

15th Triennial Symposium of the International Society for Tropical Root Crops

Summary of Conclusions and Recommendations from Oral Presentations

Session III

Crop Improvement for Sustainable Intensification of Root & Tuber Crops

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A total of 12 presentations including one lead lecture were made. Below is the summary of conclusions and recommendations from presentations.

Heritability estimates for an accelerated breeding scheme (ABS) in clonally propagated crops-using sweetpotato as a model, presented by W. Gruneberg: The proposed ABS reduces the breeding period from 7-8 years to 4 years. It resulted in significant heritability estimates for yield and quality traits. ABS should be used for sweetpotato population improvement in regions where Genotype x Year interaction is low. ABS should be considered for other clonally propagated crops. Two to three environments were found optimal for yield trait. For quality traits the number of environments should not be more than two.

Studies of the inheritance of plant and tuber traits in diploid and in tetraploid potatoes, presented by V. Mosquera, resulted in the determination of the mode of genetic control of the plant and tuber traits investigated. Some of the characteristics studied were albinism, eye depth, flower corolla colour, tuber flesh color. In the study with tetraploid potatoes, some characters were controlled by single loci while others were controlled by two or three loci showing different types of epistasis.

Breeding for heat tolerance, earliness and disease resistance for the warming potato producing environments, presented by H. Mendoza: Evaluation of large potato population with diverse genetic background permitted to select heat tolerant early maturing genotypes that were intercrossed to produce 50 clones with attributes useful to maintaining the crop in areas where warming climate may limit potato production.

Potato multiple virus resistance breeding in Peru, presented by H. Mendoza: Immunities to PVX and PVY are available at commercial level and each simply inherited at independent loci with a dominant immunity allele. PLRV infection resistance is polygenic but possesses additive genetic components with medium-high heritability that

ensures positive response to selection. Combined resistance to PVX, PVY and PLRV was introduced in some commercial cultivars presently grown in Peru.

Development of potato cultivars suitable for processing under subtropical conditions using conventional and biotechnological approaches, presented by S.K. Pandey and S. Kumar: In India, using conventional method four potato chip processing varieties and one French Fries processing variety were developed. With biotechnological approaches, breeding lines that can produce tubers that will not accumulate reducing sugar during cool storage were produced.

New potato (*Solanum tuberosum* L.) varieties were released for the high lands of Southern Ethiopia, presented by E. Tsegaye: The new varieties were released in May 2009. The highest yielding variety was CIP 392618.511 with tuber yield of 30.88 tons and Late Blight reading of 6.4%.

The influence of GxE interaction on the storage root yields of orange fleshed sweet potato varieties grown in Ethiopia, presented by E. Tsegaye. The influence was studied using 15 orange flesh sweetpotato clones in two years and 3 seasons. GXE interaction was highly significant for both marketable and total root yield. Highest mean marketable and total root yield across environments were 32.92 and 38.05 tons/ha, respectively with NASPOT-1 which also had acceptable level of stability. This clone was recommended for on-farm trial for confirmation of performance prior to release.

Past and current status of sweetpotato breeding in Uruguay was described by G. Rodriguez. Main selection criteria included multiple disease and insect resistance, short growing cycle (90days), high yields, high carotenoid content, high dry matter, high yield, long storability, stability in different growing conditions and quality for diverse markets and new uses.

Adaptability and storability of CIP advanced potato clones under long-day conditions of Central Asia, presented by C. Carli, was studied using CIP-derived advanced clones. Most promising clones for each agro-ecological situation were identified. Best clones designated for French Fries and chip processing were CIP 388611.22, 397073.16 and 397077.16.

Adapting an instantaneous canopy photosynthesis model to simulate potato net primary productivity using remotely sensed data, presented by H. Loayza. In this study, model parameters were estimated using remotely sensed data. The estimation of parameters with remotely sensed data presented R^2 ranging from 0.89 to 0.99. The parameters were integrated into a MATLAB net primary productivity model and tested with growth chamber and field data using commercial potato varieties as well as new clones. Simulated results explained over 85% of the variation in the actual yield data.

Inheritance patterns of tetraploid *Dioscorea alata* varieties were studied by A. Nemorin. Polyploidy is a crucial issue in yam improvement programmes. Recent studies have revealed that the basic chromosome number of the species *D. alata* is $x=20$ and that

accessions with $2n=40$, 60, and 80 chromosomes are diploid, triploid and tetraploid, respectively, and not tetraploid, hexaploid and octoploid, as usually assumed. Tetraploid varieties ($2n=80$) are of agronomic interest because of their high yield and vigour in the field but there is no information about their inheritance patterns. Preliminary results of some studies revealed that tetrasomic segregation is more likely than disomic segregation.