Ecuador's Andean highlands is a fragile ecosystem prone to drought, and heavy frosts and soil erosion, which compromises food crop production. A high proportion of residents suffer chronic food and income insecurity. Malnutrition is widespread: 52% of children under five suffer protein-energy malnutrition, 28% suffer riboflavin deficiency and 25% suffer iron deficiency.

The search to improve agricultural productivity has led the Ecuadorian National Institute for Agricultural and Livestock Research (INIAP) to focus its research on a precious local resource - the ancient crops of the Andes. These indigenous foods, which include quinoa, amaranth, lupins and various roots and tubers, are a significant source of protein, calories, vitamins and minerals. The crops are well adapted to mountainous climates, may be cultivated with few inputs and are drought- and frost-tolerant, thereby protecting against food insecurity when traditional market crops such as barley and potatoes produce insufficient yields.

One of the most promising Andean crops is quinoa (Chenopodium quinoa Willd), formerly a staple of the Incan diet but displaced by barley and wheat following the Spanish conquest. Abundant in nutrients including lysine-rich protein, vitamin E, folic acid and iron, quinoa is enjoying increased demand in Ecuador and beyond.

With IDRC support during the 1980s, INIAP research on quinoa and other Andean crops emphasized improved varieties, better machinery to produce and process quinoa, and the marketing and consumption of quinoa. A decade later, the research has turned to the communities themselves to truly understand the quinoa food system in all its agricultural, social and economic aspects.

The most recent project sought to integrate research on production, processing and marketing of quinoa through a community-based small enterprise. This business was launched in Guamote, Chimborazo, jointly by INIAP and the Union of Indigenous Communities of Guamote (UCIG). Guamote was considered an ideal test site: the soil erosion, deforestation, climatic uncertainty and extreme poverty make agricultural and income-generating alternatives an urgent necessity.

The research partnership between IDRC, INIAP and UCIG has led to the release of four improved varieties of quinoa, advances in production technology emphasizing organic fertilizers and manual weeding, development of equipment for threshing and dehulling quinoa, and market studies.

But the most significant result is the creation of "Agroindustrial ICU," a successful small enterprise now two years old, cooperatively owned and managed by 28 indigenous communities who share profits. Production of quinoa and other grains is financed through a revolving credit fund. The enterprise purchases the grains and classifies, cleans, dehulls, mills, packages and markets value-added products. The plant is run by community members who receive hands-on training in agricultural production, the
operation of processing equipment and business administration. Guamote's indigenous people now "feel they are controlling their own destiny," explains Eliseo Guznay, President of ICU's steering committee.

"The main benefits are training," reports Maria Custodia Lama, accountant at the pilot plant. "The project is helping communities to improve themselves." Other benefits for the 2,000 families in ICU's member communities include labour savings for both men and women, and stronger local women's organizations. For Carlos Vimos, project manager, "the most significant impact is the increased production of quinoa in the region." Quinoa-producing families report keeping about one-third of the produce for their own consumption, which represents potential increased intake of protein, vitamins and minerals.

INIAP's experience both in working with indigenous grassroots organizations and looking at food systems systematically to target weak links from production to consumption, breaks important ground in research for development. The knowledge gained could be used not only to produce quinoa in other high-risk regions, but also to develop new small enterprises and strengthen indigenous organizations elsewhere.

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