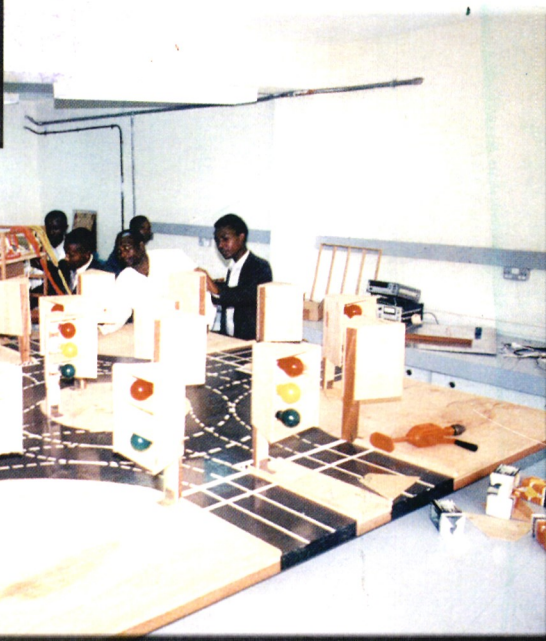


KENYA INDUSTRIAL RESEARCH AND DEVELOPMENT INSTITUTE

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1999-2000

ANNUAL REPORT and STATEMENT OF ACCOUNTS

Annual Report and Statement of Accounts 1999/2000

157-3
KIRDI

**KENYA INDUSTRIAL RESEARCH
AND DEVELOPMENT INSTITUTE**



**ANNUAL REPORT
AND
STATEMENT OF ACCOUNTS
1999 - 2000**

KENYA NATIONAL ASSEMBLY

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LIST OF ABBREVIATIONS

ACFC	- Agro-Chemical Food Company Ltd
ADB	- African Development Bank
ARCEDEM	- African Regional Centre for Engineering Development and Manufacture
ARF	- Agricultural Research Foundation
ASARECA	-
CTD	- Chemical Technology Division
COMESA	- Commonwealth Countries of East and Southern Africa
DPET	- Data Processing and Electrical Technology
EARNETT	
EDSC	- Engineering Development and Service Centre
EPZA	- Export Processing Zone Authority
EU	- European Union
FKE	- Federation of Kenya Employees
FTD	- Food Technology Division
IDA	- International Development Agency
IDRC	- International Development Research Centre
IFAD	- International Fund for Agriculture Development
IITA	- International Institute for Tropical Agriculture
IPMU	- Industrial Plant and Machinery Unit
JKUAT	- Jomo Kenyatta University of Agriculture and Technology
KAM	- Kenya Association of Manufacturers
KEFRI	- Kenya Forestry Research Institute
KENYAC	- Kenya National Assurance Coöperation
KIRDI	- Kenya Industrial Research and Development Institute
KISWA	- KIRDI Staff Welfare Association
KSPPP	- Kisumu Sorghum Processing Plant
LDC	- Leather Development Centre
LSC	- Laboratory service Centre
MSE	- Medium and Small Enterprise
NARL	- National Agricultural Research Laboratories
NGOS	- Non Governmental Organization Ser ice
NIC	- Newly Industrialised Country
NIIC	- National Industrial Information Centre
SMI/SMEs	- Small and Medium Industry and Small and Medium Enterprises
TFDC	- Traditional Food Development Centre
UNDP	- United Nations Development Programme
UNIDO	- United Nations Industrial Development Organisation
WAITRO	- World Association of Industrial and Technological Research Organizations

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CHAIRMAN'S STATEMENT

Dear Sir,

I hereby submit on behalf of the Board of Directors of Kenya Industrial Research and Development Institute (KIRDI), the 1999/2000 Annual Report and Statement of Accounts in accordance with the provisions of section 20 of the Science and Technology act, Cap 250 of the Laws of Kenya.

KIRDI spent Ksh 104,929,031.50 during the period under review. Records provided by the Auditor General reveal a revenue income of Ksh 112,595,088.40, this left a deficit (net excess income incurred plus expenditure) of Ksh 7,666,056.90 before depreciation.

The current National Development Plan, lays emphasis on the expansion and modernisation of existing industries. KIRDI is highlighted as a major contributor to this process. The Institute, just like other public research institutions in Kenya has the resources, organisation and capabilities to do research, but lack adequate funding and knowledge of market opportunities

The Institute endeavoured to address the aforementioned hurdle by embarking on collaborative projects and agreements with both the public and private sectors. This report provides information about the various activities undertaken in the year 1999/2000 by the Institute in its efforts to achieve the national goals.

On behalf of the Board of Directors, I thank the government, donor institutions and other KIRDI collaborators, KIRDI Director and staff for the year's achievements.

**Chairman
KIRDI Board of Management**

DIRECTOR'S REPORT

KIRDI's operating environment has changed over the last few years. Changes in government policy and priorities demanded that the Institute find ways of generating its own income to sustain its operations. Nonetheless, the Institute continued to depend largely on governments grants for its operations

During 1999/2000 some of the projects implemented in the Institute included a study to assess the status of the national production and importation of biopesticides and other natural products in Kenya and establish gaps in information that would require R & D interventions, a survey to determine the feasibility of locating a cloudy sorghum brewery in Eldoret Municipality, and energy audit for Unga Limited which was submitted to the client at the end of the year.

KIRDI continued to make worthwhile contributions to the development of the country through technology development, consultancy and technical services and capacity building training programmes for college and university students.

I wish to thank the Board of Management for its support and wise management during the period, the Kenyan government for both financial and moral support, donor organisations and all who have worked with KIRDI to achieve its mission.

Dr. Patrick Muturi
Director, Kenya Industrial Research and Development Institute

FINANCIAL REVIEW

REPORT OF THE DIRECTORS

Directors

Mr. G.K Yegon	- Chairman
Prof. S.M. Maranga	- Director
Mr. R.G Mwai	- Director
Mr. G. M. Omulayi	- Director
Mr. J. Marete	- Director
Mr. Z. N. Kahura	- Director
Mr. J. Sagala	- Director

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Secretary

Dr. Patrick Muturi

The Directors presented the audited accounts for the year ended 30th June 2000.

Results

The accounts show;

A net deficit for the year - Ksh 8,628,744.55

Net accumulated deficit to date - Ksh 37,220,163.20

Directors

The Directors, whose names are listed above are appointed for fixed terms of three (3) years and are not subject to retirements by rotation.

Auditors

The Auditors, Auditor -General (corporations) continue in office in accordance with the provision of section 5(3) of the State Corporation Act, 1986

By Order of the Board

Dr. Patrick Muturi

SECRETARY



MANAGEMENT

BOARD MEMBERS

Mr. G.K. Yegon
Prof. S M Maranga
Mr. R.G. Mwai
Mr. G. M. Omulayi
Mr. J. Marete
Mr. Z. N. Kahura
Mr. J. Sagala

Representatives from Ministries

Permanent Secretary, Ministry of Research, Technical Training and Technology
Permanent Secretary, Ministry of Agriculture and Livestock Development.
Permanent Secretary, Ministry of Commerce and Industry.
Permanent Secretary Ministry of Public works and Housing.
Permanent Secretary, Ministry of Energy
Permanent Secretary, Ministry of Environment and Natural Resources
Permanent Secretary, Ministry of Finance
Permanent Secretary, Ministry of Water Development
Permanent Secretary, Ministry of Health
Director of Research, Ministry of Research, Technical Training and Technology
Secretary, Kenya National Federation of Jua Kali Associations
Secretary, National Bureau for Science and Technology.

HEADS OF DEPARTMENTS AND DIVISIONS

HEAD OF DEPARTMENT

Dr. P. M. Muturi

Research and Development Department

HEADS OF CENTRES

Mr. K. T. Lumumba

National Industrial Information Centre

Mr. J. M. Mong'oni

Industrial Plant and Machinery unit

Mr. J. Kamau

Engineering Development and Services Centre.

Mr. F. Wainaina

Leather Development Centre

Mr. J. Achacha

Traditional Foods Development Centre

Mr. J. M. Muriuki

Laboratory Services Centre

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HEADS OF DIVISIONS

Mr. E. J. Muruka

Human Resources and Administration Division

Mrs. J. Nyakawa

Finance Division

Dr. M. Makayoto

Chemical Technology Division

Mr. A. J. Awimbo

Ceramics and Building Materials Division

Mr. K. W. Aduda

Data Processing and Electrical Technology Division

Dr. W. Otieno

Food Technology Division

Mr. E. W. Odongo

Leather and Textiles Technology Division

Mr. W. Musungu

Energy and Environment Division.

HUMAN RESOURCES

AND ADMINISTRATION

page 11

HUMAN RESOURCES SECTION

In its facilitatory role in acquiring quality staff in the right numbers and coordinating the Management efforts of the Institute's personnel towards achieving a common focus of productivity (Research and Development), the Human Resources office undertook and has participated in the following activities effective 1st July, 1999 to date:

Recruitment

Effective 1st July 1999, the office facilitated the enrolment of Research Scientists and a few support Staff in the following categories:

<u>Designation</u>	<u>Number</u>
(i) Research Officer II	1
(ii) Research Assistant	3
(iii) Assistant Process Design Engineer	1
(iv) Laboratory Technologist	1
(v) Accountant I	1
(vi) Copy Typist	1
Total	9

Separation

The Institute also saw the exit of the following from its service:

<u>Designation</u>	<u>Number</u>
(i) Principal Research Officer	1
(ii) Senior Laboratory Technologist	1
(iii) Donor Liaison Officer	1
(iv) Research Officer II	1
(v) Librarian/Computer Operator	1
(vi) Senior Clerical Officer	1
(vii) Clerical Officer I	1
Total	7

KIRDI Billboards

Fabrication of Billboards was done at EDSC. The layout was prepared and approved. Quotations for the earthwork were sought and opened. However, the project did not take off due to financial constraints.

Staff Rationalization

An exclusive document on Staff Rationalization and right-sizing was prepared and submitted to the Central Government for consideration and funding.

BENEFITS SECTION

During the year under review, the following activities were undertaken and achievements made:

1. Staff Retirement Benefits Trust Deed was revised and submitted to Commissioner of Tax for registration purpose.
2. Registration of pension scheme with Commissioner of Income Tax was finalised and Exemption Certificate No. 01 185, with effect from 1st January, 2000, was issued.
3. The Board of Trustees was instituted comprising of staff representatives and Management.

CONSTRUCTION

Construction on block D was done and completed on first floor. Putting on and fixing the windows, doors and painting was done.

In completion of Block D, there was need for a bigger switchboard. The Institute therefore installed a switchboard with more than 40 extensions.

STORES

A Supplies Manual, awaiting Board approval was prepared by this section.

TRAINING

a) During the period under review the Section continued with its role of facilitating training whereby 19 members of staff were enrolled for various courses.

b) Training needs analysis exercise was carried out and a report compiled for necessary action.

c) Training programme for the period 2000/2001 was compiled for submission to the Board of Management for deliberations and approval.

d) The section continued to facilitate student attachments from various institutions.

Harambee Sacco Society

Out of 281 KIRDI staff, 250 were members of the giant Harambee Sacco. Members enjoyed services through their elected officials in the form of development loans, emergency loans, school fees and annual dividends. Through this scheme, members were able to accomplish personal projects thus uplifting their welfare status as they continued working with the Institute.

Staff Welfare Association (KISWA)

By the end of period under review, 248 staff were members. Dividends totalling KShs. 200,000/= were paid out. Other than giving out development loans too, KISWA continued to serve welfare needs of its members especially in times of bereavement and emergencies.

Sports Club

Men's football team continued to shine during this period. Having qualified to Nairobi Super II League from Nairobi Division I in position three the previous year, the team is showing bright signs of qualifying to National Super League in the next season. However, financial constraints continued to bite, affecting its overall performance. The ladies' netball team remained inactive.

ASK Show

The Institute for the first time exhibited at the Nairobi ASK Show in its own stand. This was as a result of the abrupt re-organization of government ministries that saw the Institute shifted to the Ministry of Tourism, Trade and Industry.

This move necessitated all the Research and Development Divisions, Production and Service Cen-

tres to exhibit at the Show starting 27th September to 2nd October, 1999. Serious inquiries were recorded and follow ups have been going on. Despite inadequate preparations to enter the competitive categories, the impact of the Institute's participation was better than the previous year's.

Annual Projects' Review and Open Day

Under the theme "Partnership in Industrial Technology Development and Management for Industrialization", the Institute for the first time organized a projects Review and Open Day starting 19th to 20th August, 1999. The two-day Symposium and Exhibition was meant to give the public an opportunity to freely visit the Institute's research and production facilities and also for the Researchers to present papers on their recent research findings and services. This way, there would be a facilitated feedback from other stakeholders; industry and beneficiaries of the Institute's products and services.

Due to unavailability of adequate space, the symposium was held at the College of Insurance whereas the exhibition was going on at our two sites. Serious inquiries were recorded and follow ups have been going on.

RESEARCH AND

DEVELOPMENT

- o Chemical Technology Division
 - o Food Technology Division
- o Energy and Environment Division
 - o Data Processing and Electrical
- o Ceramics and Building Materials Division
- o Leather and Textiles Technology Division

NEEDS ASSESSMENT FOR BIOPESTICIDES AND OTHER NATURAL PRODUCTS IN KENYA: IMPORTATION AND LOCAL PRODUCTION

Introduction

The natural products industry has the potential to supply the raw materials for extraction and bio-synthesis of industrial and medicinal products that add value to the chemicals the country would otherwise import or export as primary products for use in advanced countries to produce secondary products.

In the agrochemical industry, naturally occurring insecticides of economic importance are nicotine and the pyrethrins, both of which are available in the country in commercial quantities. The latter yields quinine. Another source of quinine grown locally on a commercial scale is cinchona from which (+)cinchonine is extracted. These belong to the class of alkaloids that include atropine from the deadly nightshade, D (-)-ephedrine, epinephrine (adrenaline), and cocaine among others. Natural plants also serve as potential sources of fungicides and herbicides.

These pesticides have a great potential to substitute and replace the synthetic agrochemicals such as DDT, Dieldrin and BHC that have been found to be environmentally toxic and have been withdrawn from the market for this reason.

The alkaloids belong to the larger group of natural heterocyclic compounds that also include P-lactarr antibiotics, consisting chiefly of the natural penicillins and the third group the natural porphyrins, an important member being chlorophyll.

Under the lipid class the natural product of economic importance is lanolin the wool wax that can be refined and used to service the cosmetic and pharmaceutical industries. There is a need to establish the level of local stocks of wool wax and the potential for processing it.

Anthocyanins are the natural plant pigments of glycosidic nature. Other copigments that contribute to plant color are the flavones and the flavonols. The latter are the main polyphenol components of the tealeaves and their fermentation products confer beverage qualities to the tea. They also can be used as pigments for colouring textiles.

Justification

To enable the industry take up the challenge of ensuring a stable and sustained economic growth, it was necessary to design appropriate measures that would enhance the development of industrial products from the natural plant sources through cultivation and extraction. To come up with the design, data was to be created by carrying out a survey to cover the current status in relation to:

- Raw materials sources, supply and importation figures.
- Potential levels of production.
- Appropriate technology for industry.
- Potential additional benefits in linkage industries.
- Mechanism to help infant industries to develop products that meet both national and international standards.

The survey thus formed the basis for future interventions in the biopesticides industry as a way of making this subsector contribute its fair share towards Kenya achieving an NIC status by the year 2020, besides meeting the twin challenges of unemployment and poverty.

The challenges facing the natural products industry in this liberalized market require a review of policies and strategies, R&D input into process and product development, technology development and up grading of skills so as to make the products competitive both nationally and internationally.

The study aimed at producing baseline data for further interventions. The study would put in place a structured linkage mechanism that would ensure that the R&D carried out in KIRDI would be industry oriented and demanded.

Objectives

Main Objective

The overall objective of the study was to assess the status of the national production and/or importation of the biopesticides and other natural products in Kenya and establish gaps in information that would require R&D interventions.

Specific Objectives

To determine the production levels if any, of 10 most common natural bi-products sourced locally and their economic value.

To determine the importation levels of 10 most common natural-based products into the country and their economic value.

To determine the potential for value addition through extraction and biosynthesis of natural-based products currently imported into the country.

Review existing policies and development strategies and identify constraints towards the growth of the biopesticides industry.

Development of project proposals on identified R&D needs in collaboration with the industries.

Expected Outputs

Documented status of the industry including raw material sources, supply and constraints facing the industry.

Documented policies and development strategies affecting the natural products industry in Kenya.

Documented list of potential beneficiary industries utilizing and producing the identified natural products.

Expected Impact

KIRDI would have upto date baseline data for use in helping the industry grow and contribute towards Kenya's NIC status by the year 2020.

Status

The R&D needs identified by the survey carried out for the programme were being implemented by the end of the review period.

FEASIBILITY STUDY ON THE ESTABLISHMENT OF A SORGHUM-BASED CLOUDY BEER BREWERY IN ELDORET

Introduction

The project involved the establishment of cloudy sorghum beer brewing factory in Eldoret using sorghum and maize as the main raw materials input. The brewing capacity was anticipated at about 1.5 million litres per month. It was a joint venture between a local industrialist and the National Sorghum Brewery Ltd. of South Africa.

Justification

A local Kenya industrialist, in conjunction with National Sorghum Breweries Ltd. of South Africa, was the sponsor of the project. The local industrialist was expected to seek long-term financing for the project from the local development financial institutions for capital investment. A total of R 6,554,300 (South African Rand) was required to undertake the project. National Sorghum Breweries Ltd.(NSB) was to contribute about R 2,080,000 (KShs 24,960,000/-) in the form of equipment (1R was equivalent to KShs 12/-at the time of report writing) the local Kenya industrialist would contribute R 4,474,300 equivalent to KShs 54,003,600.

Objectives

This was essentially a survey to determine on the ground, the feasibility of locating a cloudy sorghum brewery in Eldoret Municipality. The objectives were mainly two. Firstly, to assess the suitability of the alternative sites for the brewery and secondly to gather data on the raw material availability in the North Rift agricultural belt as well as the logistics on the ground for supporting the construction, siting and sustainability of the medium scale brewery.

The initial groundwork had been done at KIRDI and field visits had been made to Nyanza and Western Province.

Expected Outputs

- Identified suitable site for the planned brewery
- Identified sources of raw material in the North Rift agricultural belt.

Expected Impact

- Setup of the factory will result in new jobs being created in the municipality.
- The products manufactured will compete with similar imported products leading to savings in foreign exchange.
- Other economic benefits in the region shall be higher farm incomes, as the raw materials shall be bought at competitive prices by the brewery.
- There shall be improved nutrition and health resulting from more environmentally friendly methods of brewing cloudy beer.

Status

The final report was under discussion by the end of the financial year. The financial analysis was also being done to determine the project's profitability.

Beneficiaries

- Smallholder farmers growing sorghum, maize and millet.
- Farm families (including dependents).
- Low income earners who drink cheap illicit liquor.
- Unemployed in the rural economy.

DEVELOPMENT OF NATURAL TEXTILE DYES FROM INDIGENOUS FLORA FOR SMALL-SCALE APPROPRIATE TEXTILE TECHNOLOGY USERS

Introduction

Some 130 indigenous plants have been screened in Kenya for dyeing properties but little has been documented nor have these plants been studied in detail, neither have the dyes been isolated for development purposes. Much of the natural dyes available have been exploited on their application to wool mostly as very few of these dyes are substantive to cotton and where they are substantive, are of inferior fastness properties, of limited and dull shade range and generally require metal mordants to impart permanent hue to dyeable fibres. The present study seeks to fill the gaps identified therein, by development of suitable dyes for wool and cotton from local dyeplants.

There is a lot of potential for the revival of use of natural dyes to substitute synthetic colours in certain areas. The trend has been fuelled by the challenge for protection of the environment. Although most attention has been focussed to modifying synthetic dyeing processes the need to realize the importance and explore the technology of application of natural dyes is more urgent.

Justification

A few organizations and/or institutions in Kenya were engaged in the study of natural dyes for the textile industry. Natural dye studies were undertaken as far back as 1943 by East Africa Industrial Research Board, EAIRB (now known as KIRDI) and Scott Research Laboratories (now NARL).

The Departments of Chemistry at the Universities of Nairobi and Dar-es-salaam were also engaged in the study of products from natural sources among them, dyes.

However, these studies were being done without any effective coordination especially on aspects which would ultimately result in their industrial utilization. There were at best attempts made by scien-

tists and technologists individually. KIRDI wished to coordinate systematic studies on natural textile dyes through sponsorship of interested parties.

Objectives

- To isolate, characterize and evaluate indigenous low cost textile dyes of natural origin.
- To isolate the main components of each dyestuff where necessary, to improve shade reproducibility.
- To isolate the pure solid product or liquid concentrate with enhanced shelf life.
- To determine the commercial viability of natural dyes. This will take the form of laboratory evaluation and performance testing to establish light and wash fastness.

Expected Outputs

1. Checklist of 12 most potential dyeplants.
2. List of natural dyes from local plants described.
3. Properties of evaluated dyes described.
4. List of developed natural dyes.

Expected Impact

New jobs would be created in the rural economy especially among the women's groups.

Increased diversity of plant species in the rural forests and plantations through cultivation of these dyeplants.

Status

This project was initiated in 1992 in KIRDI and some work has been done on the *Lawsonia inermis* dyeplant.

The project proposal was submitted to the IDA-funded Agricultural Research Fund (ARF-KARI) in 1999, but in the awards announced in April 2000, this project was unsuccessful in being funded.

Target Beneficiaries

- Women groups cultivating these dyeplants for extraction of natural dyes.
- Manufacturers of extractors for use on these dyeplants.

DEVELOPMENT OF PIGMENTS FROM TEA TANNINS AND THEIR APPLICATION TO TEXTILES.

Introduction

There was growing interest in the use of natural dyes in textile applications. This was in response to the toxic and allergic reactions associated with synthetic dyes. Tea is a natural product of immense socioeconomic importance to Kenya. Tea chemical components are basically phenolic compounds and have antimicrobial activities. Further, most of these tea phenolics have been demonstrated to have many benefits to human health. Due to the process of black tea manufacture the majority of these phenolics are oxidized to bright orange-red products. Green leaf phenolic compounds complex with transition metal ions to give brightly coloured products. Other non-transition metal ions like boron and aluminium complex with the troponoid ring structure of the 3', 4' - dihydroxy-benzotropolone substances called theaflavins and thearubigins that are intensely coloured, stable and are soluble in organic and aqueous solvents. The methods of separation and purification of these tea phenolics have already been developed and are fairly simple.

Natural dyes are often a combination of varying amounts of other coloured components so that the shade produced on textiles tends to vary. Most natural dyes are also known for dull, fugitive hues. In spite of their inferior fastness, natural dyes are more acceptable to the environmentally conscious people around the world.

Cotton, the main target fabric in this study, is mainly composed of cellulose. It is cellulose that determines the dyeing behaviour and fastness properties of cotton and other cellulosic fibres. The cellu-

lose of cotton can be chemically modified to improve its dyeability. The innovation expected is isolation of the dye derived from tea phenolic components from the solvent, purification to obtain a pure shade and recovery of the solid product or liquid concentrate that may have an enhanced keeping quality.

Justification

The rationale for this kind of research was the potential for revival of use of natural dyes to substitute synthetic colours in certain areas. This trend was fuelled by the challenge for the protection of the environment.

The local textile industry is heavily dependent on imported textile synthetic dyes and these are a significant overhead in the operation of textile mills. The unit cost of importing these dyes has continued to rise inspite of the reduced demand for local textiles due to unfavourable market forces. Alternative sources of dyes have therefore become important.

Natural dyes are often a combination of varying amounts of other coloured components so that the shade produced on textiles tends to. By isolating the major components it will be possible to obtain a constant reproducible shade.

Most natural dyes are known for their dull, fugitive hues, but structural modifications will be attempted where possible to improve fastness properties of the fugitive colours.

The innovation expected was isolation of the dye from the solvent, purification to obtain a pure shade and recovery of the solid product or liquid concentrate that may have an enhanced keeping quality.

In the Development Plan then, the Government set itself the objective of development and promotion of agro-based industry through value addition of raw materials from agriculture such as sisal and tea. The diversification of utilization and consumption of such crops shall hopefully lead to better returns

for the industry and possible job creation and in the rural economy. The project results would also contribute in conserving and earning foreign exchange.

Objectives

Main Objectives

- 1 To promote the application of natural plant dyes for environmental mitigation of the textile industry.
2. To identify suitable natural dyes locally in order to cut down on the foreign exchange bill and create jobs for Kenyans.

Specific Objectives

- To isolate, characterize and evaluate tea leaf tannins with respect to their viability as natural dyes for textile application. This will include performance testing to establish light and wash fastness on cellulosic (cotton) and protein (wool) fibres.
- To use tealeaf tannins to regenerate metal-complex dyes of various colours.
- To apply the synthesized metal-complex tannin-based dyes to chemically modified cotton.

Expected Outputs

- Booklet of most potential products from tea.
- Booklet on properties of evaluated dyes described.
- List of developed natural dyes and byproducts from tea.
- Developed technology for extraction of tannins.
- Formulations on application of regenerated dyes from tealeaves.
- Developed technology for isolation of solid or concentrated pigment.
- Developed technology for chemical modification of cotton and other cellulosic fibres.

Expected Impact

Most of the dyeplants grew in rural regions where resultant knowledge of the potential of these natural resources for industrial application would lead to a new economic activity among peasant farmers.

Cottage industries utilizing craft skills would benefit from improved products as a result of this project.

An indirect benefit would be creation of more employment opportunities in the sector and an improvement of biological diversity of plant species. Cultivation of promising tea cultivars and harvesting from natural resources will involve a large number of rural people (including women) thus creating employment.

The industry when fully developed will help entrepreneurial groups to set up small cottage industries to extract dyes and dye craft textiles for local and export markets.

Additional by-products from tea would lead to diversification of the utilization and consumption of tea in Kenya.

Status

This project was developed in collaboration with the Tea Research Foundation of Kenya. The project document was submitted to The ARF-KARI for funding consideration. If funded the project would run for 18 months.

A client, Jakai Ltd, commissioned KIRDI to develop dyes from waste green tea. The concepts developed in this project were used in the client project, for which a down payment was committed.

Constraints

The planned duration may be much longer if and when the project takes off, due to the power rationing schedules which severely curtailed operations dependent on electricity. The client project is similarly experienced delays as a result.

IMPROVING LIVELIHOODS OF LOCAL COMMUNITIES THROUGH EXPLOITATION OF NON-FOOD VEGETABLE OILS

Introduction

Vegetable oil industry is of strategic importance to the country. In view of this, the Government stipulated in a number of policy instruments, measures to be taken to promote this important sub-sector.

According to statistics of the year, Kenya imported about 190,000 metric tons which accounted to more than 95% of her domestic demand, costing the country about six billion Kenya Shillings a year. The bulk of this oil was palm oil (from the Far East).

It was argued prudently that, first, Kenya should not rely on a foreign country to supply her with such a primary commodity such as vegetable oil for in case of disrupted supply, our country would be thrown into a crisis.

Secondly, it was advocated that as a matter of urgency Kenya explore alternative oil crops as suitable sources of edible and industrial oils. Suggested candidates include groundnuts, rapeseed, and sunflower and coconut oil, all of which grow in different parts of the country. The byproducts of the oil milling would serve as feedstock for the animal feeds industry whereas the byproducts of the oil refining would be used as an important raw material in soap making. The cited oil seeds were well established as food crops or sources of food. Industrial application of the same would compete severely with that of food. In a situation where the country was far from being self-sufficient in food oils, it was prudent to explore non-food oils for their industrial applications and exploit them fully. As oils extracted from these seeds had the triglyceride structure along with the functional groups associated with the various fatty acids, they can be put to use in many industrial applications. Applications for these oils may be found in soap making, resins and coatings, printing inks and in plastics among others.

Justification

- The project would contribute in alleviating poverty by creating employment, in harvesting, processing and marketing of the raw materials and the final products.
- The raw materials intended to be used for the project were plentifully available in the target areas but not exploited.
- Some of the raw materials to be addressed, such as mango seeds were otherwise disposed as useless wastes. The project would therefore contribute in creating a cleaner environment.
- The capacity to develop and adapt simple technologies to convert the raw materials into useful commercial final products was available at KIRDI, and other Institutions such the national universities.
- Since biological materials (natural products) were to be used as raw materials, it followed that the final products would be environmentally friendly.
- Kenya is a net importer of edible fats and oils, other oil based products like soap have to rely to a large extent on imported oils and fats (total oil/fats imports total more than 190,000 metric tons). Exploitation of non-food oils would relieve the pressure on imports of the commodity.
- The project would significantly favour women who formed the majority of the rural population and who in most cases are in charge of their families' overall wellbeing.
- To evaluate five non-food seed oils for production of consumer commodities such as soap, resins, tanning oil and drying oil.
- To develop and adapt technologies to convert non-food oils into consumer commodities.
- To develop small-scale plants/equipment to extract, refine and process the oils into consumer commodities.
- To disseminate and transfer the small-scale technologies to the rural areas.
- To extend the results of the project to 5 other Districts.

Expected Outputs

The project outputs included compilation of data on availability of oil yielding materials for non-food oils; characterization of the oils in question; development of different products based on the oils, design of small scale plants to process the oils into the identified products; economic feasibility reports and technology package reports.

Expected Impact

Implementation of the project would lead to creation of a new source of income for rural/urban areas and particularly for women. It would generate employment and contribute to conservation of environment through utilization and re-cycling of agro-wastes.

Beneficiaries

This project targeted the following beneficiaries:

Objectives

Main Objective

To improve livelihoods of local communities through development, adaptation and dissemination of 3 small-scale non-food vegetable oil processing technologies in the selected districts.

Specific Objectives

- To assess the availability and quantities of non-food oil seeds in three districts in Kenya.
- To characterize non-food seed-oils for their suitability for industrial applications.

- About 200 women groups with an average membership of 30-40: 6000-8000 women.
- Local machine fabricators will acquire skills in the construction of oil extraction and refinement plants.
- Traders will have access to better quality non-food vegetable oil and oil products.
- Intermediaries. - Community-Based Organizations, Non Governmental Organizations and Small and Medium-Scale Enterprises.

Status

This project was drafted initially as part of the implementation of the natural products programme targeting non-food vegetable oils. It was redrafted and then submitted to the Ministry of Labour and Human Resource Development and United Nations Development Programme's employment and sustainable livelihoods programme.

Constraints

The call for proposals by the Ministry of Labour and Human Resource Development and United Nations Development Programme was communicated at short notice making it difficult to submit a complete project document.

TECHNICAL FEASIBILITY OF PRODUCTION AND PROCESSING OF GIRARDINIA DIVERSIFOLIA NETTLE FIBRE: COMMERCIAL PROCESS DEVELOPMENT FOR RETTING, SOFTENING AND SPINNING OF GD NETTLE FIBRE

Introduction

Stinging Nettle (*Girardinia Diversifolia*) is a lignocellulosic bast fibre. It is obtained from the stem of the GD shrub by the biological process known as retting which separates the bast fibres from the core and the epidermis of the plant and also separates the fibres from each other. Various forms of biological retting have been developed over time, depending on the observed advantages and disadvantages.

Justification

A client had commissioned KIRDI to undertake research on a bast fibre found locally for textile application. The client indicated that when it is wet the GD fibre forms a mat, making it difficult to spin into yarn. It was proposed that the fibre be converted into a form, which can be separated into about 3 strands to facilitate spinning - i.e. establish the low-

est count technically possible to qualify as a textile fibre that can be woven by powerloom rather than being limited to handicrafts.

It was also observed that when dry the fibre became brittle, making spinnability difficult. Hence the need for softening.

Objectives

Main objective

To develop a commercial process for retting, softening, separating and spinning the GD Nettle fibre ultimates (fibre bundles known as fibrils), into elementary fibres suitable for spinning.

Specific objectives

1. To characterize the GD fibre variants
2. To determine the most technically feasible biological method for retting the GD fibre variants above.
3. To remove excess moisture and mechanically process it (scutching) in order to remove the woody matter from the retted nettle fibres.
4. To separate the long (Line) and the short (Tow) fibres from the ultimates by hackling.

Expected Outputs

1. Characterized GD fibre
2. Appropriate Technology for retting GD fibre
3. Appropriate Technology for softening GD fibre
4. Appropriate Technology for separating GD fibres form flume tow
5. Appropriate Technology for scouring, bleaching and spinning GD fibre

Expected Impact

World fibre consumption is estimated to reach about 48.5 million tonnes by the end of year 2000. Out of this, cellulose are expected to account for 53% against 42% for synthetic fibres, indicating a higher demand for cellulose fibres.

On the other hand World wool consumption is expected to remain constant at about 4% of the total by the turn of the century. These figures indicate the direction we should head - we need as a priority to develop our capacity to manufacture cellulosic fibres for local and export markets, if we are to contribute to the realization of the NIC status by the year 2020.

Status

The client commissioned KIRDI to carry out characterization tests on the fibre. The project contract document was drafted for signing before work could commence in July 2000 and run for 12 months.

Beneficiaries

- Girardinia Products Self-Help Group.
- Rural women's groups cultivating and processing Girardinia diversifolia.

Constraints

The power rationing hampered laboratory tests on fibre characterization.

DEVELOPMENT AND COMMERCIALIZATION OF POTABLE ALCOHOL

Introduction

In Kenya the incidence of poverty, unemployment and meager foreign exchange earnings from exports of her primary products have culminated in a scenario of unfavorable balance of payments and low per capita income. In order for the country to achieve economic "take-off" she must utilize the full potential of her natural resources to broaden the economy to generate a vibrant industrial sector based on primary processing, manufacturing, commerce and services. In view of the above, the Government has put forward a two-phased industrialization strategy. Phase one industrialization in-

volves the promotion of micro, small and medium scale Industries (MSEs) utilizing and adding value to the local raw materials and requiring relatively modest capital investment. Included in this phase will be the agro-processing industries within which processing of potable alcohol lies.

Justification

Local manufacturing of potable alcohol was largely in the hands of local brewers of illicit brews chiefly chang'aa and they were usually very dangerous due to high contamination, which resulted in tragic consequences for the consumers of cheap spirits.

This was attributed largely to the government policy on taxation of locally produced spirits, which tended to make them uncompetitive in the local market mainly due to high prices.

So rather than continue to pursue these illicit brewers wherever they happen to be conducting their hazardous trade, the alternative of developing small scale technologies to manufacture affordable, hygienic and conveniently packaged potable spirits appeared to be the sensible way out and the acceptable trend in the East African region. This would ultimately phase out the undesirables in the local market rather than merely legislating against them. The carrot and stick approach should solve the problem and lead to an enlarged market while ensuring that the drinking population remained healthy and economically productive. A major side benefit would be substantial savings in the foreign exchange bill, even in the liberalized market.

Objectives

Main Objective

The main objective of this project was to develop small-scale technologies to manufacture affordable, hygienic and conveniently packaged potable spirits.

Specific Objectives

The specific objectives included:-

- The blending and packaging of potable alcohol from neutral spirit (rectified ethanol spirit) to serve the lower end of the consumer market in the short term.
- To develop a certified product able to compete with similar products in the East African and wider markets leading to substantial savings in foreign exchange while contributing to the industrialization process.
- To do the costing and pricing of the various products formulated.
- To develop technologies for bulk storage and transport to minimize losses and extend shelf life.
- To carry out review of government policies on taxes and tariffs with a view to recommending measures to improve local alcohol production and consumption across the socioeconomic strata.
- To conduct a feasibility study and thus compile business packages for entrepreneurs wishing to commercialize the outputs.

Expected Outputs

- Certified potable alcohols (rums, whiskies, brandies, gins, vodkas).
- Process design specification.
- Plant and machinery specification
- Government policy guidelines
- Feasibility report.
- Business package for investors in the sector.

Expected Impact

The raw material, neutral spirit was to be sourced from Agro-Chemical Food Company Ltd (ACFC) of Muhoroni in western Kenya. Since most of their quantity of rectified spirit was currently exported the opportunity presented by this project to add value to that product and hence diversify utilization and consumption of the resulting products locally would be immense. In addition costs of the resultant products will be reduced, leading to a lower market price

for the products reaching consumers. The other raw materials to be used in blending such as food colouring and flavors would further enhance the cost effectiveness of the products formulated.

The MSEs identified to take the project to commercial stage were to help in the facilitation of technology acquisition and transfer after it was developed. With the opportunities presented by a certified product in an enlarged East African market and that of the COMESA region the long-term impact was expected to result in the creation of more jobs and an increased economic activity internationally.

Status

The project was essentially complete having been programmed to last 6 months from January 2000. All the technical outputs were realised. The final outputs of policy reviews and business package were being completed as separate components of the overall report on the project.

Beneficiaries

- Consumers of spirits.
- MSE and SME manufacturers of spirits.
- Suppliers of raw materials, chiefly neutral spirit sourced from other agro-industries.

Constraints

These were mainly financial in nature. However these were overcome by sourcing complementary raw materials where it was possible.

EQUIPMENT AND SYSTEMS DESIGN IN DATA PROCESSING AND ELECTRICAL TECHNOLOGY

Introduction

The electrical and electronic industry is one of the cross cutting industries whose development has a major and direct impact in alleviating the numerous challenges facing Kenya today. However, for Kenya to keep abreast with the rest of the developed world, it must take advantage of the existing technologies and adapt them to her own situation and advantage.

It is against this background that KIRDI through the Data Processing and Electrical Technology (DPET) division prepared its short-term programmes for the financial year.

Activities

The DPET set out to provide extension services through:

- (i) Equipment and systems design and specification
- (ii) Installation of equipment and systems
- (iii) Technology development and transfer.
- (iv) Project monitoring and evaluation
- (v) Maintenance and repair of specialised equipment and machinery.
- (vi) Training for skills upgrading.

Achievements

During the period under review the following were achieved.

- The report on energy audit for Unga Ltd was finalised and submitted
- Report on the survey of the electrical and electronic industries in Kenya was prepared and forwarded
- The division embarked on the design and development of a standardised 150kg capacity

solar dryer model for installation at KIRDI.

Completed design drawings are ready and implementation awaits availability of funds.

Training

The Division offered training to institutions such as Moi University, KITI, KENYA polytechnic, Kenyatta polytechnic among others.

FOOD TECHNOLOGY: DONOR FUNDED PROJECTS

Introduction

During much of year, the staff of the FTD division continued with implementation of donor funded projects.

UTILISATION OF CASSAVA FLOUR IN THE PRODUCTION OF BAKERY PRODUCTS IN KENYA

Funded by: IITA

Date of completion: 29th February 2000

Immediate objectives of project were to install a cassava pilot bakery at Kisumu and train MSEs in baking.

PILOT CASSAVA-PROCESSING PLANT AT BUSIA

Funded by: EARNETT

Completion date: 30th September 2000

The project involved the installation of a pilot shed, sub-drying platform and cassava processing equipment in readiness for training and technology transfer to the local community. By the end of the year, the cassava chippers were being modified to improve their efficiency.

TRANSFER OF TECHNOLOGY FOR SMALL-SCALE PRODUCTION AND PROCESSING OF SWEET POTATOES IN SOUTH NYANZA

Funded by: ASARECA

Project ending: 3 1st August 2002

The following outputs were projected:

- Baseline survey report
- First quarterly report to donors
- Three acres planted with improved sweet potato varieties
- Improved sweet-potato recipes
- Sweet potato processing machinery (chipper)

The following were accomplished:

- An improved sweet potato chipper prototype was fabricated
- A number of sweet potato-based recipes were obtained
- Baseline survey was conducted in South-Nyanza, data entry completed and analysis finalised
- The projects first quarterly report was submitted to the donors
- A sweet potato processing machine installation site was identified at St. Linus Okok Girls Secondary School in Kabondo
- Sweet potato multiplication sites were identified in Ndhiwa and Kabondo
- Planting of sweet potato vines was done at three sites (two in Ndhiwa and one in Kabondo).

EASTERN PROVINCE HORTICULTURE AND TRADITIONALFOOD CROPS

Funded by: International Fund for Agriculture Development, IFAD

The following activities/outputs were planned:

- Carry out survey on status of traditional food crops and horticultural crops processing;
- Design, fabricate and test appropriateness of small and medium scale food processing equipment and technologies;
- Conduct workshops and seminars on processing and utilisation of traditional foods crops in

conjunction with the Home Economics Branch of Ministry of Agriculture and Rural Development;

- Train food processors on use and effectiveness of the proposed technologies and quality control procedures; and
- Perform equipment and product promotion through participation in various shows and exhibitions.

No funds were released for this project, hence little was achieved by the end of the year.

EASTERN PROVINCE HORTICULTURE AND TRADITIONAL FOOD CROPS

Funded by: African Development Bank, ADB

The following activities/outputs were planned:

- Carry out survey on status of traditional food crops and horticultural crops processing
- Design, fabricate and test appropriateness of small and medium scale food processing equipment and technologies
- Conduct workshops and seminars on processing and utilisation of traditional foods crops in conjunction with the Home Economics Branch of Ministry of Agriculture and Rural Development
- Train food processors on use and effectiveness of the proposed technologies and quality control procedures
- Perform equipment and product promotion through participation in various shows and exhibitions.

The following were accomplished by the end of the year:

- Survey done in July-September, 1999 report on market survey compiled;
- Two pilot sites have already been identified in Embu and Meru Central Districts. The sites to be funded by ADP and later IFAD;
- Food processing machinery have been acquired for installation at the Meru central site (i.e. Kaguru Farmers Training Centre);
- A draft training manual on small scale food processing has been compiled. This will be used

- to train district project coordinators and selected entrepreneurs in the participating districts; and
- Participated in stakeholders' workshop on improvement of traditional food crops production in Meru south through enhanced collaboration.

CENTRE

REPORTS

LABORATORY SERVICES CENTRE

Introduction

The Laboratory Services Centre (L. S.C) function is to provide laboratory testing services to industries and also development of such capacity to enhance quality of goods in the Kenyan industry. The services are offered to the industries, specifically the SMEs and the Jua Kaili sector. The Centre also supports R & D programmes and activities by providing laboratory testing and analysis. The Centre is also involved in capacity building for the laboratory staff for the industry through training student on attachment from various institutions.

The following is a highlight of the main activities carried out during the year.

Accreditation

One of the main activities planned for the year 1999/2000 was on laboratory accreditation. During the first quarter, a report on the status of the Laboratory Services Centre for accreditation was compiled after an internal audit was carried out.

The internal audit carried out showed that a huge sum of money is needed for implementation of the laboratories accreditation since most the equipment are obsolete. The report recommended that the preparation to accreditation starts with the water and waste water laboratory. Laboratory accreditation will require a modernised, equipped laboratory with state of the art equipment. This will consequently require a huge sum of money, beyond what the Institute can be able to afford.

Networking and Capacity Building

The other main activity was in networking and capacity building in analytical testing and quality control in the industrial laboratories. A laboratory survey was carried out, where about 50 laboratories in public and private sector located in Nairobi and its environs were visited. Each of the visited laboratories was given a questionnaire aimed at

collecting information on the capacity of each laboratory in terms of equipment, and human resource. We received 21 responses of which 19 (nineteen) laboratories filled their questionnaires. The information has been compiled in an inventory that lists the name of the laboratory, location, address, telephone number, equipment available, and human resource capacity.

Training

The Laboratory Services Centre (LSC) offers practical training to students on attachments from various institutions for the industry. During the period under review the centre offered training to thirty two (32) students, on attachments, from various local institutions of higher learning.

Laboratory Testing Services

The Laboratory Service Centre (LSC) carries out laboratory testing and quality control services for external customers (the industries) and internal clients (R & D activities and programmes). During the period under review a total of five hundred and twenty six (526) were analyzed. The total amount invoiced was one million, one hundred and fifty eight thousand, two hundred and twenty shillings. (Ksh.1, 158,220). The samples were categorized as follows:

Water and waste water	134
Food and animal feeds	232
Chemical/metals/soils/rocks	88
Pilot scale extraction of essential oils	12
Leather /textiles	24
Others	36
TOTAL	526

Support To R & D Activities.

During the period under review, the Centre gave support to the following R & D activities/ programmes through laboratory testing, pilot scale tests or product or process development.

1. Sweet potato project
2. Animal feed project.
3. Domestic detergent and corn bread formulation.
4. Portable alcohol project
5. Production of pyrethrin form pyrethrum
6. Fried fish product.
7. Monitoring of tannery and paper industry liquid effluent.
8. Biopesticide formulation and others

TYPE	QUANTITY (PCS)
Hides	25,785
Goat / sheep skins	10,185
Calf skins	8,115
Ostrich skins	134
Zebra skins	8
Fish skins	100 Kgs

LEATHER DEVELOPMENT CENTRE

Introduction

During the year under review, activities in Leather Industry in the country remained very low. Some commercial tanneries worked below their installed capacity and four major ones remained closed, namely: - Bawazir, Blutan, Kamiti and Lake Tanners.

The prices of locally manufactured leathers dropped to the lowest level as KIRDI management tried all means to remain in business instead of closing down.

The Jua Kali leather dealers were also hit by this effect. They also declined in number and the volume of work they brought to LDC for contract tanning went down. Due to the above, LDC's business was badly affected and it could not meet the set up target for the year.

Achievements

LDC received leathers for re-tanning, finishing and for specific machine operations. Most of the work carried out during this period was from Njoka Tanners on contract basis.

Below are the types and quantities of leathers handled during the period under review.

NATIONAL INDUSTRIAL INFORMATION CENTRE (NIIC)

Concept paper on the framework for the National Information Network was completed. A steering committee comprising representatives from GoK (Ministries of Industry and Information), KAM, FK-E (private sector), UNIDO, UNDP and IDRC was to be formed to study document and make inputs before any further work.

INDUSTRIAL PLANT AND MACHINERY UNIT (IPMU)

Introduction

Industrial Plant Machine Unit (IPMU) is one of several centers within the institute charged with the role of advising industry on technology transfer, facilitate commercialization or R&D results, provide market driven investment studies and advise on investment opportunities.

IPMU offers investment opportunities to interested local entrepreneurs as well as technology support services to industry.

Technology Support Services

IPMU offers the following services to industry:

- Technology transfer
This is done by identifying the source of the technology, vetting it and passing it on the entrepreneur.
- Technology back-up
This is provided to entrepreneurs requiring assistance with for instance, technology installation, test-runs

and implementation schedules.

➤ Technology upgrading services

This is provided to entrepreneurs wishing to adopt modern technologies in order to be competitive.

These are presented in the form of pre-feasibility and feasibility study reports for entrepreneurs wishing to start new product lines or expand their business activities. These reports provide insight into the economic viability of the proposed business/project

➤ Consultancy Services

Entrepreneurs with various inquiries on technology e.g. sourcing, suitability, use, upgrading etc, can consult the Center for advice on the best way forward.

Business profiles

During the review period, 100 business profiles were completed and were to be compiled into a handbook once approved by the Board and consultations with other stakeholders made.

TRADITIONAL FOODS DEVELOPMENT CENTRE (TFDC)

Kisumu Sorghum Pilot Plant, the predecessor of Traditional Foods Development Centre (TFDC) was started in July 1991 with the aim of promoting production and use of the crop. The small scale plant initially made brown and white sorghum flours but later included millet as a result of enquiries from customers. A fourth product was introduced which was a mixture of sorghum and millet (composite). Dehulling ended up with bran as a by-product which was sold to small scale animal keepers.

The TFDC was transformed during this financial year into a Research & Development Facility.

The Head of Food Technology Division and a Senior Research Officer completed plans to set up R&D Laboratories.

Customers/clients of the Centre came from around the western region. Some of the specific customers of the Centre products included the Aga Khan Hospital, Nandi Hills, Kapsabet hospitals, supermarkets and even small retail shops within and outside Kisumu .

The Centre concentrated in the identification of trainees for programmes in the utilization of cassava flour in baking.

Cost of partitioning of the production hall and installation of laboratory facilities in Kisumu was estimated at Kshs. 1. 17 million using brick wall or Kshs 867, 000.00 if timber is used.

A workshop scheduled towards the end of 1999 to address the fish export problem did not take place. Further consultations with donors and other stakeholders were to be done in this regard.

ENGINEERING DEVELOPMENT AND SERVICE CENTRE (EDSC)

Engineering Development and Service Centre(EDSC) which was established in 1990 with a focus in engineering services, has therefore gone through it all. The Centre however, soldiers on to provide services to the Industry. This paper reviews the experiences and challenges faced by the Centre, as it delivered these services. It also presents the services being offered to Industry by the Centre, as its contribution to industrial development.

Hammer Mill

The main target for this period was the implementation of the project entitled "Market Development for the Master mill" in Collaboration with SITE and KITI. The project was accomplished successfully.

Industrial needs survey

Questionnaires aimed at identifying the needs of primary industries were developed and sent to industries making dies, tools, jigs, spare parts and related products.

CONTROLLER & AUDITOR

**GENERAL'S
REPORT**

REPORT OF THE CONTROLLER AND AUDITOR GENERAL ON THE ACCOUNTS OF KENYA INDUSTRIAL RESEARCH AND DEVELOPMENT INSTITUTE FOR THE YEAR ENDED 30 JUNE 2000.

I have examined the Accounts of the Kenya Industrial Research and Development Institute for the year ended 30 June 2000 in accordance with the provisions of Section 29 of the Exchequer and Audit act (Cap 412). I have obtained all the information and explanations considered necessary for the purpose of the audit. Proper books of account have been kept by the Institute and the Accounts which have been prepared under the historical cost convention are in agreement therewith and comply with the National Council for Science and Technology Act (Cap 250).

In my opinion and except for the matters referred to here-below, the Accounts, when read together with the Notes thereon, present fairly the Institute's financial state of affairs as at 30 June 2000 and of its deficit for the year ended on that date.

1. FIXED ASSETS

As was the case in the previous year, the Fixed Assets figure of Kshs.260, 809,084 as at 30 June 2000 includes two parcels of land L.R. No. 12910 Paw Paw Road, Nairobi; and L. R. No. 15292 Kibos Road, Kisumu, all valued at Kshs.16, 955,000. However, the Institute has not been issued with title deeds for the subject parcels of land reportedly due to its inability to pay land rates totalling Kshs.2, 460,580 demanded by the Commissioner of Lands covering the period from 1998 to 31 December 2002. In the absence of title documents, it is still not possible to ascertain and confirm the Institute's ownership of the two parcels of land.

2. ADVANCES AND PREPAYMENTS

During the year under review, the institute did not maintain proper and up to date Advances and Imprest Registers and as a result it was not possible to ascertain the correctness of the Advances and Prepayments balance of Kshs.9, 065,647 shown in the Balance Sheet as at 30 June 2000.

3. DEBTORS

The Balance Sheet Debtors figure of Kshs.1 1,927,839 as at 30 June 2000 includes trade debtors totalling Kshs.4, 375,288, which have been outstanding since 1990. Although indications are that the Institute is still pursuing these debtors the recoverability of some of them appears doubtful in view of the lapse of time.

D. G. NJOROGE
CONTROLLER AND AUDITOR GENERAL
24 FEBRUARY 2003

KENYA INDUSTRIAL RESEARCH AND DEVELOPMENT INSTITUTE BAL- ANCE SHEET AS AT 30TH JUNE 2000

Capital Employed	Note	1999/2000 Ksh.	1998/99 Ksh.
Fixed Assets	(2)	260,809,084.00	259,788,919.00
<u>Current Assets</u>			
Debtors	(3)	11,927,839.40	13,173,418.55
Advances & Prepayments	(4)	9,065,646.65	7,548,984.90
Deposits	(5)	479,138.00	399,138.00
Investments	(6)	36,811,394.10	27,891,061.00
Cash & Bank Balance	(7)	4,732,134.55	1,822,353.00
Stock		1,917,569.00	2,913,713.50
Stock- (loose tools)		75,888,229.00	83,515,167.00
		<u>140,821,950.70</u>	<u>137,263,835.95</u>
<u>Current Liabilities</u>			
Pension dues		2,977,722.15	3,157,035.15
Provision for Audit Fees		402,700.00	342,700.00
Provision for Doubtful Debts		3,083,317.00	3,083,317.00
Creditors	(8)	2,957,644.55	3,690,139.45
		<u>9,421,383.70</u>	<u>10,273,191.60</u>
Net Current Assets		131,400,567.00	126,990,644.35
Total Net Assets		<u>392,209,651.00</u>	<u>386,779,563.35</u>
<u>Financed by:</u>			
Capital Grants		104,099,220.00	104,099,220.00
Capital Reserve		16,118,280.00	16,118,280.00
Project Grants	(9)	497,051.40	4,207,329.70
Special Reserves		1,340,000.00	1,340,000.00
Pension Funds		35,471,394.10	26,551,061.55
Miscellaneous Deposit		1,010,244.70	(348,558.15)
Revaluation reserve		187,378,457.00	182,901,222.00
General Reserve		(37,220,163.20)	(31,604,158.35)
Donations		83,515,167.00	83,515,167.00
		<u>392,209,651.00</u>	<u>386,779,563.75</u>

J.M. NYAKAWA (MRS)
Ag. FINANCE MANAGER

DR. P. M. MUTURI
Ag. DIRECTOR

NOTES ON THE ACCOUNTS AS AT 30TH JUNE, 2000

1. Principle accounting Policies

The Institute is a non profit making body and the accounts are prepared on the basis of government accounting procedures as modified to include the revaluation of certain assets.

(a) Fixed Assets

The fixed assets are stated at cost or as revalued on existing use basis from when the Institute started self-accounting i. e 1st July 1980.

(b) Depreciation

Provision is made for Depreciation on the straight line method designed to write off the original cost or valuation of fixed assets other than land, and work in progress over the actual or estimated life of the asset. A whole year's depreciation is charged on assets acquired nine months or more prior to the closure of the financial year and none to those acquired three months or less to the end of the financial year. The annual rate for this purpose are:-

1.	Building	2%
2.	Machines	12.5%
3.	Motor Vehicles	25%
4.	Office Furniture & Equipment	12.5%

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(c) Income

The major source of income of this Institute are the grants from the Government and the nominal charges of analysis fees from Industrial manufacturers and potential entrepreneurs who need laboratory reports on their products.

(d) Bad Debts

Bad debts are written-off after all efforts to collect them have been exhausted.

**KENYA INDUSTRIAL RESEARCH AND DEVELOPMENT INSTITUTE
INCOME AND EXPENDITURE FOR THE YEAR ENDED
30TH JUNE 2000**

2. INCOME	NOTES	1999/2000 Ksh	1998/99 Ksh
Recurrent Grants		107,743,255.30	108,866,716.30
Other Revenue	(10)	4,851,833.10	8,736,124.35
Total Income		<u>112,595,088.40</u>	<u>117,602,840.65</u>
LESS EXPENDITURE			
Personal Emol. (Sal. Est. Staff		54,686,713.25	57,347,402.10
Gratuity & pension		10,559,604.50	13,686,594.70
N.S.S.F		276,400.00	
Other Personal Allowance		3,176,441.20	2,744,976.70
Medical Allowance (out-patient)		4,246,406.50	4,512,444.90
Passage & Leave Expenses		693,833.30	758,351.65
Medical Expenses (in-patient)		1,064,027.00	678,491.00
Group life insurance.		1,754,389.00	
Vehicle Running Expenses		864,690.35	1,017,482.00
Vehicle Overhaul & Repairs		1,027,308.30	859,255.80
Travelling & Accommodation (local)		1,526,227.70	1,190,225.75
Travelling & Accommodation (overseas)		286,693.75	530,610.25
Mileage Allowance		67,150.00	381,713.50
Taxi fares		559,866.00	263,845.65
Postal & Telecom. expenses		160,878.00	123,475.60
Telephone Expenses		1,242,223.95	1,305,595.30
Officials Entertainment		620,278.00	1,066,876.95
Exp. of Confer. Com.& Board		653,789.50	960,296.50
Electricity		618,677.00	210,285.80
Gas Purchase		31,700.00	
Water & conservancy		553,726.75	406,605.35
Purchase of Research Materials		133,634.80	519,801.35
Purchase of Labs. Chemicals		83,755.45	
Purchase of Consumable Stores		506,525.25	250,069.00
Publishing & printing		252,485.00	718,565.70
Uniforms & clothing		112,360.00	129,790.00
Library Expenses		154,796.30	86,223.40
Purchase of stationery		1,323,559.75	1,477,212.15
Advertising & Publicity		312,603.50	1,471,328.20
Show Expenses		295,133.45	3,535.00
Rents & Rates ⁷¹⁰		710,000.00	2,814,750.00
Contracted professional services		6,229,184.60	5,114,125.00
Computer Expenses		536,055.00	
Hire of Transport & Machinery		51,251.80	94,000.00
Misc. & Other Charges		180,387.75	247,961.50
Staff Welfare Activities		326,020.00	612,787.00
Fees, Commissions & Honoraria		167,250.00	28,400.00
Courses of Instruction		698,570.00	162,052.00
Insurance		1,324,731.00	5,290,836.00
Replacement of Motor Vehicles			39,220.00
Purchase of plant & equipment		67,865.00	110,187.65
Maintenance of Mach. & Office Equip.		269,733.65	615,068.80
Maintenance of Lab. Equipment		11,945.00	
Maintenance of building & Stations		459,713.70	1,051,893.80
Contribution to other Bodies		139,258.45	180,313.75
Other expenditure	(11)	5,911,188.00	10,428,950.50
Total Expenditure		<u>104,929,031.50</u>	<u>119,491,603.30</u>

Surplus (Deficit) for the year	7,666,056.90	(1,888,762.65)
Less: Depreciation for the year	(8,397,863.45)	(11,860,421.60)
Depreciation loose tools 98/99-2000	(7,626,938.00)	
Provision for audit fees	(270,000.00)	(150,000.00)
Net Surplus (Deficit) For the year	(8,628,744.55)	(13,899,184.25)
Add:		
Increase (Decrease) in stock	(996,144.50)	449,473.40
Special Reserves A/c		600,000.00
Prior year adjustment (Exceptional item	(12) 4,008,884.20	1,124,165.00
Surplus (Deficit) for the year	(5,616,004.85)	(11,725,545.85)
Surplus (Deficit) for the year 1998/99 b/f	(31,604,158.35)	(19,878,612.50)
Surplus (Deficit) for the year 1999/2000 c/f	(37,220,163.20)	(31,604,158.35)

NOTES

3. Debtors

Unreleased developed grant		1,600,000.00
Balance 1980/81 to 30 th /06/2000	4,375,288.10	3,290,686.10
Payroll Deductions	1,884,558.55	1,753,376.10
Defalcation	836,140.00	836,140.00
World Bank Project	1,831,852.75	5,693,216.35
TOTALS	11,927,839.40	13,173,418.55

4. Advances & Prepayments

Traveling Imprest (Local)	393,717.95	271,622.80
Traveling Imprest (Overseas)	352,717.70	277,335.20
Temporary Imprest	4,310,853.70	2,889,682.35
Standing Imprest	190,411.80	150,411.80
Salary Advance	1,010,361.10	818,919.70
Salary in Advance	1,003,368.30	990,932.05
Insurance Cover	(169,849.10)	176,727.75
Excess Medical	1,314,624.90	1,339,653.25
Plot Scheme	659,440.00	633,700.00
	9,065,646.65	7,548,984.90

5. Deposits

Fuel	6,000.00	11,000.00
Oxygen	30,000.00	30,000.00
Hospital	95,000.00	10,000.00
Electricity - Kisumu	40,000.00	40,000.00
Electricity - Newsite	308,138.00	308,138.00
	479,138.00	399,138.00

6. Investments

Pension	35,471,394.10	26,551,061.00
Thabiti Finance	1,340,000.00	1,340,000.00
	36,811,394.10	27,891,061.00

7. Cash Balance

HQ (Main Account)	696,821.00	148,228.70
L.D.C	36,540.30	118,156.00
E.D.S.C	118,786.30	181,326.05
K.S.P.P	62,436.00	110,240.00
LABS	166,271.00	92,188.00
FOREX A/C	1,300,349.00	731,734.00
BBK NC	2,016,941.05	160,000.00
N.I.I.C	16,038.00	33,599.65
Cash in hand	317,951.00	216,881.00
	<u>4,732,134.55</u>	<u>1,822,353.40</u>

8. Creditors

Nairobi City Council	1,801,800.00	1,801,800.00
Payroll Deductions	1,155,844.55	678,143.95
Motor Vehicle finances		1,210,195.50
	<u>2,957,644.55</u>	<u>3,690,139.45</u>

9. Project Grants

EU/CSIR		1,988,402.95
ICEG		548,762.15
Cassava- IITA	187,473.90	213,410.90
nutribusiness		1,151,086.70
Cassava- EARRNET	(366,751.00)	-
Horticulture- A. D. B	305,667.00	-
Horticulture- IFAD	168,735.60	-
Potato- ASARECA	201,926.25	305,667.00
	<u>497,051.75</u>	<u>4,207,329.70</u>

10. Other Incomes

Rent & Sundry Revenue	1,004,588.45	317,575.55
Training levy		34,595.80
L. D. C	510,175.75	852,339.90
E.D.S.C	1,192,397.40	3,091,404.05
Kisumu Sorghum	269,121.00	904,469.90
N.I.I.C	48,032.50	262,419.75
LABS	705,415.00	801,699.30
Outstanding Debtors	1,122,103.00	1,828,167.80
Interest on fixed deposit		88,969.65
Exchange gain		554,482.65
	<u>4,851,833.10</u>	<u>8,736,124.35</u>

11. Other Expenditure

L. D. C	1,565,622.80	2,205,311.70
E.D.S.C	2,010,418.90	3,891,841.25
N.I.I.C	154,662.40	940,755.80
LABS	677,160.70	884,063.25
K.S.P.P	550,017.60	1,638,381.00

WAITRO Project	33,637.50	31,554.00
Hire purchase interest	836,033.50	837,043.50
Training levy	29,136.15	
Closure of External project A/C	54,499.00	
	<u>5,911,188.55</u>	<u>10,428,950.50</u>

12. Prior year adjustment

Closure of EU/CSIR & Nutribusiness	3,396,369.20	
Adjustment of cash balance (K.S.P.P)	198,678.85	
Closure of ICEG project	413,836.15	
	<u>4,008,884.20</u>	

**KENYA INDUSTRIAL RESEARCH AND DEVELOPMENT INSTITUTE (KIRDI)
FIXED ASSETS SCHEDULE 1999/2000**

	LAND	WORK IN PROGRESS	BUILDING	MACHINERY & EQUIPMENT	MOTOR VEHICLE	FURNITURE & FITTINGS	TOTAL
	SHS	SHS	SHS	SHS	SHS	SHS	SHS
VALUE/COST as at 1/7/99	26,865,000.00	52,283,995.10	108,547,000.00	84,618,915.70	11,518,448.00	15,611,086.55	299,444,445.35
Additions during the year		3,648,700.45		855,700.00		421,545.00	4,961,945.45
Adjustment/ Valuation					(3,501,296.00)		(3,501,296.00)
Disposal/ (Loss through theft)					(21,152.00)		(21,152.00)
TOTAL 30 th June 2000	26,865,000.00	55,968,695.55	108,547,000.00	85,474,615.70	7,996,000.00	16,032,631.55	300,883,942.80
Accumulated Depreciation b/f			8,683,760.00	18,058,849.25	7,978,531.00	4,934,386.04	39,655,526.29
Adj. For Depreciation			2,170,940.00	4,723,598.25	(7,978,531.00)	1,503,325.20	8,397,863.45
Depreciation for the year							
Total Dep. Net Book Value 30: 06: 2000	26,865,000.00	55,968,695.55	10,854,700.00	22,782,447.50	-	6,437,711.24	40,074,858.74
			97,692,300.00	62,692,168.20	7,996,000.00	9,594,920.31	260,809,084.06
Net Book value	26,865,000.00	52,283,995.10	99,863,240.00	66,560,066.45	3,539,917.00	10,676,700.51	259,788,919.06

