

# Diploid potato breeding through participatory selection for food security of indigenous communities in Colombia



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## Introduction

The indigenous communities in Nariño are in poverty and their food security is a national concern, 67.7% of the homes in Nariño are in food insecurity. Potato production represents the main economic activity in the Nariño region, especially with smallholder farmers.

*S. tuberosum* Phureja group, is a valuable genetic resource of potato. The area of planted diploid potato in Colombia represents 8 % (10 to 12 thousand ha/year), of total potato area, with high consumer acceptance (Fig. 1).

Genetic improvement of diploid potato for higher yield, nutrition and resistance to late blight disease is considered to be one important option to improve the economic stability and daily diet of indigenous community. In a process of participative selection research with male and, especially female, clones were selected in a first trial; in a second trial eight advanced clones based in their yield, yellow skin and flesh color, round shape, shallow eyes, palatability, resistance to late blight, good performance in abiotic stresses, and high nutritional value and acceptance for potato producers were selected.



Figure 1. Potato (Phureja group) in Colombia, advanced clones of the breeding program. "Papa Criolla": a golden treasure from the Andes to the world.



Figure 4. Smallholders select and decide about new cultivars according to their needs.

- ✓ Breeding potato program involving the communities in cropping and selecting new yellow diploid cultivars has proven to be a powerful change motivator (Fig. 4).
- ✓ Three superior genotypes were selected taking into account quality for fresh consumption and for industrial processing. The estimated average specific gravity ranged between 1.081 and 1.100 and yield between 32 and 40 t.ha<sup>-1</sup>.
- ✓ Develop an Field Agricultural Schools (ECA) for the indigenous and smallholders in Nariño to introduce good agricultural and postharvest practices, including sustainable agricultural practices (Fig. 5).
- ✓ Women are axes for family food security; however their roles in preservation of potato diversity, in the cropping system and in food security are under rated (Fig. 5).



Figure 5: Participatory research in diploid potato breeding program smallholders

## Objective

Select potato cultivars with high yield, late blight resistance, improved processing quality, better nutrient content and community acceptance, for immediate release through indigenous community participatory research, recovering genetic biodiversity, preserving germplasm and measuring the variability on nutritional quality of potato tubers.



Figure 2. To collect and characterize native potatoes of indigenous communities.

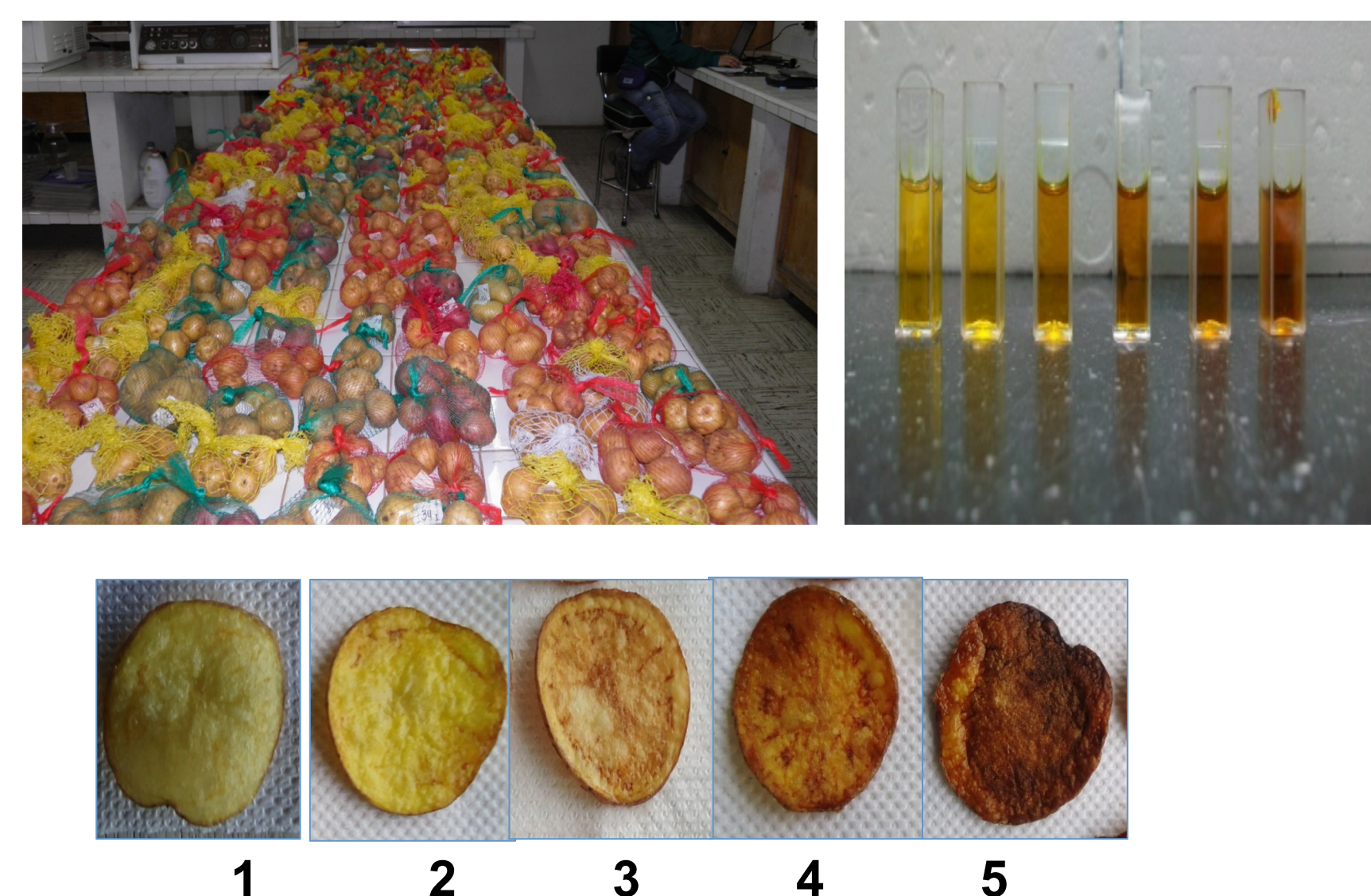


Figure 3. Culinary quality, frying quality, specific gravity, dry matter and yield, colorimetric evaluation and quantification of reducing sugars.

## The approach

- ✓ Collected 147 native genotypes (Fig. 2).
- ✓ Native cultivars are highly diverse in terms of tuber form, flesh and skin color, higher precocity, and resistance to plagues and diseases and to different agronomic limiting factors, thus constituting an important genetic background for production improvement (Fig. 3).
- ✓ To learn about ancestral aspects on the cultivation and uses of the potatoes a record in each genotype is being carried out.

## Conclusions

Genetic improvement of diploid potato for higher yield, nutrition and resistance to late blight disease is considered to be one important option to improve the economic stability and daily diet of indigenous community.

Native potatoes from indigenous communities should be preserved and protected because they are an important part of their biodiversity and culture.