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CROP SCIENCE (Cultivar Adaptation)

DETAILS

PROJECT NUMBER		M101/10
PROJECT TITLE		Evaluation of medium- and long-season maize hybrids for different production systems
PROJECT MANAGER		SH Ma'ali
CO-WORKER(S)	Internal	D De V Bruwer, CS de Klerk, DJ Muller, W Jansen, JL Snijman
	External	Seed industry, farmers, co-operatives, DoA
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2010

ACTIONS TAKEN TO DATE

The maize production area is divided into a western and eastern region for more accurate evaluation and recommendation purposes. During 2007/08 private seed companies nominated 50 normal (i.e. medium and long seasonal) maize cultivars to be tested in 79 localities in the eastern and western production regions under dry land conditions and 5 localities under irrigation. Six localities were planted for diseases assessment. A total of 90 trials were planned for the season. Co-workers received 70 trials and 20 trials were planted and maintained by the ARC-GCI.

PROGRESS MADE

Seventy nine trials out of 90 normal seasonal growers were ultimately planted in different localities in the eastern and western areas. Eleven trials have not been planted due to water logging condition in some part of the eastern area. All reports for the 2007 national cultivar trials, including multi-seasonal (2004/05 - 2006/07) reports have been published and distribution to producers and interested organizations. These reports are also available on the ARC website. Results for the MIG are done and forwarded for printing. Field visits to most localities have been done and trials will be visited on a continuing basis throughout the season. Three field days for different private seed companies in different regions were attended.

RESULTS ACHIEVED TO DATE

Not yet processed.

PROBLEMS ENCOUNTERED

Wet weather condition in some parts of the eastern area resulted in some trials not been planted. Some seed companies still not render the National Cultivar Trials priority in their schedules, which usually resulted in a decreased number of successful trials during a given season.

DETAILS

PROJECT NUMBER		M101/11
PROJECT TITLE		Evaluation of short- and ultra-short-season maize hybrids under irrigation
PROJECT MANAGER		SH Ma'ali
CO-WORKER(S)	Internal	D De V Bruwer, CS de Klerk, DJ Muller, W Jansen, JL Snijman
	External	Seed industry, farmers, co-operatives
PROJECT STATUS		Continue
DURATION		01/04/2007 to 31/03/2010

ACTIONS TAKEN TO DATE

By the end of each season, maize producers need to decide which cultivars they want to plant during the following season. Since the introduction of short-season maize cultivars it was realised that these cultivars perform quite differently from existing medium- and long- seasonal cultivars. Short-season cultivars are usually planted at much higher densities compared to the other cultivars and they are mostly cultivated under conditions of sufficient water supply or under irrigation. During the 2007/08 season 36 localities have been prepared to be planted under irrigation in the eastern and western area in order to evaluate the performance of twenty eight short and ultra short maize hybrids. In addition nine trials were prepared for diseases evaluation.

PROGRESS MADE

Twenty eight short and ultra short maize hybrids were nominated by seed companies to be planted under irrigation. Thirty trials out of 36 trials were actually planted by ARC-GCI and other co-workers. Six trials were not planted due to operational constrains and other reasons and nine trials were planted under irrigation for disease assessment. Short growing seasonal cultivar reports for the 2007 season, including multi-seasonal (2004/05 -

2006/07) reports have been published and distribution to producers and interested organizations. These reports are also available on the ARC website. Results for the MIG are in printing. Field visits to most localities have been done and additional visits will be carried out on a continuing basis throughout the season. Three field days for different private seed companies in different regions were attended.

RESULTS ACHIEVED TO DATE

Not yet processed.

PROBLEMS ENCOUNTERED

Some seed companies still not giving the National Cultivar Trials priority in their Schedules, which usually resulted in a decreased number of successful trials for a specific season.

DETAILS

PROJECT NUMBER		M101/80
PROJECT TITLE		Evaluation of maize open-pollinated varieties (OPV's) for economic viability
PROJECT MANAGER		SH Ma'ali
CO-WORKER(S)	Internal	D De V Bruwer, CS de Klerk, SJ Mashao,
	External	DoA, seed industry, farmers, municipalities, co-operatives
PROJECT STATUS		Continue
DURATION		01/04/2001 to 31/03/2010

ACTIONS TAKEN TO DATE

The identification of correct maize cultivars and varieties for successful maize production in small holder communities is essential. Characteristics such as adaptability, lodging and stable yields are very important to every farmer. Thirty five trials with three replications were planned during 2007/08. Each trial consisted of 12 entries of which five were hybrids and the rest open pollinated varieties. Co-workers received 16 trials and ARC-GCI managed 19.

PROGRESS MADE

Twenty nine trials out of 35 were planted this season in the eastern and western production areas. Due to operational constrain in specific areas, six trials were not planted. Field visits for trials at Limpopo, North West and Free State were carried out to date. Maize cultivar trial reports with open pollinated varieties (OPV's) and hybrids for the 2007 season were published and distributed to small scale farmers and to interested organizations. These reports are also published on the ARC-GCI website.

RESULTS ACHIEVED TO DATE

Not yet processed.

PROBLEMS ENCOUNTERED

The most common problem encountered is to find reliable farmers who are interested and willing to plant trials. Theft and damage to trials before harvest is also a common problem.

CROP SCIENCE (Grain Quality)

DETAILS

PROJECT NUMBER		M102/10
PROJECT TITLE		Determination of the milling quality and colour deviation of white maize cultivars
PROJECT MANAGER		HY Wong
CO-WORKER(S)	Internal	MB Molebatsi, C Chiremba
	External	Food processors, seed industry, silo industry, NAMM
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2008 (request for project to be extended by one year, until 2009)

ACTIONS TAKEN TO DATE

ARC-GCI has received and analysed maize samples from the 2006/07 season (33 of the commercially available cultivars). Results have been submitted for publication in the Maize Information Guide. The correlation between the NIT method and Roff Mill method for mixed samples has been determined. Milling of pure cultivar in an

industrial mill for comparison purposes has been organised.

PROGRESS MADE

The Results of Maize quality from 2006/07 season was submitted for publication in the Maize Information Guide. Extra spectra files has been added to the existing calibration to increase robustness with the newly acquired software. The practice of testing newly registered cultivars has been discontinued. Instead, commercially available white maize cultivars (as is submitted to the National Cultivar Trials) will be tested for quality.

Discussion with interested parties and experts took place in February 2008 concerning an acceptable level for the milling index correlation.

A commercial mill has agreed to take part in the extraction comparison exercise. Five cultivars have been planted by GSA and the exercise will take place in June to July. This will provide a useful indicator of the usefulness of the Milling index calibration in an industrial environment.

RESULTS ACHIEVED TO DATE

From comparison between Roff Mill and NIT results, using mixed samples, the NIT Milling Index was found to be unsuitable for mixed samples as the correlation between the Roff milling and NIT method was found to be far lower than that of pure cultivar samples. Data regarding environmental and seasonal effects has been compiled and distributed, more in dept analysis will follow.

PROBLEMS ENCOUNTERED

A new calibration has been developed but the correlation using mixed samples spectra was found to be unsuitable for commercial purposes. It was deemed necessary to include more spectra from pure cultivars to increase the robustness of the calibration. The seasonal and environment effect on maize quality is still unknown and results from different years form different localities will be compared.

DETAILS

PROJECT NUMBER		M102/12
PROJECT TITLE		Calibration of NIT for maize protein, starch, ash, oil and fermentable starch
PROJECT MANAGER		HY Wong
CO-WORKER(S)	Internal	MB Molebatsi, C Chiremba, T Matsela, PP Vis
	External	South African Grain Laboratories (SAGL)
PROJECT STATUS		Continue
DURATION		01/04/2006 to 31/03/2009

ACTIONS TAKEN TO DATE

The project was reactivated during the 2006/07 growing season. Selected maize samples collected from the National Maize Cultivar trials were chemically analysed for protein, ash, starch, fibre, moisture and fat contents with the assistance of SAGL. Due to the lack of universally acceptable reference methods for fermentable starch, an in house method has been developed and evaluated.

The commercially available calibration was evaluated using available results. The correlation between the protein, moisture and wet chemistry results and NIT scans were determined. Furthermore, newly developed calibrations using only South African maize from pervious year were evaluated.

PROGRESS MADE

Due to the lack of universally acceptable reference method for fermentable starch, an in-house method has been developed and evaluated. Further work will be done to improve the repeatability on fermentable starch. Both commercial and locally developed calibrations were evaluated.

RESULTS ACHIEVED TO DATE

Both Foss and in house protein calibrations were found to have an extremely good relations with the reference method ($R^2 > 0.95$). The newly developed calibration for oil was found to be better than the international calibration (R^2 of 0.55 compared to 0.22)but still needs to be improved. Newly developed calibration for starch was again found to be better than the international calibration (R^2 of 0.62 compared to 0.53), which can be used for rough screening but more spectra data should be added on to improve repeatability. The R^2 value of ash and fibre were found to be lower than 0.4, they are unlikely to improve due to the lack of range of these components (1 % for fibre and 0.7 % for ash).

The experimental method developed for fermentable starch determination was not a success possibly due to the lack of sample agitation during fermentation, a request for a shaking water bath was submitted.

PROBLEMS ENCOUNTERED

The experimental method developed for fermentable starch determination was not a success due to the lack of sample agitation during fermentation. Ash and fibre calibration development were not successful due to the inherent lack of range in maize kernels and should be discontinued.

CROP SCIENCE (Crop Modelling)

DETAILS

PROJECT NUMBER		M103/13
PROJECT TITLE		System analysis for maize production under different management practices for specific agro-ecoregional zones.
PROJECT MANAGER		MA Prinsloo
CO-WORKER(S)	Internal	W Durand, DJ Muller
	External	Farmers
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2008 (request for an extension until 30/09/2008 by to finalise the project)

ACTIONS TAKEN TO DATE

During the 2007/08 season eight ultra short-season maize cultivars were planted at four localities (i.e. Bethlehem, Bothaville, Potchefstroom and Ottosdal). Each cultivar was planted at three plant densities. All treatments were replicated three times. Cultivars consisted of PAN 6804, PHB 32A03, PHB 32A05, PHB3203, ENERGY and DK61-24. PAN 6479 and PAN 6146 were included as reference cultivars.

PROGRESS MADE

This is the last planting of the trial and a wide spectrum of production practices and yield results have been obtained. Results will ultimately be used to define the behaviour of short seasonal cultivars under diverse production practices and climate conditions. Genetic coefficients will be calculated in order to calibrate the CERES model for modelling purposes of short seasonal cultivars.

RESULTS ACHIEVED TO DATE

Trials have not yet been harvested and results are therefore, not available at this stage.

PROBLEMS ENCOUNTERED

None.

DETAILS

PROJECT NUMBER		M103/15
PROJECT TITLE		Estimating methods for grain yield across South Africa using systems/statistical analysis and crop modeling
PROJECT MANAGER		W Durand
CO-WORKER(S)	Internal	DL du Toit, CS de Klerk, MA Prinsloo
	External	DoA, farmers, cooperatives, SIQ, University of Natal
PROJECT STATUS		Continue
DURATION		01/04/2005 to 31/03/2008 (request for the project to be extended by a further three years until 2011)

ACTIONS TAKEN TO DATE

Integrated decision support system for yield estimations in South Africa (IDSS-YES): The IDSS-YES was adapted to reflect the current farming operations where maize is only planted on higher potential soils. The land type and modular soil's data was acquired for incorporation in the model. Soil data was also acquired from a private company. Locations where weather data are collected is also being better geo-referenced. A conceptual framework for a new IDSS-YES system, using the field boundary coverage and relational database, was also conceived. A GIS workshop was attended in October 2007 and by encouragement SIQ made a presentation on the Crop Estimates Framework to delegates. Three sites (Mpumalanga, Free State and Northwest Province) were planted to maize for model evaluation and calibration purposes. *Difference factor:* A successful round of sampling was done to calculate a difference factor between yield determined by objective yield technology and farmer yields

on the field. *Trend Analysis*: The new fully operational trend analysis system was used to supply the CEC with results for all crops.

PROGRESS MADE

Integrated decision support system for yield estimations in South Africa (IDSS-YES): With the new adaptation to the IDSS-YES model, the crop estimates committee is supplied with yield figures per province and an additional best and worse case scenario. Sites were successfully planted and harvested and all data for model evaluation was collected. *Difference factor*: The aim is to determine the difference between what is harvested and that calculated, using objective yield methodology. Post harvest measurements were also done on cobs left in the field after harvest in order to identify whether it has an impact on harvest results. For this purpose, 50 sites and 250 samples were collected and data analysed. *Trend Analysis*: Data was added to the Trend Analysis program. All data was supplied to the CEC.

RESULTS ACHIEVED TO DATE

Integrated decision support system for yield estimations in South Africa (IDSS-YES): For the past six months forecasts, using the Integrated Decision Support System for yield estimation in South Africa (IDSS-YES) and the Trend Analysis, were supplied to the CEC. The IDSS-YES forecast in February with rainfall until the end of January was slightly higher than that of the CEC who, in their estimate made provision for extremely low rainfall experienced during February. However, the IDSS-YES was within 5 % of the final crop estimate as accepted by the Crop estimates Liaison Committee in November 2007. Analysis of cumulative probability over the season for the second year running indicated that the IDSS-YES had an 80 % probability to be within 2 % of the target. *Difference factor*: Results of research in determining a difference factor was tested infield in conjunction with the rapped assessment methodology for Objective yield estimations against methodology of the ARS. The small difference between the two methods suggests the success of the difference factor.

PROBLEMS ENCOUNTERED

No major problems were encountered, however, the acquisition and integration of baseline input data to the crop model is not easily to come by and time-consuming to set up.

CROP SCIENCE (System Analysis)

DETAILS

PROJECT NUMBER		M104/13
PROJECT TITLE		Evaluation of biological, organic and inorganic substances associated with improved plant growth, yield and biotic and abiotic stress tolerance traits in maize
PROJECT MANAGER		TC Baloyi
CO-WORKER(S)	Internal	MD Thobakgale, DJ Muller
	External	Farmers
PROJECT STATUS		Continue
DURATION		01/04/2002 to 31/03/11

ACTIONS TAKEN TO DATE

During 2007/08 replicated trials were planted successfully at four localities namely, Bethlehem, Potchefstroom, Ottosdal and Bothaville (Nampo). Eleven treatments that include nine biological treatments, one inorganic fertiliser treatment and the unamended control were included in the trials.

PROGRESS MADE

All trials are looking good and the relevant growth analysis microbial biomasses data was collected, however, it is not yet statistically analysed at this stage. Growth data such as plant height, dry matter production and leaf area was determined at ninth leaf (V9) and at flowering (R1) stages, respectively.

RESULTS ACHIEVED TO DATE

There are no yield results available in this reporting period since trials are not yet harvested. As opposed to the former season plant emergence across treatments was good.

PROBLEMS ENCOUNTERED

No serious constraints encountered during this reporting period.

CROP SCIENCE (Crop Systems)

DETAILS

PROJECT NUMBER	M105/80
PROJECT TITLE	The impact of crop rotation and fertilizers on sustainability and economic issues for developing farmers in the North-West Province
PROJECT MANAGER	TC Baloyi
CO-WORKER (S)	Internal MA Prinsloo, MD Thobakgale, SJ Mashao External DoA, farmers, co-operatives
PROJECT STATUS	Continue
DURATION	01/04/2005 to 31/03/2011

ACTIONS TAKEN TO DATE

During 2007/08 three replicated trials were planted successfully at Gelukspan, Potchefstroom and Vryhof. Six crop combinations were used designated as sole maize (MMM), sole sunflower (SSS), cowpea-maize-cowpea (CMC), maize-cowpea-maize (MCM), maize-sunflower-maize (MSM) and sunflower-maize-sunflower (SMS). Trials were maintained regularly to ensure good results.

PROGRESS MADE

As opposed to the past season, trials are looking good at all localities. An information day has being planned for the Gelukspan and Vryhof localities.

RESULTS ACHIEVED TO DATE

Results are not available since trials are not yet harvested.

PROBLEMS ENCOUNTERED

No serious constraints encountered during this reporting period, except that there was inadequate rains at Vryhof, which could result in lower yields than expected.

CROP SCIENCE (Fertility)

DETAILS

PROJECT NUMBER	M121/81
PROJECT TITLE	Maize cultivar evaluation under different soil fertility conditions for resource-poor farmers
PROJECT MANAGER	MA Prinsloo
CO-WORKER(S)	Internal DJ Muller, JL Snijman, MD Thobakgale External Grain SA
PROJECT STATUS	Continue
DURATION	01/04/1999 to 31/03/2009

ACTIONS TAKEN TO DATE

During 2007/08 trials consisting of 16 cultivars and replicated three times were planted at Bethlehem and Potchefstroom. Treatments consisted of optimum fertility, low N and low P levels. Appropriate measurements were done and trials were visited on a regular basis to ensure results. Trial maintenance were conducted frequently in order to ensure reliable and usable results.

PROGRESS MADE

Trials were planted successfully and maintained. Performing differences can early be observed between OPV's and between OPV's and hybrids. In some instances certain OPV's clearly showed superior tolerance towards specific fertility deficiencies compared to some hybrids. Results over the years provide guidelines on what OPV's can be used successfully under conditions where resources such as fertilisers are a constraint.

RESULTS ACHIEVED TO DATE

Trials have not yet been harvested and results are therefore, not available at this stage.

PROBLEMS ENCOUNTERED

No serious problems were encountered.

PRODUCTION SYSTEMS (Crop Systems)

DETAILS

PROJECT NUMBER		M105/10
PROJECT TITLE		Comparison of the effects of integrated crop rotation, tillage systems and fertiliser application on economic and sustainable crop production on the Highveld
PROJECT MANAGER		AA Nel
CO-WORKER(S)	Internal	JW Lodewyckx
	External	Farmers
PROJECT STATUS		Complete
DURATION		01/04/2001 to 31/03/2008

ACTIONS TAKEN TO DATE

All planned trial procedures on the three crop rotation trials (two at Bloekomspruit and one at Ottosdal) were completed, viz. soil and grain analyses, analyses of the results and compilation of the final report.

PROGRESS MADE

The aim of these long-term trials was to determine the sustainability of crop rotation, tillage systems and nitrogen fertiliser application within the variability of the climate on the Highveld. The field trials were all completed successfully.

RESULTS ACHIEVED TO DATE

The yield of maize was affected by crop rotation in four out of five seasons at Ottosdal although effects were not consistent and the ranking of the maize yields of the cropping systems varied from season to season. The yield of maize grown in rotation differed between - 48 % and + 58 % from that of maize in monoculture. Maize after fallow had the highest rank in two seasons, dropping to fifth position during the next two seasons. Maize following a sunflower crop had the lowest yield in three seasons and the highest in the fourth season.

At Bloekomspruit, maize grain yield was affected by nitrogen fertilisation and crop rotation in three of the six seasons. During these seasons the yield of maize following soybean and sunflower respectively, was 27 % and 9 % higher than that of maize in monoculture. In two of the six seasons, the yield of maize following a dry bean crop was 9 % higher than that of maize grown after a soybean crop. Method of ploughing (chisel or mouldboard) had no effect on yield. The rotational effect was more consistent at the higher yield potential conditions of Bloekomspruit than at the marginal conditions of Ottosdal. A final report on the study will be submitted.

PROBLEMS ENCOUNTERED

No serious technical problems occurred, except for the extremely low and late rainfall of the last season at Ottosdal.

DETAILS

PROJECT NUMBER		M105/11
PROJECT TITLE		Evaluation of suitable conservation tillage methods in crop production systems
PROJECT MANAGER		AA Nel
CO-WORKER(S)	Internal	P Venter
	External	None
PROJECT STATUS		Continue
DURATION		01/11/2005 to 31/08/2009

ACTIONS TAKEN TO DATE

All planned trial procedures for the 2007/08 season were completed viz. soil sampling, soil preparation, planting and the application of chemicals according to the planned procedure and maintenance of the field trial at Nampo park. Treatments consisted of two crop systems (maize in rotation with soybean and monocropped maize), three cultivation intensities (ripping or conventionally tilled, ripping every second season and no-till) and two nitrogen fertilisation procedures (conventional and delta yield).

PROGRESS MADE

The third season of the field trial progressed as planned.

RESULTS ACHIEVED TO DATE

The yield of maize was affected by tillage system, rotation system and an interaction between these two factors. The yield of the rotated maize was similar to that of monocropped maize in the no-till system but with ripping the soil, the yield of the rotated maize was 37 % or 1 066 kg ha⁻¹ higher than that of the monocropped maize. The soybean yield of the no-till system was only 54 % of that of the conventionally tilled system. The Delta yield procedure for estimating the N fertilisation requirement indicated that no-till maize should receive about 59% less N than conventionally tilled maize.

PROBLEMS ENCOUNTERED

The emergence of soybean was poor in the no-till treatment. No commercial seed was available for replanting due to the high demand.

DETAILS

PROJECT NUMBER		M105/12
PROJECT TITLE		Investigating maize root diseases in a crop rotation trial
PROJECT MANAGER		AA Nel
CO-WORKER(S)	Internal	W Jansen
	External	ARC-PPRI
PROJECT STATUS		Complete
DURATION		01/04/2007 to 31/03/2008

ACTIONS TAKEN TO DATE

Maize root samples were collected from an irrigated crop rotation trial at Vaalharts. Maize were planted every summer or second summer preceded by canola, wheat or barley. The maize root samples were supplied to the ARC-PPRI laboratory at Stellenbosch who analysed it for the rating and identification of fungi.

PROGRESS MADE

All intended procedures were completed successfully.

RESULTS ACHIEVED TO DATE

Root rot ratings differed. Maize rotated with canola in the one-year system had the highest, and maize preceded by three other crops in the two-year system the lowest rating with all other systems intermediate. Yield and root rot ratings correlated well with the maize grain yield. Crown rot ratings for the different rotational systems did not differ. A number of fungi, both saprophytic and pathogenic were isolated. No correlations existed between crown and root rot severity and the incidences of the different fungi except for a negative correlation between crown rot severity and incidences of *Fusarium proliferatum* in crowns and root rot severity and incidences of *F. equiseti* in roots. A final report will be submitted after the completion of the project.

PROBLEMS ENCOUNTERED

None.

PRODUCTION SYSTEMS (Conservation agriculture)

DETAILS

PROJECT NUMBER		M106/10
PROJECT TITLE		The role of soil microbiology in maize production
PROJECT MANAGER		OHJ Rhode
CO-WORKER(S)	Internal	AA Nel, D Fourie, AH Mc Donald
	External	Seed industry, farmers
PROJECT STATUS		Continue
DURATION		01/04/2006 to 31/03/2009

ACTIONS TAKEN TO DATE

During 2007/08 soil from fields at seven localities that represent different soil types of the local maize-producing areas were sampled to investigate the role microorganisms have in maize production. These included soil samples from Bothaville that represented a second series (first series-2006/07season) and those from maize cultivar trials, a first series of sampling.

PROGRESS MADE

Soil samples from maize fields in an existing crop rotation trial at Nampopark (Bothaville) and from maize cultivar trials at Bethlehem, Bloekomspruit, Hartbeesfontein, Vierfontein, Wesselsbron and Vaalharts were collected for

chemical and microbiological analyses. All collected soil samples are currently being subjected to laboratory analyses that includes soil enzyme assays and functional community profiling using Biolog Eco plates. An additional procedure viz. PCR-denaturing gradient gel electrophoresis (DGGE) was introduced to study microbial population diversity and shifts in the soil samples.

RESULTS ACHIEVED TO DATE

The analyses and processing of data is still in progress and will be incorporated and discussed in the next report.

PROBLEMS ENCOUNTERED

Initial problems with regard to the unavailability of DGGE equipment at ARC-GCI were experienced to successfully implement the abovementioned fingerprinting technology. The procedure was then contracted out to the University of the North-West (Potchestroom Campus) for analyses until ARC-GCI could obtain the necessary facility.

PRODUCTION SYSTEMS (Fertility)

DETAILS

PROJECT NUMBER		M121/15 (M121/34)
PROJECT TITLE		Fertiliser monitoring for maize production
PROJECT MANAGER		W Deale
CO-WORKER(S)	Internal	HL van Zyl
	External	GSA, FSSA
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2008 (request for the project to be extended by a further three years, until 2011)

ACTIONS TAKEN TO DATE

Sampling for fertiliser and lime monitoring were completed for the 2007/08 season during December 2007. For fertiliser monitoring 50 samples were taken from 43 farmers, from different localities according to the approved protocol. Products from five different fertiliser companies were monitored. Seven lime sources were also sampled.

PROGRESS MADE

All samples were sent to three independent laboratories for independent analyses and a report was compiled.

RESULTS ACHIEVED TO DATE

A report on the fertiliser and lime monitoring was send to FSSA and GSA during March 2008 for their comments. The report will be published during April 2008.

PROBLEMS ENCOUNTERED

One of the laboratories moved from Gauteng to the Western Cape province which resulted in an increase in courier costs.

PLANT BREEDING & BIOTECHNOLOGY (Plant Pathology)

DETAILS

PROJECT NUMBER		M141/12
PROJECT TITLE		Breeding for Grey Leaf Spot (<i>Cercospora zea-maydis</i>) resistance in maize
PROJECT MANAGER		ML Lichakane
CO-WORKER(S)	Internal	AP Fourie, JK Lake, CMS Mienie
	External	None
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2009

ACTIONS TAKEN TO DATE

Breeding material, including lines tolerant and resistant to grey leaf spot from 2006/07 nurseries, was put back into the current 2007/08 breeding nursery for further development. Some of the lines were crossed with different testers to evaluate combining ability and grey leaf spot resistance. Thirty-six yield trials were established at five different locations, namely Potchefstroom, Delmas, Baynesfield, Karkloof and Cedara. As Cedara is known as a disease 'hot spot' environment, the trials at Cedara were duplicated with one set sprayed to control grey leaf spot and the other set not sprayed. The aim of this practise is to evaluate yield loss due to grey leaf spot and to observe grey leaf spot behaviour in different resistant backgrounds.

PROGRESS MADE

Maize breeding nurseries and yield trials were exposed to natural infection as well as artificial infection of grey leaf spot. Ten resistant lines and four susceptible lines were crossed in a full diallel mating system to further evaluate resistance and combining ability.

RESULTS ACHIEVED TO DATE

Thirty-six yield trials and two breeding nurseries were successfully planted during November to December 2007. Data collection is in progress.

PROBLEMS ENCOUNTERED

Early drying off of plants due to erratic rainfall, high temperatures and low relative humidity mainly during critical stages like flowering and grain filling. Low infection rates of various foliar diseases were encountered.

DETAILS

PROJECT NUMBER		M141/16
PROJECT TITLE		Development and application of molecular markers in maize breeding
PROJECT MANAGER		CMS Mienie
CO-WORKER(S)	Internal	K Mashingaidze, AP Fourie, ML Lichakane, RE Terblanche
	External	None
PROJECT STATUS		Continue
DURATION		01/04/2001 to 31/03/2010

ACTIONS TAKEN TO DATE

Markers linked to GLS resistance genes in S196Y population (as the source) were developed during 2003 and 2004. Segregating populations developed from CML7, CML8 and A1.P100 as sources of resistance were rated for disease resistance during the 2004/05 season by Mr JK Lake. Leaf material was collected from F₂ plants of the three populations and is being screened with molecular markers for possible linkage. F₃ families were planted during November 2005 to confirm disease ratings on F₂ plants. DNA from three segregating populations was screened with AFLP as well as SSR markers for linkage with the resistance genes.

PROGRESS MADE

DNA analysis of these three populations is in progress.

RESULTS ACHIEVED TO DATE

Previously the three populations were screened using 57 SSR as well as 144 MluI and MseI primer combinations possible in the AFLP technique. Selected individual samples were screened with 40 additional SSR markers. Two markers were identified for the resistance trait in population B1. Marker bnlg1057 (on chromosome 1) explained 28 % and marker us44 (in the same chromosomal region) 27 % of the variation in the GLS disease ratings from population B1 (CML 7 x I137TNW). This corresponds with the region on the chromosome where Lehmensik *et al.* (2001) found a QTL (37 %) and this could mean that the resistance QTL from the two sources could be the

same. Markers us40 and us42 on chromosome 5 were not significantly linked in any of the populations. AFLP analysis of population B1 did not result in any fragments linked significantly to GLS resistance. Population B2 (CML8 x I137TNW) was tested for linkage with SSR markers, as well as limited AFLP analysis. One of the additional set of SSR markers shows linkage in a selected sample of individuals and needs to be tested in the total population. This marker is located on chromosome 3. Screening of population B3 (A1.P100 x I137TNW) with 144 MluI - MseI primer combinations as well as combinations formed with primers from a different restriction enzyme, EcoRI, did not produce any fragments significantly linked to the resistance trait. SSR analysis of selected individual samples indicated possible linkage with four markers, which need to be screened against the total population. These markers are located on chromosomes 2, 3 and 4.

PROBLEMS ENCOUNTERED

Lack of polymorphism linked to the GLS resistance trait in populations B2 and B3, although a great number of primer combinations have been screened, makes it very difficult to identify markers. This could indicate the possibility of a number of QTL with smaller effect involved in the resistance of these sources. Mapping a larger population (all 250 plants available/population) with all the available markers could possibly be a solution to this problem. The Institute currently lacks skilled human capacity for performing laboratory analyses.

PLANT BREEDING & BIOTECHNOLOGY (Drought)

DETAILS

PROJECT NUMBER		M161/10
PROJECT TITLE		Maize cultivar development
PROJECT MANAGER		AP Fourie
CO-WORKER(S)	Internal	JH Coetzer, SF Grobler
	External	Commercial seed sector
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2009

ACTIONS TAKEN TO DATE

Development and evaluation of open pollinated maize varieties (OPV's) for low input farming conditions. Development and evaluation of maize inbred lines for combining ability (hybrid vigor) in hybrid combination.

PROGRESS MADE

The application to register the following OPV's for placing on the SAAFQIS cultivar list 2006/07 was approved during August 2007: SAM 1107 OPV (prolific, drought tolerant and yield stability) and SAM 1109 OPV (QPM).

The following CIMMYT maize OPV's is also currently available in the market place: ZM1421, ZM521, ZM1423, ZM1523, ZM1623 and Obatanpa SR. ARC-GCI is also mandated by SANSOR to maintain the genetic integrity of these CIMMYT OPV's.

RESULTS ACHIEVED TO DATE

Since SANSOR reported in 2005/06 that five ARC-GCI inbred lines features in nine commercial hybrids marketed by three commercial seed companies more emphasis was placed on hybrid development. The reports from SANSOR indicated that ARC-GCI inbred lines have, during the 2005/06 and 2006/07 seasons, earned just over R 1 000 000 in royalties, and more emphasis was placed in the breeding programme on hybrid development, as well as the commercialisation of inbred lines.

Mechanised planting and threshing equipment was imported from the US to facilitate expansion of the yield testing programme. The commercial seed sector was also co-opted as a partner to ARC-GCI in the expansion of the yield testing programme.

PROBLEMS ENCOUNTERED

The two projects M161/10 and M191/10 are historically old projects, which have over the years evolved into one project namely "Maize Breeding and Cultivar Development". It is recommended that these two projects be officially merged into one project to avoid confusion and for more efficient administration.

DETAILS

PROJECT NUMBER		M161/11
PROJECT TITLE		Fingerprinting of maize genotypes
PROJECT MANAGER		CMS Mienie

CO-WORKER(S)	Internal	K Mashingaidze, RE Terblanche, VJ Gobiyeza, AP Fourie
	External	None
PROJECT STATUS		Continue
DURATION		01/04/2001 to 31/03/2009

ACTIONS TAKEN TO DATE

During the course of the project several techniques were tested for applicability in fingerprinting of maize genotypes. The AFLP technique proved to be repeatable, but is a lengthy and expensive process. It is not suited for large scale fingerprinting of maize breeding lines. The microsatellite technique comprises a simple PCR reaction and is a much better option, preferred by most marker laboratories and plant breeders. When microsatellite analysis is combined with electrophoresis on an automatic DNA sequencer, the technique has the potential to be scaled up to generate thousands of data points in a short period of time. Fingerprinting or “genome mapping” can also be used in breeding programmes to monitor the introduction of a certain genetic background in specific crosses. The use of molecular markers for background selection can accelerate recovery of the desired recurrent parent genome by several generations.

Routine fingerprinting of lines is done as required by maize breeders.

PROGRESS MADE

Ten breeding lines were used to optimize the fingerprinting with fluorescently labelled microsatellites on the automatic DNA sequencer. DNA from 100 varieties was isolated.

RESULTS ACHIEVED TO DATE

The fingerprinting technique for the DNA sequencer was optimised utilising 40 different SSR markers as published by CIMMYT. The PCR reactions were optimized with respect to DNA concentration, primer concentration and PCR protocol. Different combinations of primers were tested for possible multiplexing of reactions. The DNA sequencer was optimised with respect to the concentration of size standard added and the dilution of PCR product to be injected into the capillary columns. The Genemapper software needs to be calibrated for accurate identification of individual microsatellite alleles from each marker through the process of “binning”. The combination of different markers labelled with different fluorescent colours makes multiloading possible, which can lower the cost of genetic fingerprinting considerably. Ten breeding lines were fingerprinted and tested for purity through analysis of single plants from each line using the new method.

PROBLEMS ENCOUNTERED

Lack of skilled human capacity to do DNA analyses.

DETAILS

PROJECT NUMBER		M161/80
PROJECT TITLE		Participatory evaluation and identification of maize varieties for smallholder farmers
PROJECT MANAGER		DR Masindeni
CO-WORKER(S)	Internal	K Mashingaidze, MS Magongwa, MW Ratladi, TP Hansa
	External	Limpopo and Free State PDA's, CIMMYT, ECOLINK, farmers
PROJECT STATUS		Continue
DURATION		01/04/2001 to 31/09/2009

ACTIONS TAKEN TO DATE

Maize Mother and Variety Evaluation, Verification and Observation (VEVO) trials were planted at 20 and 70 sites, respectively, in Limpopo, Free state and Mpumalanga provinces during 2007/08 summer season. Each Mother trial has 42 entries which include 26 experimental QPM OPV's (10 yellow and 16 white), two registered QPM OPV's (SAM 1109 and Obatanpa-SR), two experimental non-QPM OPV's, two farmers' varieties (landraces), six non-QPM elite OPV's (SAM 1065, SAM 1066, ZM 1423, ZM 521, ZM 1523 and ZM 1623) and four hybrid checks (CRN 3505, PAN 6479, QS 7707 and QS 7608). Each VEVO trial has eight elite farmer preferred varieties (namely, ZM 1421, ZM 1523, ZM 521, ZM 1523, ZM 1623, CRN 3505, Obatanpa-SR and the farmer's variety) planted on-farm in strip plots. The varieties are tested in two types of trials: (i) researcher-managed VEVO trials at optimum levels of fertilization and (ii) completely farmer-managed VEVO trials. Farmer consultations were done during field trial monitoring visits in January and March 2008.

PROGRESS MADE

All the trials were planted and managed well, and some are ready for harvesting.

RESULTS ACHIEVED TO DATE

Data collection is in progress.

PROBLEMS ENCOUNTERED

Unfavourable climatic conditions such as late rain, drought and high temperatures experienced in Limpopo province will result in yield reduction, or even crop failure, at some locations.

PLANT BREEDING & BIOTECHNOLOGY (Plant Breeding)

DETAILS

PROJECT NUMBER		M191/10
PROJECT TITLE		Maize breeding: Inbred lines and cultivar development
PROJECT MANAGER		AP Fourie
CO-WORKER(S)	Internal	SF Grobler
	External	Seed industry
PROJECT STATUS		Continue
DURATION		01/04/2003 to 31/03/2009

ACTIONS TAKEN TO DATE

Drought is the most limiting factor to maize production worldwide, therefore inbred line development for drought tolerance is extremely important. Approximately 1 000 inbred lines, both white and yellow endosperm, are currently in the developmental stage. Emphasis is placed on drought tolerance as primary selection criterion, along with prolificacy and tolerance to Diplodia ear rot.

PROGRESS MADE

Specific emphasis is placed on the exploitation of the I137TN heterotic germplasm group (I-GROUP) in the breeding programme for the development of inbred lines. The I-Group of genetic material has over the past 30 years played a significant role in South Africa in the development of hybrid cultivars by commercial companies. The original I137TN material was released by the DoA to the commercial sector in the 1970's, but initially lacked prolificacy and drought tolerance. The I-Group was also susceptible to Diplodia ear rot. Significant progress has since been made in the improvement of the prolific and drought tolerant traits, as well as increased tolerance to Diplodia ear rot.

It was also determined over many years of research that the I-Group of material combines well with the US Cornbelt (CB-GROUP) in hybrid combination. Therefore, emphasis was also placed on improving the CB-Group of material for drought tolerance, prolificacy and Diplodia tolerance.

RESULTS ACHIEVED TO DATE

Approximately 300 white inbred lines in the I137TN (I) heterotic group and the US Corn Belt (CB) heterotic group have been planted in November 2006 and evaluated for prolificacy and drought tolerance. Climatic conditions of extremely high temperatures, low relative humidity and low rainfall was beneficial for the identification and selection of prolificacy and drought tolerance in the inbreds. It is clear, from visual observation of the inbred nurseries at that stage that prolificacy and drought tolerance has been significantly improved.

From the CB group, 45 of the most promising inbreds with regard to drought tolerance and prolificacy was selected and planted at the Burgershall Research Station during March 2007. They have been crossed in single cross hybrid combination with one of the most promising newly developed white inbreds, I37, from the I-group. The crosses are presently under investigation in yield trials.

Release of inbred lines

These 45 CB inbreds, as well as 12 I-group inbreds have since been released to the commercial seed sector in October 2007 and March 2008 for utilisation in their respective summer and winter nurseries. They are crossed in hybrid combination with the best inbreds from the commercial sector. The crosses will be yield tested during the 2008/09 season.

Commercialisation of inbred lines

During January 2007 SANSOR reported that five inbred lines from ARC-GCI was used in nine different commercial hybrids marketed by three different commercial companies. Royalties amounting to R355 584 was earned by the ARC on the inbred lines. The total seed market value of the hybrids amounted to R16 070 038.

In January 2008 SANSOR reported that an additional amount of R750 000 was earned in royalties by ARC-GCI inbred lines.

PROBLEMS ENCOUNTERED

Research farm security is becoming a major problem and will reflect negatively on research results and progress.

DETAILS

PROJECT NUMBER		M191/11
PROJECT TITLE		Genetic characterisation of <i>Stenocarpella maydis</i> resistance in maize
PROJECT MANAGER		LJ Moremoholo
CO-WORKER(S)	Internal	C Minie
	External	University of Limpopo
PROJECT STATUS		Continue
DURATION		01/04/2006 to 31/03/2009

ACTIONS TAKEN TO DATE

The objective of this project is to identify effective resistance genes against diplodia ear rot in order to build up long term resistance in selected maize cultivars through breeding and identify quantitative trait loci (QTL) responsible for diplodia ear rot resistance. Fifty-four yellow and 60 white inbred lines were compared to four breeding lines for grain yield and resistance to diplodia ear rot, in two trials planted at Potchefstroom during the 2007/08 summer season. The trials were laid out in a randomised complete block design with three replications. The trials were artificially inoculated with diplodia inoculum prepared by the Plant Pathology Section of ARC-GCI.

Three hundred F₃ lines were planted at Potchefstroom during the 2007/08 summer season, and self pollinated to advance them to F₄.

Fifty inbred lines, resistant to *S. maydis* ear rot, were imported from CIMMYT-Mexico and were crossed to 60 ARC-GCI inbred lines and OPV's.

PROGRESS MADE

One hundred and ten F₁'s were obtained from CIMMYT and ARC-GCI germplasm and will be used to develop new inbred lines resistant to ear rot. Three hundred F₃ lines were advanced to F₄.

RESULTS ACHIEVED TO DATE

Data collection from the field trials in progress.

PROBLEMS ENCOUNTERED

Diplodia ear rot occurrence is seasonal and requires cool rainy weather for at least two weeks after flowering, but the 2007/08 summer season was dry and hot resulting in no diplodia ear rot occurrence in artificially inoculated trials.

DETAILS

PROJECT NUMBER		M191/12
PROJECT TITLE		Evaluation of maize genotypes suitable for increased ethanol extraction for biofuel purposes
PROJECT MANAGER		AP Fourie
CO-WORKER(S)	Internal	HY Wong
	External	None
PROJECT STATUS		New
DURATION		01/04/2007 to 31/03/2011

ACTIONS TAKEN TO DATE

During the past 20 years there has been a significant shift in the grain industry's perspective of maize cultivars. Although farmers continue to be concerned with grain yield, there is a greater awareness that some hybrids have traits suited for specific uses. These include, but are not limited to high oil content, waxiness (containing 100 % amylopectin), high (> 50 %) amylose and high lysine content. Recently "highly fermentable" hybrids have been developed for the ethanol fuel industry.

The starch content and quality of the ARC-GCI maize germplasm stocks need to be quantified for possible use in the production of maize cultivars suitable for the extraction of bio-fuel ethanol. Differences between lines should be quantified so that the industry could avoid possible undesirable effects while they are concentrating only on

the opportunities these lines present. This evaluation will help to ensure continued availability of genotypes with desirable traits, will improve processing efficiencies and serve as a basis for the continued improvement of maize cultivars. Quality control would be facilitated should some of these attributes be possible to measure with Near-Infrared Transmittance (NIT) instruments.

The main selection criterium will be the fermentable starch content.

PROGRESS MADE

During the 2007/08 season 18 genotypes representing different endosperm mutants were submitted to the ARC-GCI grain laboratory for determining fermentable starch content and other industrial quality traits e.g. endosperm hardness. Endosperm types included waxy, *opaque-2* and a range from hard flint to soft dent types.

RESULTS ACHIEVED TO DATE

The laboratory tests are still in progress but results are not yet conclusive. No heritable variation for the fermentable starch content was indicated in the results so far.

PROBLEMS ENCOUNTERED

None.

DETAILS

PROJECT NUMBER		M191/80
PROJECT TITLE		Development and transfer of high quality protein maize (QPM) varieties to smallholder farmers using marker-assisted breeding
PROJECT MANAGER		DR Masindeni
CO-WORKER (S)	Internal	K Mashingaidze, MS Magongwa, MW Ratladi, TP Hansa
	External	Limpopo, Eastern Cape and Mpumalanga PDA=s, CIMMYT
PROJECT STATUS		Continue
DURATION		01/04/2006 to 31/09/2015

ACTIONS TAKEN TO DATE

The aim of the project is to convert elite inbred lines and farmer preferred OPV's to QPM using marker assisted backcrossing. During the 2007/08 summer season, (i) 21 elite inbred lines were crossed with QPM donors, (ii) one OPV was crossed with 4 QPM donors, (iii) 336 F₁'s of yellow inbreds and 312 F₁'s of white inbreds were advanced to the F₂, (iv) 76 QPM and 12 non-QPM inbreds were planted for seed increase, and (v) 14 F₂ populations of four OPV's (ZM 521, ZM 423, ZM 523 and ZM 623) homozygous for the *opaque-2* gene, identified using the light table and molecular markers, were backcrossed to their respective parental OPV's. Seven of the resultant BC₁F₁'s (of ZM 521 and ZM 523) were planted in a winter nursery at Burgershall, for advancement to BC₁F₂. Fifty-six elite inbred lines and 24 QPM donors were also planted at Burgershall winter nursery, to initiate conversion to QPM.

PROGRESS MADE

All self- and cross-pollinations were successfully done. (i) Fourteen populations are now at BC₁F₁ and seven are currently being advanced to BC₁F₂, (ii) 648 F₁'s of inbred x QPM donors were advanced to F₂ and (iii) conversions of German yellow, a local variety popular in Eastern Cape Province and 21 elite inbreds to QPM were initiated.

RESULTS ACHIEVED TO DATE

Seed from the summer nursery is currently being harvested, and the winter nursery was successfully established.

PROBLEMS ENCOUNTERED

None.

CROP PROTECTION (Entomology)

DETAILS

PROJECT NUMBER		M131/10
PROJECT TITLE		Integrated management strategies for the stalk borer complex in maize
PROJECT MANAGER		JB van Rensburg
CO-WORKER(S)	Internal	N de Klerk, A van Wyk, AL Rossouw, UM du Plessis, LL Ramonyane
	External	Seed industry, University of the Free State, North-West University, chemical companies
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2010

ACTIONS TAKEN TO DATE

Field and laboratory evaluation of a new Bt-event (Monsanto). Field evaluation of experimental Bt-hybrids (Pannar and Syngenta). Further investigation of insect resistance to the Mon810 Bt-event, involving larvae collected at various irrigation sites (Christiana, Vaalharts, Douglas, Rysmierbult). Further testing of experimental insecticides for control of infestations in the post-tasselling period of plant development. Further advance of stem borer resistant breeding material.

PROGRESS MADE

The incidence of natural infestations (except for maize under irrigation) was again low during the 2007/08 season, and no trail sites were identified for evaluation of experimental insecticides in the post-tasselling period of plant development. A field at the Potchefstroom facility was artificially infested for this purpose but has not been treated yet. Further experimental insecticides were obtained, one of them a novel product from Australia that acts as a moth attractant. A new Bt-event from Monsanto was further evaluated. Insect resistance to Bt-maize was further investigated. Artificial infestation of breeding material was successfully done.

RESULTS ACHIEVED TO DATE

Results pertaining to insecticide trials and experimental breeding material are pending. A new Bt-event from Monsanto was confirmed to be superior to the event currently in commercial deployment, particularly with regard to control of larvae present in the reproductive plant parts. It also seems to control larvae from Bt-resistant populations. A scientific publication on insect resistance to Bt-maize appeared in Vol 24(3) of *SA Journal for Plant and Soil* and was presented at the Crop Science congress held at Grahamstown during January 2008. Responses to the publication were received from Australia, Germany, Belgium and France. It also prompted a negotiation for collaborative research with the University of Arizona (Prof Tabashnik, an authority on insect resistance to the Bt-toxin). The importance of the refuge strategy to delay resistance was further promoted at farmers' days at Bloemfontein (30 persons) and Ottosdal (30 persons). Three popular publications (*Landbouweekblad*, *Farmer's Weekly*) and four radio talks emanated from these results.

PROBLEMS ENCOUNTERED

Severe stand losses during the early season resulted from guinea fowl damage and some trials had to be replanted more than once. This included experimental Bt-material imported with great effort from the USA. Persistent power failures during January 2008 caused considerable temperature fluctuations in the laboratory and consequently resulted in high mortality among diapause larvae, also those collected at considerable cost from irrigation areas.

DETAILS

PROJECT NUMBER		M131/11
PROJECT TITLE		Stand reducing insects of maize
PROJECT MANAGER		TW Drinkwater
CO-WORKER(S)	Internal	None
	External	Farmers
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2009

ACTIONS TAKEN TO DATE

During 2007/08 preparations were made to put 88 light traps in operation in a quarter-degree grid pattern over the traditional and semi-traditional pest-outbreak area of black maize beetles (BMB) (*Heteronychus arator*), in order to continue developing an early-warning system for this pest. A maize field was also planted at Bloekomspruit near Heidelberg and 90 pit traps were installed, randomly spread over an area of 3.6 ha in this field in order to study the seasonal activity of stand reducing insects. The insects captured in the light and pit traps

are identified and counted on a weekly basis.

PROGRESS MADE

The 88 light traps managed by producers operated during February and March and will be continued during April. Captured beetles will be collected, taken to Potchefstroom, counted and the results analyzed. The data will be incorporated into a model that is being developed for predicting the pest status of BMB. The numbers of beetles captured in light traps during February to April are used in an early-warning system for estimating the size of the beetle population that could damage maize seedlings during the following spring.

The pit traps placed in the maize field at Bloekomspruit for the fifteenth consecutive year. BMB, false wireworms (*Somaticus terricola*), wireworms (Elateridae), dusty surface beetles (*Gonocephalum* spp.), ground weevils (*Protoctrophus* spp.), larvae of the spotted maize beetle (*Astylus atromaculatus*) and predators (Carabidae and Dermaptera) occurring in these traps, are counted weekly.

Chapters for the planned book *Insect Pests of Maize in South Africa* on plant hoppers, spittlebugs and snout beetle larvae damaging maize plants were drafted. Three radio talks were presented on Radio Pretoria and one on RSG. A popular article on entomological research at ARC-GCI was published in the December 2007 edition of *Landbouweekblad*. Attention was again given to the gerbil problem that caused serious stand reductions in maize fields throughout the production area. Gerbils dig up and eat recently planted maize seed as well as young maize seedlings. A popular article in this respect was published in the November 2007 edition of *Ons Eie*. The list of registered insecticides for the control of maize pests was updated for *MIG 2008*.

RESULTS ACHIEVED TO DATE

No serious pest outbreaks of BMB during the 2007/08 growing season are in accordance with forecasts by the early-warning system and producers were advised accordingly in a talk on Radio Pretoria. Producers who followed the advice saved between R100 and R150 per ha on input costs by not using control measures.

PROBLEMS ENCOUNTERED

None.

DETAILS

PROJECT NUMBER		M131/12
PROJECT TITLE		Integrated management strategies for streak disease in maize
PROJECT MANAGER		BC Flett
CO-WORKER(S)	Internal	TM Ramusi, WG Khali, W Jansen,
	External	KwaZulu-Natal PDA, University of Cape Town (UCT), University of the North-West Potchefstroom Campus (UNW)
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2008 (request for the project to be extended by a further three years, until 31/03/2011)

ACTIONS TAKEN TO DATE

Various cultivar and epidemiological trials have been planted over a number of seasons.

During the last season (2007/08) three trials were successfully planted at Vaalharts, Makhatini and Burgershall including three cultivars DKC 6320, PAN 67 and PAN 6479, differing in susceptibility to MSV. As plants became infected they were marked as previously.

PROGRESS MADE

During the first season, 2002/03, poor MSV infections occurred but during the next two seasons 2003/04, 2004/05 (summer) and 2004 and 2005 (winter) plantings had adequate infections. This last season three different cultivars were planted at the two localities to see if the tendencies of previous findings obtained for PAN 6479 would be consistent over more resistant and susceptible cultivars. The seasonal nature of MSV epidemics makes field work at one locality where we are reliant on field infections highly risky. The findings of the previous year were confirmed, however, infection levels were relatively low due to the dry season. The rating technique must include time of infection to identify early whole plant infections from late whole plant infections which will normally be given the same rating. This will also help to identify tolerant genotypes as opposed to resistant genotypes that were infected late in the season but have all leaves infected. This will enable ARC-GCI to therefore screen infections more efficiently and also gives ARC-GCI the opportunity to move on with the project into new epidemiological work. The development of an ELISA technique to identify MSV infections and the cooperation of Dr Darren Martin from UCT and the involvement of Dr Johnnie van den Berg from UNW has enabled us to

approach this project from a new perspective and Mr Moses Ramusi will use this project for further PhD studies. The first trials for these studies were planted at three localities. Mr Ramusi is busy collecting isolates at various localities for further study.

RESULTS ACHIEVED TO DATE

The data to date indicate that infection time must be taken into account to improve the rating technique. This does, however, imply visiting trials on a weekly basis to mark newly infected plants. This has certain economic and time implications. This finding enables us to approach MSV research more accurately and enable us to expand the program again to MSV surveys, epidemiological and resistance screening studies.

PROBLEMS ENCOUNTERED

None.

CROP PROTECTION (Plant Pathology)

DETAILS

PROJECT NUMBER		M141/10
PROJECT TITLE		Integrated control of maize ear rots
PROJECT MANAGER		BC Flett
CO-WORKERS	Internal	WG Khali, B Janse van Rensburg, TM Ramusi, A Faber, E Ncube (DST Student), TS Mothata (DST Student)
	External	Medical Research Council (MRC), University of Free State, University of Stellenbosch, Plant Research International, Wageningen, Netherlands
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2010

ACTIONS TAKEN TO DATE

The high variation obtained in *Fusarium verticillioides* and fumonisin research to date prompted a study into the quantification of the fungus as well as the mycotoxin fumonisin in maize samples. These results have been written up in an MSc thesis and are in the process of submission for publication in scientific journals.

During 2007/08 a total of 201 maize samples were collected from Limpopo, KwaZulu-Natal, Eastern Cape, Mpumalanga and North West provinces during the previous season with another 140 collected during this last season. Thirty groundnut samples were also collected from Limpopo, KwaZulu-Natal and Mpumalanga provinces over both seasons. The fumonisin and aflatoxin levels were quantified using an ELISA technique on a 5 g subsample taken from a 250 g milled maize-grain sample. The incidences of *F. verticillioides* and *A. flavus* in maize were determined by plating out 200 kernels (four kernels per plate) on selective Rose Bengal-Glycerine-Urea (RbGU) and potato dextrose agar medium, respectively, followed by incubation for 7 days at room temperature. After that the fungi were identified morphologically under a light microscope. Quantification of *Aspergillus* species in groundnuts are still being carried out. A questionnaire was used to determine which agricultural decisions might influence mycotoxin contamination from production through to consumption. The questionnaire was also used to assess the level of mycotoxin awareness by surveying and noting Global Positioning System (GPS) coordinates of 201 and 140 subsistence maize farmers in consecutive seasons in production areas of KwaZulu-Natal (KZN), Eastern Cape (EC), Mpumalanga (MP), Limpopo (LP) and North West (NW) provinces. These results were written up in an M.Sc. thesis and are in the process of submission for publication in scientific journals

Nine maize cultivars were selected based on their degree of susceptibility or resistance to *Fusarium verticillioides*. All of these nine cultivars were collected at 16 different localities. Each sample were separately milled and tested for fumonisin levels (3 replications) at the ARC-GCI using the Veratox ELISA technique. Grain from each sample were randomly collected for fungus isolations. Two hundred and fifty kernels from each sample were surfaced sterilized and plated onto the selective RbGU media in order to enumerate and identify *Fusarium* spp. Two hundred and fifty kernels from each sample were also surface sterilized and plated out on PDA to enumerate and identify *Aspergillus* spp. All the isolated *Fusarium* fungi were enumerated, morphologically identified, and single spored. These single spore cultures were then placed in an Ultra Freeze at -70°C for further studies. Up to date 1000 single spored cultures have been placed in the Ultra Freeze. The isolated *Aspergillus* fungi are in the process of being morphologically identified and single spored. These single spore isolates will then be stored by means of freeze drying. From October to December, the nine cultivars selected above were also planted at Pothefstroom, Bethlehem, Vaalharts and Cedara. Seed companies planting cultivar trials at various localities were

contacted, and some are willing to supply us with the same cultivars from these various localities.

Diplodia cultivar trials were planted at various localities. Short-season cultivar trials were planted at Vaalharts, Potchefstroom and Greytown and the phase-two cultivar trials were planted at Vaalharts, Petit, Potchefstroom and Greytown. Trials were all successfully inoculated. Data from these trials were collected and are being analysed for publication.

PROGRESS MADE

Significant successes have been obtained regarding sample variation. This work was part of an MSc-dissertation that was completed recently and results are in the process of being published.

Data analysis of questionnaires has been completed and various tendencies were identified. The awareness levels of the majority of subsistence farmers where these samples were collected were non-existent. This indicates the need to make these farmers aware of the potential dangers of mycotoxins and how to prevent them from developing. Quantification of fumonisins and aflatoxins were carried out and specific high risk areas were identified. Quantification of the fungi is in progress. The results have been written up as part of an MSc study. The various chapters are being completed as manuscripts for publication in scientific journals. Progress to date is excellent.

Progress regarding the screening of cultivar trials for Diplodia resistance is satisfactory. All trials were established, inoculated and we are waiting for harvest.

RESULTS ACHIEVED TO DATE

The studies on the variation of Fusarium ear rot and fumonisin quantification are presently being published in scientific journals and resulted in the completion of an MSc Degree by Ms Belinda Janse van Rensburg. The survey study results have been written up in an MSc Thesis by Mr Edson Ncube. New projects are being planned for these two scientists.

Field trials were carried out at four localities, namely Greytown, Potchefstroom, Vaalharts and Petit to screen phase-II hybrid entries. Ultra short-season maize hybrid entries were screened at Potchefstroom, Greytown and Vaalharts. Trials were planted in random block designs with two rows per entry. One row was inoculated prior to flowering and rated at harvesting. Disease levels on all trials were very low due to the dry season experienced. Even where irrigation was available the infection levels were insignificant. The Institute is also responsible for preparing inoculum for all major seed companies, which is used in screening programmes in maize hybrids in the development process. This ensures that highly susceptible hybrids are identified and removed before entering the market. This has played an important role in the improved levels of resistance observed in commercially available maize hybrids in the past.

PROBLEMS ENCOUNTERED

The phase two trial planted at Vaalharts is to be written off as all the ears in the trial were stolen.

DETAILS

PROJECT NUMBER		M141/11
PROJECT TITLE		Integrated control of maize common rust and northern corn leaf blight
PROJECT MANAGER		M Craven
CO-WORKERS	Internal	BC Flett, CMS Mienie, WG Khali, TM Ramusi
	External	None
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2009

ACTIONS TAKEN TO DATE

During 2007/08 two plantings containing the *Puccinia sorghi* (maize leaf rust - LR) and *Exserohilum turcicum* (northern corn leaf blight - NCLB) differential sets were planted at Potchefstroom for seed multiplication. Twenty-one NCLB isolates have been collected throughout the 2007/08 season from localities ranging from Bergville, Winterton, Norandien, Paul Pietersburg, Balfour and Wolmeransstad. In addition the 20 NCLB isolates collected during the 2006/07 season were isolated from the leaf material, plated out on PDA-agar for inoculum generation and used to inoculate sweet corn in greenhouse trials to verify the presence of the NCLB pathogen. Twelve of these isolates were selected and cultured on autoclaved maize kernels in fruit flasks for a period of two weeks. The flasks were shaken daily. Dried maize kernels were ground and the various isolates stored separately until it were to be used in greenhouse and field trials. Greenhouse trials were planted over a period of two months (7 replicates in total) and consisting of 28 short-season maize hybrids, nine maize breeder lines with grey leaf spot

(GLS) resistance and 19 NCLB differential set lines. A total of 29 *P. sorghi* isolates collected during the 2006/07 season were used to inoculate the highly susceptible Phb 3394 in greenhouse studies in an attempt to generate enough spores for isolate identification. NCLB trials consisting of 28 short-season maize hybrids were planted at Potchefstroom and Vaalharts. Both trials consisted of a control and an inoculated block. The inoculated blocks for each of the two trials were inoculated twice (at 4 - 5 leaf stage and 8 - 12 leaf stage). Ground infected leaf material harvested during the previous season was used with the first inoculation. With the second inoculation an inoculum mixture consisting of 12 isolates (cultured on maize kernels and ground to a fine powder) was used. Both trials were screened on a weekly basis for a period of five weeks. Once matured the trials will be harvested and the yield of the various cultivars determined. An additional trial was planted for the evaluation of nine GLS resistant lines for their NCLB resistance. The trial was inoculated and screened similarly to the Potchefstroom and Vaalharts trials. The GLS resistance lines were also used in a crossing block where the lines were crossed with *P. sorghi* differential sets lines containing the *Rp1-GDJ*, *Rp1-FJC* and *Rp1-GFJ* resistance genes. A field of sweetcorn was planted at Potchefstroom and inoculated with *E. turcicum* to increase inoculum for the 2008/09 season.

PROGRESS MADE

Crosses for seed generation as well as for *Lr*-gene incorporation into the GLS-resistant lines were completed. From the isolates collected during 2006/07, 18 were verified as *E. turcicum*. Twelve isolates were selected for flour inoculum preparation to be used in field trials, with fourteen placed in the ultra-freeze for future studies. Screening of both the two cultivar trials and GLS-line trials were completed. Collected NCLB isolates have been prepared for storage, for use during the forthcoming off-season in greenhouse studies.

RESULTS ACHIEVED TO DATE

Data for both the greenhouse and field trials are in the process of being analysed.

PROBLEMS ENCOUNTERED

Load shedding resulted in four out of the seven greenhouse trials being discarded due to extremely high temperatures. Due to the less than adequate greenhouse facilities none of the rust isolates could be effectively increased for isolate identification. This can mostly be attributed to the loss of viability of the isolates in cold storage. This type of research necessitates the need of isolation compartments within greenhouses that would result in a faster screening process.

DETAILS

PROJECT NUMBER		M141/80
PROJECT TITLE		Variation between <i>Fusarium verticillioides</i> isolates in their ability to produce fumonisins and infect maize kernels and their resultant population dynamics
PROJECT MANAGER		A Faber
CO-WORKER(S)	Internal	BC Flett, B Janse van Rensburg
	External	University of Stellenbosch
PROJECT STATUS		New
DURATION		01/04/2007 to 31/03/2010

ACTIONS TAKEN TO DATE

During 2007/08 the DNA extraction procedure was optimised and DNA was extracted from 457 *Fusarium* spp. The isolates are being identified molecularly using a species-specific PCR assay.

PROGRESS MADE

High-quality DNA was successfully extracted from *Fusarium* spp.. The species-specific PCR assay was optimised for use in the ARC laboratories for identification of *F. verticillioides*, *F. proliferatum*, *F. subglutinans* and *F. graminearum*.

RESULTS ACHIEVED TO DATE

The DNA extraction procedure and species-specific PCR assay have been optimised. The PCR assay is now used to identify *Fusarium* spp. molecularly.

PROBLEMS ENCOUNTERED

The DNA extraction procedure and the species-specific PCR assay needed to be optimised. Power load shedding caused a delay in laboratory because no backup power is available. There is no biotechnology equipment in the Plant Pathology division which means that facilities in another division must be utilised.

CROP PROTECTION (Nematology)

DETAILS

PROJECT NUMBER		M151/10
PROJECT TITLE		Integrated nematode control in maize
PROJECT MANAGER		H Fourie
CO-WORKER(S)	Internal	GA Venter, MJ Schoeman, S Steenkamp, KN Ntidi, L Bronkhorst, DB Matuli, MAM Tladi, GL Ngobeni (DST Student)
	External	None
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2010

ACTIONS TAKEN TO DATE

Field trials

During the 2007/08 growing season at least 150 seeds of six S₆ populations of maize were planted in a field trial at Potchefstroom to validate the root-knot nematode resistance in these material. Each maize seed was inoculated with approximately 10 000 *M. incognita* race 2 eggs and second-stage juveniles (J2). Two other field trials were also planted at sites previously infested with root-knot nematodes at Potchefstroom and Nelspruit to validate the root-knot nematode resistance in local OPV QS-Obatampa and USA line MP712w in these two regions under prevailing local environmental conditions. Root-knot nematode susceptible genotypes have been included in all three trials.

PROGRESS MADE

Local commercial maize cultivars and OPV's that are poor hosts to *M. incognita* race 2 and *M. javanica*, respectively, were identified. Furthermore, root-knot nematode resistance has been successfully introgressed into local maize material. Subsequently S₂ progenies resulting from crosses between exotic root-knot nematode resistant with susceptible local maize lines have been verified for resistance in field trials during the 2004/05 - season. Furthermore, S₃ and S₄ populations advancing from these S₂ populations were evaluated for desirable agronomic traits in field trials. Information on an *in vitro* method to identify molecular markers associated with the root-knot nematode resistance in the above-mentioned breeding material was obtained. Preliminary trials were conducted in order to become familiar with the different facets of the technique.

RESULTS ACHIEVED TO DATE

Field trials

Root-knot nematode samples will only be obtained from the S₆ populations when maize ears are physiologically mature. Root-knot nematode samples have, however, been obtained from the two trials planted at Potchefstroom and Nelspruit and nematode counts are underway.

PROBLEMS ENCOUNTERED

Excessive rainfall during planting and nematode inoculation of the S₆ material at Potchefstroom may have an adverse effect on results. Poor germination of QS-Obatampa and Mp712w also posed problems with regard to the evaluation of resistance in these genotypes. Although sufficient plants could be obtained for nematode sampling, these trials will have to be repeated during the next growing season. Since identification of molecular markers associated with root-knot nematode resistance relies heavily on phenotypic expression of resistance in root-knot nematode-infected roots of crop cultivars, problems were encountered with maize. The reason for that is that maize roots do not regularly show typical gall formation as in other crops. Subsequently an *in vitro* technique used successfully to identify molecular markers associated with root-knot nematode resistance on wheat has been adapted for use on maize and adaptation of this technique is currently being investigated.

PLANT SCIENCES & TECHNOLOGY TRANSFER (Weed Science)

DETAILS

PROJECT NUMBER		M111/13
PROJECT TITLE		Increased use of integrated weed control
PROJECT MANAGER		E Smit
CO-WORKER(S)	Internal	MM van der Walt, KE Ramatseng , S Tsamai, RT Nkasha, JD van der Walt
	External	None
PROJECT STATUS		Continue
DURATION		01/04/2000 to 31/03/2008 (request for the project to be extended by a further three years, until 2011)

ACTIONS TAKEN TO DATE

Glasshouse trials: Chlorophyll fluorescence data captured during the glasshouse trial were analysed and processed.

Field trials: During 2007/08 two field trials were planted at Potchefstroom (34 % clay) and Bethelhem (19 % clay). Cultivars planted included PAN 6966, Phb 30D05, LS 8504 and CRN 3505. Herbicides were applied pre-emergence at standard and double the standard dosage rate and included Bullet, Primagram, Gardomil and Wenner. Control treatments were mechanically howed to keep clean from weeds.

Digitaria sanguinalis seed were sown at Potchefstroom. The trial site was kept clean from broad leaf weeds and other grasses to ensure a homogenous *D. sanguinalis* infestation. This trial site will be used for threshold level studies.

PROGRESS MADE

Glasshouse trials: Data obtained from the Glasshouse trial were presented at the Combined Congress in Grahamstown during January 2008.

Field trials: Visual phytotoxicity, plant length, dry mass and root mass were determined three times during the growing season until flowering for all cultivars and treatments at both localities. Plant material (shoots and roots) is being dried at 60°C. Root: shoot ratio will be determined and data are being analysed to determine significance between cultivars and treatments.

D. sanguinalis seed germinated late in the season, but a homogenous field infestation was obtained. Fresh seed is being harvested and dried.

RESULTS ACHIEVED TO DATE

Glasshouse trial: Maize cultivar CRN 3505 was grown in the glasshouse. Seven pre-emergence herbicides and/or mixtures were applied at normal and double the standard dosage rates. A control treatment was included where no herbicide was applied. Total seedling emergence, visual phytotoxicity (%), plant height (cm) and dry mass (43 DAP) were measured during the trial period. Chlorophyll (A) fluorescence transients were recorded weekly for all treatments in fully dark-adapted attached leaves. The transients were analysed using the JIP test, which is quantitative analysis providing information about the energy flow through photosystem II (PSII). One of its calculated parameters, the performance index (PI_{ABS}), was used to quantify the degree of herbicide damage to maize. PI_{ABS} is a multi-parametric expression that combines the three main functional steps taking place in PSII that can serve as an indication of the vitality of a plant. Significant differences, in which herbicide application differentially affected O-J-I-P fluorescence rise kinetics, and thus the PI_{ABS} , were observed between atrazine-mixtures and acetamide-herbicides. Herbicide mixtures containing acetamides/atrazine significantly altered these kinetics in a characteristic way. These mixtures negatively affected electron transport through PSII. Herbicides and dosage rates had no significant effect on total seedling emergence. Visual phytotoxicity symptoms were significantly higher in acetamide treatments (62 % and 75 %, respectively). Herbicides and dosage rates had a significant effect on plant height. The most stunted plants were observed in the atrazine/s-metolachlor and acetachlor + safener treatments. A significant interaction ($P < 0.025$) between herbicides and dosage rates was only observed for plant height. Results suggested that chlorophyll fluorescence (A) shows potential as a screening tool to assess herbicide damage in maize.

Field trials: Data were captured during the season and is being analysed.

PROBLEMS ENCOUNTERED

Data capturing was delayed early in the season due to heavy rainfall. No other problems were encountered and trials will be harvested at the end of the season.

DETAILS

PROJECT NUMBER		M111/15
PROJECT TITLE		Monitoring of agro-chemicals registered on maize
PROJECT MANAGER		AEJ Saayman-du Toit
CO-WORKER(S)	Internal	MM van der Walt, JD van der Walt
	External	None
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2008 (request for the project to be extended by a further three years, until 2011)

ACTIONS TAKEN TO DATE

Deviations from registered concentrations of agro-chemicals as specified on labels could imply millions of rands in losses to users of products and irreparable damage could be done to the integrity of those products. The aim of this study is to monitor the compliance to agro-chemical formulations. During 2007/08 ARC-GCI in collaboration with Croplife SA (AVCASA and ACDASA) compiled a protocol with regard to the annual sampling of agro-chemical products and the reporting of the analysis. In brief the protocol reads as follows: "ARC-GCI will decide annually on the number of products to be sampled for quality control analysis - this will be determined by funds available to conduct tests. ARC in collaboration with Croplife SA (AVCASA and ACDASA) will annually randomly draw product brand names. Products sampled will include herbicides, insecticides, pesticides and seed dressings. All manufacturers will supply the product free of charge for experimental purposes. Identified products will be randomly drawn annually, in consultation with Croplife SA (AVCASA and ACDASA), throughout grain producing regions, during November to January annually. Only products with a manufacturing date of two years or less will be sampled.

PROGRESS MADE

The following agro-chemicals were nominated:

Herbicides: Acetrazine, Ratel, Rhino, Robyn, Erupt, Robust, Smarag, Atraflo Super, Agrizine Plus, Terazine, Atraflo Super, Atrazine Xtra, Cheetah, Gesaprim Super 600, Supranex, Suprazine, Terbazol, Terbuzin, Ultraflo Super, Ultrazine 500, Sorgomil Gold 600SC and Triflurex 480 EC.

Insecticides: Judo.

Fungicides: Propicon 250 EC and Bumper 250 EC.

RESULTS ACHIEVED TO DATE

Samples are currently at the SABS for analysis. Only Bumper 250 EC and Triflurex 480 EC has already been analysed. It complies with the prescribed rules and is therefore commercially acceptable.

PROBLEMS ENCOUNTERED

Slow response from SABS due to restructuring and loss of critical personnel at SABS.

PLANT SCIENCES & TECHNOLOGY TRANSFER (Seed Quality)

DETAILS

PROJECT NUMBER		M112/10
PROJECT TITLE		Factors affecting maize seed quality
PROJECT MANAGER		AEJ Saayman-du Toit
CO-WORKER(S)	Internal	MM van der Walt, KE Ramatseng, S Tsamai, JD van der Walt, RT Nkasha
	External	Seed industry, farmers
PROJECT STATUS		Continue
DURATION		01/04/1999 to 31/03/2008 (request for the project to be extended by a further three years, until 2011)

ACTIONS TAKEN TO DATE

Although commercial seed are analysed by commercial seed companies, producers still complain, that seed germination tests are often not on standard and do often not comply with the prescribed rules set by ISTA or the

Plant Improvement Act 53 of 1973. It also seems that farm applied seed dressings and storing conditions may cause decreases in seed quality. From this GSA requested ARC-GCI to act as watchdog to evaluate seed quality of farm collected seed. Seed samples collected from different farms across the maize producing area were subjected to a series of tests on normal seedlings. Seed sampling and tests on normal seedlings were conducted according to the stipulations of the International Seed Testing Association (ISTA). Tests on normal seedlings determine the potential of seed to develop into normal seedlings under optimal environmental conditions.

Discussions between GSA, SANSOR and ARC-GCI concluded that the DoA improved with regard to human capital resulting that commercial seed will in future be analysed and inspected by government-registered laboratories at commercial seed companies. The ARC will thus from April 2008 not be responsible to act as watchdog to evaluate seed quality from farm collected seed. Producers, however still complain, that emergence is often below expectation. From previous studies it appeared that farm applied seed dressings, seed size, unfavourable storing conditions and environment x seed dressing x herbicide interactions often cause decreases in crop stand. Although national legislation set strict prescriptions with regard to the application of seed dressings, the on-farm situations are mostly not optimal. This is also the case with seed handling and seed storage in particular. Research is also needed to set standards for South Africa's unique farming environment to optimise production. Because of worldwide economic pressure, information on variables influencing the quality of seed and crop stand is of utmost importance for producers and seed companies. Information of this kind is especially important in Africa, where a variety of crops/cultivars are mostly used under unfavourable environmental conditions. From April 2008, the focus of this project will thus change from being a watchdog to a pure research project.

PROGRESS MADE

Although the focus of the project will change from April 2008, the germination and vigour of a number of already collected maize samples were evaluated to complete the watchdog purpose of the project. Seed analysis, were conducted according to the rules of the International Seed Testing Association (ISTA). From the seed analysis the percentages normal and abnormal seedlings as well as non-germinated seed were determined. The percentage normal seedlings in germination tests, represents the percentage germination. Seed that did not germinate may be either dead or dormant.

On the above mentioned maize samples, trial runs were also conducted to finetune the procedures for the conducting of specific vigour test such as the cool test, conductivity test, cold test, tetrazolium test and the accelerated ageing test.

RESULTS ACHIEVED TO DATE

According to the Plant Improvement Act, the percentage normal seedlings (germination percentage) of the maize samples tested were within the range of commercial acceptability. The seed vigour of most maize samples ranged between "medium" to "high", which was commercially acceptable.

Challenges were experience with the finetuning of the accelerated ageing test and the evaluation of the tetrazolium tests. Especially the tetrazolium tests require a lot of practice with regard to the preparation to perfect staining techniques and to evaluate vigour according to the staining patterns.

PROBLEMS ENCOUNTERED

Problems were experience to get specific containers and bowls to conduct the accelerated ageing tests.

PLANT SCIENCES & TECHNOLOGY TRANSFER (Technology Transfer)

DETAILS

PROJECT NUMBER		M181/10
PROJECT TITLE		Maize Information Guide (MIG)
PROJECT MANAGER		Vacant
CO-WORKER(S)	Internal	MA Prinsloo, SH Ma'ali, D de V Bruwer, AA Nel, AEJ Saayman-du Toit, MM van der Walt, H Fourie, E Smit, TW Drinkwater, JBJ van Rensburg, BC Flett
	External	None
PROJECT STATUS		Continue

ACTIONS TAKEN TO DATE

According to a resolution by the 5th Maize Planning Committee Meeting of 19 October 2006, the income derived

from advertisements placed in the MIG should be paid to the Maize Trust. **An amount of R55 000 was electronically transferred to the Maize Trust on 19 February 2008 for advertisements in MIG 2007.** Currently all activities are on schedule for the preparations of the MIG 2008 edition. This is scheduled to be launched during the Nampo Harvest Day, May 2008. The authors of the different chapters in the MIG were requested to update their respective chapters and submit it by the end of **February 2008.** The input **providers** who advertised in MIG 2007 were contacted to establish who would be interested in advertising again in MIG 2008.

PROGRESS MADE

The MIG was revised/updated by the relevant researchers. Several advertisements were received from various private companies. The MIG 2008 is now entering the final stages and is currently with the printers for final layout.

Currently, a temporary PRO has been appointed. The position was advertised. The short-listing and interviews will be conducted as a matter of urgency.

RESULTS ACHIEVED TO DATE

During the **2007/08** season **7 000** copies of MIG 2007 were printed and distributed to commercial, as well as resource-poor farmers through different means at different opportunities.

PROBLEMS ENCOUNTERED

No significant problems were encountered during the report under review.

