Bioversity International

Bioversity International
Musa Germplasm
Transit Centre (ITC)

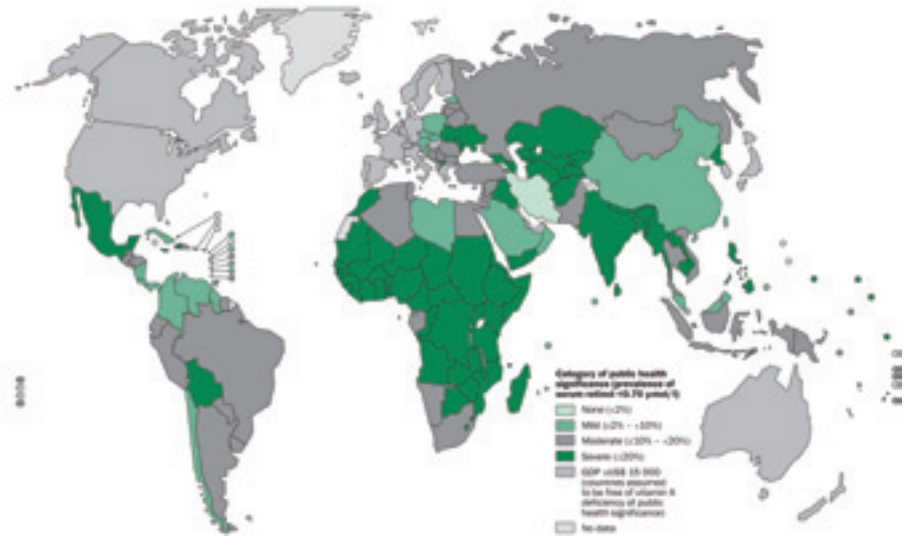
Factsheet 5

Use of banana diversity for nutritious diets

For more information about the Bioversity International *Musa* Germplasm Transit Centre, see:

- Factsheet 1: *Operations, Outreach and Impact*
- Factsheet 2: *Unravelling the genetic basis of banana traits using Next Generation Sequencing technologies*
- Factsheet 3: *Phenotyping for drought*
- Factsheet 4: *Screening for resistance to Fusarium wilt*

Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children, with an estimated 250,000-500,000 children becoming blind every year. Half of them die within 12 months of losing their sight, as VAD increases the risk of disease and death from severe infections. In pregnant women, VAD causes night blindness and may increase the risk of maternal mortality. VAD is a public health problem in more than half of all countries, especially in Africa and South-East Asia.



Countries and areas with survey data and regression-based estimates: Pre-school-age children (source: http://www.who.int/)

Banana (*Musa* spp.) is a staple food for millions of poor people in these regions and as such forms an important source of nutrients. Introduction or promotion of vitamin A-rich cultivars has the potential to have significant long-term beneficial impact on the incidence of VAD. Interest in vitamin A-rich bananas took off in the early 2000s when analyses done by L. Englberger and her collaborators revealed that some orange-fleshed cultivars indigenous to the Pacific region have high levels of vitamin A precurors. Since banana breeding is difficult and time-consuming, direct introduction or 'fast-tracking' of such existing vitamin A-rich cultivars is seen to offer substantial savings in terms of both cost and time, and helps conserving traditional farmers' cultivars.

Top photo: http://humphreykariukindegwa.blogspot.be/2014/06/importance-of-modern-agro-production.html

Progress

Large-scale screening of the banana genepool by Bioversity and its partners has shown that there is indeed substantial variability in the levels of vitamin A precursors in banana cultivars, and that the levels in some cultivars are so high that they can contribute to improving the vitamin A nutritional status of banana-dependent populations at modest and realistic fruit consumption levels.

A selection of high-vitamin A banana cultivars was sent from the Bioversity International *Musa* Germplasm Transit Centre (ITC) to Burundi and the Democratic Republic of Congo, to evaluate their agronomic performance and consumer acceptance in this region.

At least five of the cultivars performed well agronomically and their overall acceptance was not significantly different from that of local cultivars. At least six of the cultivars had levels of vitamin A precursors that are high enough to meet a child's needs by consuming 100 grams/day of the ripe fruit. Levels were significantly higher for ripe compared to unripe fruits.

The orange-fleshed Karat banana (right) contains 100 times more pVACs than the Cavendish banana (left).
Credit: Island Food Community of Pohnpei/L. Englberger

Looking ahead

Through collaboration with local universities, national research organisations, local government and local NGOs, more than 200 community resource persons were trained on the nutritional importance of food groups, appropriate cooking and processing methods and the preparation of banana-based nutritious dishes (also catering for other important nutrients). These resource persons have already reached close to 1500 farmers and will reach out to more farmers within the pilot countries with these key messages.

A total of 450 farmers have received planting materials of the preferred vitamin A-rich banana cultivars. Three additional vitamin A-rich cultivars have been ordered from the ITC. Evaluation of the cultivars will continue over subsequent cycles and across different agroecological zones in Burundi and Eastern DRC. The scaling out of the work to Tanzania, Uganda and Kenya has also been initiated.

Selected references

1. Davey, MW, Van den Bergh, I, Markham, R, Swennen, R and Keulemans, J. 2009. Genetic variability in *Musa* fruit provitamin A carotenoids, lutein and mineral micronutrient contents. Food Chemistry 115(3):806-813.
2. Englberger, L, Darnton-Hill, I, Coyne, T, Fitzgerald, MH and Marks, GC. 2003. Carotenoid-rich bananas: A potential food source for alleviating vitamin A deficiency. Food and Nutrition Bulletin 24(4):303-318.
3. Ekesa, BN, Kimiywe, J, Van den Bergh, I, Blomme, G, Dhuique-Mayer, C and Davey, M. 2013. Content and Retention of Provitamin A Carotenoids Following Ripening and Local Processing of Four Popular *Musa* Cultivars from Eastern Democratic Republic of Congo. Sustainable Agriculture Research 2(2):60-75.
4. Ekesa, BN, Kimiywe, J, Davey, M, Dhuique-Mayer, C, Van den Bergh, I, Blomme, G. 2013. Contribution of bananas and plantains to the diet and nutrition of *Musa*-dependent households with preschoolers within Beni and Bukavu territories; Eastern Democratic Republic of Congo. Chapter 24. p. 202-209. In: Banana Systems in the Humid Highlands of Sub-Saharan Africa - Enhancing Resilience and Productivity CABI.
5. Ekesa BN, Miroir C, Blomme G, Van den Bergh I and Davey MW. 2013. Retention of provitamin A carotenoids during post-harvest ripening and processing of three popular *Musa* cultivars in South-Western Uganda. Acta Horticulturae 986: 319-330.

For more information about vitamin A in banana, check out the Musapedia page on vitamin A: http://www.promusa.org/Vitamin+A+in+banana

Partners