



Precision phenotyping for improving drought stress tolerant maize in southern Asia and eastern Africa

International Maize and Wheat Improvement Center (CIMMYT)

Country/Region:	Kenya, Thailand and China
German participation	University of Hohenheim and University of Freiburg
Leading scientists:	Jill Cairns and Jose Luis Araus
Duration:	January 2009 - December 2011

Initial situation

Maize is a key feed and food crops in many regions of Africa and southern Asia. Conventional breeding using managed stress screening protocols has resulted in significant yield increases under drought stress. However faced with climate change in drought-prone areas larger breeding efforts are required now to meet the needs of future generations. With rapid advances in molecular technology, phenotyping is now a major bottleneck in breeding programs. To ensure maximum selection gains and to harness the outputs of molecular biology within NARS breeding programs improved, high throughput phenotyping methodologies are essential.

Approach of the project

The aim of this project is to strengthen phenotyping capacity of NARS and local seed companies within

southern Asia and eastern Africa breeding programs and develop novel and affordable high throughput phenotyping methodologies. Enhancing phenotyping capacity will play an important role in the development of drought stress tolerant maize for resource poor within the target regions.

Major results achieved

To strengthen phenotyping capacity within target countries training course was held in Yunnan, China with over 20 participants from 3 countries (China, India and Thailand). To complement the training course, technical staff from the partner institutes at Thailand, China and Kenya visited CIMMYT for extended field training. Testing facilities at all experimental sites were upgraded with new phenotyping tools for evaluating performance

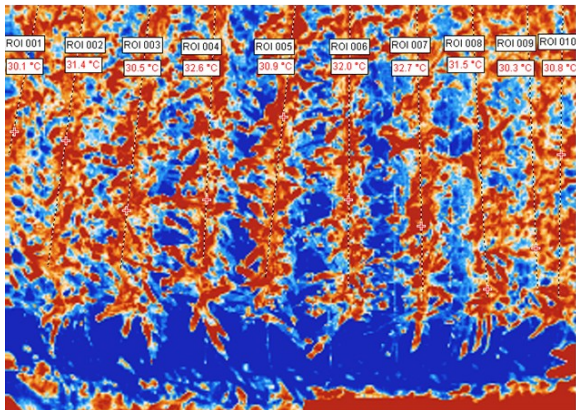


under drought stress. Standardized phenotyping protocols were developed and implemented at all project sites. The potential of novel phenotyping methodologies have now been verified under

drought stress in the field and work is now underway to confirm the breeding value of these new tools. To increase the precision of phenotyping the “noise” inherent to the spatial and temporal heterogeneity of field testing is being reduced by deploying new statistical tools factoring in environmental variability, together with mapping soil variation. A diverse source of breeding lines is under evaluation as the basis for refining and developing phenotyping methodologies. By screening the same panel in multi-location trials well-characterized sources of genetic variation have been identified and delivered to breeding programs in Kenya, Zimbabwe, China, Thailand and Mexico to sustain drought tolerant improvement.

Expected impact

The ultimate beneficiaries of this project are resource-poor farmers in stressed environments who are insufficiently served by multinational private sector maize breeding programs. Intermediate beneficiaries include NARS and seed companies who will gain long term benefits from improved phenotyping capacity and



training. The indirect flow of proven drought tolerance donors is also expected to result in long term yield gains in drought-prone environments.



Collaborating Institutions: Yunnan Academy of Agricultural Science, China; Kenyan Agricultural Research Institute, Kenya; Nakhon Sawan Field Crops Research Center, Thailand.

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Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany

Dahlmannstr. 4
53113 Bonn

T +49 61 96 79-3347
F +49 61 96 79-803347
E beaf@giz.de
I www.giz.de/agricultural-research

T +49 228 24934 231
F +49 228 24934 215
E judith.jansen@giz.de

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Contact:

Jose Luis Aarus: j.aarus@cgiar.org
Jill Cairns: J.Cairns@cgiar.org