (GOK), the Export and Industrial Development Division (EIDD) of the Commonwealth Secretariat agreed to fund, in 2000, a technical assistance study on the global competitiveness of the Kenya pyrethrum-based pesticide industry. A consultancy team from the Natural Resources Institute (NRI), University of Greenwich, UK were contracted to carry out the study with the assistance of officers from MTTI.

The final report incorporates the consultants' findings arising from field trips to Kenya between November 2000 and May 2001, UK based desk studies, and the conclusions and recommended action plan agreed at a stakeholders workshop held in Nakuru, Kenya on the 11th and 12th February 2002.

The consultants experienced some constraints to their research as certain key information regarding production forecasts, costs of pyrethrum product production, sales prices and details of overseas buyers, requested from the Ministry of Agriculture (MOA) and the Pyrethrum Board of Kenya (PBK) were not forthcoming. Additionally, certain sensitive global information regarding the pyrethrum market in terms of prices and competition from multinational companies was difficult to obtain. The difficulty of obtaining information is, perhaps, indicative of the potential profit margins available in the pyrethrum sub-sector. However, notwithstanding the above constraints, the consultancy team was able to obtain sufficient information to make recommendations on the future of the Kenyan pyrethrum sub-sector

The Global Pesticide Market and the Role of Pyrethrum

Pyrethrum, traditionally used as an insecticide, is an ideal pesticide in the current environmentally conscious climate. The trend away from synthetic ingredients in pesticide formulations in favour of natural plant derived products has increased interest worldwide in pyrethrum.

The global market for pesticides is valued at around US\$ 28 billion (2 million tonnes of active ingredients), whereas the world market for pyrethrum-based pesticides is estimated at US\$ 100 million, based on a current demand of the processed product equivalent to about 20,000 tonnes of dried pyrethrum flowers. These figures are approximate, as up to date accurate figures are still unavailable. However, the available data illustrates the relative insignificance of the pyrethrum sector in global pesticide market terms.

Pyrethrum production worldwide is currently around 12,000 tonnes of dried flowers and the trend in recent years has been for declining production. Therefore, the current excess of demand over supply, together with the worldwide trend away from synthetics, augurs well for pyrethrum's future. Furthermore, research and development into diversification of the usage of pyrethrum, beyond the traditional domestic insecticide sector, would greatly expand market demand for the product.

Current world pyrethrum production is centred on the East African region of Kenya, Rwanda and Tanzania, which accounts for around 90% of global output, and 85% of

exports. The only other significant producer and exporter is the Australian state of Tasmania, a relative newcomer to the market.

Kenya, as the world's largest producer, and the only country in the East African region with long established processing facilities and a well established international market for its products, is in an excellent position to take advantage of the current global interest in pyrethrum.

Value Addition to Processed Pyrethrum Products

Traditionally, in Kenya, dried pyrethrum flowers have been processed into pyrethrum extract, pyrethrum powder and the residue of the process known as marc. These products, particularly extract and powder, have, in the main, been exported to overseas buyers where they are used, primarily, in insecticide formulations and marketed as branded products in aerosol and mosquito coil form.

For a number of years, there has been an attempt to add value to the country's pyrethrum production by manufacturing insecticide products in Kenya. Whilst the bulk of Kenya's mosquito coils are still manufactured locally, both for the domestic market and export, the local manufacture of aerosol insecticides has all but collapsed over the last four years.

Some of the country's leading aerosol insecticide brands (eg, *Doom, Raid, IT*), accounting for around 75% of the market, were, until relatively recently manufactured in Kenya, either directly by the multinational brand owning companies (eg, Reckitt Benckiser, Johnson Wax and Sara Lee), or under license. These leading brands are now imported from Australia, Belgium, Indonesia, Malaysia, Netherlands and South Africa. The only brand now containing pyrethrum products is Johnson Wax's "Raid". An informal supermarket survey located only one brand manufactured locally, under license, and containing pyrethrum products ("Bolt").

The main reasons given by multinational companies and local companies, manufacturing under license, for the collapse of local insecticide aerosol manufacture are:

- Unavailability and irregularity of adequate supplies of pyrethrum products from the Pyrethrum Board of Kenya (PBK), whereas pesticide formulation requires the long term, guaranteed and regular availability of established active ingredients.
- The high cost of manufacture in Kenya, particularly with regard to meeting global factory safety standards. However, TWIGA, a leading domestic contract manufacturer and former Imperial Chemical Industries (ICI) facility is committed to invest in upgrading its factory to meet such standards.
- Competition in the marketplace from cheap imports.
- The current duty structure, whereby imported aerosol components attract duty at levels ranging from 10% for tinplate to 35% for inks and varnishes, plus VAT at 18% on the locally manufactured product. In comparison, finished imported aerosol insecticides attract duty at a flat 15% (since January 2002) with no VAT applicable.

- Multinational sourcing policy, whereby global aerosol insecticide brands are sourced from the cheapest origin available, and manufacturing is concentrated where costs are low, due to economies of scale and other factors.

Of the brand leaders, only Reckitt Benckiser, with around 48% local market share indicated that they would return to local manufacture if the availability of pyrethrum improved significantly and the duty structure changed to encourage local industry.

With regard to mosquito coils, around 75% of the domestic market is covered by products manufactured locally, the balance being imported from India, China and Indonesia. Whilst the three local manufacturers use pyrethrum products in their coil formulations, the lack of adequate supplies from the PBK have necessitated the import of synthetic pyrethroids from Japan.

Kenyan Pyrethrum Production

Kenyan pyrethrum production declined from around 18,000 tonnes in 1992/93 to a low of 4000 tonnes in 1998/98, however, production recovered to around 7000 tonnes in 2000/2001. Current indications are that this upward trend will continue, provided that the improved marketing systems, including prompter payment to farmers, introduced by the PBK, continue. The main reasons for the decline of production in the 1990's were:

- Adverse weather conditions
- ethnic clashes
- low profitability, due to the high cost of inputs and low yields resulting in high unit costs of production
- the labour intensive nature of pyrethrum production and harvesting
- competition from alternative crops and enterprises
- unavailability of suitable high yielding planting material and inadequate extension services to farmers.
- inadequate marketing arrangements leading to exploitation by middlemen and poor prices to farmers.

Conclusions

The development of the Kenyan pyrethrum-based pesticide industry and its global competitiveness is constrained, in the first instance, by the lack of adequate supplies of pyrethrum products to local manufacturers. Adequate supplies have not been available in recent years due to:

- The decline in pyrethrum production.
- The marketing policy of the PBK whereby overseas export client requirements have been satisfied before those of local manufacturers. This situation is the reverse of that in many countries that produce a raw material with both a local and

export demand. Normally, local demand to encourage industrial development would be met as a priority and only surpluses made available for export. An explanation given for this situation is that: (1) the PBK has long-term contractual commitments to fulfill with established long term buyers, whereas local manufacturers are ad hoc purchasers (2) until recently local manufacturers were offered discount prices, which impacted negatively on the PBK's profitability.

- Lack of incentives for growers.
- The monopoly exercised by the PBK over the licensing, purchasing, processing and marketing of pyrethrum is considered by some stakeholders, particularly local manufacturers and farmers, to be a disincentive to investment in the sub-sector.
- The GOK policy on the duty structure, which favours imports over locally manufactured products, acts as a disincentive to investment.
- Despite current trends towards natural products as active ingredients in pesticide formulation, most multinationals still prefer synthetics, particularly in view of their lower cost and reliability of supply.
- Multinational manufacturers of leading pesticide brands do not view Kenya as a single market, but rather as part of the global market for insecticides and source active ingredients from wherever supplies are cheapest. However, this situation could benefit locally owned industries as, given a favourable investment climate, Kenya could develop into a regional manufacturing centre for pyrethrum-based pesticides.
- Further research and development could diversify the range of products using pyrethrum and expand the market. Local manufacturers have criticised the Pest Control Product Board's (PCPB) slowness in approving new products, whereas the PCPB counter that, invariably, insufficient research has been carried out before application to warrant approval of a new product. (The PCPB is the statutory body responsible for the accreditation and license of new pesticides in Kenya.)

Section 7.2 contains more details on the consultants' findings.

Recommendations

Section 7 contains details of the recommendations and action plan for the future of the Kenya pyrethrum sub sector, agreed by a consensus of stakeholders at the workshop held in Nakuru on the 11th/12th February, 2002. It must be emphasized that the revision of the Pyrethrum Act is an essential feature of the recommendations and action plan summarised below.

Measures to Increase Pyrethrum Production

In order for the Kenyan pyrethrum industry to develop and flourish, it is important to improve and increase farmer incentives to grow and expand the area under the crop. Detailed recommendations are contained in section 7.3 and the key areas that require improvements are summarised as follows:

- Improved availability of suitable planting material and increased on farm R&D:
- Provision of credit for agricultural inputs from the PBK and financial institutions
- Improved marketing arrangements through the strengthening of farmers groups, reduction of middleman activity and increased competition between buyers of pyrethrum flowers.
- The improvement of agricultural extension services.
- The improvement of the profitability of the pyrethrum enterprise through better net prices to farmers.
- Expansion of the country's pyrethrum production area.
- The encouragement of commercial farming of pyrethrum with a view to establishing a flourishing smallholder and estate sector similar to that prevailing in the Kenya tea industry.
- An improved policy environment through a thorough review of the Pyrethrum Act to enable greater flexibility, competition and farmer involvement in sales and marketing

Measures to Assist Infant Industries in the Sub-sector

A review of the relevant legislation to enable greater competition and flexibility for users of pyrethrum flowers and products, including the encouragement of the import of dried flowers from other regional producers and "toll" processing by the existing PBK facility.

Improved R&D into expanding usage/developing new products based on pyrethrum that can be competitively manufactured in Kenya

The improved availability of short term (working capital) and long term (investment) finance to both existing and start up ventures in the sub-sector. A broad spectrum of the financial sector should be encouraged and engaged by the GOK and stakeholders in this context.

The PBK to give priority to supplying the domestic industry, but at international prices, ie without discount as in the past.

The Institutions mentioned in 2.4.1 below should increase support to the sector in export promotion and marketing strategy assistance.

Policy Measures to Increase Competitiveness

The following policy measures should be taken in the immediate and short term:

- A review of the Pyrethrum Act with a view to its amendment and possible abolition to reflect the realities of a liberalised domestic economy operating in a globalised world economy. Without this action, the potential for developing the sub-sector is severely constrained.

- The implementation of stricter anti-dumping measures against cheap imported substitutes, particularly mosquito coils, from Asia. Linked with this action and in the context of cheap imports, the strict enforcement of the Kenya Standards Act and the Customs and Excise Act should be monitored.
- The immediate reduction of import duty on imported aerosol raw material components such as inks and varnishes which remain at 35% (duty on valves, tinplates, cones and domes has been reduced to zero %) This course of action would assist domestic manufacturers to operate on a level playing field *vis a vis* imported finished products, which attract import duty at a flat 15 %.
- Vat at 18 % should be removed from imported components and local toll manufacturing services as, although VAT is recoverable, it ties up working capital and has a negative effect on cash flow.
 - The possibility of licensing the export of pyrethrum extract and powder should be investigated in order to ensure its priority availability to domestic manufacturers should be investigated.
 - The potential for increasing duty on finished aerosols to a minimum 25%.should be investigated. Duty was increased to 15% in December 2001, but this rise has not discouraged the import of finished products. However, the GOK's commitments to reducing tariffs under various international agreements such as COMESA and the WTO must be taken into account.

In the longer term, the following policy measures are necessary:

- Improvements to the country's infrastructure, particularly roads, power, water supply and telecommunications.
- Foster education in pest control subjects amongst the poorer sections of the urban and rural population, particularly malaria prevention measures, and initiate professional bodies and codes of practice in the sector.
- Foster, through workshops and training programmes, forward and backward linkages between different sectors involved in the pesticide industry, eg, agriculture, transport, packaging, fuel and processing with a view to expanding job opportunities and revenue earning potential.
- Build capacity at GOK level in the formulation and negotiation of international and regional trade agreements. Pursue a strategy to make Kenya a regional flower processing and value addition centre for pyrethrum.
- Foster greater cooperation and liaison between Government Departments, eg. MTTI, MOA and MOF, to ensure that overall national objectives, eg value addition, industrialisation and job creation, are given overall priority rather than narrowly focused departmental targets.

Strategic Plan to Make the Sub-sector Competitive

An effective strategy to develop the sub-sector will involve immediate/short term and medium/ long-term action.

Immediate action is necessary in order to preserve what remains of the domestic pyrethrum based industry. It was evident from discussions with the three domestic mosquito coil manufacturers in Nakuru and Nyeri and the major "toll" manufacturer in Nairobi (see 5.5.4) that urgent action is required in this context.

The following future action plan was agreed by a consensus of stakeholders at the Nakuru workshop (February 2002):

- The immediate enactment of legislation in the policy areas of import duty on finished insecticide product and imported components (see section 7 below)
- A Pyrethrum Council to be created to represent the stakeholders of the industry, with no Government involvement, elected entirely by industry representatives. The council should have no regulatory authority but will act as a voice for the industry in dealing with the GOK and such regulatory authorities as are eventually appointed.
- Industry regulation should proceed with the objective of minimizing Government regulations and establishing only enough control to ensure an orderly liberalization of the industry. The following phased approach is proposed:

(1) Immediate/short term:

In order too carry out deregulation and liberalization of the sub-sector in the most practical and effective manner, a representative industry-wide task force should be formed to work with:

- The main industry stakeholders – including growers and potential processors, the PBK, the MOA and KARI.
- Jointly, the above would develop a set of principles under which liberalization of the sub-sector could proceed in an orderly manner, learning from mistakes made in other sectors, where controls have been removed without allowing for the potential effects of liberalisation, particularly on farmers and new entrants.

These principles would be incorporated into a parliamentary paper to modify the relevant legislation and create a new, more appropriate, system of industry regulation. A Task Force could handle the issue of processing licenses to potential new entrants.

The duration of this phase is indeterminate; however, it would be the objective to carry out this phase of liberalization as quickly as possible, preferably within six months.

(2) Medium/longer term:

It is proposed that on completion of the essential tenets of liberalization, a lighter, more appropriate, mechanism for regulating the industry than the current system should be considered and the regulatory authority and role of the PBK considered. The PBK should revert to its traditional role as a farmer-owned processing company but in competition with other processing companies. The PBK should also develop services in "toll" processing of dried flowers and consider further value addition beyond its current product range of extract, powder and marc.

On achievement of its objectives, the Task Force should be disbanded and the Pyrethrum Council together with the GOK's appropriate ministries (eg MTTI and MOA) should, periodically, review the new regulations and make such recommendations as are necessary. The process should be ongoing in order to adapt to changing world economic circumstances.

1 INTRODUCTION

1.1 Background

At the request of the MTTI, the Export and Industrial Development Division of the Commonwealth Secretariat agreed to fund, in 2000, a technical assistance study on the global competitiveness of the Kenya pyrethrum-based pesticide industry. The NRI was selected to carry out the study and a multidisciplinary team, assisted by a local Kenya researcher, commenced fieldwork in Kenya in November 2000.

Pyrethrum (*Tanacetum cinerariifolium*) is a natural product whose flowers are dried, and from which chemicals known as pyrethrins are extracted and used in the formulation of insecticides. Pyrethrum is Kenya's fourth largest cash crop and the country is the world's leading producer. The crop is cultivated, at high altitude, by small scale farmers who are paid a fixed price, based on pyrethrin content, by the Pyrethrum Board of Kenya (PBK), which holds a monopoly on production, processing and marketing. Current production, at around 7000 tonnes of dried flowers p.a. has declined from a peak of around 18,000 tonnes p.a. in 1992/93, whereas world demand is increasing, as the product is considered both effective and environmentally sustainable. The GOK wish to facilitate the expansion of the pyrethrum sector by encouraging greater participation by smallholders in its production, and investment in downstream processing. The study, *inter alia*, recommends strategies, including the possible liberalisation of production and marketing, to benefit both small-scale farmers dependent on the crop for their livelihoods and domestic industrial expansion.

1.2 Objective of the Project (Terms of Reference)

The NRI consultancy team was given the following TOR:

Assess the status of the pesticides and herbicides sub-sector and in particular assess the pyrethrum-based industries regarding type and quality of products, raw material sources and supply, capacity utilisation, technologies used, human resource requirements, support from the public and private sectors, and generally carry out a SWOT analysis.

Examine current Government policies regarding Industrial Development and make recommendations as to their effect on the development of the pyrethrum-based herbicides and pesticides sub-sector.

Assess the market of pyrethrum-based products and assess the competition posed by importing synthetic products.

Give an estimate of the potential levels of production of processed and semi processed products, their marketing and export, and estimate the potential for generation of direct and indirect employment in the sub-sector.

Identify investment opportunities within the sub-sector and work out strategy to attract investment after reviewing the investment policies of Kenya.

Review the effect of the sub-sector on the environment.

Assess the potential for forward and backward linkages and linkages with other sectors.

Recommend mechanisms for helping infant industries within the sub-sector to develop products which both meet national and international standards.

Recommend policy measures and draw up a comprehensive strategy to make the sub-sector competitive.

Present the findings and recommendations to workshops on the sector and thereby transform the participants into Sectoral Consultative Groups.

In undertaking the above the consultants shall work in close consultation with officials of the Ministry of Tourism, Trade and Industry, The Ministry of Agriculture and the Pyrethrum Board of Kenya. The expert shall also consult with other beneficiaries in the sector including established private sector bodies such as Kenya Association of Manufactures, Federation of Kenya Employers, and National Chamber of Commerce and Industry.

The work was done under the overall direction of the Director, EIDD. However, the action officer designated by him managed the activities.

It was acknowledged that the TOR might require amplification and amendment during the course of the work in order to achieve practical results from the study. The report, particularly with regard to the sector's institutional structure, agricultural production and farmer incentives, reflects the importance of agricultural aspects to the sector's ability to attract investment.

1.3 Methodology

The NRI consultancy team consisting of Duncan Burnett (DGB), Team Leader/Economist and Dr Graham Farrell (GF), Principal Scientist - Pest Management Systems, carried out three field trips to Kenya from 13 November 2000 to 1 December 2000 (DGB+GF), 13 February 2001 to 24 February 2001(DGB), 1 March 2001 to 17 March 2001 (DGB).

Additional research work on the global pesticide sector was carried out in the UK.

The team was assisted by Ms Mary W Kiiru (MK) Research Fellow/Policy Analyst with the Tegemeo Institute, Egerton University, Kenya who investigated *factors and incentives influencing pyrethrum growing in Kenya*. This work was carried out end May/early June 2001 and is summarised in section 4 of the report. MK's full report is included under annex E.

Fieldwork in Kenya proceeded with the overall assistance of the Director of Industries, MTTI, who seconded two members of his staff to make appointments and accompany the consultants on their field trips and interviews with stakeholders. A MOA employee, seconded to the team, gave limited assistance.

The team visited the PBK's facilities in and around Nakuru and Molo, and held discussions with PBK staff and a cross section of pyrethrum farmers. Local manufacturers of pyrethrum-based products in Nakuru and Nyeri were visited and their opinions and views on the future of the sub-sector were sought. The major stakeholders in the pesticide sector based in and around Nairobi were interviewed. These included multi-national

companies (MNCs) toll manufacturers, trade and manufacturers' associations, government agencies, international donor representatives, research establishments and financiers. Many of the stakeholder's views expressed in sections 4 and 5 concern sensitive areas of GOK and MNC policy and should be treated in confidence.

A list of organisations and persons met is shown in Annex A.

An informal survey of supermarkets and other retailers was undertaken in order to ascertain the range of insecticides available and the extent to which pyrethrum-based products are used as active ingredients.

Checklists were provided to the PBK and manufacturers to assist in obtaining relevant information (see Annex C).

The layout of the interim report covers, in sections 2 and 3, an overview of the Kenya economy and the global pesticide market, placing pyrethrum in its respective context. The role and importance of pyrethrum production in the Kenya pesticide sector, with particular reference to institutional aspects and other factors affecting production, processing and marketing is examined in section 4. The potential and constraints for industrial development through value addition to pyrethrum-based products is examined in section 5. A SWOT analysis of the sub-sector is carried out in section 6 and final recommendations for a future strategy are given in section 7.

The findings and recommendations of this report regarding a strategy for the future development and sustainability of the pyrethrum sub-sector were endorsed by a consensus of stakeholders at a two-day workshop held in Nakuru February 2002.

2 OVERVIEW OF THE KENYAN ECONOMY

2.1 Introduction

This section describes the overall Kenyan economic situation with particular reference to the agricultural, industrial and trade sectors, and places the pesticides sector and pyrethrum in context.

2.2 The General Political, Demographic and Economic Environment

2.2.1: Poverty and Population - Poverty is viewed by the GOK as a priority and a national challenge, and industrialisation is seen as having great potential for poverty reduction through value addition in the production process, particularly by linking the manufacturing and agricultural sectors.

The GOK Poverty Reduction and Growth Programme aims to address the following issues:

- Strengthening "watchdog" institutions such as the Kenya Anti-Corruption Authority (KACA), the Central Tender Board (CTB) and Parliament.
- Restructuring and privatising the telecommunications, energy and banking sectors.

- Reforming the civil service to improve the efficiency of central and local government.
- Strengthening the government internal security organs to improve their capacity to contain crime
- Tightening budgetary controls to ensure more productive use of government resources.

Kenya's population has grown at an annual rate of 2.9% in the last decade, according to the 1999 census, which reported a total 28.7 million persons living in Kenya, compared with 26 million in 1995. Key demographic features are, the movement of people to urban centres and out of rural livelihoods, the growth of poverty, with overall national poverty estimated at 52 % (source: MTTI), and population growth (2.4% p.a. at the last census) outpacing economic growth (0.2%, latest figures to September, 2000).

In 1999 the population was distributed regionally as follows:

Rift valley:	6.991 million	- Western:	3.354 million
Eastern:	4.643 million	- Coastal:	2.491 million
Nyanza:	4.397 million	- Nairobi:	2.137 million
Central:	3.705 million	- North Eastern:	0.961million

Kenya's population is projected to rise to 31.9 million by the end of 2001, with an annual growth rate slowing to 2.5%, from 3.9% in 1979 and 3.4% in 1989. The urban population is forecast at 20.2 % of the total in 2001 compared to only 14.2% in 1979, thus illustrating the trend to urbanisation (source: National Development Plan).

2.2.2: The Current State of the Kenya Economy

The Kenyan economy is dominated by agriculture which, in 1999, contributed 24.5 % to GDP, manufacturing being the second largest sector with 13.2 %. Available data on economic sectors from the Central Bank of Kenya and the Central Bureau of Statistics indicate that the GDP expanded by 0.2% in the twelve months to September 2000 compared with 1.45% in 1999 (see Table 1 below).

Table 1: Kenya - economic growth and sector activity

Real GDP and related aggregates							
Main Sectors	% share in real GDP (1999)	Output in Kshs (millions)				Annual % change Sept/Sept 1999/2000	
		1998	1999	Sept 1999	Sept 2000		
Agriculture	24.5	25,122	25,426	25,403	25,454	0.2	
Manufacturing	13.2	13,596	13,732	13,702	13,729	0.2	
Building and construction	2.4	2,508	2,530	2,528	2,523	- 0.2	

Trade, Restaurants and Hotels	12.5	12,694	12,948	13,022	13,282	2.0
Transport, storage and communications	6.0	6,118	6,202	6,202	6,326	2.0
Financial services	10.5	10,690	10,904	10,958	11,089	1.2
Government services	14.5	14,974	15,078	14,944	15,004	0.4
Others (a)*	16.4	16,551	16,882	15,000	14,550	- 3.0
Estimated real GDP (1982 prices)	100	102,253	103,702	101,759	101,957	0.2%
Nominal GDP(at factor cost)		594,019	642,675			
Overall GDP deflator		5.8	6.2			
GDP at market prices		692,120	748,923			

Source: Central Bank of Kenya and Central Bureau of Statistics

*Note: (a) others include forestry, fishing, mining, electricity, water, house ownership, non-monetary and other sectors less imputed bank charges.

The recent slowdown in economic performance has been attributed to the following major factors:

- The severe drought in 2000 adversely affected agricultural production, water supplies and pasture for livestock. Power rationing for a large part of the year had a negative impact on all sectors of the economy.
- Poor infrastructure, particularly roads, telecommunications, railways and port facilities.
- Mismanagement of farmers' institutions such as the Coffee Board, the Irrigation Board and Kenya Cooperative Creameries (KCC).
- Insecurity.

(source: Kenya Monthly Economic Review, December 2000)

2.2.3: Other Key Economic Indicators

Interest rates - based on 91 days Treasury Bills, interest rates declined throughout 2000 from 20.3% p.a. in January to 10.4% in October, with a slight increase in November to 11.2%. Overdraft rates declined from 25.9% in January 2000 to 19.9% in October 2000.

Inflation - the overall annual rate of inflation in 2000 increased slightly from 4.3% in January to 6.2% in November

Exchange rates - the average exchange rate for Kshs against major international currencies were as follows:

Table 2: Exchange rates, 1997/2000

Currencies	1997	1998	1999	2000						
	Dec	Dec	Dec	Jan	June	July	Aug	Sept	Oct	Nov
Kshs/US\$	63.1	61.8	73.9	70.7	77.5	76.4	76.5	78.2	79.3	78.9
Kshs/Pound Sterling	104.8	103.2	119.3	106.0	117.0	115.4	113.9	112.0	115.2	112.5
Kshs/Yen	8.8	52.5	72.1	67.2	73.1	70.9	70.7	73.2	73.1	72.4
Kshs/Euro			4.9	71.8	73.7	71.9	69.3	68.1	67.8	67.5

Source: Kenya Monthly Economic Review, December 2000

Exchange rates against major international currencies have remained relatively stable over the last twelve months.

2.3 The Agriculture and Livestock Sectors

More than 80% of Kenya's population live in the rural areas in the high and medium agricultural potential areas of the country, which have a population density of about 800 persons per square kilometre. Agriculture is a major source of national income contributing around 25 % of GDP (see Table 1), providing some 80% of employment, 60% of export earnings and a large proportion of the country's food requirements. Furthermore, the sector is estimated to contribute, indirectly, around another 27% of GDP through linkages with manufacturing, distribution and other service-related sectors. The livestock sector, closely allied to agriculture, contributes around 10% to GDP (ref: MOA).

Kenya's agricultural sector directly influences overall economic performance through its contribution to GDP and its linkages to other sectors of the economy, and periods of high economic growth have, in the past, been synonymous with increased agricultural output. For example, in the period between 1963 and 1973 agricultural output recorded an average real GDP growth rate of 6.5%, coinciding with overall high rates of economic growth. However, between 1989 and 1992 the average agricultural growth rate slowed to 2.3% p.a. and the overall annual average GDP dropped to 1.1% p.a. The latest figures available (see Table 2) shows overall GDP growing at only 0.2 % p.a. with agricultural output also virtually stagnating at 0.2% p.a.

Whilst Kenya's agricultural enterprises consist of both large-scale and small-scale production systems, smallholders account for more than 75% of total production and 50% of marketed output. There are over three million small-scale farmers in the country with land holdings of less than two hectares and dependants probably totaling at least fifteen to

eighteen million. These statistics illustrate the importance of the agricultural/livestock sectors to the well being of the nation.

Major cash/export crops are tea, coffee, horticultural products (fruit, vegetables and flowers) and pyrethrum. Major food crops include maize, potatoes, wheat and rice. Livestock activities involve dairy and beef production and the rearing of sheep and goats.

Pyrethrum is the fourth most important cash crop behind tea, horticulture and coffee, and between 1994 and 1998 contributed around Kshs 2 billion (US \$25.64 million) p.a. in export earnings. The crop is an ideal smallholder crop and provides employment and cash income to the rural population. The pyrethrum agricultural sub-sector is examined in detail in section 4.

2.4 The Industrial Sector

The industrial sector, encompassing manufacturing, is one of the fastest growing in the country's economy. Initially developed under an import substitution policy, there has been, in recent years, a shift to export orientated manufacturing in line with the GOK's industrial policy (see 2.5 below). The sector plays an important role in adding value to agricultural output and providing forward and backward linkages with the aim of accelerating economic growth. The latest statistics available put the value of manufacturing output in 1996 at Kshs 28,820 million and value addition at Kshs 2,552 million. The sector comprises over 700 established enterprises employing more than 210,500 persons. Major sub-sectors are beverages, cement, electronics, grain milling, iron and steel, leather, machine tools, mining and minerals, motor vehicle parts and assembly, pesticides, paper products, plastic, chemicals and pharmaceuticals, plastics, sugar, textiles, tobacco, wood and wood products (source: Investment Promotion Centre).

The sector currently contributes 13.7% to GDP but annual growth has slowed down to 0.2% in the twelve months to September 2000 compared with 1.0% in 1999. This weak performance was attributed to the high cost of raw materials including fuel and power, the poor supply of raw materials to agro-based industries as a result of drought, and high production and distribution costs due to poor and deteriorating infrastructure (source: CBK Economic Review, December 2000). Water rationing, competition from cheap imports and low domestic demand also contributed to the slowdown in growth in the sector.

2.4.1: GOK's Incentives to Industrial Development and Investment

In line with its industrial policy of encouraging export orientated manufacturing industries, encouraging infant industries and promoting both local and foreign investment in the sector (see 2.5 below), the GOK has established a number of institutions to assist in this regard. The leading institutions are:

The Investment Promotion Centre

The IPC is a statutory body established in 1986 through an Act of Parliament with the main objective of promoting private sector investment in Kenya. The IPC is a "one stop" facility for potential investors with the following functions:

- Approval of investment projects.

- Provision of information.
- Assistance in securing licenses and permits.
- Assistance in acquiring new technology, "know how" and finance.
- Identification of joint venture projects and suitable partners.
- Guidance and advice on project formulation.
- Liaison with the GOK's appropriate ministries on policy, strategy and administrative procedures to enhance the investment climate.

Export Processing Zones Authority

The EPZA was inaugurated in 1990 under the Export Processing Zones Act. The scheme is designed to promote export oriented industrial investment with designated "free" zones, and offers a number of services to investors locating in an EPZ including a range of tax benefits, some of which are summarised as follows:

- 10-year corporation tax holiday and 25% tax thereafter.
- 10-year withholding tax holiday.
- Stamp duty exemption.
- 10% investment deduction on initial investment applied over 20 years.
- Perpetual duty and VAT exemption on company inputs including machinery, spare parts, construction material, raw materials, office equipment, packaging, heavy diesel and fuel oil, but excluding other petroleum fuel, motor vehicles not resident within the zone, and motor vehicle spare parts.

Export Promotion Council

86. The EPC was established in 1992 with the objective of improving the Kenya's level of export performance and identifying and recommending to the GOK the removal of policy impediments to export related activities. It works closely with stakeholders through sectoral panels and assists exporters in identifying opportunities, promoting an "export culture" and a "national consensus" on export development and promotion. The EPC's role covers the following functions:

- Trade policy and facilitation.
- Export market development.
- Trade information delivery services.
- Product development and adaptation.
- Human resources development.

87. Additionally, in order to assist the export community, the EPC have recently set up the Centre for Business Information in Kenya (CBIK), the first of its kind in Kenya providing up-to-date business information and support services.

Kenya International Public Policy Research Institute

KIPPRA was set up under the NDP to act as the public sector policy "think tank." Its brief is to liaise closely with all public sector institutions including GOK ministries in order to analyse public sector policy and strengthen strategic initiatives in the entire economic arena, including the industrial sector.

2.5 GOK Industrial Development Policy

The GOK's industrial development policy was set out in Sessional Paper No 2 of 1997 on industrial transformation to the year 2020, and incorporated in the National Development Plan, 1997 - 2001. The key policy aim is to implement policies and strategies which will lay the foundation for the structural transformation required to enable Kenya to become categorized as a *Newly Industrialized Country* by the year 2020. In order to achieve the policy objective the GOK has identified the following essential components, as prerequisites required to realize its industrial goals:

- Political and social stability.
- Macroeconomic stabilization coupled with flexible exchange rates and reduced budget deficits.
- Investment in primary production to increase productivity, especially in smallholder agriculture, thus raising incomes, increasing exports and generating foreign exchange.
- Investment in human resources.
- Investment to rehabilitate and expand physical infrastructure.
- Financial market reform.
- Trade and investment reform to encourage domestic and foreign investment.
- GOK intervention to support and assist the private sector.
- GOK to facilitate meaningful dialogue and co-operation with the private sector to foster mutual understanding and partnerships.
- Increased resource allocation to technology development and management.

The above policy initiatives are geared towards encouraging export orientated manufacturing industries and infant industries together with promoting both local and foreign investment.

Implementation of the policy is on a phased programme and the development and rehabilitation of agro-industrial enterprises, including the pyrethrum-based pesticide sub-sector, has been given priority status (phase 1) by the MTTI.

2.6 Trade and Trade Policy

Trade Policy: The main pillar of Kenya's current trade policy is to participate actively and support the integration efforts of the African economies and in particular the African Economic Community (AEC), Common Market for East and Southern Africa (COMESA) and the East African Community (EAC).

Trade: Kenya currently runs a widening deficit of around US\$ 1572 million on its current account reflecting the increasing value of imports due to higher oil prices and a greater volume of food imports occasioned by drought-affected domestic production in 2000. In the twelve month period October 1999/October 2000, imports totaled US\$ 3281 million against exports of US\$ 1709 million.

Kenya's main imports are as crude oil, petroleum, machinery, vehicles (new and second hand), fertilizers, textiles, iron and steel, paper products and pharmaceuticals.

Kenya's exports are relatively narrowly based with 63 % of total value in 1998 being attributable to five items; tea (28.8%), tourism (12.6%), horticultural products (10.8%), coffee (9.2%), and petroleum products (6.6%). Furthermore, the country's exports are destined to a few concentrated markets mainly within COMESA (44%) and the EU (30%). Therefore, the diversification of export products and markets is a priority (source: EPC).

Kenya's main exports are shown in Table 3, which gives each item in terms of its proportionate importance to foreign exchange earnings.

Table 3: Kenya exports 1992/1999 - % proportionate monetary contribution

Item	1992	1993	1994	1995	1996	1997	1998	1999
Tea	9.34	9.05	4.84	14.70	15.55	16.84	23.78	22.85
Tourism	9.04	4.94	4.70	0.44	7.53	15.92	12.62	14.89
Horticulture	0.52	0.96	0.92	0.69	0.33	0.60	10.77	12.29
Coffee	40.0	1.25	1.48	1.81	1.25	1.77	9.24	8.34
Petroleum Products	0.61	0.85	0.46	0.58	0.81	0.00	0.58	6.36
Soda Ash	0.11	0.25	0.85	0.84	0.79	0.93	0.89	0.91
Cement	0.00	0.33	0.44	0.32	0.74	0.60	0.04	0.87
Pyrethrum extract (b)*	0.49	0.01	0.38	0.09	0.10	0.96	0.52	0.46
Sisal	0.71	0.73	0.58	0.48	0.56	0.50	0.50	0.44
Fluorspar	0.29	0.26	0.21	0.21	0.25	0.26	0.15	0.36
Wattle extract	0.40	0.40	0.26	0.18	0.20	0.22	0.16	0.19
Wood carvings	0.17	0.19	0.19	0.18	0.16	0.18	0.27	0.23
Hides and skins	0.04	0.12	0.25	0.24	0.16	0.12	0.09	0.22
Metal scrap	0.26	0.11	0.13	0.14	0.12	0.14	0.08	0.10
Meat products	0.09	0.11	0.09	0.07	0.08	0.08	0.09	0.12

Animal feeds	0.08	0.06	0.06	0.04	0.01	0.01	0.01	0.01
All Other (a)*	9.45	4.37	1.79	6.01	6.37	5.89	3.21	31.37

Source: EPC

(a) Mainly manufactured goods such as textiles, margarine, cleansing materials, plastics, confectionery and breakfast cereals, stationery, pharmaceuticals, beverages (beer and spirits), edible oils, construction and building materials, body care products, industrial chemicals and engineering products.

(b) Whilst pyrethrum products have traditionally been a leading export the decline in production during the 1990s has resulted in a fall in its relative importance in the export league table.

2.7 Conclusions

Throughout the 1990s the GOK has intensified and continued to implement far reaching structural reforms within the economy. Particular emphasis has been focused on price decontrol, removal of import licensing and foreign exchange controls, reform of investment incentives, rationalization and privatization of public enterprises and reform of financial and other essential sectors of the economy.

Structural adjustment programmes initiated by the GOK and funded by the WB and other key donors have sought to remove bottlenecks to economic growth by maintaining macroeconomic stability, improving the efficiency of public services, enhancing external and domestic economic competitiveness and addressing the social dimensions of development.

Kenya's current plan is "rapid industrialization for sustained development" with the objective of achieving NIC status by 2020, requiring substantial acceleration of economic growth and structural transformation. Efforts are being made to promote linkages amongst industries and sectors to spread and facilitate industrial growth and the transfer of skills and technology.

The current slowdown in economic activity, threatening the achievement of long term economic goals, has been mainly attributed to structural constraints that discourage investment. Such constraints include a dilapidated infrastructure, inadequate public services, crime and insecurity, corruption, escalating manufacturing costs and reduced donor funding.

The GOK's efforts to promote investment and the policy issues, which are acting as a disincentive to investment, are examined in detail with particular reference to the pesticide sub-sector, in Section 5 of this report.

Notwithstanding the above comments, some of the major economic factors influencing investment decisions, such as rates of interest, inflation and foreign exchange are under control and relatively stable. The overall political and economic environment is currently favourable towards the development of value added projects in the pesticides sub-sector and in general terms the current National Development Plan (1997 - 2001) focuses on policies that will enhance rapid industrialisation for sustainable development. All sectors of the economy are expected to play complementary roles in contributing to high

productivity in the industrial/agro-industrial sectors by increasing the value and level of output and optimizing the utilisation of the country's available natural resources.

3 OVERVIEW OF THE GLOBAL PESTICIDE MARKET

3.1 Introduction

This section describes the global pesticide sector, current trends and uses and place pyrethrum in the context of the world market. The overall Kenya pesticide sector is also examined with particular reference to imports and usage.

Pesticides from natural sources have long been used for insect management and, for example, were known in China 1500 years ago. In more recent times plants originating in the Middle East were commercialized in Europe and USA in 1880s, where the only pesticide alternatives were arsenic, sulphur and nicotine, all with high mammalian toxicity.

Synthetic pesticide have played a dominant and increasing role in agricultural intensification worldwide over the past fifty years and this trend has been at the expense of natural products. Consequently, by the 1940s synthetics had overtaken pyrethrum and other natural products as the main active ingredients in pest control products.

3.2 World Pesticide Use and Trends

There are over 50 synthetic pyrethroids and the latest edition of the Pesticide Manual, a worldwide directory of pesticides, has 812 pesticide entries plus 598 superceded products (Tomlin, 2000).

Worldwide pesticide use increased steadily by around 5% p.a. during the 1970s and 1980. More recently, the market has matured, with lower growth, industry amalgamation, takeovers, and slower innovation rates.

World use of pesticides in 1999 was estimated at \$28 billion (2 million tonnes of active ingredient) at the user level, an increase of 1% since 1994. By 2004, world pesticide sales are likely to decline to \$27 billion annually, though this decline may be offset by increases in sales of pest- and pesticide-tolerant crops. The herbicide sector accounts for the major part of pesticide sales in the USA where retail price competition remains high because planted crops and production area have not increased substantially (Calderoni, 2000).

The size of the world market for pesticides can be broken down by crop application, as follows: fruit and vegetables 26%, cereals, 15%, maize 12%, rice 10%, soya bean, 9.4%, cotton 8.6%, sugar beet 2.8% and oilseed rape 1.6%. The balance of 14% was used on other food and non-food crops (AGROW, 1998).

In 1995 world pesticide consumption was 2.6 million tonnes of active ingredients, with a market value of \$38 billion, 85% being used in agriculture; 75% of pesticide usage is in developed countries, mostly USA, Western Europe and Japan (AGROW, 1995). In most developing countries insecticide use predominates, for example, 100,000 tonnes p.a. of mosquito coils are sold worldwide (Eisner, 1991). Insecticides of choice in the developing

world tend to be older, broad-spectrum compounds such as Oregano-Phosphates and carbamates that are noted for acute toxicity. They are popular because they no longer enjoy patent protection and therefore are cheaper than newer, proprietary brands.

Pesticide use is growing more quickly in developing countries. For example, in the decade between 1983 and 1993, sales increased by 72% in developed countries but by 81% in developing countries (Freedonia, 1994).

Intensification of world agriculture may entail a substantial increase in the use of pesticides, but different patterns of use will continue to occur. A decline in traditional pesticide use in North America and Europe is already evident due to increasingly tight requirements for safety testing and registration, the advent of newer compounds that are effective in lower doses, the increasing interest in IPM by growers that encourages alternative, non-pesticide approaches and the rise in the organic movement in Europe. The insistence by regulatory bodies on re-registration of old compounds has resulted in the reluctance of companies to go through lengthy and expensive safety testing regimes for cheap compounds that are not protected by patent. Therefore, pesticide companies would rather invest in new compounds, which provide a better rate of return.

Predicting future pesticide use is difficult, but it is possible to identify some trends, which may reveal opportunities for pyrethrum. In the developed world there is a trend towards newer compounds that are more selective, less toxic to humans and the environment and require lower application rates. New compounds are needed to replace older chemicals that are likely to be banned or restricted. For example, all EU approvals of pesticides based on permethrin (except for forestry products) must be withdrawn by 27 June 2001, with all existing stocks to be used up by 27 June 2002 (AGROW, 2001).

3.3 The Global Pesticide Market (Production and Sales)

As noted in 3.2 above in the developing world pesticide sales are increasing. Sales in India rose 5% by volume in 1995/96 and Brazil and China experienced similar growth. This trend has partly arisen from growing local production, with Brazil and India now registered as pesticide exporters and China's capacity increased by 40% from 1995 to 1996. Most of this growth is in older, more toxic compounds. The best selling pesticide in India is monocrotophos, a highly toxic insecticide whose registration was cancelled in the USA in 1988 (WRI, 1999).

Market saturation for existing compounds is approaching in the North and therefore pesticide companies are looking to the South for expansion and between 1992 and 1996, exports of pesticides from the USA increased by 40% (Kuyek, 2000).

Non-crop pesticides constituted over 12% of the global pesticide market in 1997 (i.e. about \$3830 million) and the market for non-crop pesticides is growing faster than its agricultural counterpart (home and garden pesticides, industrial herbicides, pest-control operator products, turf pesticides, public health pesticides). Seventy five percent of these sales were obtained by 15 compounds, five of which were synthetic pyrethroids (Table 4).

Table 4: Non-crop pesticides

Rank	Product	Note
01	Glyphosate	Herbicide
02	Chromium copper arsenate	Wood preservative
03	Allethrin	
04	Permethrin	
05	Chlorpyrifos	Being reregistered
06	Tetramethrin	
07	Pyrethrins	
08	Creosote	Wood preservative
09	2,4-D	Herbicide
10	Diuron	Water contaminant
11	Carbaryl	Restricted use insecticide
12	B-cypermethrin	Herbicide
13	Dimethalin	Herbicide
14	Diazinon	Insecticide

Source: DR/AIS (2000)

The top manufacturers in the non-crop market are, in rank order: Dow AgroSciences, Monsanto, Lesco, Novartis, Zeneca, DuPont, Aventis (incorporating AgrEvo and Rhône-Poulenc), Bayer and Scotts.

Developed countries dominate the pesticide market (AGRO, 1995) with 67% of global usage, relative shares being as follows:

Developed countries:

Western Europe: 25% - North America: 30% - Japan: 12%

Developing countries:

Asia: 16% - Latin America: 13% - Africa: 2% - Eastern Europe: 2%

The main players in the home and garden sector are the formulators SC Johnson, Reckitt and Colman and Sara Lee and the manufacturers Aventis and Sumitomo (DR/AIS, 2000). These companies dominate world pesticide production, accounting for 80% of all sales.

The USA is the world's largest market for non-crop pesticides, with sales of \$1,654 million in 1997 (excluding timber and home and garden sales), followed by Japan (\$420 million) and Germany (\$178 million). There is probably considerable room for expansion in other developed countries. In developing countries, pesticide use is likely to increase as living standards rise. In addition, niche markets may expand, particularly those for garden products in the USA resulting from increases in the proportion of over 40s in the population (DR/AIS, 2000) (Tables 5 and 6).

Table 5: Pesticide sales from the top ten producers (\$ millions)

Company	1996	1997	1998	1999 (first half)
Syngenta (Novartis/AstraZeneca)	6698	6873	7049	3733
Aventis (Rhône-Poulenc/AgrEvo)	4665	4554	4676	2672
Monsanto	2555	3126	4032	3069
BASF (American Cyanamid)	3492	3974	4139	2333
DuPont	2472	2518	3156	1872
Bayer	2343	2254	2273	1784
Dow AgroSciences	2010	2200	2132	1333
Total	24235	25449	27457	16796
Total*	30603	31896		

Source: Kuyek, 2000

*all pesticides (Dinham, 1998)

Table 6: Pesticide sales by region (\$ million)

Company	1999	2000	% change
North America	8513	8667	+ 1.8
West Europe	6655	6160	- 7.4
East Asia	6357	6865	+ 8.0
Latin America	4467	4735	+ 6.0
Rest of world	2098	2113	+ 0.7
Total	28090	28540	+ 1.6

Source: Philips McDougall AgriService, in AGROW, 2001

3.4 Threats to the use of Synthetics in Pesticides

As mentioned in 3.2, above the EU has been implementing a programme to establish harmonised maximum residue levels (MRLs) for pesticide residues in foodstuffs sold in the EU and a list of 102 active ingredients has been established in this context. Furthermore, the UN Environment Programme, agreed by over 120 countries, proposes to eliminate the world's most harmful pollutants, known as the "dirty dozen", which include the following eight pesticides: aldrin, dieldrin, chlordane, DDT, furans, endrin, mirex, toxaphene.

The "dirty dozen" are also referred to as POPs, or persistent organic pollutants and have been linked to cancer, birth defects and lowered sperm counts (source: The London Times, 11 December 2000).

The above developments illustrate the trend away from the use of synthetics and point to the opportunities for natural products such as pyrethrum.

With regard to synthetic pyrethroids the main threat is the need for re-registration and the lack of research investment to make them usable on crop pests in the field (they are unstable in sunlight and therefore cannot be used on field crops – only niche markets are currently available). Attempts have been made to coat pyrethrum with UV protectants, such as gelatin or fatty acids for use on high value crops, but the high cost of the base material needs to be reduced.

In addition, plant breeders are interested in lucrative licensing arrangements that rely on new, high yielding strains, or new processes to extract the active ingredients more cheaply; neither of these exists at present.

3.5 Natural Pesticides (World Pyrethrum Production and Use)

The major pyrethrum producers are Kenya, Australia (Tasmania), Rwanda and Tanzania, with minor production from Papua New Guinea, Ecuador, India, Uganda and China. In 2000 world demand was estimated at 20,000 tonnes p.a. of dried pyrethrum flowers (Materu, 2000) against current production of about 12000 tonnes in that year.

The value of the world pyrethrum market was about \$100 million in 1990 (Eisner, 1991) and \$400 million in 1992 (Jovetic, 1994).

Pyrethrum is relatively new but expanding crop in Tasmania. With 10-15% share of the world market, Tasmania is now the second largest producer behind Kenya, and briefly overtook Kenya in 2000 (see Table 8).

Aventis (through their French subsidiary PYCO) in Europe is investigating alternative uses for French grown pyrethrum. However, the company maintains that this initiative is not aimed at competing with the major established producers but to develop new markets for the crop in Europe, particularly in organic farming. The EU has recently funded a project in this area.

Pyrethrum continues to be competitive with synthetics in the specialised areas where selective toxicity and low environmental hazard are most important, e.g. control of insects in stored products, as a space spray in the food processing industry, and as a pre-harvest spray where field workers need to re-enter the field within 24 hrs.

The USA uses 75% of the world supply of pyrethrum (Eisner, 1991). It is used for pre- and post-harvest sprays for foodstuffs in transit to food processing facilities or for food stuffs kept in the dark, for intestinal parasites in livestock, head lice shampoo, pet shampoo, some indoor insect sprays, inside stock houses or on farm to flush out field pests that are then killed with a different insecticide. Indoor sprays are synergised with piperonyl butoxide.

Pyrethrum is combined with carbon dioxide by BOC Australia and sold as *Pestigas* for the treatment of cut flowers for export from Australia.

Table 7: Production of pyrethrum worldwide

Country	Production (T dried flowers) (year)	Value (\$US million) Farm gate Added value ¹	Area (ha)	Number of growers	Main export market	Ref.
Tasmania	2000 (1995)	1.2	1000	85	USA	Deck, 1997
	300 (1989)	3.5	1200			CIG Pyrethrum, 1995
Kenya	2500 (1993)		26330	200,000	USA, Europe, Asia	Eisner, 1991
	19000 (1983)	8.3-10.0	97300 ²			Wandahwa <i>et al.</i> , 1996
	3000 (1984/6)					
	10000 (1991)					
	10000 (1991)	b) 102	26300 ³			Wandahwa and van Ranst, 1996
	11979 (1994)	b) 33				KTB, 1999
	10550 (1995)	b) 25				
	7470 (1996)	b) 37				
	6220 (1997)	b) 22				
	7120 (1998)	b) 30				
Ecuador	1610 (1968)					Materu, 2000
	1100 (1972)					
Japan	950 (1968)					Materu, 2000
	600 (1972)					
Rwanda	1170 (1972)					Nzabagamba, 2000
	1500 (1976)					
Tanzania	6000 (1966)	400	8120	20000	USA	Mhekwa <i>et al.</i> , 2000
	(1999)	a) 0.42				
	1000 (2000)					

¹value added by processing in-country; ²theoretical maximum; ³theoretical maximum of 40,866 km²

3.6 The Kenya Pesticide Sector

The Kenya pesticide industry covers the manufacture, formulation, import, repackaging and distribution of pest control products for use in the agricultural, household and public health sectors. Whilst the agriculture/livestock sector are the largest users of pest control products, there is also the vital need to ensure public health and control diseases such as malaria by the use of efficient pesticides. The sector makes a significant contribution to GDP and employs around 50,000 persons either directly or indirectly (source: MTTI).

Kenya is primarily an importer of various raw materials, active ingredients, technical graded products and complete formulations for use in pest control and allied activities.

The raw materials used in the pesticide sector are varied and may be classified into the following major chemical groups:

Carbonates and dithiocarbamates, chlorophenoxy compounds, organochlorines, organophosphorus compounds, nitro compounds, biopesticides (*Bacillus thuringiensis*, pheromones etc), heterocyclines (atrazine etc), synthetic pyrethroids (permethrin,

cypermethrin, tetramethrin, sumithrin etc), natural pyrethrins (pyrethrum extract), solvents, fragrances, miscellaneous compounds, wetters, stabilizers, spreaders and inert materials (source: MTTI).

In 2000 Kenya imported 4432 tonnes of pesticides valued at Kshs 2201 million (US\$ 28.22 million) of which insecticides and acaricides were the largest group in terms of both volume and monetary value. The data shown in Table 8 below are based on applications for importation of pest control products for commercial purposes approved by the PCPB. The data does not include quantities and values of pest control products imported by the MOA as commodity aid/grants.

Table 8: Import of different groups of pesticides into Kenya - 1994/2000

1: Value (C and F Kenya Port) in million Kshs					
Year	Insecticides and acaricides	Herbicides	Fungicides	Others	Total
2000	1114.1	298.6	713.9	74.7	2201.3
1999	1178	259	891	181	2509
1998	1196.9	521.3	1358.5	37.7	3114.4
1997	1164	301.5	827.2	113	2405.7
1996	1405.4	389.9	1049.1	102.1	2946.5
1995	707	312.1	682.6	74.4	1776.1

2: Quantity in metric tonnes					
Year	Insecticides and acaricides	Herbicides	Fungicides	Others	Total
2000	1762	633.4	1665.9	370.6	4431.9
1999	2186	593	2284	1116	6179
1998	1814.4	1407.8	4225.4	158.8	7606.4
1997	2077.8	703.1	2391.0	655.6	5827.5
1996	1876.2	997.9	3469.8	602.5	6946.4
1995	1413.3	870.6	2323	501.9	5108.8
1994	1049.9	747.4	1671.8	563.3	4032.4

3: Percentage of total monetary value					
Year	Insecticides and acaricides	Herbicides	Fungicides	Others	Total
2000	50.6	13.7	32.4	3.3	100
1999	47	10.3	35.5	7.2	100
1998	38.43	16.73	43.62	1.21	100
1997	48.4	12.5	34.4	4.7	100
1996	47.7	13.2	35.6	3.5	100
1995	39.8	17.6	38.4	4.2	100
1994	37.4	22.3	33.7	6.6	100

Source: PCPB

With regard to insecticides/acaricides containing natural or synthetic pyrethrins, in 2000 Kenya imported 561 tonnes with a value of Kshs 264.95 million (US\$ 3.4 million) (Table 10). It should be noted that there are no herbicides whose active ingredients are natural pyrethrin or synthetic substitutes.

Table 9: Insecticides/acaricides imports into Kenya in 2000

Category (year 2000)	Quantity in metric tonnes (year 2000)	C and F value in Kshs (year 2000)	Country of origin (year 2000)
Agricultural	40.4	49.75	UK, Belgium, India, USA, France, Netherlands
Livestock	1.0	2.0	Zimbabwe
Household	514	172.9	Australia, UK, France, Italy, USA, Malaysia, South Africa, India, Belgium, Netherlands, Indonesia
Active ingredients	5.6	40.3	UK, France, India, Japan

Source: PCPB

3.7 Conclusion

The global pyrethrum-based pesticide market, valued at US\$ 100 million, is relatively insignificant compared to an overall pesticide market that is worth US\$ 28 billion. However, the current demand surplus over supply, together with the worldwide trend away from synthetics, augers well for pyrethrum's future.

4 KENYA PYRETHRUM PRODUCTION (M Kiiru)

4.1 Introduction

The information/data provided in this section is based on a major survey of the Kenyan pyrethrum industry carried out by Tegemeo Institute of Egerton University in 1999 and updated in 2001. The full text of the report is included under annex E. This section examines production of pyrethrum flowers in Kenya, processing, marketing, with particular reference the role of the PBK and the significance of the Pyrethrum Act, 1964, as subsequently amended, issues of research and development, and the comparative profitability of pyrethrum against alternative agricultural enterprises.

4.2 Pyrethrum Production

Pyrethrum was introduced to Kenya in 1928 from Europe and production has continued, unabated, since. It is among the major earners of foreign exchange to the Kenyan economy, ranked fifth after tea, horticulture and coffee. The industry currently earns about Kshs 2 billion through exports of the pyrethrum extract and other by-products.

Kenya is the world's leading producer of pyrethrum accounting for between 60 -70% of global supply and commands over 70% of world market share. This may be due to high internal consumption rates in some pyrethrum producing countries. The Kenya industry has been the world's market leader for over 70 years, after replacing Japan as the largest producer after the Second World War (which was less than 70 years ago!). Efforts have been made to introduce pyrethrum in other countries in Africa, Asia and South America without much success. The other producers are Tasmania (Australia) (20%), Tanzania (8%), Rwanda (5%) and Papua New Guinea (2%). Uganda also produces small amounts of pyrethrum.

Most of the pyrethrum and pyrethrum products produced in Kenya are exported, including 3% to other African countries. Only 3% of production is consumed locally. Non African export destinations are dominated by the USA (60%) with Europe absorbing 25%, Australia 4%, and Asia, and the Middle East about 5% (ref: PBK). The Kenyan market has been traditionally controlled by a small number of insecticide manufacturers and traders, namely Aventis, Johnson Wax, Roussel, Bayer, Sara Lee and Sumitomo (Griffin, 1994).

Pyrethrum is mainly grown in the Rift Valley, Central and Nyanza provinces with some insignificant production in Eastern and Western provinces. The major growing districts are Nakuru, Nyandarua, Kisii and Uasin Gishu accounting for close to 75% of total national production (see Table A1). West Pokot district is developing as a major producer with achieving yields of up to 400kg of dry flowers per acre. Nakuru District alone accounts for about 75% of the total production in the Rift Valley and over 50% of national production. Pyrethrum production is mainly undertaken by small-scale farmers, with less than 5 acres of land and an average of less than 1 acre under pyrethrum production. There are about 200,000 small-scale farmers who account for close to 97% of national pyrethrum production with only a few larger scale farms. The total area under pyrethrum is currently about 26,000 ha.

Kenya has suitable agro-ecological conditions for pyrethrum production, mainly the upper and lower highlands with a little production in the upper midland (UM1) especially in Kisii district. Pyrethrum grows well at altitudes between 1500m to 3000m above sea level with an annual rainfall of between 750mm to 1125mm (Pyrethrum Growers Manual, 1998). The crop flourishes in well-drained fertile soils.

In the early 1980s, pyrethrum and pyrethrum products faced stiff competition in the world market from synthetic products. This resulted in depressed prices due to less demand in the international market, followed by declining production at the domestic level. However, this trend changed in the mid-eighties, as awareness of the harmful side effects of synthetic insecticides became apparent, some countries moving towards complete ban synthetics. There has been a gradual shift to natural-based products resulting in increased local production of pyrethrum with national production attaining a peak of 17,710 tonnes of dry flowers in the 1992/93 season. However, due to domestic problems, a steady decline in production occurred during the 1990's, to less than 4000 mt of dry flowers

during the 1998/99 season (see Annex E Figure 1). Production is now rising, with production expected to approach at least 9,000 MT of dry flowers by the end of the 2001/2002 season. The decline during the 1990's occurred despite favourable prices in the world market (Economic Survey, 1998).

Pyrethrum output has fluctuated over the years (see Annex E Table A1 and Figure 1) and this situation has affected the sustainability of the industry as the country has been unable to supply reliable quantities to buyers in local and international markets. This is the major problem for the industry, since no market will rely on unreliable raw material supply, hence the conversion to synthetic pyrethroids in insecticide formulations.

The main reasons given for the decline in production over the last decade (Kiiru, 1999) include the following:

- Adverse weather conditions: together with other sensitive agricultural crops, pyrethrum has been affected by *El Niño* in 1997 and associated phenomena such as droughts since that date.
- Ethnic clashes: tribal clashes in 1992 displaced many farmers from their land in the pyrethrum growing areas of Nakuru and Uashin Gishu.
- Low profitability due to the high cost of inputs and low yields.
- High cost of production and the labour intensive nature of pyrethrum growing and harvesting.
- Competition from alternative crops and enterprises.
- Unavailability of suitable high yielding planting material.
- Inadequate extension services to farmers.
- Inadequate marketing organisation leading to market inefficiency, exploitation by middlemen and poor prices to farmers.

4.3 Factors Influencing Pyrethrum Cultivation in Kenya

Weather: This is a very important factor since pyrethrum is a sensitive crop and can be easily decimated by adverse weather conditions, however, climate is just one of many factors that affect production and should, therefore, not be viewed in isolation.

Availability of Planting Material: Pyrethrum generally has low input requirements compared to other crops, the major input being planting material. However, according to Ikahu and Nugget (1990) one of the major constraints affecting pyrethrum production in Kenya is inadequacy of planting material. Other inputs include fertilizer (TSP), furadan (a nematicide) and fungicides, which despite their contribution to improving yields and quality are rarely used by farmers. The majority of farmers indicated that the major problem in establishing a new crop was the unavailability of suitable planting material, when required. Planting material in the form of seeds and/or clonal material is provided mainly by the PBK from their nurseries at cost. Furthermore, some recommended planting materials do not thrive in certain regions resulting in low yields and profits. Therefore,

there is a need to develop appropriate and suitable planting material for specific regions through on-farm research. Currently, research recommendations tend to be broad and general, encompassing both high and low altitude areas.

Labour Requirements/Cost of Production: The cost of labour is a major cost component in pyrethrum production (see Annex E Table A2). Pyrethrum requires plenty of labour, particularly for planting, weeding, harvesting and drying, mostly undertaken by family labour. The labour-intensive nature of pyrethrum production is a major disincentive, in terms of both availability and cost. This problem is more acute in the Ainabkoi area of Uasin Gishu district, where the average farm size is 15 acres, yet only an average of 0.845 acres is planted to pyrethrum.

In all the regions studied in 1999, the proportion of labour cost to the total cost of production was greater than 70% (see Annex E Table A2). Therefore, any attempts to improve on the profitability of the enterprise must focus on ways of reducing the cost of production, especially labour costs. Suggested strategies to reduce labour costs include:

- Greater use of herbicides e.g. Venzar and Sencor, which have proved efficient in controlling weeds (Ngugi *et al.* 1989), with resulting reduced labour costs of 57% and increased profits 19%, to 22%. (see Annex E Table A3)
- Use of the solar drier, which reduces the labour costs of production by about 8%. A combination of herbicide and drier use can result in about a 27% increase in profits per hectare (see Annex E Table A3).

The current use of herbicides and adoption of the solar drier by farmers is very low and an aggressive extension campaign is required.

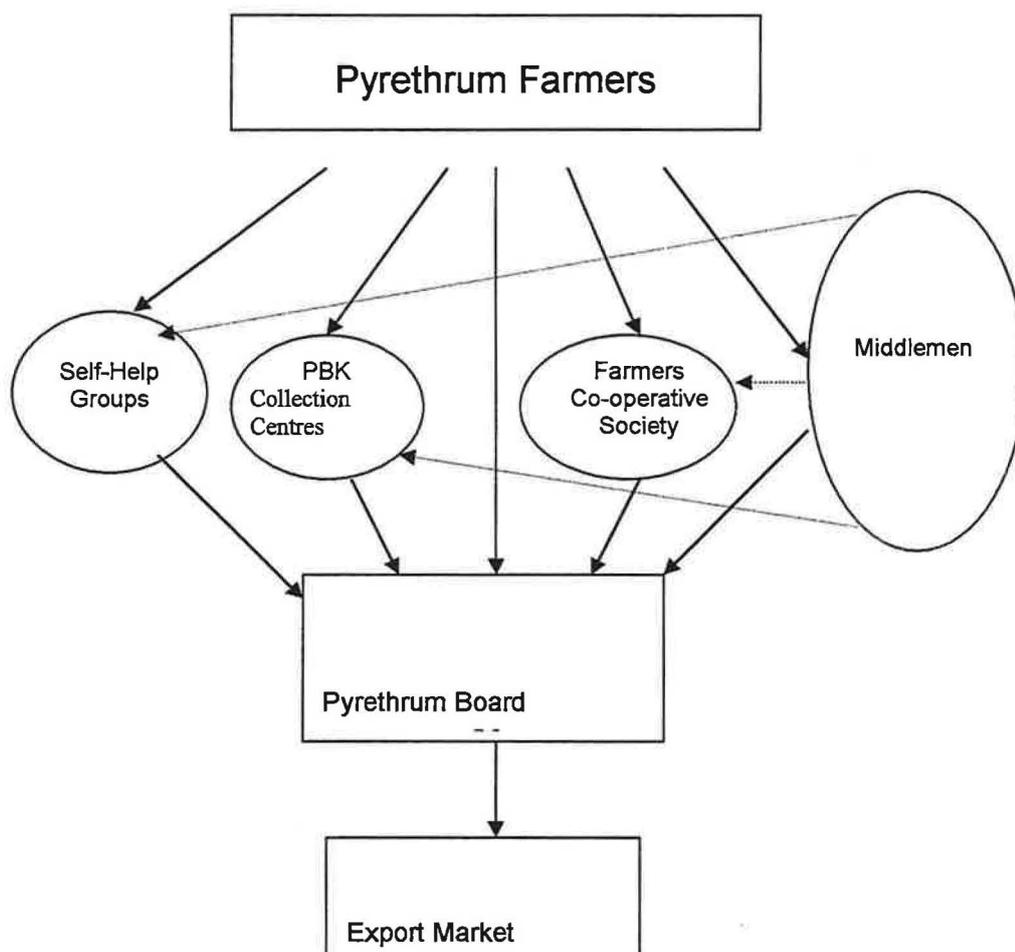
Land Availability: The unavailability of land is not considered a major constraint to pyrethrum cultivation. Therefore, if other negative factors are removed, farmers seem to be willing to increase the area planted to the crop.

Credit Facilities: There is no organized system of credit provision to pyrethrum farmers, either by cash or "in kind." However, as pyrethrum is a relatively low input user with intermediate costs usually less than 2% of the total costs (see Annex E Table A2 and Figure A1), it tends to not require credit facilities, except during the time of establishment. It is essential that monthly payments be made in time to allow regular cash flow to meet the labour weeding, and harvesting expenses.

Farmers experience problems in obtaining credit to establish new pyrethrum crops of pyrethrum particularly due to the lack of financial institutions following the collapse of the Agricultural Finance Corporation (AFC). Lack of security or collateral to guarantee commercial bank loans is another constraint.

Marketing and Pricing Arrangements: From the farm level, the dry flowers are taken to the Pyrethrum Board of Kenya factory in Nakuru for processing. The pyrethrum flower marketing channel is illustrated diagrammatically in figure 2 below.

Figure 1: Pyrethrum Flower Marketing Channels



After receipt at the PBK'S facilities, flowers are analyzed for pyrethrin content (PC), following which payments are prepared according to the PC related to the PBK's published pyrethrum prices. Payment follow the same channel back to the farmers with some deductions at every stage, hence the longer the chain the greater the deductions and the longer payment to farmers takes. Individual licensees therefore obtain better and more prompt payments than those following other marketing channels. However, for a farmer to acquire a license to deliver directly to the Board, the Act requires ownership of a minimum of 10 acres of land with at least 3 acres under pyrethrum. This is not a viable option for most farmers as only a small number have more than 10 acres in total with over 3 acres under pyrethrum.

The deductions along the channel depend on the respective marketing channels with the Farmers Cooperative Societies (FCS) deducting the highest (7-10%). For Self-Help Groups (SHG), the deductions are about 5% of the payment per kg of dry flowers. These deductions include allowances for office bearers, bank charges (cheques), transport for officials, wages for watchmen, hire of store and lost weight during weighing.

Mismanagement by the institutions that market pyrethrum on behalf of the farmers, and the difficulties of acquiring individual licenses have been a major disincentive to increased production of pyrethrum. Additionally, the PBK also make deductions from the pyrethrum price including:

- Cess at 1%.
- Presumptive Income Tax (PIT) at 2%. (this was abolished from December 2000).
- Depreciation of gunny bags at Kshs 1 per 35kg bag
- Transport at Kshs 17 for Kamara, and Kshs 28 for Naivasha per 35kg bag.
- On average, deductions at the PBK range between Kshs 3 to 4 per kg of dry flowers depending on the PC level and the output.

Generally, the deductions along the whole channel take between 5-10% of the announced pyrethrum prices.

Analysis of Pyrethrin Content (PC): The analysis of dry flowers for pyrethrin content is carried out at the PBK factory and not in the presence of farmers which can create some suspicion due to the fluctuation of PC between deliveries. This has bred discontent among some farmers. It is, therefore, important that analysis of PC is reviewed to build farmer confidence. The main question being whether it is possible to:

- Harmonize the PC across regions and paying out for quality differences at the end of the year.
- Analyze the PC at the collection site thus ensuring greater transparency.

Social Stability: The internal instability and security situation within the country, especially in the pyrethrum growing regions has been an issue particularly the ethnic clashes of 1992 and 1997, which displaced many pyrethrum farmers from their farms. The situation has improved somewhat since the 1990's.

Policy Environment: Existing policy on the industry as stipulated in the Pyrethrum Act and the overall policy framework on insecticides is an issue affecting pyrethrum production in Kenya. It should be noted that the pyrethrum industry is one of the few agricultural sub-sectors still under government control. The current monopoly structure and centralized control of the industry seems to be counter to the current trend towards market liberalisation, and is a cause of discontent, and a disincentive towards industry development amongst many stakeholders. A review of the Pyrethrum Act seems long overdue and this subject is dealt with at length in Annex E and sections 5, 6 and 7 of this report.

4.4 Profitability of the Pyrethrum Enterprise

The profitability of the pyrethrum enterprise differs across regions, and between good, normal and poor production (see Annex E, Table 2). The difference in profitability across regions depends on the achievable yields, the pyrethrin content of the flowers and the cost of the main inputs (i.e. planting material and labour), which further depends on the respective agro-climatic conditions, the main planting material used and the main marketing channel.

The profits reflected in Annex E Table 12 are not sufficient to keep farmers in pyrethrum production, let alone increase their output. The generally relatively low profitability of the pyrethrum enterprise is a reflection of 1) low flower yields; 2) low pyrethrin content and price and 3) high cost of production. However, there is unexploited profit potential for farmers through the introduction of selected hybrid varieties of planting material and the improvement of marketing channels (see Annex).

4.5 Competitiveness of Pyrethrum against other Enterprises

In order to analyze the profitability of the pyrethrum enterprise, it is important to understand how it competes with other enterprises at the farm level. Most of the areas suitable for pyrethrum production have horticulture (mainly; green peas, potatoes, cabbages and beans) and maize as a major cropping activity. However, except in Uasin Gishu and Kisii districts, where wheat and tea, respectively, are important, pyrethrum seems to be the only major cash crop (see Annex E, Table 3).

Whilst potatoes and cabbages are leading competitors to pyrethrum, the seasonal nature of horticultural production and the marketing risks associated these crops, tends to make pyrethrum the preferred crop. The importance of pyrethrum as a constant cash earner throughout the year, due to the reliability of the market, is an important factor.

It is important to note that dairy farming is also a major competing enterprise in pyrethrum growing areas. However, the profitability of the dairy enterprise has not been included in the research due to insufficient data on profitability caused by marketing problems following the collapse of the KCC. Notwithstanding this situation, it should be appreciated that under normal circumstances dairy farming is a major competitor to pyrethrum.

4.6 Cost Summaries for Pyrethrum and other Competing Enterprises

The comparative profitability of the pyrethrum enterprise against competing enterprises depends largely on the relative respective costs of production, which are shown in Annex E, Tables 4/5.

Research has shown that the total revenue for pyrethrum far exceeds that for the competing enterprises, however, the costs are also relatively high, accounting to almost 50% of gross income. The fixed costs for pyrethrum are slightly higher than for the competing enterprises since pyrethrum is a perennial crop with a high establishment cost. The fixed costs are, however, annualized over the productive life of the crop. The intermediate (input) costs for pyrethrum are the lowest compared to the other crops due to low input use.

4.7 Recommendations to Improve Farmers Incentives to Grow Pyrethrum

In order for the Kenyan pyrethrum industry to develop and flourish, it is important to improve and increase farmer incentives to grow and expand the area under the crop. Recommendations in this context are contained in 7.3 below.

4.8 The Pyrethrum Board of Kenya

Whilst a detailed examination of the role and activities of the PBK are outside the TOR of this study, the PBK's pivotal position in the Kenya pyrethrum sector and key influence on future value addition development necessitates some assessment.

The PBK was originally established in 1935 to coordinate marketing of the then expanding pyrethrum crop. It was structured, constitutionally, as a cooperative dedicated to serving the interests of pyrethrum growers and developing the new industry, including the establishment of centralised processing facilities for dried flowers in Nakuru.

The PBK, in its current form, was established by the Pyrethrum Act, 1964 which provided for the reorganization and regulation of the pyrethrum industry and the control of the growing, processing and marketing of pyrethrum, for scientific and agronomic research and connected purposes. Although subsequently amended in minor detail over the years, the Act's provisions remain essentially those established almost 40 years ago.

The Act gives the PBK a monopoly over the Kenya pyrethrum industry and the Board has absolute control of the purchase of dried pyrethrum flowers, processing and marketing.

The PBK provides agricultural extension services to farmers including the supply of planting material, plant breeding and propagation.

A network of cooperatives and self-help collection centres, under the close supervision of the PBK, assists the farmers in selling their crop.

4.9 The Pyrethrum Growers Association (PGA)

The PGA, headquartered in Molo, was formed in early 2000 to represent the interests of small-scale growers of pyrethrum, particularly *vis a vis* the PBK. The formation of the PGA was prompted by the decline in pyrethrum production and a desire to address at

GOK and other stakeholder levels the problems and grievances currently being expressed by farmers. The problems that farmers face have been publicised by the PGA as follows:

- The inadequate supply of suitable planting materials.
- Poor extension services.
- Lack of loans for farm inputs.
- Poor farm road networks.
- Low producer prices (the PGA maintain that farmers only receive about 28% of the real value of their pyrethrum production, although their calculation in this regard was not available to the consultants).
- Lack of the fruits of research being made available to farmers through the transfer of technology.
- Lack of farmer representation on the PBK. The PGA maintain that the directors of the PBK are neither pyrethrum growers nor farmers' elected representatives.

The PGA are currently lobbying the GOK through the MOA, and seeking exposure in the media in order to address their perceived grievances and problems. They have requested the GOK to free up the pyrethrum industry through liberalisation and the amendment of the Pyrethrum Act, thus abolishing the PBK's monopoly and introducing competition and investment into the sector.

4.10 The GOK's Pyrethrum Task Force

In 2000 the GOK through the MOA set up a Task Force on the pyrethrum sub-sector, which is, studying, *inter alia*, the potential effect of liberalisation on the sector. The National Development Plan, in section 3.6 dealing with the production of export/industrial crops, refers specifically to pyrethrum in 3.6.22 and states that the GOK will introduce legislation to remove the PBK's marketing monopoly. Modalities will also be investigated for processing pyrethrum before exporting.

4.10 Prices

At the time of undertaking the field work pyrethrum product price details were unavailable from the PBK but the following were obtained unofficially from the market place: Pale Extract (25%) - US \$ 75 per kg, FOB Nairobi airport; Powder (1.3%) - Kshs 133.4 per kg, ex PBK factory, Nakuru; Marc - Kshs 11.00 per kilo, ex PBK factory, Nakuru.

5 INDUSTRIAL DEVELOPMENT OF PYRETHRUM-BASED PRODUCTS IN KENYA

5.1 Introduction

This section examines the domestic insecticide market, usage, and the background and potential for value addition in the pyrethrum sub-sector. The views and attitudes of key stakeholders are stated and analysed in terms of the GOK policy, sub-sector institutional

structure, domestic, regional and global markets, MNC global policy and international competitiveness. Constraints to industrial development are examined and conclusions drawn.

5.2 Pest Control Products Board

The PCPB was established in 1984 as a statutory body of the GOK, under the Pest Control Products Act which regulates the import, export, manufacture, distribution, sale and use of pest control products. The PPCB operates under four pest control product regulations:

- Licensing of premises regulation, 45/1984
- Registration regulation, 46/1984
- Labeling, advertising and packaging regulation, 89/1984
- Importation and exportation, 146/1984

The PCPB's functions may be summarised as follows:

- Regulatory: including the analysis of products for quality, the registration and approval for use of new products, the regulation of sale and distribution of products through licensing.
- Technical: including the assessment and evaluation of data on the merits of pest control products and recommended guidelines for usage, the investigation of the role of pesticides and their impact on the environment and collaboration with international organisations (e.g. FAO, WHO, UNEP) in the field of pesticide information.
- Training and information dissemination.

The PCPB have an important role to play in the development of value addition to pyrethrum-based products, as the introduction of a new product/formulation is dependent on the PCPB's approval.

5.3 Usage of pyrethrum-based products

Pyrethrum has been traditionally used as an insecticide and is recognised as having the following outstanding properties:

- Rapid action – as a contact insecticide, attacking the nervous system of insects almost immediately, causing knockdown followed by kill.
- Low mammalian toxicity – with a long record of proven safety towards humans and animals.
- Lack of insect resistance.
- Broad spectrum of activity - pyrethrum consists of a group of related compounds and has a wider spectrum of activity against insects than many other single insecticides

- Lack of persistence – pyrethrins are rapidly degraded by the combination of sunlight and air (some commentators consider this feature to be negative as it mitigates against pyrethrum's use as a field pesticide. The topic is complex and technical and time does not permit a full investigation in this interim report.).
- Repellency – pyrethrins are powerful insect repellents which, combined with their low mammalian toxicity, favour their use in many applications.

The PBK has promoted the use of processed pyrethrum products (concentrated extract, powder and marc) in the following major sectors, which have application worldwide and not solely in Kenya:

(1) Public Health

Control of disease spreading insects and other arthropods such as mosquitoes, flies, cockroaches, fleas, lice, mites, ticks, bed bugs, bees, wasps and ants. Control formulations include; powders, oil based sprays, water based sprays, fogging solutions, aerosols, coils, chips and chocs for application through electric vapourisers. It is as a general purpose domestic insecticide to protect public health that pyrethrum is best known.

(2) Animal Health:

As a feed supplement for dairy cattle, sheep, goats and horses through a PB-branded product called *Pymarc*. The product is the vegetable matter remaining after the extraction of pyrethrins from the dried pyrethrum flowers following grinding and contains important nutrients such as carbohydrates (56%), fibre (23%) and proteins (13%). It is claimed that livestock fed on *Pymarc* have a reduced incidence of intestinal parasites and an improved general appearance.

As tick greases for cattle.

(3) Grain and Tobacco Storage:

Pyrethrum can be used in the protection of stored grain and tobacco leaf against

Insect pests. The most efficient control method is through spraying individual sacks and/or misting and fogging of entire closed warehouses.

(4) Pet Care:

Efforts are being made to develop pyrethrum-based products such as dog and cat shampoos.

(5) Pest Control in Agriculture:

Traditionally, pyrethrum has not been used as in agricultural pest control for reasons of cost and, according to some sources, its instability due to its rapid breakdown in sunlight. However, research is going on in this area with a view to introducing pyrethrum-based agricultural pesticides to the market. An interesting possibility is the potential for using pyrethrum in pest control in organic farming. It appears that fruit and vegetables sprayed with pyrethrum-based pesticides may be still classified as organic. More research is

required on this subject. (Source: PBK publication, *Formulating Pyrethrum* and technical information sheets.)

5.4 Agri-chemical Association of Kenya

The Association acts a forum to monitor issues affecting the import, formulation distribution and application of agricultural chemicals in Kenya. Membership includes most companies in the sector including the major MNC's. Whilst there is liaison with the PBK as pyrethrum is not considered a major field pesticide involvement in the sub-sector is limited.

5.5 Domestic Insecticides

5.5.1 Market Background

Kenya's domestic insecticide market is valued at around Kshs 400 million (US\$ 5.12 million) p.a. The market is dominated by aerosol cans which account for about 56% of demand, with mosquito coils accounting for 39% and other products such as chips, repellents and "chocs" comprising the balance of 5%.

The market is very competitive and is dominated by four MNCs (RB, JW, Sara Lee and Bayer) whose views and attitudes to the market are examined below. The Kenyan market for domestic insecticides is expanding with population growth and the growing awareness of the public of the threat from malaria. All the companies interviewed were of the opinion that their sales and advertising campaigns should be firmly linked to the GOK's malaria prevention programmes.

The market polarizes into the low cost mosquito coil sector, with products retailing at around Kshs 5 per unit, and the more sophisticated aerosol can sector, with products costing around Kshs 100 per unit. None of the sector's leading companies have been able to bridge the gap by introducing a mid-price range domestic insecticide product, and there is doubtless a market opportunity to be exploited for the future.

Mosquito coils are used particularly by lower income level groups and in rural areas. The unreliability of power supplies has militated against the growth of more sophisticated products such as electric vapourisers.

Kenya's traditional position as the world's leading producer of pyrethrum and the availability of the main processed products (extract, powder and marc) encouraged leading brand owners to manufacture insecticide aerosol cans in Kenya. However, over the last three years these companies have ceased manufacturing in Kenya and moved away from the use of pyrethrum-based products.

Mosquito coils are still traditionally manufactured in Kenya, with only Sara Lee of the four major MNCs importing their *Ridsect* brand into the country.

An informal survey of major Nairobi supermarkets (Metro Cash and Carry, Nakumatt and Uchumi) and retail outlets revealed the insecticide aerosols and mosquito coils shown in Tables 10 and 11 to be available in the Kenya market.

Table 10: Leading Kenya Mosquito Coil Brands

Brand	Market share	Company	Remarks	Components
<i>Flower</i>	30%	KAPI	Nakuru based Company	Primarily Kenyan
<i>Mwananchi</i>	20%	JW	Manufactured under license in Nyeri Also IT and <i>Raid</i> brands for JW	pyrethrum-based products: powder and marc. + sawdust.
<i>Moskill</i>	20%	Coil Products	Local Nakuru based Company. Also manufacture <i>Doom</i> brand under license for RB	Some synthetic pyrethrins when natural pyrethrum powder not available
<i>Ridsect</i>	18%	Sara Lee	Imported from India	
Others <i>Shelltox</i>	eg: 12%	Various imported products	Various origins, particularly Indonesia, India and China	

Source: DGB/Sara Lee and others

5.5.2 Mosquito coils

Unlike aerosol cans (see below) the components, including packaging, for the manufacture of mosquito coils may be sourced almost entirely in Kenya. Consequently, at least 70/80% of Kenyan demand is met by local manufacturers. In addition, there is some export particularly to regional markets, although data are difficult to trace. Coils consist of around 60% sawdust or other filler, plus pyrethrum powder (1.3%), pyrethrum marc, starch (maize or rice) as binding agent, jos powder as binding strengthener, sodium benzoate as a preservative, potassium nitrate as burning agent, citronella, rose or other fragrances if required, metal studs and cardboard packaging. With the exception of potassium nitrate, jos powder and fragrances, all the other components required to manufacture coils are available in Kenya.

In the event of shortages of Kenyan pyrethrum-based products, a frequent occurrence in recent years, manufacturers are forced to import synthetic pyrethrins. Sumitomo of Japan is the leading source of pynamin forte.

Depending on the target market (income group/export etc) coils are produced in a range of different colours (red, blue, green, purple, brown) with or without fragrances.

Whilst there would appear to be a good future for mosquito coil manufacture in Kenya there are currently serious constraints to its development:

- Kenyan pyrethrum production cannot currently meet the demand of local manufacturers necessitating the import of synthetics.
- Poor infrastructure.
- Unreliable and costly power supply.
- Issues regarding the long-term sustainability of forests (nb: sawdust is an important component of a coil).

Table11: Leading Insecticide Aerosol Brands Available in Kenyan Retail Outlets

Brand	Market share	Company	Country of origin	Major components	Remarks
<i>Doom</i>	48%	RB	Australia	Tetramethrin 0.23% Deltamethrin 0.0015% + perfume, solvents and propellants to 100%	Formerly made in Kenya under license by TCI using pyrethrum extract.
<i>Raid</i>	20%	JW	Netherlands	Tetramethrin 0.4% Permethrin 0.1% Pyrethrin 0.1%	Formerly made in Kenya at JW's Nairobi factory by using pyrethrum extract. Imported product contains pyrethrum extract.
<i>Ridsect</i>	14%	Sara Lee	Malaysia/ Belgium	Prallethrin 0.09%, D-phenothrin 0.05% + perfume, solvents and propellants to 100%	Initially manufactured under license by TCI, now imported
<i>Baygon</i>	10%	Bayer	South Africa Netherlands	(1) Propoxur 0.1% Dichlorros 0.5% Cyfluthine 0.4% (2) Tetramethrin 0.3% Cypermethrin 0.1% Propoxur 0.74% Both above + perfume, solvents and propellants to 100%	Traditionally imported.
<i>It</i>	8%	JW	Netherlands		Formerly manufactured at JW's Nairobi factory. Imported product

					contains pyrethrum extract.
BOLT	New product	?	Kenya	Pyrethrum pale extract 25%, Piperonyl butoxide 0.2% + Permethrin 0.1% + perfume, solvents and propellants to 100%	Made under license by Arimen Industries, Nairobi Only aerosol insecticide revealed by survey as made in Kenya.

Source: DGB/Sara Lee and others

5.5.3 Aerosol cans

The major inputs needed for the manufacture of an aerosol can are: active ingredients, tinfoil, aerosol cones and domes, valves and actuators, lacquers, inks and varnishes, copper wire, propellant, electricity and labour. The aerosol can has the advantage of being practical, safe, efficient, convenient and recyclable and has a wide range of applications including medicine, agriculture, industry, personal care and in the household. A major use is in insecticides and Kenya's position as the world's leading producer of natural pyrethrum, traditionally a popular active ingredient in pest control products, has represented an excellent industrialization opportunity for the country. However, unlike mosquito coils, most of an insecticide aerosol can have to be imported.

5.5.4 Manufacturers and distributors

The following views and comments are based on interviews and discussions with the organisations concerned.

Airmen Industries Ltd – Nairobi

This company came to the notice of the consultants during an informal market survey and time did not permit further investigation. However, the company are manufacturing, under licence, in Nairobi an aerosol insecticide with pyrethrum as its major active ingredient

Aventis Environmental Science Kenya - Nairobi

Aventis is one of the largest chemical companies in the world and claim to be the largest buyer of Kenyan pyrethrum products which they reformulate, package and sell on to companies such as Johnson Wax (JW). They are not manufacturers of branded products.

Bayer East Africa Ltd - Nairobi

Bayer's aerosol insecticide brand *Baygon* has about 10% of the market and is manufactured in Australia using synthetics. They have not manufactured in Kenya in the past and claim that they would not consider doing so in the future.

Coil Products (K)

Coil Products are a leading domestic manufacturer of pyrethrum based products such as mosquito coils vapour mats vermin powder and, in the past, aerosols. In common with their competitors KAPI they have had problems in obtaining supplies from the PBK in recent years. They have had to import synthetic pyrethrins from Japan in order to maintain both their domestic and export markets for mosquito coils, which includes manufacturing under license for RB.

In common with other local manufacturers they are looking to the GOK to liberalise the market by a review of the provisions of the Pyrethrum Act, improve infrastructure and improve the policy environment with regard to tariffs and import. They believe such measures are essential to halt the decline in local manufacture and encourage new investment.

Johnson Wax EA Ltd - Nairobi

JW are an old established USA based MNC specialising in consumer products with core interests in the personal products sector. The company manufactures a variety of branded goods, including household insecticides, deodorants and soaps, from factories worldwide. The basic aim of JW's corporate philosophy is to make an acceptable return on shareholders funds from their business activities. JW take a global perspective of the industries in which they are involved, which determines factory location in accordance with key factors such as economies of scale, access to markets and cost of production. Whilst JW have a long-term view of their business activities in Kenya, the company insists that it does not see Kenya in terms of a single country market, or even as part of a regional market.

JW markets aerosol cans (*Raid/It*) and mosquito coils (*Mwananchi*), plus products under the *Raid/IT* brand, in Kenya.

JW's policy is to obtain finished insecticide products from the most cost-effective source. Currently *Mwananchi* mosquito coils are manufactured in Kenya at the Mwananchi factory in Nyeri, and aerosol cans are imported from the Netherlands. JW formerly sourced all their aerosol cans of insecticide in Kenya at their Nairobi site but manufacture has ceased. The reason given by JW for the discontinuation of manufacture in Kenya is investment constraints on meeting JW's high safety standards. It was emphasised that aerosol can manufacture is very capital intensive due to the products' inflammability and the need to ensure the highest safety standards. Manufacture in Kenya has proved too expensive and whilst their factory in Nairobi remains open JW do not plan to recommence manufacture of aerosol cans in Kenya.

JW claim to be the largest user of Kenyan pyrethrum extract/powder/pymarc using about 80% of PBK's production in their insecticide formulations. JW uses pyrethrum extracts as their active ingredient of choice in insecticide products due to its comparative advantage over synthetics as a natural product. The company stressed that with worldwide pyrethrum product demand currently exceeding supply it does not see a problem in market offtake in the foreseeable future, and with the global trend towards natural products the outlook for pyrethrum farmers is excellent. JW have a long standing and close relationship with PBK and appear to be well informed regarding the PBK's operations. The JW representative volunteered the comment that if the pyrethrum sub-sector was to be liberalized and PBK's monopoly removed, such a policy change should be planned and proceed with caution in

order to protect farmers' interests. Otherwise, agricultural production of pyrethrum could collapse in an uncontrolled free for all.

KAPI Ltd – Nakuru

KAPI manufacture, in Nakuru, mosquito coils and sticks, insecticide sprays for house and garden, and mossi chips under their *Flower* brand. In common with their competitors, Coil Products, their business has been based on pyrethrum and they have had great difficulty in obtaining supplies from the PBK in recent years. They have had to import synthetic pyrethrins from Japan in order to maintain both their domestic and export market. However, as the use natural pyrethrum has been used as a mosquito coil marketing advantage point in overseas sales, particularly to Scandinavia and South Africa, they have experienced difficulties in maintaining sales volumes.

KAPI made the following suggestions regarding the liberalisation of the pyrethrum sector, which in their view will foster increased flower production and support and encourage investment in manufacturing geared to value addition:

Licensing: KAPI would not recommend "growing and procurement" licenses, as a major objective of liberalisation is to encourage production and to remove bureaucratic bottlenecks. The company considers that efficient processors will establish long-term relationships with growers that will provide a mechanism for ensuring markets for farmers. (ii) KAPI believe that in principle the issue of "processing" licenses should be limited as the industry will be better served by having a few strong processors that are able to sustain high quality extraction and export operations rather than a large number of weak fragmented processors. In this context, local value added processing should be encourage and "processing" licenses issued only to companies that process the bulk of their production adjacent to the pyrethrum growing areas.

Pyrethrum Board of Kenya: KAPI suggested that the PBK revert largely to its original concept, with the extraction plant remaining the property of the farmers who have paid into the share capital. It should be operated by its owners as a commercial entity to extract and market pyrethrum products and with management appointed by the owners and directly accountable to them.

All regulatory responsibility should be removed from PBK and it should not receive GOK subsidies or other advantages. It should compete in the market place on an equal footing with other processors, be responsible for its financial liabilities incurred to date and be free to raise new funding for investment purposes such as enter into joint ventures, expansion, new technology etc.

Genetic material

The GOK and donors have supported the development of genetic material for many years. The genetic material should be available to all stakeholders in the industry as a national asset and should be transferred fully to KARI and MOA who can provide breeding and extension services as part of their regular Government funded activities. Additionally, private companies should be free to upgrade their own planting material on an equal footing with PBK.

Pyrethrum council: A pyrethrum council should be created to represent the stakeholders of the industry with no Government involvement and elected entirely by industry representatives. The council should have no regulatory authority but will act as a voice for the industry in dealing with the GOK and such regulatory authorities as are eventually appointed.

Industry regulation: The objective should be to minimize Government regulation and establish only enough oversight to ensure an orderly liberalization of the industry and thereafter to ensure that the industry is broadly supported and guided in the best interests of the growers, the processors and the country. The following phased approach is suggested:

Interim phase: The objective would be to carry out liberalization in the most effective way and it is envisaged that during this phase a representative industry-wide task force would work with the main industry stakeholders – including growers and potential processors, PBK and MOA and KARI.

The above would jointly firm up the principles of liberalization, broadly as outlined in these recommendations.

These principles would be incorporated into a parliamentary paper to modify the relevant legislation and create a new, more appropriate system of industry oversight.

This working group could issue a first round of processing licenses.

The duration of this phase is indeterminate; however, it would be the objective to carry out this phase of liberalization as quickly as possible, preferably within six months.

Longer-term regulation: It is recommended that once liberalization is completed a lighter, more appropriate mechanism for regulating the industry than the current system be put in place. The regulatory authorities of the PBK would be dissolved and PBK would remain only as a farmer-owned processing company with no specific advantage over other processing companies.

The MOA would provide such limited regulation as may be required. The Pyrethrum Council would work primarily with the MOA; MTTI and revenue authority to confirm that such new regulation as is put in place by the liberalization process is upheld.

The Pyrethrum Council and MOA will also, from time to time, review the appropriateness of these regulations and make such recommendations as may be necessary. It is expected that an interval of approximately 2-3 years between changes would be appropriate.

Mwananchi Ltd - Nyeri

Mwananchi is JW's mosquito coil manufacturing facility in Nyeri, renting premises from Wananchi Saw Mills (1974) Ltd; the rationale for the association being that sawdust is a key component of the product. The factory has a target capacity of 18,000 cartons (36x11x24 g), or 77 tonnes monthly. Seventy percent of production is for the Kenya market and 30 % for export, mainly to Zimbabwe, Tanzania, and Ghana and indirectly to the Middle East.

The management of Mwananchi believes that mosquito coil manufacture in Kenya, for both the domestic and regional export market, has a good future provided that the PBK can satisfy local demand for pyrethrum powder and marc, and that infrastructure, particularly roads and power supply, can be improved.

Reckit Benckiser East Africa Ltd - Nairobi

RB is a MNC, formerly known as Reckitt and Colman PLC, with their core business in the manufacture, distribution and sale of household and personnel care products.

They formerly had their leading aerosol brand; *Doom* manufactured under license in Nairobi by TCI, but now import from Australia. They indicated that given, the regular availability of pyrethrum products from the PBK, and a change in the policy environment regarding a level playing field for domestically manufactured goods compared to imported finished products, they would recommence manufacture in Kenya.

Sara Lee Household Products Ltd - Nairobi

Sara Lee is an USA based MNC manufacturing, distributing and selling food and beverages, clothing and household products. Its household products division concentrates on four core areas (shoe care, body care, air fresheners and insecticides) and owns a number of world famous brands such as *Kiwi*, *Badedas*, *Radox* and *Ridsect*.

In Kenya, Sara Lee market a range of insecticide products such as aerosols, coils, vapourisers, sprays and chocs under the brand name *Ridsect*. Although the company initially contracted TCI to manufacture their *Ridsect* aerosol product in Nairobi, this policy was discontinued as they claimed to have had problems regarding quality and delivery.

Sara Lee now imports all of its insecticides, with aerosols being manufactured in Malaysia and Belgium and coils being produced in India. The company maintains a global sourcing policy buying from where the product is cheapest, provided that quality remains consistent. They maintain that, with the exception of JW, the major insecticide manufacturers are moving away from the use of natural pyrethrum as an active ingredient, in favour of synthetics. The reasons given were:

- The supply uncertainties of a natural agricultural product.
- Pyrethrum's inconsistent pricing.
- Synthetics are easier to use and handle.
- Synthetics are more economical.
- Some companies e.g. Bayer consider it a moot point as to whether natural pyrethrum is more or less toxic than synthetics.

Notwithstanding the above comments, the company's Kenya representatives were advocates of the use of natural pyrethrum as a natural, and old established pest control product with well known characteristics.

Twiga Chemical industries Ltd - Nairobi

TCI, formerly owned by ICI Industries, is the leading contract manufacturer of aerosol cans in Kenya, with a capacity of 8 million cans p.a. TCI has had a long-term arrangement with RB, the manufacturer of *Doom* household insecticide, the country's market leader.

The Kenyan market for aerosol cans was estimated in 1995 to be around 14 million cans p.a. (source: TCI), 9 million being household insecticides with the balance primarily deodorants. Market demand, particularly for insecticides, was largely met by local manufacture, using Kenyan produced pyrethrum extract as the active ingredient. However, since 1998 local manufacture of aerosols has declined drastically. In 1999, local manufacture of aerosols amounted to 4.4 million cans including 2 million cans of insecticides (source: TCI), a reduction of 69% from the 1995 figure. Currently production has ceased completely with TCI's production line lying idle. TCI believes that the reason for this state of affairs is primarily caused by the current disparity between duties levied on imported products compared with locally manufactured products. TCI produced a report in November 1999, supported by the PBK, Caltex Oil (Kenya) Ltd and Metal Crowns Ltd, on the effect of importing finished insecticide aerosols into Kenya. The findings of the report are summarised below:

Local manufacture entails the importation of the following components attracting duty at the rates indicated in brackets: tinsplate (originally 10% - zero since December 2001), cones and domes (originally 15% - zero since December 2001), valves and actuators (originally 10.5% - zero since 2001), inks and varnishes (35%) and copper (15%). Additionally, VAT is levied on locally manufactured cans at 18%. The duty on the import of a finished aerosol can attracts duty at 15%, with no VAT applicable. Therefore, retailers of branded insecticide aerosols have preferred the cheaper imported product. This situation has encouraged the import of insecticide aerosols manufactured with synthetic active ingredients and has resulted in the demise of local manufacture in this sector. The TCI case did not address, specifically, the cost to manufacturers of natural pyrethrum extract compared to synthetic active ingredients, which is dealt with elsewhere in this report.

The overall effect on the economy of the substitution of imports for locally manufactured products is estimated as follows:

- Direct loss of employment in the chemical-manufacturing sector.
- Indirect loss of employment in the packaging, oil and transport and general input supply sectors.
- The waste of trained and skilled staff.
- A constraint to industrial expansion.
- A significant constraint to the success of Kenya's policy of industrialization by the year 2020.
- A threat to pyrethrum farmers' incomes through the limitation of markets to exports.
- The knock on effect of the loss of jobs to direct employees' extended families.

The report recommended the following solutions to what it termed as a crisis in the local manufacturing sector:

- An increase in duties on imported aerosol cans to 25%, with 15% VAT. In December 2001 duty on imported finished aerosol cans was increased to 15% from 5%.
- A reduction in duties on imported components for the local manufacture of aerosol cans to a maximum of 5%..

5.5.5 Financial institutions

The following financial institutions were interviewed:

- Stanbic Bank Kenya, Nairobi - (2) PTA Bank, Nairobi- (3) International Finance Corporation (World Bank), Nairobi - (3) Agricultural Finance Corporation, Nairobi.

With the possible exception of Stanbic Bank, who are interested in financing agricultural projects the other institutions favoured investment lending in downstream value addition style products. It is essential that this sector is included in any future stakeholder forums.

5.5.6 Current GOK policy

The major policy impact on development of the sector is the tax and VAT regime, which tends to favour imported finished products over domestically manufactured products with a high input of imported components. Current import duties on imported finished products are: mosquito coils - 20%, aerosols - 5%, "chocs" - 5% and sachets (sprays) - 5%.

6 SWOT ANALYSIS OF THE KENYA PYRETHRUM SECTOR

6.1 Introduction

In Kenya the global competitiveness of the pyrethrum sub-sector contains elements of strength and weakness and presents both opportunities and threats to the stakeholders. Table 12 seeks to analyse and clarify the most important elements in this context.

6.2 SWOT Analysis

Table 12: SWOT analysis pertaining to the Kenyan pyrethrum sub-sector

<u>Strengths</u>	<u>Weaknesses</u>
Traditional position as world's largest producer and exporter	Poor profitability/net prices to farmers thus constraining availability of products to industry
Production is now increasing after long term declines during the 1990's	Many attractive competing enterprises/lack of farmer incentives
Potential for substantial increase of flower	

<p>production</p> <p>Established dried flower processing facilities</p> <p>Knowledge and expertise in downstream value added products</p> <p>Established overseas and domestic market</p>	<p>Lack of competition/PBK's monopoly</p> <p>Poor infrastructure</p> <p>Small market in international terms</p> <p>Lack of economies of scale</p> <p>Legislation no longer appropriate to liberalised economy and globalisation</p> <p>GOK policy on imports/tax regime discourages domestic manufacture.</p>
<p><u>Opportunities</u></p> <p>International trend now favours natural pesticides</p> <p>Expansion of usage potential outside traditional insecticides</p> <p>East African regional location - potentially centre for flower processing and value addition</p> <p>Pivotal role of insecticides in malaria prevention programmes</p>	<p><u>Threats</u></p> <p>Development of competing producing countries</p> <p>Globalisation - MNC's establishing large central manufacturing bases</p> <p>Increased competition from cheaper synthetics which are available on a regular and consistent basis</p> <p>Cheap imports /dumping</p>

As the positive and negative features of the sub-sector are elaborated upon in the text of this report, particularly in section 4, 5, and 7, we summarise the situation hereunder.

The key positive elements attributable to the sub-sector are its traditional good reputation and dominant position in the worldwide supply of pyrethrum, potential for increasing flower production, position as the only significant flower processor in the region, knowledge and experience of downstream (value addition) activities. The worldwide trend away from synthetic active ingredients and pyrethrum's well established reputation as a natural insecticide augurs well for future demand. Further R&D into a range of usages beyond its role in domestic insecticides (see 5.3) should increase demand further.

Liberalisation of the economy and globalisation pose a number of constraints and threats to the development of value addition in the sub-sector, most importantly the movement of MNC's manufacturing bases offshore and the collapse of the domestic aerosol insecticide industry (see 5.6)

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The recommendations included in this section were approved by a consensus of stakeholders at a workshop held in Nakuru in February, 2002.

7.2 Findings

The development of the Kenyan pyrethrum-based pesticide industry and its global competitiveness is constrained by the following major factors:

The successful development of domestic value addition in the pyrethrum sub-sector is, in the first instance, dependent on adequate supplies of pyrethrum products to local manufacturers. Adequate supplies have not been available in recent years due to:

- The decline in pyrethrum production.
- The marketing policy of the PBK whereby overseas export clients' requirements have been satisfied before those of local manufacturers.
- Lack of grower incentives.
- The monopoly exercised by the PBK over the licensing, purchasing, processing and marketing of pyrethrum is considered by some stakeholders, particularly local manufacturers and farmers, to be a disincentive to investment in the sub-sector.
- The GOK policy relative to the duty structure, favouring imports over locally manufactured products, acts as a disincentive to investment (see 5.5.4).
- Despite current trends towards natural products as active ingredients in pesticide formulation, most multinationals still prefer synthetics, particularly in view of their lower cost and reliability of supply.
- Multinational manufacturers of leading pesticide brands do not view Kenya as a single market and source where supplies are cheapest. However, this situation could benefit locally owned industries as, given a favourable investment climate, Kenya could develop into a regional manufacturing centre for pyrethrum-based pesticides.
- Further research and development could diversify the range of products using pyrethrum and expand the market. However, domestic manufacturers claim that GOK bureaucracy, particularly relative to the approval and licensing of new products in this regard, often thwarts their efforts with regard to the PCPB.
- Potential for forward and backward linkages with other sectors needs to be encouraged, as it is not yet sufficiently developed.

7.3 Measures to Increase Pyrethrum Production

Production: Since the current system of analyzing the pyrethrin content of the dry farmers is not transparent, it is important that it is reviewed to build confidence with farmers.

Extension Services: It is vital that pyrethrum farmers are trained in the proper management and post-harvest handling practices to increase yields and reduce loss in PC. The PBK should increase the number and quality of their extension staff and ensure close collaboration with Ministry of Agriculture staff.

Profitability: The need to improve the profitability of pyrethrum at the farm level is emphasised. The profitability of pyrethrum depends on the yield, pyrethrin content (hence price) and the cost of production. Profitability of pyrethrum could be increased by:

Increasing yields and pyrethrin content through availability and use of hybrid clones and varieties. Adherence to recommended management practices (e.g. fertilizer use, weeding, disease control etc) and proper post-harvest handling of the dry flowers (e.g. drying and storage).

Reducing the cost of production through the use of existing herbicides (e.g. *Sencor* and *Venzar* to control weeds) and making use of solar driers.

Planting material: It is necessary that appropriate and adequate planting materials are made available to farmers when and if required. Since the PBK is the only agency currently mandated to research, develop and multiply seeds, it is vital that structures are put in place to enable farmers to establish a new field or expand an existing plot whenever they need to. In addition, profitability of pyrethrum depends on the yield and the pyrethrin content of the dry flowers, hence the need to come up with high yielding varieties that are suitable to specific areas. This calls for intensive on-farm research.

Provision of Credit: Since under the current act no other person/institution can buy pyrethrum from farmers, except the PBK, it would be appropriate for the institution to devise ways of making inputs, especially planting material, available on credit and deduct the cost from the proceeds.

Marketing Arrangements: The marketing of pyrethrum from the farmer to the board is inefficient due to mismanagement of cooperative societies and other farmer organizations, resulting in increased middlemen activity. It is necessary that the marketing system at the local scene is improved through strengthening farmer organizations and licensing as many farmers as possible as an incentive.

Research and Development: More resources should be dedicated to R&D in order to develop high yielding varieties suitable to each growing region.

Policy environment: This relates to the existing policy on the industry as stipulated in the Pyrethrum Act and the overall policy framework on insecticides. The Pyrethrum Act should be reviewed to allow for viable licensing requirements and elected farmer representation at the board. This will give more power to the farmers to determine their own destiny, which is in agreement with the current wave of accountability. It is also important that the government reduces its control on the industry and allows other players in the scene for competition and efficiency.

7.4 Measures to Assist Infant Industries in the sub-sector

A review of the Pyrethrum Act to enable greater competition and flexibility for users of pyrethrum flowers and products, including the encouragement of importing dried flowers from other regional producers and "toll" processing by the existing PBK facility.

Improved R&D to expand the uses of and develop new products based on pyrethrum.

The improved availability of short (working capital) and long term (investment) finance to both existing and start up ventures in the sub-Sector. A broad spectrum of the financial sector should be encouraged and engaged by the GOK and stakeholders in this context.

Priority to be given to the domestic industry by the PBK regarding the supply of pyrethrum products processed by the PBK, but at international prices without discount as in the past.

The institutions mentioned in 2.4.1 above should increase support to the sector in export promotion and marketing strategy assistance.

7.5 Policy Measures to Increase Competitiveness

The following policy measures are recommended in the immediate and short term:

A review of the Pyrethrum Act is urgently required with a view to its amendment and possible abolition to reflect the realities of a liberalised domestic economy operating in a globalised world economy. Without this action, the potential for developing the sub-sector is severely constrained.

The implementation of stricter anti-dumping measures against cheap imported substitutes, particularly mosquito coils, from Asia. Linked with this action and in the context of cheap imports, strict enforcement of the Kenya Standards Act and the Customs and Excise Act should be maintained.

The immediate reduction of import duty on imported aerosol raw material components such as copper and inks and varnishes from levels up to 35% to a maximum of, say, 5% with zero rated VAT. The implications for other Kenya manufacturing sectors using imported raw materials will need to be taken into account. This course of action would assist domestic manufacturers to operate on a level playing field *vis a vis* imported finished products which attract import duty at a flat 15%.

VAT at 18 % should be removed from imported components as whilst VAT is recoverable it ties up working capital and has a negative effect on cash flow.

The possibility of licensing the export of pyrethrum extract and powder should be investigated in order to ensure its availability to domestic manufacturers.

The potential for increasing duty on finished aerosols from the current 15% to, say 25%, should be investigated. However, GOK's commitments to reducing tariffs under various international agreements such as COMESA and the WTO must be taken into account.

In the longer term the following policy measures are suggested:

Improvements to the country's

infrastructure, particularly roads, power, water supply and telecommunications.

The GOK together with sector stakeholders to foster education in pest control subjects and initiate professional bodies and codes of practice in the sector.

Foster, through workshops and training programmes, forward and backward linkages between different sectors involved in the pesticide industry e.g. agriculture, transport, packaging, fuel and processing with a view to expanding job opportunities and revenue earning potential.

Build capacity at GOK level in the formulation and negotiation of international and regional trade agreements (Generic? Why is this of particular relevance to pyrethrum?). Pursue a strategy to make Kenya a regional flower processing and value addition centre for pyrethrum.

Foster greater cooperation and liaison between Government departments (MTTI, MOA and MOF) to ensure that objectives such as value addition, industrialisation and job creation are given national priority rather than narrowly focussed departmental targets.

7.6 Strategic Plan to Make the Sub-Sector Competitive

An effective strategy to develop the sub-sector will involve immediate/short term and medium/long-term actions.

Immediate action is recommended in order to preserve what remains of the domestic pyrethrum based industry. It was evident from discussions with the three domestic mosquito coil manufacturers in Nakuru and Nyeri and the major "toll" manufacturer in Nairobi (see 5.5.4) that urgent action is required in this context.

The following future action plan is recommended:

The immediate enactment of legislation in the policy areas of import duty on finished insecticide product and imported components (see 7.5 above).

A Pyrethrum Council should be created to represent the stakeholders of the industry with no Government involvement and elected entirely by industry representatives. The council should have no regulatory authority but act as a voice for the industry in dealing with the GOK and such regulatory authorities as are eventually appointed.

Industry regulation should proceed with the objective of minimizing Government regulations and establishing only enough control to ensure an orderly liberalization of the industry. The following phased approach is suggested:

(1) Immediate/short term:

In order to carry out deregulation and liberalization of the sub-sector in the most practical and effective manner, a representative industry-wide task force should be formed to work with the main industry stakeholders – including growers and potential processors, the PBK and the MOA and KARI.

Foster, through workshops and training programmes, forward and backward linkages between different sectors involved in the pesticide industry e.g. agriculture, transport, packaging, fuel and processing with a view to expanding job opportunities and revenue earning potential.

Build capacity at GOK level in the formulation and negotiation of international and regional trade agreements (Generic? Why is this of particular relevance to pyrethrum?). Pursue a strategy to make Kenya a regional flower processing and value addition centre for pyrethrum.

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(1) Immediate/short term:

In order to carry out deregulation and liberalization of the sub-sector in the most practical and effective manner, a representative industry-wide task force should be formed to work with the main industry stakeholders – including growers and potential processors, the PBK and the MOA and KARI.

Jointly the above would develop a set of principles under which liberalization of the sub-sector could proceed in an orderly manner, learning from mistakes made in other sectors where controls have been removed without allowing for the potential effects of liberalisation, particularly on farmers and new entrants

Jointly the above would develop a set of principles under which liberalization of the sub-sector could proceed in an orderly manner, learning from mistakes made in other sectors where controls have been removed without allowing for the potential effects of liberalisation, particularly on farmers and new entrants

These principles would be incorporated into a parliamentary paper to modify the relevant legislation and create a new, more appropriate system of industry regulation.

The issue of processing licenses to potential new entrants could be handled by the Task Force.

The duration of this phase is indeterminate; however, it would be the objective to carry out this phase of liberalization as quickly as possible, preferably within six months.

(2) Medium/longer term:

It is recommended that on completion of the essential tenets of liberalization, a lighter, more appropriate mechanism for regulating the industry than the current system should be considered and the regulatory authority and role of the PBK considered. The PBK should revert to its traditional role of a farmer-owned processing company but in competition with other processing companies. The PBK should also develop services in "toll" processing of dried flowers and consider further value-addition beyond its current product range of extract, powder and marc.

On achievement of its objectives, the Task Force should be disbanded and the Pyrethrum Council together with the GOK's appropriate ministries (MTTI and MOA) should, periodically, review the new regulations and make such recommendations as are necessary. The process should be ongoing in order to adapt to changing world economic circumstances.

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ANNEXE A

ORGANISATIONS AND PERSONS MET

Aventis Crop Science Kenya Limited
Bayer East Africa Ltd
Coil Products (K) Ltd
Export Promotion Council
Export Promotion Zone Authority
Government of Kenya
Investment Promotion Centre
Johnson Wax
The Kenya Association of Manufacturers
KAPI Limited
Kenya Agriculture Research Institute
Kenya Institute for Public Policy Research and Analysis
Ministry of Agriculture
Ministry of Finance
Ministry of Tourism, Trade and Industry
Mwananchi Ltd
Pyrethrum Board of Kenya
Pyrethrum Growers Association
Pest Products Control Board
Reckitt Benckiser East Africa Limited
Sara Lee Household and Body Care Kenya Ltd
Stanbic Bank Kenya
TCI
Tegemeo Institute of Egerton University
Twiga Chemical Industries Ltd
Wananchi Saw Mills (1974) Ltd

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ANNEXE B

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ANNEX C

CHECKLISTS

Information requested from the PBK

- **Pyrethrum Production and Marketing**

1. Total number of rural households engaged in pyrethrum production
Ave number of persons per household
Ave size of farm/ area under pyrethrum and other activities
2. Historic statistics (10 years) and future forecasts of:
Area under pyrethrum production – is it expanding or declining – Why?
Average yields of dry flower/per hectare/per annum – are they expanding or declining – Why?
Production of pyrethrum and reasons for any significant variations in volume.
Average yield of pyrethrin content /dry flower – is it improving or declining – Why?
3. What is the PBK's method of purchase of pyrethrum from farmers, including contract terms re quality/payment/weight and delivery points?
4. What are the benefits or otherwise of the PBK's licensing system?
5. Does the PBK purchase pyrethrum from other than licensed growers, eg middlemen?
6. What does the PBK consider the constraints, if any, to farmer incentives to increase production and yields?
7. What are the costs from collection point to delivery Nakuru factory and does the PBK have its own transport or use contractors?

- **Processing**

8. What are the range of products produced and their usage?
9. What is historic, current and forecasted production of products?
10. Basic information on the production process
11. Any information available on by - products of the process and their actual and potential usage.
12. What is the factory capacity and current utilisation?
13. What are the yields of products to raw material inputs?
14. What is the age of factory/machinery and equipment and could efficiencies be improved by further investment in plant and machinery?
15. What is the cost of production per unit of product?
16. What packing is used to meet customer requirements?

- **Marketing of Pyrethrum Products**

17. How are products transported to domestic and overseas markets?
18. The domestic market:
Who are the main buyers and domestic usages?

How are prices determined and how have they fluctuated historically?

What is the potential in the domestic market?

19. The export market:

Who are the main buyers overseas, destinations and what are the end usages?

How are export prices determined and how have they fluctuated historically?

Is there a known differential between natural pyrethrum products and synthetic alternatives and how does it fluctuate?

What are the export contract terms particularly regarding quality specifications, and payment?

Does PBK sell fob or c.i.f. or both? Does PBK handle its own shipping and insurance in the event of c.i.f. sales?

Does PBK have its own warehouse facilities in Mombasa or elsewhere in Kenya?

- **General**

20. What constraints are there to the development of the Kenya pyrethrum sector particularly in terms of pyrethrum production, product production, value addition, and the domestic and export markets?

21. How does the PBK view the potential for the development forward and backward linkages in the pyrethrum sector and other sectors?

22. Is the availability and cost of credit a constraint to the PBK's operations?

23. Would the PBK like to see a review of the Pyrethrum act in the context of its current activities and future strategic plans?

CHECKLIST – MANUFACTURERS

NB:- Explain Project and aims

Focus on the Pesticide Sector and products that can use natural pyrethrum products, particularly:

Insecticides (Household, garden, offices, hotels, etc)

Agricultural pesticides

Veterinary products/ pet shampoos etc

Grain storage protection

Name of company/overseas offices/head office

Range of products manufactured – overseas. -In Kenya?

Approx. turnover and volumes

Particular involvement in the Pesticide Sector

Extent of product range using natural pyrethrum/pyrethrum synthetic substitutes

Manufacturing facilities in Kenya

Experience of manufacturing products in Kenya/overseas using natural pyrethrum

Import of finished products into Kenya

Import of active ingredients and other components into Kenya.

Relationship with the PBK

Potential for using natural pyrethrum in products manufactured in Kenya

Competitiveness of natural pyrethrum as an active ingredient

Constraints to manufacturing in Kenya

Appropriateness of GOK policy/is the policy environment friendly to private sector activity and value addition to agricultural products in Kenya

Company policy re global manufacturing centres

ANNEX D

KENYA WORKSHOP ON THE COMPETITIVENESS OF THE KENYA PYRETHRUM BASED PESTICIDE INDUSTRY

Held in the Kunste Hotel, Nakuru on the 11th and 12th February, 2002

PROGRAMME

Day 1:

0800 – 0900: Registration

0900 – 1000: Opening ceremony and keynote speech

1000 – 1020: Coffee

1020 – 1300: First Session (Production)

1020 - 1040: Introduction to the workshop and its objectives – Duncan Burnett (NRI)

1040 – 1135: Pyrethrum production processing and marketing and the role of the PBK – PBK Representatives.

1135 - 1205 Pyrethrum profitability/alternative crops – James Nyoro, Tegemeo Institute

1205 – 1210: Questions

1210 – 1235: Pyrethrum – the farmers' perspective – PGA

1235 – 1300: Questions and general discussion

1300 – 1400: Lunch

1400 – 1530: Second session (Competitiveness of the pyrethrum based products sector)

1400 – 1425: The global pesticide market, current trends and developments – Duncan Burnett (NRI)

1425 – 1430: Questions

1430 – 1455: Domestic value addition – Philip McLellan, KAPI Ltd.

1455 – 1500: Questions

1500 - 1525: The impact of importing pesticides on Kenyan industrial development – H M Macharia, Twiga Chemicals.

1525 - 1530: Questions

1530 – 1600: Tea:

1600 – 1800: Third session (Competitiveness continued)

1600 – 1625: Domestic, regional and international markets for pyrethrum based pesticides – R.K. Shah, Coil Products (Kenya) Ltd.

1625 – 1630: Questions

1630 – 1655: The impact of pesticides on the environment

1655 – 1700: Questions

1700 – 1725: Policy issues affecting the pyrethrum sector – James Nyoro, Tegemeo Institute.

1725 – 1730: Questions

1730 – 1800: Global issues affecting the competitiveness of the Kenya pyrethrum sector – Duncan Burnett (NRI)

1800 – 1820: Summary of day 1 proceedings and introduction to day 2 Group sessions

1915 – 2030: Official Cocktail Party

Day 2

0830 – 1300: Fourth Session (Group discussions)

0830 – 1030: Group discussions

1030 – 1100: Coffee

1100 – 1200: Group presentations (15 minutes each)

1200 – 1300: Conclusions and recommendations

1300 – 1315: Chairman's closing remarks

1300: Close and lunch

GROUP DISCUSSIONS

The themes for discussion and recommendations were suggestions and not exhaustive, and the groups were encouraged to expand on their topics. Group themes inevitably overlap to an extent which enabled the cross-fertilization of ideas, a range of views to be expounded and resulted in a consensus of agreement amongst stakeholders on the recommendations contained in the consultants' provisional report, which had been circulated prior to the workshop.

Each Group elected its own Chairman.

Each group chairman made a 15-minute presentation on their deliberations and findings and recommendations.

The membership and suggested themes for each group were as follows:

GROUP A – PRODUCTION

Members:

FARMERS

KAPI

KARI

MOA

PBK

PGA

Themes for discussion and recommendation:

Reasons for the decline in production

Profitability of pyrethrum vis a vis alternative crops/enterprises

Planting material

On farm drying techniques

Storage and transportation facilities
Producer prices
Licensing
R&D
Extension services
Sustainability/environmental factors

GROUP B – PROCESSING AND VALUE ADDITION

Members:

EPZA
MTTI
Banking representative
Coil Products
Farmers
IFC
KEBS
PBK

Themes for discussions and recommendation:

Adequacy of dried flower supply
Dried flower quality
Factory capacity
Condition of plant and machinery
R&D
Cost of production/factory efficiency
Range of products
Potential and capacity for value addition
Environmental issues.

GROUP C – MARKETING

Members:

PBK
EPC
KAM
MTTI
FARMERS
PGA
TEGEMEO

Themes for discussion and recommendation:

Current marketing policy
The domestic market for pyrethrum based products
The international market for pyrethrum based products
Prices

New markets
Constraints and problems to efficient marketing
New products
Competition from cheap imports

GROUP D – POLICY ISSUES AFFECTING THE PYRETHRUM INDUSTRY

Membership:

BANKING REPRESENTATIVE (TBA) – (1)
COIL PRODUCTS
EPZA
KAPI
MOA
MOF
MTTI
NRI
PBK
TWIGA

Themes for discussion and recommendation:

Is the Pyrethrum Act adequate and appropriate in the current economic environment?
Finance and credit to the pyrethrum industry
GOK policy on industrial development and support to infant industries
Import policy/tariffs & duties
Export policy
Forward and backward linkages with other sectors
Current strategy towards the pyrethrum sector (the task force?)
The legal and Institutional environment.

WORKSHOP PARTICIPANTS

Representatives of:

BANKING REPRESENTATIVES
COMMONWEALTH SECRETARIAT
DIRECTOR OF INDUSTRIES
FARMERS
KAPI
KARI
MOA
MOF
MTTI
PBK
PGA
TEGEMEO INSTITUTE
TWIGA CHEMICALS

SELECTED PAPERS PRESENTED AT THE WORKSHOP

(1) KAPI LIMITED

Adding value to Pyrethrum since 1964

CONSUMER PRODUCTS: - Mosquito Coils
- Mosquito Sticks
- Household Sprays
- Industrial Insecticides
- Mossi- Chips

→ POTENTIAL - Public Health
Aerosols
Horticulture
Agriculture
Grain Protection

LOCAL AND EXPORT MARKETS:

PRODUCTS: RAW MATERIALS
Pyrethrum Powder
Pyrethrum Marc
Pale Refined Extract
Oleo Resin - Crude Extract

Industry to perform and thrive needs:-

Raw Materials Regular Supplies
Competitive Price → Security of supply.

This enables industry to energetically market value added products.

For many years Pyrethrum Board of Kenya followed a policy of supplying Local Manufacturers at a subsidised price. Perhaps to preclude moves towards competition. Certainly this was a cost of their Monopoly.

However, with the subsidy came the condition - Local Industry was rationed to between 5% and 10% of Flower Production.

- 2 -

Therefore supplies of Raw Materials to Local Industry became irregular - (variable) (totally dependant on the marketing policies of the Board, and availability of Flowers).

Thus while during the supply crisis from 1994 and from 1998 to 2001, supplies to Local Industry were slashed in line with the rationing policy.

In August 2000 prices of Pyrethrum products were increased by 69% to 100%. Having been forced to reformulate with Synthetics by the shortage, or having lost market share completely. This price increase was a mortal blow to Pyrethrum based mosquito-coils; and other price sensitive commodity products - mosquito-coils and aerosols.

Irregular supplies and High Prices together have made it very difficult to rebuild the markets lost in the late nineties.

Competition is a fact of life, and the Pyrethrum industry in Kenya has to face this fact. For Pyrethrum to compete as a Raw Material to value added products - then we need to create an environment of regular supplies at competitive prices.

(In the 21st Century, we need to review the policies, the mistakes that were made in the 20th century).

Security: The farmers
 The Intermediate processors
 Industry
 Shops
 Consumers

The market: Consumers who need a product that they can trust, at a reasonable price, with a security of supplies.

(2) Workshop on the Competitiveness of the Kenya Pyrethrum based Pesticide Industry - Nakuru, 11th & 12th November, 2002

INTRODUCTION TO THE WORKSHOP AND ITS OBJECTIVES

By

Duncan Burnett, NRI, UK

This presentation gives the background, purpose, objectives and structure of the workshop and sets the scene for the next two days activities.

Background

At the request of the Ministry of Tourism, Trade and Industry (MTTI) of the Government of Kenya (GOK), the Export and Industrial Development Division (EIDD) of the

Commonwealth Secretariat agreed to fund, in 2000, a study on the global competitiveness of the Kenya pyrethrum-based pesticide industry. The study was deemed essential in view of declining pyrethrum production, a traditional and long established agricultural enterprise, in which Kenya is the world leader, together with, the apparent imminent collapse of domestic value addition in the sector. The Natural Resources Institute (NRI), University of Greenwich, UK were contracted to carry out the study with the assistance of officers from MTTI and Ministry of Agriculture and Tegemeo Institute, Egerton University. The consultants' findings and provisional recommendations, from field trips in Kenya between November 2000 and May 2001, and UK based desk studies were incorporated into an interim report delivered to the Commonwealth Secretariat in the second half of 2001. The interim report has been made available to workshop participants.

The study was undertaken under the overall direction of the Director, EIDD, and Commonwealth Secretariat. The consultancy team comprised Duncan Burnett, Principal Economist, Enterprise, Trade & Finance Group, NRI; Dr Graham Farrell, Pest Control Management Specialist, NRI; and Ms Mary Kiiru, Research Fellow/Policy Analyst, Tegemeo Institute, Nairobi.

Unfortunately, due to prior commitments, Dr Farrell and Ms Mary Kiiru are unable to attend the workshop, and Duncan Burnett (NRI) and Dr James Nyoro (Tegemeo Institute) will present papers on their behalf respectively.

The consultancy team conducted the study in accordance with the following terms of reference:

- To assess the status of the pesticides and herbicides sub-sector and pyrethrum-based industries regarding type and quality of products, raw material sources and supply, capacity utilisation, technologies used, human resource requirements, support from the public and private sectors. A SWOT (Strengths, weaknesses, Opportunities and Threats) analysis was then carried out.
- To examine current Government policies regarding industrial development and make recommendations as to their effect on the development of the pyrethrum-based herbicides and pesticides sub-sector.
- To assess the market of pyrethrum-based products the competition posed by importing synthetic products.
- To estimate the potential levels of production of processed and semi processed products, their marketing and export, and estimate the potential for generation of direct and indirect employment in the sub-sector.
- To investigate factors and incentives influencing pyrethrum growing in Kenya, particularly production costs and the attraction of alternative economic enterprises. It was acknowledged in the study that issues regarding production and farmer incentives reflect the importance of agricultural aspects to the sector's ability to attract investment).
- To identify investment opportunities within the sub-sector and work out strategy to attract investment after reviewing the investment policies of Kenya.
- Review the effect of the sub-sector on the environment.

- To assess the potential for forward and backward linkages and linkages with other sectors.
- To recommend mechanisms for helping infant industries within the sub-sector to develop products which both meet national and international standards.
- To recommend policy measures and draw up a comprehensive strategy to make the sub-sector competitive.

In undertaking the study the consultants worked in close consultation with officials of the Ministry of Tourism, Trade and Industry, The Ministry of Agriculture and the Pyrethrum Board of Kenya. The consultants visited the PBK's (Pyrethrum Board of Kenya) facilities in and around Nakuru and Molo, and held discussions with PBK staff and a cross section of pyrethrum farmers. Local manufacturers of pyrethrum-based products in Nakuru and Nyeri were visited and their opinions and views on the future of the sub-sector were sought. The major stakeholders in the pesticide sector based in and around Nairobi were interviewed. These included multi-national companies (MNCs) toll manufacturers, trade and manufacturers' associations, government agencies, international donor representatives, research establishments and financiers.

The study included (1) an overview of the Kenyan economy with particular reference to the agricultural sector, industrial development and investment, and trade policy (2) the global pesticide market (3) pyrethrum production and incentives to farmers (4) Value addition to pyrethrum based products (5) Findings and a suggested strategic plan to make the pyrethrum sub sector competitive. These issues are the subject matter of the various presentations and discussion sessions, which will form the proceedings of this workshop.

The Purpose of the Workshop

THE PRIME PURPOSE OF THIS STAKEHOLDER WORKSHOP IS TO ENABLE STAKEHOLDERS TO CONSIDER THE FINDINGS AND RECOMMENDATIONS OF THE STUDY AND AGREE, AND PROPOSE, A STRATEGIC PLAN TO THE GOK TO MAKE THE PYRETHRUM SUB SECTOR GLOBALLY COMPETITIVE.

The Objective of the Workshop

The main objective of the workshop is to reach an industry wide consensus on a comprehensive strategy will be reached to enable the pyrethrum-based sub-sector to compete successfully in the world market place. Full details of the study's provisional findings and recommendations are included in Annexes I and II to this paper, both for ready reference and as guide to form the basis for discussion during the workshop.

The main points that require careful consideration and consensus by the workshop are:

- HOW TO PRESERVE AND HALT THE DECLINE OF THE EXISTING

DOMESTIC PYRETHRUM BASED INDUSTRY

AND

- HOW TO MAKE THE INDUSTRY GLOBALLY COMPETITIVE AND A REGIONAL CENTRE OF EXCELLENCE FOR THE PRODUCTION, PROCESSING AND VALUE ADDITION OF PYRETHRUM

THROUGH AN ACTION PLAN COVERING

- Measures required to increase pyrethrum production
- Measures to assist infant industries in the sector
- Policy measures required to increase competitiveness
- A strategic plan to make the sub sector competitive

The Structure of the Workshop

The workshop has been planned to provide, on day 1, a number of presentations on topics pertinent to the competitiveness of the Kenya pyrethrum based pesticide industry, broadly categorised into “production topics” and “competitiveness topics.” Time has been allowed for question and answer sessions and general discussion. Day 2 will be given over to group discussions, and participants have been allocated places in 4 groups, which will discuss:

- (A) Production.
- (B) Processing and value addition.
- (C) Marketing.
- (D) Policy issues affecting the pyrethrum sub sector.

Each group is requested to elect its own chairmen and make a short presentation (15 minutes) regarding its deliberations. Suggested themes have been provided for each group, however, they are not exhaustive and it is hoped that a wide range of views and a cross-fertilization of ideas will result, enabling a consensus on the way forward.

Details of presentation topics and speakers and the composition of discussion groups are contained in the workshop programme and attached papers.

Duncan Burnett
Principal Economist,
Enterprise, Trade & Finance Group,
Natural Resources Institute,
Chatham Maritime, UK

Nakuru, 11th February, 2002

(3) Presentation by Mr R Shah of Coil Products, Nakuru

Honourable Minister of Trade & Industry, Mr Nicholas Biwott,
Representatives of Associations and Organisations involved in the Pyrethrum Industry,
Distinguished Speakers & Stakeholders,
Ladies & Gentlemen

Good Afternoon,

Welcome to Nakuru, the heart of the Pyrethrum Industry in Kenya.

Sorry, do forgive me for that inaccurate statement!

Welcome to Nakuru, the heart of the Pyrethrum Industry in the World!

Thank you for allowing me the opportunity to share my views on **The Domestic, Regional & International Markets for Pyrethrum Based Products** at this fundamental workshop that intends to pave the way forward for the Pyrethrum Sector in Kenya.

The Interim Report (August 2001) prepared by the Commonwealth Secretariat and the Natural Resources Institute (University of Greenwich) on the local competitiveness of the Kenyan Pyrethrum based Pesticide Industry bears reference. I am assuming that all the stakeholders and members of the audience here do not need to be familiarised with the definitions, capabilities and limitations of Pyrethrum, and why it maintains its status as **“a beautiful daisy used to make the best natural pesticide available!”**¹

In order to keep this discussion within context, it is important to refer to the scale of representation that Pyrethrum based Pesticides command with regard to the Global Pesticide Market.

The Global Pesticide Market is currently estimated at approximately US \$ 28 Billion². With regard to the regional share of the Global Pesticide Market, Africa constitutes an insignificant 2%³. Of this, Pyrethrum based Pesticides accounted for a mere US \$ 100 Million.

Pyrethrum based Pesticides **ONLY** constitute approximately 0.36% of the Global Pesticide Market!

The good news though, is that it is still **important** enough to warrant significant focus and exposure as is being done at Forums and Workshops like these. Pyrethrum may be a small or minuscule part of the Global Pesticide Market in terms of value and volume, But Ladies and Gentlemen, let me assure you, it is **NOT** an **IMMATERIAL** part!

¹ <http://www.msue.msu.edu>

² Interim Report (August 2001) Commonwealth Secretariat

³ Interim Report (August 2001), Commonwealth Secretariat

To date, the market for Pyrethrum based Pesticides has been dominated by the USA which consumes approximately 75 % of the World Pyrethrum Supply⁴. The balance is consumed largely by Western Europe, Japan, Latin America & Asia. Alas, it is sad to note that Kenya and Africa constitute a negligible part to the Pyrethrum based Pesticides Market, even though Kenya continues to dominate the supply of Pyrethrum to the World.

In addition, as addressed by my colleague, *Mr. Macharia of Twiga Chemical Industries Ltd*, Kenya continues to import a significant proportion of its Pesticide requirements, and those too are largely of a synthetic nature. There remains the potential for Pyrethrum based Pesticides to fulfil some of those needs.

In order to effectively look at the market, it is better to classify the types of markets as compared to the locations of these markets. These can be broken down into four primary categories:

1. Domestic & Household insecticides (for the control of flying and crawling insects)
2. Agricultural Pesticides (used for pre and post-harvest protection of food crops)
3. Human and Animal Healthcare (for the control of ectoparasites)
4. Public Health Products (used in the control of disease vectors)

These are commercially available in the following product types:

1. Aerosols
2. Insecticide powders
3. Vapour mats
4. Coils
5. Lotions
6. Shampoos
7. Emulsifiable concentrates
8. Liquid emitting devices

Synthetic products have over the last forty years met the increase in demand for active ingredients used in the manufacture of agricultural and household insecticides. This comes as no surprise considering that the largest consumers of insecticides also produce the synthetic active ingredients.

Pyrethrum continues to play a minor stake in comparative terms to its synthetic cousins. The primary reasons are it's limitations, irregularity of supply, and of course, Price!

Nevertheless, there are changes. Yes Ladies and Gentlemen, there are changes!

The markets have matured over time and in turn have brought a series of complexities that favour Pyrethrum based Pesticides. These complexities are threatening the existence of some synthetic pesticides, challenging the efficacy and positions of others, opening up new opportunities, and overall creating the ideal grounds for a shake-up in the Global Pesticide Market. These complexities are:

⁴ Eisner (1991)

1. Pyrethrum Redefined!

“The image of Pyrethrum has changed. It used to be a product with insecticide properties subject to competition from any other product with the same characteristics, BUT NOW it is looked upon as an insecticide of natural origin and therefore cannot be compared with products of different origins – even if at the end of the day they have the same function”⁵

⁵ V de Rinaldini, 2000

2. Regulation

Recent developments in consumers' requirements and regulations governing the use of pesticides have initiated a shift in the demand for actives, towards products of natural origin. In 1991, the Council of the European Community, "*in consideration of the fact that consumers increasingly demand agricultural products and foodstuffs that have been grown biologically*" adopted Regulation number 2092/91. This Regulation establishes biological production methods, and the phytosanitary products that can be used on crops, in order to qualify as having been biologically produced. Pyrethrum is recognized as a biological product under this Regulation.

In 1999, The Council adopted a new regulation (No. 1804) which completed the proceeding 2092/91 and extended the norms on the biological methods of agricultural produce to include animals, non transformed animal products to transformed animal products, destined for human consumption.

The European Commission also set up a process for harmonizing the regulation of pesticides used in the agricultural industry of the Union's countries, especially fixing common maximum permitted levels of pesticide residues in fruits and vegetables. The directive is also applicable to imports from outside the Union. As a result, growers of fruits and vegetables intended for export are keen to use pesticides with low residue levels.

These developments have provided Pyrethrum with an excellent opportunity for its return to the agricultural industry. This opportunity must be exploited.

3. The "Green" Factor

There is a committed move towards "organically grown, organic products"! What product, other than Pyrethrum, can best suit such a niche market?

4. Increased Awareness of Pyrethrum

Over the last few years, as the markets and consumers have consciously moved towards a more natural pesticide, the awareness of Pyrethrum has increased. In addition, usage patterns of synthetics for over 2-3 decades have resulted in resistance and residue effects, which have further supported the selection of Pyrethrum as a Pesticide.

5. Emerging Markets

Many opportunities lie in the penetration of Pyrethrum based Pesticides in Emerging Markets, as well as in sectors where there are a growing number of consumers who are willing to pay premium for the freedom to choose a product that is not harmful to them. Once again, Pyrethrum stands out as a pesticide of choice.

6. The Public Procurement Process

Africa receives a lot of aid from the rest of the world. A significant part of this comes in the form of goods and services. There are many programs that support the fight against Malaria and other Vector borne diseases on the African Continent. It is a shame to note that not much is being done in terms of the promotion of Pyrethrum based Pesticides (such as larvicide's) to this specialised "market".

In order to cultivate and take advantage of the opportunities ahead, the Pyrethrum Industry in Kenya needs to address a number of key issues. These are:

1. Regular and Consistent Supply

There is a need to ensure that a regular and consistent supply of Pyrethrum is available in order to ensure that organisations and participants throughout the channel can effectively **PLAN** and **DEPEND** on Pyrethrum. The pyrethrum grower has a very important role to play if the industry is to flourish.

There has to be sustained production of adequate supplies of pyrethrum flowers throughout the year. I am sure that the farmers and the Pyrethrum Growers Association present at this workshop appreciate the need for a serious and focused approach (including investments in the growing sector) to fulfilling a crucial role in the development of the Pyrethrum Sector. This would also involve the re-education of farmers to provide increased efficiency and output.

Recent reports in the media regarding pricing and bonuses do not offer comfort or encouragement to the farmers. There is a need for all Stakeholders to “work together” in order to alleviate and move forward from the detrimental stalemates that frequently arise.

2. Independent Think Tank / Task Force

There is a need to set up an independent, Not For Profit, think tank (possibly, the “New” Pyrethrum Board) that is responsible for the promotion, research, and development of the Industry. Some of its key tasks should include:

- ⊙ Increased research and development by the relevant bodies to ensure that Pyrethrum applications to “New” World requirements are met
- ⊙ Data generation (as per the requirements of EC and other registrant bodies) as well as securing registration of locally manufactured products with World Health & Chemical Organisations (e.g. EPA/HSE)
- ⊙ Development of formulations for agricultural use, especially for organic farming.
- ⊙ Act as a Lobby Group promoting a Global Education and Awareness Program to ensure that consumers make “informed” decisions about the pesticides they use

3. Registration with World Health & Chemical Organisations

Authorities established in each country regulate importation and use of pesticides, within their jurisdiction. It is therefore a pre-requisite that they have to be approved and registered before they are available to consumers. This requirement serves to protect the consumer and the environment, and should be encouraged at all levels. However, the requirements set by some of the regulatory bodies are beyond the capabilities of local manufacturers. The charges levied for the evaluation of the products are extremely high, particularly in Europe and America.

4. Regional Competitiveness

Capitalise on the Regional Competitiveness of Pyrethrum from East Africa, and move towards a more unified and transparent structure, enabling all stakeholders in the region to participate in the growth opportunities. Possibly even promote co-operative arrangements between growing and processing countries for greater stability in all aspects of supply, quality, and pricing. It is sad to note that in the past, during times of shortages, the East African Countries have not been able to work together to combine their resources and fulfil market needs. I sincerely hope that we can alleviate such problems.

5. Governmental Initiative

A serious, fair and transparent Governmental initiative to capitalise, for the benefit of the Country, the Natural resource we have in Pyrethrum.

6. Liberalisation

To promote the competitiveness of the Pyrethrum Industry by exposing it to Market Forces and fair business practises through liberalisation, and through the decreasing of bureaucracy and red tape.

7. Value Addition

To enable Regional partners within the supply chain from flower to pesticide to develop and grow their businesses through Value Addition to the Pyrethrum actives.

8. World Class Companies

The private sector in Kenya **IS** capable of playing an active role in the processing and formulation of Pyrethrum based Pesticides. Should the Government be considering the liberalisation of the Pyrethrum Sector, I feel strongly to let all the stakeholders present here know that the Private Sector **is and can** meet the required World Standards in terms of Quality, Efficiency, Production, Environmental Issues, etc.

I call upon representatives of the Private Sector present here to take up the challenge of bettering, **NOT** equalling, the existing high standards set by the Pyrethrum Board.

9. Customer Base

To increase the number of customers so as to avoid “dependency” on a few large customers.

10. Regional Blocs

Capitalise on the strategic benefits of being part of regional trading blocs such as EAC/COMESA which would allow for a competitive edge in the pricing of Pyrethrum based Pesticides in such markets.

In conclusion, the future for Pyrethrum is bright. The real question is whether Kenya and the Pyrethrum Sector **IS, CAN BE, OR WANTS TO BE** in a position to capitalise on the opportunities that appears on the horizon.

Ladies and Gentlemen,

Thank you for your time and attention.

I wish this workshop success in achieving its goals and I look forward to an optimistic future for the flower that binds us all together ...**Pyrethrum!**

(4) Workshop on the Competitiveness of the Kenya Pyrethrum based Pesticide Industry - Nakuru, 11th & 12th November, 2002

THE GLOBAL PESTICIDE MARKET – CURRENT TRENDS AND DEVELOPMENTS

By

Duncan Burnett, Principal Economist, NRI, UK

Introduction

Unfortunately, my colleague at the NRI, and member of the consultancy team, Dr Graham Farrell, is unable to be present at the workshop today due to prior commitments.

Therefore, I have been requested to speak to you on “ The global pesticide market, current trends and developments.” Dr Farrell’s work on this subject is acknowledged and can be found in section 3 of the Interim report.

Whilst I am not a specialist in this field, I will endeavour to answer any questions that may arise from this paper. Should anyone require any information beyond my capability to answer I will endeavour to obtain a written response from my pest control management colleagues in due course.

General Background:

This paper examines the global pesticide sector, current trends and uses, and places pyrethrum in the context of the world market. The overall Kenya pesticide sector is also examined with particular reference to imports and usage.

Pesticides from natural sources have long been used for the control of insects, and their use was recorded in China some 1500 years ago. In more recent times, plants originating in the Middle East, were commercialised in Europe and USA in the 1880s, where the only pesticide alternatives, at the time, were arsenic, sulphur and nicotine, all with high mammalian toxicity.

Synthetic pesticide have played a dominant and increasing role in agricultural intensification worldwide over the past fifty years, and this trend has been at the expense of natural products. Consequently, by the 1940s synthetics had overtaken pyrethrum and other natural products as the main active ingredients in pest control products.

World Pesticide Use and Trends

There are over 50 synthetic pyrethroids and the latest edition of the Pesticide Manual, a worldwide directory of pesticides, has 812 pesticide entries.

Market size and use:

Worldwide pesticide use increased steadily by around 5% p.a. during the 1970s and 1980's. More recently, the market has matured, with lower growth, industry amalgamation and takeovers, and slower innovation rates.

World use of pesticides in 1999 was estimated at \$28 billion (2 million tonnes of active ingredient) at the user level, an increase of 1% since 1994. By 2004, world pesticide sales are likely to decline to \$27 billion annually, though this decline may be offset by increases in sales of pest- and pesticide-tolerant crops. The herbicide sector accounts for the major part of pesticide sales in the USA where retail price competition remains high because planted crops and production area have not increased substantially.

The size of the world market for pesticides can be broken down by crop application, as follows:

- fruit and vegetables - 26%
- cereals - 15%
- maize - 12%
- rice - 10%
- soybeans - 9.4%
- cotton - 8.6%
- sugar beet - 2.8%
- oilseed rape - 1.6%
- The balance of 14% is used on other food and non-food crops

Consumption trends:

In 1995 world pesticide consumption was 2.6 million tonnes of active ingredients, with a market value of \$38 billion, 85% being used in agriculture.

Annex A (3) shows that about 75% of pesticide usage is in developed countries, mostly USA, Western Europe and Japan. In most developing countries pesticide use as insecticides control predominates, eg 100,000 tonnes p.a. of mosquito coils are sold worldwide. Insecticides of choice in the developing world tend to be older, broad-spectrum compounds such as OP's and carbamates that are noted for their acute toxicity.

They are popular because they no longer enjoy patent protection and therefore are cheaper than newer, proprietary brands.

Pesticide use is growing more quickly in developing countries and in the decade between 1983 and 1993, sales increased by 72% in developed countries, but by 81% in developing countries.

Intensification of world agriculture may entail a substantial increase in the use of pesticides, but different patterns of use will continue to occur. A decline in traditional pesticide use in North America and Europe is already evident due to increasingly tight requirements for safety testing and registration, the advent of newer compounds that are effective in lower doses, the increasing interest in IPM by growers that encourages alternative, non-pesticide approaches and the rise in the organic movement in Europe.

The insistence by regulatory bodies on re-registration of old compounds has resulted in the reluctance of companies to go through lengthy and expensive safety testing regimes for cheap compounds that are not protected by patent. Therefore, pesticide companies would rather invest in new compounds, which provide a better rate of return.

Future trends:

Predicting future pesticide use is difficult, but it is possible to identify some trends, which may reveal opportunities for pyrethrum. In the developed world there is a trend towards newer compounds that are more selective, less toxic to humans and the environment and require lower application rates. New compounds are needed to replace older chemicals that are likely to be banned or restricted. For example, all EU approvals of pesticides based on permethrin (except for forestry products) should have been withdrawn by 27 June 2001, with all existing stocks to be used up by 27 June 2002.

The Global Pesticide Market (Production and Sales)

Background general trend:

As noted above pesticide sales are increasing in the developing world. Sales in India rose 5% by volume in 1995/96 with Brazil and China experiencing similar growth rates. This trend has partly arisen from growing local production, with Brazil and India now registered as significant pesticide exporters, and China's capacity having increased by 40% from 1995 to 1996. Most of this growth is in older, more toxic compounds. The best selling pesticide in India is monocrotophos, a highly toxic insecticide whose registration was cancelled in the USA in 1988.

Market saturation for existing compounds is approaching in the North and therefore, pesticide companies are looking to the South for market expansion, eg, between 1992 and 1996, exports of pesticides from the USA increased by 40%.

The Non Crop pesticide market:

Non-crop pesticides (eg, home and garden pesticides, industrial herbicides, pest-control operator products, turf pesticides, public health pesticides) constituted over 12% of the global pesticide market in 1997 (i.e. about \$3830 million) with the market growing faster than its agricultural counterpart. Around 75% of non crop pesticide sales were obtained by

15 compounds, five of which were synthetic pyrethroids, details are given in Annex A (1) to this paper.

The top manufacturers in the non-crop pesticide market in rank order are:

- Dow AgroSciences.
- Monsanto.
- Lesco.
- Novartis.
- Zeneca
- DuPont.
- Aventis (incorporating AgrEvo and Rhône-Poulenc).
- Bayer.
- Scotts.

The above companies sales figures are shown in Annex A (2)

The major companies involved in the home and garden pesticide sector are, SC Johnson, Reckitt and Colman, and Sara Lee, Aventis and Sumitomo, dominating world pesticide production, accounting for 80% of all sales. The pesticide sales of the top ten producers are given in Annex A (2). The USA is the world's largest market for non-crop pesticides, with sales of \$1,654 million in 1997 (excluding timber and home and garden sales), followed by Japan (\$420 million) and Germany (\$178 million). There is probably considerable room for expansion in other developed countries. In developing countries, pesticide use is likely to increase as living standards rise. In addition, niche markets may expand particularly those for garden products in the USA resulting from increases in the proportion of over 40s in the population.

Threats to the Use of Synthetics in Pesticides

The EU has been implementing a programme to establish harmonised maximum residue levels (MRLs) for pesticide in foodstuffs and a list of 102 active ingredients has been established in this context. Furthermore, the UN Environment Programme, agreed by over 120 countries, proposes to eliminate the world's most harmful pollutants, known as the "dirty dozen", which include the following eight pesticides: aldrin, dieldrin, chlordane, DDT, furans, endrin, mirex, and toxaphene.

The "dirty dozen" are also referred to as POPS (Persistent Organic Pollutants) and have been linked to cancer, birth defects and lowered sperm counts (source: The London Times, 11 December 2000).

The above developments illustrate the trend away from the use of synthetics and point to the opportunities for natural products such as pyrethrum.

With regard to synthetic pyrethroids the main threat is the need for re-registration and the lack of research investment to make them usable on crop pests in the field (they are unstable in sunlight and therefore cannot be used on field crops – only niche markets are currently available). Attempts have been made to coat pyrethrum with UV protectants,

Source:

such as gelatin or fatty acids for use on high value crops, but the high cost of the base material needs to be reduced.

In addition, plant breeders are interested in lucrative licensing arrangements that rely on new, high yielding strains, or new processes to extract the active ingredients more cheaply; neither of these exists at present.

Natural Pesticides (World Pyrethrum Production and Use)

The major pyrethrum producers are Kenya, Australia (Tasmania), Rwanda and Tanzania, with minor production from Papua New Guinea, Ecuador, India, Uganda and China. In 2000 world demand was estimated at 20,000 tonnes p.a. of dried pyrethrum flowers against current production of about 12000 tonnes in that year. Details of world pyrethrum production are shown in Annex A (4).

The value of the world pyrethrum market was about \$100 million in 1990 and \$400 million in 1992. Details of worldwide production of pyrethrum are given in Annex A (4) to this paper.

Pyrethrum is relatively new but expanding crop in Tasmania where it is grown on a commercial farming basis. With 10-15% share of the world market, Tasmania is now the second largest producer behind Kenya, and briefly overtook Kenya as the leading producer in 2000.

Aventis (through their French subsidiary PYCO) in Europe is investigating alternative uses for French grown pyrethrum. However, the company maintains that this initiative is not aimed at competing with the major established producers but to develop new markets for the crop in Europe, particularly in organic farming. The EU has recently funded a project in this area.

Pyrethrum continues to be competitive with synthetics in specialised areas where selective toxicity and low environmental hazard are most important, e.g. control of insects in stored products, as a space spray in the food processing industry, and as a pre-harvest spray where field workers need to re-enter the field within 24 hrs.

The USA uses 75% of the world supply of pyrethrum. It is used for pre- and post-harvest sprays for foodstuffs in transit to food processing facilities, or for food stuffs kept in the dark, for intestinal parasites in livestock, head lice shampoo, pet shampoo, some indoor insect sprays, inside stock houses or on farm, to flush out field pests that are then killed with a different insecticide. Indoor sprays are synergised with piperonyl butoxide.

Pyrethrum is combined with carbon dioxide by BOC Australia and sold as *Pestigas* for the treatment of cut flowers for export from Australia.

The Kenya Pesticide Sector

The Kenya pesticide industry covers the manufacture, formulation, import, repackaging and distribution of pest control products for use in the agricultural, household and public health sectors. Whilst the agriculture/livestock sector are the largest users of pest control products, there is also the vital need to ensure public health and control diseases such as

malaria by the use of efficient pesticides. The sector makes a significant contribution to GDP and employs around 50,000 persons either directly or indirectly.

Kenya is primarily an importer of various raw materials, active ingredients, technical graded products and complete formulations for use in pest control and allied activities. Details of the major groups of pesticides imported into Kenya, including, insecticides/acaricides, herbicides, and fungicides are shown in Annex A (5). Details of the uses of insecticides and acaricides, with their countries of origin are shown in Annex A (6)

The raw materials used in the pesticide sector are varied and may be classified into the following major chemical groups:

- Carbonates and dithiocarbamates, chlorophenoxy compounds, organochlorines, organophosphorus compounds, nitro compounds, biopesticides (*Bacillus thuringiensis*, pheromones etc), heterocyclines (atrazine etc), synthetic pyrethroids (permethrin, cypermethrin, tetramethrin, sumithrin etc), natural pyrethrins (pyrethrum extract), solvents, fragrances, miscellaneous compounds, wetters, stabilizers, spreaders and inert materials.

In 2000 Kenya imported 4432 tonnes of pesticides valued at Kshs 2201 million (US\$ 28.22 million) of which insecticides and acaricides were the largest group in terms of both volume and monetary value. The details shown in Annex A (4) are based on applications for importation of pest control products for commercial purposes approved by the PCPB. The data does not include quantities and values of pest control products imported by the MOA as commodity aid/grants.

With regard to insecticides/acaricides containing natural or synthetic pyrethrins, in 2000 Kenya imported 561 tonnes with a value of Kshs 264.95 million (US\$ 3.4 million) It should be noted that there are no herbicides whose active ingredients are natural pyrethrin or synthetic substitutes. Details are given in Annex A (5)

Conclusion

The global pyrethrum-based pesticide market, valued at US\$ 100 million, is relatively insignificant compared to an overall pesticide market that is worth around US\$ 28 billion. However, the current demand surplus over supply, together with the worldwide trend away from synthetics, augurs well for pyrethrum's future.

Duncan Burnett
Principal Economist,
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Natural Resources Institute,

Chatham Maritime, UK

Nakuru, 11th February, 2002

Annex A

Annex A (1) - Non-crop pesticides

Rank	Product	Note
01	Glyphosate	Herbicide
02	Chromium copper arsenate	Wood preservative
03	Allethrin	
04	Permethrin	
05	Chlorpyrifos	Being reregistered
06	Tetramethrin	
07	Pyrethrins	
08	Creosote	Wood preservative
09	2,4-D	Herbicide
10	Diuron	Water contaminant
11	Carbaryl	Restricted use insecticide
12	B-cypermethrin	Herbicide
13	Dimethalin	Herbicide
14	Diazinon	Insecticide

Source: DR/AIS (2000)

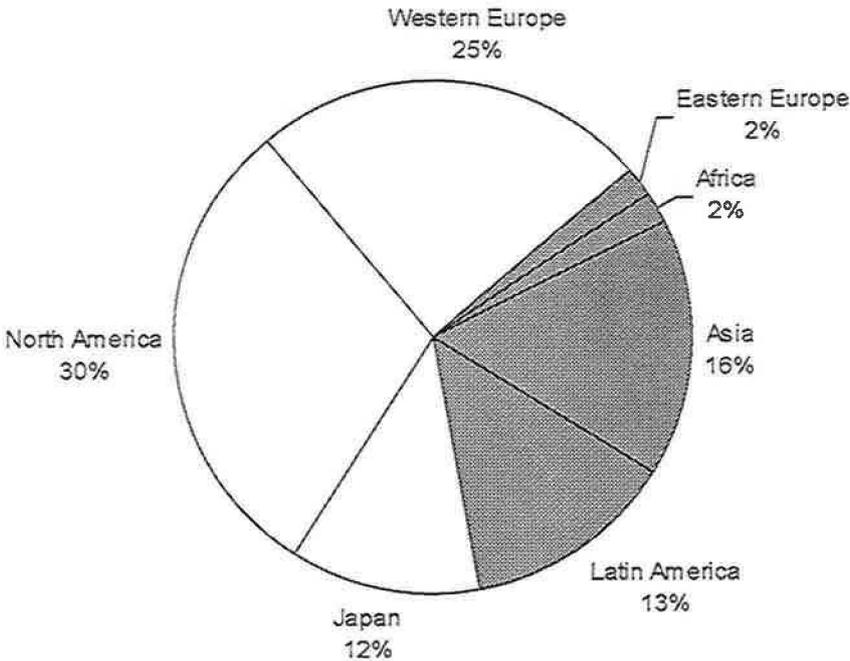
Annex A (2) - Pesticide sales from the top ten producers (\$ millions)

Company	1996	1997	1998	1999 (first half)
Syngenta (Novartis/ AstraZeneca)	6698	6873	7049	3733
Aventis (Rhône- Poulenc/AgrEvo)	4665	4554	4676	2672
Monsanto	2555	3126	4032	3069
BASF (American Cyanamid)	3492	3974	4139	2333
DuPont	2472	2518	3156	1872
Bayer	2343	2254	2273	1784
Dow AgroSciences	2010	2200	2132	1333
Total	24235	25449	27457	16796
Total*	30603	31896		

Source: Kuyek, 2000

*All pesticides (Dinham)

Annex A (3) – Developed countries dominate pesticide use



Annex A (4) - Production of pyrethrum worldwide

Country	Production (Mt of dried flowers) (year)	Value (\$US million) Farm gate Added value ¹	Area (ha)	Number of growers	Main export market	Ref.
Tasmania	2000 (1995)	1.2 3.5	1000	85	USA	<i>Deck, 1997</i>
	300 (1989)		1200			<i>CIG Pyrethrum, 1995</i>
	2500 (1993)					<i>Eisner, 1991</i>
Kenya			26330	200,000	USA, Europe, Asia	
	19000 (1983)	8.3-10.0	97300 ²			<i>Wandahwa et al., 1996</i>
	3000 (1984/6)					
	10000 (1991)					
	10000 (1991)	b) 102	26300 ³			<i>Wandahwa and van Ranst, 1996</i>
	11979 (1994)	b) 33				<i>KTB, 1999</i>
	10550 (1995)	b) 25				
	7470 91996)	b) 37				
	6220 (1997)	b) 22				
	7120 (1998)	b) 30				
Ecuador	1610 (1968)					<i>Materu, 2000</i>
	1100 (1972)					
Japan	950 (1968)					<i>Materu, 2000</i>
	600 (1972)					
Rwanda	1170 (1972)					<i>Nzabagamba, 2000</i>
	1500 (1976)					
Tanzania	6000 (1966) 400 (1999)	a) 0.42	8120	20000	USA	<i>Mhekwa et al., 2000</i>
	1000 (2000)					

¹value added by processing in-country; ²theoretical maximum; ³theoretical maximum of 40,866 km²

Annex A (5) - Import of different groups of pesticides into Kenya - 1994/2000

1: Value (C and F Kenya Port) in million Kshs

Year	Insecticides and acaricides	Herbicides	Fungicides	Others	Total
2000	1114.1	298.6	713.9	74.7	2201.3
1999	1178	259	891	181	2509
1998	1196.9	521.3	1358.5	37.7	3114.4
1997	1164	301.5	827.2	113	2405.7
1996	1405.4	389.9	1049.1	102.1	2946.5
1995	707	312.1	682.6	74.4	1776.1

2: Quantity in metric tonnes

Year	Insecticides and acaricides	Herbicides	Fungicides	Others	Total
2000	1762	633.4	1665.9	370.6	4431.9
1999	2186	593	2284	1116	6179
1998	1814.4	1407.8	4225.4	158.8	7606.4
1997	2077.8	703.1	2391.0	655.6	5827.5
1996	1876.2	997.9	3469.8	602.5	6946.4
1995	1413.3	870.6	2323	501.9	5108.8
1994	1049.9	747.4	1671.8	563.3	4032.4

3: Percentage of total monetary value

Year	Insecticides and acaricides	Herbicides	Fungicides	Others	Total
2000	50.6	13.7	32.4	3.3	100
1999	47	10.3	35.5	7.2	100
1998	38.43	16.73	43.62	1.21	100
1997	48.4	12.5	34.4	4.7	100

1996	47.7	13.2	35.6	3.5	100
1995	39.8	17.6	38.4	4.2	100
1994	37.4	22.3	33.7	6.6	100

Source: PCPB

Annex A (6) - Insecticides/acaricides imports into Kenya in 2000

Category (year 2000)	Quantity in metric tonnes (year 2000)	C and F value in Kshs (year 2000)	Country of origin (year 2000)
Agricultural	40.4	49.75	UK, Belgium, India, USA, France, Netherlands
Livestock	1.0	2.0	Zimbabwe
Household	514	172.9	Australia, UK, France, Italy, USA, Malaysia, South Africa, India, Belgium, Netherlands, Indonesia
Active ingredients	5.6	40.3	UK, France, India, Japan

Source: PCPB

(5) GLOBAL ISSUES AFFECTING THE COMPETITIVENESS OF THE KENYA PYRETHRUM SECTOR

By

**Duncan Burnett,
Principal Economist,
Natural Resources Institute,
Chatham Maritime,
UK**

Global Issues Affecting the Competitiveness of the Kenyan Pyrethrum Sector (SWOT)

Slide 1

◆ INTRODUCTION

➤ GLOBAL COMPETITIVENESS – THE KEY ISSUE

Analysis Contains Elements of Elements of

- Strength**
- Weakness**
- Opportunity**
- &**
- Threats**

**Usually Represented Diagrammatically by a MATRIX
Known as SWOT ANALYSIS**

SEE TEXT

Socio –Economically SWOT Also Implies Analysis of Comparative Advantage

Comparative Advantage is the Economic Term Giving the Theoretical basis of a Country's Measure of Success in International Trade

THEREFORE

THE QUESTIONS TO ASK ARE

- **DOES KENYA HAVE COMPARATIVE ADVANTAGE IN ITS PYRETHRUM SECTOR ?**

AND

- **WHAT OTHER FACTORS IMPINGE ON THIS ISSUE ?**

Egs:

- **Government Policy / Legal Framework**
- **Internal Social Issues**
- **Externalities such as the International & Regional Trade Regime**
- **Environmental Concerns & Safety**

- **MANY OF THESE ISSUES HAVE BEEN ADDRESSED IN TODAY'S PRESENTATIONS**

Global Issues Affecting the Competitiveness of the Kenyan Pyrethrum Sector
Slide 2: SWOT MATRIX

<p><u>Strengths</u></p> <ul style="list-style-type: none"> • Traditional position as world's largest producer and exporter • Production is now increasing after long term declines during the 1990's • Potential for substantial increase of flower production • Established dried flower processing facilities • Knowledge and expertise in downstream value added products • Established overseas and domestic market for semi processed products 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> • Poor profitability/net prices to farmers thus constraining availability of products to industry • Many attractive competing enterprises/lack of farmer incentives • Lack of competition/PBK's monopoly • Poor infrastructure • Small market in international terms • Lack of economies of scale • Legislation no longer appropriate to liberalised economy and globalisation • GOK policy on imports/tax regime discourages domestic manufacture.
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> • International trend now favours natural pesticides • Expansion of usage potential outside traditional insecticides • East African regional location - potentially centre for flower processing and value addition • Pivotal role of insecticides in malaria prevention programmes 	<p><u>Threats</u></p> <ul style="list-style-type: none"> • Development of pyrethrum production in competing producing countries • Globalisation - MNC's establishing large central manufacturing bases • Increased competition from cheaper synthetics which are available on a regular and consistent basis • Cheap imports /dumping

Slide 3

◆ STRENGTHS

- **TRADITIONAL POSITION AS WORLD'S LARGEST PRODUCER AND EXPORTER**
- **PRODUCTION IS NOW INCREASING AFTER LONG TERM DECLINES DURING THE 1990'S**
- **POTENTIAL FOR SUBSTANTIAL INCREASE OF FLOWER PRODUCTION**
- **ESTABLISHED DRIED FLOWER PROCESSING FACILITIES**
- **KNOWLEDGE AND EXPERTISE IN DOWNSTREAM VALUE ADDED PRODUCTS**
- **ESTABLISHED OVERSEAS AND DOMESTIC MARKET**

Global Issues Affecting the Competitiveness of the Kenyan Pyrethrum Sector

Slide 4

◆ WEAKNESSES

- POOR PROFITABILITY/NET PRICES TO FARMERS
THUS CONSTRAINING AVAILABILITY OF PRODUCTS
TO INDUSTRY**

- MANY ATTRACTIVE COMPETING ENTERPRISES /
LACK OF FARMER INCENTIVES**

- LACK OF COMPETITION/PBK'S MONOPOLY**

- POOR INFRASTRUCTURE**

- SMALL MARKET IN INTERNATIONAL TERMS**

- LACK OF ECONOMIES OF SCALE**

- LEGISLATION NO LONGER APPROPRIATE TO
LIBERALISED ECONOMY AND GLOBALISATION**

- GOK POLICY ON IMPORTS/TAX REGIME
DISCOURAGES DOMESTIC MANUFACTURE.**

◆ THREATS

**➤ DEVELOPMENT OF PYRETHRUM PRODUCTION IN
COMPETING PRODUCING COUNTRIES**

Egs:

Australia (Tasmania) / Tanzania / Rwanda

Are Developments in the EU (France) a threat?

**➤ GLOBALISATION - MNC'S ESTABLISHING LARGE
CENTRAL MANUFACTURING BASES**

**➤ INCREASED COMPETITION FROM CHEAPER
SYNTHETICS WHICH ARE AVAILABLE ON A
REGULAR AND CONSISTENT BASIS**

➤ CHEAP IMPORTS /DUMPING

Slide 6

◆ OPPORTUNITIES

- INTERNATIONAL TREND NOW FAVOURS NATURAL PESTICIDES**

- EXPANSION OF USAGE POTENTIAL OUTSIDE TRADITIONAL INSECTICIDES / NON CROP APPLICATIONS**

- EAST AFRICAN REGIONAL LOCATION - POTENTIALLY CENTRE FOR FLOWER PROCESSING AND VALUE ADDITION**

- PIVOTAL ROLE OF INSECTICIDES IN MALARIA PREVENTION PROGRAMMES**

◆ CONCLUSIONS

KENYA'S PYRETHRUM SECTOR HAS THE OPPORTUNITY & POTENTIAL TO OVERCOME ITS WEAKNESSES AND THREATS AND DEVELOP INTO THE REGIONAL CENTRE FOR

Pyrethrum processing & Value Addition

AND

DEVELOP A FLOURISHING EXPORT BUSINESS IN:

BUT TO SUCCEED

IT MUST

WITHOUT DELAY

- **Create A Suitable and Private Sector “Friendly” Legal & Regulatory Framework**
- **Actively Encourage & Support Private Sector Investment in the Sector**
- **Take an Informed & Proactive Stance in International & Regional Trade Negotiation Forums**
- **Support R& D in the Sector**

(6)

**EFFECT
OF
IMPORTING
FINISHED
INSECTICIDE
AEROSOLS**

JUNE 2001

(JANUARY 2002)

Over 7 million cans valued at approximately Kshs. 1 billion. This volume requires 700 tons of liquidified petroleum

The East African market for insecticide aerosols is gas (LPG), 600 tons of solvents, 7 million cans and 20 tons of active ingredients. Until last year, the demand has always been met by locally manufactured products. Recently, we have seen entry of new imported products and a deliberate discontinuation of previously locally manufactured ones in favour of imported substitutes.

This has been largely encouraged by an existing enormous disparity between duty levied on products from the two sources. Inputs for local manufacturing attract 10 to 15% import duty and 15% VAT. Duty on imported finished product is only 5% and zero VAT. The impact is a combined loss of Kshs. 102 million in government revenue.

Worldwide, the best known natural insecticide is pyrethrum which contains a blend of six active ingredients. It is renowned for its safety to humans and mammals because of its low toxicity and non persistence in the environment compared to its competing synthetic alternatives. Kenya has been the leading producer for many years. Pyrethrum extract has successfully been used as one of the active ingredients in local formulations. Imported options do not use Pyrethrum in their formula. Instead they use less environmentally friendly synthetic options. An estimated 1022 Pyrethrum farming families will be adversely affected.

Local investment worth over Kshs. 360 million will go to waste. Business activities representing an annual turnover of Ksh. 531 million will go to waste. Business activities representing an annual turnover of Kshs. 531 million will be lost. This will send the wrong signal to other investors and serves a severe blow to our commitment to be industrialized by 2020.

Over 100 direct employees and a number of service providers will lose their jobs. Opportunities for business expansion that would create more jobs will be eroded drastically. This will send more Kenyans into the poverty trap.

Affected industry fraternity recommends immediate correction on duty and VAT disparity to provide a level playing field. This is not a looming crisis, we are deeply in it.

Compiled by:

HM Macharia
General Manager – Manufacturing
Twiga Chemical Industries Limited

THE AEROSOL

INVENTED 1924 BY ERIC ROTHEIM OF NORWAY

PURPOSE

- Packaging liquid
- Spray or foam release

FEATURES

- Very practical
- Safe
- Efficient
- Convenient
- Can is recyclable

INSECTICIDE FORMULATIONS

TYPES

- AEROSOLS
- POWDERS
- LIQUID ECs
- MATS

- COILS
- GRANULES

COMPOSITION

- ACTIVE INGREDIENT(S)
- CARRIER OR FILLER

APPLICATIONS

MEDICAL

- Asthma inhalers
- Antiseptics
- Wound Dressings

AGRICULTURAL

- Foot rot
- Insecticides for plants

INDUSTRIAL

- Lubrication
- Painting

PERSONAL CARE

- ❖ Deodorants
- ❖ Perfumes
- ❖ Shaving Creams
- ❖ Hair Sprays

HOUSEHOLD

- Insecticides
- Polish
- Air freshner
- Disinfectants
- Paints

ADVANTAGES OF PYRETHRUM

- Best known natural insecticide

- Powerful knockdown agent that kills
- Unique blend of insecticidal active ingredients
- Low toxicity
- Non persistent in the environment
- Safe to both human and mammal
- No insect resistance to date, 100 years

PYRETHRUM SOURCE

- Kenya has been leading producer since 1940's
- Ranked fifth cash crop in Kenya
- Labour intensive, preserve of small holder
- Production 12,000 T dried flowers per annum
- Turnover in excess of Kshs. 2 billion

ACTIVE INGREDIENTS

Natural Pyrethrins

- Pyrethrum Extract
- Blend of six active ingredients

Synthetic Pyrethroids

- Single molecule compounds
- Modelled on Chemistry of Pyrethrin individual molecules

INSECTICIDE AEROSOL DEMAND

- Annual demand in E. Africa over 7 M cans
- Retail value approximately Kshs. 1 billion
- Pyrethrum extract constitute 0.7% of the weight
- Pyrethrum extract required 10T, 25% concentration
- Value Kshs. 60.0M

COST OF A TYPICAL INSECTICIDE AEROSOL (200 GM)

Concentrate	% Concentrate Weight	Cost (Kshs)	% Cost
Active ingredient	1.4	14.00	21.90

Solvents	48.0	13.92	21.77
Others	0.6	1.85	2.89
Gas	50.0	6.00	9.39
Packaging			
Can		18.63	29.14
Valve		6.40	10.01
Cap		1.75	2.74
Carton (24 pcs)		1.38	2.16
Total	100.0	63.93	100.0

RETAIL PRICES OF COMMON AEROSOL INSECTICIDES – OCTOBER 1999

PACK SIZE	BRAND PRICE (KSH)			
	Superdoom	Baygon	Raid	Ridsect
120 ML		95.00		
137 ML/100 G (L)	109.00			
153/100 G (I)	109.00			
150 ML/100G			112.00	
100G (ODOURLESS) (1)	109.00			
200ML				
231ML/150G				97.00
250 ML/200G		125.00	145.00	
306/200G (1)	153.00			
275ML/200G (L)	145.00			
325 ML				
400 ML		176.00	180.00	
400ML (CF)			196.00	
413 ML/300G (L)	182.00			
300G/ (ODOURLESS) (1)	198.00			
450 ML				
459 ML/300 (1)	194.00			
462 ML /300G				189.00
600 ML		229.00		
617ML/400G				220.00

SOURCE : UCHUMI SUPERMARKETS LTD

I : Imported

L : Locally manufactured

IMPORTED FINISHED PRODUCT

- ◆ 5% Duty (Increased to 15% in January 2002)
- ◆ No VAT
- ◆ Overall reduced government revenue

CAN MANUFACTURING

- ◆ Local Expertise

- ◆ To main plants
 - Metal Crowns in Nairobi

 - CarnaudMetalbox in Thika

AEROSOL CAN RAW MATERIALS

- ◆ Tinplate
- ◆ Aerosol cones and domes
- ◆ Valves & actuators
- ◆ Lacquers, inks and varnishes
- ◆ Copper wire
- ◆ Labour
- ◆ Electricity
- ◆ LPG gas

CAN MANUFACTURING PROCESS

- ◆ Printing and coating

- ◆ Slitting
- ◆ Roll-forming-welding
- ◆ Seaming
- ◆ Pressure testing

DUTY ON CAN MATERIALS

<u>CODE</u>	<u>ITEM</u>	<u>PREVIOUS</u>	<u>CURRENT</u> <u>DUTY</u>	<u>DUTY</u>
7210.50.00	Tin plates	5%	5 % (3%)	
8309.90.10	Cones & Domes	5%		5%
8481.80.00	Valves & Actuators	5%		5%
3210.00.90	Varnishes for inks		35%	35%
7408.11.00	Copper Wire	15%	15% (10%)	

**COMPARED TO FILLED CAN DUTY OF 15%
WHICH BECAME EFFECTIVE IN JANUARY 2002**

IMPORT DUTIES ON RAW MATERIALS 200 GM CAN SIZE 65 MM X 120 MM

<u>Component</u>	<u>Previous</u> <u>Duty</u> <u>(Kshs.)</u>	<u>Current</u> <u>Duty</u> <u>(Kshs.)</u>
Tinplate	0.290	0.174

Cones & domes	0.170		0.170	
Solvent, Lacquers & Inks	0.467		0.467	
Valves & actuators	0.1904		0.1904	
Total duty per can	1.1174	----- =====	1.0014	----- =====

Current duty became effective on 15 June 2001

SURVEY

1995 MARKET SURVEY – CANS

- ◆ Insecticides – 9 million
- ◆ Deodorants – 5 million

1999 ACTUAL LOCAL OUTPUT – CANS

- ◆ Insecticides – 2 million
- ◆ Deodorants – 2.4 million

69% reduction in local manufacturing

EFFECTS OF IMPORTED CAN

- ◆ Current local unit price Kshs.23.29
- ◆ Applicable duty on imported can ie
5% - Ksh 1.16 (15% - Kshs. 3.49)
- ◆ Need to increase duty on imported can
- ◆ Make local manufacturing attractive

- ◆ 18% VAT on local can
- ◆ No VAT on imported can

IMPLICATIONS

- ◆ Wasted machinery
- ◆ Wasted skilled and talented staff
- ◆ Against policy of industrialization by 2020
- ◆ Job losses
- ◆ Lost opportunities for expansion

PROPELLANT

- ◆ Destenched liquified petroleum
gas (LPG)
- ◆ Ozone friendly
- ◆ Abundantly available

ANNUAL LPG CONSUMPTION

- ◆ Total volume – 30,852 T

- ◆ Domestic use – 19,212 T

- ◆ Industrial – 11,640 T

- ◆ Insecticide aerosols – 700 T
 - Value Kshs.42.0M
 - 6% of industrial application

LEVY ON LPG

- ◆ Import duty -Kshs. 3.0200 per kg

- ◆ Development levy-Kshs. 0.1511 per kg

- ◆ Combined levy – 6.53%

- ◆ Duty on finished product – 5.00% (15%)

- ◆ VAT on imported product – 0%

EFFECTS OF IMPORTATION ON LPG INDUSTRY

- ◆ Reduced refined volume at KPRL

- ◆ Currently govt./W. Bank investing in KPRL

- ◆ Increased unit cost of domestic cylinder

- ◆ Increased use of charcoal and firewood

IMPLICATIONS

- ◆ Direct loss of government duty – Kshs.2.2M

- ◆ Job losses
 - KPRL
 - Oil industry
 - Transport sector

- ◆ Use of environmentally unfriendly fuels

LOSSES

IMPACT ON FARMER

- ◆ Dried flowers equivalent – 204.2T

- ◆ Average dry flower yield per acre – 400kg

- ◆ Total acreage – 510.5

- ◆ Average Pyrethrum acreage per family – 0.5

- ◆ No of families – 1022
- ◆ Average family size –7

- ◆ No of AFFECTED KENYANS – 7,154 and
On the increase

LOSSES

SUPPLIERS

- ◆ 7M empty cans and valves worth Ksh.175M
- ◆ 700T of LPG valued Ksh 42M
- ◆ 600T of solvent at a cost of Ksh. 87M
- ◆ 10T of Pyrethrum extract generating Kshs. 60M
- ◆ Various jobs

AEROSOL MANUFACTURING

- ◆ Twiga Chemical Industries has largest
filling facility in this region
- ◆ Annual capacity over 8M cans
- ◆ Plant has always been used for
manufacturing leading Brands
- ◆ Readily available on contract basis
- ◆ Johnson Wax has own plant
- ◆ Various small manual plants

LOSSES

CONTRACT MANUFACTURER

- ◆ Plant cost Ksh. 40M
- ◆ Ozone friendly compliance Ksh. 20M
- ◆ Projected annual revenue over Ksh. 100M
- ◆ Direct job losses

HUMAN EFFECTS

- ◆ Approx. 100 direct employees, 700 persons
- ◆ 1022 families, 7154 persons
- ◆ Other ancilliary services
 - Transport sector
 - Farm labour
 - General suppliers

SUGGESTED SOLUTIONS

- ◆ Increase tariffs on filled aerosol cans

- Import duty - 25% (minimum)
- VAT - 18%
- ◆ Reduce tariffs on raw materials – max 5% (0%)
- ◆ Improve infrastructure to reduce manufacturing costs

ANNEX E

**FACTORS AFFECTING PYRETHRUM
PRODUCTION IN KENYA
2001**

By
Mary W. Kiiru

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Introduction

Pyrethrum is a flower, scientifically known as *Chrysanthemum Cinerariaefolium* containing an insecticidal chemical compound known as pyrethrin. Pyrethrum plants were introduced in Kenya in 1928 from Europe and the production of this crop has continued since then. It is among the major earners of foreign exchange to the Kenyan economy, ranking fifth after Tea, Horticulture and Coffee as export earners and Sugar as an import substitute. The industry currently earns about Kshs. 2 billion through exports of the pyrethrum extract and other by-products.

Kenya is the world's leading producer of pyrethrum accounting for between 60 -70% of the global supply and commanding over 70% of world's market share. This could be due to high internal consumption rates in some of the pyrethrum producing countries. Kenya has been the world's market leader for over 70 years after replacing Japan as the largest producer after the Second World War. Efforts have been made to introduce pyrethrum in other countries in Africa, Asia and South America without much success. The other producers are Australia (Tasmania) (20%), Tanzania (8%), Rwanda (5%) and Papua New Guinea (2%). Uganda also produces minor quantities of pyrethrum.

Most of the pyrethrum products produced in Kenya are sold to the world market with only 3% being consumed locally, and 3% regionally to the rest of Africa. Out of the 94% that is exported outside Africa, 60% goes to the U.S., 25% to Europe, 4% to Australia and about 5% to Asia, India and Middle East (Ref: PBK).

In Kenya, Pyrethrum is mainly grown in the Rift Valley, Central and Nyanza provinces with some insignificant production in Eastern and Western provinces. The major growing districts are Nakuru, Nyandarua, Kisii and Uasin Gishu accounting for close to 75% of the total national production (see Table A1). West Pokot district is also developing as a major producer with farmers in the district attaining up to 400 kg of dry flowers per acre. Nakuru District alone accounts for about 75% of the total production in the Rift Valley and over 50% of national production. Pyrethrum production in Kenya is mainly undertaken by small-scale farmers, with less than 5 acres of land and an average of less than 1 acre under the crop. There are about 200,000 small-scale farmers who account for close to 97% of the national pyrethrum production

with only a few larger-scale farmers (over 5 acres). The total area put under pyrethrum is currently about 26,000 hectares.

Kenya has suitable agro-ecological conditions for pyrethrum production. These are mainly the upper and lower highlands with a little production in the upper midland (UM1) especially in Kisii district. Pyrethrum grows well in altitudes of between 1500m to 3000m above sea level and annual rainfall of between 750mm to 1125mm (Pyrethrum Growers Manual, 1998). The crop flourishes in well-drained fertile soils.

In the early 1980's, pyrethrum products faced stiff competition from the synthetic products in the world market. This resulted in depressed prices due to less demand in the international market, followed by declining production at the domestic level. However, this trend changed in the mid-eighties as great awareness of the harmful side effects of the synthetic insecticides was realized with some countries completely banning their use. There was then a gradual shift to the natural-based pyrethrum products resulting in increased local production of pyrethrum with national production attaining a peak of 17,710 tonnes of the dry flowers in the 1992/93 season. However, due to problems locally, a steady decline in production followed to less than 4000 MT of dry flowers during the 1998/99 season (see Table A1 and Figure 1 below). There is now an upward trend with production forecast at around 7,000 MT + of dry flowers by the end of the 2000/2001 season. Production decline occurred despite the 'favourable prices' in the world market (Economic Survey, 1998).

Table A1 shows the production trend of pyrethrum from 1970 to 2001 reflecting cyclical fluctuations of output over the period, as shown by Figure 1:

Figure 1: National Pyrethrum Production Trend (1969/70 - 2000/01)

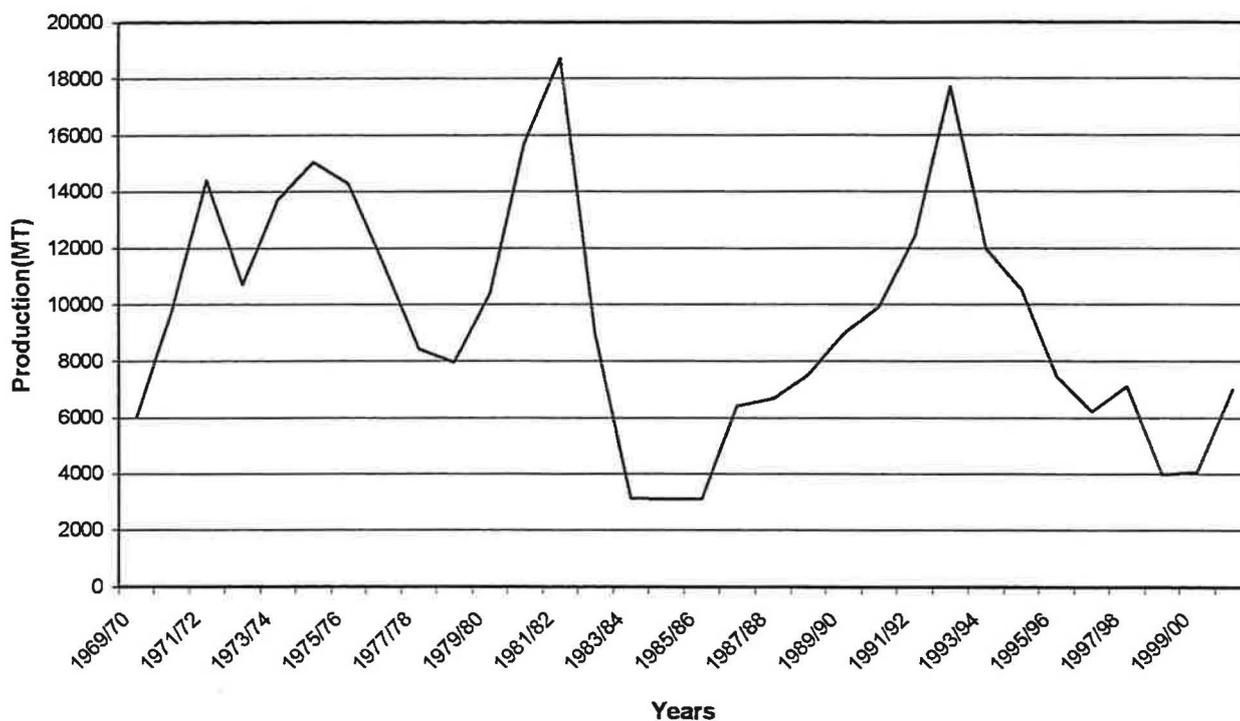


Figure 1 shows the fluctuation of pyrethrum output over the years. This affects the sustainability of the pyrethrum industry since reliable quantities cannot be supplied to the buyers in local and the international markets. This is the major problem in the industry since no market will rely on an unreliable raw material, hence the continuing preference for synthetic pyrethroids.

It is important to note that the information/data provided in this report is based on a major survey of the Kenyan pyrethrum industry carried out by Tegemeo Institute of Egerton University in 1999 and this update (2001) in Nakuru and Uasin Gishu districts. The 1999 survey was conducted in the major pyrethrum producing districts with the specific study sites shown in Table 1.

The recent update for Nakuru summarizes data for Kamara division only although field visits were also made to Naivasha division. This is because the 1999/00 was a very bad year for Naivasha resulting in close to total loss of all the crop harvests. Carrots and spinach were not harvested at all, while pyrethrum yield nose-dived to a mere 40 kg per acre. An estimated 75% of the pyrethrum dried up in the field, hence any profit figures worked out would not be reflective of a normal season.

Table 1: Pyrethrum Study Sites

DISTRICT	DIVISION	AEZ	SITE
Nakuru	Kamara	UH2	Sinendet, Kamara Mau Summit
	Naivasha	LH3-LH4	Kinungi Longonot
Nyandarua	Ndaragwa	UH3	Shamata
	Kipipiri	UH2	Mawingu
	North Kinangop	UH2	Engineer Ndunyu Njeru
Uasin Gishu	Ainabkoi	UH1-UH2	Ainabkoi, Ndanai, Kaptagat Olare, Gaiti Kapsinendet
Kisii	Masaba	LH2	Ibacho Ramasha
	Keumbu	UM1-LH1	Taracha
	Ringoma	UM1-LH1	Mungoni

(Source: Kiiru, 1999)

Factors Influencing Pyrethrum Cultivation in Kenya

Weather

This is a very important factor since pyrethrum is a very sensitive crop and can be easily wiped out by adverse weather. This factor has partly contributed to the recent shortage in pyrethrum especially since late 1997 when the El-nino rains struck and its effects have continued to take toll on the agricultural sector. However, this is just one of the many factors that affect production (and all other commodities) and should therefore not be looked at in isolation.

Availability of Planting Material

The Pyrethrum crop generally has low input requirements as compared to other crops, the major input being planting material. However, according to Ikahu & Ngugi, 1990, a major constraints affecting pyrethrum production in Kenya is inadequacy of planting materials. Other inputs include fertilizer (TSP), furadan (a nematicide) and fungicides, which despite their contribution in

improving the yields and quality of produce, are rarely used by the farmers. The planting material is in form of seed or clones and is mainly provided by the PBK from their nurseries at cost. According to the survey by Tegemeo Institute in 1999, about 72% of the farmers interviewed were using own splits or borrowing from neighbours with 45% of them splitting old traditional varieties and the rest splitting the hybrid clones and even variety P4. The main reasons for preferring the local traditional materials, as indicated by the majority of the farmers (68%) was the ease of availability as compared to the new hybrid planting materials. Majority of farmers indicated that the major problem in establishing a new crop was the unavailability of planting material if and when required. Some farmers, especially in Naivasha indicated that since their crop was washed away or destroyed by the El-nino rains, they had found it difficult to re-establish a new crop due to unavailability of planting material.

In addition, some of the recommended planting materials were not doing well in certain regions resulting in low yields, hence low profits, which is a disincentive to increased production. There is therefore need to develop appropriate and suitable planting materials for specific regions through on farm research. This is because the research recommendations are so broad and general encompassing high altitude and low altitude areas.

Labour requirements/ Cost of Production

Labour is a major cost component in pyrethrum production as shown Table A2. Pyrethrum is a labour-intensive crop requiring plenty of labour for planting, weeding, picking and drying, among others.

The majority of farmers interviewed indicated that the labour-intensive nature of this crop was a major disincentive to its production both in terms of availability and cost. This problem was more acute in the Ainabkoi area of Uasin Gishu district where the average farm size was 15 acres yet only an average of 0.845 was put under pyrethrum. These farmers indicated that the unavailability of labour was the main limitation to increased pyrethrum production.

In all the regions studied in 1999, the proportion of labour cost to the total cost of production was greater than 70% (see Table A2). Therefore, any attempts to improve on the profitability of this enterprise must focus on ways of reducing the cost of production especially the labour component.

One of the ways to reduce the high labour requirement and therefore reduce cost and increase profit levels is through:

1. Use of herbicides e.g. Venzar and Sencor, which have been tested and proved efficient in controlling weeds on the pyrethrum fields (Ngugi et al, 1989). This is shown in Table A3 where use of Sencor or Venzar in controlling weeds reduced the labour costs by 57% and increased profit by close to 22% and 19% respectively.
2. Use of the invented solar drier, which reduces the labour costs of production by about 8%. A combination of Sencor and the drier results in about 27% increases in profit per hectare (see Table A3).

Currently, the use of herbicides and adoption of the solar drier is very low hence the need for extension campaign to popularize these cost cutting technologies in pyrethrum production, which is at present lacking.

Land Availability

Only a small proportion of the farmers interviewed indicated unavailability of land as a constraint to pyrethrum cultivation. This means that if the other constraints were removed, farmers would be willing to put more land under the crop. The mean size of land under pyrethrum cultivation in Kamara and Ainabkoi was found to be 0.96 and 0.85 acres respectively. However, these farmers indicated that they would be willing to increase the acreage to at least 2 acres if the right conditions (price, policy, market) were put in place. Farmers in the two regions alluded to the possibility of increasing the area under pyrethrum and cultivate other crops in the forests.

Credit Facilities

The results of the 1999 survey indicated that there was no organized system of availing credit to pyrethrum farmers either by cash or through provision of inputs. Pyrethrum is a low input user as shown in Table A2 where intermediate costs in all the study sites is less than 2% of the total costs. Hence, the crop does not require credit facilities except during the time of establishment. However, monthly payments needs to be made in time to allow regular cash flow to meet the monthly labour expenses for weeding and picking. Over 50% of the farmers interviewed, indicated that the major problem in establishing a new crop was inadequate funds.

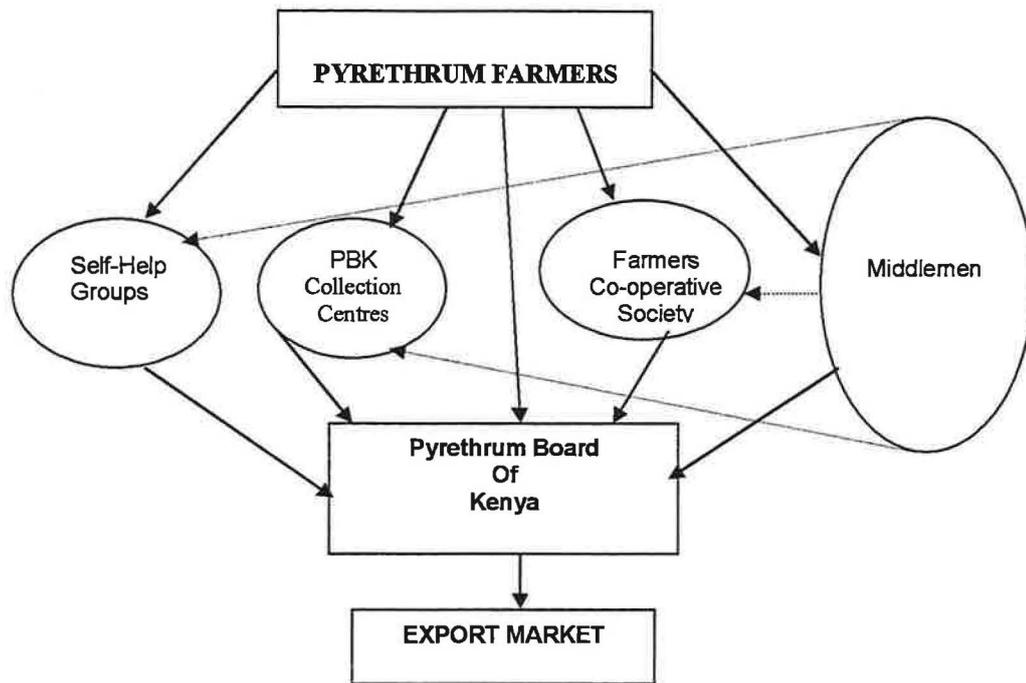
It is therefore clear that there is a problem in getting credit in cash or in form of inputs to enable the farmers to establish a new crop of pyrethrum. The major problem in getting credit was lack of financing institutions after the collapse of the Agricultural Finance Corporation (AFC). Lack of security or collateral to guarantee commercial bank loans was another constraint.

Currently, a farmer requires about Ksh. 4,000 to purchase hybrid seedlings or clonal materials (when available) for an acre of pyrethrum, a figure which is out of reach for many of the farmers in question. This constrains the use of the new hybrid varieties, thus the continued use of indigenous varieties in some regions. The cost of seed is however much lower, but this has in the past been in limited supply. The availability of the hybrid seeds plus adequate farmer training on nursery preparation and care would go along way towards overcoming the problem of establishing a new pyrethrum crop.

Marketing and Pricing Arrangements

From the farm level, the dry flowers are taken to the Pyrethrum board of Kenya (PBK) factory in Nakuru for processing. The farmers deliver their dry flowers to the board either through the Farmers Cooperative Societies (FCS), Self-help Groups (SHG), and PBK Collection Centers (BCC) or directly to the board for those with individual licenses as shown in Figure 2. Some farmers do sell their flowers to the middlemen who then use any of the above mentioned channels to deliver to the board. Different regions use certain marketing channels or at least more of one than the others. Generally the main marketing channel countrywide is the SHG which seems to have taken over from the FCS as a result of mismanagement. However, in Kisii District, FCS are still the dominant marketing channel while in Nyandarua, the BCC seems to dominate.

Figure 2: PYRETHRUM FLOWER MARKETING CHANNEL



Once the flowers are received at the board, they are analyzed for their respective Pyrethrin Content (PC) after which payments are prepared according to the PC and the announced pyrethrum prices. The payments follow the same channel back to the farmers with some deductions at every stage. Hence the longer the chain, the higher the deductions and of course the longer it takes to get to the farmers. Individual licensees therefore get better and more prompt payments than those following these other channels. However, for a farmer to acquire a license to deliver directly to the board, the Act requires that he owns a minimum of 10 acres of land with at least 3 acres under pyrethrum. This is not viable for most farmers as only a few were found to be having greater than 10 acres in total and over 3 acres under pyrethrum. Such are the sections of the current act that require to be reviewed, as they limit increased production.

The deductions along the channel depend on the respective marketing chain with the FCS deducting the highest (7-10%). For SHG, the deductions are about 5% of the payment per kg of dry flowers. These deductions include sitting allowance for office bearers, bank payment (cheques), transport for officials, and wages for watchmen, hire of store and lost kilograms (kg) during weighing, among others.

Mismanagement of these institutions that market pyrethrum on behalf of the farmers and the difficulties of acquiring individual license has been a major disincentive to increased production of pyrethrum.

It is worthwhile to note that there are also some deductions at the board which include:

- Cess at 1%,
- Presumptive Income Tax (PIT) at 2%. (This was however scrapped from December 2000).
- Depreciation of gunny bags at Ksh. 1.00 per 35kg bag
- Transport at Ksh. 17 for Kamara and Ksh. 28 for Naivasha per the 35kg bag.

On average, deductions at the PBK range between Ksh. 3.00 to ksh.4.00 per kg of dry flowers depending on the PC level and the output. Generally, the deductions along the whole channel take between 5-10% of the announced pyrethrum prices.

Analysis of Pyrethrin Content (PC)

The analysis of the dry flowers for pyrethrin content is done at the PBK factory away from the farmers and this seems to create some suspicion due to fluctuation of PC between deliveries, even though the growing and handling conditions are similar. This has brought discontent among some farmers.

It is therefore important that the analysis of the PC is reviewed so as to build confidence with the farmers. The question is whether there are possibilities of:

- Harmonizing the PC across regions and paying out for quality differences at the end of the year
- Analyzing for the PC at the collection site for transparency.

Social Stability

This relates to internal instability and security situation within the country especially in the pyrethrum growing regions. A case in point is the ethnic clashes of the 1992 and 1997 which displaced many pyrethrum farmers from their farms leaving the pyrethrum crop unattended resulting in unexpected decline. These clashes happened to have occurred in the major pyrethrum growing districts of Nakuru and Uasin Gishu. This could have contributed to the recent decline in national production as most farmers left their farms for security reasons. Some of these farmers have never gone back to their farms. Those that were left are shying off from the enterprise and concentrating on crops that require little attention incase of a repeat. Pyrethrum requires to be attended to on a weekly, if not daily basis in terms of weeding and picking of the flowers.

Policy Environment

This relates to the existing policy on the industry as stipulated in the Pyrethrum Act and the overall policy framework on insecticides. It is important to note that the pyrethrum industry is one of the sub-sectors that are still under government control. The control and the regulation of the pyrethrum industry in Kenya has been and still remains the mandate of the Pyrethrum Board of Kenya (PBK) formed through an Act of Parliament in 1964. This is contained in The Pyrethrum Act, CAP 340 of the Laws of Kenya, which provide for the regulation of the pyrethrum industry and the control of the growing, processing and marketing of pyrethrum. Basically, the PBK acts as a monopoly in all matters pertaining to the industry as stipulated in the act which includes: licensing of growers; purchasing and taking delivery of all pyrethrum grown in Kenya; processing of the commodity; sale and export of pyrethrum and pyrethrum products; payment of the farmers; investigation and research into all matters relating to the agronomy, processing and marketing of pyrethrum; and finally the regulation of imports of pyrethrum and pyrethrum products.

The current scenario is that any farmer intending to grow pyrethrum must first acquire a license from the board, get planting material from the PBK nurseries and finally deliver and sell the dry flowers to the board. It is illegal, according to the pyrethrum act for any grower to deliver his produce to any other buyer other than the PBK and for any other buyer to take deliveries from any grower. The PBK then processes the dry pyrethrum into some different crude forms (extract, powder or marc) and organizes for export. In this case the PBK acts as an intermediary between thousands of small-scale local farmers and a number of foreign firms that reformulate the product for resale. Most of the pyrethrum and pyrethrum by-products are sold based on contract prices between the buyer and the seller, although a small share of the world trade passes through international brokers (Nelson, 1995).

The structure described above does not augur well with the current spirit of free market and transparency. It is an example of the traditional monolithic structures that were set by the government to develop various agricultural sectors. Such bodies not only fixed producer prices and marketed the commodity, but also maintained monopsony power over the farmers' produce. This is an example of some of the acts that are in dire need of review as indicated by the Minister of Agriculture (Daily Nation, 1999) since they leave no room for farmers and other stakeholders.

Liberalization will more often than not enhance competition and increase efficiency hence better services to the farmers. It may therefore be necessary to consider allowing private traders

especially the local manufacturers to buy pyrethrum directly from the farms for their local processing requirements and leave the export market to one marketing body for the time being. It may still be to the advantage of Kenyan small- scale farmers to keep a single marketing channel system that can exert monopoly power over international buyers and hence keep prices relatively high for the Kenyan farmers. The marketing body could however be made to function better by giving farmers a bigger say on the way it is run. This can only be achieved through adequate farmer representation at the board. Liberalization can however, be implemented in various ways e.g. institutional arrangements for credit supply, input delivery, output sale and contracting arrangements among others. An improvement in the provision of these services could act as an incentive to increased production.

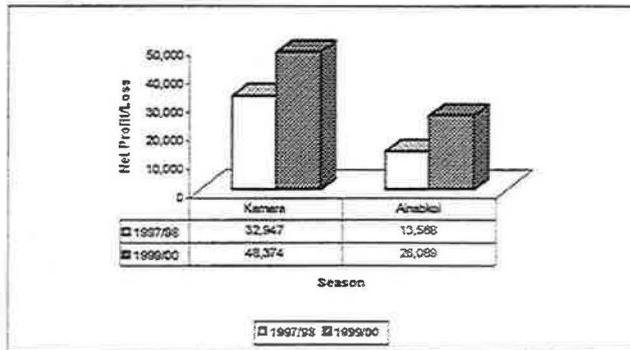
In addition, a board consisting of the chairman, six area representatives and four other members, all appointed by the Minister of Agriculture, runs the PBK. Other members include the Permanent Secretary of the Ministry, Director of Agriculture and the Commissioner of Cooperatives. There are a total of 14 members with a 2-year period of appointment, but eligible for reappointment. Such a composition of board members is an indication of high government involvement and insignificant farmer representation, if any, thus making the Ministry very powerful in contradiction to the current liberalized economy. Indeed, most farmers felt that they had nobody to speak on their behalf and recommended that they be adequately represented at the board. It is therefore time to review the Pyrethrum act with a view to liberalizing the industry. A review will go a long way towards encouraging increased production. This process should however be done with caution to avoid similar experiences as was with the maize and dairy sectors.

Profitability of the Pyrethrum Enterprise

The profitability of the pyrethrum enterprise differs across regions, and between good, normal and poor production years as shown in Table 2. The difference in profitability across regions depends on the achievable yields, the pyrethrin content of the flowers and the cost of the main inputs (i.e. planting material and labour), which further depends on the respective agro-climatic conditions, the main planting material used and the main marketing channel among others.

The chart below shows the comparative pyrethrum profits for Kamara and Ainabkoi divisions between the 1997/98 and 1999/00 seasons.

Figure 3: Comparative Pyrethrum Profits



It is interesting to note that there is a remarkable increase in pyrethrum profits for Kamara and Ainabkoi area since the 1997/98 season. This is particularly so for Ainabkoi division of Uasin Gishu district where profits have almost doubled between the 1997/98 season to the 1999/00. In Kamara division of Nakuru district, net profits increased from Ksh. 32,947 to Ksh. 48,374 per hectare during the 1999/00 season. This is mainly a result of the general increase in price (about 20%), good weather, improvements in yield and pyrethrin content especially for the farmers in Uasin Gishu most of who have shifted from using the indigenous ‘chui’ variety to hybrid P4 which has a higher PC hence price.

The profits reflected above are not sufficient enough to keep farmers in pyrethrum production let alone increasing their production. This is only about Ksh. 4,000 per hectare (1620 per acre) per month for the farmers in Kamara, and about Ksh. 2,000 for the farmers in Uasin Gishu for the 1999/00 season. These are however not high enough considering that profits are even lower during poor production years as shown in Table 2. A case in point was in the recent past when weather has been taking toll on agricultural production. It is also important to note that most of the farmers cultivate less than an acre of pyrethrum hence profits are less than kshs.2, 000 and 1,000 per month for Kamara and Uasin Gishu respectively.

Table 2: Pyrethrum Profits across Regions (Ksh/Hectare)

District	Study Area (Division)	Actual Year		Good Year		Bad Year	
		1997/98	1999/00	1997/98	1999/00	1997/98	1999/00
Nakuru	Kamara	32,947	48,374	61,305	71,220	-2,996	-7,107
Uasin Gishu	Ainabkoi	13,568	26,089	31,352	48,151	1,948	-8,580

Source: Author's Computation

It is important to note that the profit/loss figures reflected in Table 2 represent payment to farmer's management only¹. This means that in actual sense, farmers get more than the figures indicated in the table as payment to their own/family labour, hence may continue in business even though they seem to be making losses.

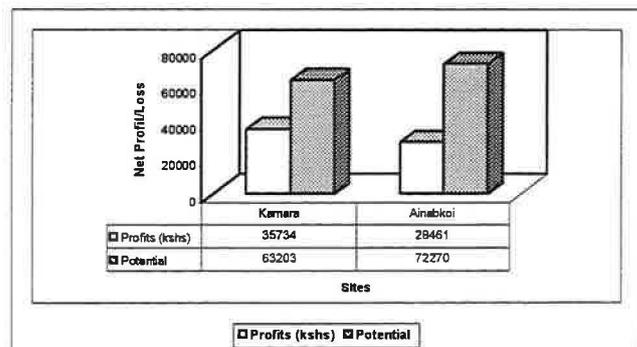
The relatively low pyrethrum profits shown in Table 2 are a reflection of 1) low flower yields; 2) low pyrethrin content hence price and 3) high cost of production. Dry flower weight and the respective pyrethrin content are the determinants of pyrethrum income, which, in addition to the cost of production, determine the profitability of the enterprise. High flower yields are mainly a result of favourable weather and good field management practices e.g. planting, weeding, input use, pest and disease control among others (Pyrethrum Growers Manual, 1998). On the other hand, Pyrethrin content, which determines the rate of pyrethrum payment, is a function of the genetic make-up of the planting material and proper handling of the flowers (e.g. picking, drying methods, storage and time of delivery). According to research findings, the genetic composition of the planting material contributes up to 90% of the PC of the dry flowers. This underscores the importance of using suitable planting material, which was found to be lacking.

Figure 4 illustrates the actual versus the 'potential'² pyrethrum profits for Kamara and Ainabkoi areas as a result of using the hybrid variety P4 with a PC of 1.90 and direct delivery to the PBK.

¹ Not payment to capital because we have considered the Capital Recovery Factor (CRF) that takes care of the opportunity cost of the capital used. Not payment to labour also because family labour has also been valued and included in the total cost of production.

² 'Potential' here imply highest profits achieved by a few farmers in the area while the majority earn less. Actual potential is much higher than this and can be achieved through use of high yielding varieties and improvement in the management and post handling processes.

Figure 4: Actual Vs Potential Pyrethrum Profits by Area (1999/00)



According to Figure 4, pyrethrum farmers in Ainabkoi division of Uasin Gishu district could be making more than double their income by using the hybrid variety and delivering their dry flowers directly to the board. This is a clear indication that there is still unexploited potential, which the industry should tap on to increase pyrethrum incomes.

Competitiveness of the Pyrethrum Enterprise among other Alternative Enterprises

In order to analyze well the profitability of the pyrethrum enterprise, it is important to understand how it competes with other alternative enterprises at the farm level. Table 3 shows the net profit/loss in Ksh. per hectare of various alternative enterprises as compared to pyrethrum in the various regions.

As shown in Table 3, most of the areas suitable for pyrethrum production have horticulture as a major cropping activity. However, except in Uasin Gishu and Kisii districts where we have wheat and tea respectively, pyrethrum seems to be the only cash crop in the areas in which it is grown.

From Table 3, potatoes and cabbages seem to give pyrethrum stiff competition, particularly during the 1997/98 season, with profits as high as Ksh. 122,000 per hectare for potatoes. However, these profits came down steadily during the 1999/00 season as a result of overproduction due to increased farming in the forests. This leaves pyrethrum as the most profitable enterprise in Kamara and a close competitor for potatoes in Ainabkoi. This is a reflection of the seasonal nature of horticultural production as a result of the high risk involved in the marketing of these crops, which makes pyrethrum a preferable crop. The importance of

pyrethrum as a constant cash earner due to the reliability of the market cannot therefore be underscored.

Table 3: Profitability of Pyrethrum Vs Alternative Enterprises (Ksh./ Hectare)

Districts	Study Area (Division)	Enterprise	Profit/Loss	
			1997/98	1999/00
Nakuru	Kamara	Pyrethrum	32,947	48,374
		Green Peas	9,747	6,742
		Potatoes	61,378	32,146
		Cabbages	-2,799	-9,040
		Maize	8,203	11,754
Uasin Gishu	Ainabkoi	Pyrethrum	13,568	26,089
		Cabbages	24,291	20,757
		M/Beans	12,411	19,561
		Wheat	-8,605	19,937
		Potatoes	122,538	27,727

Source: Author's Computation

It is important to note that dairy is also a major competing enterprise in the areas where pyrethrum is grown. However, the profitability for the dairy enterprise is not included. This is because in the study areas under consideration, the farmers complained about the marketing problems since the collapse of the KCC and could not hence rank dairy appropriately. It was therefore difficult to compute profit figures for dairy, though it is appreciated that under normal circumstances, it is a major competitor to pyrethrum.

Cost Summaries for Pyrethrum and other Competing Enterprises

The profitability of the pyrethrum enterprise depends largely on the respective cost of production. Below are cost summary/structure for pyrethrum and the competing enterprises for Kamara and Ainabkoi Divisions. From Table 4, the total revenue for pyrethrum far exceeds that for the competing enterprises, but the costs are also relatively high taking close to 50% of the gross income. The fixed costs for pyrethrum are slightly higher than for the competing enterprises since pyrethrum is a perennial crop with a high establishment cost. The fixed

costs are however annualized over the productive life of the crop. The intermediate (input) costs for pyrethrum are the lowest compared to the other crops due to low input use.

Table 4: Cost Summaries in Ksh for Pyrethrum and other Competing Enterprises for Kamara Division of Nakuru District (1999/2000).

	Pyrethrum	Cabbages	Potatoes	Maize	Green Peas
Output	666.9	8645.0	104.0	30.0	2149.0
Unit of Output	kgs	heads	bags	bags	kgs
Times planted	1	2	2	1	2
Price Ksh/per Unit	139	2	420	1,200	10
Total Revenue	92,906	17,290	43,571	35,568	21,489
Fixed Costs	9,688	84	84	168	84
Labour Inputs	29,442	13,279	15,054	15,724	11,187
Intermediate Costs	5,402	8,447	12,360	7,921	6,847
Total Costs	44,532	21,810	27,498	23,813	18,118
Profit/ha/season	48,374	(4,520)	16,073	11,755	3,371
Profit/ha/Year	48,374	(9,040)	32,146	11,755	6,742
Proportion of Labour Costs (%)	66.11	60.88	54.75	66.03	61.75
Proportion of Fixed Costs (%)	21.76	0.39	0.31	0.71	0.46
Prop. Intermediate Costs (%)	12.13	38.73	44.95	33.26	37.79

Source: Author's Computation

In addition to pyrethrum, wheat is another cash crop in Ainabkoi division though the profit is much less, this being not a major wheat growing zone. As shown in Table 5, there are no fixed costs for wheat, this being due to the crop being highly mechanized yet all of the farmers were hiring the machines as opposed to owning them. The labour costs for wheat are also minimal as expected, while close to 98% of the cost of production is from the intermediate input costs.

In conclusion, the profitability of pyrethrum is more stable relative to other competing enterprises whose profits fluctuate from year to year due to the seasonal nature of the alternative enterprises, which are mainly horticultural crops. Pyrethrum thus should be seen as an anchor crop that shields producers against these fluctuations and to some extent stabilize farm incomes.

Nevertheless, the profitability of pyrethrum is low compared to the potential and appropriate measures be put in place to ensure that farmers make the best out of this crop.

Table 5: Cost Summaries in Ksh for Pyrethrum and other Competing Enterprises for Ainabkoi Division of Uasin Gishu District (1999/2000)

	Pyrethrum	Wheat	Cabbages	Potatoes	Maize/Beans Intercrop
Output1	568.1	32.1	5763.0	111.0	43.0
Output2					2.0
Unit of Output	kgs	bags	heads	bags	bags
Times planted	1	1	2	2	1
Price/unit	135	1,400	5	420	1,000
Price/unit					3,200
Total Revenue	76,580	44,954	28,813	46,683	49,548
Fixed Costs	8,131	-	237	635	475
Labour Inputs	37,489	724	12,639	11,520	18,301
Intermediate Costs	4,871	24,293	5,558	20,665	11,211
Total Costs	50,491	25,017	18,434	32,820	29,987
Profit/ha/season	26,089	19,937	10,379	13,863	19,561
Profit/ha/Year	26,089	19,937	20,757	27,726	19,561
Proportion of Labour Costs (%)	74.25	2.89	68.56	35.1	61.03
Proportion of Fixed Costs (%)	16.1	0	1.29	1.93	1.58
Prop. Intermediate Costs (%)	9.65	97.11	30.15	62.96	37.39

Source: Author's Computation

Farmer Incentives to Improve Pyrethrum Production

In order for the Kenyan pyrethrum industry to develop and flourish, it is important to improve and increase farmer incentives to grow and expand the area under the crop. The key areas that require improvements are the following:

1. Planting material/Seed

It is necessary that appropriate and adequate planting materials are made available to the farmers when and if required. Since under the current act, PBK is mandated to research on, develop and multiply seeds, it is vital that structures are put in place to enable the farmers to establish a new field or expand on the existing one whenever they need to. This will require more efficient seed multiplication in the nurseries and once produced, the seeds/ clonal materials should be made available to the farmers.

2. Provision of Credit

Since under the current act, no other person/institution can buy pyrethrum from the farmers, except the PBK, it would be appropriate for the institution to devise ways of making inputs especially planting material available on credit and deduct the cost from the proceeds.

3. Extension Service

It is vital that pyrethrum farmers are trained on proper management and post harvest handling practices so as to increase yields and reduce loss in PC. This will require aggressive extension campaign, increase in the number and quality of the extension staff and close collaboration with the Ministry of Agriculture staff.

4. Profitability

The need to improve on the profitability of pyrethrum at the farm level cannot be underscored. The Profitability of pyrethrum depends on the yield, Pyrethrin content (hence price) and the cost of Production. Profitability of pyrethrum could be increased by:

1. Increasing yields and pyrethrin content through availability and use of hybrid clones and varieties.
2. Adherence to recommended management practices (e.g. fertilizer use, weeding, disease control, etc) and proper post-harvest handling of the dry flowers (e.g. drying and storage).
3. Reducing the cost of production through the use of existing herbicides (e.g. sencor and venzar to control weeds) and making use of the invented solar drier.

5. Research

Profitability of pyrethrum depends on the yield and the pyrethrin content of the dry flowers, which further largely depends on the genetic composition of the planting material. There is thus need to come up with high yielding varieties that are also suitable to specific areas. This calls for intensive on-farm research.

6. Marketing Arrangements

The marketing of pyrethrum from the farmer to the board is inefficient due to mismanagement of cooperative societies and other farmer organizations, resulting in increased middlemen activity. It is necessary that the marketing system at the local scene is improved through strengthening farmer organizations and licensing as many farmers as possible as an incentive to increased production. The current system of analyzing the pyrethrin content of the dry flowers should be reviewed so as to allow transparency and build confidence with the farmers.

7. Policy environment

This relates to the existing policy on the industry as stipulated in the Pyrethrum Act and the overall policy framework on insecticides. The Pyrethrum Act should be reviewed to allow for viable licensing requirements and elected farmer representation at the board. This will put more power on the farmers to determine their own destiny, which is in agreement with the current wave of reform in the agricultural sector. It is also important that the government reduces its control on the industry and allow other players in the processing and marketing for competition and efficiency. It is also vital that the government creates an enabling environment by enacting policies that promote and encourage local manufacturing of insecticides with a view to developing further and sustaining the pyrethrum industry.

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Appendices

Table A1: Production of Pyrethrum in Kenya (1969/70 to 2000/01)

Year	National Production (MT)	Production by District (MT)			
		Kisii	Nakuru	U.Gishu	Nyandarua
1969/70	6,005	2,378	636	313	1,411
1970/71	9,748	5,860	881	262	988
1971/72	14,414	8,556	1,345	292	2,609
1972/73	10,698	5,577	1,267	219	2,253
1973/74	13,722	8,055	1,544	292	2,083
1974/75	15,035	9,587	1,346	250	1,510
1975/76	14,267	8,917	1,487	209	2,960
1976/77	11,429	6,529	1,713	246	839
1977/78	8,441	4,139	1,614	205	1,094
1978/79	7,950	3,361	2,040	363	1,027
1979/80	10,424	5,029	2,582	431	1,089
1980/81	15,704	7,582	3,941	657	1,401
1981/82	18,720	6,893	5,657	1,089	2,218
1982/83	8,974	2,408	2,914	644	1,600
1983/84	3,156	610	1,080	185	1,404
1984/85	3,101	735	1,096	191	1,290
1985/86	3,117	916	1,185	148	1,353
1986/87	6,407	1,313	2,843	378	843
1987/88	6,689	1,196	3,292	360	938
1988/89	7,538	1,284	3,610	476	1,055
1989/90	8,988	1,803	4,256	660	1,119
1990/91	9,942	2,201	3,506	721	1,015
1991/92	12,452	2,871	3,854	756	1,379
1992/93	17,710	1,742	7,446	1,188	2,315
1993/94	11,979	2,323	4,583	858	1,463
1994/95	10,550	967	5,200	630	1,649
1995/96	7,490	691	3,800	440	1,089
1996/97	6,220	528	3,173	322	851
1997/98	7,120	470	3,794	386	811
1998/99	3,990	150	-	122	266
1999/00	4,074	-	-	-	-
2000/01**	7,000	-	-	-	-

** This is an estimate and (-) not available

Source: PBK and Ministry of Agriculture

Table A2: Cost Summary for Pyrethrum across Regions in Kshs. /Hectare (1997/98)

	Nakuru Kamara	Nakuru Naivasha	Nyandarua Engineer	Nyandarua Shamata	Nyandarua Mawingu	U/Gishu Ainabkoi	Kisii Ibacho	Kisii Ramasha	Kisii Keumbu
Planting Materials	P4	Local	c223, P4	Katamani	Ndege	Chui	Nyamasibi	Nyamasibi	Nyamasibi
Average P.C	1.67	1.35	1.7	1.3	1.5	1.42	1.1	1.1	1.05
Marketing Channel	S.H.G	B.C.C	P.B.K	B.C.C	B.C.C	S.H.G	F.C.S	F.C.S	F.C.S
Yield- Kg of dry flower	593	445	618	494	494	556	467	375	403
Price -Ksh/kg	78	64	80	60	71	65	46	43	42
Bonus -Ksh/kg	37	30	38	29	34	31	25	23	24
Total Price	115	95	118	89	105	96	70	67	65
Total Revenue	68,059	42,017	72,865	43,719	51,747	53,352	32,855	25,004	26,339
Total Establishment	15,610	11,140	14,301	10,201	15,067	13,289	9,284	11,198	7,410
Annualised Fixed Costs	8,319	5,891	7,623	5,410	7,947	7,055	4,868	5,908	3,918
Labour Inputs	26,247	31,385	34,839	29,481	36,202	32,062	20,637	24,898	21,860
Intermediate Costs	547	654	726	614	754	668	430	519	455
Total Costs	35,113	37,930	43,189	35,505	44,902	39,785	25,935	31,324	26,233
Profit/ha/year	32,947	4,087	29,676	8,214	6,844	13,568	6,920	(6,320)	106
Prop.Labour Costs (%)	74.75	82.74	80.67	83.03	80.62	80.59	79.57	79.48	83.33
Prop.Fixed Costs (%)	23.69	15.53	17.65	15.24	17.70	17.73	18.77	18.86	14.94
Prop. Intermediate Costs (%)	1.56	1.72	1.68	1.73	1.68	1.68	1.66	1.66	1.74

Figure A1: Proportion of Labour, Fixed and Intermediate Costs in Pyrethrum Production (1997/98 season)

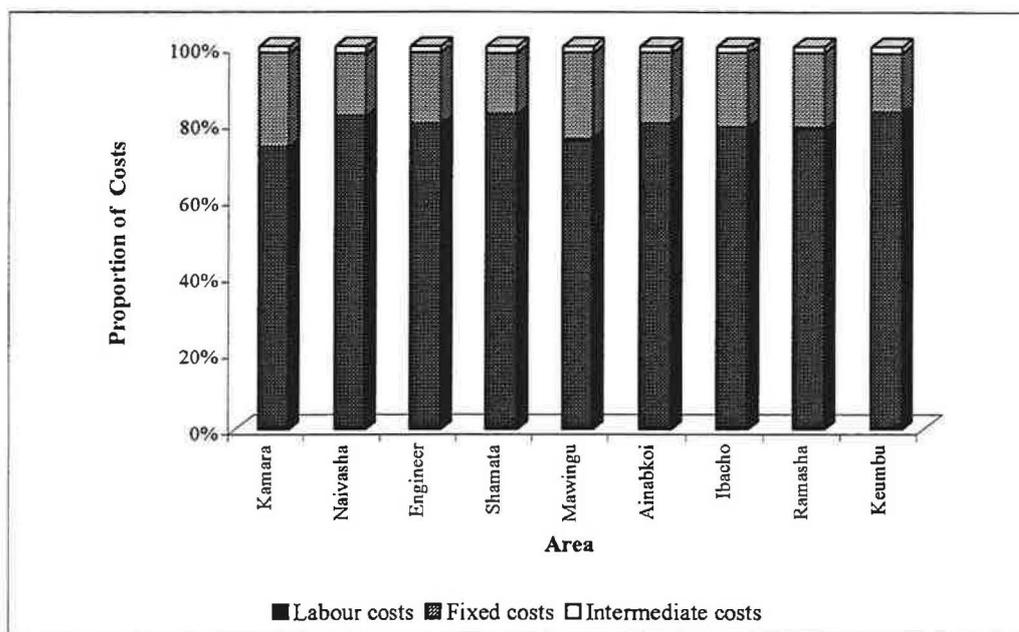


Table A3: Effects of using Herbicides and Solar drier in Pyrethrum Production: The Case of Kamara Division, Nakuru District

	Manual Weeding	Sencor	Sencor & Drier	Herbicides Venzar	Venzar & Drier	Drier
Revenue (Kshs)	92,906	92,906	92,906	92,906	92,906	92,906
Annualized fixed costs	9,688	11,751	11,751	11,751	11,751	9,688
Labour Costs	29,442	12,498	10,245	12,498	10,245	27,189
Intermediate Costs	5,402	9,546	9,499	11,136	11,150	5,406
Total costs	44,532	33,795	31,495	35,385	33,146	42,283
Profit/ha/year	48,374	59,111	61,411	57,521	59,760	50,623
% Increase in Profit		22.20	26.95	18.91	23.54	4.65
% Increase in Intermediate costs		76.71	75.84	106.15	106.41	0.07
% Decrease in Labour Costs		(57.55)	(65.20)	(57.55)	(65.20)	(7.65)

