

SWEETPOTATO: A Conservationist's Perspective

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Sweetpotato appears to be one of the last important food crops with a global distribution that so far has received little attention from modern plant breeding.

As a crop tolerant to adverse conditions like drought and low soil fertility, sweetpotato is considered a “survival” crop particularly suited to marginal environments. This, however, may not necessarily be an inherent and discriminating crop characteristic. It could also reflect the absence of modern bred improved varieties. Prior to the introduction of high-input agriculture, most present day major crops such as wheat, maize, upland and rainfed rice, potatoes were selected under local conditions that often included lack of water, variable and occasionally poor soil fertility, and dependence on natural balances to cope with biological stresses. The major achievement of institutional plant breeding has been to adapt crops to better growing conditions, making effective use of added artificial fertilizers, irrigation, mechanical tillage, and chemical control of pests and diseases, to maximize production of the harvested product. In the process, crops seemed to have lost some of their original tolerance to biological and abiological stress conditions. It is sometimes suggested that through plant breeding, yield security under variable environmental conditions is traded for maximization of production under optimum conditions, although many plant breeders challenge that statement.

Genetic Diversity

The genetic diversity of sweetpotato within and among regions probably still largely reflects traditional patterns of distribution from the original center of origin (South/Central America) characterized by limited founder populations along migration and trade routes and exchange between farming communities. Taxonomic studies, backed up by molecular genetic techniques will clarify the evolutionary relationships among species and within the cultivated sweetpotato among geographic regions. In the process of distribution and cultivation, both natural and human selection resulted in a wide array of different cultivars. Human selection is particularly effective in a vegetatively reproduced crop since individual variants can immediately be fixed and multiplied. This suggests that much of the apparent genetic diversity in cultivars of sweetpotato results from producers' cum users' perspectives. It, therefore, seems totally opportune for UPWARD to consider the role of genetic diversity of sweetpotato in cultivation and use.

UPWARD Approaches

UPWARD needs to establish cooperation with competent taxonomic units to provide clues as to how the crop spread from its original home. It can contribute by supplying relevant research materials. Such studies are needed to provide clues on the distribution of genetic diversity within and among regions. However, it would seem that UPWARD's comparative advantage would lay in actively contributing to a better understanding of the important user perspective in harnessing and molding genetic diversity in individual cultivars. Curiously, this aspect has so far received little attention from conservationists. Until recently, plant collectors only collected data on the physical environment, totally ignoring information of farmer producers and users. The anomaly of this situation is now recognized, but the methodology to collect and document producer/user

information is still poorly developed. UWPARD is particularly well placed to contribute in this area, both because of the nature of the crop and because of its overall expertise in identifying users' perspectives.

Research Issues

Some researchable issues are discussed below.

- The distribution of cultivars in sweetpotato seems to be uneven with particular areas characterized by very high varieties. It seems likely that new cultivars are selected from occasional seedlings in vegetatively reproduced plantings. The occurrence of seedlings, i.e. the flowering pattern and/or the rate of germination of seeds may be affected by environmental conditions. However, growers or users must be able to recognize new types and propagate them. Hence, there clearly is an interaction between different causal factors.
- The first step in improving access of farmers to better planting material may well be identification of good cutlivars in various geographic areas and facilitating exchange of such materials among communities. An important and largely unresolved question, however, is the extent of *genotype x environment interaction* (GxE). Are cultivars specifically adapted to local conditions and if so what is the range of adaptation? Secondly, what is the interest of farmers in new cultivars and what is the basis of their judgement? These issues can be researched in various ways. A rather straight-forward approach would be to sample a set of cultivars in a range of different environments and repeat the set in test plots in those environments. Farmers could be invited to judge the various cultivars on their suitability, possibly using a farmer field school approach. This would give information both on GxE as well as on differences between farmers and communities in their assessment of genetic diversity.
- It would seem that the role of sweetpotato in diets differs among regions and even communities. Evidence from UPWARD research supports this observation. How does this affect or is it affected by the availability of diversity in farmers' fields and in the market?
- A major problem in the conservation of sweetpotato is the cost of maintaining living collections of clones. An alternative or complementary method would be to maintain not the actual clones, but the overall genetic variation by storage of seeds. From a users' perspective, it would be interesting to know how easy it is to recover from seedlings clones that are comparable to the original parental clone.

Systematic studies on these and other issues are highly needed and the results will have more general relevance to conservation in other vegetatively reproduced crops. It requires multidisciplinary approaches particularly suited to a program like UPWARD.

Ownership and Access

The present distribution of sweetpotato reflects a free flow of materials among communities. Free and open exchange of planting materials is a common principle embedded in the agricultural philosophies of most farmer communities. It is based on a realization of mutual interdependence and shared concerns. However, times have changed. The 1992 Convention on Biological

Diversity stresses national sovereignty over biological materials in the wake of increasing application of patents on biological materials promoted on negotiations of the World Trade Organization (WTO) and the Trade Related Intellectual Property Systems (TRIPS). Nations are obliged to give recognition to such ownerships through *sui generis* systems of protection. As a result and through increasing globalization of industrial interests, free flow of genetic diversity is threatened. The concept of Farmers' Rights, while recognizing that farmers have made their contributions deserving comparable recognition as contributions made by industries, has so far remained a concept since it is difficult to implement in a meaningful way. The free flow of materials among communities makes it virtually impossible to identify original owners. Furthermore, limiting such flows would probably have overall adverse effects. UPWARD needs to consider these issues and argue for the interests of small farmers and users of sweetpotato and their needs for continuous and unimpaired access to genetic diversity.

