



# Improved potato varieties in Peru: Determinants of adoption and impacts



## Adoption estimates

**Table 1:** Adoption estimates of the most popular improved potato varieties in terms of total land area and share of potato land area in Peru in 2013.

| Potato varieties              | Released date | Breeding institute | Total land area (ha) | Share of potato land area (%) |
|-------------------------------|---------------|--------------------|----------------------|-------------------------------|
| <b>ALL IMPROVED VARIETIES</b> |               |                    | <b>170,225</b>       | <b>61.9%</b>                  |
| Yungay                        | 1971          | UNALM              | 61,600               | 22.4%                         |
| INIA 303 Canchan              | 1990          | CIP - INIAA        | 33,000               | 12.0%                         |
| INIA 302 Amarilis             | 1993          | CIP - INIA         | 29,700               | 10.8%                         |
| UNICA                         | 1998          | CIP - UNICA        | 12,100               | 4.4%                          |
| CICA                          | 1982          | UNSAAC             | 9,075                | 3.3%                          |
| Andina                        | 1976          | CIP - DGI - MINAG  | 4,400                | 1.6%                          |
| Chaska                        | 1982          | CIP - INIA         | 4,400                | 1.6%                          |
| Perricholi                    | 1984          | CIP - INIPA        | 4,125                | 1.5%                          |
| INIA 309 Serranita            | 2006          | CIP - INIA         | 3,575                | 1.3%                          |
| Other improved varieties      |               |                    | 8,250                | 3.0%                          |
| <b>NATIVE VARIETIES</b>       |               |                    | <b>104,775</b>       | <b>38.1%</b>                  |

## Determinants of adoption and disadoption

- Adoption is region specific, and occurs through social networks.
- Information acquired by selling potatoes in the market promotes adoption of improved potato varieties.
- Living near an experiment station increases the probability of adoption and reduces the likelihood of disadoption.
- Farmers living in very high vulnerable areas to natural disasters and food insecurity are less likely to adopt certain improved varieties but more likely to continue to use improved varieties once adopted.

**Table 2:** Marginal effects of selected variables on the probability of adopting and disadopting improved varieties in Peru

| Selected variables                                    | Adoption  | Disadoption |
|---|-----------|-------------|
| Sell potatoes (1= yes)                                | 0.1040*** | -0.0175     |
| Distance to experiment station (km)                   | -0.0003*  | 0.0007***   |
| Informal source of seed (1 =yes)                      | 0.0518*   | 0.0004      |
| Vulnerability to natural disaster (base = low/medium) |           |             |
| High  | -0.00001  | -0.0912     |
| Very high   | -0.0067   | -0.1378**   |

Notes: \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level respectively.

## Economic impact of varietal adoption

**Table 3:** Adoption of improved varieties increases yields by 1.0 ton/ha on average. It also increases farmers' volume and revenue from potato sales, compared to their nearest matching neighbor (Treatment group=290, Control group=193).

| Outcomes Variables                                 | ATT   | Standard Errors | T-value |
|--|-------|-----------------|---------|
| Yield Gain (tons/ha)                               | 1.02  | 0.66            | 1.55    |
| Additional potato sales (tons/farmer)              | 2.71  | 1.35            | 2.00    |
| Additional revenues from potato sales (USD/Farmer) | 492.5 | 302.1           | 1.63    |

## Conclusions

- Farmers growing improved varieties have benefited from higher yield and marketed a larger share of their output, earning higher incomes than comparable neighbors.
- Future improved variety dissemination efforts should target specific geographic areas and agro-ecologies
- Results indicate that the market is a good place to promote the adoption of new varieties.

**Willy Pradel<sup>1</sup> • Guy Hareau<sup>1</sup> • Luis Quintanilla<sup>2</sup> • Victor Suarez<sup>1</sup> • Catherine O'Donnell<sup>3</sup> • Catherine Larochelle<sup>3</sup> • Jeff Alwang<sup>3</sup>**

<sup>1</sup> International Potato Center (CIP). Social and Nutrition Science Division • Av. La Molina 1895. La Molina. Lima 12. Perú

<sup>2</sup> Instituto Nacional de Innovación Agraria (INIA) • P.O. Box 2791, Lima 12, Peru

<sup>3</sup> Virginia Polytechnic Institute and State University (VT) • Blacksburg, VA 24061, USA

## Background

- For more than 40 years CIP has worked with the potato breeding program of the National Institute of Agriculture Innovation (INIA) of Peru to develop new genetic material.
- Through this collaboration, 34 improved potato varieties were released.
- Besides meeting market needs, these varieties have higher yields and lower production costs, increasing farmers' income and reducing the environmental footprint through lower pesticide use [1,2,3].
- Lack of nationally representative data has constrained the ability of drawing rigorous conclusions about farmers' drivers of adoption and impact of adoption.
- Information on why farmers adopt as well as disadopt these improved varieties is needed to increase the impact of the next generation of improved potato varieties.

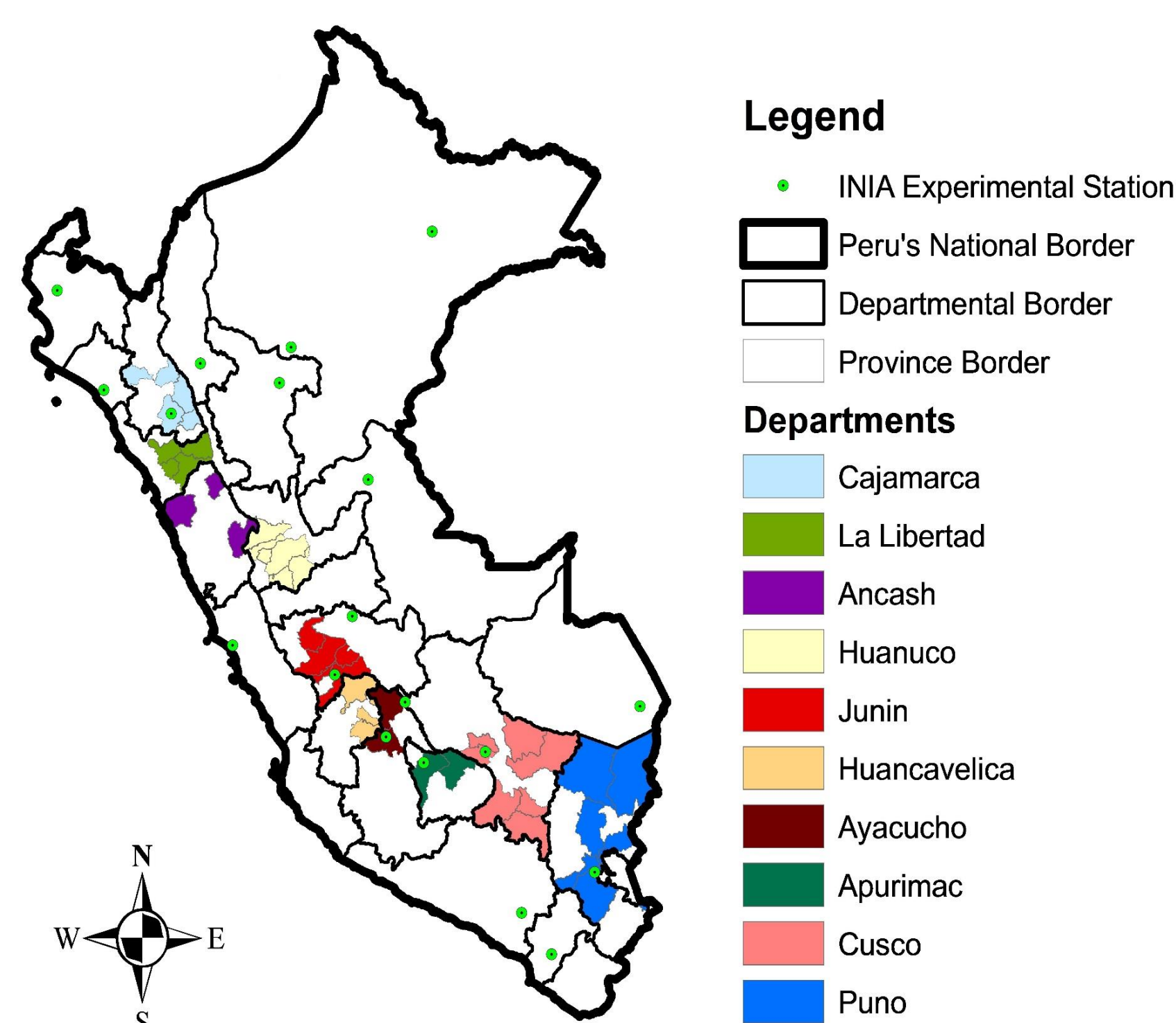
## Objectives

The objectives of this study are to:

- Quantify adoption and diffusion of improved potato varieties in the most representative production regions of Peru;
- Identify adoption and disadoption determinants of improved potato varieties; and
- Estimate the impacts of adoption among small-scale potato farmers.

## Methods

- Nationally representative households survey of 86% (275, 000 ha) of the total potato area in Peru.
- 1098 potato producing households were interviewed between November 2012 and July 2013.
- Factors affecting adoption and disadoption of improved varieties were identified using Heckman Probit models [4].
- Impacts of improved varieties adoption on yield, sales, and incomes were estimated using Propensity Score Matching to control for endogeneity of the adoption decision. Estimates of the impact are the average treatment effect on the treated (ATT)[5].



**Figure 1.** Map of the sampled areas (at province level) in the Peruvian highlands, 2013

## References

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