CRUK/University of Reading

Screening Cocoa Varieties for Physiological Traits

Evaluating the materials held at the International Cocoa Quarantine Centre for variation in physiological traits

Cocoa varieties that are stress resilient and perform well under local climatic conditions are key factors in ensuring farmer livelihoods. However, in many cocoa growing areas, rainfall patterns and other environmental conditions are changing as a result of local shifts in land use and global climate change. Previous research has shown that there is genetic variation in photosynthetic capacities and ability to withstand stress, including drought, which cocoa breeders can utilize in developing improved varieties. However, only a very limited range of cocoa varieties have been studied. This project set out to screen a larger range of germplasm for traits which are likely to affect their yield potential and stress resilience with a view to identifying interesting materials for priority inclusion in breeding work and for future studies of the impact of climate change on cocoa productivity.

The International Cocoa Quarantine Centre at the University of Reading (ICQC,R) holds over 400 cocoa varieties with different genetic and geographic origins. Plants from 295 of these types were screened for a broad range of traits which had been identified during previous CRUK supported work as being useful indicators of vigour, photosynthetic capacity, water use efficiency and flowering pattern. Although most of this study was undertaken under greenhouse conditions, the measurements were repeated on a range of the clones which were growing under field conditions at the International Cocoa Genebank, Trinidad (ICG,T). Key findings from this study were:

- Extensive variation shown to exist in a range of photosynthetic and physiological traits in cocoa varieties growing under greenhouse and field conditions
- Photosynthetic measurements made at ICGT shown to correlate well with those made at ICQC,R for 10 of the 15 varieties studied
- Identification of varieties with contrasting characteristics for further detailed assessment under varying environmental conditions (greenhouse and field).

Data on the physiological characteristics made available through the International Cocoa Germplasm Database (www.ICGD.rdg.ac.uk) to help breeders prioritise materials for acquisition and field evaluation

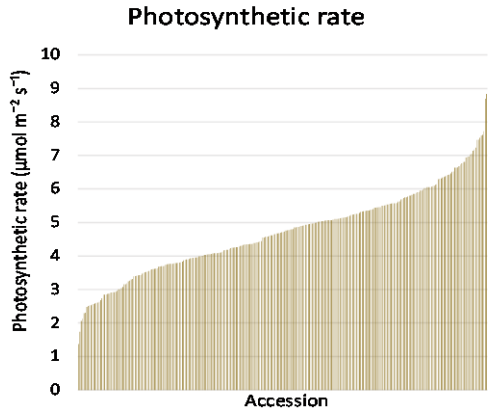

Figure 1. A wide range of variation in photosynthetic rate was observed across 295 varieties held at ICQC,R

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