Accurate sweetpotato phenotyping of agronomic traits

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How do we measure genetic diversity

- **Morphological/ phenotypic markers**
- Biochemical markers
- Molecular markers

Variety/Clonal identification

Why is it important?

- Outcrossing mating system
- Somatic mutation events
- Exchange system at local and regional levels

Characterization of morphological diversity is restricted to germplasm bank collections

CIP 400004 identity verification

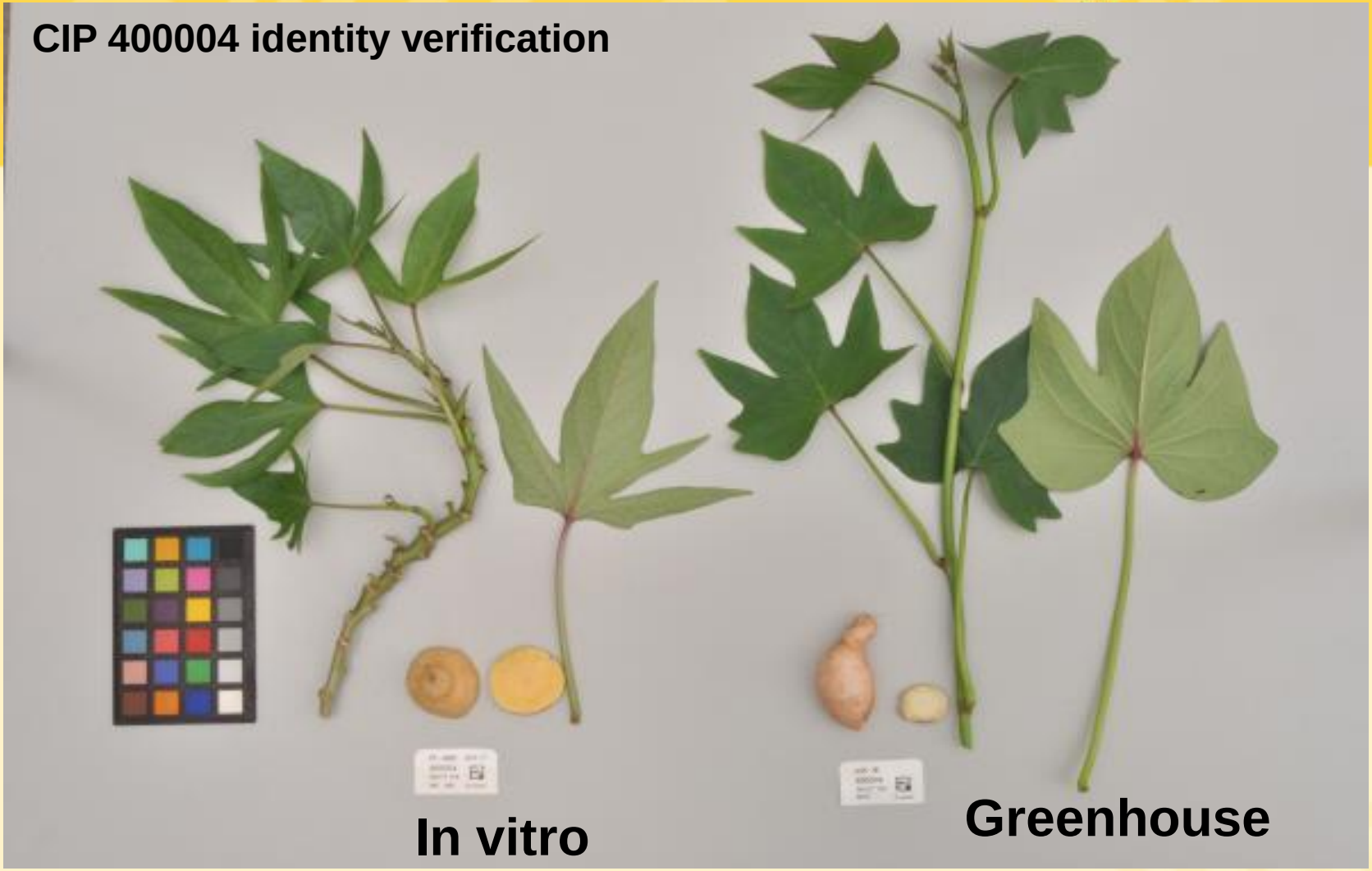
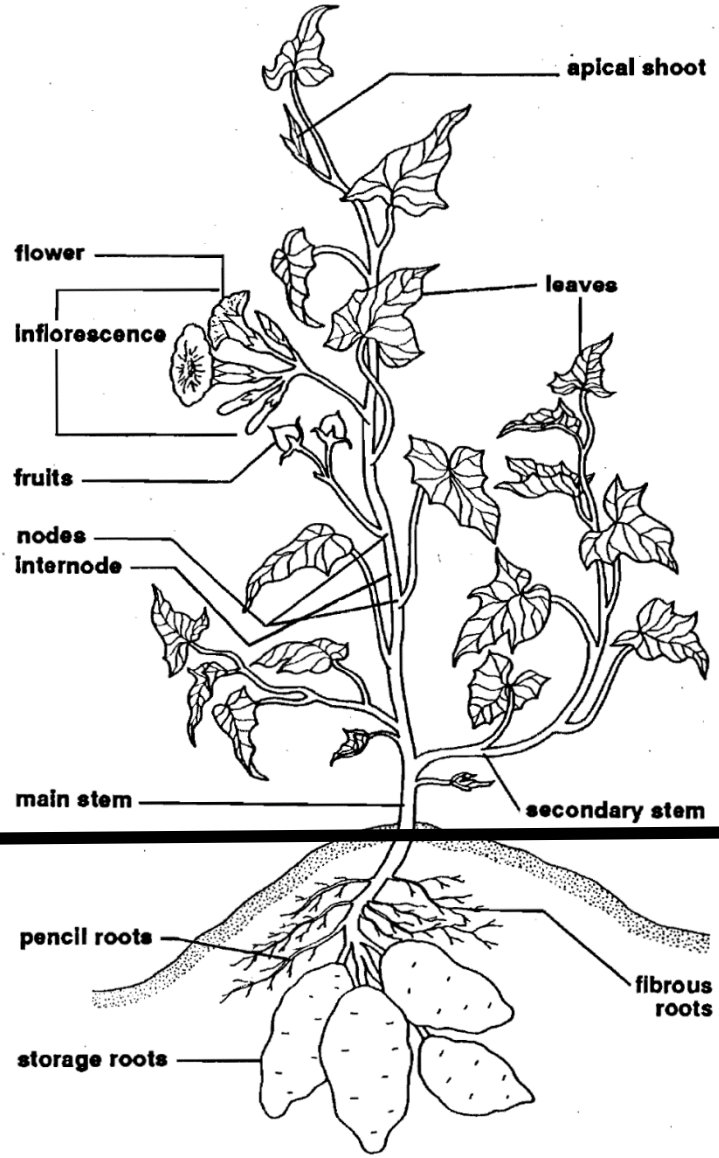


Figure: Leaf and root cross section: L “Orange-Chingova” and **R** Orange-Chingova

Morphological/Phenotypic

Vegetative aerial descriptors

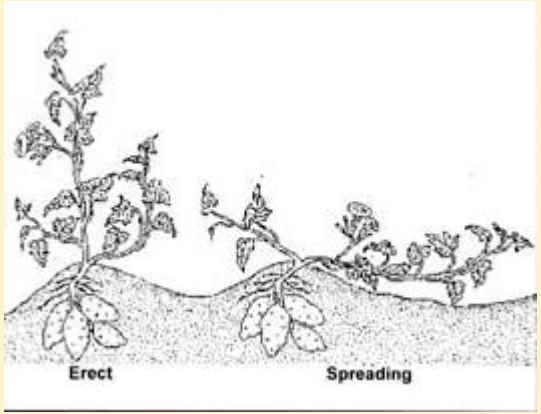
Storage root traits



Key sweetpotato descriptors (plant data)

Plant growth habit

- Erect (<75cm)
- Semi-erect (75-150 cm)
- Spreading (151-250 cm)
- Extremely spreading (>250 cm)



Twining (ability)

- Non-twining
- Slightly twining
- Moderately twining
- Twining
- Very twining

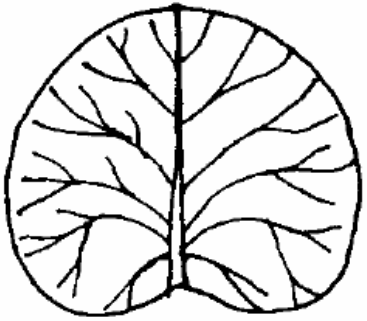
Ground cover

- Non-twining
- Slightly twining
- Moderately twining
- Twining
- Very twining

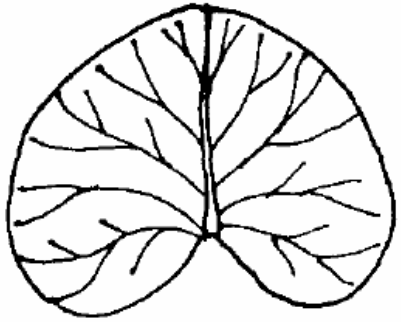
Vine

- Vine internode length
- Vine internode diameter
- Predominant vine colour
- Secondary vine colour

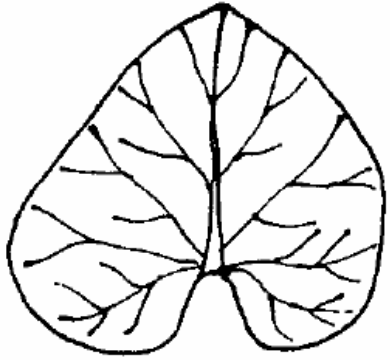
General outline of leaf



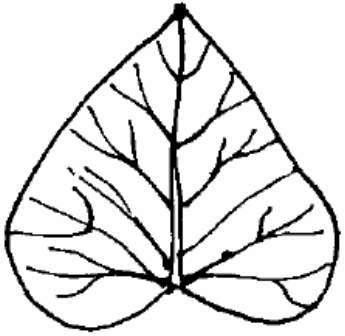
1 Rounded



2 Reniform



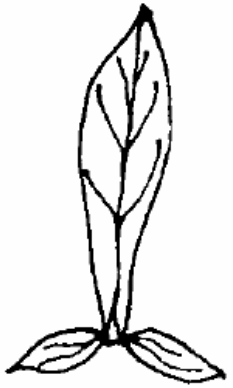
3 Cordate



4 Triangular

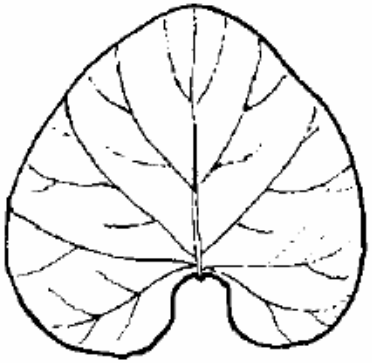
5 Hastate

6 Lobed

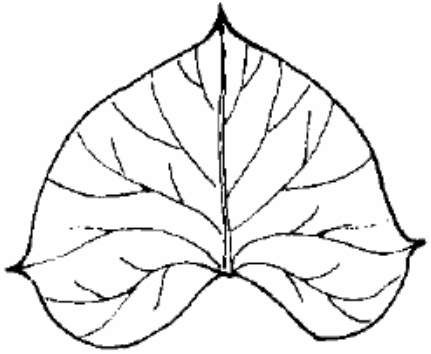


7 Almost divided

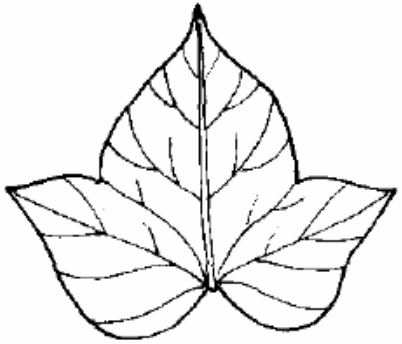
Leaf lobe type



0 No lateral lobes



1 Very slight (teeth)



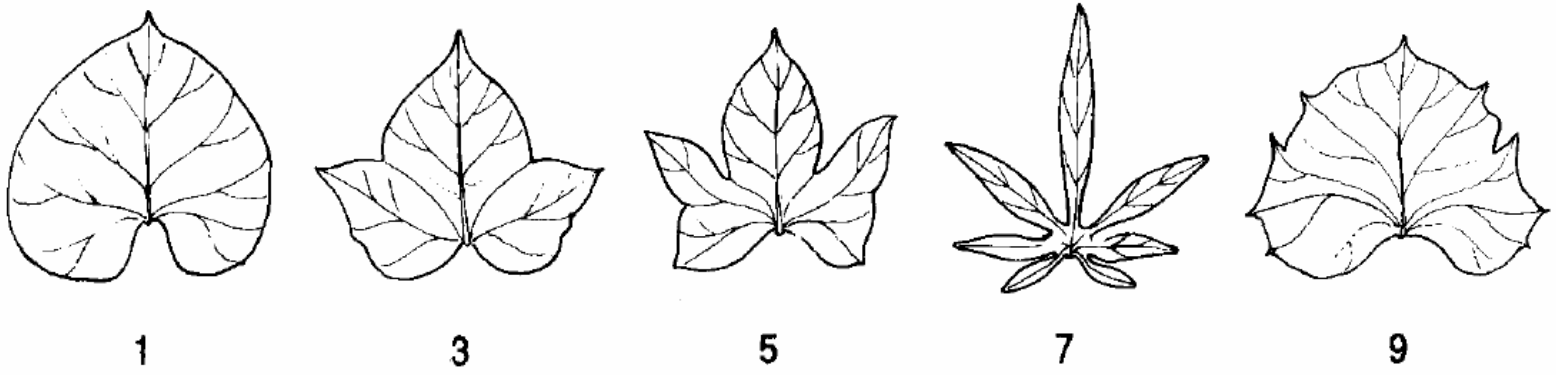
3 Slight

5 Moderate

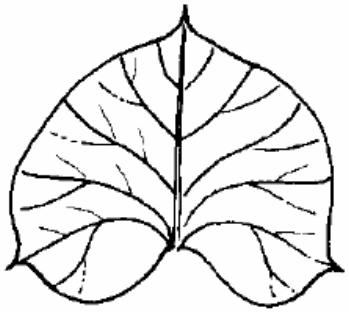
7 Deep

9 Very deep

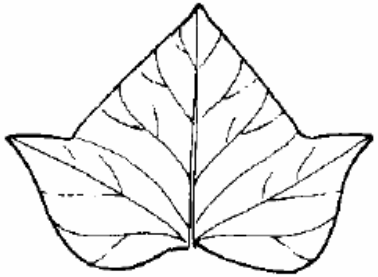
Leaf lobes number



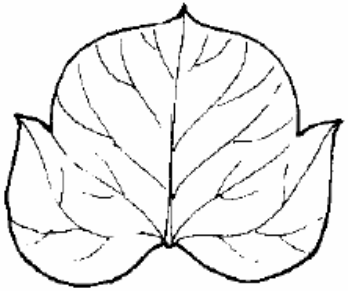
Shape of central leaf lobe



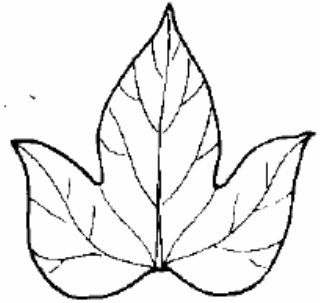
1 Toothed



2 Triangular



3 Semi-circular



4 Semi-elliptic

5 Elliptic

6 Lanceolate

7 Oblanceolate

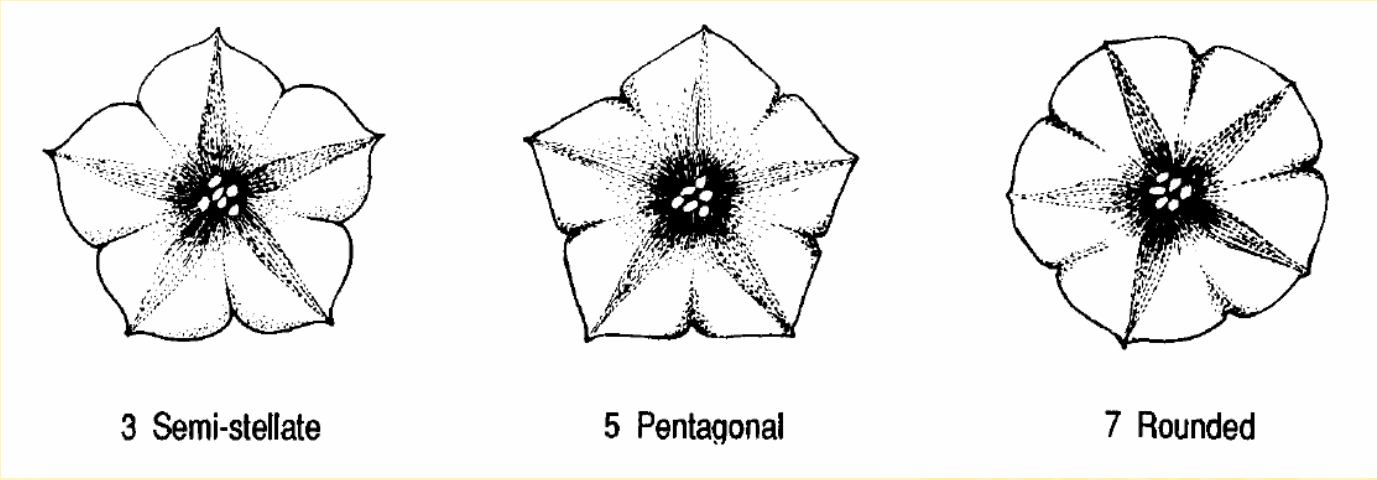
9 Linear (narrow)

Other leaf attributes

- Mature leaf size
- Abaxial leaf vein pigmentation
- Mature leaf colour
- Immature leaf colour
- Petiole length
- Petiole pigmentation

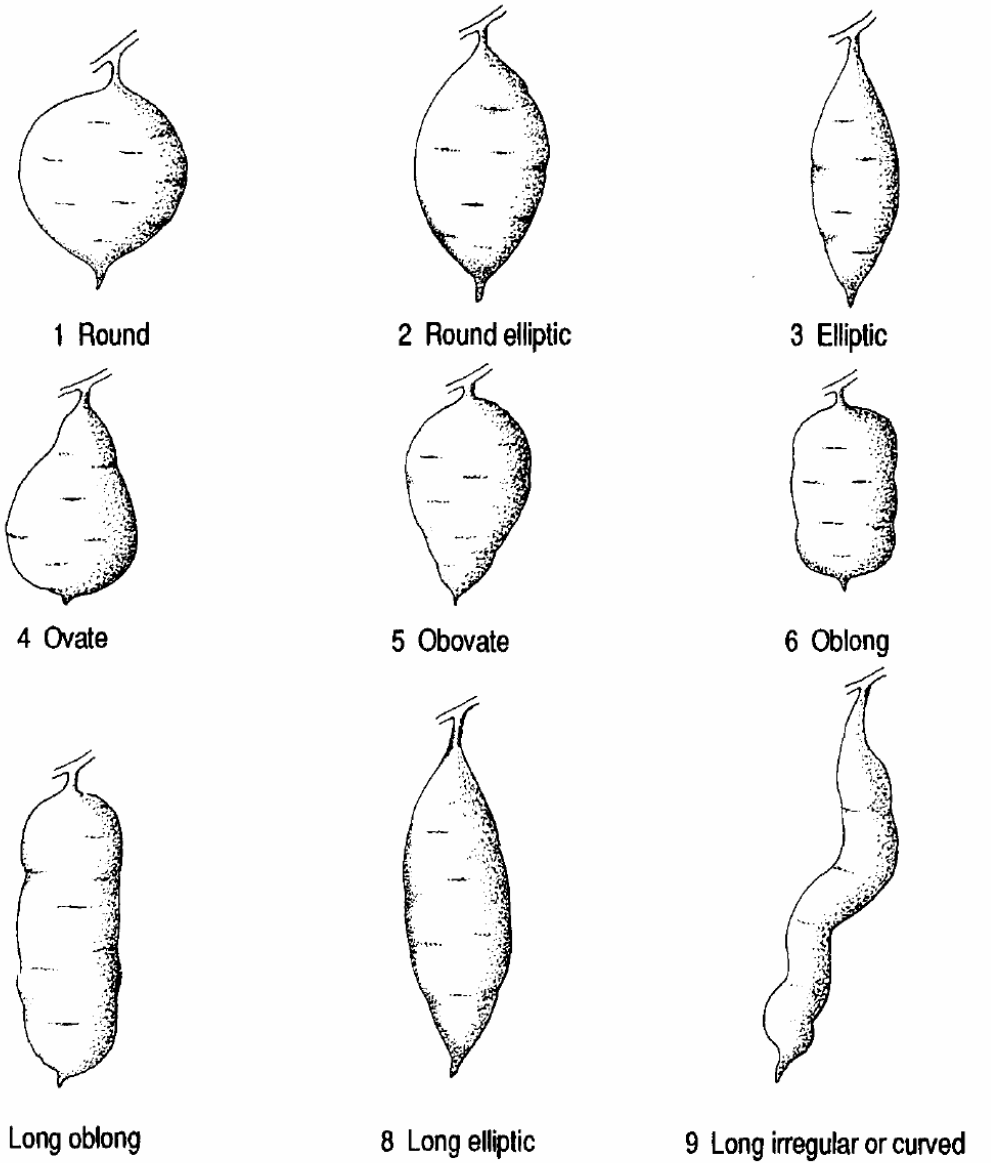
Inflorescence

- Flower habit
- Flower color
- Flower size-length and width
- Shape of limb

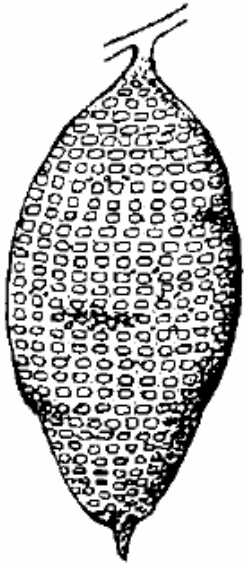


Storage root

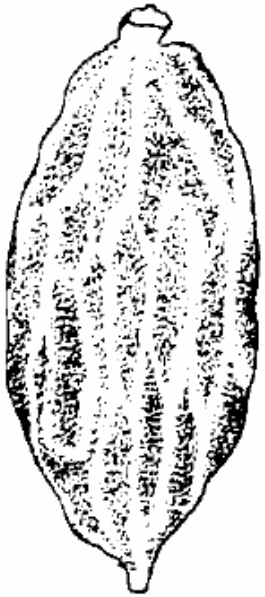
- Storage root shape
- Skin color
- Storage root flesh color
- Type root formation



Storage root surface defects

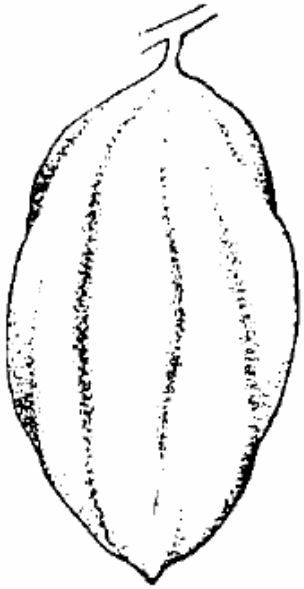


1 Alligator-like skin



2 Veins

3 Horizontal constrictions



5 Longitudinal grooves

Other storage root attributes

- Storage root dry matter content
- Storage root nitrogen content
- Storage root starch content
- Storage root total alcohol soluble sugar content
- Storage root carotene content
- Consistency of boiled storage root
- Texture of boiled storage root flesh

Abiotic Stress

- Reaction to drought
- Reaction to flooding
- Reaction to heat
- Reaction to salinity

Biotic Stresses

- Sweet potato weevil (*Cylas* spp.)
- Root-knot nematode (*Meloidogyne* spp.)
- Fusarium wilt or stem rot (*Fusarium oxysporum* f. sp. *batatas*)
- Black rot (*Ceratocystis fimbriata*)
- Java black rot (*Diplodia gossypina*)
- Scab or spot anthracnose (*Elsinoe batatas*)
- Charcoal rot (*Macrophomina phaseoli*)
- Bacterial stem and root rot (*Erwinia chrysanthemi*)
- Sweet potato virus disease (SPVD complex)
- Sweet potato chlorotic stunt virus (SPCSV)

Overcoming Bottle-Necks

SASHA
Sweetpotato Action for Security and Health in Africa

Information management

- Standardized data formats
- Tools for accurate, field-based phenotyping
- Data repositories (distributed centralized) - CIPTCL
- Data-analysis & visualization tools
- Support & assistance

Conclusion

- Genetic diversity is basic ingredient of all breeding & conservation of plant genetic resources
- Bridging two worldviews
  - Genomes & genes = Germplasm & traits

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ASANTENI SANA