Seed availability, access and quality of potato seed systems in Cotopaxi-Ecuador

Background
Understanding potato seed systems in developing countries will potentially improve the livelihoods of smallholder farmers. In Ecuador, the province of Cotopaxi is one of the most important potato production and diversity areas. However, this province is characterized by a low productivity (12.8 t ha⁻¹) (SINAGAP, 2016) and by a change on the preferred varieties that modify the in situ potato diversity (Travalí 2016). One of the main factors causing these issues is the seed. Unfortunately, the poor understanding of the potato seed systems has limited the improvement of productivity and the maintenance of potato diversity. Here, we report a research aiming at understanding seed availability, access and quality of the potato seed systems in the province of Cotopaxi.

Results
Seed availability
In Cotopaxi, there is a low availability of registered and certified seed. The national statistics estimate that the government supplies near 6% of the seed. Yet, the variety Super Chola is the only one disseminated. Private companies and traders supply seed of other few varieties like Suprema or Unica (not in the formal system). Our results estimate the presence of 24 varieties cultivated, disseminated and maintained by farmers. Seed availability is mainly affected by climatic problems such as freezing, drought or hail, and by biotic problems such as tuber moth and Andean weevil. There is no information available about nematodes and viruses.

Discussion
In Ecuador, there is a regulation indicating thresholds for seed-borne pests and diseases for registered and certified seed. The perception of seed quality differs among stakeholders. However, the main quality cues mentioned are:
• Absence of pests, diseases and mechanical issues
• Adequate physiological status
• Colour
• Size
• Number of eyes

Unfortunately, there is no information of seed-borne pests and diseases affecting seed quality.

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References

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Figure 1. Methodologies implemented to characterize the potato seed system in the province of Cotopaxi. Green squares represent the location of surveys implemented

Methodology
Different tools were used: (1) The multi-stakeholder framework, (2) potato seed exchange surveys, and (3) a formal survey (Figure 1).

The multi-stakeholder framework
The multi-stakeholder framework is a matrix-like tool aiming to understand seed availability, access, and quality (RTB 2016). We collected the information through interviews, focus groups discussions (Figure 1), analysis of secondary data and a literature review.

Potato seed exchange surveys
Farmers (participants = 95) and extension agents were interviewed about their seed / information exchange networks using the methodology suggested by Tadesse et al. (2017). The multi-stakeholder framework framework is a matrix-like tool aiming to understand seed availability, access, and quality (RTB 2016). We collected the information through interviews, focus groups discussions (Figure 1), analysis of secondary data and a literature review.

Formal survey
A rural household characterization (n=260) was designed adapting the survey suggested by Hammond et al. (2017). The survey was implemented using a stratified sampling design considering the cantons as strata (Figure 1).

Focus Group Discussions

Figure 2. Governmental seed exchange network described by extension agents. A Seed exchange network. B Information exchange network.

Seed access
Seed potato is disseminated by different isolated stakeholders. The Ministry of Agriculture (MAG) and INIAP are the main sources for registered and certified seed as shown in Figure 2A. Seed of initial categories is produced by INIAP in a large greenhouse near Quito. Then, extension agents of MAG and INIAP (Figure 2A) deliver the seed to formal organizations. INIAP is the main stakeholder exchanging information about seed and varieties (Figure 2B).

Farmers mainly reuse their seeds. However, common seed sources are neighbours, relatives, and the market (Figure 3A). Yet, the importance of each source differs among the different cantons (Figure 3A). Farmers consider the altitude where the seed was produced the previous cycle due to the fact that yields are higher (Figure 3B).

Figure 3. Farmers’ seed sources and preferences. A Main farmers’ seed sources among different cantons. B Farmers preferences to acquire the seed depending on the altitude.