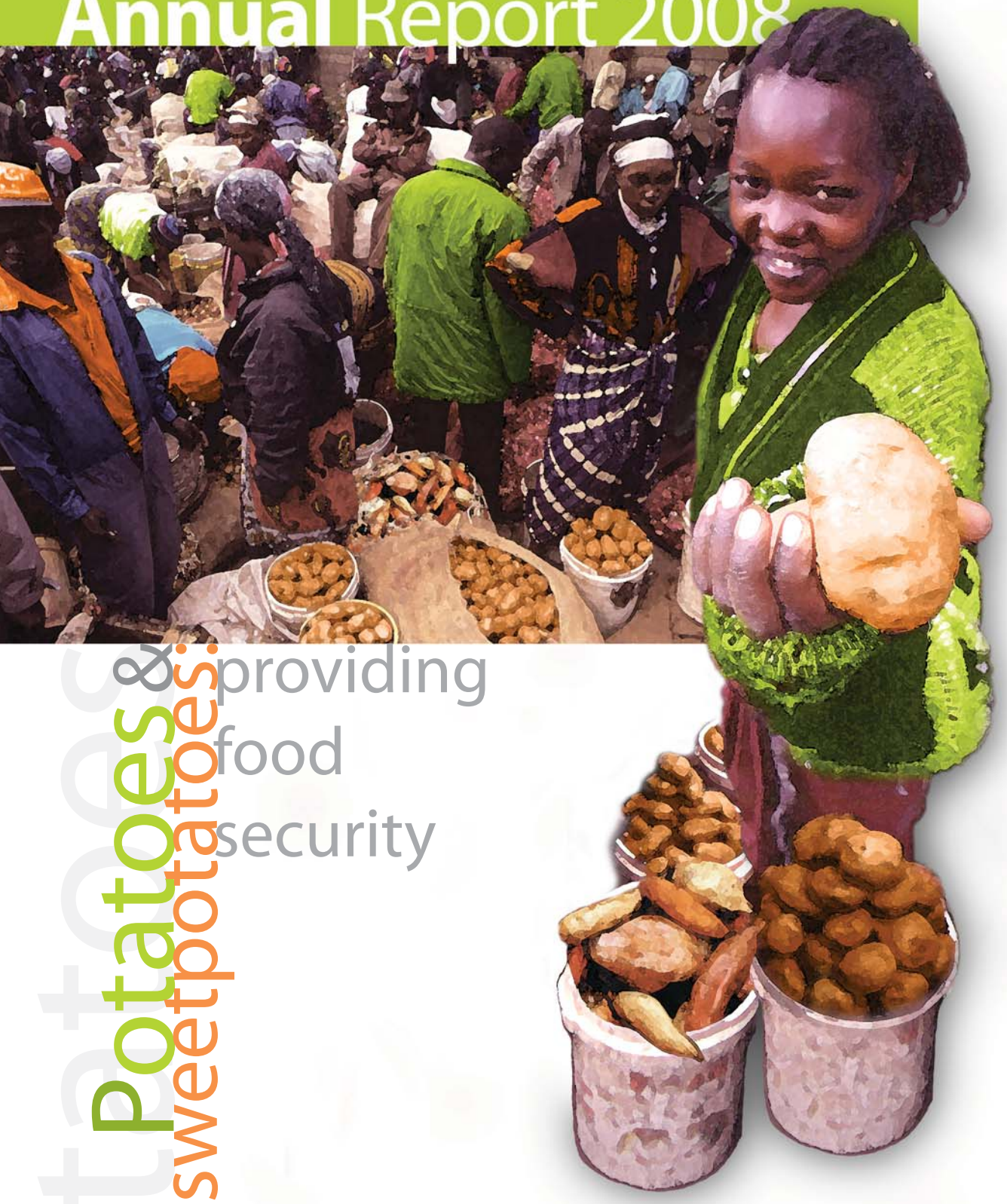
Annual Report 2008



Potatoes & sweetpotatoes: providing food security

CENTRO INTERNACIONAL DE LA PAPA
CIP

International Potato Center

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by the Board Chair

2008 was a special year for the potato and for the International Potato Center (CIP). With the United Nations declaring 2008 as the International Year of the Potato (IYP), it was a year of recognition and praise for the precious tuber, for its nutritional and economic value; for its potential to secure food for a growing population and for helping the poor to get out of poverty in a sustained manner. For the occasion, the International Potato Center bundled its efforts to explain and demonstrate to an interested public, to producers and consumers the vital role of potatoes in providing food in the past, the present and in the future. A good example is the significant increase in yield and area under potato production in Asia and Africa. This is the result of the growing recognition of the value of the potato as a healthy and nourishing food and of the promotion of improved planting materials and techniques. CIP, together with its partners, has played a vital role in these encouraging developments. More recent is the ground-breaking work in orange-fleshed sweetpotatoes. At the Annual General Meeting of the Consultative Group for International Agricultural Research (CGIAR) CIP received an award for a publication detailing its research on the nutritional effects of orange-fleshed sweetpotatoes in Mozambique children.

CIP is well equipped to respond to the future challenges of climate change and food security. Its collective know-how and the germplasm collection it holds in trust allow CIP to further advance its program of research for development. CIP will intensify its efforts in research and cooperation to serve especially the needs of the people in the poverty belts and pockets of Asia, Africa and Latin America.

The Change Management Process of the CGIAR was a major focal point of the year for CIP and its Board of Trustees. The Director General and the Board have seriously engaged in the change process to make the outcome a success for the advancement of agricultural research for development. The Board met four times during the year; twice face to face; twice in telephone conferences. This allowed for a regular follow up, with special attention to finances and other risk issues. Thanks to the tireless efforts of the Director General and staff, the CIP budget has steadily grown by 10 percent per year over the past four years. This is all the more remarkable, considering the financial crisis and the persistent lack of funding for agricultural research to respond to the food crisis with a longer term perspective. Due to prudent financial management, CIP was able to maintain its financial assets and obtain positive, though diminishing returns. With an increasing budget and dwindling surpluses the Board is monitoring the development of the financial indicators attentively.

After two terms of service on the Board of Trustees of the Center Dr. Alexander Boronin, Dr. Madhura Swaminathan, and Dr. Jim Godfrey retired from their function as Board members in 2008. Jim Godfrey served the Board as its Chair for more than five years. He played a vital role in the advancement of the professionalization of the Board and in the training of CGIAR Board members. I am grateful for the leadership he provided to CIP and the strategic work done. It facilitated my work and that of the Board.

I do not want to finish without thanking our donors and partners who contributed to achieving these goals for the year 2008. Special thanks go to the whole CIP team who managed so well the additional work for the International Year of the Potato. I trust that CIP and its staff will similarly grasp the opportunities and tackle the challenges associated with the upcoming CGIAR Reform.

Ruth Egger
Board Chair

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Foreword

Director General

2008 was a unique year for the International Potato Center and our partners around the world. The United Nations declared 2008 as International Year of the Potato (IYP). The mission of the IYP was "to increase awareness of the importance of the potato as a food for developing nations, and to promote research and development of potato-based systems as a means of contributing to the achievement of the United Nations Millennium Development Goals (MDGs)". IYP was a success both in terms of public awareness and promoting research and development efforts. We are finishing a separate publication in order to share the activities and the outcomes of IYP.

As the International Year progressed we witnessed the emergence of a world crisis in the price of food grains. Because of this, the media rapidly shifted their focus to the role of potato in global food security. Indeed, of the top ten foods that the world depends upon for global food security, potato and sweetpotato rank third and sixth, respectively, with sweetpotato taking on an increasingly important role for food security in Sub-Saharan Africa. For that reason we have titled this 2008 Annual Report Potatoes and Sweetpotatoes: Providing Food Security.

Food security exists when all people at all times are free from hunger. It is generally agreed that the components of food

security include: food availability, access, utilization and vulnerability. Food availability is the supply of food. Access is the ability to obtain that food. Utilization is a persons' ability to select, take-in and absorb nutrients in the food. And vulnerability is the physical, environmental, economic, social and health risks that may affect availability, access and use.

We have organized this 2008 report to present examples of the research that CIP and our partners are carrying out in each of these component areas of food security. While the Centers supported by the CGIAR have historically focused on increasing food productivity, it should be clear that our research and development efforts also represent critical contributions in the areas of access, utilization and vulnerability. We have systematically expanded our research to encompass the broader agenda of food security.

We are moving into a post-food-surplus world. As the world's population continues to grow and become more affluent, food security will become increasingly critical, both on a country and an individual level, and especially for the most needy and disadvantaged on our planet. I am proud of contributions that the International Potato Center and our partners are making to this global challenge.

Pamela K. Anderson
Director General

Food availability

A million hectares
of potatoes in the
developing world

Towards certified seed of
native potatoes

The fastest spreading
potato variety in China

Producing the best
of all potatoes in the
Philippines

A million hectares of potatoes in the developing world

Food Security

"Potato varieties bred with CIP materials or obtained with help from the Center now occupy over 1 million hectares of land worldwide. This statistic comes from a survey of 23 national potato-breeding programs in developing countries in Asia, Sub-Saharan Africa and Latin America, which together account for more than 80% of developing country potato area and production.

This is an important milestone. not only for CIP, which has invested in potato breeding ever since its inception more than 35 years ago, but for the agriculture research community as a whole, because it helps validate investments in crop improvement programs. Over the past three decades, CIP breeders have been spearheading efforts to develop better-adapted, disease-resisting, higher-yielding potato varieties that can become a reliable source of food and income for poor potato farmers around the world. And according to recent findings, this long-term investment is paying off. Equally important, this impressive marker demonstrates farmers' continued interest in adopting new, improved potato varieties.

In addition to identifying the most popular varieties adopted by farmers, the survey (conducted in 2007 and validated in 2008) elicited information on potato and seed production, released varieties, and escapes, among other things.

The area planted to CIP-related varieties in the surveyed countries increased to 13.1 percent of the total. China accounted for about half of the increase, compared to figures from a previous 1997 survey. Cooperation 88, covering nearly 120 000 ha in 2007, is the largest adopted CIP-related variety worldwide. Peru also made significant contributions, with the area planted to the Canchan variety more than doubling in just 10 years from 26 000 ha to 58 000 ha. Today, this CIP-derived high-yielding, potato

Over 1 million ha of land are planted with CIP-derived varieties

PHOTO BY CIP ARCHIVES

variety released by Peru's national potato breeding program is a predominant commercial variety on the Peruvian market.

CIP materials have had significant impact in the poorer countries of Sub-Saharan Africa, contributing to improved food security in that continent. In seven of the eight countries sampled in 2007, CIP-NARS (national agricultural research systems) varieties occupied the largest proportion of the total area planted, with 92 000 ha in Rwanda, 30 200 ha in Uganda and 67 000 ha in Kenya. In Tanzania, Kikondo, a CIP-distributed and NARS-released variety occupies 18 000 ha, representing more than 50% of the country's total area planted. In Burundi and DR Congo CIP-related varieties occupy almost all of the planted potato area.

Potato is a vegetatively propagated crop that is susceptible to viruses and diseases, which are, in turn, transmitted by infected tubers used as seed the following year. CIP-bred materials have been particularly important for smaller national programs that do not have enough potato production to justify a full-scale breeding effort, and more importantly, the budget to conduct the costly and time-consuming pathogen testing and virus elimination required for successful breeding. The relatively large number of varieties adopted in Sub-Saharan Africa also suggests success in providing adapted materials to highly heterogeneous agro-ecological zones.

CIP-bred materials are set to become more important with potato production in developing countries growing much faster than anticipated. Potato area and yield in developing nations have expanded rapidly since the early 1960s, with production increasing more than threefold and the area more than doubling.

With an estimated achieved yield increase of 2.0 tonnes per hectare, widespread adoption of CIP materials has generated a net present value of more than US$120 million and rates of return to continued investment in breeding and crop-improvement programs of more than 20 percent. If new materials continue to be developed and are successful in responding to farmers' demands, the aggregate area under CIP-related varieties will continue to increase returns to investment in crop improvement programs. Strengthening breeding programs in developing countries that seek advanced materials and populations for local selection will increase the chance that the released varieties will share parentage with CIP material.

In today's economic context, the role of the potato as a staple crop becomes more and more relevant as food crop prices settle at higher levels than in the past. Thus, the development and availability of appropriate varieties and crop technologies is crucial to meet an increased potato demand at affordable prices for the poor.

Food Security Towards

certified seed of native potatoes

In an important milestone for Peru's native potato industry, in 2008 the government gave farmers the green light to officially register a select group of 61 native potato varieties as commercial varieties. This registration allows farmers to produce healthy seed of these native varieties under the country's national seed certification program.

This is big news for all the people involved in the native potato production chain, as certified seed will help not only to expand, but more importantly, formalize the rapidly growing native potato market by guaranteeing a steady supply of high quality tubers as raw material for the processing industry.

61 native potato varieties have been registered in Peru

PHOTO BY K. ZINSER

Over the past few years, there has been a growing interest in native potatoes, given their culinary versatility and nutritional content. Some varieties, namely those with bright colored flesh and uniquely pigmented skin, are being processed into gourmet chips while others are being incorporated into main dishes at upscale restaurants.

Despite this boom, native potato farmers have not been able to fully capitalize on this growing trend; they are having a difficult time keeping up with market demand as most of these farmers have technical constraints that hinder a competitive potato production. Indeed, access to

quality planting material is one of farmers' main constraints.

With this in mind, CIP's projects INCOPA and Papa Andina brought together a seed thematic group involving other local public and private-sector organizations that together have spearheaded efforts over the past few years to allow the certification of native potato seed. The primary organizations involved in this endeavor include Peru's Ministry of Agriculture (MINAG), the Servicio Nacional de Sanidad Agraria (SENASA), the Instituto Nacional de Innovacion Agraria (INIA) and non-governmental organizations such as: ADERS-Perú, FOVIDA and CAPAC Peru, representing farmer organizations from Junin, Huanuco, Pasco, Andahuaylas and Huancavelica.

Certification provides farmers with access to healthy seed, the best guarantee to obtaining high quality potato tubers. Currently, most native potato farmers in Peru utilize substandard, poor yielding "common" seed that carries pests and diseases from one season to another. Because the potato is a vegetatively propagated crop, the tuber seed transports these harmful pests and diseases, diminishing the yield and quality of the cultivar from generation to generation. The use of healthy seed is the only way to stop this vicious cycle.

In addition to helping develop Peru's native potato industry at all levels of the production chain, the underlying goal of this collective action is to help impoverished Andean native potato farmers improve their incomes and therefore livelihood by creating market opportunities for their crop.

Farmers enjoying freshly harvested potatoes in San Jose de Aymara, Peru

PHOTO BY K. ZINSER

The seed thematic group overcame a series of challenges, which involved, among other things, numerous research and advocacy efforts, in order to inscribe 61 new cultivars as commercial varieties in the country's official registry—and therefore allow the production of certified seed.

The group's initial undertaking involved developing novel standards for characterizing native potatoes. A variety must be thoroughly identified and characterized in order to be included in Peru's Registry of Commercial Cultivars. Prior to these new standards, native potatoes could not be adequately identified using the former characterization tests because these tests were limited to traits that show up only in improved or modern commercial varieties—and therefore did not detect the diversity of traits found in native cultivars. The skin color of improved varieties, for example, is usually solid red, white or cream, whereas the skin, and even flesh, of native potatoes exists in an assortment of colors and its tubers in an array of sizes and shapes.

The registration process of a specific cultivar also used tests and multi-location field trials aimed at ensuring that a variety, particularly a new, untested variety, performs well across different environments. Cleary, these extensive trials do not make sense for native varieties, which have been grown by farmers for hundreds of years and have therefore already been "tried and tested" as resistant and high yielding.

Indeed, these and other requirements made the registration of new varieties not only extensive, but more importantly, too expensive for including new native potato cultivars. Today, extensive trials are no longer required to register native potatoes: identification is now possible with a descriptor list for native potatoes proposed by CIP, which has been adopted by SENASA and INIA.

More than 15 of the 61 new varieties currently inscribed in Peru's Registry of Commercial Cultivars are already commercialized in Lima and other regional markets. These include Huagalina, Huayro, Huamantanga, Peruanita and Tumbay. Moreover, a large part of these newly listed varieties have unique colored flesh and skin, an attribute that is highly sought after by the gourmet foods sector.

Another significant task achieved by the seed thematic group involved the exemption of the associated inscription fee when registering native potatoes in the national registry. This amendment, approved by the Peruvian government last year, is quite significant, considering that there are well over 2000 native potato varieties that have yet to be inscribed.

In addition to helping promote Peru's growing native potato industry by approving pro-registration amendments, the Ministry of Agriculture was particularly keen in creating a new National Registry of Native Peruvian Potatoes (Registro Nacional de la Papa Nativa Peruana), managed by INIA, in order to protect the Peruvian native potato from illegal, unauthorized appropriation.

CIP is well aware of the importance of protecting a country's potato genetic resources not only from unauthorized appropriation, but also from natural and man-made disasters. Ever since its inception more than 35 years ago, the Center has been committed to conserving native cultivars. Today, CIP maintains the world's largest bank of potato germplasm, including some 4200 samples of traditional Andean cultivated potatoes.

Promoters and supporters of seed certification are confident that this and other efforts designed to formalize the native potato industry will help create new native potato-based initiatives in Peru as well as support related on-going projects, namely those involved with the processing of varieties into colorful chips. Moreover, certification will help pave the way for obtaining seals and certificates of approval (i.e. good agronomic practice, organic farming) for native potato products.

The fastest spreading potato variety in China

Chinese farmers are rapidly adopting a CIP-developed potato variety that resists drought and gives much better yields than local varieties. CIP scientists developed the Tacna variety in 1993 and it was introduced into China in 1994 in the form of *in vitro* plantlets. After multiplication in laboratory and greenhouse, the Chinese authorities worked with CIP scientists to evaluate the variety for drought tolerance. Work took place in the field in the Hebei Highland Crop Research Institute, the Wumeng Agricultural Research Institute and the Shanxi Highland Crop Research Institute from the late 1990s onwards. Because of its high tolerance to drought and good yield, after several years' evaluation, the variety was put into the National Regional Trial for New Potato Varieties by the Hebei Highland Crop Research Institute in 2003.

Trials in 2004 and 2005 in northern China (including Hebei, Shanxi and Inner Mongolia) showed tuber yields of 31.41 t/ha, over 40 percent higher than Zihuabai, the most popular variety in the region. Yet the Tacna variety produced these yields with almost no irrigation. Tests for disease resistance also showed that it was highly resistant to potato viruses X and Y, with some resistance to late blight. Because of this excellent performance, the Chinese authorities released Tacna as a new national potato variety in 2006, naming it Jizhangshu 8. "The performance of Tacna in China is an example of the useful diversity for stress tolerance that has been maintained in CIP's lowland tropics population, and which we are now rescuing by directed selection," said Meredith Bonierbale, CIP's Senior Breeder.

Jizhangshu 8 has been rapidly spreading throughout China since it was registered. Planted area was over 66 000 ha in 2008 and the large-scale multiplication that is going on in the country is expected to increase that area to up to 100 000 ha in 2009. "No other new potato variety in China, maybe in the world, has ever reach a planting area near 66 000 ha so soon after it was registered," said Xie Kaiyun, the head of CIP's Liaison Office in Beijing. The variety has been widely planted in Hebei, Inner Mongolia, Shanxi, Gansu, Ningxia, Xinqiang, Heilongjiang, Fujian and Guizhou, from 25 to 48 degrees

north latitude, in different agro-ecological regions.

CIP has developed elite potato breeding clones with resistance to virus, tolerance to heat, drought and/or salinity in the lowland potato population. The variety Jizhangshu 8 is a product of this breeding effort. The genetic background of the variety Jizhangshu 8 is highly diverse and includes 3 wild and 2 cultivated species. Its parents had been pre-bred in INTA-Argentina, Max Planck Institute-Germany, Cornell University-USA and SPBS-Scotland and CIP. The variety Jizhangshu 8 is a clonal selection from a CIP cross, actually made in 1988 and tested during intensive research during 1989-1993 by Jorge Espinoza and Humberto Mendoza of the University of Tacna. It was found outstanding in the arid areas of Peru, tolerating drought and the boron toxicity common in desert areas. It was released as the variety Tacna in collaboration with Rene Chavez of the Universidad Jorge Basadre Grohmann, Peru. Results from evaluating potato crosses related to the variety Tacna in north China revealed the yield potential of such material.

Tacna, or Jizhangshu, has a growing period from 100 to 110 days after emergence, produces about six good-sized tubers per plant, with 16.4 mg vitamin C per 100 g fresh flesh, 17 percent starch content and 2.25 percent protein. Its steam-cooking quality is very good, one of the reasons for its popularity, although its drought resistance is its outstanding quality. Northwest China is going through a severe drought now; one of the more critical challenges that China is facing in increasing food production. "With proper management and inputs, average yields could be doubled," said Xie Kaiyun.

Because of the high tolerance to drought and high yield potential, this variety can yield about 30 t/ha under rain-fed conditions, with annual rainfall from 300 to 400 mm and can achieve even higher yields under irrigation. "In the early stage of extending this variety, I would get many calls everyday from farmers and my friends and they asked me to give them some seed potatoes during the harvesting season. To solve the problem, all of the nethouses in our institute were used to produce pre-basic and basic seeds of this variety," said Mr. Ying Jiang, the vice president of Zhangjiangkou Academy of Agricultural Sciences, who got the variety registered in China under its Chinese name, Jizhangshu 8.

"I saw Tacna growing in the field in Keshan, northeastern China, where it had been planted for several years," said Fernando Ezeta, CIP's regional leader in East and Southeast Asia. "The health status of the crop was good after many years without seed renewal, possibly due to its virus resistance. It has nice tubers and it is quite prolific and a good yielder."

Left: Tacna tolerates dry conditions and still produces good yields;

PHOTO BY F. EZETA

Right: Average yields can be doubled with proper management and inputs

PHOTO BY X. KAIYUN

Producing

the best of all potatoes in the Philippines

> For several years CIP breeding material has been making a valuable contribution to potato production in the Philippines. Potato varieties selected and bred from CIP clones, such as Igorota and Solibao (CIP 676089) both first released in the 1990s, and most recently Gloria (CIP 13.1.1), a variety named after the Philippine president, have each come to play an important role in the local potato industry and the ongoing changes in potato demand.

"The availability of these materials has meant we have been able to respond to rapidly changing market conditions," said Dr Lorna Sister, research specialist at CIP Los Baños. "Due to their suitability for the warmer growing environment, Solibao and Igorota performed extremely well when farmers expanded to mid-elevation areas in the north. They are also good varieties for processing which further developed production"

Igorota was bred from CIP clones at the Northern Philippines Rootcrops Research and Training Center at Benguet State University (BSU). With a dry matter content of more than 21 percent, it is a very attractive variety for fast food chains. It was among the varieties included in an ambitious government funded, seed-production effort started in 2005 and aimed at improving farmers' incomes in the Philippine Cordillera through the supply and development of high quality planting materials. The 2 million-peso (roughly US$44 000) project jointly implemented by The Rootcrops Center, the Bureau of Plant Industry (BPI) and the Department of Agriculture (DA) focused on opening up business opportunities for local farmers. After trials in The Rootcrops Center's laboratories, seeds were distributed to selected farmers' groups via on-station screenhouses, community-based nurseries and government seed farms.

Dr. Jocelyn Perez, project team leader at The Rootcrops Center and a long-time collaborator of CIP in the Philippines, said participants

CIP material is playing an important role in Philippines potato industry

PHOTO BY F. EZETA

were encouraged to follow formal seed accreditation processes to ensure the varieties meet international standards. "Before planting, farmers submit soil samples for testing and then during the cropping period a seed inspector comes about three times to check for pathogens. The seeds must possess inspection tags as proof that they have been certified".

The project could also cash in on the growing demand for improved varieties abroad. Dr. Perez added, "we are training farmers in the rudiments of computers and the use of the Internet for e-business; they will be able to create a webpage and post advertisements for their seed". Seed growers enjoy stable prices at about double the average price of conventional ware potato. Thus, these small farmers organized to produce quality seed enjoy a return on their investment of 72 percent.

Farmers who sell Igorota tubers in the local trading post for vegetables at La Trinidad said that Igorota tubers are bought at a higher price compared to the most common potato variety grown. The buyers usually supply the Universal Robina Corporation (URC) which produces potato chips and other potato-based snack foods in the country. Presently, the Igorota variety is planted to about one third of the potato-growing area in the highlands, or about 6000 crop ha annually.

Now, two more CIP-related clones, Solibao and Gloria, are set to satisfy the demands of the latest market trend: inorganic production. They have just been declared the Philippines' first organic potato varieties. Organic cultivation has a two-fold effect on farmers' incomes. Not only does it cut costs on farm inputs; it also offers a higher return on investment. Potato ordinarily sells for US$0.6 to US$0.7 per kg but organic varieties can fetch considerably higher prices, upwards of US$2.00 per kg, especially when aimed at the high end of the market such as supermarkets. "Production at present is aimed at fulfilling local demand, but this is a springboard for farmers to expand into the... market where adaptability to low/zero chemical inputs is the main criterion," said Perez. "Consequently, there is also an emerging demand for organic seed potatoes, priced at 75 percent more than the conventional potato."

Mr. Pat Acosta, one of the prominent organic vegetable producers in Baguio City in Northern Philippines, said that "with the selection of two potato varieties for organic potato production, the organic revolution in the highlands has begun".

The emerging organic vegetable industry is slowly, but surely, finding its niche in the vegetable industry and in consumers' minds.

Benguet is the Philippines' main potato production center, supplying approximately 62 percent of the country's annual production. The province's most common potato disease is late blight which can cause serious damage to potato, leaves, stems and tubers. But the two CIP varieties' genotypes are strongly resistant to late blight and other pests and require minimum use of farm inputs.

The varieties were developed by a team at The Rootcrops Center after testing on organic farms at

Potato fields in the tropical highlands of Benguet, the Philippines

PHOTO BY F. EZETA

1336 m asl to 2350 m asl in Benguet in order to assess adaptation to varying degrees of temperature. From an initial 55 clones, mostly from CIP, 15 were chosen for trials studying performance based on yield per hectare, tuber size and resistance to disease. Response was also analyzed based on the area of cultivation, temperature, relative humidity and soil conditions, with farmers using only compost, animal manure, effective microorganisms and biological control. Among the varieties that stood out were Solibao, and Gloria which have a potential yield of 7.85 tonnes per hectare. In a contest to name the varieties during BSU's recent anniversary celebrations, farmers honored Philippines' President Arroyo by naming CIP 13.1.1 "Gloria Kamaptengan". Kamaptengan means 'the best of all'.

With the selection of varieties for organic production ongoing and seed production for organic potato seeds already started, farmers in Benguet can see the potential for capacity building and entrepreneurial opportunities. The cases of seed potato and organic potato point to the willingness of seed users and consumers to pay a higher price for quality products. More importantly, these opportunities are readily available, even to small producers.

Food access

Food security

Food access

Going to scale with sweetpotatoes in Indonesia

Farmers willing to pay for quality sweetpotato vines

Looking into the future of sweetpotato in western Kenya

Chips in Uzbekistan

Food Security

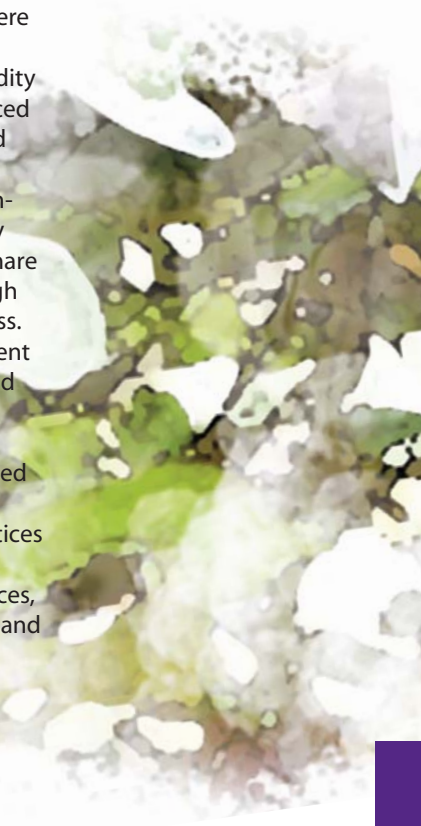
Going to scale with sweetpotatoes in Indonesia

"Indonesia has one of the most dynamic non-governmental organization (NGO) sectors in the developing world. Thousands of community-based development NGOs operate throughout the country, often in areas not reached by public-sector extension.

CIP has long invested in building partnerships with Indonesia NGOs as it recognizes their strategic role in dissemination and going to scale—a key step in the pro-poor research for development cycle underpinning the Center's new vision and strategy. But as shown by a CIP study conducted last year to review the Center's decade-long Indonesian experience, a better understanding of unique institutional characters is essential in widening the development impact of its research via the NGO route.

Since the late 1990s, CIP has worked with a network of NGOs in both Java and eastern Indonesia. Starting with Mitra Tani, a local NGO in Yogyakarta, the partnership expanded to cover a network of over 30 NGOs in 13 Indonesian provinces under the auspices of Vredeseilanden (VECO) Indonesia.

The collaborative effort with NGOs involved a participatory learning methodology for farmers to better manage their sweetpotato crop. There were three key methodological, technological and commodity dimensions of the introduced innovation. The farmer field school methodology (FFS) was introduced as a season-long training methodology where farmers learn and share farming knowledge through a direct, experiential process. Integrated crop management (ICM) formed a research and development strategy to improve crop production quantity and quality, pursued through the integration of various management practices supporting crop health, optimal use of local resources, and supporting ecological and economic sustainability. The underlying goal for engaging with NGOs was



NGO staff and farmers jointly analyze results of sweetpotato ICM experiments in Indonesia

PHOTO BY D. CAMPILAN

to promote wider uptake of sweetpotato ICM. CIP aimed to build on and go beyond the pioneering farmer groups participating in pilot research and learning activities where ICM innovations were initially shown to work effectively. However, the study pointed out that variability in needs, opportunities and conditions required agricultural innovations from pilot projects to be continuously adapted to local conditions when introduced to other communities.

Following a series of trainers' training and technical support workshops by CIP, monitoring studies revealed that partner NGOs subsequently implemented several types of workplans derived from the original sweetpotato ICM-farmer field school innovation. "This offers NGOs a flexible approach by allowing participants to select and combine a set of principles and practices relevant to local farmers' needs," said Imam Suharto, leader of the collaborating team from VECO Indonesia. "While NGOs initially learned about ICM through the case of sweetpotato, they were able to apply this to other crops and systems." Though some NGOs opted not to implement the FFS approach, the principles of participatory learning were applied in conducting field experiments with farmers – both for sweetpotato and other crops.

"I consider development NGOs as CIP's strategic partners because they directly support community-level learning and action, especially for crops and systems overlooked by mainstream public-sector development efforts," said Dindo Campilan, the CIP scientist who led the study. He emphasized however that these NGOs generally take a multi-sectoral community development approach as compared with agricultural research institutions, which are often commodity/sub-system focused. Therefore, they are less likely to treat research-generated innovations as finished products that only need to be transferred and diffused; instead they facilitate further innovation through adaptive learning.

This study confirmed that scaling up cannot simply be seen as a process of diffusing knowledge products generated by research. As a multi-component innovation, the sweetpotato ICM FFS evolves into various forms as NGOs take it through a process of continuous improvisation. The study emphasized that, together with farmers, NGOs can opt to use only some components, apply these for different crops/livelihoods, or combine them with other complementary innovations. Indeed, NGOs' capacity to continuously innovate is itself a key part of any mechanism for scaling up. Tracking an innovation as it moves from one scale to the next can be problematic because it continues to evolve in the hands of several intermediate and end users. Thus, adopting methodologies that integrate scaling up in the design for impact evaluation is of utmost importance.

Food Security

Farmers willing to pay for quality sweetpotato vines

Results of an innovative study amongst small farmers in Zambezia, Mozambique showed that the farmers were willing to pay for sweetpotato vines for planting, if they were sure they were good quality and would produce a good yield. This is encouraging progress towards meeting food security challenges in a country where sustainability of seed systems is constantly undermined by natural and manmade disasters.

Sweetpotato is an important food crop in Sub-Saharan Africa

PHOTO BY S. TUMWEGAMIRE

Sub-Saharan Africa (SSA) food security relies heavily on seed systems dominated by an informal sector supplying between 85 and 90 percent of the required seed, with a low availability of clean, healthy planting material. Mozambique is one of the poorest countries in the region, with subsistence farmers generating very low crop yields that on average can satisfy only 80 percent of the minimum daily calorie requirements. The distribution of planting materials has traditionally largely been limited to short term emergency programs with no real view to long term production and sustainability access.

Extension programs in the country run by World Vision International and CIP's national partner the Instituto de Investigação

Agrária de Moçambique (IIAM) have therefore focused on disseminating and enhancing orange-fleshed sweetpotato (OFSP) production, while promoting awareness of its properties as a vitamin A-rich food, targeted to combat nutritional deficiency among children under five, women and the elderly.

The projects are working towards expanding the beneficiary population by establishing a viable network of decentralized vine multipliers that produce high quality OFSP vines and create new income-generating opportunities for small farmers in the region. There is a need to promote private enterprise in the multiplication of healthy planting material. In the region, farmers would normally get free material from their neighbors or from NGOs or on the limited occasions when vines were sold, at prices set well below production costs. A question remained as to whether small-scale farmers, the main market for sweetpotato vines, would be able or willing to pay for such material.

Reaching End Users (REU) is the most recent multi-institutional scaling up project, funded by Harvest Plus, run by CIP partners with CIP support, permanent monitoring and feedback. It expects to reach more than 10 000 households in the Zambezia province and had already started to sell vines to the target farmers. "The first task of this present study was to assess farmer's willingness to pay for clean OFSP vines and determine the existence of a sustained demand for OFSP planting material," said Ricardo Labarta, agricultural economist and CIP seed systems specialist in Mozambique. "We also aimed in other trials to assess whether multiplying OFSP vines under small farmers' conditions could become a sustainable and profitable enterprise."

Until now most willingness-to-pay studies had been based on stated preferences and hypothetical experiments. Following a model originally used in Norway, REU developed a real choice experiment involving 121 sweetpotato growers in Zambezia province, specifically designed to fit Mozambique's particular rural conditions. This approach replicates a real market experience aimed at determining the real purchase decisions of the respondent. "It is an excellent look at how to assess willingness to pay in a community setting," said Jan Low, CIP's Regional Leader for Sub-Saharan Africa.

"For the sampling we randomly selected six villages with previous experience of OFSP," said Labarta. "Our experiment consisted of ten different choice scenarios. In each, the respondent farmer had to express which, if any, of the two they would buy at the displayed prices. We included the four most preferred OFSP varieties (Resisto, MGCL01, Jonathan and Lo323) and compared them with the most used local variety. There was also always a 'none of these' option, if they did not like any of the varieties or if they found the prices unaffordable."

Interviews took place immediately before the sweetpotato planting season. Participation was voluntary, each participant receiving some money at the beginning of the study to buy the vines or alternatively keep for other purchases. "We stressed to the farmers that at the end of the experiment, the respondent would randomly draw one of the ten scenarios and they would have to buy the variety they had chosen in that scenario. This was an important incentive to really express whether they would buy or chose to keep the cash," said Labarta.

Results were very encouraging. Only 6 percent of the participants decided not to buy whereas more than 65 percent bought more than the required one kilogram of vines at the end of the experiment, revealing the farmers' willingness to pay for OFSP varieties (costing US$ 0.07-0.12/kg) over non-orange planting material (US$ 0.03) and compared to the traditional subsidized price of clean sweetpotato vines (US$ 0.06).

Labarta sees the outcome of the study as extremely encouraging, providing valuable feedback for sweetpotato breeders all over Sub-Saharan Africa. "Given that in corresponding on-farm and on-station trials we verified that vine multiplication under small farmer conditions is feasible at a cost of US$ 0.02 per kilo, this demonstrates a real prospect for the future creation and consolidation of private vine multipliers in Mozambique."

Food Security

Looking into the future of sweetpotato in western Kenya

By applying a well-known method of agricultural systems analysis for the first time to sweetpotato farming in Kenya, CIP researchers have gained insights into what research to do that will best benefit smallholder farmers in the future.

Lieven Claessens, a CIP scientist based in Nairobi, Kenya, used what is known as a minimum-data approach to estimate the economic feasibility of different technologies and farm-management practices and then used those results to assess the chances of farmers adopting the alternative practices. The minimum-data approach estimates how fast a mixed farm population will adopt a new technology. The aim of the study was to use the approach to assess the economic feasibility of introducing dual-purpose (human food and animal feed) sweetpotato varieties as a first step in assessing prospective pathways out of poverty for smallholder farmers.

The longer-term goal is to determine the potential for adoption of this technology over larger regions with conditions similar to the study area. The area chosen was Vihiga district in western Kenya, which lies between 1300 and 1500 m asl and covers an area of 563 km^2 of which 419 km^2 is arable land. Vihiga district is similar to other areas of

Harvesting sweetpotato in western Kenya

PHOTO BY L. CLAESSENS

Selling sweetpotato provides women with an independent income

PHOTO BY L. CLAESSENS

the east African highlands found in Uganda, Ethiopia and Madagascar in terms of soils, climate, technology and production potential.

Although sweetpotato is currently not one of the major crops in Vihiga district, it is an important crop grown typically by women for roots, which are mainly used as food, and to a limited extent for leaves and vines which are a supplementary source of fodder for livestock. Sweetpotato is an excellent crop for many smallholder farmers because it produces high yields yet requires few inputs, such as fertilizer. It can also be used as a food for humans and as a feed for animals. This dual-purpose nature makes sweetpotato especially attractive in areas where land availability is declining.

The results show that with the lowest average total yield from the CIP-developed varieties, 22.7 t/ha per season, farms representing 55 percent of the total land area would economically benefit from adopting the system with dual-purpose sweetpotato. The number of adopting farms increases with the average total yield. At 40 t/ha, the adoption rate increases to about 82 percent. There is a higher adoption when there is relatively more tuber yield because tubers have a higher value than fodder. Even if average total yields from dual-purpose sweetpotato were very low (5 t/ha), a majority of farms would benefit from adoption due to the value of both tubers and fodder produced.

The main reasons why adoption of dual-purpose sweetpotato is economically viable for a relatively large percentage of farms are the higher yields, net returns and crude protein content of the fodder which increases milk production and income. Average crop yield of dual-purpose sweetpotato is 8 t/ha compared with 1.5 and 4.3 t/ha for maize–beans and the mixed crops, respectively. The average fodder yield for dual-purpose sweetpotato amounts to 14.6 t/ha compared to 3.4 for maize–beans and 9.3 t/ha for the mixed crops. Average net returns for dual-purpose sweetpotato are about four times more than maize–beans and double the return from mixed crops. Actual yields would be lower in the farmers' fields than the experimental plots, but even if the average total yield was reduced from the experimental mean value of 22.7 to 10 t/ha, 65 percent of farmers would still benefit from adopting the system.

The study showed how including dual-purpose sweetpotato into the agricultural system could improve the livelihoods of smallholder farmers operating in the mixed crop–livestock systems in east Africa. "It can also provide timely advice to policymakers and for exploration of technology options," said Claessens, "In this case, the analysis clearly indicates the best lines of research to take."

The findings argue for the selection and breeding of sweetpotato varieties that are high yielding in general or have increased fodder without compromising tuber yield. Improved agronomic practices to increase total yields would have very positive effects. In addition, because factors other than yield will influence actual adoption, researchers and rural extension agents should involve farmers from the early stages of the screening and dissemination process. Participatory work in the study area indicated that even when farmers are aware of the potential benefits of alternative technology options, they have different attitudes to risk and are constrained by market failure and the heavy burden of providing for many people who depend solely on small farms.

"The minimum-data approach offers a flexible framework for evaluating innovations and new technologies using scarce data of resource-poor countries in Sub-Saharan Africa and other parts of the world," said Claessens. "In this case, the results indicate that a substantial number of farmers in the study area could benefit economically from adopting dual-purpose sweetpotato."

Food Security Chips

in Uzbekistan

"Three CIP advanced potato clones have shown outstanding performance in tests in Uzbekistan. A new geopolitical situation in the Central Asia and the Caucasus region has led Uzbekistan to embark upon developing a self-reliant agriculture for food security and improved livelihoods. "A multitude of newly independent, often poorly trained farmers has emerged," said Carlo Carli, CIP's Regional Seed Production Specialist. "Potato is the only food and cash crop with comparative advantages in the highlands and among the most profitable diversification crops in lowland systems. But rural poverty is high and farmers need urgent assistance to become acquainted with new technologies."

Potato area has increased rapidly in the last decades (from 20 000 ha in 1970 to more than 50 000 ha in 2007). But area expanded mainly to meet demand because of low yield (around 16 t/ha) due in part to limited technical knowledge of farmers, inappropriate European varieties and poor quality seed. "Due to the absence of a sound potato seed industry in the country that would guarantee a continuous supply of healthy seed sold at affordable prices, farmers have been obliged to utilize imported seed," said Carli. "In addition to the problems of stress such as drought, heat and soil salinity, farmers are faced with the high cost of imported seed, sold at more than US$2000/t. It is essential for the country to reduce its dependence on seed imports and the first way to do that is to find varieties that can be grown under local conditions."

As part of this ongoing effort, 32 CIP advanced potato clones from the Lowland Tropic Virus Resistant Population (LTVR) were tested under mid-elevation conditions in Pskem (1300 m asl) from June to October 2008. Pskem is situated in the Bostanliq district in the northern part of the country, at the borders with Kazakhstan and Kyrgyzstan. The site was allocated by the Ministry of Agriculture to the Institute of Vegetables, Melons and Potato based in

Participatory evaluation of tuber characteristics before organoleptic tests, Pskem, Uzbekistan, October 2008

PHOTO BY C. CARLI

Tashkent, with the specific purpose of conducting potato research. The location was chosen for the possibility of multiplying CIP clones under isolation and milder climatic conditions than those present in Tashkent; the main purpose of the tests being to check the performance of CIP germplasm materials under the long day conditions of Central Asia. "The local farmers were curious to see the results. They all need seed at an affordable price and we informed them that there would soon be that possibility," said Carli. "The performance was highly satisfactory."

As well as the short term availability of inexpensive quality seed, there is a long term impact for farmers with the increased benefits they can get from becoming specialized seed growers. At present potato is used mainly for the fresh market, but the development of local seed production represents a substantial initial step towards developing a domestic potato processing industry.

The market potential for different processed products (chips, frozen French fries, extruders, potato flakes, etc.) is not yet fully known but imported products are already in urban supermarkets. What is certain is that the fast food industry is developing rapidly in the region and processed potato products are becoming a basic menu item in urban areas.

After the harvest, farmers were invited to participate in tests to assess the organoleptic performance of each clone (a taste test), conducted by Dr. Firuz Yuldashev, a CIP research assistant. Potatoes were cut into shape and fried in oil. A group of seven testers, including the local farmers and one researcher, was then asked to assess a series of characteristics, among them cooking performance, tuber shape, taste, smell and color of the fries and rate each variety.

Quanishboy Zaydullaev, a farmer from Tepar village in Bostanliq district said that previously he had only considered potato as a food for everyday consumption. "The French fries and chips from the clones had excellent taste, nice smell and intense color. I appreciated them for their special crispness and crunchiness. Clone 397077.16 especially had very good characteristics once fried, boiled or baked. It was a nice experience for me. I never took cooking qualities into account before, but now I realize the importance of distinguishing varieties for their particular taste characteristics and will look at potato differently, not only considering yield, diseases and pests."

Results concluded that CIP clones 388611.22 (47.0 t/ha), 397077.16 (58.0 t/ha), which was also selected in tests in Kazakhstan and Tajikistan, and 397073.16 (52.0 t/ha) were the most appreciated in terms of cooking performance, yield and tuber marketability, producing more than 90 percent commercially sized tubers.

The candidate varieties are now set to be delivered to the State Commission for Variety Testing where results will be verified and procedures carried out to check that they are adapted to local conditions and that their yield is stable. Testing will be implemented to cover locations representing the different agro-ecological conditions of the country.

"This story represents a great advance in reducing the timeframe for variety identification in a cross-regional or global breeding program via the efficient links established between providers like CIP and users like the national agricultural research systems and farmers," said Meredith Bonierbale, CIP's senior potato breeder.

utilization

Food Security Food

Food utilization

Sweetpotato as a health benefit

Potatoes for health

Food Science

Sweetpotato as a health benefit

Each year the Consultative Group on International Agricultural Research (CGIAR) organizes a series of awards to recognize the top innovations and achievements among the Centers. The 2008 CGIAR Award for Outstanding Scientific Article was received by CIP's Dr. Jan Low, for ground-breaking research she led* during a 2-year project that used orange-fleshed sweetpotato to boost nutrition in Mozambique children. Vitamin A deficiency affects an estimated 71 percent of Mozambique's children under the age of five. The orange-fleshed sweetpotato contains high quantities of vitamin A. Introducing these beta-carotene-rich sweetpotatoes into the diet of young children increased vitamin A intake and reduced the frequency of low retinol in their blood, an indicator of vitamin A deficiency. The work showed conclusively that food-based approaches can be used to curb nutritional deficiencies. The work took place in rural Mozambique and is the first food-based community-level study in Africa that has followed the same intervention and control households and children throughout the initial adoption period.

As such, the results of this research give clear support to CIP's proposed Sweetpotato for Health and Profit Initiative, which seeks to reposition sweetpotatoes in African food economies, particularly in expanding urban markets, to reduce child malnutrition and improve smallholder incomes. About 50 million African children under 6 years of age are currently at risk from diseases associated with vitamin A deficiency. Over the next 10 years the Initiative is expected to generate significant health and economic benefits within African food systems. Estimates suggest that the work will mean additional production of $241 million a year in 17 African countries distributed across about 11 million

*Low, J., Arimond, M., Osman, N., Cunguara, B., Zano, F. and Tschirley, D. (2007) A food-based approach introducing orange-fleshed sweetpotatoes increased vitamin A intake and serum retinol concentrations in young children in Rural Mozambique. Journal of Nutrition (USA). 137(5): 1320-1327.

LEFT: Most children prefer the sweeter taste of OFSP RIGHT: Farmers sort sweetpotato roots for marketing, Tanzania

PHOTO BY S. TUMWEGAMIRE

beneficiaries. The vast majority would be non-commercially oriented producers, of which over three quarters would be women.

Sweetpotato production is expanding faster than any other major food crop in southern Africa. Sweetpotato generates large amounts of food per unit area over time during relatively short rainy periods, tolerates occasional dry spells and produces yields even on less fertile soils. Eleven countries in Sub-Saharan Africa are now members of CIP's highly successful Vitamin A for Africa platform that is promoting the breeding, consumption and sale of the locally adapted, conventionally bred beta-carotene-rich orange varieties and gradually replacing the traditional white-fleshed varieties. The varieties already cover at least 15 percent of the total planted area in Kenya, Tanzania and Uganda.

OFSP varieties have proved to be very popular with consumers and a number of new products have been developed using the bright orange flesh. CIP's work in Mozambique with sweetpotato has already developed the market for and supplied over 1 million people with orange-fleshed sweetpotato varieties. Kenya and other Sub-Saharan Africa countries have already been reaping the benefits of the crop for many years, thanks to the efforts of the Vitamin A for Africa initiative. Adding 100 g of orange-fleshed sweetpotato to the daily diet provides enough vitamin A for children and dramatically reduces the maternal mortality rate. Pioneered and led by CIP, the initiative is promoting the increased production and use of the orange varieties to combat vitamin A deficiency in Sub-Saharan Africa.

Food Security

Potatoes for health

Agricultural research in developing countries is increasingly focusing on the relationship between food and nutrition. In marginal conditions, where life is hard and food is scarce, the local people may have enough to eat but they are often short of nutrients like vitamins, calcium, iron and zinc. One way to approach this problem is to breed new varieties of staple crops that contain higher levels of these essential micronutrients so that people absorb them from their daily diet.

The potato is food for more than 1 billion people worldwide. From the point of view of nutrition, the potato is an important source of carbohydrates and quality protein, and a good source of vitamins, such as vitamin C and the B complex, and minerals, such as calcium, iron and magnesium. Potato is also a source of antioxidants, such as ascorbic acid, carotenoids and phenolic compounds. Additionally, the contribution of potato to the nutrient intake can be higher than any other crop, depending on the amount of potato consumed. According to recent surveys, households in the Andean highlands eat on average 421 g/adult equivalent per day, while women and children in the Department of Huancavelica (with some of Peru's highest rates of poverty and malnutrition) consume on average 800 g and 200 g, respectively, of potatoes per day).

Coinciding with the International Year of the Potato, Elsevier's *Journal of Food Composition and Analysis* published a special issue on potatoes in 2008, featuring a number of articles

Measuring carotenoid concentration in yellow-fleshed native potatoes

PHOTO BY CIP ARCHIVES

by CIP staff on the nutritional composition of potato.*

CIP researchers looked at the chemical composition of yellow-fleshed native potatoes. This color comes from compounds called carotenoids. Carotenoids are well credited with important health-promoting functions such as increasing the formation of vitamin A, enhancing the immune system and reducing cancer and cardiovascular disease. The chemical analyses were performed in potatoes of the *Solanum phureja* group that grow from western Venezuela to central Bolivia and are important breeding stock because of their excellent culinary properties and crossability with other cultivated as well as wild potatoes.

There was a lot of variation for the carotenoid concentration, but the group with the highest concentrations of total carotenoids had levels over 10 times higher than a yellow *Solanum tuberosum* variety that might be sold in any supermarket. One sample showed the highest concentration ever reported in a potato, including those achieved through genetic modification.

During the work, the researchers developed an accurate way to estimate carotenoid concentrations in a bigger number of samples using near-infrared reflectance spectroscopy (NIRS). The method is faster and cheaper than the chromatography method that was used for a reduced number of samples. It works by bouncing light off ground-up samples of the material under test. The reflected light gives extremely accurate information about the chemical composition of the samples.

The NIRS method will allow scientists to screen a large germplasm collection and identify potatoes varieties with specific chemical properties. It can be applied to document descriptive and potentially beneficial characteristics of potato genebank materials, assess the food value of present farmers' varieties, and select parents in a breeding program oriented to nutritional enhancement of potato.

The value of the potato as an important source of vitamin C is often underestimated or ignored. Vitamin C is an essential component of most living tissues that can reduce the risk of heart disease, stroke and cancer. As an antioxidant, it is an important scavenger of free radicals that can damage tissue and may contribute to degenerative diseases such as heart disease or cancer. The current recommended daily allowance of vitamin C in healthy individuals is 100–120 mg/day for adults. In another paper, the CIP scientists looked at the levels of ascorbic acid or vitamin C in a diverse set of native Andean potato cultivars grown in three different environments and found significant levels with a variety reaching above 30 mg of vitamin C per 100 g on a fresh weight basis.

The effect of cooking and storage time on the vitamin C concentration in subsets of samples was also evaluated. Boiled tubers had higher levels of ascorbic acid than baked or microwaved tubers; the concentration decreased as storage time increased. The degree of retention after cooking and storage under farmer conditions was very different among varieties.

One hundred grams of boiled potatoes of the variety with the highest concentration of ascorbic acid would provide adults with 17–20% of the daily allowance, but the real contribution could be higher, because highland people eat on average over 400 g of potato a day. This information will be very useful to recommend those varieties and preparation methods with the highest retention of ascorbic acid, as well as to assess genetic diversity for use in breeding programs seeking to improve the nutritional value of potato.

Chuño, or traditionally freeze-dried potato, is a critical component of the diet of the rural population of the Peruvian highlands. Andean populations use freeze-drying as a reliable way to preserve tubers for long periods and to provide food during periods of scarcity. Chuño can be stored for several years and is essential for rural food security in risk-prone high altitude communities.

Little was known of the effect of the preparation process on the levels of micronutrients in chuño. A study found that potatoes processed as chuño have less protein and zinc than unprocessed tubers, four to seven times the calcium, probably from the mineral-rich water that is used in the process, while iron concentration was unchanged. This information can now be used by health authorities working on the nutrition of Andean people.

* Burgos, G.; Auqui, S.; Amoros, W.; Salas, E. and Bonierbale, M. 2008. Ascorbic acid concentration of native Andean potato varieties as affected by environment, cooking and storage. Journal of Food Composition and Analysis. In Press, Accepted Manuscript, Available online 29 August 2008. doi:10.1016/j.jfca.2008.05.013
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Vulnerability

Corporate social responsibility and native potatoes

Looking at the Andes through the eyes of a condor

Balancing the benefits of organic and inorganic fertilization

Making lives better for Ethiopia's farmers

Food Security

Corporate social responsibility and native potatoes

"In the Andes as elsewhere, agricultural development is taking place in the context of rapid urbanization and increasing market integration. As packaged food sales and supermarket retail outlets rapidly expand, urban consumers increasingly look for original, natural, and healthy foods produced in a sustainable way. For small-scale farmers in developing countries, these trends represent an opportunity to improve their living standards through access to high-value markets—but they also challenge farming communities' traditional production and marketing systems.

Turning potato biodiversity into a drive for sustainable rural development implies two challenges: strengthening smallholders' participation and competitiveness in these high-value market chains despite their high transaction costs; and guaranteeing their access to a fair share of benefits despite their low negotiation capacity. Faced with this challenge, CIP, through its Papa Andina partnership program, over the past few years has been spearheading efforts to facilitate the development of a native potato market chain that combines business with corporate social responsibility (CSR).

CSR is a form of business management seeking to combine business and responsible behavior. For a company, CSR implies taking into account the interests of its stakeholders, including clients and providers, to achieve mutual sustainable development. The expected result is advantageous for all players, resulting in a sustainable business relationship.

By applying CSR to the native potato market chain, leading companies have created opportunities for farmers to improve their income and thus livelihood by accessing new markets and selling their crop under fair and transparent conditions. The

responsible behavior of the company lies in the preferential terms of trade it offers to its providers and its investment in a long-term relationship with them, as well as in the quality product it offers to its clients. The business element lies both in the access to new market segments, where socially and environmentally conscious consumers are ready to pay a higher price, and in an increased loyalty and reliability of its providers in the framework of a long-term relationship.

To assist the integration of CSR into a market chain, innovation is required. The identification and development of sustainable pro-poor commercial and production practices, certification and social marketing schemes represent new research fields. And in the innovation process, for both farmers and companies, a research for development institution like CIP represents a knowledgeable ally and warrantor of credibility.

Papa Andina's efforts to integrate CSR elements into the native potato market chain involved months of research and evaluations of past case studies promoting the use of native potatoes as well as extensive dialogue with national and international agribusiness companies in Peru, including snack giant PepsiCo. The team identified factors that are key in carrying out a successful—and sustainable—CSR strategy for a company in the case of the native potato market chain.

In the first place, it appears essential to establish a transparent and empowering

The corporate social responsibility approach is allowing farmers to increase their income and empowerment in Peru

PHOTO BY JL. GONTERRE IN COLLABORATION WITH CIP

business relationship. This involves negotiating a fair price, covering farmers' production costs and leaving them with a margin, and considering other aspects like short payment delays, which are crucial for low-capitalized actors like small-scale farmers. It further involves setting clear quality criteria and responsibilities, preferably in a contract signed at the beginning of the crop cycle. Finally, improving its providers' production capacities, through training, can prove a relevant investment for the company. In the second place, it is key to communicate about the company's CSR investment in order to make the premium price of the final product understandable and acceptable to consumers, which can be achieved by social marketing.

In an effort to make visible its contribution to Peru's economy, PepsiCo, launched naturally colored native potato chips in the Peruvian domestic market in 2008. Lay's Andinas, as the product is branded, is a high-quality product, generating concrete benefits for small-scale farmers and to consumers, promoted through a social marketing scheme highlighting aspects of culture, biodiversity, poverty reduction and health.

PepsiCo's initiative was accompanied by the contribution of several of Papa Andina's partners, including CIP-INCOPA, the NGO FOVIDA and the stakeholders platform CAPAC Peru. Papa Andina and its local partners helped identify and strengthen the production, marketing and innovation capacities of native potato farmer associations interested in participating in PepsiCo's initiative.

At the same time, Papa Andina facilitated a joint innovation process for

establishing pro-poor commercial and production practices, a corresponding certification scheme and a social marketing initiative. As a result, a public-private alliance led by CAPAC-Peru launched the so-called Andean Potatoes Initiative (www.papasandinas.org) in 2008 to promote native potato trade with CSR. It includes leading food companies, NGOs and the gastronomy sector, and conducts a broad-scale communication strategy about the culinary and nutritional as well as social and cultural value of native potatoes, and the importance of their responsible trade and consumption.

Preliminary data gathered from cases of native potato trade with CSR is encouraging, particularly in terms of results at the farmer level. Prices received by farmers for their crop have been between 30 percent and 100 percent higher than local market prices. The involvement of agrifood multinational companies has also significantly increased the perspective of native potato production, which in the sole case of PepsicCo benefited over 300 Andean farming families in 2008, either through their involvement as direct suppliers or from the economic activity generated through wages as hired workers. On the shelves, products such as Lay's Andinas have been in very strong demand, and farmer organizations are expected to double their supply volumes and increase the number of suitable varieties in 2009. In parallel, the agroindustry is seeking to expand its supply chain to other Andean regions in Peru.

An indirect effect of this new market is the increased motivation of farmer organizations to raise productivity while maintaining sustainable farming practices to deliver a high quality product. This demand-oriented challenge is being addressed by CIP.

The success of these initiatives has demonstrated that there is clearly a market for native potato products, and that consumers are sensitive to the link between their consumption and the impact on small-scale high Andean farmers' livelihoods. Meanwhile, research and development groups like CIP and NGOs have been able to better target their research based on the needs of small-scale farmers while forging alliances with powerful and resourceful private actors towards development objectives.

Though there are still many efforts to be consolidated, promoters of this native potato CSR business strategy believe that the on-going innovations—like the certification scheme—will serve to secure further benefits of the native potato trade for small-scale farmers in the context of an increasingly competitive market, and to highlight the need for a sustainable and quality production of native potatoes in Andean communities.

The commercial success of native potato chips is an opportunity for small-scale farmers

PHOTO BY PAPA ANDINA

Looking at the Andes through the eyes of a condor

"It is as if we were in the eyes of the condor looking at the entire Andean region, observing how people manage its resources", said René Gómez, specialist in native potatoes and curator of CIP's potato genebank, to explain the project that will organize a network of microcenters of agrobiodiversity to conserve the genetic resources of the potato where they are growing, or *in situ*.

The network has been christened the 'Route of the Condor' and will include practically the entire Andean area, from Mérida in Venezuela up to Jujuy in Argentina. Over 500 years ago, the Incas capitalized on work done by earlier Pre-Columbian civilizations and constructed a network of roads that criss-crossed their entire empire. These roads made rapid communication possible and allowed food and other goods to flow throughout the mountainous region. The Incas rely heavily on the potato as a staple food. It was cultivated in the highlands and widely distributed. Consequently, the Inca farmers spread hundreds of different types of ancient potato varieties everywhere they grew the crop.

The primary road from north to south, down the spine of the Andes, is known in the local Quecha language as the Qhapaq ñan. Nowadays, CIP scientists, with a group of collaborators, are studying the biodiversity of the potato using the road as a guide to locating sites that hold rich concentrations of original genetic resources.

"It is surprising to find how many genetic resources have been conserved in these sites and what a great flow of biodiversity there has been, not only of potato but of other Andean crops," said Gómez, while showing a map of how the primary centers of agrobiodiversity overlay the principal road, and the second and third level centers of agrobiodiversity coincide with transverse or minor roads.

The organizers of the project are the Division

of Conservation and Characterization of Genetic Resources of CIP, the Association for Nature and the Sustainable Development (ANDES), and the Association of Communities of the Potato Park, located in Cusco, Peru. Other South American countries, such as Colombia, Ecuador and Bolivia, where high concentrations of diversity and variability of potato are found, are also being approached through the Community of Andean Nations.

All these groups are contributing in different ways, from the genetic characterization of the samples, up to political support; the Minister of the Environment of Peru, Dr. Antonio Brack-Egg, is an enthusiast of the project. CIP contributes its experience in the *in situ* and *ex situ* (i.e. stored in a genebank), conservation of potato, which includes, in the case of *in situ* conservation, the genebank that it maintains in San José de Aymará, Huancavelica, experience with repatriating healthy potatoes to rural communities, village seedbanks and its work with the Potato Park in Pisac, Cusco, a community initiative of farmers for the conservation and sustainable use of the agrobiodiversity and the associated knowledge.

"With this project we are demonstrating that *in situ* and *ex situ* conservation are complementary," said Dr. David Tay, the Leader of CIP's Division of Conservation and Characterization of Genetic Resources. "What is generated *in situ* serves *ex situ* and *vice versa*, and in this way we achieve a process of dynamic conservation."

Ancient terraces used by the Incas for cultivation at high altitudes

PHOTO BY P. STAPLETON

The basic units of the project are microcenters of agrobiodiversity, areas of *in situ* conservation of the genetic resources of potato, where the people involved not only conserve them but are also searching for a sustainable use that gives them a clear benefit. In selecting a microcenter, the quantity of native potato cultivars that the families handle is taken into account, as well as the associated knowledge and the traditional technology they use managing them.

Pointing to the map of South America again, Gómez showed how the area to the north of Lake Titicaca abounds in red areas, indicating high diversity. It is a large area, which extends from southeast Peru, through the central Andes and on northwards. In north Ecuador and south Bolivia, are some orange zones that indicate average diversity. The red and oranges zones mark possible *in situ* conservation areas, but there are so many that other criteria are being used to narrow them down. "To qualify as a primary microcenter, at least 10 percent of the rural families must each cultivate over 40 potato varieties on their land," explains Gómez. At the secondary level, 20 cultivars will be required, corresponding to Carchi and Chimborazo in Ecuador, Oruro, Potosí and Cochabamba in Bolivia, and Jujuy in Argentina. Tertiary areas, with a minimum crop of 10 cultivars include Grass in Colombia and Mérida in Venezuela.

One of the principal microcenters of agrobiodiversity, based on these criteria, is in the provinces of Paucartambo, and Calca, in Cusco, where the Potato Park is located. More than 600 varieties are cultivated among the six

communities that make up the Park. In fact, the Park is such a rich center of diversity, it is possible to find a single family cultivating up to 150 different types of potato. The Park is functioning as a pilot center for the project, while the community of San José de Aymara is an example of a village genebank within a microcenter.

A final and important requirement is that the families involved in conserving the varieties must possess indigenous knowledge associated with the crop. Almost all of the women and adult and elderly men of the community traditionally possess this collective knowledge. The scientists are finding that much of the knowledge built up from observation and experience and transmitted verbally from generation to generation is actually validated in the laboratory.

What benefit will these agrobiodiversity centers contribute? "In addition to conserving threatened genetic resources and ensuring the intellectual property rights of the traditional knowledge," said Tay, "It will be possible to return to the farmers and communities of every area, in every country, virus-free potatoes from the CIP collection that will guarantee the farmers increased productivity. Together, the scientists and the farmers can search for benefits in the sustainable use of this invaluable biodiversity, and develop new concepts to be able to compete adequately in the market"

So thanks to the Route of the Condor, 500 years after the Incas last walked the Qhapaq ñan, it continues to fulfill one of the objectives for which it was constructed: as a means of transportation to guarantee the food security of the people.

Map of the Route of the Condor

Food Security

Balancing the benefits of organic and inorganic fertilization

"Andean farmers are experts in growing potatoes in fields located up to 4200 meters above sea level, where soils are often poor and climatic conditions harsh. They have been doing it for centuries. Despite the region's low potential for crop production, farmers manage to produce enough potatoes to eat, and sometimes to sell, with few inputs aside from their own knowledge, experience and labor.

High Andes farmers marking out their fields for fertilizer experiments

PHOTO BY A.OSWALD

Considering their challenging environment, it comes as no surprise that these small-scale potato farmers seek to produce a crop with acceptable yields even in poor growth conditions. "Their over-riding concerns are stable yields and a stable income," said Andreas Oswald, CIP's Integrated Crop Management expert. They do not give priority to obtaining the highest yields possible. The danger is that farmers run the risk of losing their entire crop, which, in many cases, is their only source of food and income.

With this in mind, CIP and Peru's Instituto Nacional de Innovación Agraria (INIA) have been working closely with resource-poor potato farmers in Peru's Central High Andes over the past few years to capitalize on their knowledge and develop with them better soil and crop management practices. Specifically, the farmers, CIP and INIA are conducting an on-going study that aims to highlight the best ways to increase the efficiency of fertilizer use in low- and high-input systems, thus increasing yield per unit of fertilizer used, reducing expenses

and decreasing environmental damage.

In general terms, organic fertilizers are based on organic compounds from either plants or animals (i.e. manure, compost) while inorganic fertilizers are based on chemical compounds or minerals that are commercially available. However, their price is directly related to the price of energy and crude oil, as could be seen during recent times, when oil, and fertilizer, prices, reached record levels.

Low-input systems involve farmers living in remote areas who produce potatoes mainly for their subsistence and often do not have the resources to buy inorganic fertilizers. These farmers generally use compost and manure and sometimes some small amounts of inorganic fertilizer to maintain the vigor of their crop. A well-managed crop is also less prone to pest and disease attack.

Farmers in high-input systems live close to market centers with road connections to cities, and therefore produce mainly for the market, but also for their subsistence. These farmers use higher amounts of both organic and inorganic fertilizers, as well as commercial pesticides.

In this participatory investigation, the underlying goal is to let the farmers guide the work. Researchers approach farmers, who must be interested in the research and be prepared to provide their land and labor. Material and other inputs are provided by the researchers. That is the bargain. The farmers then evaluate the crops at flowering time and at harvest, using their own criteria. Uniform plant emergence, good, healthy-looking plants are more important to them than best possible yield. During the flowering period they are looking for plants that are flowering really well, with lots of leaves, but they are also looking for certain types of growth habit that are harder to explain. "We try and take their criteria and use them for our evaluation," said Oswald. "This is the basis of the participatory research – understanding how the farmers see things and capturing that knowledge. The farmers benefit by acquiring new technologies and knowledge – so in theory this should be a mutual win-win situation."

The work will have effects in both low- and high-input systems. Increasing productivity in low-input systems gives farmers crop security and a better harvest. Improving the efficiency of fertilizer use in high-input systems means that the farmers use less inorganic fertilizer, for the same productivity and less risk of causing environmental damage.

Study results revealed that the best outcomes were obtained with mixed fertilization, increasing efficiency in both systems. If growth conditions were marginal, organic fertilization could be as effective as inorganic fertilization, whereas under more favorable growth conditions, inorganic fertilization was better than organic fertilization. "However, the highest yields always came with a mixture of organic and inorganic fertilization, never with inorganic fertilizers alone," said Oswald.

The beneficial effects of the two inputs are not only based on the nutrients they contain but also on other attributes of the organic manure, which improve growth conditions and fertilizer use efficiency, underlining the importance of organic matter for sustainable and efficient crop production, especially in low-potential growth conditions.

Manure is essential for the potato crop to be able to use the nutrient supply from inorganic fertilizer effectively. Only a mix of readily available nutrients for plant growth and a source of carbon and other elements stimulating soil life, accomplish the dual task of feeding the crop and the soil simultaneously. Hence, these different types of fertilizers fulfill different functions in maintaining plant growth and sustaining soil fertility under most small-scale farming conditions.

This work and other similar trials are showing that there is a plateau effect in these types of agroecologies so that yields will not increase above a certain level, no matter how much fertilizer is applied. Despite these agroecological limitations, the study confirmed that native potatoes show a clear response to fertilization, both organic and inorganic. This is good news for native potato farmers in Peru, where more than 3800 different native potatoes are grown, most of which possess unique culinary and nutritional properties.

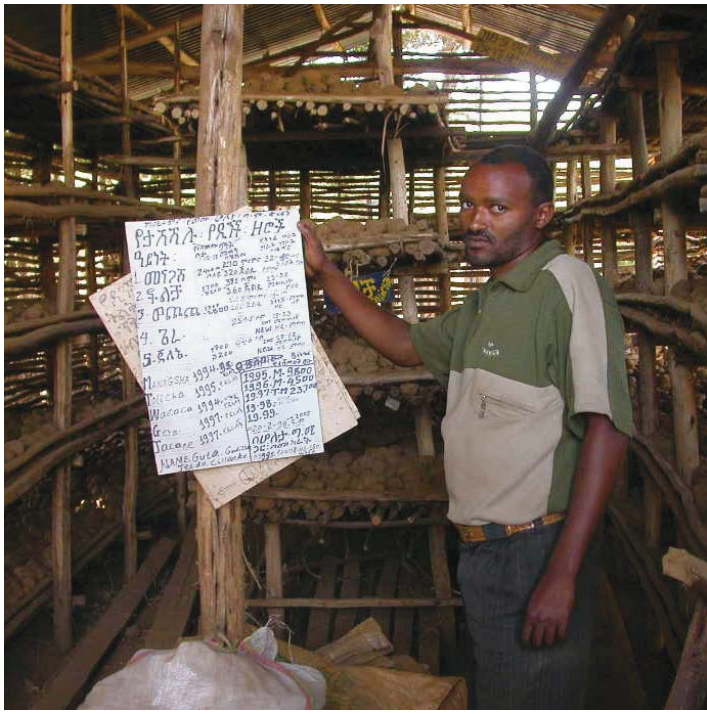
CIP scientists recently initiated a new investigation that aims to reveal how and if farmers can produce effective organic fertilizers, considering their limited resources, what inputs are needed to produce these fertilizers, and their effects on crop productivity. Andreas Oswald is particularly interested in a mixture that the farmers make up, called "biol" in Spanish, using manure, compost, beer, yeast, milk and other ingredients mixed with water and fermented for several months. They spray this direct on to the leaves to encourage growth and vigor.

The over-arching goal of these and similar efforts is to enlist the farmers' participation in obtaining useful information to improve the productivity of crops cultivated by small-scale farmers in developing countries, and therefore improve their income and livelihood. "The work could be a global public good that could be extended to other developing countries," said Oswald.

Food Security Making

lives better for Ethiopia's farmers

"Ethiopian farmers continue to build on their successes with CIP-developed potato varieties. Economic benefits from the CIP varieties released through the Holetta Agricultural Research Center since 1998, along with ongoing training in improved potato production technologies, have transformed the quality of life of farmers and their families in the West Shewa zone in Jeldu, improving living standards, expanding resources and income and diversifying business opportunities.



Guta Gudissa in his diffused light store in Jeldu, Ethiopia

PHOTO BY B. LEMAGA

The Jeldu highlands in central Ethiopia is the main source of seed potatoes of improved varieties in the country. Government organizations, non-governmental organizations, community based organizations and private potato growers buy seed from these seed producers. Some come from as far away as 800 km. More than 200 farmers were involved in seed production in the 2008 main season in West Shewa and more than 270 hectares were covered with the improved varieties, compared to less than 100 hectares in 2007. The Ministry of Agriculture reported production of about 8527 tonnes, with an average yield of 29.7 t/ha.

This success is a result of the concrete efforts of the different stakeholders, which include the Ethiopian Institute of Agricultural Research (EIAR), CIP and PRAPACE, the Regional Potato and Sweetpotato Improvement Network in Eastern and Central

Africa, and the team members of the Ethiopian potato program. The story below looks in detail at one farmer's extraordinary success story, as a way of understanding the impact that growing CIP potato varieties can have on livelihoods.

Guta Gudissa lives and works in the West Shewa Zone of the Jeldu highlands in central Ethiopia. In 2001 his situation was very poor. Without money to complete his education and no land to cultivate crops or raise animals, he was producing a local potato variety that was susceptible to disease, especially late blight, on rented land for very little profit.

After observing the performance of improved potato varieties that other farmers in his district were using, he decided to grow them too. He started with 8 kg of one CIP variety (Tolcha) provided by the Holetta Agricultural Research Center of the Ethiopian Institute of Agricultural Research or simply EIAR. Their training and workshops enabled him to produce clean potato seed for sale and he now grows CIP-origin released varieties both for seed and to sell.

"Potato production is far more profitable than producing other crops," said Guta. In 2008, he cultivated three potato varieties for seed, Jalene, Gudene and Guassa, on 3.6 ha of land which he rented at 4000 Etb per hectare (US$1 = 11/12 Ethiopian birr - Ethb). He harvested 86 tonnes of tubers and sold 52.6 tonnes for seed potato at 450 Etb per 100 kg. "When I calculate the amount of money he got from potato seed alone, it is about US$35 000 just in one season. This is extraordinary," said CIP researcher, Berga Lemarga. "He is going to buy a truck to transport his produce and do some business with it."

Guta kept 10 tonnes of the clean seed for planting next season. The health status of his crop was monitored by regular follow up from the researchers from Holetta Agricultural Research Center and also through the evaluation of potato seed-producing cooperatives in the area. He mainly sells his seed potatoes to NGOs, the Ministry of Agriculture and Rural Development and to individual farmers in the surrounding area, who are willing to buy good seed potatoes with their own money. "Seed potatoes are much more expensive than ware potatoes," said Guta. "In 2008, 100 kg of ware potatoes cost between 180 and 210 Etb, but seed potatoes cost between 400 to 450 Etb." So he is concentrating on producing more disease-free, good quality seed potatoes to generate greater profits to further diversify his business activities. He needs further technical support and training especially in market and in business diversification. He also needs more disease-tolerant and very high-yielding potato varieties than he is using today.

"Guta is the most progressive of all the farmers in the area," said Berga Lemarga, who has been supporting the farmers to get the CIP-derived varieties, knowledge and other technologies and training. "He is making quick, reliable progress. He is progressive because he has some education, he is young, dares to take risks and listens to advice."

His success speaks for itself. He has improved his and his family's living standard. He has built a modern house with round the clock electricity service, good facilities, a color television and furniture. He is paying for his two brothers to follow bachelor's degrees in banking and accounting in Addis Ababa and Bahirdar universities. With his earnings he can support all his extended family.

But Guta is also looking to the future, to build on the firm basis that his potato profits are bringing in, and diversify his businesses. He has established three electrically operated grain mills, bought four more hectares of farm land and constructed improved seed and ware potato storage buildings. The milk from his cows is earning him 1200 Etb per month.

Moreover, he is participating in different research activities in the areas of bee keeping, water harvesting, fattening, temperate fruits production, wheat and barley production. He has now changed his production system towards diversified business. "The experience of Guta and his group is becoming the road map for other farmers in the country to diversify the sources of income for the family," said Gebremedhin Giorgis, the EIAR scientist closely involved in the project. As a result Guta received the Madelia award from the Ethiopian government for his economic achievements, mainly through potato production.

The positive outcome has been significant not only for Guta and his family but for his community too. Guta is a member of seed producer cooperatives and was instrumental in getting 24-h electricity operating in his village. Now he is also giving training to neighboring farmers on improved potato production and handling techniques. He explained why he thinks potato production is better than other crops. "Production per hectare is high. The researchers that have brought us these new technologies have been lifesavers."

CIP's impact

Food Security

CIP impact

CIP Publications - 2008

CIP Outputs - 2008

CIP Outcomes - 2008

CIP Impact Culture - 2008

Publications – 2008

INDICATOR 1:
Composite measure of Center research publications

1A:
Number of externally peer-reviewed publications per scientist in 2008 that are published in journals listed in Thomson Scientific/ ISI (50%) 0.97 papers per scientist.

Indicator 1A – Number of peer-reviewed publications per scientist in Thomson Scientific 2008.doc*

1B:
Number of externally peer-reviewed publications per scientist in 2008 (excluding articles published in journals listed in the Thomson Scientific/ ISI (20%)
- number of externally peer-reviewed publications per scientist in externally published journals and books: 0.45 papers per scientist
- number of externally peer-reviewed publications per scientist in Center-produced book/research report series or journals: 0.00 papers per scientist

- Total number of externally peer-reviewed publications per scientist: 0.45 papers per scientist

List of publications:
Indicator 1B -
Peer-reviewed not in Thomson Scientific 2008.doc

INDICATOR 2: Percentage of scientific papers that are published with developing country partners in refereed journals, conference and workshop proceedings in 2008 43.00 % of scientific papers.

List of publications:
Indicator 1C -
Dev Country co-authors.doc

* Documents available on request from CIP-CPAD@cgiar.org

CIP Outputs – 2008

Monitoring of achievement of MTP output targets in - 2008

PROJECT 01.
IMPACT ENHANCEMENT

Output 01.01
Pro-poor R&D Cycle Validated (2010).

Target 01.01.01 | **Other kinds of knowledge** | **Fully Achieved**

Global trends in potato and options for poverty impacts analyzed and documented.
Comments/Explanations:

Target 01.01.02 | **Other kinds of knowledge** | **Fully Achieved**

Method for geographical targeting to increase probability of poverty impacts through mandate crops validated.
Comments/Explanations:

Target 01.01.03 | **Other kinds of knowledge** | **Fully Achieved**

Sweet potato growers preferences for OFSP planting material and willingness to pay for OFSP vines in Mozambique & Uganda determined.
Comments/Explanations:

Target 01.01.04 | **Policy strategies** | **Fully Achieved**

Opportunity cost of growing OFSP among small farmers in Mozambique determined.
Comments/Explanations:

Output 01.02
Strategies for linking farmers with markets and post-harvest innovations tested and documented (2011).

Target 01.02.01 | **Practices** | **Fully Achieved**

Approach for developing social responsibility in potato market chain in the Andes validated (with Papa Andina).
Comments/Explanations:

Target 01.02.02 | **Other kinds of knowledge** | **Fully Achieved**

Strategy for using Participatory Market Chain Approach to enhance small farmers livelihoods in the Andes available to NARS (with Papa Andina).
Comments/Explanations:

Output 01.03
Pro-poor policies and strategies for institutional learning and change identified and documented (2012).

Target 01.03.01 | **Materials** | **Fully Achieved**

Training method for sharing knowledge between the Andes and Africa analyzed and documented (Papa Andina).
Comments/Explanations:

Target 01.03.02 | **Materials** | **Fully Achieved**

Learning materials for science education on OFSP in Uganda developed.
Comments/Explanations:

Target 01.03.03 | **Other kinds of knowledge** | **Fully Achieved**

Ex-ante study of potential role of institutional changes and participatory research in agricultural innovation system in China.
Comments/Explanations:

PROJECT 02.
GENETIC RESOURCES CONSERVATION AND CHARACTERIZATION

Output 02.01
New wild and cultivated genetic resources of several crops (potato, sweetpotato and nine other root and tuber crops) are collected with their associated information, securely conserved and made available by 2010.

Target 02.01.01 | **Materials** | **< 50% Achieved**

Ten wild potato species populations collected in Southern Peru, 10 wild or cultivated maca, 20 yacon and mashua accessions acquired.

Comments/Explanations:

We are still waiting for permission of Peruvian governmental agency INRENA. The expedient number 02419-8 (INRENA). www.inrena.gob.pe

Target 02.01.02 | **Please select...** | **Cancelled**

Duplicate set of 100 sweetpotato landraces from the Philippines transferred to CIP genebank for back up storage for the UPWARD network.

Comments/Explanations:

Post entry quarantine problems.

Target 02.01.03 | **Materials** | **Fully Achieved**

Eighty potato and 50 sweetpotato accessions cryopreserved in CIP genebank, 100 oca, ulluco and mashua accessions conserved under low temperature and slow growth storage.

Comments/Explanations:

Target 02.01.04 | **Materials** | **Fully Achieved**

Three hundred wild potato and 200 sweetpotato accessions from the *in vitro* and botanical seeds respectively from CIP genebank regenerated.

Comments/Explanations:

Target 02.01.05 | **Materials** | **Fully Achieved**

Virus-free stocks of 300 potato, 200 sweetpotato and 50 other roots and tubers accessions produced.

Comments/Explanations:

Target 02.01.06 | **Materials** | **Fully Achieved**

Virus-free stocks distributed worldwide, including distribution to farmer communities in Peruvian Highlands, Potato Park and East and SE Asia countries.

Comments/Explanations:

Target 02.01.07 | **Materials** | **>50% Achieved**

An illustrated atlas of wild potato *Solanum* Section *Petota* published.

Comments/Explanations:

In process of editing and printing. Funds are needed for this purpose.

Target 02.01.08 | **Practices** | **Fully Achieved**

Practices and guidelines to improve technological, institutional and policy support to *ex situ* and *in situ* on-farm sweetpotato conservation in the Philippines are identified and field-validated.

Comments/Explanations:

Target 02.01.09 | **Materials** | **>75% Achieved**

Central germplasm database updated and made available to external users (access via latest SINGER information exchange protocols and search and reporting facilities according to the SMTA).

Comments/Explanations:

There is information missing and we are working on it in order to update the corporate database.

Target 02.01.10 | **Please select...** | **Fully Achieved**

Geo-referenced information, evaluation and molecular data are linked to CIP central germplasm database updated and made available to external users.

Comments/Explanations:

Target 02.01.11 | **Materials** | **>75% Achieved**

Identification of sweetpotato duplicate accessions using morphological descriptors and molecular markers completed.

Comments/Explanations:
Some plants have not produced roots and flowers.

Target 02.01.12 **Other kinds of knowledge** **Fully Achieved**

500 common names and geographic positions of native potato are verified and central germplasm database updated and made available to external users.
Comments/Explanations:

Target 02.01.13 **Materials** **Fully Achieved**

Duplicate accessions (100 potato and 80 sweetpotato landraces) converted into seeds for long-term conservation.
Comments/Explanations:

Target 02.01.14 **Other kinds of knowledge** **Fully Achieved**

Geo-referenced information on potato, sweetpotato and ARTC collections placed on line.
Comments/Explanations:

Target 02.01.15 **Materials** **>75% Achieved**

Safety backup of in trust potato, sweetpotato and ARTC landrace collections renewed and procedures refined.
Comments/Explanations:
Some accessions require additionally health status testing for international distribution. This is going on and a safety back up is being stablished in Huancayo Tissue Culture Laboratory.

Target 02.01.16 **Capacity strengthening** **Fully Achieved**

Upgraded version of bar-code system developed at CIP available and in place in CGIAR partner genebank institutions.
Comments/Explanations:
One institution, CIMMYT, did not want to participate further in bar-code implementation and did not send a participant. Some others, ICRISAT, WARDA, ILRI, ICARDA, IITA, are still in process.

Target 02.01.17 **Practices** **>50% Achieved**

Best practices for germplasm documentation management (including statistical quality control of processes and reproducibility of analytical protocols) published.
Comments/Explanations:
Best practices on statistical process management to be done; a student started working on this. Working documents are published on-line so far (see link); two formal publications are pending.

Target 02.01.18 **Materials** **>50% Achieved**

300 oca, ulluco and mashua specimens documented in the herbarium collection.
Comments/Explanations:
Delivery of output delayed because funds were shifted to other activities.

Output 02.02
The genetic diversity of potato, sweetpotato and nine other root and tuber crops is characterized and documented by 2010.

Target 02.02.01 **Other kinds of knowledge** **< 50% Achieved**

Over one hundred fifty potato landraces from Altiplano communities are characterized morphologically.
Comments/Explanations:
It has not been able to advance because the INIA-Punos administration was in the process of making decisions to implement the project.

Target 02.02.02 **Other kinds of knowledge** **Fully Achieved**

Molecular fingerprints with at least 24 microsatellite markers of 500 potato landraces from CIP genebank made available through internet.
Comments/Explanations:

Target 02.02.03 **Other kinds of knowledge** **Fully Achieved**

The identity of 500 cultivated potato accessions verified using morphological descriptors; and one set of 50 accessions analyzed using molecular markers.
Comments/Explanations:

Target 02.02.04 | **Materials** | **Fully Achieved**

Assessment of the genetic diversity and relatedness between *S. bukasovii* populations and primitive potato cultivars documented.

Comments/Explanations:

Target 02.02.05 | **Other kinds of knowledge** | **Fully Achieved**

Molecular characterization database integrated to the central germplasm database.

Comments/Explanations:

Target 02.02.06 | **Other kinds of knowledge** | **Fully Achieved**

Homologation of yacon and arracacha collections of 7 genebanks from Peru and Bolivia is assessed using molecular markers and documented.

Comments/Explanations:

Target 02.02.07 | **Materials** | **Fully Achieved**

Ploidy level of 200 wild and 500 cultivated potato accessions determined.

Comments/Explanations:

Target 02.02.08 | **Materials** | **>50% Achieved**

Homologation of 300 oca accessions from INIA-Peru and CIP genebank is assessed and documented.

Comments/Explanations:

Delivery of output delayed because funds were shifted to other activities.

Target 02.02.09 | **Materials** | **>50% Achieved**

The identity of 80 oca and 30 ulluco accessions verified using standard descriptor lists; and one set of 30 accessions analyzed using molecular markers.

Comments/Explanations:

Delivery of output delayed because funds were shifted to other activities.

Target 02.02.10 | **Practices** | **>75% Achieved**

DIVA-GIS upgraded through better integration with CIP corporate database and through inclusion of new analytical and visualization tools to support analysis of new data.

Comments/Explanations:

Joint activity with Div 4 on using DIVA-GIS to support spatially explicit pest modeling: the tool was finally developed into a separate product called ILCYM (100%, 1st version in December 2008). Joint activity with Div 3 on using DIVA-GIS to visualize spatial patterns of haplotypes. Coordinated activities with French collaborators from CIRAD under Generation Challenge Program. Expect to finish Feb. 2009

Target 02.02.11 | **Other kinds of knowledge** | **< 50% Achieved**

An interactive training manual of geostatistical methods for analysis of plant genetic resources completed.

Comments/Explanations:

Unexpected departure of key staff member

Output 02.03

Selected genepools of root and tuber crops are evaluated for breeders ' traits of interest, nutritional and health-related attributes by 2010.

Target 02.03.01 | **Materials** | **Fully Achieved**

Resistance to virus diseases evaluated for 30 *Solanum* accessions from the Piurana group (for PVY) and 80 *Ipomoea* landrace accessions (for SPVD) and documented.

Comments/Explanations:

Target 02.03.02 | **Other kinds of knowledge** | **Fully Achieved**

Environmental effect on yield and primary (proteins, carbohydrates, fat, ash) metabolites and glucosinolates content of 4 maca ecotypes documented.

Comments/Explanations:

Target 02.03.03 | **Other kinds of knowledge** | **Fully Achieved**

The use of yacon as food supplement (assessed for gastrointestinal motility in humans) is documented.

Comments/Explanations:

Target 02.03.04 | **Other kinds of knowledge** | **Fully Achieved**

Assessment of pesticide impact on the reproductive ability of 15 accessions belonging to 8 wild potato species documented.

Comments/Explanations:

Target 02.03.05 | **Materials** | **Fully Achieved**

Inheritance of resistance to PRLV of 4 wild potato species from *Solanum* Section *Petota* determined and documented.

Comments/Explanations:

Target 02.03.06 | **Materials** | **>50% Achieved**

Protein content of 50 mashua accessions, and essential amino acids of promising cultivars determined.

Comments/Explanations:

Delivery of output delayed because funds were shifted to other activities.

Target 02.03.07 | **Capacity strengthening** | **Fully Achieved**

Relationships between spatial and environmental data of potato and its pests and diseases resistances investigated and documented.

Comments/Explanations:

Target 02.03.08 | **Other kinds of knowledge** | **Fully Achieved**

Internet accessible germplasm database complemented with trait evaluation data.

Comments/Explanations:

PROJECT 03.
GERMPLASM ENHANCEMENT AND CROP IMPROVEMENT

Output 03.01
Effective strategies for the identification and dissemination of high-yielding, resistant and nutritious potato and sweetpotato varieties available for each CIP region (3-5 years).

Target 03.01.01 | **Materials** | **Fully Achieved**

New collaborative schemes for clonal testing and variety development are available and documented in SWCA.

Comments/Explanations:

Target 03.01.02 | **Materials** | **Fully Achieved**

5-10 elite late blight resistant clones available and established in validation trials for variety release in ESEAP and SSA.

Comments/Explanations:

Target 03.01.03 | **Practices** | **Fully Achieved**

Method for participatory trials for sweetpotato variety release available and initiated in SWCA.

Comments/Explanations:

Target 03.01.04 | **Materials** | **>75% Achieved**

Strategy for promotion and diffusion of varieties completed for two additional countries in SSA.

Comments/Explanations:

It is a new approach for variety difusion linked to seed systems with pivaste sector and milestones are doumented each year starting in late 2007.

Target 03.01.05 | **Materials** | **Fully Achieved**

DNA fingerprint datasets available with elite clones distributed from CIP.

Comments/Explanations:

Target 03.01.06 | **Materials** | **Fully Achieved**

Database of resistance, yield, post-harvest and nutritional attributes from Standard Evaluation Trials of 250 advanced clones developed in the last 15 years of CIP breeding.

Comments/Explanations:

Target 03.01.07 | **Practices** | **Fully Achieved**

Variety uptake pathways documented in 2 LAC countries.

Comments/Explanations:

Target 03.01.08 | **Other kinds of knowledge** | **Fully Achieved**

End-user acceptability criteria for potato varieties in Mozambique and Malawi documented.

Comments/Explanations:

Target 03.01.09 | **Materials** | **Fully Achieved**

An online database (catalogue) for publishing and communicating descriptions of CIP-derived elite clones and varieties available.

Comments/Explanations:

Target 03.01.10 | **Materials** | **Fully Achieved**

Adaptability of new TPS families evaluated in different environments in two SWA countries.

Comments/Explanations:

Output 03.02

Potato populations, progenitors, clones and true seed varieties with superior resistance, nutritional and end-use quality characteristics are developed for SSA, LAC, ESEAP and SWCA.

Target 03.02.01 | **Practices** | **Fully Achieved**

An *in vitro* screening method for early identification of families and clones that tuberize well under warm conditions is available.

Comments/Explanations:

Target 03.02.02 | **Practices** | **Fully Achieved**

A greenhouse screening method for early identification of families and clones that tuberize well under long day and warm conditions is validated and available.

Comments/Explanations:

Target 03.02.03 | **Materials** | **Fully Achieved**

Ten new elite clones combining LB and virus resistances are available for multilocation trials for variety selection in 3 countries in SSA.

Comments/Explanations:

Target 03.02.04 | **Practices** | **Deferred**

A multi-trait selection scheme is proposed for combining production, protection and utilization traits in CIP advanced germplasm.

Comments/Explanations:

Deferred to 2010.

Target 03.02.05 | **Other kinds of knowledge** | **Fully Achieved**

Molecular markers closely linked to PLRV resistance in *S. tuberosum* subsp. *andigena* and able to be converted for MAS are identified.

Comments/Explanations:

Target 03.02.06 | **Materials** | **Fully Achieved**

Four TPS families with late blight resistance and high dry matter are identified for subtropical highland agro-ecologies.

Comments/Explanations:

Target 03.02.07 | **Practices** | **>75% Achieved**

Molecular markers available to assist and expedite selection of *Ry* for extreme resistance to PVY.

Comments/Explanations:

Need to put in practice the plex-assay for M6 markers (expected in the first quarter of 2009)

Target 03.02.08 | **Materials** | **>75% Achieved**

Diploid progenitors of late blight resistance from *Solanum piurana* are characterized for use in interploid crosses.

Comments/Explanations:

Agronomic characterization of resistant hybrids is pending completion for early 2009. Following evaluation of fertility in 2007, resistance evaluations were completed in April 2008, and only then could agronomic evaluations be conducted. In summary, the pace of the consecutive series of trials was slower than anticipated. The major reason was inconsistent funding for pre-breeding

Target 03.02.09 | **Materials** | **Fully Achieved**

Potato populations segregating for nutritional quality from native Andean potatoes documented

(with HarvestPlus).
Comments/Explanations:

Target 03.02.10 | **Other kinds of knowledge** | **Fully Achieved**

Mutant genetic stocks of potato are screened for at least one trait value.
Comments/Explanations:

Target 03.02.11 | **Other kinds of knowledge** | **>50% Achieved**

Features of selected potato mutants are characterized at the molecular level.
Comments/Explanations:
Internal planning errors led to slippage in achieving output target.

Target 03.02.12 | **Other kinds of knowledge** | **Fully Achieved**

Loci and alleles conferring LB resistance from wild species and improved germplasm are identified and characterized by genetic mapping and expression analysis.
Comments/Explanations:

Target 03.02.13 | **Materials** | **Fully Achieved**

Micronutrient concentrations of 30 potato varieties of world importance, samples of advanced breeding populations, and popular Andean native varieties are documented (with HarvestPlus).
Comments/Explanations:

Target 03.02.14 | **Capacity strengthening** | **Fully Achieved**

Correlations among vitamin C, phenolics and Fe bioavailability in potato estimated by *in vitro* methods (with HarvestPlus)/
Comments/Explanations:

Target 03.02.15 | **Capacity strengthening** | **>50% Achieved**

Bioavailability of Fe in potato and potato based diets is estimated using *in vitro* methods (with HarvestPlus).
Comments/Explanations:
The study about the bioavailability of Fe in potatoes was done but the Fe bioavailability of potato based diets could not be achieved due to financial problems.

Target 03.02.16 | **Materials** | **Fully Achieved**

Adaptation of advanced clones with mid-high Fe and Zn contents to Central Asia environments assessed (with HarvestPlus).
Comments/Explanations:

Target 03.02.17 | **Materials** | **Fully Achieved**

Information on complementary nutritional traits of sets of potato clones available for Andean systems and crop improvement (with HarvestPlus).
Comments/Explanations:

Output 03.03
Sweetpotato populations and clones with superior agronomic, nutritional and end-use quality characteristics are developed for SSA, LAC, ESEAP and SWCA and breeding methods tools, information and capacities are enhanced (3 – 5 years).

Target 03.03.01 | **Materials** | **< 50% Achieved**

Adaptation of introduced (84 OFSP clones with > 150 ppm pro-vitamin A) and local Southern African OFSP breeding clones is documented (with HarvestPlus, VITAA).
Comments/Explanations:
Data not yet available from partner.

Target 03.03.02 | **Materials** | **Fully Achieved**

4000 clones (majority OFSP) screened at IIAM for drought tolerance.
Comments/Explanations:

Target 03.03.03 | **Please select...** | **Cancelled**

Adaptation of introduced (84 OFSP clones with > 150 ppm pro-vitamin A) and local East African OFSP breeding clones is documented (with HarvestPlus, and VITAA).
Comments/Explanations:

The target was not met for 2008 because results will depend on at least two years of field data and the respective analysis which can be completed in 2009.

Target 03.03.04 **Practices** **>50% Achieved**

Adaptation of introduced (84 OFSP clones with > 150 ppm pro-vitamin A) and local SWCA OFSP breeding clones is documented (with HarvestPlus).

Comments/Explanations:

The establishment of SP clones received from Lima took more time than expected in the local conditions in Bangladesh.

Target 03.03.05 **Materials** **>50% Achieved**

Adaptation of introduced (84 OFSP clones with > 150 ppm pro-vitamin A) and local ESEAP OFSP breeding clones is documented (with HarvestPlus).

Comments/Explanations:

Local institute cannot multiply enough materials for all the clones at the same time.

Target 03.03.06 **Materials** **>50% Achieved**

OFSP varieties identified for pig and small animal feed systems in ESEAP countries.

Comments/Explanations:

OFSP in Indonesia is not fully achieved because it is postponed due to transition period (office move to Lembang). The materials were received from CIP-HQ in Pathogen Tested (tissue culture) state in the middle of 2007. It took time for acclimatization, multiplication process to produce enough cuttings for evaluation at three sites such as Malang (ILETRI), Bogor (IPB), and Bandung. The experiment in Bogor has been harvested and the report will be submitted Malang and Bandung are going to harvest last week February.

Target 03.03.07 **Materials** **< 50% Achieved**

Adaptation of introduced (84 OFSP clones with > 150 ppm pro-vitamin A) and local LAC OFSP breeding clones is documented.

Comments/Explanations:

Germplasm shipment and partner receipt problems have led to delays. New internal management systems of shipment should solve this problem and target will be achieved.

Target 03.03.08 **Practices** **Fully Achieved**

25 elite demonstration clones including new OFSP elite clones available for all 115 sweetpotato producing countries (with HarvestPlus, VITAA).

Comments/Explanations:

Target 03.03.09 **Materials** **Fully Achieved**

"VA-2" generation comprising 300 seed families with improved high beta-carotene, medium iron & zinc and high dry matter available and tested for SSA and LAC (with HarvestPlus).

Comments/Explanations:

Target 03.03.10 **Materials** **Fully Achieved**

200 promising drought-tolerant clones with medium to high dry matter, beta carotene, Fe and Zn content identified in VA-1x breeding population for LAC and SSA (with HarvestPlus).

Comments/Explanations:

Target 03.03.11 **Materials** **Fully Achieved**

"VA-E1x" generation comprising 8 x 1000 elite seed crossings with high drymatter, high beta-carotene, medium iron and zinc populations developed and available for all CIP regions (with HarvestPlus).

Comments/Explanations:

Target 03.03.12 **Materials** **Fully Achieved**

4 OFSP pre-breeding populations carrying a new source of resistance to SPVD are available (with GCP).

Comments/Explanations:

Target 03.03.13 **Practices** **>75% Achieved**

Rapid NIRS screening network for HP crops (sweetpotato: ß-carotene, Fe and Zn, potato: Fe and Zn, beans: iron and zinc; cassava: ß-carotene; maize: ß-carotene, ß-cryptoxanthin) established in LAC, and selected SSA countries (with HarvestPlus).

Comments/Explanations:

Shipping delay caused by phytosanitary regulation changes delayed implementation.

Target 03.03.14 | **Practices** | **>75% Achieved**

Rapid NIRS screening network for sweetpotato quality (storage roots and tops) – protein, starch, sugars, beta-carotene, Fe and Zn established in East Africa, Southern Africa and India (with HarvestPlus).
Comments/Explanations:
All data and information are available and are used in routine at CIP Lima-HQ. Thomas zum Felde will travel to African countries beginning of 2009 and will install the available NIRS calibrations for sweetpotato quality-protein, starch, sugars, beta-carotene, Fe, Zn- in order to use it in a NIRS quality network.

Target 03.03.15 | **Practices** | **>50% Achieved**

Rapid NIRS screening methods for water use efficiency (WUE) in sweetpotato tested.
Comments/Explanations:
Experiment carried out. Reference values for NIRS calibration developement not available yet.

Output 03.04
Transgenic potatoes and sweetpotatoes for resource-poor producers and consumers are developed and tested using good practices (3-5 years).

Target 03.04.01 | **Practices** | **>75% Achieved**

Heat shock parameters for excision of antibiotic selectable marker with the Cre-loxP system determined for sweetpotato.
Comments/Explanations:
Only incomplete excisions obtained. Further research required to find out why.

Target 03.04.02 | **Materials** | **Fully Achieved**

Plant transformation vector with freedom to operate in specific African countries is available.
Comments/Explanations:

Target 03.04.03 | **Other kinds of knowledge** | **Fully Achieved**

Evidence for the naturalization of cultivated potatoes in the Andean highlands is described.
Comments/Explanations:

Target 03.04.04 | **Materials** | **>50% Achieved**

31 and 48 events of the varieties Revolución and Parda Pastusa respectively are identified with known copy number of the *cry1Ab5* gene.
Comments/Explanations:
Budget differed to priority activity in other target.

Target 03.04.05 | **Please select...** | **Fully Achieved**

Stability of RNA silencing mediated PLRV resistance under infection of alternative viruses is determined.
Comments/Explanations:

Target 03.04.06 | **Materials** | **>50% Achieved**

Reaction to LB of transgenic potato with the *Rp-blb1* gene under *in vitro* or greenhouse conditions is described.
Comments/Explanations:
We achieved the identification of RB Desiree plants and have propagated these in the greenhouse. However, cuttings and lower temperature are still needed before a greenhouse infection with Pi isolate can be done. We expect this to be achieved during the first semester of 2008.

Target 03.04.07 | **Other kinds of knowledge** | **Cancelled**

At least ten events of the second transformation of transgenic lines with construct CYP79/F2A/CYP83/T2A (new construct) are obtained.
Comments/Explanations:
The gene construct CYP79/F2A/CYP83/T2A referred into this output target was not provided to us by the partner due to unexpected technical problem.

Target 03.04.08 | **Other kinds of knowledge** | **Fully Achieved**

Molecular variability of SPFMV in Peru characterized and documented.
Comments/Explanations:

Target 03.04.09 | **Materials** | **Fully Achieved**

Sweetpotato events transformed with new constructs for SPCSV resistance (with phloem specific promoter) are available for testing.

Comments/Explanations:

Target 03.04.10 | **Materials** | **Fully Achieved**

Proceedings of the regional workshop on Sweetpotato Biotechnology for Africa published.

Comments/Explanations:

Target 03.04.11 | **Other kinds of knowledge** | **Fully Achieved**

Natural siRNA defense targeting of sweetpotato to SPFMV and SPCSV determined.

Comments/Explanations:

Target 03.04.12 | **Materials** | **Fully Achieved**

Novel gene constructs based on si RNA targeting profile developed.

Comments/Explanations:

PROJECT 04.
INTEGRATED CROP MANAGEMENT

Output 04.01
Strategies and technologies for improving formal and farmer-based seed systems towards enhancing potato and sweetpotato production efficiency and competitiveness validated in at least three priority countries per region in LAC, SSA and Asia by 2012.

Target 04.01.01 | **Practices** | **>75% Achieved**

Procedures for installation and operation of simple aeroponic units suitable for rapid multiplication of potato seed minitubers developed.

Comments/Explanations:

Draft only - needs checking by collaborators

Target 04.01.02 | **Other kinds of knowledge** | **>75% Achieved**

Seed systems for native potatoes characterized in Peru.

Comments/Explanations:

Data from national programs (INIAs) is missing despite the information being requested in advance. We expect to complete the information in the first trimester of 2009.

Target 04.01.03 | **Capacity strengthening** | **>75% Achieved**

NARS capacities and role of disease detection techniques for potato and sweetpotato seed production assessed in at least three countries per region.

Comments/Explanations:

In Georgia, work has not been easily carried out this year due to well-known reasons. Local advisors could not travel throughout the country, especially at harvest that was conducted in a hurry. Therefore, some data concerning negative selection have not been gathered.

Target 04.01.04 | **Policy strategies** | **>50% Achieved**

Potato seed policies and certification legislation in relation to formal and informal seed systems analyzed in at least two countries per region.

Comments/Explanations:

Some documents awaiting translation. Will be completed by February 2009.

Output 04.02
Strategies and methods for technical integration of soil, seed, disease and insect management components for subsistence and semi-commercial potato and sweetpotato growers developed in at least three priority countries per region in LAC, SSA and Asia by 2012.

Target 04.02.01 | **Practices** | **>75% Achieved**

Plant growth promoting rhizobacteria (PGPR) assessed for their ability and usefulness to increase productivity and plant health of potato in Peru (with Papa Andina).

Comments/Explanations:
The plant health component of the output target could not be finalized, because the student involved abandoned his work.

Target 04.02.02 **Practices** **>75% Achieved**

Strategies for conservationist agriculture and soil fertility management developed to reduce effects of erratic rainfall and other climatic risks in potato based systems in Peru (with Papa Andina), and sweetpotato-based systems in Uganda and Kenya.
Comments/Explanations:
The activities in sweetpotato in Uganda and Kenya could not be implemented because of lack of personnel and funds.

Output 04.03
Components for integrated disease management against potato and sweetpotato diseases – late blight (LB), bacterial wilt (BW) and viruses – developed, tested and disseminated within ICM strategies in at least three priority countries per region LAC, SSA and Asian priority countries by 2012.

Target 04.03.01 **Materials** **Fully Achieved**

GIS-based Late Blight severity maps developed.
Comments/Explanations:

Target 04.03.02 **Other kinds of knowledge** **Fully Achieved**

Potential for gene flow among different populations of *P. infestans* in Andes determined.
Comments/Explanations:

Target 04.03.03 **Other kinds of knowledge** **Fully Achieved**

Cultivar-specific simulation of potato LB achieved and validated via experiments in Peru and Ecuador with specific resistance parameters of 3 local cultivars.
Comments/Explanations:

Target 04.03.04 **Practices** **Fully Achieved**

Efficacy of environmentally friendly LB management using phosphites and seed treatment in Ecuador.
Comments/Explanations:

Target 04.03.05 **Practices** **Fully Achieved**

Strategies for integrated management of LB validated with NARS in Kenya, Uganda, Ethiopia, Rwanda, Burundi and DR Congo.
Comments/Explanations:

Target 04.03.06 **Practices** **Fully Achieved**

Real time PCR for sweetpotato chlorotic stunt and feathery mottle virus diagnosis developed and validated.
Comments/Explanations:

Target 04.03.07 **Practices** **Fully Achieved**

One strategy to control SPVD in sweetpotatoes validated in Uganda and Tanzania.
Comments/Explanations:

Target 04.03.08 **Practices** **Fully Achieved**

Quality accreditation manuals and standard operation procedures for testing quarantine viruses in potato and sweetpotato germplasm suitable for ISO accreditation developed.
Comments/Explanations:

Output 04.04
Components and strategies for the integrated management of key potato and sweetpotato insect pests developed as part of ICM in at least three priority countries per region LAC, SSA and Asia priority countries by 2012.

Target 04.04.01 **Practices** **>75% Achieved**

The potential of entomopathogens (nematode, PoGV) assessed for *T. solanivora* control in Ecuador.
Comments/Explanations:

This output target consists of three working papers compiled as draft publications. Field experiments should be repeated to confirm results for entomopathogenic nematodes; best results for storage control should be tested under farmers storage conditions.

Target 04.04.02 **Practices** **>75% Achieved**

The efficacy of attracticides based on oil formulations of PTM sex pheromones, UV protectors and contact insecticides for the control of the PTM complex (*P. operculella, S. tangolias, T. solanivora*) evaluated in Ecuador and Peru.

Comments/Explanations:

For PTM and APTM the output target is achieved by 90%; some more field and storage trials should be conducted before publishing these data. For *Tecia solanivora* the technolgy is more difficult to adapt and develop. More research is needed here: achievement is about 30%.

Target 04.04.03 **Practices** **>75% Achieved**

Biology and ecology of potential parasitoids for classical biocontrol of LMF assessed and specimens introduced to Kenya.

Comments/Explanations:

Temperature studies for the species *Halticoptera arduine* are almost completed and documented.

Target 04.04.04 **Practices** **Fully Achieved**

The ecological and economical impacts of physical barriers for APW control assessed in Peru, Bolivia and Ecuador.

Comments/Explanations:

Target 04.04.05 **Practices** **>50% Achieved**

Impact of insecticides on natural enemies of potato pests in the highlands and coastal regions of Peru investigated and documented.

Comments/Explanations:

For the achievement of this output target two WPs are in preparation and to 60% completed. They will be finished until end of February 2009.

Target 04.04.06 **Practices** **Fully Achieved**

Potato pest problems and post harvest practices of potato farmers in Nepal, Bhutan and Bangladesh understood and biological control options appropriate for resource-poor farmers identified; action plan for research and IPM technology interventions developed.

Comments/Explanations:

Target 04.04.07 **Materials** **Fully Achieved**

Distribution and importance of potato pests (esp. CPB) and natural enemies assessed and documented in the main potato production areas of Uzbekistan.

Comments/Explanations:

Target 04.04.08 **Practices** **Fully Achieved**

The leafminer fly-parasitoid complex and diversity on weeds in potato agroecosystems at the Peruvian coast investigated and documented and used for developing LMF IPM strategies.

Comments/Explanations:

Output 04.05

Participatory strategies and methods for socioeconomic integration of potato and sweetpotato ICM components developed and made available for improving potato and sweetpotato innovation systems in at least three priority countries per region LAC, SSA and Asia by 2010.

Target 04.05.01 **Other kinds of knowledge** **>75% Achieved**

Guidelines to support decision-making by research and extension institutions regarding the use of participatory methods for potato and sweetpotato ICM available (extracted from experiences in Peru, Bolivia, Uganda, Ethiopia, Vietnam, Philippines, Indonesia, Lao PDR).

Comments/Explanations:

This guideline is a synthesis of the work conducted between 2004 and 2007 in the IFAD-funded project related to participatory research methods. The work was accomplished, but the preparation

of the guideline has taken more time than expected. A preliminary version of the guideline has been uploaded, but a more refined version is expected to be in the system in February 2008.

Target 04.05.02 **Other kinds of knowledge** **< 50% Achieved**

Manual on methodologies for participatory learning and research on LB adapted for farmer training in Uganda, China, DPRK, Mongolia and Indonesia.

Comments/Explanations:

This part of the work was not accomplished because 2008 has been a transition period for Berga Lemaga, who was supposed to work on ICM-related issues in 2008, but the plans changed when he started to be in charge of the CFC project with no time to conduct this work.

Target 04.05.03 **Other kinds of knowledge** **Fully Achieved**

Manual for evaluating impact of IPM interventions validated in cases of technologies to control white fly in Bolivia, Ecuador and El Salvador (collaboration with CIAT and System Wide Program on IPM).

Comments/Explanations:

Target 04.05.04 **Other kinds of knowledge** **>75% Achieved**

Cases of scaling-up of participatory research and training methods for potato ICM assessed and documented in Peru.

Comments/Explanations:

An MSc. research thesis was conducted during 2008. The field work was concluded and the elaboration of the dissertation has started. At the moment we are uploading a preliminary report of the work done so far. The thesis is expected to be defended in March 2009.

Target 04.05.05 **Other kinds of knowledge** **>75% Achieved**

Simple model to support decision-making by research and extension institutions regarding choices of potato ICM technologies validated in Peru.

Comments/Explanations:

This year, a synthesis of the work conducted in the three previous years was documented. However, the lack of time and the fact that I did not have a full-time research assistant working on this topic in 2008 prevented us from accomplishing 100% of the output.

PROJECT 05. NATURAL RESOURCES MANAGEMENT

Output 05.01
Geospatial methods and computer assisted tools for improved research targeting, crop assessments and Environmental Vulnerability Analyses, preparedness and mitigation in the Andes, SSA and SWCA developed (By 2011).

Target 05.01.01 **Practices** **>50% Achieved**

Effectiveness of partial root drying (PRD) irrigation method for potato and sweetpotato in Peru established.

Comments/Explanations:

Further analysis of completed experimental work will be carried out soon. We are planning to conduct more field work in order to confirm previous results.

Target 05.01.02 **Practices** **>50% Achieved**

Protocol for geospatial temperature interpolation based on RS data and biophysical–mathematical tools developed.

Comments/Explanations:

The development of the protocol for geospatial temperature interpolation is under way. Some delays are due to the necessary refinement of the mathematical procedures.

Target 05.01.03 **Practices** **>75% Achieved**

Methods and tools for potato yield forecasting combining RS and modeling finalized and validated in the Andes.

Comments/Explanations:

The potato growth model is parameterized and validated. However, we are still working on the parameterization of the model with the RS data.

Output 05.02
Management recommendations and policy options to reduce environmental and economic vulnerability in representative priority ecosystems in LAC, East Africa, India and Bangladesh tested and documented (By 2010).

Target 05.02.01	Practices	Fully Achieved

Minimum Data-Tradeoff Analysis application in potato systems in the Andes and environmental services in watersheds in Mesoamerica conducted (with Montana State and Wageningen universities).
Comments/Explanations:

Target 05.02.02	Policy strategies	>50% Achieved

MD-TOA application in rice-potato systems in India and Bangladesh conducted (with Montana State and Wageningen universities).
Comments/Explanations:
Due to lack of funding, the work could not be executed in the mixed cropping systems of India and Bangladesh. However some methodological developments were done in western Kenya, applying MD-TOA to the mixed cropping system there.

PROJECT 06.
AGRICULTURE AN HUMAN HEALTH

Output 06.01

Target 06.01.01	Practices	< 50% Achieved

Relative effectiveness of different intervention components in reducing toxic pesticide health effects in potato production systems documented for Ecuador communities
Comments/Explanations:
Incomplete as there were delays in analysis and writing.

Target 06.01.02	Other kinds of knowledge	Fully Achieved

Stakeholders' perceptions of agro-ecosystem function, factors affecting net productivity and sustainability including hazardous pesticide use determined for intensive horticultural systems in metropolitan areas of Bolivia, Ecuador and Peru
Comments/Explanations:

PROJECT 07.
ECOREGIONAL PROGRAM CONSORTIUM FOR THE SUSTAINABLE DEVELOPMENT OF THE ANDEAN ECOREGION (CONDESAN)

Output 07.01
Policies and local, national and regional recommendations for improved integrated water resource management (IWRM) in Andean countries from Venezuela to Argentina scaled up and out by 2010.

Target 07.01.01	Other kinds of knowledge	Fully Achieved

Conceptual-analytical framework developed to systematize and carry out comparative analysis of IWRM successful case studies (with CIP Project 1; Paramo and ANDES-CPWF).
Comments/Explanations:

Target 07.01.02	Practices	Fully Achieved

Scaling up and out mechanisms for better practices for IWRM designed (with CIP Project 1).
Comments/Explanations:

Target 07.01.03	Practices	>50% Achieved

Results of the implementation of methodologies for improved IWRM such as Watershed analysis for territorial planning or Compensation for ecosystem hydrological services schemes documented for 4 basins (with CIP Project 5 and ANDES-CPWF).
Comments/Explanations:
The CPWF-ANDES synthesis report for 2008 is going to be ready at the end of January 2009

Target 07.01.04 | **Practices** | **Fully Achieved**

Water-related causes of poverty documented for two basins in the Andes (with ANDES-CPWF).
Comments/Explanations:

Target 07.01.05 | **Other kinds of knowledge** | **Fully Achieved**

Water yield and water regulation in Paramo and upper mountain forest and its relation to land use changes documented (with Paramo Initiative).
Comments/Explanations:

Target 07.01.06 | **Materials** | **< 50% Achieved**

Distance education offer related to watershed management documented (with Andean Community).
Comments/Explanations:
This activity was originally planned with CAN but they decided not continue with this activity.

Target 07.01.07 | **Other kinds of knowledge** | **Fully Achieved**

Decision support tools and information disseminated through relevant users (with ANDES-CPWF).
Comments/Explanations:

Target 07.01.08 | **Other kinds of knowledge** | **Fully Achieved**

Comments about suitable biophysical models in the Andes as a decision support tool for IWRM (with ANDES-CPWF and CIP project 5).
Comments/Explanations:

Output 07.02
Institutional innovations, forms of organization and mechanisms for cooperation, training and dialogue are developed and promoted in the Andean agricultural systems to take advantage of the ecoregion's natural diversity by 2011.

Target 07.02.01 | **Other kinds of knowledge** | **Fully Achieved**

Structure and performance of current agricultural innovation in the Andean Ecoregion documented with special emphasis on Peru and Colombia (with CIP Project 1 and RAMP initiative).
Comments/Explanations:

Target 07.02.02 | **Other kinds of knowledge** | **Deferred**

Policy environment related to innovation processes in agriculture and IWRM in the Andes documented for 3 countries (with GMP and RAMP initiative).
Comments/Explanations:
This Output target was postponed to 2009 to be included as part of the CONDESAN Synthesis 2009.

Target 07.02.03 | **Practices** | **Deferred**

Innovative learning mechanisms (instruments and processes) on innovation systems documented and tested in 3 Andean Countries (with UNU-MERIT-LINK and RAMP initiative).
Comments/Explanations:
This output target was postponed to 2009 as part of CONDESAN synthesis on Innovation Systems.

Target 07.02.04 | **Other kinds of knowledge** | **Fully Achieved**

Role of women and youth in the innovation on agricultural systems analyzed in at least one country of the Andean Ecoregion (with RAMP initiative).
Comments/Explanations:

PROJECT 08.
GLOBAL MOUNTAIN

Output 08.01
The principal research products of the CGIAR centers for mountains are available and accessible to mountain communities in the from of a supermarket or market place of innovations and opportunities. (5 years with individual CGIAR Centers and the Mountain Forum (MF) (finished 2017.

Target 08.01.01 | **Other kinds of knowledge** | **Cancelled**

An integrated research and development strategy for developing an "Information and innovation marketplace" for rural mountain people is available.

Comments/Explanations:

No funding was available for this activity due to an expected donor decision to stop funding.

Target 08.01.02 | **Please select...** | **Please select...**

A study on the strengths and weaknesses of mountain policies for Agriculture and Rural Development is available.

Comments/Explanations:

Output 08.02

Livelihood, land use & natural resources flow and a policy analyses of Rural-Urban-Rural in Ethiopian benchmark are available. (2008-2010) With CIFOR, IWMI, IFPRI, SWIUPA, AHI and national partners).

Target 08.02.01 | **Please select...** | **Please select...**

Comments/Explanations:

Target 08.02.02 | **Policy strategies** | **Fully Achieved**

A study on the strengths and weaknesses of mountain policies for Agriculture and Rural Development available.

Comments/Explanations:

PROJECT 09.
URBAN HARVEST

Output 09.01

Innovative technologies and practices developed for increasing productivity and marketing of agricultural commodities produced in urban and peri-urban areas.

Target 09.01.01 | **Other kinds of knowledge** | **>50% Achieved**

ICM urban field schools and modules for animal nutrition and management validated in Kampala (in partnership with CIAT).

Comments/Explanations:

Slow implementation by partners has delayed shedule for meeting output targets.

Target 09.01.02 | **Capacity strengthening** | **>50% Achieved**

Rural-urban agro-enterprise models tested and validated in Kampala and other Latin American cities (in partnership with CIAT).

Comments/Explanations:

Due to involvement of partners in the project, some of whom are behind schedule by 6 months, there has been delay in completing training for farmers to be followed by seed rants.

Target 09.01.03 | **Practices** | **Fully Achieved**

Model for participatory testing of high value crop production established in Lima.

Comments/Explanations:

Target 09.01.04 | **Practices** | **Fully Achieved**

Strategy of adding value to horticultural crops through organic production and marketing evaluated in Lima.

Comments/Explanations:

Target 09.01.05 | **Practices** | **Fully Achieved**

Approach and methods for the agricultural contribution to mitigating HIV/AIDS in urban areas developed in Nakuru.

Comments/Explanations:

Output 09.02
Methods developed to enhance the safety and sustainability of urban and peri-urban agriculture and the uptake of urban sources of nutrients for soils and feed (2011).

Target 09.02.01	Practices	Fully Achieved

Strategies for reduced environmental and public health risks affecting men and women in communities involved in wastewater re-use in Nairobi developed.
Comments/Explanations:

Target 09.02.02	Practices	>75% Achieved

Comparative assessment of the benefits and risks of recycling urban organic residues for pig production based on case studies in Hanoi, Lima and Kampala
Comments/Explanations:
MSc. thesis study in Lima still incomplete and preventing finalization of studies.

Target 09.02.03	Other kinds of knowledge	Fully Achieved

Relations between urban flooding, waste generation and agriculture determined based on data from Kampala (with IWMI)
Comments/Explanations:

Target 09.02.04	Other kinds of knowledge	>75% Achieved

Urban ecosystem indicators developed with stakeholders for pesticide use in peri-urban horticulture systems in Peru, Ecuador and Bolivia (with CIP-Project 6).
Comments/Explanations:
Need to prepare new proposal for second and third year of project reduced the capacity to synthesize three country results of ecosystem indicator development.

Target 09.02.05	Practices	Fully Achieved

Nutrient recycling strategy for horticulture and livestock systems in Nakuru established (in partnership with ILRI).
Comments/Explanations:

CIP Outcomes - 2008

Outcome 1

Farmer field schools improving productivity and increasing incomes in Peru

The outcome is the adoption of the farmer field school method by governmental and non-governmental research and development oriented institutions in Peru. Methods research conducted by CIP has resulted in at least 34 research and development oriented organizations in Peru (22 and 12 respectively) adopting participatory research methods, particularly the farmer field school (FFS) approach for their interventions. This participatory research method was pioneered in Peru by CIP. The method was adapted over a number of years while developing curricula for various potato production practices and then when adopted by other institutions, other crops. User guides were developed, validated and published. This work has been the result of partnership with institutions such as CARE-Peru and FAO. This is an example of methods research which has generated public goods that can be used by a wider range of users for different topics that go beyond potato cultivation, including other crops such as cotton, coffee, fruit trees, and livestock.

The output for participatory methods for integrated crop management technologies development output is listed in MTP 2004-2006, Project 4, Output 5, milestone in 2004: "Cases of participatory research methods dealing with ICM-related technologies identified in Peru, Bolivia, Uganda and Ethiopia, and a monitoring system defined".

The achievement is documented in Tenorio, J. 2008. "Adaptación y uso de la metodología de Escuela de Campo de Agricultores (ECA) en instituciones de desarrollo e investigación en el Perú" [Adaptation and use of the FFS methodology by research and development institutions in Peru]. Preliminary report in Spanish of an MSc. thesis. The field work was conducted in 2008 and the dissertation is currently under preparation. Earlier evidence of the adoption/adaptation of the method provided by: Warnaars M. and W. Pradel. 2007. A comparative study of the perceptions of urban and rural farmer field school participants in Peru. Urban Harvest. Working Paper Series. Paper 4. International Potato Center. Lima, Peru.

The output is used by a variety of governmental and non-governmental agencies in Peru, Ecuador and Bolivia. In all three countries CIP was the first research organization to introduce the concept of structured Farmer Field Schools as a participatory adult education method, a method that explicitly elicits demands for technologies.

The magnitude of the outcome is estimated from the adoption study recently completed in Peru. That study shows that the method has been used by at least 34 research and development oriented organizations in Peru, which include 22 non-governmental and 12 governmental organizations.

Outputs related to integrated crop management can always be questioned for their relevance as a global public good. However in this case the output is not ICM practice but rather the introduction and validation of a **research for development method** for eliciting demand and efficiently adapting it with participants. The FFS as a participatory method was originally adapted for potato-related problems and showed that it could stimulate actions leading to impact. However, the method itself and its adaptation to the Peruvian conditions generated a public good which has been adopted by organizations working with farmers not necessarily for potato production but for other agricultural problems. The training provided by CIP about participatory methods in general and FFS in particular has influenced organizations to insert the FFS approach as part of their intervention strategies. Additional organizations in Ecuador, Bolivia and Nepal have adopted the method.

Outcome 2

Restoring potato diversity in traditional farming communities of the Peruvian Andes

Outcome statement

The outcome is the empowering of local communities to manage and preserve their native potato biodiversity. The results of the empowerment are increased resilience of *in-situ* biodiversity conservation. This includes the strengthening of local organization, the stabilization of potato biodiversity, the creation of local new flows of germplasm exchange. CIP has established a long-running and productive relationship with the traditional farming communities of the Potato Park, the Quechua-Aymara Association for Nature and Sustainable Development (ANDES in Spanish). With ANDES, CIP collaborated to build a model for conserving native potatoes in their natural environment implemented by local traditional conservation experts known as papa arariwas to promote a sustainable on-farm conservation strategy that emphasizes farmers' rights. Thus, communal gene banks are being maintained to guarantee quality and tuber seed availability for the local custodians (arariwas), who consciously or unconsciously dynamize the tuber seed flow between families of the same community or with families of neighbor communities.

What was the output?

The output has two main parts, restoration of potato diversity and productivity. The output is consistent with the Convention on Biological Diversity and International Treaty by ensuring fair and equitable sharing of benefits arising from access to genetic resources. The first output involves the repatriation of 410 cultivars of native potatoes pathogen free to six communities of the Potato Park: Amaru, Chawaytiri, Cuyo Grande, Pampallaqta, Paru Paru, and Sacaca. This enhanced the potato diversity in the villages by adding 237 new cultivars involving 15 new alleles to the local cultivars. The second output derives from the first one as potato production was increased by 22 percent explained by the utilization of pathogen free tuber seed for planting.

Which MTP?

The biodiversity restoration output is listed in MTP 2006-2008, Project 2, Output 3, No. 9.
Where was the achievement documented?

The achievement is documented in: (1) the 11th International Congress of Ethnobiology hosted by ANDES and featuring the Potato Park, (2) the declaration of the community bio-conservationists and various new stories of community led discussion and interventions on Peru bio-conservation issues, (3) The farmers' rights project, background study 8, farmers' rights in Peru, farmers' perspectives held in Lima on September 2008 addressing issues like the basis of future policies for farmers' rights in Peru, the establishment of agro-biodiversity reserves, and support to community gene banks, (4) "Panorama" issued in August/September 2007, and (5) iied press released on 31 October 2007. The last two evidences emphasizing on farm conservation in the PotatoPark.

Who used the output?

Families of the six rural communities of the PotatoPark have been using restoration of potato diversity, which is a way of benefit sharing. Thus, diversity restoration ensures food security, nutrition, health, income, and contributes to meet the Millennium Development Goals.

Magnitude of the outcome?

The magnitude of the outcome is measured in the number of other communities with initiatives to restore potato biodiversity and their direct links to the Potato Park. This initiative is being followed by other Andean rural communities, which had lost potato diversity in the past due to many factors including wrong governmental policies of promoting commercial production of modern varieties and ignoring "old-fashioned" traditional cultivars and their growing methods. To date, CIP has restored 1250 cultivars of native potatoes (3608 samples) to 41 Andean communities and 6 institutions in Peru.

Evidence for the outcome?
Restoration of potato diversity and productivity in Andean rural communities has stimulated institutions of the south American Andes to interact with CIP scientists by showing their willingness to participate in on farm conservation strategies based on the Potato Park experience, and the Inca trail namely "the route of condor". Thus, CIP's potato curator was invited on November 2008 to Universidad Nacional de Colombia to interact with its scientific staff about the indicated issue.

Outcome 3

T'ikapapa, linking urban consumers and small-scale Andean producers with potato biodiversity

The outcome is the establishment of new agro-industrial market chains with socially responsible governance related to the output 'post harvest innovations'. Native potatoes (landraces) are considered an inferior food in the Andes, the traditional fresh market is rudimentary, with mixed varieties sold unwashed in bulk. CIP's Papa Andina partnership program, using the CIP designed tool the Participatory Market Chain Approach (PMCA) with its Peruvian partner INCOPA, local research and development institutions and private sector Peruvian market chain actors developed a social marketing concept, where farmer groups provide cleaned, selected native potatoes for supermarkets in attractive bags labeled T'ikapapa. The approach has spread beyond the pilot exercise and has reached Ecuador and Uganda. CIP is headquartered in the Andes and seeks to conserve and promote the use of potato landraces to enhance livelihoods of the poor.

The 'post harvest innovations' output is listed in MTP 2006-2008, Project 1, Output 3, Output Target 'Two new market products developed for native potato varieties…' Traditionally native potato varieties are perceived as inferior products consumed by the rural poor and little appreciated in urban markets. The idea of promoting multi-colored potato chips made from native potatoes emerged from CIP's research efforts to screen native potato varieties for their processing qualities. The novel T'ikapapa social marketing product was developed by CIP with national partners from Bolivia and Peru using the PMCA, an approach for identifying and exploiting new business opportunities that benefit the poor, by stimulating market-driven innovation. Pilots provided evidence of the commercial interest for these colorful and versatile potatoes in demanding urban markets. Corporate social responsibility and linking with a producers association is a key dimension of the market product to ensure that benefits flow back to the poor.

The achievement is documented in : (1) Ordinola, M. T. Bernet and K. Manrique (2008) T'ikapapa: Linking urban consumers and small-scale Andean producers with potato biodiversity a CIP Working paper, (2) also in Devaux, A. et al. Collective Action for Market Chain Innovation in the Andes. Food Policy, 34:31-38. Published on line 17 Nov 2008, and (3) CIP (2008) 'T'ikapapa, Linking urban consumers and Andean producers with the biodiversity of potato' Leaflet, International Potato Center, Lima, Peru. 2pp

The output is used by NGOs and private partners are using native potatoes with the improved market concept. High altitude farmers are growing native potatoes for the new market and getting higher prices. Uptake of similar postharvest innovations with native potatoes is occurring in Ecuador and Colombia.

The magnitude of the outcome is reflected in the number of market chains and volume of product in them. T'ikapapa was the first brand of high-quality, fresh, native potatoes sold in Peru's leading supermarkets. Sales grew from 14 tonnes in 2004 to over 120 tonnes in 2007 in the pilot and more than 400 families in 12 communities obtained 20–50 percent above the market price for native potatoes. The innovation process stimulated the development of other native potato based products such as native potato chips. Small-scale Peruvian processors began marketing native potato chips

in 2005. In 2008, the sector-leading Pepsico and Gloria launched two new native potato products. Through the partnership with Pepsico, around 100 farmers' families signed contracts, selling more than 100 tonnes of native potatoes in a framework of corporate social responsibility, with a price increase of 100 % compared to local market. Total demand in 2009 is estimated to reach 2000 tonnes, including Gloria and five other small-scale processing firms that started to develop this product. Prices are considerably higher than local market prices for potatoes. There is evidence that as a consequence of the promotion of these novel native potato products that the demand curve for native potato has shifted upwards leading to more widespread welfare gains for the rural poor producers.

Market chain development is process-oriented. The **outcome described here can be widely** extrapolated via the training documents and users manuals for PMCA and have been used in Uganda and other Andean countries. In 2007, Papa Andina, INCOPA and its partners received a United Nations award for 'Supporting Entrepreneurs for Environment and Development' and the BBC World Challenge Award recognizing the public and private alliances developed to link small Andean farmers to dynamic markets.

Outcome 4

Towards a sustainable seed system for orange-fleshed sweetpotato in Mozambique

The outcome is policy change through the adoption of a strategy to pay for sweetpotato planting vines by a large international development agency, dropping their strategy of free vine distribution. Since independence in Mozambique the prevailing strategy for government and NGO assistance has been to manage the multiplication and distribution of sweetpotato planting material for free distribution. The lack of incentives for the involvement of private vine multipliers limits the consolidation of a sustainable seed system for sweetpotatoes.

The output is a policy study establishing farmers' willingness to pay for sweetpotato vines and is listed in MTP 2008-2010, Project 1, Output 1, Output target 'Sweetpotato growers … willingness to pay…determined'. In recent years there have been attempts to disseminate among Mozambican small farmers orange-fleshed sweetpotato (OFSP), but the beneficiary population has been relatively small given the constraints for massively and sustainably disseminating OFSP planting material. The Reaching End User (REU) project funded by Harvest Plus has been the most recent attempt to scale out the dissemination of OFSP in Mozambique and has been aiming to consolidate a network of local vine multipliers that would be able to supply seed to more than 10 000 targeted households in Zambezia province.

CIP engaged in research activities in early 2007 that were aimed to inform World Vision International, the institution in charge of running the extension program in the REU project, about the feasibility of producing OFSP vines at small farmers' conditions and the potential demand for OFSP vines among the final users of this planting material. These research outputs were completed in two separate but linked studies. The first study demonstrated that small scale vine multiplication is profitable and attractive to Mozambican farmers as they can produce OFSP vines at 0.02 US$ per kg using watering cans and conventional multiplication techniques. The second study evaluated the potential demand of OFSP planting material among small sweetpotato growers in central Mozambique by eliciting their willingness to pay (WTP). The studies showed large demand and willingness to pay.

The achievement is documented in : a World Vision progress report documenting the adoption of the policy for selling vines based on the willingness to pay study: World Vision Mozambique, Reaching End Users with Orange Fleshed Sweetpotato (OFSP) Mozambique Implementation. Progress Report. Reporting period. April 2008 to September 2008. 17 pp.

The magnitude of the outcome is the captured by the data that in spite of the limited cash resources faced by small scale farmers in the Zambezia province, around 38 percent of the targeted beneficiaries or about 5000 farmers were able to pay for the OFSP vines requested by the project and on average paid 25 percent more for each kg of high quality vines than the prior subsidized price (0.06 US$ per kg). This happened because World Vision International adopted the policy advice of CIP and introduced the "purchase only" option during its large OFSP vine distribution conducted in 2008 in 50% of their targeted population in the Zambezia province. The outcome of making this decision has resulted in a large proportion of households paying for the planting material requested from the REU project. The results will also be used to design sustainable vine markets in the REU project in Uganda and eventually in other countries.

The results of the policy study can be widely extrapolated. World Vision works in many countries and distributes planting material of many different crops. The other influence of CIP's output target has affected World Vision's 2009 plan of activities. In this year World Vision has explicitly incorporated establishment of a network of decentralized OFSP vine multipliers that are directly selling OFSP vines to the small farmers, and has included the variety preferences highlighted in the WTP study.

Outcome 5

A bar-code kit to improve genebank management

The outcome is the adoption by other CG centers of a bar-code kit developed by CIP. Since 2008 a group of sister CG centers have adopted or adapted a bar-code kit to improve their daily genebank operations as part of an activity in the genebank upgrading project "Global Public Goods phase 2" financed by the World Bank.

The bar code kit output is listed in MTP 2007-2009, Project 2, Output 1, Output Target #7 in 2007 and #16 in 2008. Managing plant genebanks involves repeated identification of plant materials (accessions) for tracking purposes and updating accession-level information in various processes like pathogen testing, cleaning, multiplication, characterization or evaluation. This is both time-consuming and prone to increased levels of errors if done using paper and pen practices with extensive human input. Therefore, CIP sought to use bar-codes as a pivotal element in improved genebank process and information management starting in 2000. Soon it became clear that the bar-code idea involved the use of several complimentary hardware components. As a side benefit, this transition from hand-registration also resulted in the consolidation of databases and documentation of processes to identify 'points-of-barcode-applications' with the highest potential cost/benefit. However, for ease of technology transfer this is not an integral part of the barcode kit described here – that is, users are free to continue with their existing databases and software and add the bar-code kit or adapt both in case no workflows and databases are documented.

CIP 's genebank manages accessions in a complete array of processes including cleaning, multiplication, evaluation and conservation in field, seeds, *in-vitro*, roots and tubers, cryo and DNA banks. The kit supports all these areas with cutting edge technologies. The kit is defined as a series of hardware specifications which provides each genebank with the flexibility of optimizing local technical support and selection equipment and consumable providers. In addition, the kit contributes to a standardization of germplasm labeling and information exchange on best practices of usage of identification technologies like bar-code.

The achievement is documented in : (1) the current GPG2 project profile recommending all centers adopt the kit (Activity on Barcode 2.2), (2) link to the on-line help desk, (3) the report of the workshop conducted by CIP to teach the use and application of the kit, and (4) statements of adoption by genebank managers in the other CG centers.

The output is used by genebanks at several CGIAR centers that participated in a training workshop at CIP in 2008 financed under the GPG2 project. These included: Bioversity, IITA, ILRI, ICARDA, ICRAF, ICRISAT, IRRI and WARDA. The "kit" consists primarily of six hardware components namely mobile computers or handhelds, thermal printers, bar-code labels for different environments, hand barcode reader, barcode specifications and wireless access points. It also includes a technical specification document and web site complete with links to application videos and complementary information. To encourage adoption CIP established an on-line helpdesk. Optional components include open source software for data capture, inventory management, information integration and advice on designing and documenting workflows incorporating the bar-code kit (as mentioned above).

The magnitude of the outcome is the current adoption and estimated further adoption of CG and non-CG genebanks over the next years. The bar-code kit along with the processes and software developed at CIP contributed considerably to the relatively quick ISO accreditation of CIP's genebank. Thus, other genebanks interested in ISO certification or accreditation might be interested in adopting CIP's bar-code kit and supporting workflows, software and databases as well. The concept of a kit also foresees the eventual replacement of bar-code by other identification technologies like the recently established RFID (Radio Frequency Identification) already heavily used in industry. However, current cost-benefit analysis shows the unit costs are still in favor of bar-code under the circumstances of a genebank. The emergence of a competing new technology will most probably result in further declining costs for bar-code related tools.

From this viewpoint, the integration of the bar-code kit will be a worthwhile investment for the next technology life cycle of 3-5 years as well as a facilitator to implement any new tracking or high throughput identification technology.

Evidence for the outcome

(1) GPG1 project evaluation report by World Bank.
(2) GPG2 project document, Activity 2.2
(3) Activity web site: http://research.cip.cgiar.org/confluence/display/GIMS

CIP Impact Culture - 2008

Criterion 1. EpIA studies/Advancement of epIA methods (45%)

1.A. Please provide the full citation of all ex post IA studies published in 2008 that attempt to assess major impacts attributed to your Center's work and provide summary information describing the scale of adoption (# farmers, # of hectares) and the main impacts or effects resulting from the adoption in economic or social or environmental terms. [20 points maximum if submitting one or more ex post IA study per every $20 million of Center budget]

1. Full Citation: Graham Thiele, Guy Hareau, Víctor Suárez, Enrique Chujoy, Merideth Bonierbale, Luis Maldonado. 2008. Varietal change in potatoes in developing countries and the contribution of the International Potato Center: 1972-2007. International Potato Center (CIP), Lima, Peru. Working Paper 2008-6. 44 p.

Clearly state the research related output being assessed and the role of the center in realizing that output. Indicate the geographic scale/size of the assessment, the time period covered, and the method used. Present main result/indicators of impact reported by the study, i.e., estimates of adoption or uptake, estimates of income and other effects (on poverty, environment) both positive and negative – max of 100 words for each study:

Potato crop improvement programs in 23 developing countries were surveyed in 2007 to gather information about varietal change and the extent of adoption of potato varieties in Asia, Africa and Latin America. The survey found that CIP in partnership with NARS contributed about 13 percent of the area, and CIP related potato varieties are planted on more than one million hectares worldwide. The milestone was achieved earlier than predicted and increased the rate of return to CIP investment in potato breeding to over 20 percent. The Net Present Value (NPV) of this investment is estimated at $121 million dollars.

1.B. For each ex post IA study listed in 1.A above, please provide the relevant information under each component by checking the appropriate item 1 [20 points maximum for ex post IA studies' quality score of 100]

1. Publication venue (select one only)
[ ] Refereed journal
[ ] Book chapter
[ ] Conference paper (includes proceedings)
[x] In-house publication (reviewed externally)
[ ] In-house publication (not reviewed externally)

2. (Co-) authorship (additive up to max 5)
[ ] With other CG Center scientists
[ ] With NARS scientists
[ ] With ARI scientists
[x] Center only scientists

3. EpIA coverage (primary type of research assessed) (select one only)
[x] Commodity improvement
[ ] NRM related
[ ] Policy related
[ ] Biodiversity related
[ ] Training/Capacity building related
[ ] Other challenging area (specify)

4. Distance down the impact pathway covered by the study (points based on the highest-point indicator marked)
[ ] Uptake/adoption (only for policy-related research)
[x] Uptake/adoption plus direct impacts at the adopter-level (Stage 1): improved yield/quality, higher incomes, lower risk, improved health, etc.
[ ] Uptake/adoption plus intermediate impacts that go beyond the direct impacts at the adopter-level (conserve resources, increased market access/efficiency, developed human capacity, increased productivity)
[ ] Uptake/adoption plus ultimate societal impacts on poverty, food security, environment (Stage II)

5. Geographical breadth or scale of documented uptake/adoption on which the impacts assessed by the study are based (points based on the highest-point indicator marked)
[ ] Single location (region)

within a single country
[ ] Multi-locations (regions) within a single country
[ ] Multiple locations (regions) within several countries (~ 2-5)
[x] Global coverage across the center's mandated political region (e.g., the whole region of West Africa, Latin America, Asia , Sub-Saharan Africa, All developing countries, etc.)

6. Advances in new methods/ models & use of novel indicators (additive, up to a max.of 25 pts)
[x] Addresses non-economic impact indicators
[ ] Addresses negative effects
[ ] Addresses differential effects (different target groups)
[ ] Addresses multiplier effects (other sectors)
[x] Employs novel methods (combines quantitative & qualitative, etc.)
[ ] Other methodological advances (specify)

2. Full Citation: Campilan, Dindo and Lorna Sister. Exploring livelihood outcomes of participatory farmer training: the case of sweetpotato feed utilization in Vietnam and the Philippines. Paper presented at the Workshop "Rethinking Impact: Understanding the Complexity of Poverty and Change". Cali, Colombia, March 2008.

Clearly state the research related output being assessed and the role of the center in realizing that output. Indicate the geographic scale/size of the assessment, the time period covered, and the method used. Present main result/indicators of impact reported by the study, i.e., estimates of adoption or uptake, estimates of income and other effects (on poverty, environment) both positive and negative – max of 100 words for each study:

Participatory farmer training approaches were used to promote sweetpotato as an improved feed source for resource-poor pig raising systems in Vietnam and cattle raising systems in the Philippines. Post-training assessment determined how farmers' improved knowledge led to changes in farmers' practices and income. Adopting farmers increased net benefits with silage technology by almost US$ 1 per day and increased farming system efficiency, reducing use of feed (-26%), fuel (-100%) and labor (-92%). High initial investments and complexity deterred adoption of improved technologies and thwarted impact, despite farmers' increase in knowledge. Overall, technologies' impact improved the livelihood assets managed by households.

1.B. For each ex post IA study listed in 1.A above, please provide the relevant information under each component by checking the appropriate item 1 [20 points maximum for ex post IA studies' quality score of 100]

1. Publication venue (select one only)
[ ] Refereed journal
[ ] Book chapter
[x] Conference paper (includes proceedings)
[ ] In-house publication (reviewed externally)
[ ] In-house publication (not reviewed externally)

2. (Co-) authorship (additive up to max 5)
[ ] With other CG Center scientists
[ ] With NARS scientists
[ ] With ARI scientists
[x] Center only scientists

3. EpIA coverage (primary type of research assessed) (select one only)
[ ] Commodity improvement
[ ] NRM related
[ ] Policy related
[ ] Biodiversity related
[x] Training/Capacity building related
[ ] Other challenging area (specify)

4. Distance down the impact pathway covered by the study (points based on the highest-point indicator marked)
[ ] Uptake/adoption (only for policy-related research)
[x] Uptake/adoption plus direct impacts at the adopter-level (Stage 1): improved yield/ quality, higher incomes, lower risk, improved health, etc.
[ ] Uptake/adoption plus intermediate impacts that go beyond the direct impacts at the adopter-level (conserve resources, increased market access/ efficiency, developed human capacity, increased productivity)
[ ] Uptake/adoption plus ultimate societal impacts on poverty, food security, environment (Stage II)

5. Geographical breadth or scale of documented uptake/ adoption on which the impacts assessed by the study are based (points based on the highest-point indicator marked)

[ ] Single location (region) within a single country
[ ] Multi-locations (regions) within a single country
[x] Multiple locations (regions) within several countries (~ 2-5)
[ ] Global coverage across the center's mandated political region (e.g., the whole region of West Africa, Latin America, Asia , Sub - Saharan Africa, All developing countries, etc.)

6. Advances in new methods/ models & use of novel indicators (additive, up to a max.of 25 pts)

[x] Addresses non-economic impact indicators
[ ] Addresses negative effects
[ ] Addresses differential effects (different target groups)
[ ] Addresses multiplier effects (other sectors)
[x] Employs novel methods (combines quantitative & qualitative, etc.)
[ ] Other methodological advances (specify)

1.C. Please provide an estimate of the number of full time equivalent staff devoted to epIA work in your Center in 2008 [5% for IA investment relative to Center budget]: 2.30

Criterion 2: Building an IA culture at the Center and enhancing the capacity of IA (including communication/dissemination) (20%)

A) IA conferences and workshops: List those held for both external and internal audiences, e.g., showing results of impact studies of a particular research theme; assessing the expected impacts of planned and ongoing research of the Center. Describe theme and number of participants for each. [5%]

B) Utilization of epIA results: Describe using specific examples how empirical epIA findings have been applied as a basis for ex-ante impact projections that contribute to the Center's priority-setting procedures, or have been used to validate earlier ex-ante work. (< than 100 words) [5%]

The study on potato varietal release that showed one million hectares planted under CIP-related varieties and positive returns to CIP's breeding program has been influential in assigning more resources to breeding as part of the targeting and priority setting which forms a part of a new strategic plan being prepared in CIP. The study was presented to the Center Commissioned External Review (CCER) of the Crop Improvement Program, which recommended that more attention be paid to capturing the benefits from specific traits in the released varieties be registered and tracked, in addition to the number and country. This recommendation is giving place to new procedures for material release at CIP.

C) Baseline surveys/studies: Provide specific examples of establishment (or updating) of baseline studies conducted in the reporting year to provide counterfactuals for future epIA (< than 100 words) [2.5%]

- Under the Andean Change Project, 10 baseline studies were conducted at the village level in Bolivia, Colombia, Ecuador, and Peru where different participatory methodologies in innovation processes are being applied. The baseline studies involve more than 800 farmers (including 192 counterfactual farmers) in those countries and will provide the basis for epIA studies of the use of participatory methodologies in the Andean Change project.

- In 2008, first follow up survey of the Reaching End Users (REU) project impact study in Mozambique for orange fleshed sweet potato (OFSP), collecting part of the panel data for impact analysis in 2009. This updated the 2006 baseline and improved definition of levels of participation among targeted beneficiaries (just received vines, just received agriculture and/or nutrition training, received both OFSP vines and trainings and not receiving either vines or planned trainings). A total of 430 participating households (in 24 randomly selected villages) and 217 households randomly

selected in 12 control villages with no exposure to OFSP dissemination were surveyed.

- To measure the economic losses caused by virus and sweet potato weevil, in collaboration with researchers in DRC Congo, Rwanda, Burundi & Uganda a total of 216 households were interviewed in a total of 54 randomly selected clusters, belonging to three different pre-defined (stratified) agroecological areas. The data will be used in a cross sectional impact study and serve as a baseline for future impact evaluation.

- HortiSana is a project to shift highland Andean horticultural systems including potatoes towards more healthy and sustainable production, commercialization and consumption. In 2008, CIP conducted structured interviews of approximately 600 households in Peru, Ecuador and Bolivia, with both the person most in charge of the horticultural crop production and the person most in charge of managing the household. In 2010, CIP will conduct a repeat survey, focusing on key indicators of change.

D) EpIA briefs, popular media: List epIA briefs produced and other forms of communication of epIA study results. [2.5%]

E) Training materials: List IA related training materials developed. [2.5%]

F) MS or PhD theses completed: List MSc and PhD dissertations completed (published) during 2008. [2.5%]

Criterion 3. One epIA published study that effectively demonstrates the impact of the Center on the poor or food insecure people and to the environment, rated for quality and rigor (35%)

CIP in 2008

Food Security

Financial report 2008

Donors' contributions

Countries in which CIP is working

Global contact points

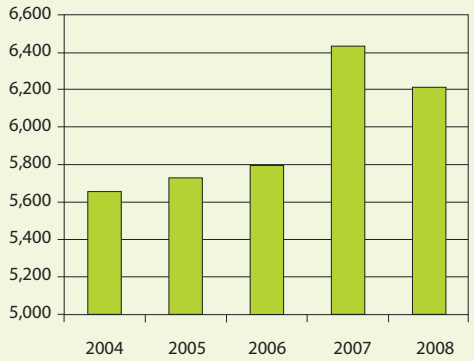
CIP's internal structure

CIP staff list

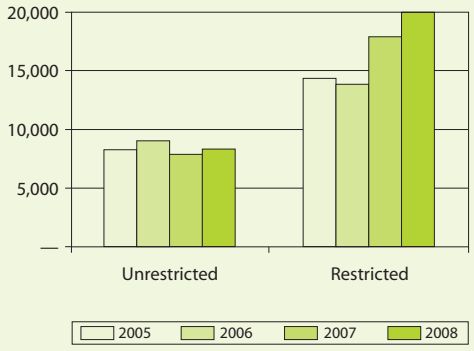
Centers supported by the CGIAR

Financial report 2008

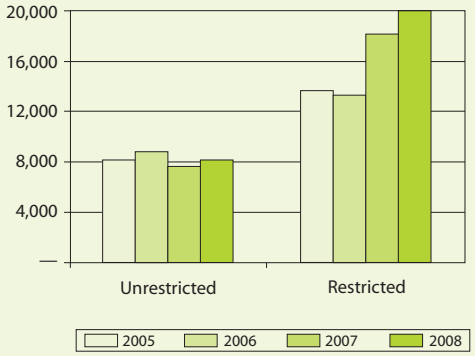
Financial Reserves (US$ thousands)



Revenues (US$ thousands)



Expenditures (US$ thousands)



The International Potato Center achieved a US$ 0.3M surplus in 2008. CIP's reserves (measured as net working capital plus long term investments minus net fixed assets) reached US$6.2M.

Total revenues reached US$28.2M, 9% above 2007. Total revenues include US$7.9M of unrestricted contributions, US$19.8M of restricted donations and US$0.5M of other revenues, consisting of interest earned on investments and exchange rate gains (losses). As of December 2008, US$2.6M of approved grants were pending disbursement by donors.

Unrestricted contributions increased 13%, from US$7.0M to US$7.9M. This is explained by additional contributions from CIDA, Germany, Belgium and the World Bank. Restricted contributions increased by 10% from US$18.0M to US$19.8M due to an increasing success in obtaining new research contracts.

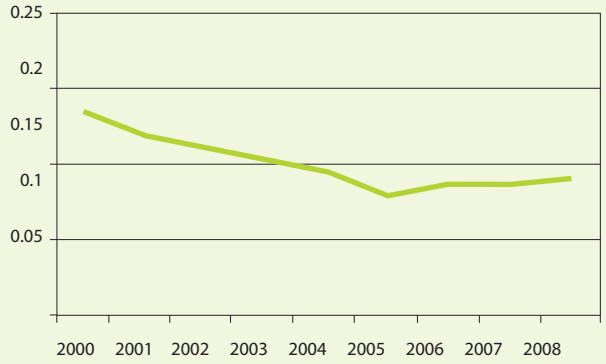
During the year, 54 new restricted proposals, for a total commitment of US$22.6M, were approved by donors. New commitments increased by 12% with respect to 2007. The average donation per proposal approved increased from US$0.39M to US$0.42M.

Unrestricted expenditures grew 11% from US$7.2M to US$8.0M. CIP's indirect cost ratio, as defined by FG5, CGIAR Cost Allocation Guidelines, reached 13.4%, reflecting efficient growth, thanks to austere management policies.

The liquidity indicator (measured as net working capital plus long-term investments divided by the daily average expenditures excluding depreciation) decreased from 104 days in 2007 to 92 days in 2008, due to an increase in advances from donors. The financial stability indicator (measured as the unrestricted net assets minus net fixed assets, divided by the daily average expenditures excluding depreciation) decreased from 92 days in 2007 to 84 days in 2008. Both indicators are within the acceptable ranges of the CGIAR. The Center will continue exercising prudent policies to improve its financial position, while assuring sustainable growth.

The table over leaf summarizes CIP's financial position as of December 2008. A copy of the complete audited financial statements may be requested from the office of the Director for Finance and Administration at CIP headquarters in Lima, Peru.

Indirect Cost Ratio



Liquidity (Acceptable range 90/120 days)

Adequancy of Reserves (Acceptable range -75/120 days)

Statement of financial position

Year ending 31 December 2008
(compared with 2007 - US$000)

	2008 US$	2007 US$
ASSETS		
Current Assets		
Cash and cash equivalent	4,201	4,741
Investments	13,179	11,917
Account Receivable:		
Donors	2,606	1,602
Employees	185	152
Others	247	311
Inventory	379	410
Advances	641	269
Prepaid Expenses	171	140
Total Current Assets	**21,609**	**19,542**
Non-Current Assets		
Investments non–current	1,429	383
Furnishing and	3,932	3,686
Equipment, Net		
Total Non-Current assets	**5,361**	**4,069**
Total Assets	**26,970**	**23,611**
Liabilities and Net Assets		
Current Liabilities		
Accounts Payable		
Donors	11,351	8,071
Others	4,264	4,390
Employees	173	104
Accruals and Provisions	439	450
Total Current Liabilities	**16,227**	**13,015**
Non-Current Liabilities		
Employees	397	388
Accruals and Provisions	205	407
Total Non-current Liabilities	**602**	**795**
Total Liabilities	**16,829**	**13,810**
Net Assets		
Designated	4,182	3,373
Undesignated	5,959	6,428
Total Net Assets	**10,141**	**9,801**
Total Liabilities and Net Assets	**26,970**	**23,611**

Donors' contributions

STATEMENT OF GRANT REVENUES

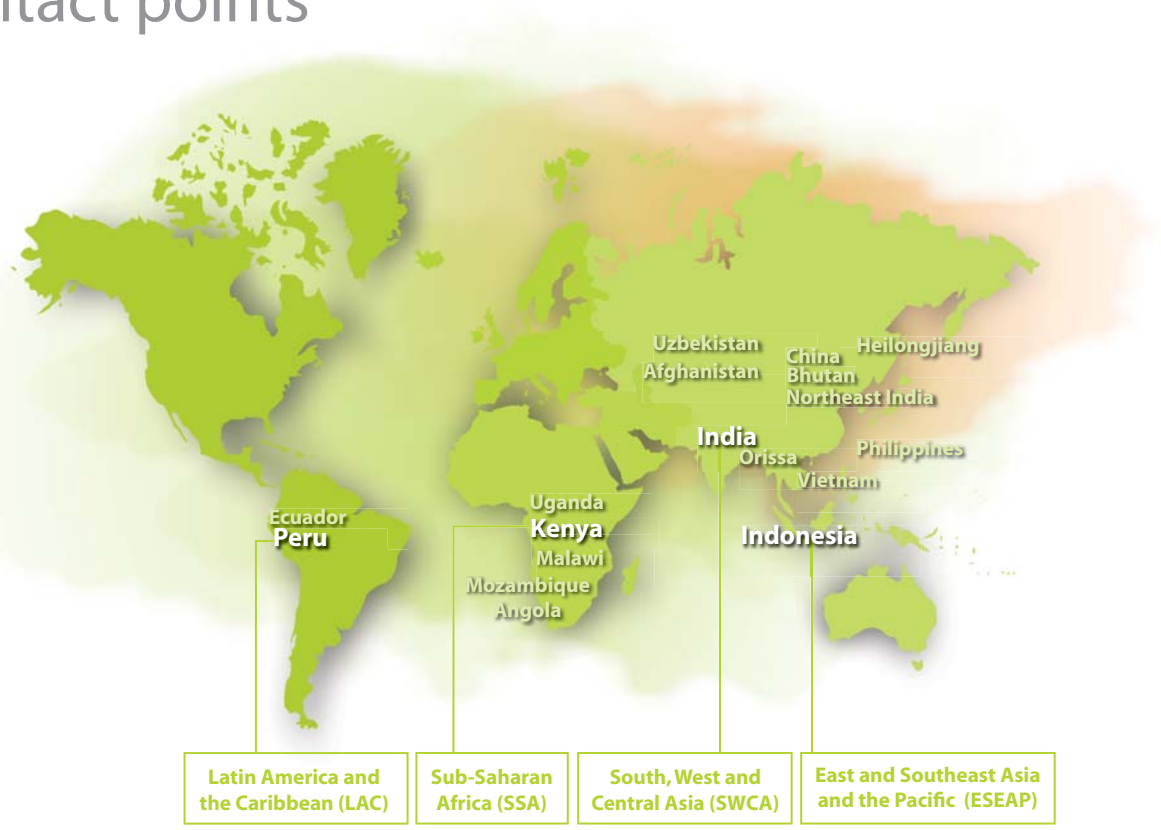
Donors (For the year Ending 31 December, 2008) (US$ 000)	Unrestricted	Restricted	Total
Canadian International Development Agency (CIDA)	969	2,159	3,128
Swiss Agency for Development and Cooperation (SDC)	972	1,519	2,491
International Bank for Reconstruction and Development (World Bank Group)	1,740	416	2,156
Global Enviroment Facility (GEF)		1,617	1,617
Centro Internacional de Agricultura Tropical (CIAT)		1,593	1,593
United States Agency for International Development		1,404	1,404
Government of Belgium	499	640	1,139
Government of Germany (BMZ/GTZ)	437	676	1,113
Department for International Development (DFID)	1,100		1,100
Government of Spain		1,054	1,054
European Commission		965	965
Swedish International Development Cooperation Agency (SIDA)	909		909
Australian Centre for International Agriculture Research (ACIAR)	221	423	644
Irish Aid	290	299	589
International Food Policy Research Institute		574	574
Bill and Melinda Gates Foundation		563	563
International Development Research Centre (IDRC)		571	571
Government of Norway	478		478
Centro Internacional de Mejoramiento de Maíz y Trigo-Generation Challenge Program		464	464
Common Fund for Commodities (CFC)		460	460
New Zealand Agency for International Development		451	451
Government of Luxembourg		441	441
The Kilimo Trust		300	300
Government of Peru		290	290
Bioversity International		283	283
Fondo Regional de Tecnologia Agropecuaria		261	261
Government of Italy		234	234
Rockefeller Foundation		215	215
Alliance for a Green Revolution in Africa (AGRA)		186	186
Government of The Republic of Korea	50	93	143
Association for Strengthening Agricultural Research in Africa-ASARECA		138	138
Government of India	38	100	138
Chevron		132	132
Donald Danforth Plant Science Center		128	128
The Lemelson Foundation		126	126
Government of China	120		120
International Water Management Institute-Water and Food		113	113
The International Centre of Insect Physiology and Ecology		108	108
Universidad Politecnica de Madrid		102	102
International Livestock Research Institute-ILRI		83	83
Gordon and Betty Moore Foundation		82	82
The OPEC Fund for International Development		74	74
Food and Agriculture Organization of The United Nations		73	73
Government of Brazil		53	53
United States Department of Agriculture		43	43
Valent BioSciences Corporation		32	32
The International Crops Research Institute		30	30
Department of Agriculture and Food, Western Australia (DAFWA)		24	24
The Mcknight Foundation		24	24
Swedish University of Agricultural Sciences (SLU)		23	23
RUAF Foundation		22	22
Natural Resources Institute		21	21
Organizacion Española de Cooperación Internacional		20	20
Government of Islamic Republic of Iran	20		20
International Center for Agricultural Research in Dry Areas		20	20
University of the Philippines Los Baños Foundation, Inc.		17	17
Global Crop Diversity Trust		16	16
ONG Grupo Yanapai		16	16
Dr. David Nelson, Branston LTD		12	12
CGIAR-IFAR		10	10
Instituto Nacional de Investigación Agraria		10	10
Danish International Development Agency (DANIDA)		8	8
Ayuda-Help for Latin America		7	7
Fundación para la Promoción e Investigación Productos Andinos de Bolivia-FUNDACION PROINPA		7	7
Government of Philippines	7		7
The Field Museum of Natural History		6	6
Secretaria General de la Comunidad Andina		5	5
Universidad Nacional Agraria La Molina		4	4
Kansas State University		3	3
TOTAL	7,850	19,825	27,675

Countries in which CIP is working

These are the countries in which CIP is currently working:

1. Tajikistan
2. Armenia
3. Georgia
4. Uzbekistan
5. Kazakhstan
6. Afghanistan
7. Zambia
8. Burkina Faso
9. South Africa
10. Malawi
11. Ethiopia
12. Angola
13. Cameroon
14. Ghana
15. Kenya
16. Mozambique
17. Uganda
18. Tanzania
19. Rwanda
20. Madagascar
21. Ecuador
22. Brazil
23. Peru
24. Bolivia
25. Colombia
26. Philippines
27. Indonesia
28. Papua New Guinea
29. Solomon Island
30. Vietnam
31. Korea DPR
32. Myanmar
33. China
34. Nepal
35. Bhutan
36. India
37. Sri Lanka
38. Bangladesh

Global contact points



CIP Headquarters

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email: cip@cgiar.org • Website: www.cipotato.org

Latin America and the Caribbean (LAC)

Ecuador Liaison Office
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Contact: Bert De Bièvre, Liaison Officer

Sub-Saharan Africa (SSA)

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Contact: Berga Lemaga, Liaison Scientist

South, West and Central Asia (SWCA)

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Contact: Sreekanth Attaluri

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Medziphema
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India
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Fax: +91-03862-247113
Email: v.thorie@cgiar.org
Contact: Viwheto Thorie

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G.P.O. Thimphu
Bhutan
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Fax: +975 2 351 027
email: w.roder@cgiar.org
Contact: Walter Roder

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Uzbekistan
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Fax: +998 71 120 7125
email: c.carli@cgiar.org
Contact: Carlo Carli, Liaison Scientist

East and Southeast Asia and the Pacific (ESEAP)

Regional Office
c/o BALITSA
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Indonesia
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Fax: +62 22 2785549
email: cip-eseap@cgiar.org
Website: www.eseap.cipotato.org
Contact: Fernando Ezeta, ESEAP Regional Leader

China Liaison Office
International Potato Center
c/o The Chinese Academy of Agricultural Sciences
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Beijing, People's Republic of China
Tel: +86 10 8210 5690
Fax: +86 10 8210 5689
email: cip-china@cgiar.org
Website: www.eseap.cipotato.org/cip-china
Contact: Xie Kaiyun, Liaison Scientist

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Contact: Fengyi Wang

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Thuy Phuong, Chem
Tu Liem, Hanoi
Vietnam
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Fax: +84 4 7410-003
email: tnguyen@cgiar.org
Contact: Thi Tinh Nguyen, Liaison Scientist

Global, Regional and Systemwide Initiatives

Papa Andina Initiative
same address, telephone and fax as CIP Headquarters
email: a.devaux@cgiar.org
Website: www.cipotato.org/papandina
Contact: André Devaux, Coordinator

CONDESAN (Consortium for the Sustainable Development of the Andean Ecoregion)
(same address, telephone and fax as CIP headquarters)
email: condesan@cgiar.org
Website: www.condesan.org
Contact: Bert De Bièvre, Coordinator

GMP (Global Mountain Program)
(same address, telephone and fax as CIP headquarters)
email: p.trutmann@cgiar.org
Contact: Peter Trutmann, Coordinator

PRAPACE (Regional Potato and Sweet Potato Improvement Program for East and Central Africa)
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Kampala, Uganda
Tel: +256 414 286 209
Fax: +256 414 286 947
email: prapace@prapace.co.ug
Contact: Berga Lemaga, Coordinator

UPWARD (Users' Perspectives with Agricultural Research and Development)
c/o IRRI DAPO 7777
Metro Manila, Philippines
Tel: +63 49 536 8185
Fax: +63 49 536 1662
email: cip-manila@cgiar.org
Contact: Marietta Nadal, Office manager
Website: www.cip-upward.org

Vitamin A for Africa (VITAA)
Liaison Office Uganda
International Potato Center
c/o PRAPACE
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Kampala, Uganda
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Fax: +256 414 286 947
email: j.low@cgiar.org

CIP's internal structure*

BOARD OF TRUSTEES

Office of the Director General

Director General
Pamela K. Anderson

- **External Relations**
  Mariella Altet

Deputy Director General for Research
Charles Crissman

- **Research Divisions**
  - **Division 1**: Impact Enhancement
    Leader: Graham Thiele
  - **Division 2**: Genetic Resources Conservation and Characterization
    Leader: David Tay
  - **Division 3**: Germplasm Enhancement and Crop Improvement
    Leader: Merideth Bonierbale
  - **Division 4**: Crop Management
    Leader: Oscar Ortiz
  - **Division 5**: Production Systems and the Environment
    Leader: Roberto Quiroz
  - **Division 6**: Agriculture and Human Health
    Leader: Donald Cole
- **Partnership Programs**
  - **VITAA**
    Coordinator: Regina Kapinga
  - **Papa Andina**
    Coordinator: André Devaux
  - **PRAPACE**
    Coordinator: Berga Lemaga
  - **UPWARD**
    Coordinator: Dindo Campilan
  - **CONDESAN**
    Coordinator: Miguel Saravia
  - **Global Mountain Program**
    Coordinator: Peter Trutmann
  - **Urban Harvest**
    Coordinator: Gordon Prain
- **Regional Offices**
  - **Sub-Saharan Africa (SSA)**
    Regional Leader: Jan Low
  - **South, West and Central Asia (SWCA)**
    Regional Leader: Dindo Campilan
  - **East, and Southeast Asia and the Pacific (ESEAP)**
    Regional Leader: Fernando Ezeta
  - **Library**
    Head: Cecilia Ferreyra
- **Research Support**
  - **Germplasm and Distribution Unit**
    Leader: Enrique Chujoy
  - **Applied Biotechnology Laboratory**
    Leader: Marc Ghislain
  - **Research Informatics Unit**
    Leader: Reinhard Simon
  - **Capacity Strengthening Dept**
    Leader: Wayne Nelles
- **Communications and Public Awareness Dept**
  Head: Paul Stapleton
- **Grants & Contracts**
  Head: Jacqueline Sawyer

Director of Finance and Administration
Carlos Alonso

- **Finance**
  Head: Amalia Perochena
- **Administration**
  Head: Eduardo Ferreyra
- **Human Resources Services**
  Head: Michael Pigeon
- **Information Technology Unit**
  Head: Anthony Collins

*As of 1 September 2008

CIP staff list

1. Director General's Office

Director General,
Anderson, Pamela K.
Altet, Mariella, Manager for External Relations
García, Erika, Office Auxiliary
Infantas, Viviana, Visitors Officer
Alberco, Roque, Audiovisual Technician
Huanes, Martha, Events & Conferences Administrator
Ortiz, Caroll, Administrative Assistant
Cortbaoui, Roger, Executive Assistant to the Director General[2]

Deputy Director General for Research,
Crissman, Charles
Salinas, Lilia, Administrative Assistant

Director of Finance and Administration,
Alonso, Carlos
Gallardo, Ana, Administrative Assistant[2]

Grants & Contracts, **Sawyer,Jacqueline, Head[1]**
Aguilar, Edith, Administrative Assistant[1]
Mel, Isabel, Bilingual Secretary (since july)

Communications and Public Awareness Department, **Stapleton, Paul, Head**
Avendaño, Juan Carlos
Brenner, Eduardo, Webmaster[1]
Carre, Jean Pierre, Systems Development Support[2]
Champi, Blanca, Handicraft
Delgado, Ruth, Exhibits/Display Assistant
Fernández-Concha, Nini, Graphic Designer
Lafosse, Cecilia, Chief Designer
Lanatta, María Elena, Administrative Assistant
Moncada, Paul, Webmaster[2]
Morales, Anselmo, Graphic Designer
Portillo, Zoraida, Spanish Writer-Editor/Media
Ramírez, Mirian, Handicraft
Taipe, Elena, Graphic Designer
Torres, José, Graphic Designer

Finance and Administration Department Administration, **Ferreyra, Eduardo, Manager of Administration[1]**
Tang, Aldo, Head of Administration[2]
Córdova, Silvia, Administrative Assistant
Secada, Ana María, Head, Travel Office

Human Resources, **Pigeon, Michael, Human Resources Head[1]**
Marcovich, Rosario, Administrative Assistant
Delgado, Gustavo, Human Resources Manager[2]
Alfaro, Jorge, Cooking Attendant
Barrios, Teófilo, Cooking Attendant
Carpio, Giovanna, Bilingual Secretary[2]
Castillo, Maria Cecilia, Human Resources Analyst[1]
Cerna, Wilber, Cooking Attendant
Chávez, Raúl, Cook
Ferreyros, Mónica, Auxiliary Services Supervisor
Gómez, Sandra, Human Resources Assistant[1]
Isla, Rocío, Social Worker, Social Welfare and Health Supervisor
Lapouble, Sor, Auxiliary Services Assistant
Llallico, Joel, Cooking Attendant
Navarro, Teófila, Room & Linen Attendant
Polo, William, Human Resources Analyst
Quico Venturo, Cook
Schmidt, Lucero, Nurse
Varas, Yoner, Salary Administrator
Vargas, Gerardo, Cooking Attendant
Ventura, Jerónimo, Cooking Attendant

Logistics, **Locatelli, Jorge, Logistics Administrator[2]**
Alarcón, Willy, Maintenance Thecnician
Alminagorta, Luis, Driver
Anaya, Alfonso, Janitor[2]
Anglas, Ignacio, Maintenance Technician
Arellano, Tito, Warehouse Supervisor
Auqui, Carlos, Janitor
Auqui, Filomeno, Purchasing Assistant
Blanco, Dalmecio, Mechanic
Briceño, Antolín, Security Officer
Bruno, Genaro, Receptionist
Cánepa, Héctor, Driver[2]
Castillo, Wilfredo, Janitor[2]
Ccenta, Alberto, Janitor
Ccenta, Leoncio, Warehouse Assistant
Curasi, Mario, Driver
Dueñas, Javier, General Services Assistant
Enciso, Cirilo, Driver
Enciso, Facundo, Janitor
Enciso, Wilmer, Mechanic
Ganoza, Ximena, Purchasing Supervisor

1 Joined CIP in 2008
2 Left CIP in 2008
3 Funded by special project
4 Joint appointment

Garay, Marino, Driver
Garay, Rogger, Janitor
García, Raúl, Purchasing Assistant
Gorvenia, José, Security Driver
Guerrero, Atilio, Vehicle Programmer
Huambachano, Victor, Security Officer[2]
Lara, Eduardo, Janitor[2]
Marquina, Juan, Driver
Martínez, Julio, Janitor
Mena, Víctor, Janitor[2]
Mendoza, Julio, Security Driver
Montalvo, Hugo, Security Officer
Morillo, Antonio, Maintenance Chief
Murrieta, Raquel, Receptionist (until August)
Noa, Martín, General Services Auxiliary
Orellana, Richard, Janitor
Palomino, Juan, Maintenance Technician
Peláez, Pedro, Maintenance Technician
Pozada, Angel, Logistics Assistant
Quispe, Edgar, Janitor
Quispe, Kini, Maintenance Technician
Quispe, Francisco, Carpenter
Ramírez, Melissa, Receptionist[1]
Riveros, Richard, Janitor[2]
Tintaya, Teófilo, Security Officer
Uribe, Carlos, Maintenance Technician
Vásquez, Lisardo, Safety Officer
Vences, Luciana, Purchasing Assistant[1]
Vilca, Luis, Janitor[2]
Yancce, José, Maintenance Technician
Zapata, Saturnino, Maintenance Technician

Finances, **Perochena, Amalia, Finance Manager[1]**

Bardalez, Eliana, Accountant
Chirinos, Raúl, Special Projects Supervisor
García, Andrés, Assistant Accountant[2]
Giacoma, Denise, Budget Supervisor[2]
Maza, Christian, Assistant Accountant[2]
Monteverde, Carla, Assistant Accountant[1]
Neyra, Gladys, Administrative Assistant
Patiño, Milagros, Treasurer
Peralta, Eduardo, Accountant
Rivero, Nadia, Finance Auxiliary[1,2]
Saavedra, Miguel, General Accountant
Solari, Sonnia, Cashier
Tapia, César, Assistant Accountant
Zambrano, Mamerto, Office Auxiliary
Zapata, Susana, Accountant
Zuñiga, Tania, Finances Analyst

Information Technology Unit, **Collins, Anthony, Head**

Castro, Samuel, Helpdesk Assistant
Chang, Candie, Helpdesk Assistant
Del Villar, Roberto, Server Administrator
Díaz, Denis, Linux Administrator
Navarro, Rolando, Network Administrator
Puchuri, Jacqueline, Administrative Systems Analyst
Palacios, Dante, Helpdesk Administrator
Palomino, Omar, Systems Assistant[1]
Rodríguez, Saúl, Web Systems Analyst
Torres, Edgardo, Systems Development Administrator
Valdivieso, Peter, Helpdesk Assistant

2. Divisions

Impact Enhancement Division, **Graham, Thiele, Anthropologist, Division Leader**

Ashby, Jacqueline, Research Coordinator, Colombia
Campilan, Dindo, Sociologist, CIP-SWCA Regional Leader (since June)
Fonseca, Cristina, Agronomist, Intermediate Researcher
Hareau, Guy, Agricultural Economist[1,3]
Labarta, Ricardo, Post Doctoral Agricultura Economist[3] (Mozambique)
Low, Jan, Economist, CIP-SSA Regional Leader
Maldonado, Luis, Economist, Intermediate Researcher[3]
Suárez, Víctor, Statistics Assistant
Vásquez, Zandra, Administrative Assistant

Genetic Resources Conservation and Characterization Division, **Tay, David, Plant Biologist, Division Leader**

Arbizu, Carlos, Andean Crops Specialist
Barrientos, Marleni, Laboratory Technician[3]
Bendezú, Néstor, Fiel/Greenhouse Auxiliary
Callañaupa, Julio, Greenhouse Auxiliary[3]
Cárdenas, José, Laboratory Technician[3]
Carrillo, Oscar, Research Technician
Cruzado, Juan, Laboratory/ Greenhouse Auxiliary[2]
Espinoza, Catherine, Biologist, Research Assistant[2,3]
Fernández, Juan, Laboratory Technician[3]
Fuentes, Segundo, Plant Pathologist, Research Associate
García, Luis, Greenhouse Auxiliary[3]
García, Wendy, Laboratory Technician[3]
Gaspar, Oswaldo, Field/Greenhouse Auxiliary
Gómez, Rene, Agronomist, Intermediate Researcher
Gonzales, Roberto, Research Technician
Javier, Miguel, Research Thecnician[3]
Manrique, Iván, Biologist, Intermediate Researcher
Martín, Mariana, Administrative Assistant
Nuñez, Jorge, Biologist, Research Assistant[2]
Panta, Ana, Biologist, Intermediate Researcher
Ramírez, Carlos, Laboratory Technician
Ramos, Martín, Laboratory Technician[2,3]
Robles, Olegario, Research Technician[3]
Robles, Ronald, Research Assistant[1,3]
Rodríguez, Wilder, Research Technician
Rojas, Edwin, System Analyst
Romero, Sandra, Research Technician
Rossel, Genoveva, Intermediate Researcher
Ruíz, Mario, Research Technician
Salas, Alberto, Agronomist, Research Associate
Sánchez, Juan, Research Technician[3]
Soto, Julián, Research Assistant[1,3]
Torres, Pilar, Laboratory Technician[3]
Vargas, Fanny, Agronomist, Intermediate Researcher
Villagaray, Rosalva, Research Technician[3]
Vivanco, Francisco, Agronomist, Research Assistant
Ynga, Alberto, Research Technician[3]
Ynouye, Cecilia, Biologist, Research Assistant[2,3]
Zorrilla, Cinthya, Biologist, Research Assistant[2,3]
Zea, Brenda, Research Assistant[1,3]

Germplasm Enhancement and Crop Improvement Division, **Bonierbale, Merideth, Senior Potato Breeder, Division Leader**

Agili, Sammy, Breeder, Research Assistant
Amorós, Walter, Agronomist, Research Associate
Andrade, Maria, Sweetpotato Breeder and Seed Systems Specialist[3] (Mozambique)

Attaluri, Sreekanth, Sweetpotato Scientist, Liaison Scientist (Bubaneshwar, India)
Alfaro, Delio, Greenhouse Auxiliary
Aliaga, Vilma, Greenhouse Auxiliary[3]
Alva, Eduar, Greenhouse Auxiliary
Aponte, Maruja, Research Technician[3]
Auqui, Mariella, Researh Technician[1,2,3]
Baca, Helga, Greenhouse Auxiliary[3]
Blanco, Mónica, Administrative Assistant
Bastos, Carolina, Research Assistant[3]
Barzola, Alexander, Laboratory Technician
Beltrán, Arnaldo, Research Technician
Burgos, Gabriela, Biologist, Intermediate Research[3]
Cabello, Rolando, Agronomist, Intermediate Researcher
Carbajulca, Doris, Biologist, Research Assistant[2,3]
Carpio, Rossemary, Research Assistant[1,3]
Carli, Carlo, Regional Seed Production Specialist, Liaison Scientist (Uzbekistan)
Chujoy, Enrique, Geneticist, Head of Acquisitions and Distribution Unit
Cruzado, Regina, Research Assistant[1,2,3]
De la Torre, Idelfonso, Field/ Greenhouse Auxiliary
Del Villar, Faviola, Research Technician
De Haan, Stefan, Potato Breeder[3]
Diaz, Luis, Agronomist, Intermediate Researcher
Erquinio, Efraín, Field/Greenhouse Auxiliary
Espinoza, Jorge, Agronomist, Intermediate Researcher
Eusebio, Domingo, Laboratory Technician
Falcón, Rosario, Biologist, Intermediate Research
Fernández, Máximo, Research Technician
Fernández, Luciano, Research Technician
Forbes, Anne, Plant Breeder Fellow[2]
Gamarra, Freddy, Agronomist, Research Assistant[3]
García, Paulo, Research Technician
Gastelo, Manuel, Agronomist, Intermediate Researcher
Ghislain, Marc, Head Applied Biotechnology Laboratory
Gómez, Félix, Research Technician
Gómez, Walter, Research Technician
Grande, Enrique, Research Technician
Gruneberg, Wolfgang, Sweetpotato Breeder Geneticist
Gutiérrez, Luis, Researh Technician
Gutiérrez, Claudia, Research Assistant[2,3]
Gutiérrez, Raymundo, Research Assistant[1,3]
Herrera, Rosario, Biologist, Intermediate Researcher
Huaccachi, Juan, Resesarch Technician
Huamani, Kelvin, Research Assistant[1,3]
Jara, Paola, Research Technician[1,2,3]
Kadian, Mohinder, Agronomist (India)
Kapinga, Regina, Sweetpotato Breeder,Program Coordinator (Uganda)
Kreuze, Hannelle, Expert in Molecular Genetic and Plant Pathology[1,3]
Kreuze, Jan, Molecular Virologist[3]
Landeo, Juan, Potato Breeder (Kenya)
Lajo, Gabriela, Research Assistan[1]
Lara, Raúl, Greenhouse Auxiliary
Loayza, Wilder, Greenhouse Auxiliary
Manrique, Sandra, Ph.D. Biologist, Intermediate Researcher
Martínez, Roberto, Greenhouse Auxiliary
Mel, Isabel, Bilingual Secretary (until June)
Mihovilovich, Elisa, Biologist, Intermediate Researcher
Molina, Carla, Research Technician[1,2,3]
Munive, Susan, Research Technician[3]
Murrieta, Raquel, Secretary (since september)
Nuñez, José, Research Technician[1,2,3]
Nuñez, Jorge, Biologist, Research Assistant[2]
Muñoa, Lupita, Research Technician[1,3]
Ochoa, Carlos, Taxonomist, Scientist Emeritus
Orbegozo, Jeanette, Research Assistant[1]
Ordoñez, Benny, Research Technician[1,3]
Ormachea, Milagros, Research Assistant[1,3]
Orrillo, Matilde, Biologist, Intermediate Researcher
Plasencia, Franklin, Research Assistant[1,3]
Paredes, Joel, Research Technician[3]
Park, Young-Eun, Potato Breeder, Visiting Scientist[1,3]
Patilla, Julio, Greenhouse Auxiliary
Perinango, Carla, Biologist, Research Assistant[2,3]
Prentice, Katterine, Research Assistant[1,3]
Ponce, Miguel, Greenhouse Auxiliary[3]
Portal, Leticia, Biologist, Research Assistant
Porras, Eduardo, Research Technician[3]
Pozo, Víctor, Research Technician
Ramos, Shamir, Laboratory Technician[3]
Rivera, Cristina, Biologist, Research Assistant[3]
Rivera, Luis, Research Assistant[2,3]
Roder, Walter, Regional Seed Potato Specialist[2,3] (Bhutan)
Rodríguez, Daniel, Greenhouse Auxiliary[3]
Rodríguez, José, Research Technician
Rojas, Percy, Biologist, Research Assistant[3]
Roman, Maria Lupe, Research Assistant[1,3]
Romero, Elisa, Agronomist, Research Assistant[3]
Salas, Elisa, Agronomist, Research Assistant[3]
Salazar, Rosa, Secretary
Salcedo, Carlos, Greenhouse Auxiliary[3]
Sánchez, Jacqueline, Research Technician[1,3]
Schafleitner, Roland, Biotechnology Research Scientist[3]
Setiawan, Asep, Sweetpotato Breeder(CIP-ESEAP)
Solís, Julio, Biologist, Research Assistant[3]
Sosa, Paola, Research Technician[1,3]
Sierra, Yaquili, Agronomist, Research Assistant[2,3]
Tincopa, Rosalina, Research Assistant[3]
Tovar, José, Biologist, Research Assistant[3]
Trebejo, Sunny, Office Auxiliary[1,3]
Tumwegamire, Silver, Breeder, Research Assistant, Liaison Office Uganda
Untiveros, Milton, Biologist, Research Assistant[3]
Vega, Jorge, Greenhouse Auxiliary
Vélez, José, Field/Greenhouse Auxiliary
Wang, Fengyi, Potato Production Specialist, DPRK Project Coordinator[3] (China)
Xie, Kaiyun, Liaison Scientist[1] (China)

Integrated Crop Management Division, Ortiz, Oscar, Agricultural Extension & Rural Development Specialist, Division Leader

Alcazar, Jesús, Agronomist, Research Associate
Aley, Pedro, Plant Pathologist, Intermediate Researcher
Alfaro, Armando, Research Assistant[1,3]
Alvarado, Javier, Research Assistant[3]
Arellano, Jaime, Research Technician
Barker, Ian, Senior Virologist
Burgos, Angie, Research Assistant[1,3]
Calvo, Pamela, Research Assistant[1,2,3]
Cañedo, Verónica, Biologist, Research Assistant

Carli, Carlo, Regional Seed Production Specialist, Liaison Scientist (Uzbekistan)
Castillón, Maromeo, Field Laborer
Caycho, Jorge, Research Assistant[2,3]
Chávez, Daniel, Research Assistant[1,3]
Chuquillanqui, Carlos, Agronomist, Intermediate Research
Cuellar, Wilmer, Post-Doctoral Fellow[1,3]
De la Torre, Elvin, Laboratory Technician
Demo, Paul, Regional Potato Expert[3]
Erquinio, Jhojan, Greenhouse Auxiliary[3]
Espinoza, Angel, Field Laborer
Espinoza, Hugo, Research Technician
Ezeta, Fernando, Agronomist, CIP-ESEAP Regional Leader
Flores, Betty, Research Technician[3]
Forbes, Gregory, Pathologist
French, Edward, Scientist Emeritus
Fuentes, Segundo, Plant Pathologist, Research Assistant
Gamarra, Heidy, Research Assistant[3]
Gamboa, Soledad, Biologist, Research Assistant
García, Gregory, Research Assistan[1,3]
Girish, Basavapatna Halappa, Potato Scientist
Gonzales, Manuel, Laboratory Technician
Gutarra, Liliam, Agronomist, Intermediate Researcher
Huamán, Eva, Research Technician
Ilangantileke, Sarath, Postharvest Specialist[2] (India)
Kadian, Mohinder Singh, Agronomist (India)
Kakuhenzire, Rogers, Regional Potato Research Fellow[1] (Uganda)
Kowalski, Britta, Potato Agronomist, Proyect Leader[1,3] (Angola)
Kroschel, Jurgen, Entomologist
Llacta, Eusebio, Field Laborer
Lemaga, Berga, Potato Agronomist (Uganda)
McEwan, Margaret, Research Leader on OFSP Technology Transfer Dissemantion[1,3] (Kenya)
Mendoza, Carlos, Research Technician
Meza, Marco, Research Technician
Mujica, Norma, Agronomist, Intermediate Researcher
Muller, Giovanna, Biologist, Intermediate Researcher
Oliva, Ricardo, PhD Student[2]
Ochoa, Francisco, Research Technician
Orrego, Ricardo, Agronomist, Intermediate Researcher
Oswald, Andreas, Integrated Crop Management Expert[3]
Paredes, Catalina, Research Technician
Pérez, Wilmer, Plant Pathologist, Intermediate Researcher
Picho, Claudia, Research Assitant[3]
Ponce, Luciano, Field,Greenhouse Auxiliary
Pradel, Willy, Zoologist, Intermediate Researcher[3]
Prudencio, Maria Cecilia, Research Assistant[1,2,3]
Quispe, Héctor, Research Technician
Roder, Walter, Regional Seed Potato Specialist[2,3] (Bhutan)
Sánchez, Juan, Research Technician[3]
Santivañez, Sonia, Secretary
Sierralta, Alexander, Laboratory Technician
Sofiari, Eri, Plant Breeder, Regional Scientist
Sporleder, Marc, Entomologist, ICM Specialist[4]
Taipe, Jaime, Research Assistant
Tenorio, Jorge, Biologist, Intermediate Researcher
Trebejo, Marcelo, Research Technician
Trillo, Antonio, Research Technician
Uribe, Richard, Greenhouse Auxiliary[2,3]
Vega, Adan, Research Technician
Ventura, Fredy, Laboratory Technician
Vinueza, Marcelo, Research Technician
Zamudio, Julia, Administrative Assistant
Zegarra, Octavio, Biologist, Research Assistant

Production Systems and the Environment Division, **Quiroz, Roberto, Land Use Systems Specialist, Division Leader**

Alarcón, Nikolai, Greenhouse Technician[3]
Barreda, Carolina, Agronomist, Research Assistant
Bazoalto, Jimena, Research Assistant
Claessens, Lieven, Soil Scientist[3] (Kenya)
Cruz, Mariana, Research Assistant[3]
García, Alberto, Photographic Design Technician[3]
Guerrero, José, Systems Assistant[3]
Heidinger, Haline, Research Assistant[3]
León-Velarde, Carlos, Agricultural Systems Analysis Specialist[3]
Loayza, Hildo, Research Assistant[3]
Mares, Víctor, Production Systems Agronomist[3]
Posadas, Adolfo, Physicist, Research Associate[3]
Raymundo, Ruby, Programmer[1,3]
Rosales, Luis, Research Assistant[2,3]
Sietz, Diana, Associate Expert, ICM Environmental Vulnerability Evaluation[4]
Silva, Luis, Database Technician[3]
Valdizán, Ivonne, Administrative Assistant
Yarlequé, Christian, Research Assistant[3]
Zorogastúa, Percy, Agronomist, Intermediate Researcher

ALTAGRO Project

Leon Velarde, Carlos, Project Leader[3]
Lanatta, Amalia, Administrative Assistant[3]
Rojas, Abel, Coordinator Altagro-La Paz[3]
Valdivia, Roberto, Coordinator Altagro-Puno[3]

Agriculture and Human Health Division, **Cole, Donald, Epidemiologist, Division Leader**

Loechl, Cornelia, Nutritionist[3]

Capacity Strengthening Department, **Nelles, Wayne, Head[1]**

Echeandía, Edda, Multimedia Developer
Puccini, Alfredo, Multimedia Designer
Suito, Mercedes, Administrative Assistant
Torres, Dora, Office Auxiliary[1,2]

Library, **Ferreyra, Cecilia, Head Librarian**

García, Daniel, Library Auxiliary
Hoyos, Alexis, Library Auxiliary
Lay, Griselda, Library Assistant

Field Research Support, **Otazú, Victor, Experimental Stations Superintendent**

Alburqueque, Juan, Field Laborer
Ayquipa, Agustin, Driver
Barrientos, Herminio, Gardener
Blas, Walter, Mechanic
Callañupa, Francisco, Field Laborer
Cancho, José, Field Laborer[2]
Cardozo, Reymundo, Field Laborer
Carhuamaca, Mario, Administrative Auxiliary[2]
Cipriano, Jorge, Field Laborer
Colachagua, Eloy, Field Laborer
Cosme, Anastacio, Driver (Tractor)
Coz, Armando, Driver
Cristobal, Juan, Field Laborer
Cumpa, Jhony, Field Laborer[2]
Domínguez, Augusto, Field Laborer
Duarte, Roberto, Agronomist, Field/Greenhouse Supervisor
Falcón, José, Cooking Attendant
Flores, Julián, Office Auxiliary
Frisancho, Rebeca, Agronomist, Field/Greenhouse Supervisor

Gaspar, Demetrio, Field Laborer
Gaspar, Henry, Cooking Attendant
Huaccache, Elías, Gardener
Huarcaya, Alberto, Field Laborer
Lara, Carmen, Secretary
Limaylla, Jenny, Administrative Assistant
López, Serapio, Field Laborer
Maguiña, Sergio, Field Laborer
Marín, Fernando, Maintenance Technician
Mena, Víctor, Greenhouse/Field Laborer[2]
Merma, Luis, Greenhouse/Field Laborer
Montes, Marco, Field Laborer
Noa, Fernando, Field Laborer
Olmedo, José, Driver (tractor)
Piana, Vanna, Administrative Assistant
Porras, Jorge, Warehouse Assistant
Quino, Miguel, Research Technician
Quispe, Julio, Field Laborer[2]
Reyes, Eddy, Gardener
Romero, Emeterio, Field/Greenhouse Auxiliary
Silva, Fredy, Security Chief[2]
Suárez, Julio, Field Laborer
Vega, Ricardo, Field/Greenhouse Auxiliary
Velasco, Diogardo, Field/Greenhouse Auxiliary
Vicencio, Domingo, Field Laborer[2]
Zamora, Marco, Field Laborer

Research Informatics Unit, Simon, Reinhard, Head
Aliaga, Christian, Systems Assistant[1,3]
De Mendiburu, Felipe, Statistician, Research Assistant
Gonzales, Juan Carlos, Systems Assistant[3]
Hualla, Vilma, Research Assistant[2,3]
Juárez, Henry, Agronomist, Intermediate Researcher
Rojas, Edwin, Systems Analyst
Rojas, Luis, System Assistant[1,3]
Schmitt, Magna, Systems Assistant[2,3]
Vargas, María Elena, Research Assistant[3]

3. Partnership Programs

VITAA, Kapinga, Regina, Sweetpotato Breeder, Program Coordinator (Kampala)
Tumwegamire, Silver, Breeder, Research Assistant

Papa Andina, Devaux, André, Agronomist, Program Coordinator[3]
Andrade, Jorge, Coordinator, InnovAndes Project[3]
Antezana, Ivonne, Economist, Regional Scientist[3]
Egúsquiza, Rolando, Consultant
Julca, Pamela, Consultant[2]
López, Gastón, Consultant[3]
Manrique, Kurt, Agronomist, Intermediate Researcher
Ordinola, Miguel, Consultant[3]
Thomann, Alice, Associate Expert[3]
Valcárcel, Verónica, Information Assistant[2,3]
Vela, Ana María, Administrative Assistant[3]
Velasco, Claudio, Coordinator of Papa Andina in Bolivia

UPWARD, Campilan, Dindo, Sociologist, Program Coordinator (until May)
Aquino, Mylene, Administrative Officer
De los Reyes, Mario, Office Messenger[2]
Gallentes, Jaime, Research Fellow
Luis, Judith, Project Specialist[2]
Nadal, Marietta, Office Manager
Sister, Lorna, Project Specialist

CONDESAN, Saravia, Miguel, Program Coordinator[3]
de Bièvre, Bert, Paramo Andino Project Coordinator[3]
Briceño, Musuq, Research Assistant[3]
Calle, Tania, Research Assistant[3]
Castro, Augusto, Research Assistant[3]
Fernández, Edith, Intermediate Researcher[1,3]
Guerrero Mauricio, Consultant
Hermoza, María Pía, Research Assistant[1,2,3]
Hernández, Connie, Administrative Assistant[3]
Hidalgo, Ruth, Junior Web Assistant[2,3]
Montoya, María Paz, Project Coordinator[1,3]
Ramírez, Amparo, Project Administrator[2,3]
Sánchez, Adam, Programmer[3]
Yáñez, Natalia, Research Assistant[2,3]

Global Mountain Program, Trutman, Peter, Program Coordinator[2,3]

Urban Harvest, Prain, Gordon, Social Anthropologist, Program Coordinator
Alegre, Jessica, Research Assistant[2,3]
Gonzales, Nieves, Research Assistant[3]
Karanja, Nancy, Regional Coordinator (CIP-SSA)
Lwasa, Shuaib, Project Leader, Focus Cities[3] (Uganda)
Njenga, Mary, Research Officer
Pacheco, Rossana, Research Assistant[3]
Salvo, Miguel, Post Doctoral Scientist[2,3]
Muñoz, Ana Luisa, Administrative Assistant

4. Regional Offices

Liaison Office, Quito, Ecuador, de Bièvre, Bert, Liaison Officer, Paramo Andino Project Coordinator[3]
Alcocer, Julio, Field Laborer
Ayala, Sofia, Administrative Assistant
Burbano, Rosa, Accountant
Brusil, Ramiro, Guard
Cuesta, Francisco, Consultant
Delgado, Juan, Vehicle Maintenance and Messenger[2]
Guerrero, Mauricio, Consultant
Jiménez, José, Network Management and Systems Maintenance
Mera, Xavier, Research Assistant[1]
Oliva, Ricardo, PhD Student[2]
Oña, Marlene, Administrative Assistant[1]
Orozco, Fadya, Project Coordinator[2]
Pomboza, Pedro, Research Assistant[2]
Reinoso, Lidia, Field and Greenhouse Laborer
Taipe, Jaime, Research Assistance
Vinuesa, Marcelo, Research Technician
Yanza, Pablo, Field Laborer[1]

Sub-Saharan Africa (SSA) Nairobi, Kenya, Low, Jan, Economist, Regional Leader
Agili, Sammy, Breeder, Research Assistant
Borus, Dinah, Research Assistant[1]
Kaguongo, Wachira, Agricultural Economist,Research Assistant[3]
Kioko, Musua, Administrative Assistant[1]
Landeo, Juan, Potato Breeder
Maina, George, Driver
McEwan, Margaret, Research Leader OFSP Technology Transfer Dissemantion[1,3]
Ndoho, Emily, Accountant
Reuben, Anangwe, Cleaner
Zani, Naomi, Administrative Assistant

Liaison Office, Kampala, Uganda, Kapinga, Regina, Sweetpotato Breeder, VITTA Program Coordinator[3]
Atong, Moses, Office Messenger
Kasaato, Paul, Security Guard[1,2]
Kakuhenzire, Rogers, Regional Potato Research Fellow[1]

Lemaga, Berga, Potato Agronomist
Loechl, Cornelia, Nutritionist[3]
Lwamata, James, Security Guard
Lwasa, Shuaib, Project Leader, Focus Cities[3]
Namanda, Sam, Agronomist, Research Assistant[3]
Nyamutale Placid, Research Assistant[3]
Tumwirize, Ronald, Driver, Purchasing Assistant
Tumwegamire, Silver, Breeder, Research Assistant
Ameru, Martha, Secretary[1]
Nsumba, James, Agronomist, G Program Assistant[1,3]
Wakulira, N. Rachel, Accountant
Migisa, Isaac, Driver[1]

Office, Lilongwe, Malawi,
Demo, Paul, Regional Potato Expert[3]
Ndiwa, Godknows, Administrative Assistan[1,2]

Liaison Office, Maputo, Mozambique, Andrade, Maria, Sweetpotato Breeder and Seed Systems Specialist[3]
Alvaro, Abilio dos Santos, Agronomist, Research Assistant[3]
Armando, Lourenco, Driver[3]
Chibebe, Arlindo, Technician[2,3]
Chiconela, Luisa, Greenhouse worker[3]
da Costa, Virgílio, Driver, Angonia[3]
Faria, Maria de Lourdes, Assistant Nutritionist[3]
Jorge, Fernandes J., Technician[3]
Martins, Cheila, Research Assistant[1,2]
Mauariha, José Albino, Driver, Gaza[3]
Munguambe, Chelza, Greenhouse worker[3]
Rabeca, Cesar A., Technician Beira (Sofala Province)[2]
Ruco, Amelia Ozias, Accountant and Administrator
Venancio, Felismino, Agronomist, Research Assistant (Based in Angonia)[3]
Vura, Alberto, Technician[3]
Guambe, Abrahamo Alberto (gardener)[3]
Zibia, Jabula, Research Assistant[1,2]
BK-Chevron-Angola Vegetatively Propagated Crops

Liaision Office, Huambo, Angola
Kowalski, Britta, Potato Agronomist, Proyect Leader[1,3]

Reaching End Users Project Office, Quelimane, Mozambique,
Labarta, Ricardo, Post Doctoral Agricultura Economist[3]
Munhaua, Bernardinho Azevedo, Data Entry Manager and Administrator[3]
Mussuale, Momade Cesar, Field Supervisor[3]
Devunane, Jose, Driver[3]
Murina, Bernardo, Cleaner & Messenger[3]
Manteiga, Iranett Almeida, Field Enumerator and Data Entry[3]
Godinho, Nelson, Field Enumerator and Data Entry[3]
Pedro, Gomes Federico, Field Enumerator and Data Entry[3]
Serra, Victor Luis, Field Enumerator and Data Entry[3]

South, West and Central Asia(SWCA),New Delhi, India,
Ilangantileke, Sarath, Postharvest Specialist, Regional Leader[2] (until May)
Campilan, Dindo, Sociologist, Regional Leader (since June)
Kadian, Mohinder Singh, Potato Agronomist
Girish, Basavapatna Halappa, Potato Scientist
Arya, Sushma, Accountant/Program Coordinator
Mony, Lalitha, Administrative Secretary
Verma, Romi, Program Associate
Dasappan Jayakumar, Computer Assistant
Jagram, Office Assistant
Anjan, Barik, Office Driver
Kumar, Vinod, Office Driver[1]
Rahaman, E.H.M. Shofir, Research Assistant[1]
Shahid, Ali, Senior Research Fellow[1]
Sharma, Neeraj, Research Assistant[1]
Viwheto, Thorie, Research Assistant[1]

Liaison Office, Bhubaneswar, India
Attaluri, Sreekanth, Sweetpotato Scientist, Liaison Scientist-BBSR, India

Office, Kathmandu, Nepal
Sporleder, Marc, Entomologist, ICM Specialist[4]

Liaison Office, Tashkent, Uzbekistan, Carli, Carlo, Regional Seed Production Specialist, Liaison Scientist
Ibragimov, Zokhid, Research Assistant[1,2]
Makhmudor, Murod, Administrative Assistant
Muzaffar, Aliev, Administrative Officer[1]
Khalikov, Durbek, Agronomist Assistant
Khegay, Eduard, Office Driver
Kim, Alexey, Administrative Assistant[2]
Kim, Galina, Secretary[1]
Tashpulatova, Dildora, Interpreter/ Translator[2]
Yuldashev, Firuz, Research Assistant[1,2] Bhutan Special Project-Liaison Office-Bhutan
Roder, Walter, Project Coordinator[2,3]
Norbu, Kencho, Driver[2]

East and Southeast Asia and the Pacific (ESEAP) Lembang, Indonesia, Ezeta, Fernando, Agronomist, Regional Leader
Budhi, Prasetya, Program Officer[1,2]
Kosay, Luther, Research Assistant[3]
Mahalaya, Sukendra, Researcher
Nawawi, Kusye, Accountant
Satiman, Partono, Office Driver
Sofiari, Eri, Plant Breeder, Regional Scientist
Syahputra, Aris, Research Assistant
Tjintokohadi, Koko, Research Assistant
Yuniarti, Fihartini, Secretary Executive
Cargill, Colin, Animal Scientist[3] (Australia)

Liaison Office, Beijing, China,
Xie, Kaiyun, Liaison Scientist[1]
Dian-ping, Zhu, Yanqing Station Manager and Technician
Gu, Jianmiao, Administrative Assistant
Shi-an, Liu, Office Assistant and Driver
Wang, Fengyi, Potato Production Specialist, DPRK Project Coordinator[3]
Wang, Xiao-Xue, Research Assistant[1]

Consulting Agencies in the Provinces,
Min-shuang, Yao, Potato Seed Technology, Breeding and Training, Pengzhou Potato Unit, Sichuan Agriculture Bureau, Sichuan Province
Yu-ping, Bi, Pathogen Diagnosis and Training, Biotechnology Center, Shandong Academy of Agriculture Sciences, Shandong Province

Liaison Office, Hanoi, Vietnam,
Nguyen, Thi-Tinh, Animal Scientist, Liaison Scientist
Nguyen, Thia Hoa, Cleaner
Le van Huyen, Research Assistant

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CIFOR	**C**enter for International Forestry Research
CIMMYT	**C**entro Internacional de Mejoramiento de Maíz y Trigo
CIP	**C**entro Internacional de la Papa
ICARDA	**I**nternational Center for Agricultural Research in the Dry Areas
ICRISAT	**I**nternational Crops Research Institute for the Semi-Arid Tropics
IFPRI	**I**nternational Food Policy Research Institute
IITA	**I**nternational Institute of Tropical Agriculture
ILRI	**I**nternational Livestock Research Institute
IRRI	**I**nternational Rice Research Institute
IWMI	**I**nternational Water Management Institute
WARDA	**W**est Africa Rice Development Association
	World Agroforestry Centre
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CIP is one of 15 food and environmental research centers located around the world that make up the Consultative Group on International Agricultural Research (CGIAR), a strategic global partnership of countries, international and regional organizations, and private foundations. Working with national agricultural research systems, the private sector and civil society, the CGIAR mobilizes agricultural science to reduce poverty, foster human wellbeing, promote agricultural growth, and protect the environment.

The Centers collaborate among themselves and with their diverse partners through numerous projects and system-wide programs. The CGIAR is also creating a series of independently governed partnerships among a wide range of institutions for high-impact research that targets complex issues of overwhelming global and/or regional significance. CIP has substantial participation in each of these Challenge Programs, and intends to extend this involvement to the Sub-Saharan Africa Challenge Program, currently being formulated. Over the past two years, three Challenge Programs have been established: The Challenge Program on Water and Food, The HarvestPlus Challenge Program, The Generation Challenge Program

CIP's Mission

The International Potato Center (CIP) works with partners to achieve food security and well-being and gender equity for poor people in root and tuber farming and food systems in the developing world. We do this through research and innovation in science, technology and capacity strengthening.

The CIP Vision

Our vision is roots and tubers improving the lives of the poor.
www.cipotato.org

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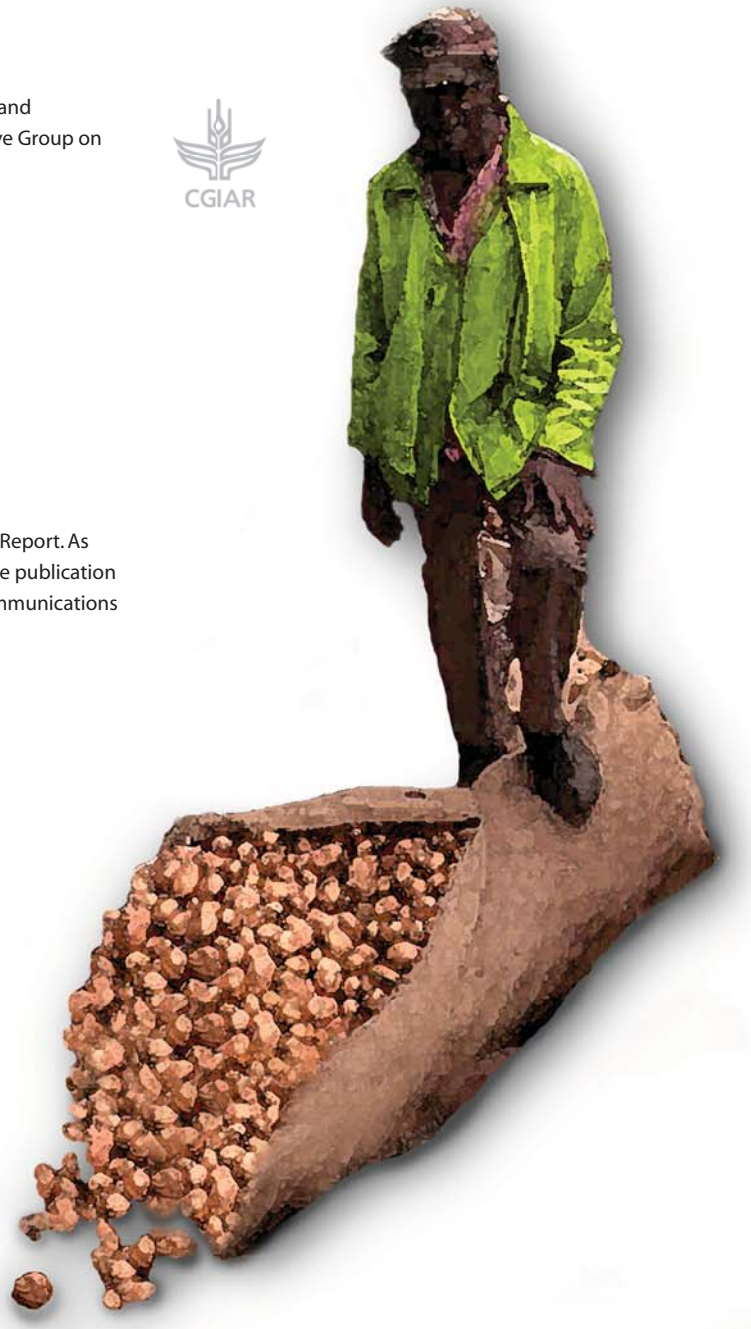

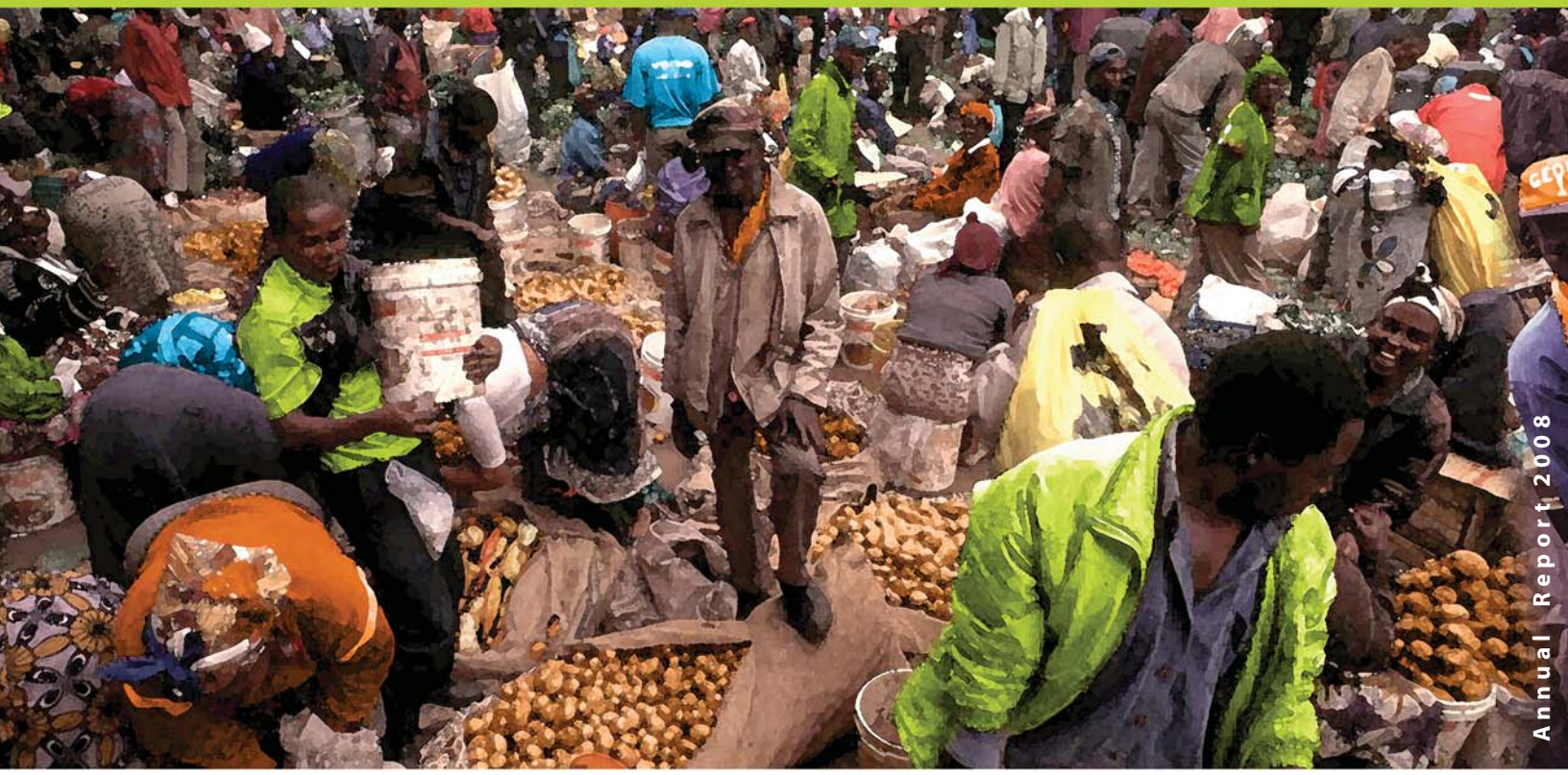

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International Potato Center

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