Improving the Performance of Matooke and Mchare Breeding Pipeline in East Africa

Research GAP

All the landrace cultivars of the East African highland cooking bananas are susceptible to pests and diseases, threatening the livelihoods of over 30 million people in East Africa. The key pest threats are weevils and nematodes, while the leading diseases are black Sigatoka, Fusarium wilt and Bacterial wilt. Developing resistant cultivars provides a fundamental intervention to addressing these pest and disease challenges. However, classical breeding of bananas is fraught with obstacles due to the low fertility, low seed germination, long evaluation and selection cycle period of banana, as well as the large amount of space required for field evaluation.

What WE DID

"Breeding is a game of numbers"! To increase the breeding pipeline performance for Matooke and Mchare we increased the progeny populations from which to select better performing and more pest and disease resistant hybrids. We further improved the progeny evaluation process. This has been conducted using a broad range of interventions:

- Expanded pollination blocks from 4ha to 15ha;
- Characterized floral development stages at and after anthesis to identify the best time for pollination;
- Studied pollen viability during the day and over the calendar season;
- Studied the efficacy of various sugars for improving pollen germination;
- Intensified the number of crosses made on a daily basis;
- Targeted valuable crosses;
- Introduced, generated and characterized specific male parents for desired traits to be integrated in the breeding program;
- Improved tissue culture operations and nursery infrastructure;
- Optimized embryo germination media and protocols;
- Conducted chromosome doubling for Mchare;
- Increased progeny populations in trials segregating for desired traits;
- Developed product profiles for Matooke and Mchare cultivars;
- Reduced the progeny evaluation period;
- Conducted phenomics for genotypes at early stages of evaluation;
- Introduced BTracT tool to fast-track breeding activities.
What WE ACHIEVED

By focusing our efforts as a team, sharing information, skills and training between partners we were able to improve our success all along the breeding pipeline:

- Generated 439 hybrids from 3x-2x;
- Generated 12054 hybrids from 4x-2x;
- Generated 7035 diploid hybrids from 2x-2x, 3x-2x and 4x-2x;
- Selected 231 hybrids for advancement to field yield trials;
- Selected 90 diploid hybrids from inter-ploidy crosses;
- Generated 1218 hybrids from Mchare-2x crosses;
- Planted 92 matooke hybrids in multi-location PYTs;
- Established biophysical and sensory platforms for banana post-harvest characterization.

Why THIS IS IMPORTANT

Development and release of banana cultivars better tailored to market and consumer demands will lead to rapid cultivar adoption across a wider target area, with beneficial impacts on food security, livelihoods and human nutrition. Robooni Tumuhimbise <rtumuhimbise@hotmail.com>

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