Progress in developing a sweetpotato ontology for breeders

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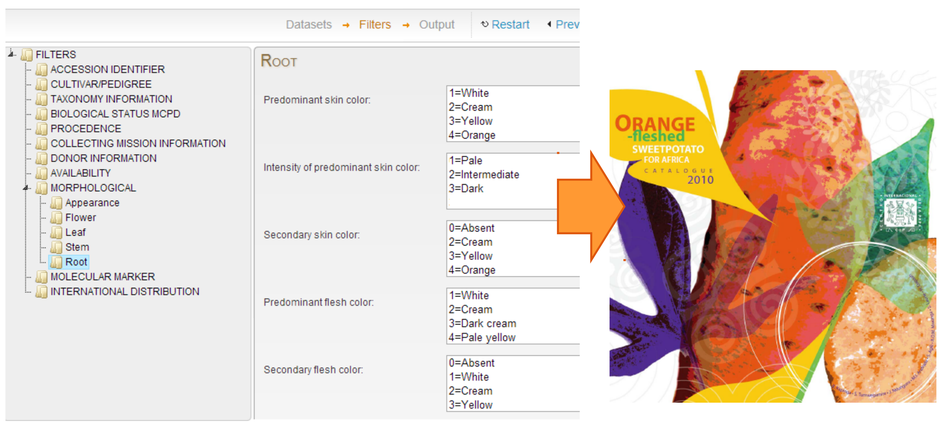
Introduction

Crop ontologies have been identified under the Generation Challenge Program and at the International Potato Center (CIP) as a crucial tool for managing and analyzing crop related information. Here we report progress on applying ontological concepts on sweetpotato traits important for breeders and varietal development. We defined a general strategy of identifying important traits based on their re-use in catalogs and experience in usage. A list of about 40 descriptors was identified, including 17 morphological and 22 evaluation traits. Those traits were cross-checked against other crop-ontologies (cassava, barley, maize, solanaceae) on the community site 'crop ontology' for consistency. Where appropriate, we annotated linkages. The current draft list of traits is still work-in-progress and subject to further review and refinement. This will include completion of traits, further consistency checks and translation before depositing on the crop-ontology site. The 39 descriptors include morphological (17), agronomical (3), resistance (4), biochemical (11) and post-harvest (4) traits.

Materials and method

The descriptors used in morphology (Huamán 2001) and the evaluations were previously standardized (CIP 2009). Morphological descriptors are generally useful for variety identification. Besides, we used descriptors published in the Catalogue of International Potato Center (Kapinga et al. 2010). We conducted comparisons of different ontologies of crops as solanaceae, cassava, barley and maize.



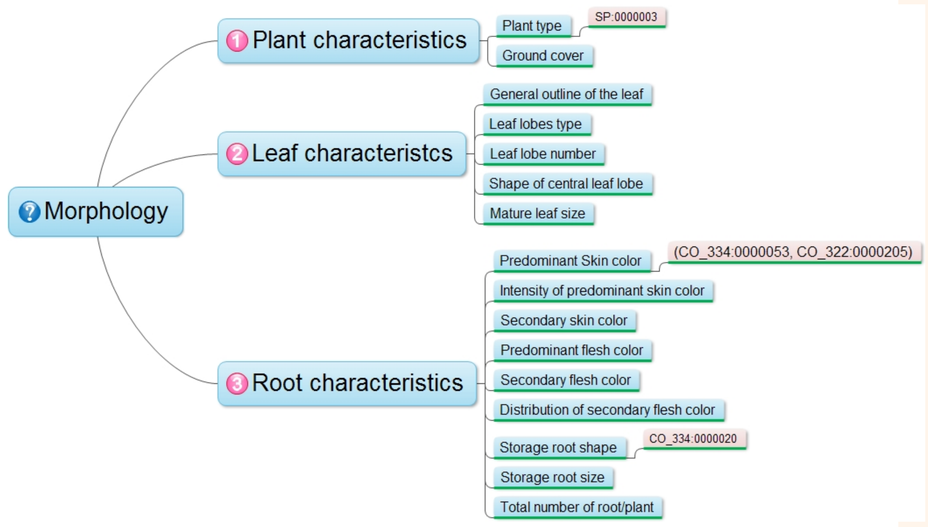


Figure 1: Main morphology descriptors of sweetpotato

Results and Conclusions

Seventeen morphology descriptors were grouped into three subgroups: plant characteristics (2), leaf characteristics (5) , and root characteristics (9). See Figure 1 for examples of cross-reference: predominant skin color (CO_334:0000053 (cassava) CO_322:0000205 (maize), storage root shape (CO_334:0000020 cassava). For agronomic performance (3 descriptors) see Figure 2 and for resistance traits (4) see Figure

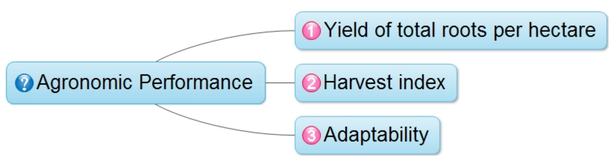


Figure 2: Descriptors agronomic performance

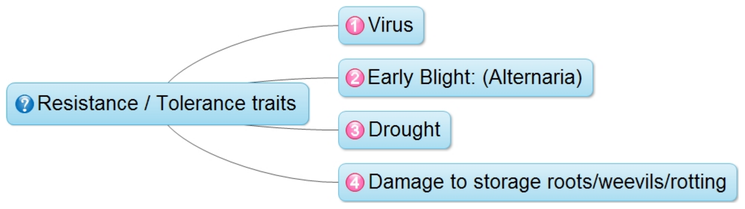


Figure 3: Resistance / Tolerance traits

Post-harvest performance with 4 descriptors (Figure 4) Storage root dry matter content (CO_334:0000092 cassava)
Biochemical (11 descriptors) Figure 5, Protein content (CO_334:0000070) Fe (CO_334:0000068 cassava , CO_322:0000110 maize) , Zn (CO_334:0000078 Cassava, CO_322:0000111 maize), Beta carotene content (POLAPGEN_BARLEY:0000129, CO_334:0000095), Total carotenoids (CO_334:0000073 Cassava), Starch (CO_334:0000071 Cassava), Maltose (POLAPGEN_BARLEY:0000126), Fiber content (CO_334:0000067 Cassava).

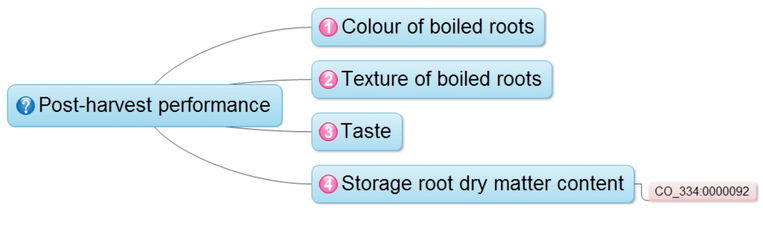


Figure 4: Post harvest performance

Scientists have a special interest in the ontology to further develop it and to continuously interact with growers and growers with them.

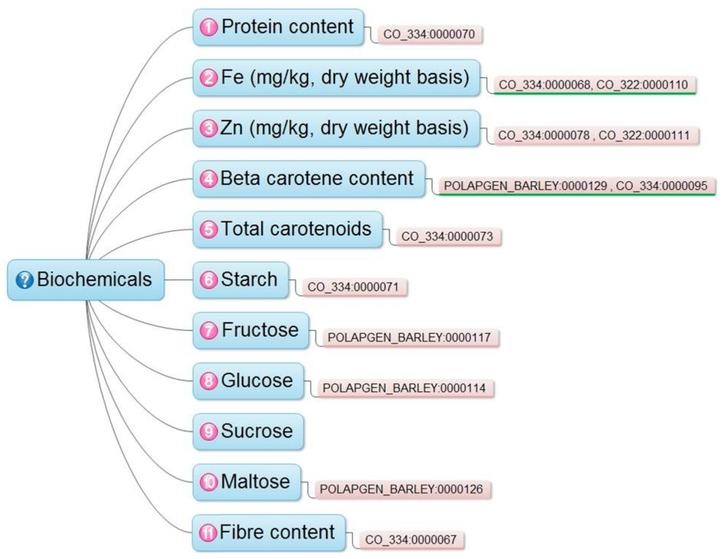


Figure 5: Biochemical descriptors

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CIP 2009 Procedures for the evaluations and analysis of sweetpotato trials
Ontology Cassava on http://www.cropontology.org
Ontology Solanacea on http://www.cropontology.org
Ontology Maize on http://www.cropontology.org
Ontology Barley on http://www.cropontology.org

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