Republic of Zambia

ZAMBIA AGRICULTURE RESEARCH INSTITUTE

Ministry of Agriculture and Cooperatives

2008 ANNUAL REPORT

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List of Acronyms

CIA	Crop Improvement and Agronomy
DTMA	Drought Tolerant Maize for Africa
FRA	Food Reserve Agency
FSSS	Farming Systems and Social Sciences
GMOs	Genetically Modified Organisms
ITPGRFA	International Treaty on Plant and Genetic Resources for Food and Agriculture
NPGRC	National Plant Genetic Resource Centre
PARO	Principal Agricultural Research Officer
PC	Phytosanitary Certificates
PIP	Plant Import Permit
PPQ	Plant Protection and Quarantine
PQPS	Plant Quarantine and Phytosanitary Service
RMT	Research Management Team
RUR	Round up Ready
SADC	Southern African Development Community
SOFECSA	Soil Fertility Consortium of Southern Africa
SPGRC	SADC Plant Genetic Resource Centre
SWM	Soils and Water Management
ZABS	Zambia Bureau of Standards
ZARI	Zambia Agriculture Research Institute
ZNFU	Zambia National Farmers Union

1.0 Introduction

The Zambia Agriculture Research Institute (ZARI) is one of the nine Departments in the Ministry of Agriculture and Cooperatives. ZARI was created during the 2003 ministerial restructuring exercise as a core Department within the Ministry in order to strengthen the research functions and be in conformity with regional arrangements in the SADC countries.

ZARI has the mandate to provide agricultural services and conduct public good as well as farmer demand-driven research in soils, rain-fed and irrigated crops, plant protection and farming systems. The ZARI programmes and activities conducted during the 2007/08 season are outlined in this annual report.

In general, implementation of core research programmes during the period under review was satisfactory in the first half of the year as funding from government showed great improvement. However, the second half of the year was adversely affected due to limited funding resulting from the challenges the country went through leading up to the presidential by-elections. Activities conducted included field trials in the area of crop improvement, soil productivity and services provision in the area of plant nutrients, soil analyses, soil survey, plant insect pest and disease diagnostics, quarantine/phytosanitary service and training in post-harvest technologies to facilitate trade and market access. Rainfall was reportedly very high in most parts of the country, especially between December and February. A number of research stations held field days to demonstrate available and promising technologies developed through ZARI research efforts. Operations continued to be hampered by poor conditions of vehicles and equipment due to lack of capital funds and low staffing levels. However, during the year 2008 a number of staff were recruited at both technical and professional levels significantly boosting ZARI staffing levels.

2.0 Mission Statement

The mission of the Institute is to ‘contribute to the welfare of the Zambian people through the provision of technologies and knowledge that enhance household food security and equitable income-generating opportunities for the farming community and agricultural enterprises while ensuring the maintenance of the natural resource base’.

3.0 Objectives

The overall objective of ZARI is to generate and adapt crop and soil technologies in order to increase agricultural productivity and diversify production. This includes the development of low cost sustainable farming systems for all major agro-ecological zones and farm sizes through participation of both the public and private sectors in research

activities. This would ensure the provision of a high quality, appropriate and cost effective service to farmers.

4.0 Structural Organization and Functions

The Institute is headed by a Director and is made up of two core Branches, namely, the Technical Services Branch and Research Services Branch. The Department has a Research Management Team (RMT) which co-ordinates, manages and controls human, physical and financial resources of four technical Divisions, Central Services and Administration. The technical divisions comprise Crop Improvement and Agronomy (CIA), Soils and Water Management (SWM), Plant Protection and Quarantine (PPQ) and Farming Systems and Social Sciences (FSSS). Central Services consists of biometrics, library, documentation and information services, whereas the Administration provides the remaining support services mainly concerning personnel welfare.

Under the Crop Improvement and Agronomy Division there are eight (8) research programmes, three (3) are under the Soils and Water Management Division, four (4) fall under the Plant Protection and Quarantine Division and yet another four (4) are under Farming Systems and Social Sciences Division.

The technical divisions and administration form the basis for the formulation of the programme components of the Annual Work Plan and Budget. Activities under these programmes are conducted throughout the country covering ten (10) research stations and on-farm trials and demonstration locations. In addition, other activities such as Infrastructure Rehabilitation, Seed Multiplication, Crop Protection, Soil Surveying, Soil Fertility and Water Management were conducted at the research stations.

5.0 ZARI Activities

5.1 Technical Services Branch

The Technical Services Branch is responsible for the technical operations of the Institute involving timely generation/adaptation of technologies in soils and crops in order to provide high quality research services for the benefit of farmers. Technical Services Branch personnel are stationed at the ten (10) research stations covering the three agro-ecological regions in the country.

The specific functions of the Branch are to coordinate and provide technical backstopping in:

- Farming systems agronomy in the three agro-ecological regions (Regions I, II & III). This is done to ensure responsiveness to farmer needs based on the human, financial, physical and other resources and specialization of each region.

- Plant breeding and agronomy in cereals, oilseeds, tree crops, horticulture, food legumes and roots and tubers. This involves the development of production technology packages and multiplying foundation seed in commodity research programmes. The collecting and characterizing of plant genetic germplasm in the Plant Genetic Resources Programmes were also carried out. These activities are performed in close liaison with the Agriculture Department post harvest activities.

- Agro-forestry, soil fertility, microbiology, soil survey, soil physics and irrigation research.

- Plant protection (biotechnology, entomology, plant pathology, plant quarantine and phytosanitary services and food storage). Plant Quarantine and Phytosanitary Services are also provided at Border Areas including the Lusaka International Airport, Livingstone, Nakonde, Sesheke, Mufulira and Chirundu.

The Technical Services Branch interfaces closely with the Agriculture Extension Branch under the Department of Agriculture.

The table below summaries the activities conducted in the various research stations

Station	**Programme Activities**
Mt. Makulu:	Maize, Sorghum, Sunflower, Wheat, Tree and Plantation Crops, Plant Genetic Resources, Soil Survey, Soil Fertility and Agroforestry, Entomology, Pathology, Food Storage and Plant Quarantine and Phytosanitary Services and Biotechnology
Mongu	Pearl Millet, Rice; Cassava, maize and legume rotations
Misamfu	Food Legumes, Finger Millet, Rice, Soil Fertility, Agroforestry and Entomology
Mutanda	Root and Tuber, Food Legumes and Soil Fertility
Mochipapa	Food Legumes, Green manures as sustainable production systems for sorghum-maize and maize-livestock based farming systems in the valley and plateau farming systems, improved fallow trials,
Msekera	Food Legumes, Soil Fertility, Agroforestry, Entomology, Food Storage and Plant Quarantine and Phytosanitary Service
Nanga	Vegetables, Tree and Plantation Crops, Irrigation engineering and Pathology
Kabwe	Food Legumes, Kenaf, Soil Survey and Soil Fertility
Mufulira	Tree and Plantation Crops Research, Soil Survey and Soil Fertility,

On-Station and On-farm verification of promising varieties is conducted by researchers throughout the country.

5.2 The Research Services Branch

The Research Services Branch is responsible for the management and coordination of the research systems through an agro-ecological regions approach to research in the country.

The objectives of the branch are to provide high quality services in areas of Soil Advisory, Plant Insect Pest and Disease Clinics, Library and Biometrics, ensuring that quality fertilisers are available on the market and building capacity in the areas of Bio-technology and to facilitate trade.

The Branch is generally responsible for generating, adapting and disseminating improved agricultural technologies in order to ensure increased and sustainable crop production in collaboration with the Department of Agriculture and other agricultural extension service providers.

The Research Services Branch is structured on Agro-Climatic, or the Agro-Ecological Region basis, and thus the agro-ecological approach to research, ensures conditions that are more responsive to the farmers' needs than the previous traditional 'provincial approach'. Accordingly, three (3) Agro-Ecological Regions are identified, which are mainly based on soil types and climatic conditions thus determining the agricultural potential and productivity of any given region in the country. The research infrastructure comprises ten research stations conveniently located in the Regions II and III, being Central, Eastern and Western Zambia, and the Northern, Luapula, Copperbelt and North-western provinces respectively. Research programme activities conducted in Region I, covering most of the Southern parts of the country especially in the Rift Valleys of the Zambezi and Luangwa trough are carried out by scientists based in region II research stations. This is because Region I has no developed research station infrastructure. Below is a broad outline of the main geographical locations of the Agro-Ecological Regions.

- **Region I** - includes the Zambezi, Gwembe, Luangwa and Lusemfwa Valleys, especially the extreme southern ends of the Western and Southern Provinces.

- **Region II** - covers the central parts of the country and includes the Central, Lusaka, Eastern, and the northern parts of the Southern and Western Provinces;

- **Region III** – comprises mainly the Northern, Luapula, Copperbelt and North-Western Province.

The ten research stations over the three Agro-Ecological Regions are each headed by a Principal Agricultural Research Officer (the Programmes Officer) responsible for station programmes. And still at each station, other Principal Agricultural Research Officers (PAROs) head different research disciplines.

Specific activities conducted included field trials, screen house experiments, soil surveys, provision of advisory services in soil plant nutrient management, soil and fertiliser sampling and laboratory analyses, plant disease and insect laboratory analyses, training in post harvest technologies and phytosanitary services to facilitate trade.

Most research stations held field days and took part in the agricultural shows to showcase the various ZARI technologies.

6.0 Research Indicators and Targets

The indicators for research are the number of technologies developed, varieties released, soils analysed, plant insect pests and diseases diagnosed and recommendations made, border inspections made, phytosanitary certificates and plant import permits issued. Others are the number of laboratories rehabilitated and equipped, and staff trained including in the areas of GMO testing and the use of molecular techniques.

The research programme is targeted at farmers, importers and exporters.

7.0 Research Outputs (Achievements)

The following is a summary of the achieved results during the period under review:

- 7,500 soil and plant samples were analysed by the Soil Fertility Laboratories for various nutrients. Fertilizer and crop recommendations were made from the analytical results obtained.

- 5,000 sachets of soybean inoculant (250g) were sold to stakeholders which mainly comprised the Zambia National Farmers Union (ZNFU)

- Technologies available for dissemination are on crop rotations, intercropping, crop residue management, green manures, agro-forestry, inoculum use, liming, and application of Rock Phosphate.

- Research activities in relation to climate change were conducted in Sinazongwe, Petauke, Kasama and Monze. The aim is to help farmers build their adaptive capacity to cope with climatic variability.

- A soil survey of the Senanga mango fruit plantation area was done covering a total area of 1,245 ha. A final report is available.

- 60 treadle pumps in conjunction with the Total LandCare Project were distributed to farmers in the Eastern province

- 14,584 Plant Import Permits (PIP) and 14,577 Phytosanitary Certificates (PC) were issued while 238 farm inspections were conducted.

- The web site for PQPS was concluded and launched; *www.pqps.gov.zm*

- The web site for ZARI was concluded; *www.zari.gov.zm*

- A web site frame on phytosanitary information management system has been created and information on pests is being uploaded.

- GMO tests were done on various crops for export and import (sorghum, maize and rice) whose results were negative to Bt1 and RUR proteins. However, the 669 metric tones of soya cake that tested GMO positive at Tiger Animal Feed was detained and later re-exported to RSA.

- In order to ensure that food commodities coming in to the country are GMO free, new GMO test kits (Bt1and RUR) were purchased and distributed to plant Health Inspectors at border posts.

- The Department received plant samples from farmers for disease and pest identification. Appropriate recommendations for their control were prepared and issued. The major problems identified were Collar rot (*Phytophthora spp)* and Cytospora canker on moringa; Powdery mildew (*Oidium* spp), and Anthracnose (*Colletotrichum gloeosporiodes on* Jatropha and Plant bugs, *Leptocoris spp)* on Baby corn.

- Surveys to detect pests of economic importance in Zambia were carried out. These surveys have led to the detection of two species of fruit flies that are serious quarantine pests. These are Mediterranean fruitfly (*Ceratitis capitata*) and the Asian fruit fly (*Bactrocera invadens*).

- ZARI trained nine Senior Agricultural Research Officers in Northern Province in Insect collection, preservation, shipment and basic identification of the Mediterranean, (*Ceratitis capitata)* and Asian fruit fly, (*Bactrocera invadens)*

- Physical analysis of 191 maize samples from Food Reserve Agency (FRA) sheds in Eastern and Southern province was conducted. The results indicated that 9 samples were under grade while 4 were rejects.

- CIMMYT plans to invest in Nanga for the purpose of national and regional drought work in maize. A detailed soil survey of the station has been conducted.

- ZARI released a groundnut variety “MGV 5” in September, 2008.

- Seed packaging and duplication to the Base collection at SPGRC: The seed of various crop species in the gene bank including pearl millet, finger millet, rice, amaranthus, cleome, pumpkins and other crops were packaged in medium aluminium packs upon drying and duplicate samples taken to SPGRC Base collection for safety conservation.

- ZARI through PQPS/Plant Protection has been involved in the World Bank Funded ADSP project on fruit fly surveys in the country whose major focus is on main fruit production areas in selected provinces. Samples from these surveys have been sent to Pretoria for identification. The data will be a critical component of a regional database on fruit flies currently being put together by USDA-APHIS.

- ZARI is also involved in the American Foulbrood survey with the same project with the main aim of facilitating access of Zambian organic honey and its by-products, without irradiation, to RSA and other international markets. The study is also expected to contribute to scientific knowledge on honey bee diseases in Zambia, particularly AFB
-

8.0 Meetings and Workshops/Seminars/Studies

- The Maize Research Programme staff attended the 4th HarvestPlus Maize Team Meeting in Ghana. There is progress in developing maize with high vitamin A and Zn levels but not Fe. Preliminary results from an Orange maize acceptance study conducted in Zambia showed that consumers were ready to pay a 60% premium for orange maize.

- An Aflatoxin training to equip stakeholders in groundnut production with knowledge and practical skill to manage aflatoxin in the groundnut value chain and a Legume network meeting to share some production, marketing, processing and consumption information data on groundnuts and other legumes with players in the legume value chain were held in August, 2007 in Chipata.

- Participated in NSIMA/DTMA Annual Collaborators Meeting where results of the previous season and workplans for following season were presented. The Maize Research Programme won an Award for the best breeding programme among the 5 DTMA participating countries in Southern Africa. The Award comprised a shield and US$ 3,000.

- ZARI organized and participated at an ISO 9001:2000 implementation training programme and participants were drawn from all the Technical Divisions and

Administration. The training workshop aimed at empowering ZARI to improve its effectiveness and efficiency in service delivery to its clientele and towards the accreditation and document control. The facilitators were from Zambia Bureau of Standards (ZABS), a National standards body mandated by an Act of Parliament to undertake standardization.

- Researchers attended a Soil Fertility Consortium of Southern Africa (SOFECSA) sponsored Workshop on data handling and scientific writing in Malawi from the 7th to the 13th July, 2008.

- SPGRC/NPGRCs Review and Planning Meetings: The Team participated in the meetings held 15-19 September 2008 at which the status of implementation of the 2007/08 activities and the planned activities for 2008/09 season were presented.

- The Plant Genetic Resources Programme, in conjunction with Biodiversity Community Network, held a national seminar for policy makers on issues pertaining to the domestication of the International Treaty on Plant and Genetic Resources for Food and Agriculture (ITPGRFA).

- The Vegetable Research Programme had a visit from the Liaison Officer and Program Research Manager for the World Vegetable Research Centre, Arusha, Tanzania to follow up on collaborative research activities.

- The AWARD Project Manager at the CGIAR Gender & Development Programme briefed staff at Mt. Makulu on the activities of AWARD. AWARD is a career enhancement project with the aim of balancing the number of male and female scientists. Support is available in the area of Mentoring, Science and Leadership. Details and procedures for application will be sent and can also be accessed on the website www.genderdiversity.cgiar.org.

9.0 Administrative Issues

9.1 Financial Position

In general, implementation of core research programmes during the period under review was satisfactory in the first half of the year as funding from government showed great improvement. However, the second half of the year was adversely affected due to limited funding resulting from the challenges the country went through leading up to the presidential by elections. This resulted in some research activities to either be cancelled or rescheduled.

9.2 Staff Recruitment

Many new members of staff have joined ZARI during the period under review and a lot of vacancies have been filled especially at Agricultural Research Officer and Technical Research Assistant levels. The ZARI staff strength by close of the year 2008 was 74%. Due to lack of accommodation at border points, PQPS is failing to position Plant Health Inspectors to monitor movement of plants, plant parts, plant products and other regulated articles entering the country.

9.3 Vehicles

Just like in 2007, the work in the department is currently being hampered by the poor status of vehicles in the various research programmes. The vehicles are necessary for field activities.

9.4 Equipment

The work in the department is also being hampered by the poor status or lack of equipment in the various research programmes. The equipment is necessary for field activities, laboratory analysis and processing of data.

9.5 Buildings

Most buildings at all stations are dilapidated and require attention.

10.0 Conclusion

The Zambia Agriculture Research Institute (ZARI) has the mandate to conduct public good as well as farmer demand-driven research in soils, rain-fed and irrigated crops, plant protection and farming systems. During the period under review, progress was reported in the areas of Soils research, Plant Quarantine and Phytosanitary Services (PQPS), Variety Releases and Research.

The implementation of core research programmes under ZARI was satisfactory especially in the first half of the year as funding from government showed great improvement as compared to the previous year. Activities conducted included field trials in the area of crop improvement and soil productivity and improvement services provision in the area of plant nutrients, soil analyses, plant insect pest and disease diagnostics, quarantine/phytosanitary services and training in post harvest technologies to facilitate trade. Rainfall was adequate in most parts of the country, especially towards the end of the season. A number of research stations held field days to demonstrate available and promising technologies developed through ZARI research efforts.

11.0 Recommendations

For the Department to attain its set objectives there is need to ensure that more staff are employed to fill the establishment, improve on the release of funds to the Department to upgrade the facilities and procure new vehicles and equipment.

Appendix 1 Financial Report

Annual Budget Summary

The GRZ budget estimates for the 2008 totalled **K13,532,212,515.** This was broken down as follows:

Personal Emoluments	6,032,212,521
Recurrent Departmental Charges	
ZARI H/Qs	2,799,999,995
Research Stations	2,699,999,999
Agriculture Research Infrastructure Development	2,000,000,000
Total	**13,532,212,515**

1 USD = K5,500

Appendix 2 Staffing Position

By the close of the year, ZARI staff strength stood at 74%

	Establishment	**In Place**	**%**
Professional (PhD, MSc, BSc)	178	114	65
Technical (Diplomas, Certificates)	149	101	68
Administration (Human Resource Management, Registry, Stores, etc)	60	44	73
Support (General)	377	296	79
Totals	**764**	**555**	**74**

Appendix 3 Vehicles

MINISTRY OF AGRICULTURE AND CO-OPERATIVES
MANAGEMENT INFORMATION SYSTEM

VEHICLES, TRACTORS AND MOTOR CYCLES

Sub-Programme: ZARI Station/District: Mt Makulu 2008.

	Type Of Vehicle	Total No	No. Operational	No. Non-Operational	No. Repairable	No. Scrap/Bos
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
1	Mitsubishi Pajero Petrol	3	2	1	1	1
2	Mitsubishi L200 Diesel	7	3	4	1	1
3	Mitsubishi Rosa Bus	1		1	-	-
4	Nissan D/Cab Diesel	3	1	1	-	1
5	Nissan Patrol Diesel	2	1	2	1	-
6	Nissan D/C Petrol	2	2	-	-	-
7	Toyota Hilux Diesel	8	3	5	3	-
8	Toyota Hilux Petrol	3	2	1	-	-
9	Toyota L/Cruiser Diesel	3	2	1	1	-
10	Landrover 110	1	-	1	-	1
11	Motor Cycle CT200	2	-	2	2	-
12	Motor Cycle AG200	2	2	-	-	-
13	Motor Cycle XL125	2	-	2	2	-
14	Motor Cycle Suzuki	1	-	1	1	-
15	Tractor MF 365	1	-	1	-	1
16	Tractor Valmet 665	1	-	1	1	-
17	Holland Tractor	1	1	-	-	-
18	Marsey Ferguson Tractor	1	2	-	-	-

Comments: As per attached memo!

Notes: **Columns (3) + (4) = (2)**
Columns (5) + (6) = (4)

Completed by (Name and Position): Robbie Kazhila – Workshop Supervisor Date: 31 December 2008

Appendix 4. Technical Divisions Annexes

Plant Protection and Quarantine Division

Objective	Strategies	Indicators	Target	Achievement	Comments
To develop and adapt appropriate plant protection, crop storage, processing and utilization technologies in order to prevent/minimize crop losses due to pests and diseases	Develop improved technologies for crop protection, crop storage, processing and utilization.	Number ,Type and results of surveys carried out	9 surveys to conducted a year	Surveys carried out in Central, Southern & Western Provinces resulted into the detection of two species of Fruit flies that are serious quarantine pests. These are Mediterranean (*Ceratitis capitata*) & Asian (*Bactrocera invadens*) . These attack a wide range of fruits including mangoes, fruiting vegetables, bananas etc.	Surveys need to be conducted frequently in order to identify new pests of economic importance. However financial constraint is the limiting factor
		Number and type of pest and disease control packages generated.	2 disease, 2 pest and 2 storage control packages	Disease and pest control strategies have been developed and adopted by farmers. Work done on LGB has resulted into an insecticide known as Shumba Super and is widely marketed in the country.	Pests and diseases become resistant to control measures. There is need to have different control options.
		Number of samples analyzed and type of disease identified	1,000 samples analyzed in a year	The plant disease clinic analyzed more than 100 plant samples and control measures were prepared and provided. Major diseases diagnosed were: *Fusarium graminearum* on wheat, banana bunchy top on bananas, Cassava Mosaic virus, etc.	Work has improved following the recruitment of new members of staff, although resources are needed to train them
		Number of samples analyzed and type of pest identified	800 samples analyzed in a year	The plant pests clinic received about 120 samples and identified the following: Larger Grain Borer and maize weevils (*Sitophilus zeamais*) on maize, African Boll worm on maize, Pink Stem Borer on Sorghum, Mango weevils on Mangoes. Appropriate recommendations for control were provided.	Work has improved following the recruitment of new members of staff, although resources are needed to train them
		Number of improved storage structures built during demonstrations	4 demonstration courses conducted and 12 structures built in a year	On farm improved storage structures were constructed during demonstration courses held in Northern (20), Central (5) & Eastern provinces (11). These were mainly the Mud Plastered Baskets.	Post harvest technologies are supposed to cover all parts of the country, but financial constraint has affected the implementation of the work.

		Number and type Of plant material tested and proven effective	An increase in the usage of botanical insecticides by Small Scale Farmers	Various plant materials have been tested and are being used by rural farmers for seed storage. These are wood ash, neem leaf powder and *Tephrosia vogelii*	This is a demand driven activity brought about by the high cost of synthetic insecticides & non availability of insecticides in rural areas
		Number and type of cassava products marketed	Appearance of tangible quantities of standardized cassava products on the market	A cassava processing pilot plant has been set up in Mansa, Luapula Province and farmers have access to industrial markets. The plant is capable of producing 500Kg of High Quality of cassava flour in a day or 15 tons in a month hence generating a total of K15 million (15,000kg x K1,000) in a month.	The farmers are however unable to meet the demand by the industries due to transportation problems
		Number and type of recommendations produced	8 leaflets 4 hand books & 4 posters	Publication of plant protection technologies for use by extension workers farmers and other stakeholders have been made in the form of field guides, recommendation leaflets, brochures, and posters. Crop disease hand book was published by the Plant Pathology Team	This is a way of ensuring that technology generated reaches the target group
		Number of maize samples analyzed and graded	500 samples in a year	150 samples from FRA sheds from different parts of the country were analyzed and graded into four standards A,B, C,U. Problems identified include damage from *Sitophilus* sp., LGB and high moisture content (above the recommended level of 12.5 %).	When maize grain overstays in sheds, it becomes susceptible to spoilage hence the need for sampling and analyses to ensure quality is maintained.
	Liaise with the Ministry responsible for Science and Technology and institutions or statutory bodies responsible for the Regulation of biotechnology, for the purpose of the introduction and use of agro-biotechnology products in particular, Genetically Modified Organisms (GMOs)	Number & results of samples tested	Testing to be done on all imported commodities	Modified Organisms (*GMO)* tests were done on various imported products like maize, soya cake & other products and positive consignments were not allowed in to the country and those already in the country were sent back. In addition GMO tests were done on the following: 20,000 tons maize for FRA 801 tons tobacco for African Leaf Tobacco 240 tons seed maize for Seedco 160 tons Soybean seed for Seedco. All these were found to be GMO negative.	This is a continuous exercise as long as the country is importing food stuffs from other countries and it is a measure that helps to block importation of GMOs in the country.

	Provide services that prevent introduction of pests and diseases into the country and facilitate agricultural trade	Number of Phytosanitary Certificates and Plant Import Permits issued	40,000 Phytosanitary Certificates (PCs) and 20,000 Plant Import Permits (PIPs) per year	18,100 Phytosanitary Certificates (PCs) and 9,126 Plant Import Permit (PIPs) were issued. 249 Export Inspections, 183 Fumigation Inspections and 48 Fumigation Equipment Inspections were conducted in 2008. The total revenue generated from these was K352,100,000	Phytosanitary Certificates and Plant Import Permits are issued to facilitate agricultural trade but imports and exports reduced due to economic forces towards the end of the 2008.
		Number of Plant Healthy Inspectors Deployed at border posts	All the borders to be manned by PHI	Plant health Inspectors have been positioned at borders with high traffic of agricultural commodities and these are Chirundu (2), Livingstone (1), Mwami (1), Nakonde (1), Ndola (1), and Lusaka International Airport (6). Sesheke (1) and Kapiri Mposhi (1) are manned by Field Service Staff trained as Plant Health Inspectors.	More Plant Health Inspectors are needed as some borders don't have staff basically due to human resource constraint
		Number of Inspections carried out	2,000 inspections	The inspections carried out were: 250 Export, 150 fumigation and 50 fumigation Equipment and revenue of **K24, 300,000** (450 x K54, 000) in 2008. Access to new markets through the usage of the PRA has increased and Zambia is now exporting Rose flowers and fresh farm produce to the UK, The Netherlands, South Africa, New Zealand, Spain, etc.	With the increased marketable agricultural products, there is need to increase the inspectorate activities at the point of entry/exit and fields but the volume of work is reduced due to human resource and transport constraints

		Number of detention orders	Zero detention	There were no detention orders issued in 2008 on commodities not complying to the Zambian Phytosanitary conditions.	Success of this activity is measured when there is zero detention of pests of quarantine importance. This is an indicator that the Inspectors are working properly
		Number of Inspection facilities	4 at high traffic of agricultural commodities (Sesheke, Nakonde, Chirundu, Kasumbalesa)	ZARI has a modern inspection facility at Lusaka International Airport which has enhanced capacity to comply with International Phytosanitary Regulations.	ZARI should continue to lobby with Ministry of Works and Supply to include modern inspection facilities as they construct office complexes at border posts

SOIL AND WATER MANAGEMENT DIVISION 2008

OBJECTIVE	STRATEGIES	INDICATORS	TARGET	ACHIEVEMENTS
To develop appropriate soil and water management technologies and packages for sustainable agricultural production	Develop alternative soil plant nutrient sources and the use of input technologies	Number of soil and water management technologies and packages developed to support sustainable agriculture production	Widespread adaptation of a wide range of appropriate soil and water management technologies and packages used by various categories of farmers.	At least 10 cover crop leguminous and grass plant species were identified for soil fertility and pasture land improvement and management, and about 50 % of these are actively promoted in conservation agriculture by various stakeholders including GART, Extension services and research demonstrations country wide
To undertake soil and related land resources surveys for planning and promotion of the conservation of the soils, water and vegetation resources to help sustain agricultural productivity.	Develop and maintain an inventory of soil, land and water resources databases for agriculture planning and development purposes.	Number of soil survey, soil fertility, agroforestry and irrigation engineering products and services provided to public and private sector institutions and farming ventures.	Significant increase in the use of soil and land-crop suitability maps, reports, and soils laboratory facilities for agricultural planning, development and productivity purposes at the farm, district and national levels.	More than 750 soil samples, fertilizer samples and plant herbage materials were tested by the national soils laboratories, and appropriate recommendations and advisory services were delivered to farmers, fertilizer dealing organizations and environmental protection agencies
	Develop and promote appropriate and	Number of soils, land and water information		Several Soil Survey reports as follows:

	sustainable irrigation technologies and techniques for small-scale farmers.	databases developed and operating.		The Zambia Sugar: Magobbo Farm Area (No. 125a) Mazabuka District; The Chanyanya Farm No_ 333a For The Zambia National Service, Kafue; Senanga Fruit Plantation Development area, Western Province.
				Agroforestry demonstrations and seed multiplication plot for Grilicidia, Sesbania, Cajunas, etc. established in all 9 Provinces across the country
				Prototype simple low cost water lifting devices eg Rope lift Pump designed/produced; 7. Published the Manual on Sustainable Agriculture practices with PaViDIA.
				Inoculum production for Soyabean and distributed more than 500 sachets

COMMENTS: Important difficulties included inadequate funding, lack of transport facilities and inadequate staffing at both professional and technical levels.