

Year 3 Annual Technical Report: Narrative for 1 July 2011–30 June 2012

Executive Summary

The Sweetpotato Action for Security and Health in Africa (SASHA) is a five-year project that seeks to directly improve the food security of at least 155,000 Sub-Saharan Africa (SSA) families by exploiting the untapped potential of sweetpotato and to create the conditions for going to scale. This requires (1) transforming sweetpotato breeding, (2) developing innovative seed systems, (3) strengthening partners' capacities, and (4) understanding how to link these components to market and food-based nutritional interventions while assuring gender equity. The project is slightly more than half-way through. This report reports progress made through 30 June 2012.

Overall, most components of four of the five research programs (RP) are on track based on their original milestones. The exception is RP2, which seeks to develop a transgenic weevil resistant sweetpotato. Expected results in a key RP2 experiment were not obtained early in year 3. This has necessitated a re-design of RP2, in consultation and with the approval of the relevant BMGF program officers. RP2 has proposed 3 new milestones and dropped 18. Of the remaining milestones, 17 have been achieved or almost achieved, 4 are on track, and 11 are behind schedule. Of the 109 milestones for *non*-RP2 sub-programs whose activities have begun, 51 have been completely or almost achieved (47%), 37 (34%) are on track for their expected completion dates, 18 are behind schedule (16%), and 3 (3%) have been dropped. The majority of "behind schedule" milestones are for the breeding program. In several cases it has taken longer to multiply material for the proposed trials than expected or further validation work for another season was needed. Explanations for any delays are provided in the main text and detailed milestone table in Appendix B. Appendix A provides an updated log frame of outputs. Highlights for this period are summarized below. OBx.x refers to relevant objective numbers and MSx.x to milestone numbers.

RP1: Breeding and Varietal Improvement. The overall objective of RP1 is to develop improved breeding methods and establish efficient population improvement programs at a sub-regional level in SSA, linked with participatory varietal selection at the national level. At headquarters, all data for the seminal study demonstrating heterosis in sweetpotato have been gathered, and a manuscript is being prepared that clearly shows that heterosis can be exploited in sweetpotato. A large experiment to critically evaluate the efficiency of paired cross versus controlled cross breeding methodology is under way in the field. All of the three sweetpotato support platforms (SSPs) are implementing accelerated breeding schemes with NIRS capacity for evaluating quality traits in each SSP. In Uganda, two genetically distinct populations were constituted using simple sequence repeat (SSR) molecular markers and are being used to produce seed both within and between populations. Improvement of both populations for resistance to sweetpotato virus disease (SPVD) and quality attributes for the region is under way. In Mozambique, the first cycle of selection for drought tolerance among two genetically distinct OFSP populations continues. In Ghana, full-scale collaborative participatory varietal selection of non-sweet or unsweetpotato (USP) is operational, and CIP-HQ produced 2,000 seeds of distinct non-sweet parental material (UPS-Population B) that will be sent to Ghana. Since 2009, national programs in five SSA countries have released 39 sweetpotato varieties, of which 29 are orange-fleshed. A new version (3.0) of the CloneSelector program was developed during year 3, which has enhanced analytic capacity.

RP2: Breeding Weevil-Resistant Sweetpotato (WRSP). This research program aims at the development of weevil resistant (WR) varieties of sweetpotato using a transgenic approach. Three weevil resistance genes were introduced into sweetpotato varieties amenable to genetic transformation and produced close to a hundred transformed events (transgenic plants). Transgenic events from the first transformed variety, Jewel, were sent to Puerto Rico (9), Kenya (29), and Uganda (30). In Uganda, 29 transformed events produced storage roots that were subsequently tested for their capacity to affect weevils using four assays and larvae from *Cylas puncticollis*. None of them has provided satisfactory control of the weevil so far. More events will be tested in the future. In Kenya, the quantification of Cry protein in storage roots suggests that Cry proteins are accumulating at a low level unlikely to confer control of the weevils. A mid-term program meeting was held in October 2011 to review progress. Subsequently, a new work plan was developed with substantial changes in the research approach, which was approved by the Foundation. Subsequently, new gene constructs have been developed and are almost ready to be used to transform African cultivars in Peru, Kenya, and Uganda.

RP3: Sustainable Seed Systems. This was the final year of the Marando Bora component of RP3, which sought to deliver quality planting material at scale. In this year, a total of 71,735 households received sweetpotato vines through decentralized vines multipliers (DVMs) and an additional 26,883 were reached through mass dissemination. Marando Bora has covered 16 districts, with an accumulated total of 110,722 households (74% of the original target) receiving vines in just slightly over three dissemination seasons. Eighty-eight DVMs were established with 77 disseminating vines in the last season. Research on virus degeneration and the use of the Quality Declared Protocol will continue in Tanzania for an additional year. The experiment testing the use of lower cost net tunnels to protect primary material from virus infection concluded in Western Kenya with very positive results. A concerted effort was initiated to work toward ISO 17025 standards for germplasm clean up and distribution from each of the sweetpotato support platforms by the end of 2013, with initial efforts focused on the regional distribution platform at KEPHIS (Kenya). Major improvements at KEPHIS include the installation of a barcoding system for managing the in vitro germplasm activities. Progress on developing a field tool (ClonDiag) continued, with a major training for virologists held on its development and use in January 2012.

RP4: Effective Delivery Systems. Mama SASHA, the integrated agriculture and nutrition intervention that links orange-fleshed sweetpotato (OFSP) access to ante-natal services for pregnant women, completed the blood analysis in January 2012 and submitted a draft baseline report (MS4.1.1C) at mid-term. A complete draft became available in May 2012. From June 2011 to May 2012, 3,151 pairs of vouchers were issued, with 74% (2,329 pairs) redeemed for vines from the community vine multipliers. Since the rolling out of wave 2 (March 2011 to May 2012), the number of women who have received vouchers stood at 2,873, which far exceeds the original project goal of reaching 900 women. The **Rwanda Super Foods Project**, which seeks to establish sweetpotato processed product value chains, now has 37 farmers directly contracted by SINA Enterprises and 20 farmer groups (80% women; 20% men) supplying roots to SINA to produce six sweetpotato-based products, earning \$33,000 in sales this year. In June 2012, a new Italian made cookie/biscuit processing machine was acquired and installed at SINA. A technical consultant assisted in refining cookie/biscuit recipes with 43–45% wheat flour substituted by sweetpotato puree. A major launch event is

planned for September 2012. A sweetpotato value chain study conducted in representative states in **Nigeria** in August and September 2011 and finalized in May 2012 is serving as a valuable input into the new RAC project. Dual-purpose trial results from Rwanda, as part of the **Animal Feed** component, indicated that local landraces were superior to improved varieties for both root and vine production, in contrast to results found for similar work in Kenya. A pig farming baseline survey was carried out to collect data on the current trends in pig production in seven districts of the Central and Eastern provinces of Kenya. On-farm pig feeding trials with nine farmers selected from Maragua, Kirinyaga, and Embu districts of Kenya were completed in June 2012, and results are being analyzed to determine the most profitable feed using sweetpotato silage.

RP5: Management and Support Platforms (SSP). The SASHA project successfully organized and held its second Annual Technical Meeting and the SPHI Executive Steering Committee meeting on 13–15 September 2011 in Kampala, Uganda. Two-page flyers on each major sub-program were produced, as well as flyers on key partners and students associated with SASHA. Several communication events were held, but the major investment for this period was our strategic participation in the African Crop Sciences meeting 10–14 October 2011. SASHA sponsored a half-day workshop on Advances in Sweetpotato Research and Dissemination, an event led by the vice-minister of agriculture featuring OFSP processed products to launch the Reaching Agents of Change project and an informative exhibition booth. Over 450 participants from 36 countries attended this meeting. The fourth and fifth rounds of Sweetpotato Support Platform (SSP) meetings were conducted, and backstopping on the use of CloneSelector in breeding programs and improvements in the Sweetpotato Knowledge Portal continued. A major Seed System Consultation meeting was held in Nairobi on 7–8 June 2012, bringing together SSP members and private sector vine multipliers from 11 SSA countries to share lessons learned to date.