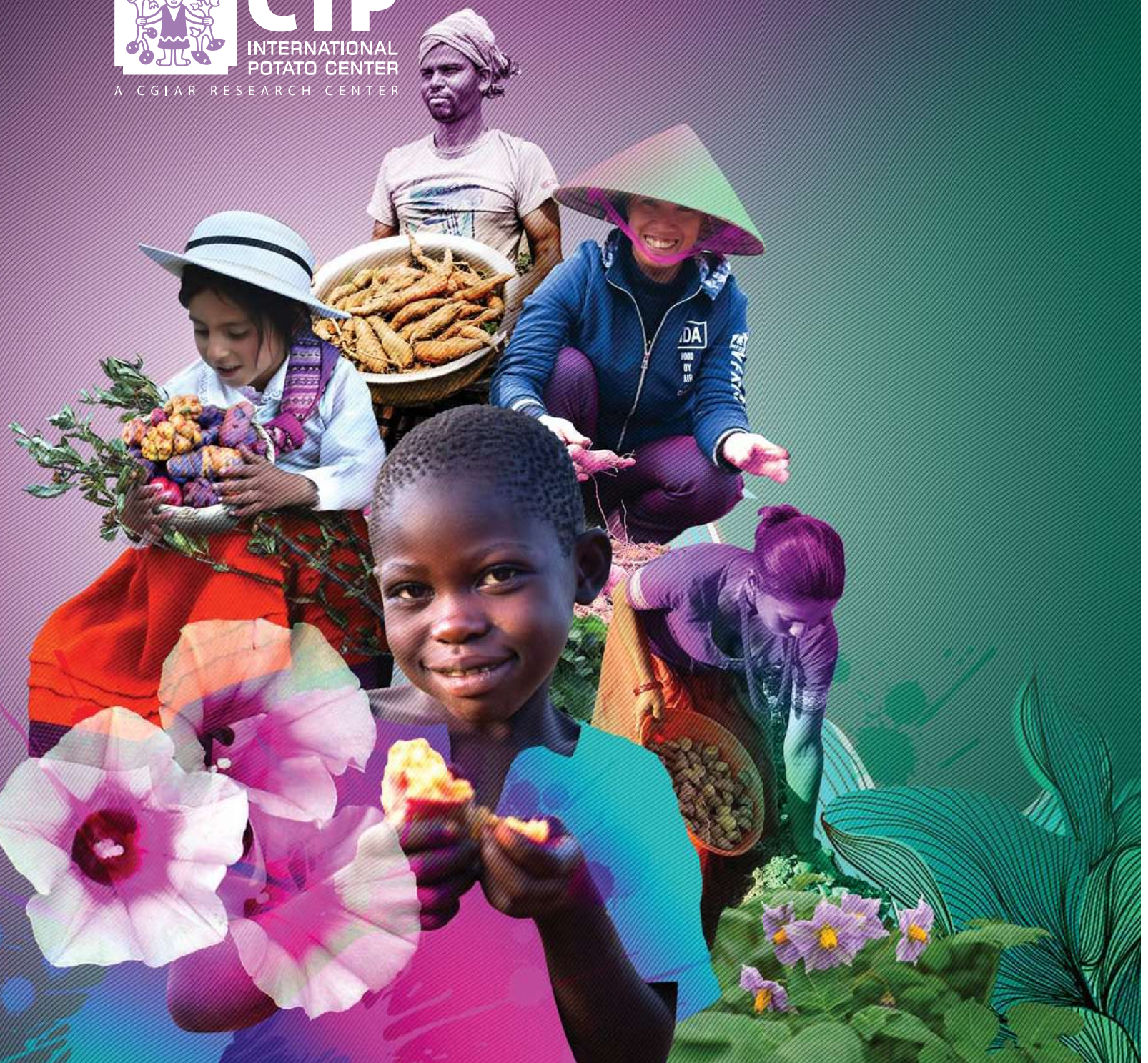
CIP
INTERNATIONAL POTATO CENTER
A CGIAR RESEARCH CENTER

Annual Report 2017

HARNESSING POTATO AND SWEETPOTATO'S POWER
FOR FOOD SECURITY, NUTRITION AND CLIMATE RESILIENCE



Participatory Varietal Selection Brings Biofortified Potatoes Closer to National Release

Funders: European Union, CGIAR Trust Fund contributors through the CGIAR Research Programs on Roots, Tubers and Bananas (RTB), Agriculture for Nutrition and Health (A4NH) and Harvest Plus

Countries: Peru, Ethiopia, Rwanda, Bhutan, Nepal

In May of 2017, indigenous farmers in five rural communities of Yauli district, in Peru's Huancavelica Region, harvested fields planted with 17 potato clones with increased levels of iron and zinc, developed by CIP as part of its mission to reduce malnutrition. While their families ended up eating most of those colorful potatoes, farmers saved tubers from what they had collectively determined to be the best seven clones for planting when the rains resumed in November, as part of a participatory varietal selection process to choose the best candidates for release as new varieties in Peru, based on farmer and consumer opinions.

Those potatoes are the result of almost 15 years of work by CIP and local partners. The process began with lab analyses of approximately 200 native Andean landraces, which resulted in the identification of 16 with relatively high levels of iron, zinc and vitamin C. CIP breeders then spent a decade crossing those nutritious potatoes and selecting offspring with even higher levels of iron and zinc – a process known as biofortification. The resulting clones have between 40 and 80 percent more iron and zinc than commonly grown varieties, which means they have the potential to make a significant contribution to reducing micronutrient malnutrition.

An estimated 1.6 billion people globally suffer iron and zinc deficiencies, primarily young children and women of childbearing age, and severe cases can result in childhood stunting, hindered mental development, susceptibility to infections and maternal mortality. According to a Peruvian government study, one-third of children five years or younger in the Huancavelica region suffer chronic micronutrient malnutrition, and 40

Participatory varietal selection allows rural men and women to select candidate potato varieties for national release.

The biofortified potatoes being grown in Huancavelica, Peru are the result of crosses between native varieties with elevated levels of iron and zinc.

percent are anemic. Malnutrition is also common among women of reproductive age in the region.

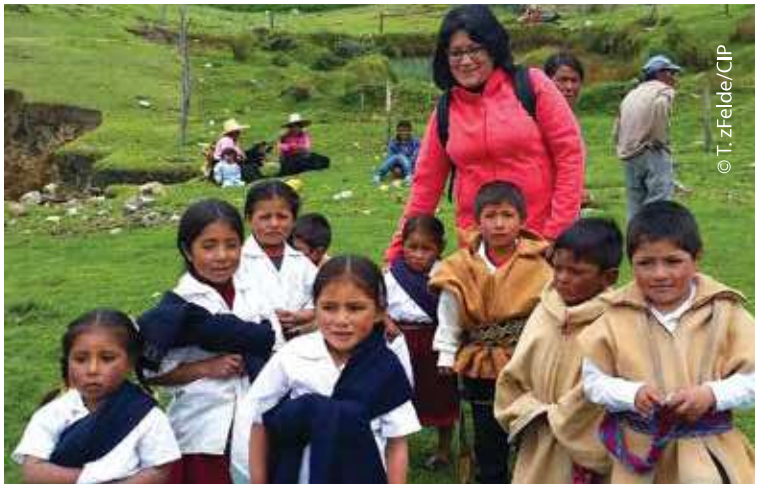
With support from the European Union and CGIAR Trust Fund contributors, through A4NH and RTB, CIP has been able to get biofortified potatoes to farmers in highland areas of Peru and other countries where micronutrient malnutrition is common. According to CIP biologist and nutritionist Gabriela Burgos, "These potatoes have great potential for reducing anemia because they also contain high levels of vitamin C, which facilitates the absorption of iron, and low levels of phytates, which inhibit the absorption of iron."

CIP partnered with the Peruvian nonprofit Grupo Yanapai to coordinate the participatory varietal selection of the biofortified potatoes by farmers in Huancavelica, and to provide nutrition education to get local families to diversify their diets – a strategy that CIP and partners use frequently. Grupo Yanapai's Executive Director, Maria Scurrah, explained that local women have started growing vegetable gardens and now feed their children more animal protein. She noted that those families eat a lot of potatoes, and they like the biofortified clones because they look and taste like the native varieties they've traditionally grown.

> Alicia Azorsa, who grows the seven selected varieties on her small farm in the village of Castillapata, in Huancavelica, said that she and her daughter, Luz, eat them every day. "We like these potatoes very much because they protect our children and us against diseases. They are also delicious," she smiled.

According to CIP scientist Thomas zum Felde, CIP and local partners have also organized the participatory varietal selection of biofortified potato clones with farmers in Ethiopia and Rwanda, and CIP is working with partners in Bhutan and Nepal to do the same. He noted that even though those small, colorful clones are quite different from the potatoes grown in Africa and Asia, the African farmers who have tasted them liked them. In parallel, CIP is building the capacity of regional partners in Africa and Asia to perform lab analyses of iron and zinc levels, in preparation for the incorporation of biofortified potatoes in breeding programs and scaling efforts in those regions.

While the biofortified potatoes currently being grown by farmers are quite nutritious, they have lower yields and are less resilient than other improved varieties. CIP Breeders have thus spent the past six years crossing them with parents in CIP's advanced breeding populations, resulting in a new population of biofortified clones with much higher yields, as well as resistance to late blight and virus diseases. Multilocational field trails and participatory varietal selection of that second set of biofortified clones began in Peru in late 2017, in partnership with the National Institute for Agricultural Innovation, and should take two or three years to result in a nationally released variety. *In-vitro* plants of those clones have also been shipped to Ethiopia, Rwanda, Bhutan and Nepal for local testing.



CIP biologist and nutritionist Gabriela Burgos with children in one of the Peruvian communities that are growing, eating, and evaluating biofortified potatoes.

> "We are pioneers in the biofortification of potato," observed CIP potato breeder Walter Amorós. "We've accomplished a lot, but we need to continue increasing the micronutrient levels and other desirable characteristics of these potatoes."