Universitat de Barcelona

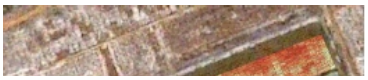
‘Skywalker’: aeronautical technology to improve maize yields

Skywalker complex aerial phenotyping platform, a remote-controlled plane provided with an advance flight system.

An image of *Skywalker*rsquo;take-off.

This new device will help to select the maize varieties which are best adapted to adverse environmental conditions.

The first prototype of the aerial platform was handed in February to people in charge of the South Africa Office of CIMMYT, in Harare (Zimbabwe).



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Recerca

To design a low-cost unmanned aerial vehicle which helps to select the maize varieties which are best adapted to adverse environmental conditions is the main objective of an international project led by Josep Lluís Araus, professor from the Department of Plant Biology of the UB and head of the Consolidated Research Group on Ecophysiology of Mediterranean Agriculture. Nowadays, constraints in phenotyping capability limit our ability to dissect the genetics of quantitative traits, especially those related to harvestable yield and stress tolerance. In particular, phenotyping under real environmental conditions remains the bottleneck for future breeding advances.

Maize is the most consumed cereal in Sub-Saharan Africa and Latin America, widely cultivated under varying temperatures, precipitation and soil types. Currently, about 77% of maize production in developing countries is consumed by humans. Drought and poor soil fertility are the leading production constraints in most maize farming systems. Reduction in maize yield caused by climate-related stress may be increased under climate change. In this sense, development of new technological phenotyping platforms at an affordable cost is urgently needed to strengthen maize breeding and agriculture in developing countries.

To improve maize yields

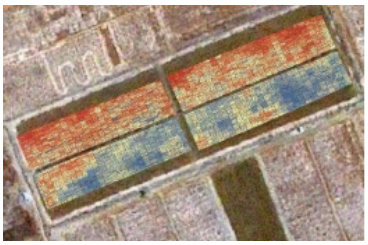
Skywalker is a complex aerial phenotyping platform, a remote-controlled plane provided with an advance flight system which do not require previous knowledge of aeromodelism. Spectral (visible and near infrared) reflectance and thermal imagery cameras were fitted to the wings; they allow evaluating crops’ growth, temperature and available soil water of large numbers of maize varieties in only a few minutes. This data will be used to improve the efficiency of maize breeding and speed up the development of drought and low nitrogen tolerant maize varieties for some of the poorest farmers in the world.

The plane ranges from 30 to 45 minutes, and can fly at over fly at over 600-meter with an average speed of 45 kilometres per hour. Take-off and landing, as well as flight plan (way, height, etc.), can be automatically programmed previously.

***Skywalker*: prototype’s first flight in Zimbabwe**

The project, founded by the International Maize and Wheat Improvement Center (CIMMYT), has the collaboration of the company Airelectronics —which designed the flight control system and installed sensors on the plane— and the Teledetection Group of the Institute for Sustainable Agriculture of CSIC, in Córdoba, responsible for selecting platform’s sensors and the software to transfer and process information data.

The first prototype of the aerial platform was handed in February to people in charge of the South Africa Office of CIMMYT, in Harare (Zimbabwe), when Professor Josep Lluís Araus, Antón Hernández, president from the company Airelectronics, and Alberto Homero, technician from the group led by Pablo J. Zarco Tejada at the Institute for Sustainable Agriculture, were making a stay there. The researcher Jill Cairns, expert on maize physiology at CIMMYT, coordinated the field-test of the platform. The experts, who also visited Zimbabwe’s Crop Breeding Institute (CBI), provided local technicians with theoretical and practical training to guarantee the maximum output of this new idea. It is planned to hand a second platform to Peru’s National Institute for Agronomic Research (INIA).



Information generated by*Skywalker*: false coloured images of smallholdings with the levels of accumulated biomass.

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