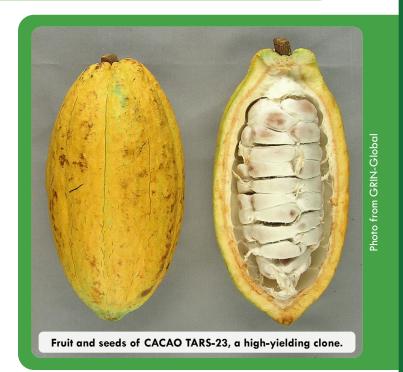# Cacao TARS Germplasm - High Yielding

USDA-ARS Tropical Agriculture Research Station, Puerto Rico

Scientists at the USDA-ARS Tropical Agriculture Research Station (TARS) in Puerto Rico ran a large-scale experiment that grew more than 1320 cacao trees from five hybrid families. Cacao with the highest yield potential were grafted to rootstocks. Evaluations of these clones identified nine individuals with exceptional productivity (more than 4x the worldwide average) that also produced high quality chocolate. These accessions were publicly released. Their availability has been a boon for the resurging commercial cacao industry in Puerto Rico.

Photo from GRIN-Global

Fruit and seeds of CACAO TARS-23, a high-yielding clone.

PROJECT GOALS

✓ Understand the yield potential of hybrid cacao grown from seeds
✓ Identify and release cacao clones with high yield potential

Problems Addressed

Cacao yields tend to be low, with a worldwide average of about 400-500 kg/ha/yr of dry beans. Greater yield could significantly improve production efficiency and output for this highly in-demand crop, and even help restart the commercial cacao industry in Puerto Rico. Although some considered the seeds from controlled pollinations as the best means of growing highly productive trees, there was insufficient data to support this hypothesis.

Solutions Developed

In the 1980s, TARS scientists grew 1320 cacao trees from seed produced by five controlled crosses. During a period of 16 years, evaluation of productivity showed that only 2-3% of the trees were high yielding. The 40 most productive trees were then grafted onto rootstock and evaluated during 4 years of production. Nine clones demonstrated superior yield when compared to the parental varieties. These clones yielded 2170 kg/ha/yr of dry beans during their first 4 years of full production. These clones were then accessioned and made available to cacao researchers and breeders.

Written by: R. Goenaga, K. Chen (editor)

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