

Breeding pipeline: PROINPA landscapes 2000-2017



Farmers access to high quality, diverse seed varieties

(2014) 7,980 m2 of **living barrier** of th'ola plants were established in farmers' quinoa fields. An additional 12,107 m2 were reinforced using **9 different species** of native grasses and bushes in order to combat erosion and soil fertility loss in quinoa monocrops, among 5 farmers in 5 communities. The cost of these barriers was \$100 a hectare.



A farmer demonstration field in Uyuni, with a parcel that was planted with wild lupin Orinoco (l), a living barrier with th'ola plants (center), and a plot that was left fallow after the last quinoa harvest 4 years ago
Photo credit: Claire Nicklin

Systems Oriented Breeding

Dr. Alejandro Bonifacio, an Ayamara leader who benefits from his ancestral knowledge, growing cuttings of native succulents he found on a collecting trip. The CCRP helped to support his PhD training.

Photo credit: Claire Nicklin

Los Andes Community of Practice



Project Partners

PROINPA

Non-Governmental Organization



Integrate farmer knowledge

Take a long term perspective, Enhance quality through capacity building

Characterizing agrobiodiversity, availability of high quality seed

Between 2013-2015, **2313 kilos of wild bush** (4 species) and **64,000 kilos of native grass** (9 species) seed has been collected. They have grown **38,758 seedlings** of these species to plant living barriers.



Availability of high quality seed

Native **perennial grasses** that were **transplanted with soil** in prepared land had a 85-95% of survival, but those that were transplanted with bare roots and in holes only had 15-23% survival.

For **Th'ola bushes** (*Lepidophillum quadrangulare*) there is a marked difference in survival for those that come from **greenhouse** (87%) compared that those that come from natural banks (29%).

Apply agroecology concepts, knowledge & principles (AEI); Look for intersections among multiple pathways

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Value heterogeneity: build on and enhance diversity

Availability of high quality seed

Scratching the seeds before germinating led to 90% **germination** in the lab and 75% emergence in the field. A **machine** was developed that can scarify 20 kilos of seed in 10 mins. **Manual methods** with coarse sand takes twice as long.



More appropriate variety testing and release systems that test varieties under targeted conditions

Testing **wild lupin** plants in 15 hectares among 6 families, some in association with quinoa plants, showed:

- No decrease in quinoa production but **highly variable mortality** from 10-80%.
- The **natural dissemination** of the seed was confirmed in at least 3 plots, the mechanism is either through seeds dispersed in previous season being broken out of dormancy by wind and weathering, or seeds that just fell in the current season encountered humid soil and germinated.
- 2 **pest resistant varieties** have been identified (Orinoca y Habascnacha).
- 85 kilos of these varieties have been **multiplied** in two years, which is slow going with this biennial flowering plant.
- Roughly 67,000 plants should be planted in one hectare. Plants produce approximately 6874 kg/ ha of **green material** every 16 months that can be incorporated into the soil.

Participatory research

The context: Breeding for landscapes and multi-functional varieties

Since the 1990s **quinoa production in Bolivia has tripled** resulting in a loss of the native vegetation from the landscape in these areas that was important for **soil health** (organic matter, nitrogen fixation, and erosion control), and **habitat** and **forage** for animals such as larger ones that provide manure, as well as beneficial insects. PROINPA has been working on methods to reinsert some of this native vegetation into the ecosystem in a more efficient manner. Native plants are important because they are the only species that are adapted to this extreme climate of high altitudes, freezing temperatures (6C) and drought. However, that also means their seeds can have high levels of dormancy and are also difficult to collect since they are wild species.



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