

## **DETAILS**

PROJECT NUMBER	M101/10
PROJECT MANAGER	MA Prinsloo
PROJECT TITLE	Evaluation of medium-and long-season maize hybrids for different production systems
PROJECT STATUS	<b>Extension</b>
DURATION	01/04/2011 to 31/03/2015 (request for project to be extended for five more years, until 2020)

## **EXTENSION MOTIVATION**

The world's population will grow from around 7 billion today to over 9 billion in 2050. To accommodate this growth, the world will need to double food production over the same period. Meeting this target will require bringing more land into cultivation and increasing crop productivity per unit of land, without depleting or destroying natural resources. In order to increase the yield, correct cultivar choice is the most significant factor and has been consistently proven over the years by the results of the maize National Cultivar Trials. Choosing the right cultivar is one of the most important decisions a producer makes every year. Yield potential, stability and agronomic characteristics determine cultivar choice. Every year new cultivars are entering the market more rapidly than in previous years. Independent and unbiased information regarding their adaptability, stability and yield potential is therefore very critical to the entire maize industry.

The National Cultivar Trials conducted by ARC-GCI as an independent organisation in collaboration with co-workers could serve as reference for other trials and could be used as a guideline for cultivar recommendations by maize producers, advisors, agribusinesses and industry. This is achieved by providing accredited, unbiased information to farmers on better adapted cultivars at the earliest opportunity.

Every year commercially available medium-and long-season conventional and Bt maize hybrids submitted by various seed companies are evaluated under varying environmental conditions. The aim of these trials is to ensure impartial, independent information with reliable prediction values that could help to stabilise and optimise maize production for the whole spectrum of producers in South Africa. Since maize breeders are breeding new hybrids with specific traits, such as drought tolerance and resistance to pests and diseases, it is also important to evaluate the behaviour of different maize cultivars to environmental factors such as climate change.

Characteristics such as adaptability, lodging, stability and higher yields are very important for every farmer. The National Cultivar Trials are the only independent evaluation system for maize cultivars and supply valuable information to commercial and developing farmers, industry and advisory services. Also a large number of local universities and institutes are using this information for their research purposes which will have a significant impact on the maize industry.

Conducting approximately 45 statistically replicated successful trials with 50 maize hybrids in the maize producing area every year should give the producer, advisors and maize industry in general very solid and sound information about the performance of the newly introduced cultivars to the market within a short period of time. By this method seed companies will not be able to claim that specific cultivars perform better than other cultivars.

In the absence of the National Cultivar Trials it can result in a chaotic maize industry since seed companies will evaluate and promote their own cultivars, leaving producers and industry without any unbiased selection norms. This in turn could jeopardise sustainable production, food provision, income and quality of maize products.

In addition the information is published in the Maize Information Guide (MIG), reports and other means of information which are widely disseminated throughout the SA farming community and assists farmers in selection of appropriate cultivars that will give optimum yields in their respective areas and reduce the risk for crop failure, drought, pests and diseases.

It is therefore, of national interest and food security that the evaluation of medium-and long-

season maize hybrids for different production systems be continued.

## PROGRESS REPORT

A total of 74 trials were planted for the season consisting of 50 different cultivars. Seven of these trials were planted for disease evaluation. Co-workers received 58 trials and 16 trials were planted and maintained by ARC-GCI. In addition to yield, other agronomic characteristics were evaluated. The AMMI model is being used to estimate the yield potential and the stability value of the tested cultivars under different environments. Fifty six out of 74 trials from the western and eastern areas were received and statistically analysed. Due to the dry season a number of trials were not successful. An annual meeting was held with seed companies and other role players regarding the project progress and another meeting was held on 3 October 2013 where results were approved before being published.

Mean grain yield for the medium and long season maize hybrids in the western area was 4.36  $\text{ha}^{-1}$  (minimum 1.67  $\text{t ha}^{-1}$  at Delareyville 7 (North West Co-op) and maximum 7.33  $\text{t ha}^{-1}$  at Wesselsbron 3 (GCI), DKC 77-77BR, PAN 6Q-245, DKC 78-79BR, and PAN 6Q-445B were the best four performing hybrids in the western region and yielded 4.93, 4.89, 4.82 and 4.75  $\text{t ha}^{-1}$ , respectively. Based on AMMI analysis, the cultivar P 2961W is considered the most stable cultivar followed by, DKC 78-45BRGEN, PAN 6Q-245 and IMP 52-11B over different yield potential conditions. Mean grain yield for the medium and long seasonal hybrids in the eastern region was 9.27  $\text{t ha}^{-1}$  (minimum 4.88  $\text{t ha}^{-1}$  at Bethlehem 3 (GCI) and maximum 14.04  $\text{t ha}^{-1}$  at Bergville (Pannar). DKC 80-40BRGEN, P 2653WBR, PAN 6P-110, DKC 77-85B and PHB 32W72B were the best four performing hybrids in the eastern region and yielded 10.26, 10.12, 9.80, and the last two hybrids yielded 9.71  $\text{t ha}^{-1}$ , respectively. Based on AMMI analysis, the hybrid DKC78-35R, is considered the most stable hybrid followed by LS 8535B, KKS 4581BR, and PAN 6R-510R. Multi-seasonal analysis for the last three seasons (2010/11-2012/2013) was completed where 15 medium and long seasonal cultivars were evaluated under 70 environments in the eastern area. Mean grain yield over all environments was 8.98  $\text{t ha}^{-1}$ . The cultivars PAN 6Q-445B (9.44  $\text{t ha}^{-1}$ ) produced the highest yield across the years and environments followed by PAN 6P-110 (9.37  $\text{t ha}^{-1}$ ). In the western area 14 medium and long seasonal growers were evaluated under 57 environments. Mean grain yield over all environments was 5.45  $\text{t ha}^{-1}$ . The cultivars PAN 6Q-445B (6.04  $\text{t ha}^{-1}$ ) produced the highest yield across the years and environments followed by PAN 6Q-245 (6.01  $\text{t ha}^{-1}$ ). Other agronomical characteristics have been recorded and analysed and include lodging %, tillers %, moisture % and number of cobs per plant.

## PUBLICATIONS

OOSTHUIZEN, E., 2005. An evaluation of cultivar stability in ARC maize trials over a six year period. *MSc (Agric.) Thesis*, Department of Plant Sciences (Plant Breeding), Faculty of Natural and Agricultural Sciences, University of the Free State, Bloemfontein, South Africa.

MA'ALI, S.H., 2008. Additive mean effects and multiplicative interaction analysis of maize yield trials in South Africa. *S. Afr. J. Plant Soil*, 25: 185 - 193.

MA'ALI, S.H., 2009. Die jongste navorsing met graan, olisadeen peulgewaskultivars gee boere gaandeweg toegang tot basters en nismarkprodukte wat volhoubare boerdery malkliker maak. Navorsing maak deure vir graanboere oop (Mielies). *Landbouweekblad*, 1 603: 4 - 5.

MA'ALI, S.H., 2010. Choosing your maize cultivar. *Farmer's weekly*, 10 025: 56 - 57. 9 July 2010.

MA'ALI, S.H., 2010. Your maize choice made easy. *Farmer's weekley*, 10 026: 52 - 56. July 2010.

NEL, A.A., 2011. Nuwe mieliebasters kan produktiwiteit verhoog. *Landbouweekblad*, 22 July 2011.

NEL, A.A., 2011. Goeie oeste in KZN-mielieproewe. *Landbouweekblad*, 5 August 2011.

NEL, A.A., 2012. Hou hierdie mieliebasters dop. *Landbouweekblad*. Vol 1 758. Pg 32 - 34. 15

June 2012.

NEL, A.A., 2012. Mieliebasters haal byna 10 ton. *Landbouweekblad*. Vol 1 759. Pg 40 - 41. 22 June 2012.

NEL, A.A. 2012. Mieliebasters in weste vertoon blink. *Landbouweekblad*. Vol 1 757. Pg 30 - 31. 8 June 2012.

MA'ALI, S.H. & BRUWER, D., 2013. Mieliekultivarproewe saamgevat: Kort groeiseisoenkultivars onder besproeiing verbou. Kultivars vir die oostelike produksiegebiede & Kultivars vir die westelike produksiegebiede. *SA Graan/Grain SA*.

MA'ALI, S.H. & BRUWER, D., 2013. Hier kom 20t/ha vir mielies. *Landbouweekblad*. Page 32 - 34. 18 January 2013.

PRINSLOO, M.A., 2013. Mielies in ooste raak-raak aan 10t/ha! *Landbouweekblad*. Vol 1 813. Pg 32 - 34. 19 July 2013.

PRINSLOO, M.A., 2013. Hou dié mielies dop in KwaZulu-Nalta. *Landbouweekblad*. Vol 1 814. Pg 30 - 32. 26 July 2013.

#### **RADIO TALKS**

BRUWER, D., 2011. Hoekom is kultivar keuse baie belangrik vir die graanprodusent? *Radio RSG Landbou*. 4 May 2011.

#### **PRESENTATIONS**

MA'ALI, S.H., 2009. Additive mean effects and multiplicative interaction analysis of maize yield trials in South Africa. Paper presented at Combined Congress held in Durban, South Africa. 19 - 23 January 2009.

MA'ALI, S.H., 2013. Identifying essential test locations for maize national cultivar trials in South Africa. Paper presented at the 67<sup>th</sup> Northeastern Corn Improvement Conference held in Ottawa, Ontario, Canada. 14 - 15 February 2013.

#### **MEETINGS WITH INTEREST GROUPS**

MA'ALI, S.H., 2008. Presented cultivar evaluation research for the Maize Research Evaluation meeting. 13 August 2008. ARC-GCI Potchefstroom.

MA'ALI, S.H., 2009. Presented cultivar evaluation research for the Maize Research Evaluation meeting. 18 August 2009. ARC-GCI Potchefstroom.

MA'ALI, S.H., 2010. Presented cultivar evaluation research for the Maize Research Evaluation meeting. 4 August 2010. ARC-GCI Potchefstroom.

MA'ALI, S.H., 2010. Attended the role of bio-fertilizers in crop production and conservation agriculture ARC-GCI in Potchefstroom. 25 August 2010.

MA'ALI, S.H., 2010. Attended workshop on Multivariate Analysis of Ecological Data. Held at University of North West, Potchefstroom. 8 & 9 November 2010.

MA'ALI, S.H & D. Bruwer, 2010. Presented and managed the annual meeting with the seed companies and other stakeholders. 11 August 2010. ARC-GCI. Different issues regard maize cultivar evaluation projects had been discussed.

MA'ALI, S.H & D. Bruwer, 2011. Presented and managed the annual meeting with the seed companies and other stakeholders. 11 August 2011. ARC-GCI. Different issues regard maize cultivar evaluation projects had been discussed

MA'ALI, S.H & D. Bruwer. 2012. Presented and managed the annual meeting with the seed companies and other stakeholders held in 14 of August 2012 at ARC-GCI, different issues

regard maize cultivar evaluation projects had been discussed

BRUWER, D. 2013. Presented and managed the annual meeting with the seed companies and other stakeholders held in 12 of August 2013 at ARC-GCI, different issues regard maize cultivar evaluation projects had been discussed