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# S&T RESEARCH/INNOVATION IN ZIMBABWE

Prof. C. J. Chetsanga, (Updated) 1998

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Country: **ZIMBABWE**

Project Title: **Maize Seed**

**Background Information:**

The research work to develop hybrid maize that is high yielding under the agro-ecological conditions obtaining in Zimbabwe and neighbouring countries has been a long term project. the launching of this maize improvement project predates the independence of Zimbabwe in 1980. A number of strains of hybrid maize have been developed by the Department of Research and Specialist Services (DR & SS) using traditional biotechnology. The SR52 hybrid has been one of the most successful maize strains developed by DR & SS.

It is successfully grown by both small-holder and large commercial farming groups. Some requirement for hybrid maize variety is early maturing while the other is late maturing. These strains are likely to differ in yield capacity.

Some of the hybrid maize varieties developed by the innovations carried out are very high yielding and have been progressively adopted for cultivation by both village small-holder and commercial farmers. Certified hybrid maize seeds are marketed by approved members of the seed Association of Zimbabwe such as Seed Co. The seed associations/companies exploit the new maize varieties commercially under a license that is free of charge. An important condition to be met by the participating seed companies is that they ensure that Zimbabwe's demand for seed is secured each growing season, with a 20% buffer stock for good measure. The second condition is that the seed prices are negotiates between the government. the Commercial Farmers' Union and the Seed Association.

**Innovation Process/Success of the Work:**

The DR & SS is the institution that pioneered the research on developing hybrid maize. The work of the DR & SS in developing hybrid maize has greatly enhanced maize production in Zimbabwe. The arrangement made is that DR & SS does the R&D work to develop the desired varieties of hybrid maize and then licensing Seed Co or other members of the Seed Association to commercialise the product. This arrangement has ensured the availability of hybrid maize seed to all farmers. There is an effective seed information distribution promoted by the system of field days organised by the Department of Agricultural Technical Extension Services (AGRITEX) under the Ministry of Lands and Agriculture. The field days are often organised during the growing at fields of small-holder farmers to view a farmer's maize crop that displays exceptional growth characteristics.

It is now widely felt that Seed Co should not have been given a totally free licence. The charges for the licensing could have been used to finance the needs of DR & SS which is now suffering badly from inadequate government funding.

DR & SS has lost a number of its maize breeders to Seed Co and other commercial maize breeding organisations which pay higher staff salaries. The private sector entrepreneurial seed companies have been able to both commercialise the production of hybrid maize seed by bulking

the seed for marketing and to carry out their own in-house R&D work to produce their own varieties of hybrid maize using the DR & SS seed lines as starter material.

**Major Progress Achieved:**

Thus, the combination of local research on hybrid maize, complemented by the expansion of credit, input delivery and extension support necessary to ensure that the new technologies are appropriately utilised, was instrumental in leading to the success of the maize improvement project. It is factual that the original arrangement between DR & SS and Seed Co has eventually led to a mechanism by which the whole agricultural system of Zimbabwe has a sustainable source of maize seed.

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Seed Co., Rattray Arnold Research Station

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**Collaborating Institution:** None

**Funding Sources:** Government of Zimbabwe

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**Country:** **ZIMBABWE**

**Project Title:** **Horticulture in Zimbabwe**

**Background Information:**

Zimbabwe has had a long history of dependency on South Africa for fruit and vegetables. Local potential in this area was depressed by a combination of both too low prices as return on investment and limited expertise in horticulture.

It was the Eastern District of Zimbabwe that first led the way in fruit and vegetable growing. The high altitude in the Eastern Highlands is particularly suitable for fruit growing, especially temperate climate fruits like apples.

It has been in the growing of fruit that the horticulture industry has taken advantage of Zimbabwe's varying climates. The mountainous areas are cool while the lowlands have hot tropical climate.

Starting with an economy which relied on imported fruit and vegetables, it was to undertake necessary experimental work in order to be able to produce these horticultural products locally. After satisfying local demands, overseas markets could then be explored.

**Innovation Process/Success of the Work:**

Through research and experimentation, scientists collaborated with farmers to grow temperate fruit like citrus fruit, apples and vegetables like Brussels sprouts in the highlands while tropical fruits like bananas and mangoes are abundantly produced in the lowlands.

Seasonal produce like vegetables that have a preference for cool weather are grown under irrigation during the winter months of May to August.

Along with the development of fruit and vegetables has sprung up the growth of flowers on a large scale. The rapid expansion of floriculture quickly exceeded local demand and forced the flower growers to seek export markets.

Arrangements have now been made to export large quantities of flowers by cargo aircraft to Amsterdam where they are auctioned to world market merchants. Zimbabwe flower growers have developed capabilities to grow high quality flowers that fetch good prices in Europe.

Export fruit, vegetables and flowers to Europe is constrained by inadequate air carrier facilities. The highly perishable nature of this produce requires that it be transported by air. During the peak produce season, this transport should be available on a daily basis. The high air freight rates necessitate the exporting of only produce able to command high prices in Europe.

**Major Progress Achieved:**

To be successful in growing flowers, fruit and vegetables for export, Zimbabwe growers have had to learn about the tastes of world customers for this produce. Although vegetables are exported, the growers have learned that it is the export of flowers and fruit that is profitable.

Producers have learned that European markets are mostly ready to import this produce

during the European winter months from October to April. They have also learned about the importance of developing a capacity for local processing in order to present for export the produce that achieves the necessary quality standards.

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**Funding Sources:** Government of Zimbabwe

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**Country:** **ZIMBABWE**

**Project Title:** **Trout Aquaculture**

**Background Information:**

Zimbabwe has long recognised the necessity of fish farming in order to provide the growing population with a source of protein in its diet. There has always been a shortage of fish at an affordable price.

In many parts of Zimbabwe there is good potential for bream fish farming. Success has been had at Mount Hampden Bream Farm and at Lake Kariba on the Zambezi River.

The introduction of trout farming has been much more challenging. Many earlier efforts at trout farming around the City of Harare failed. Success was had when the cooler Eastern Highlands of Zimbabwe were used for concentrated research on experimental trout farming. This event led to the construction of the first trout hatchery by the Department of National Parks and Wildlife on the Mare River adjacent to Mare Dam in Nyanga (Eastern Highlands).

**Innovation Process/Success of the Work:**

The trout aquaculture project took advantage of the cool mountain river that flows year round. The most dominant species in this project has been the rainbow trout (Parasalmo mykiss). There has been limited success with the brown trout (Salmo tratta) in some streams of the Nyanga District.

This hatchery provides rainbow trout for stocking the streams under the Department of National Parks and Wildlife and those under private owners. Trout farming has now become so successful that the Nyanga area provides most of the trout required in Zimbabwe. The Nyanga trout has become a favourite dish on the menu of most Zimbabwe hotels and restaurants. The average trout provided are about one-half to one kilogram in weight. Rainbow trout can grow to 200-400 grams in a year. Angling records show that trout weighting over three kilograms have been caught in Nyanga.

The agriculture research work done by fisheries specialists in the Department of National Parks and Wildlife has enabled Zimbabwe to establish sustainable trout farming enterprises in its Eastern Highlands. The trout hatcheries established there now supply trout for stocking both the Department of National Parks and Wildlife waters and private holdings waters. The project has led to an enterprise in which there are now a number of individual players and restaurants do not need to use foreign exchange to import trout for their patrons. Trout farming now provides employment for many labourers.

**Major Progress Achieved:**

The trout farming project in Zimbabwe has demonstrated that with good and appropriately trained scientists, it is possible for a country to introduce new farming enterprises which can fill certain gaps in the economy.

The introduction of trout farming into Zimbabwe has provide a nice source of protein to a significant proportion of the population. As the number of trout farms is increasing, it is expected that more consumers will benefit from this source of protein. This agricultural enterprise has also provided several jobs to the Zimbabwe workforce.

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**Collaborating Institution:** Government of Zimbabwe

**Funding Sources:** Government of Zimbabwe

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**Country:** **ZIMBABWE**

**Project Title:** **Nyanyadzi Irrigation Scheme**

**Background Information:**

Zimbabwe is in a drought prone region of Africa. This has resulted in considerable risks associated with rainfed agriculture. This risk can be minimised by measures to conserve water in dams so that it can be used in times of great need. Dam stored water can be used to irrigate crops during times of drought.

There is great potential for irrigation development in Zimbabwe. It is the costs involved in dam construction that have been a constraint to capturing runoff water into dams and use it for irrigation. There is currently a total of 165,000 hectares of land under irrigation. Most of this irrigation occurs in commercial farms. There is potential for irrigating 430.000 hectares of more land using runoff water.

The management of dams is not totally successful as there is a build up of siltation in some of them. In the extension services provided to irrigation communities, a great deal of training has been offered to the plot holders.

In terms of rural applications of irrigation of agricultural lands, the Nyanyadzi irrigation scheme has become one of the most successful irrigation projects in Zimbabwe. The surrounding communities use irrigation for growing food crops and horticultural products. The Nyanyadzi area is of tropical climate so that bananas, mangoes and papaws are very profitably grown. Bananas are grown on 95 hectares, mangoes on 140 hectares and papaws on 75 hectares. The success for this irrigation scheme has brought about great financial returns for the 320 households for the community.

**Innovation Process/Success of the Work:**

The Nyanyadzi project was the first project whereby rural farmers were systematically trained in irrigation methods. Correct knowledge about irrigation is gradually being acquired by these rural folk. More training on the effective practice or irrigation is still required.

The Nyanyadzi Irrigation Scheme has been a very successful project. The members of the community have benefited considerably. A number of such schemes in irrigation of crops have enabled the rural dwellers to increase their incomes. The containment of siltation of some irrigation dams has not been achieved.

**Major Progress Achieved:**

The introduction or irrigation schemes in rural communities to help the people to hedge against the risks associated with rainfed agriculture has been very successful at Nyanyadzi. The annual incomes of the community members have been increased considerably. There needs to be ongoing extension work to assist them in preventing dam siltation.

The scheme was originally developed by the government, but is now managed by the

community itself. Households contribute funds towards the maintenance of irrigation facilities.

Lessons from the Nyanyadzi scheme are that the community quickly learnt to value irrigation because it quickly brought tangible benefits to them. This has in turn made them find ways of sustaining the irrigation facilities.

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**Country:** **ZIMBABWE**

**Project Title:** **Tobacco Production**

**Background Information:**

Tobacco is the highest single foreign currency earning crop in Zimbabwe. Over 98% of the tobacco produced in the country is exported to over 60 countries throughout the world. Zimbabwe has two of the world's largest tobacco auction floors measuring about 3 hectares under roofing.

The success of tobacco farming in Zimbabwe has been made possible by the research support of the Tobacco Research Board (TRB) established by the Zimbabwe Tobacco Association (ZTA). The TRB sets the policy direction at the Kutsaga Research Station where the tobacco research takes place. The ZTA also runs a Tobacco Training Institute (TTI) which offers a variety of short term courses for tobacco growers and their managers through the growing season.

The TRB carries out research on improving the yield and quality of the tobacco leaf grown by tobacco farmers. It was established in 1950 and has developed remarkable expertise over the years to give farmers the necessary advice and guidance in tobacco production and plant protection. It has well equipped research laboratories. The individual tobacco grower can approach the TRB with any problem that he is having with his crop. The research programs of the TRB are designed in the light of the previous production results and the current problems that growers may be facing.

The ZTA holds annual growers' meetings in the different tobacco growing districts of the country. The specialists from the TRB attend these meetings as resource persons to discuss with the growers any problems they may be facing.

**Innovation Process/Success of the Work:**

1. Infrastructure Issues

There was a systematic approach to designing the method of approach to improving both the yield of tobacco per hectare and to improving the quality of the tobacco leaf to be marketed. In the laboratories of the TRB, it was determined that there was a need for expertise in soil science, tobacco breeding and processing, tobacco pathology training and information dissemination. All these provisions formed the platform on which a sustained programme of tobacco research has been carried out.

The success of tobacco farming has been made possible by the foresight of the stakeholders who saw to it that a capable R & D agency (TRB) was established, first with government funding and later with full funding from the stakeholders themselves. This arrangement has given the industry a firm and sustainable footing. The research agenda of the TRB is driven by the tobacco growers themselves. Thus the scientists on the TRB made sure that they carried out experiments on work that answers the farmers' needs.

The other lesson to be learned from the success of tobacco farming is the effective arrangements that the ZTA has made for marketing their tobacco product through the Tobacco Marketing Board. They have used the auction methodology which enables the buyer to personally inspect the tobacco leaf on offer. World tobacco merchants come to the auction floors in Zimbabwe during the tobacco auction season (April to October) of each year. After making the purchase, the buyer makes his own shipping arrangements for exporting the tobacco. It is a result of all these provisions that tobacco growing has become a multimillion dollar industry in Zimbabwe.

2. Administration of Tobacco Research

A board of directors sets the policy instruments that guide the research operations of Kutsaga Research Station. This research station is under a Director who is in charge of its day-to-day operations. Under him are heads of research units that oversee the work of scientists who work on tobacco crop yield and quality improvement, plant pathology, leaf processing, etc. These scientists also visit tobacco farms to answer farmer queries. They operate on an annual budget in excess of US$ 12 million.

3. Administration of Tobacco Farming

Each farmer who owns a tobacco farm has the overall administrative responsibility over the running of his farm. He may hire a farm manager for the farm. He sees to it that all the necessary preparations for the tobacco growing season are in place at the start of the season. Among the dues that he pays to the ZTA, is a research levy that goes to the TRB.

He recruits farm hands whom he trains in planting tobacco, weed removing, addition of fertilisers and application of pesticides when that become necessary. He trains them in leaf harvesting, curing and total processing in preparation for marketing.

**Major Progress Achieved:**

Lessons to be learnt from the success of tobacco farming in Zimbabwe are the effective provisions that have been made to support a very active research programme that addresses the practical problems faced by the stakeholders, the farmers. Each farmer can singly approach the research station and get answers to his tobacco farming problems.

The provision for this direct interaction makes farmers value the services of the research station. Each farmer readily pays his annual contribution of research funds which the ZTA uses to support the work of the research station. The scientists work in well equipped laboratories and they are well paid.

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Country: **ZIMBABWE**

Project Title: **Salmonella Diagnostic Kit**

**Background Information:**

It is now widely accepted that primary health care is the most effective approach to health care delivery. Primary health care emphasises disease prevention. An effective way of preventing disease is to ensure that the food and beverages consumed by people do not contain pathogenic micro-organisms, especially infectious bacteria.

Salmonella is one of the most pathogenic bacteria and is a frequent cause of food poisoning. The frequency with which Salmonella causes food poisoning requires that there be a simple, cost effective and reliable method of detecting it in food and water. It is estimated that hundreds of people suffer from Salmonella food poisoning a year. The cases in rural areas are usually not diagnosed or reported. This makes it difficult to quantify the number of cases of food poisoning by Salmonella.

Innovation Process/Success of the Work:

Dr J M Gopo developed the Salmonella diagnostic kit when he was a lecturer at the University of Zimbabwe. The DNA fragment used for screening for the presence of Salmonella in a test specimen measures 361 base pairs in length. This fragment will base pair with a corresponding sequence from Salmonella DNA in a contaminated food or beverage sample.

The Salmonella probe is highly specific for the target nucleotide sequence of Salmonella. This detection capability makes the DNA fragment a convenient probe to use when screening for the presence of Salmonella in selected biological material.

The screening for Salmonella in rural drinking water, industrial water, animal feed and food can be done rapidly and cost-effectively. The DNA probe is not labelled with radioactive isotopes, but is labelled with DIG (Digoxigenin-11-dUTP).

Dr Gopo's diagnostic kit which contains Salmonella DIG is labelled DNA probe, detection reagents, buffers and information sheets. This is a sensitive, simple and cost-effective kit which can be used for Salmonella screening in most African countries. The kit can be used to carry out routine screening of potable water, dairy products, foodstuffs, waste water, stockfeeds and industrial wastes.

**Major Progress Achieved:**

The Salmonella kit has been commercialised and can be purchased through either Dr Barros in Pretoria or Dr Gopo in Harare.

With good scientific ideas and good training, it is possible for an African scientist to develop technologies which can be readily applied both in Africa and elsewhere. In this case, Dr Gopo knew what a serious problem Salmonella food poisoning was in many rural, industrial and clinical situations.

He decided that a useful contribution to be made was to find a way of detecting the presence of Salmonella in both food and water. It was from this awareness that he set about developing the Salmonella diagnostic kit.

The benefits of this invention to society is that food and beverages can now be screened for Salmonella rapidly and cost-effectively. Cases of food poisoning at parties and banquets can be readily determined at minimal cost.


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**Funding Sources:** Government of Zimbabwe.
CSIR



**Information provided by: Prof. C.J. Chetsanga, SIRDC. P.O.Box 6640. Harare. Zimbabwe**

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Country: **ZIMBABWE**

Project Title: **Cleaner Production Technology**

**Background Information:**

Most of the production processes entail the formation of waste matter which does not become a component of the final product. This waste matter is in the form of either a solid or a liquid or a gas and can be a cause of serious environmental pollution. In some processes, it is possible to collect the waste and use it as the feedstock for some other types of product. The realisation of the importance of the need to carefully handle waste management during production cycles has made the Environmental Forum of Zimbabwe (EFZ) to take measures to promote the adoption of cleaner production technology by Zimbabwe industry. The Environment & Remote Sensing Institute (ERSI) of the Scientific & Industrial Research & Development Centre (SIRDC) was one of the early participants in this UNIDO sponsored project. The EFZ is an association of industrial companies in Zimbabwe that are participating in the cleaner production project so as to reduce environmental pollution. Some overseas markets insist on certain minimum environmental standards at factories that export to them.

The specific amount of waste released largely depends on the technology used and the product being made. A modern production system seeks to minimise the amount of waste released to the environment as this can become a source of pollution. Those production technologies that reduce waste emission by the efficient using up of primary raw materials or subsequent re-utilisation of secondary raw materials in product formation are the ones that promote a cleaner production environment. One tries to push the production system as close to zero emission as possible. Such systems provide for an efficient use of raw materials in manufacturing activities as the re-cycling process will result in considerable reduction of net waste to be disposed of from the industrial plants. Adoption of cleaner production technologies by industry can help Africa in avoiding the serious polluting of its limited waterways in the serious way in which Europe polluted the Rhine and Danube Rivers.

Today's competition in the marketplace calls for efficient industrial processes geared to reducing production costs and optimising an organisation's ability to increase its market share. The lowering of production costs by an efficient exploitation of raw materials in manufacturing processes will enable such an entrepreneur to sell his products at more competitive prices.

The application of cleaner production technologies can be enhanced by the nature of raw materials used, technology and product design and the waste management protocols selected. Cleaner technologies are currently being actively promoted as they are efficient in both boosting production and in enhancing environmental quality assurance.

**Innovation Process/Success of the Work:**

The execution of a cleaner production programme starts with an audit of the production line to fully understand the loci of loopholes where waste is generated and where waste is likely to occur. It is essential to have the proprietor of the company accompany the audit team so that

he can fully understand the sites that need attention.

Even when establishing a new industrial plant. it is important to design it in such a way that there is a clearer strategy for handling the waste material to be released. Measures are instituted to make sure that the solid, liquid or gaseous waste material do not pollute the environment. but can be captured for further use or proper disposal.

The process of controlling waste emission to reduce waste accumulation from the production system should become the focus of production attention.

The establishment of the Cleaner Production Centre (CPC) in Zimbabwe was initiated by UNIDO. The EFZ and SIRDC soon joined in promoting this project each in its own way.

Three research scientists of the Environment & Remote Sensing Institute (ERSI) of the Scientific and Industrial Research and Development Centre (SIRDC) are participating in training production technical staff in industry in cleaner production technologies. This includes conducting environmental audits to show industry where in the production cycle they can collect waste material for disposal for further use. They also carry out cleaner production demonstrations. The SIRDC has thus closely co-operated with the EFZ in promoting cleaner production technologies in Zimbabwe. Target industries for this project have been cement factories. breweries and fertiliser manufacturing plants.

**Major Progress Achieved:**

As a component of best practice. cleaner technologies offer efficient approaches to production which can be achieved at reduced costs. The waste can be collected, quantified and either disposed of carefully or collected for use in other production runs.

As the country is at the early stages of industrialisation, it is expected that adopting cleaner production technology policies will enhance the productive competitiveness of Zimbabwe industry. There are encouraging signs that the industrial responses have been good and that some of them are profiting from the efficiencies achieved.

Thus cleaner production systems now attract the interest of manufacturing enterprises as they are efficient in the use of raw materials. The lowered emission of waste because most waste is re-utilised in the production cycle. means that there will be less time and money spent on waste management. There will be a reduction in costs allocated towards waste disposal. As Africa industrialises. it is very important that the new industrial entrepreneur be fully aware of how to apply cleaner production technology to his enterprise so as to avoid industrial pollution and some of the economic waste that goes with it.

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**Collaborating Institution:** UNIDO (Vienna, Austria)

**Funding Sources:** UNIDO
Environmental Forum of Zimbabwe (EFZ)
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**Country:** **ZIMBABWE**

**Project Title:** **Ventilated Pit Latrine for Rural Sanitation**

**Background Information:**

A very important way of improving the quality of life in rural communities is to provide them with adequate sanitation facilities. Many diseases that affect rural dwellers are a result of contamination of their food and water. Such diseases as cholera and dysentery are spread by vectors found in organisms that are vector borne or that contaminate communal water systems.

It was the realisation of a need to provide good rural sanitation that the project on developing a ventilated pit latrine was initiated in Zimbabwe.

The ventilated improved pit (VIP) latrine is widely known as the Blair Latrine. It was developed by Dr Peter Morgan of the Health Technology Unit at the Blair Research Laboratory of the Zimbabwe Ministry of Health.

The adoption of the VIP latrine for use in rural areas brings a lot of desirable advantages with it. This includes the promotion of clean sanitation in the community, odour reduction in the latrine, the lowering of fly infestation of the latrine and the minimisation of the incidence of fly-borne diseases. It is this host of sanitation features that has made the VIP latrine very popular in the rural communities of Zimbabwe.

**Innovation Process/Success of the Work:**

Dr Morgan and his colleagues came up with a number of design models of pit latrines before they achieved the one described below.

Pit latrines have a round pit that measures 3 m deep and 1.2 m diameter. A 1.5 m diameter reinforced concrete coverslab with a squat hole for discharging urine and excreta into the pit and a second hole for the ventilation pipe are the major features on the floor of the latrine. A 2 m high brick round wall is built on the concrete coverslab and the top opening covered with a concrete slab roof or grass or other material. The walls are built in such a way that they do not meet, but do overlap in a spiral. This creates a dark environment inside the latrine.

The floor is made to slope towards the squat hole to facilitate the draining of water used to wash down the floors. Some villagers take their baths standing on the floor inside the pit latrines.

With proper care the section of the latrine inside the brick walls is essentially ordourless. The air currents drawn into the pit through the squat hole is subsequently drawn up to the outside atmosphere through the ventilation pipe.

To ensure that the smell of the air coming out of the ventilation pipe does not affect one's neighbours, it is a good idea to build the latrine downwind with the entrance to the structure facing towards the houses of the other village dwellers.

**Major Progress Achieved:**

The 110 mm diameter ventilation pipe is generally made of PVC or stainless steel and acts in effective control of flies. Odour in the pit attracts a few flies which enter through the squat hole. They breed in the pit. The emerging flies are attracted towards the light coming in through the opening of the ventilation pipe to the outside. The head of the ventilation pipe is fitted with a corrosion resistant flyscreen. The flies thus become trapped in the pipe and eventually die.

**Lead Institution:** Blair Research Laboratory,
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**Funding Sources:** Government of Zimbabwe

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**Country:** **ZIMBABWE**

**Project Title:** **Sorghum and Millet**

**Background Information:**

The current status of sorghum and millet and the challenges relating to their exploitation in food security measures in Zambia and Zimbabwe are closely related. This situation also holds for other SADC States.

In deed, sorghum and millet are referred to as traditional crops in each SADC State. The majority of SADC States have drought prone regions of considerable proportions. The inhabitants of these regions have relied on growing sorghum and millet as a hedge against drought for many generations.

In both Zambia and Zimbabwe, the land that was traditionally planted to sorghum and millet is now used for growing maize. In terms of popular food preference, maize has supplanted sorghum and millet among the consumers in these two countries. This contrasts with Argentina in whose drier regions, sorghum has replaced maize in traditional maize growing areas. In spite of the poor growth characteristics of maize in semi-arid areas and under drought conditions, there is a marked regional preference for maize in SADC States. There is considerable research and extension infrastructure provision biased towards maize.

The SADC States have established a regional Food Security Unit to co-ordinate activities directed at promoting food security in SADC member states. This Unit is based in Zimbabwe and co-ordinates issues concerned with ensuring the availability of food supplies in SADC member states.

Both Zambia and Zimbabwe have attempted to give sorghum and millet a greater status in their agricultural programmes in the hope that their citizenry would adopt them for wider use as food material. Their drought tolerant properties suit them to being strategic food crops during droughts. Their importance can thus be strengthened by having them become more widely used as food items. Achieving such end results takes a long period of time and requires research to achieve increased yield and to find more ways in which these grains can be used.

**Innovation Process/Success of the Work:**

In 1984 an International Crop Research Institute for Semi-Arid Tropics ICRISAT/SADC) research programme for SADC on sorghum and millet was launched as a 20 year project. The initiative seeks to develop sorghum hybrids with such desired traits as high yield per hectare, good malting, flour that blends well with wheat flour, etc. The end result is hoped to be expanded market opportunities for sorghum in SADC member states. This project is expected to identify industrial uses of sorghum and its applications in stockfeed.

In Zimbabwe, there has been concerted effort directed at raising public awareness of the way in which sorghum can be bountifully grown and how it can be beneficiated by industrial technological processes. The research work on cultivation of sorghum and millet at ICRISAT (Matopos Research Station, Bulawayo, Zimbabwe) has developed a number of high

yielding sorghum varieties with variety of desirable traits.

There is a steady increase in the cultivation of sorghum in the drier parts of Zimbabwe where some people now use it for cooking porridge and for staple food, especially during years of drought. There is an increasing use of sorghum as feedstock among poultry breeders.

The use of sorghum in making opaque beer (called chibuku) has increased considerably. This is the cheaper beer that is consumed by about 80% of beer drinkers in these countries. A company called Chibuku Breweries is the largest maker of chibuku beer in Zimbabwe. They buy the bulk of the sorghum grown in Zimbabwe. They have now established a new brewery in Mozambique and have been advertising their need for increased tonnage of sorghum.

The Biotechnology Research Institute of SIRDC in collaboration with a group at King's College has launched a project on cultivating sweet sorghum from which sugar is extracted for making ethanol. They have focused on a sweet sorghum variety that yields high amounts of sugar which is fermented to produce ethanol. In Zimbabwe, ethanol is used as a petrol extender and cars run on a petrol-ethanol blend which can be up to 20% in ethanol.

There is extension work going on to popularise the cultivation of sweet sorghum by rural small scale farmers. It is grown by rain-fed agriculture. This commercial use of sweet sorghum holds great potential of having this crop grown on a large scale. The increasing use of sorghum as a food item will now make it an important alternative food during drought years which are known to reduce the yields of maize.

Major Progress Achieved:

The ICRISAT research programme has developed a number of sorghum hybrids. The different hybrids have a variety of desirable traits.

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**Collaborating Institution:** None indicated

**Funding Sources:** USAID

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**Country:** **ZIMBABWE**

**Project Title:** **Micro-propagation for Plant Multiplication**

**Background Information:**

Plant propagation is the means by which the different varieties of plants can be multiplied and preserved. The majority of plants can be grown from seed planted into the soil for that purpose.

There are plant varieties that can be grown from cuttings or tubers. In these cases, the material to be planted is sliced into small pieces which are planted in the soil to enable them to root.

In recent years, it has become technically feasible to mesh up plant roots, stems or leaves into single cells which can be grown in culture media to enable them to grow into plantlets. These plantlets can grow to attain the sizes of their parent plants.

**Innovation Process/Success of the Work:**

The Biotechnology Research Institute of SIRDC and a couple of commercial enterprises in Zimbabwe have mastered the new technologies now available for the rapid multiplication of planting material using single cells which can be made to grow into seedlings by the process of micro-propagation. The starting material is usually from the apical meristem region or from other parts of a plant.

The technology entails collecting plant tissue, disaggregating the cells under aseptic conditions and suspending the cells in culture medium to stimulate cell division. Each single cell will give rise to a seedling which can then be transplanted.

**Major Progress Achieved:**

There are a number of advantages offered by this micro-propagation technique. It provides disease-free and fresh planting material which has been found to give rise to high yields. Micro-propagation needs not be carried out during the regular planting season. A small piece of plant tissue can be replicated to produce large quantities of seedlings.

The plants which have been used in micro-propagation include sweet potato, yams, potato, strawberry, dates, etc. Commercial enterprises now market the micro-propagated seedlings. The technique is used to enhance food security as it can get planting material ready in incubators for rapid growth in cases of short rainfall periods.

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**Funding Sources:** Government of Zimbabwe
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