Mango Production in Guatemala

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Mango has been planted in Guatemala for many years, but was grown on a limited scale for rich growers or in a backyard setting. The actual commercial production of mango started in the 1960s when production was intended for marketing. Technical knowledge about mango production was limited and the use of methyl bromide, for soil sterilization and the control of certain diseases, was common. Beginning in 1970, there was a steady increase in mango production. Area under production increased from 37 hectares in 1970 to 7492 hectares in 1999. In 1986, the local government prohibited the use of the methyl bromide, clearing the way for fruits to be exported to the United States, the main market for Guatemalan mangoes. In 1998, an agribusiness agency ,"Profruta," was established in Guatemala to improve and enhance production and exportation of mangoes.

The collaborative efforts of Profruta, mango growers and many agencies in Guatemala resulted in a significant increase in mango production and export. The total numbers of boxes (2.5/4.5 Kg) were increased from 625,000 in 1994 to 1,939,070 in 1998. It is estimated that the exportation of mango will reach 10,000,000 in the year 2005. Researchers are working in programs to induce early flowering of mango trees for exportation purposes, and experimenting with new mango cultivars other than 'Tommy Atkins', which is the major mango variety in Guatemala.

National Sweetpotato Collaborators

Comparison of Three Parameters for Estimation of Allelopathic Potential in Sweetpotato [*Ipomoea batatas* (L.) Lam.] Germplasm

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Eleven sweetpotato [*Ipomoea batatas* (L.) Lam.] germplasm sources, primarily cultivars, were tested for allelopathic potential. Three parameters were used for estimation: suppression of yellow nutsedge (*Cyperus esculentus* L.) growth and development, inhibition of prosomillet (*Panicum milliaceum* L.) seed germination by methanolic extracts of storage root periderm tissue and quantitative determination of resin glycoside content of storage root periderm tissue. The three methods identified the same clones with the strongest potential, i.e., 'Excel', 'Regal', and 'Sumor'. The seed germination bioassays are useful if equipment is not available. They gave good results and are easiest to perform; however, much time is required since the experiments have to be performed several times. Quantitative determination of resin glycoside content, using HPLC methods, is recommended. This method is inexpensive, fast, and adaptable to automation and therefore lends itself best for routine evaluation of large numbers of sweetpotato seedlings generated routinely in breeding programs.

Pollination of Sweetpotatoes in Polycross Seed Nurseries

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Polycross seed nurseries are commonly used in breeding programs for sweetpotato, *Ipomcea batatas* (L.) Lam. However, because of the dependence on native insect pollinators, the male parents of F_1 progeny are not known; and little has been reported about pollinators of sweetpotatoes. Sweetpotato entries may flower at different times and may have different amounts of pollen and nectar, which could influence bee visitations. Therefore, knowledge about the flowering cycles of individual sweetpotato entries and their synchrony with native insect pollinators could be very important to maintain efficient polycross nurseries. During 1996–98, we monitored sweetpotato flowering patterns and pollinators in polycross seed nurseries at Charleston, S.C. In 1996, 27 sweetpotato lines were grown in four single-plant replications in one field. Plants were monitored once a week between 10:00 AM and noon from mid-June to mid-December. At each sampling, all open flowers and associated insects were counted, and sample specimens were collected for identifications. For 1997, eight breeding lines (W-125, W-263, W-272, W-278, W-302, W-306, W-316, and W-317) were grown in three fields with four plants of each entry. These lines had a wide range of total flowers and onset of flowering. W-272 and W-278 could not be grown in 1998, so W-235 and W-296 were substituted. The total number of flowers for all lines ranged from 0.6 to 78.0 flowers/plant/sampling date. At least four species of bumblebees (*Bombus* sp.) were the primary pollinators, and their presence was highly synchronized with flowering. No honeybees (*Apis mellifera* L.) were observed until late in the season (November), after other pollen sources were no longer available. Few other pollinators were observed.

Transgenic High-protein Sweetpotatoes: Their Effects on Protein Quality and Lipid Metabolism

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The present study was conducted to investigate the nutritional quality of transgenic sweetpotato on the growth of hamsters, its effects on lipid metabolism. Male Golden Syrian hamsters were fed six different types of diets containing transgenic sweetpotato flour supplemented with soy flour along with two control diets made up of casein and soy protein. Body weight gain were significantly higher ($P < 0.05$) in the groups fed casein and soy protein diets. However, the protein efficiency ratio of transgenic sweetpotato was significantly higher ($P < 0.05$) than casein. Plasma total cholesterol, triglycerides, HDL, and LDL-cholesterol concentrations were significantly higher ($P < 0.05$) in hamsters fed casein compared with those fed soy protein and sweetpotato diets. No significant differences were observed in plasma total cholesterol and lipoprotein fractions of hamsters fed sweetpotato diets. The liver total cholesterol, triglycerides, and LDL-cholesterol concentrations were lower in hamsters fed sweetpotato diets than that in the control groups. There was a positive correlation ($r = 0.858$) between methionine content of the diets and plasma total cholesterol concentrations. The highest corrected PER value (3.71) indicated that transgenic sweetpotato has good-quality protein, which also lowered plasma and liver total cholesterol, triglycerides, and LDL-cholesterol levels.

The Role of Damage and Wound Healing in Sweetpotato Storability under Tropical Conditions

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Sweetpotatoes have a short shelf life in the tropical environment of east Africa. Weight loss (primarily water loss) is an important factor in perishability. Even after careful handling, most water loss occurs through damaged areas and irregularities in the skin. Wound-healing ability under local storage conditions was investigated for 16 sweetpotato cultivars. Wound-healing ability was measured by assessment for lignin using phloroglucinol/HCl staining. Significant cultivar differences were observed in the percent lignification (i.e. 100 ¥ the number of wounds that had lignified divided by the total number of wounded roots), which ranged from <40% (Kemb10, KSP20, and SPK004) to >89% (Yanshu1, BP1-SP2, and Pumpkin). There was a negative relationship between the percent lignification and the dry matter (DM) content ($P < 0.0005$ for Trial 1 and 3, and $P = 0.038$ for Trial 2), which explains why cultivars with high DM content deteriorate more rapidly. We suggest that after wounding, the relative rates of desiccation and wound healing (lignification) are critical, and if the

parenchyma dries out below a critical moisture content, lignification cannot occur. Preliminary studies indicate, consistent with this hypothesis, that the lignified cell layers are situated deeper for high DM than for low DM cultivars. This would imply that at high humidity, all cultivars can heal wounds whereas at low humidity only cultivars with low DM can heal.

Addressing the Problems of Sweetpotato in East Africa

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Sweetpotato is an important staple food in developing countries. Major limitations of this crop are its short shelf life under tropical conditions (where refrigeration is not economically feasible) and field infestation by sweetpotato weevil (*Cylas* sp.). The NRI is involved in collaborative projects in east Africa to improve storage and processing of sweetpotato and investigate methods for controlling *Cylas* infestation. The results of a project to investigate the potential for breeding for more storable cultivars are presented. Locally available cultivars have been assessed for rates of deterioration (fresh-weight loss and rotting) under normal marketing conditions at five sites in Tanzania over two seasons. Initial data show that rates of deterioration vary considerably by cultivar but are consistent over seasons and sites. The rate of weight loss is a good indicator of perishability and therefore provides a simple means of cultivar selector. The data show that cultivars with low dry-matter content deteriorate less rapidly.

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National Cowpea Improvement Association

Development of New Southernpea Cultivars: An Update on the USDA Effort

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The genetic improvement of southernpea (*Vigna unguiculata*) has been a major objective of the USDA research effort at Charleston, S.C., for over 30 years. Current objectives include the development of cream-, pinkeye-, and blackeye-type cultivars with persistent green seed phenotypes; the development of improved snap-type cultivars; and the incorporation of root-knot nematode resistance into commercial cultivars. The small-seeded, green cotyledon, pinkeye-type cultivar Petite-N-Green was released on 7 Aug. 1998 for use by home gardeners. Several experimental lines are in advanced stages of evaluation for potential release as cultivars. These experimental lines include a green cotyledon, acre type (US-865); a green cotyledon, blackeye type (US-867); two cream types with both green cotyledon and green testa phenotypes (US-880 and US-881); several high-yielding snap types (US-903, US-904, US-905, US-908, and US-909); and a root-knot nematode resistant version of the cream-type cultivar Bettergreen (US-910).