eapr
EUROPEAN ASSOCIATION FOR POTATO RESEARCH

Pathology & Pests Section Meeting 2016

Dundee, Scotland

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CGIAR

August, 2016

SOUTH AMERICA, POTATO PEST AND PATHOGEN THREATS – with focus on the ANDES

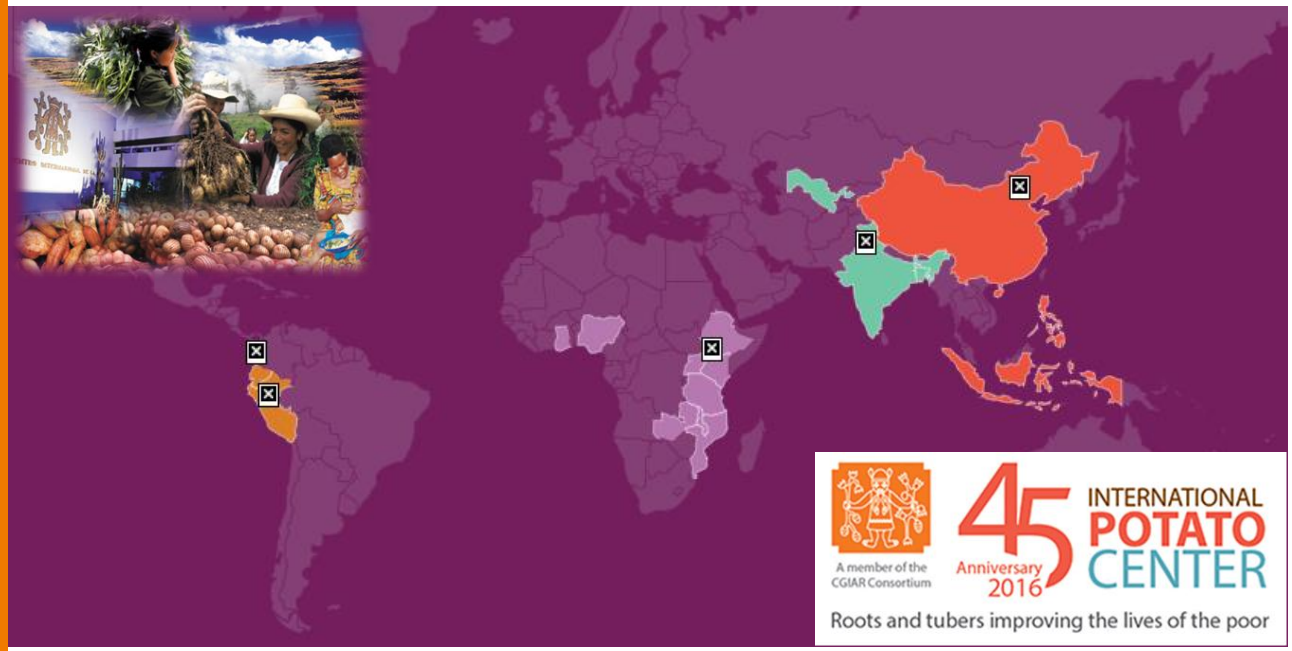
Peter Kromann – International Potato Center

Outline

1. International Potato Center (CIP)
2. Potato production in South America
3. Main potato pests in SA
4. Main potato diseases in SA
5. New biotic threats to potato production in SA
6. Recent research approaches
7. Challenges and opportunities related to late blight management

International Potato Center

CIP GLOBAL PRESENCE



Mission: *To work with partners to achieve* ***food security****,* ***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 sciences, technology and capacity strengthening.*

LAC:
Quito (Ecuador)
Lima (Peru)

SSA:
Kumasi (Ghana)
Abuja (Nigeria)
Addis Ababa (Ethiopia)
Nairobi (Kenya)
Kampala (Uganda)
Kigali (Rwanda)
Lilongwe (Malawi)
Maputo (Mozambique)
Chipata (Zambia)
Mbeya (Tanzania)

ASIA:
New Delhi (India)
Tashkent (Uzbekistan)
Dhaka (Bangladesh)

CCCAP:
Beijing (China)
Lembang (Indonesia)
Los Baños (Philippines)

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CIP PRESENCE in South America

Latin America and the Caribbean (LAC) Regional Office, Ecuador, Quito, Ecuador

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CGIAR's 2016—2030 Strategy and Results Framework

Vision: A world free of poverty, hunger and environmental degradation

1. Reduced Poverty

2. Improved Food and Nutrition Security for Health

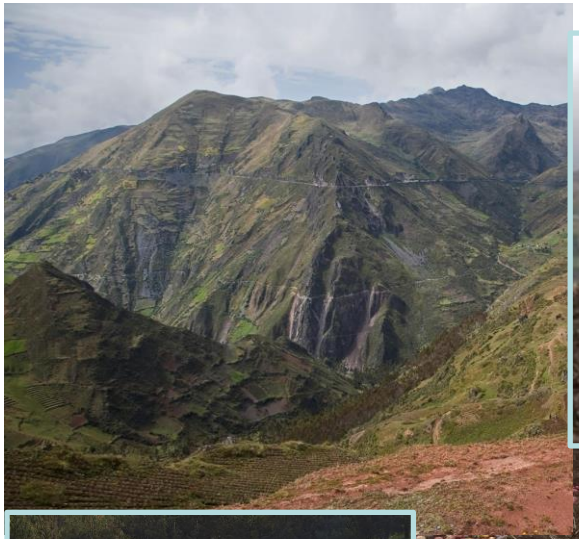
3. Improved Natural Resources and Ecosystem Services

Cross cutting Themes:

◆ Climate Change ◆ Gender and Youth ◆ Policies and Institutions ◆ Capacity Development

2 Potato production in South America

Andean potato production



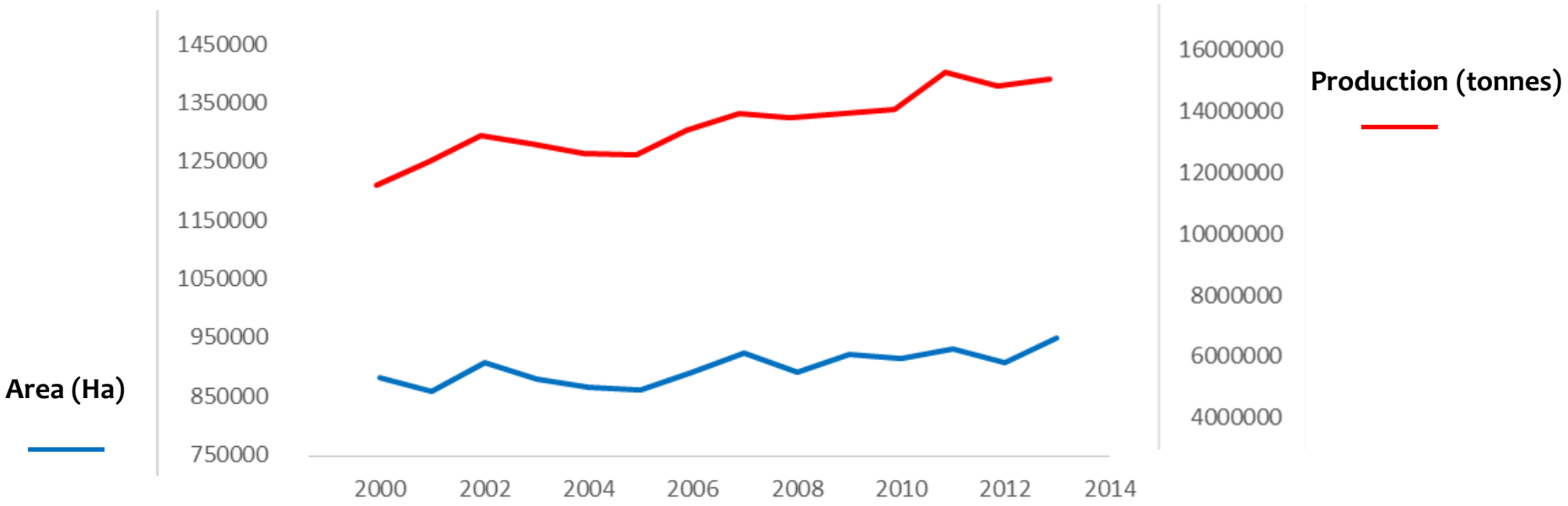





Flatter areas, e.g. in southern parts of South America

Source: http://www.argenpapa.com.ar/

Planted area and production of potato in South America



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Area (Ha)	881390	859042	906934	880548	865689	861251	891885	924060	892512	922652	913798	931456	907587	949099
Production (ton)	11861398	12610047	13458178	13188665	12906817	12859862	13662168	14174893	14056171	14201739	14325426	15522907	15100336	15314943

Source: FAO 2016

Potato production in South American countries

Countries	2009	2010	2011	2012	2013	Average
	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes
Peru	3,765,289	3,814,373	4,072,455	4,474,713	4,569,629	4,139,292
Brazil	3,443,712	3,547,510	3,917,234	3,731,798	3,553,772	3,638,805
Argentina	1,950,000	1,996,038	2,126,787	2,200,000	2,000,000	2,054,565
Colombia	2,272,772	1,867,899	1,709,950	1,847,145	2,129,319	1,965,417
Chile	924,555	1,081,349	1,676,444	1,093,462	1,158,922	1,186,946
Bolivia	956,953	1,002,902	1,032,492	1,006,249	1,044,527	1,008,625
Venezuela	499,179	512,544	554,852	349,029	420,319	467,185
Ecuador	286,790	386,798	339,038	285,101	345,922	339,215
New Zealand	545,000	525,000	530,000	550,000	560,000	542,000
Belgium	3,296,077	3,455,800	4,128,669	2,929,800	3,428,000	3,447,669
World Total	**334,734,461**	**333,618,656**	**374,054,845**	**369,091,265**	**314,806,639**	**345,261,173**

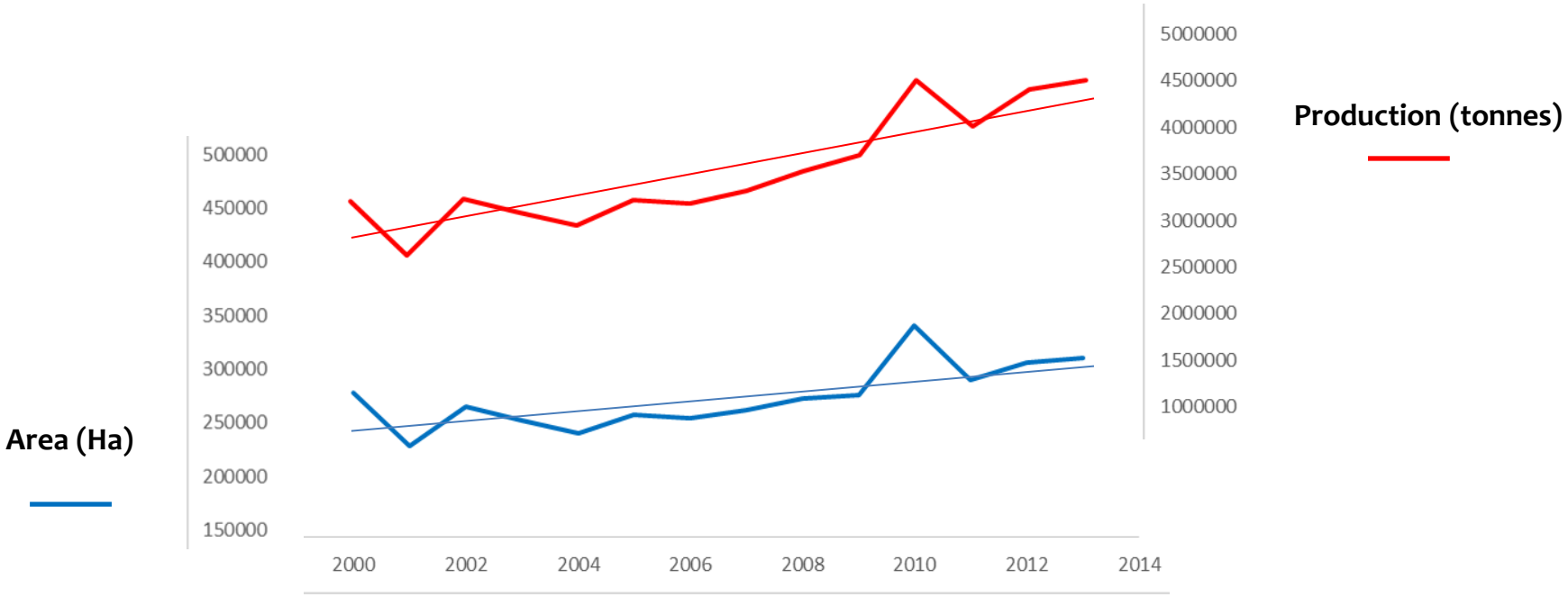
Fuente: FAO 2016

Potato yield in South American countries

Countries	2009	2010	2011	2012	2013	Average
	T/ha	T/ha	T/ha	T/ha	T/ha	T/ha
Argentina	28.04	27.95	29.74	31.42	28.78	29.2
Brazil	24.82	25.89	26.25	27.45	27.75	26.4
Chile	20.51	21.30	31.25	26.33	23.38	24.6
Venezuela	19.97	17.62	17.31	19.97	19.79	18.9
Colombia	18.38	17.25	17.34	18.17	18.56	17.9
Peru	13.34	13.15	13.74	14.33	14.41	13.8
Ecuador	5.85	8.74	7.78	8.31	7.31	7.6
Bolivia	5.23	5.66	5.70	5.76	5.77	5.6
New Zealand	47.82	49.58	49.42	47.50	46.67	48.2
Belgium	44.71	42.27	50.14	45.42	46.15	45.7
World average	**17.91**	**17.85**	**19.48**	**19.13**	**19.47**	**18.8**

Fuente: FAO 2016

Planted area and production of potato in Peru



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Area (Ha)	284671	234242	270894	258003	246770	264054	260847	268161	278546	282355	347267	296439	312227	317,044
Production (ton)	3274860	2690544	3298162	3143874	3008159	3289699	3248416	3388000	3597091	3765289	3814373	4072455	4474713	4,570,673

Source: FAO 2016

PERU: Coloured Potato Crisps market

MT

2000

1000

Commercial Innovation

Creative imitations

Large companies

Challenges

- Capitalize existing knowledge
- Sustainable technologies
- Integrating Research and Development

2002 2004 2006 2008 2009

3

Main potato pests in South America

Potato pests

- Farmers usually face around 10 insect pests
  - Typically, 2-4 insect pests reach a damage threshold that requires control

- The most important in the Andean countries are:
  - Andean potato weevils (*Premnotrypes* spp.)
  - Tuber moths (*Symmetrischema tangolias, Phthorimaea operculella, Tecia solanivora*)

Potato pests

- Leaf miner fly (*Liriomyza huidobrenis*)

- Potato flea beetles (*Epitrix* spp.)

- Nematodes (*Globodera pallida*, *G. Rostochiensis*, *Nacobbus aberrans*)

4

Main potato diseases in South America

Potato diseases

- **Potato late blight caused by *Phytophthora infestans* is the most important disease**

Potato diseases

Foliage diseases

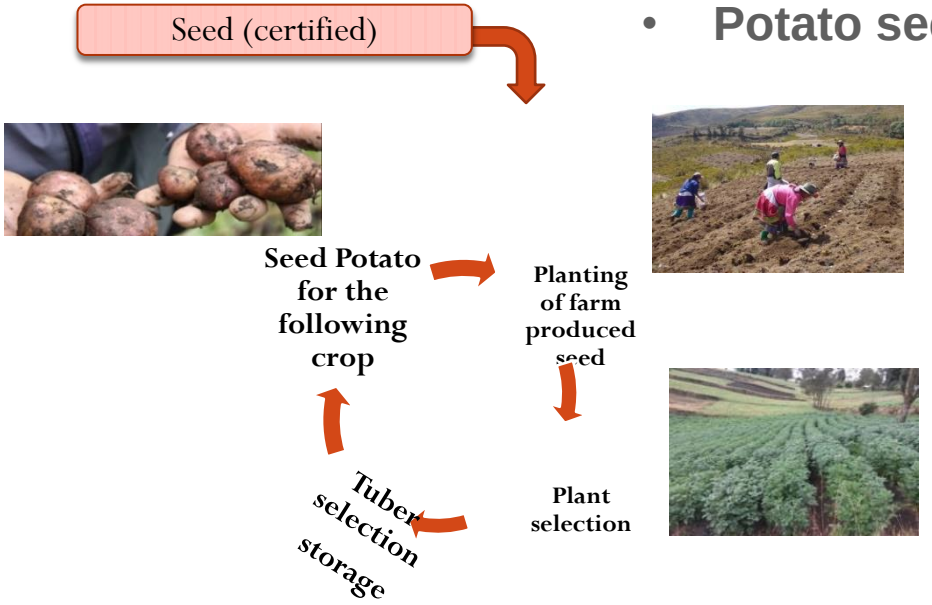
- *Alternaria solani*
- *Erysiphe / Oidium spp.*
- *Puccinia pittieriana*

Soilborne diseases

- *Ralstonia solanacearum,*
- *Rhizoctonia solani*
- *Spongospora subterranea*
- *Pectobacterium spp.*
- *Fusarium spp.*

Potato seed health

Certified seed use (%)	Colombia	Ecuador	Peru	Bolivia
	2	8	0,5	<0,1

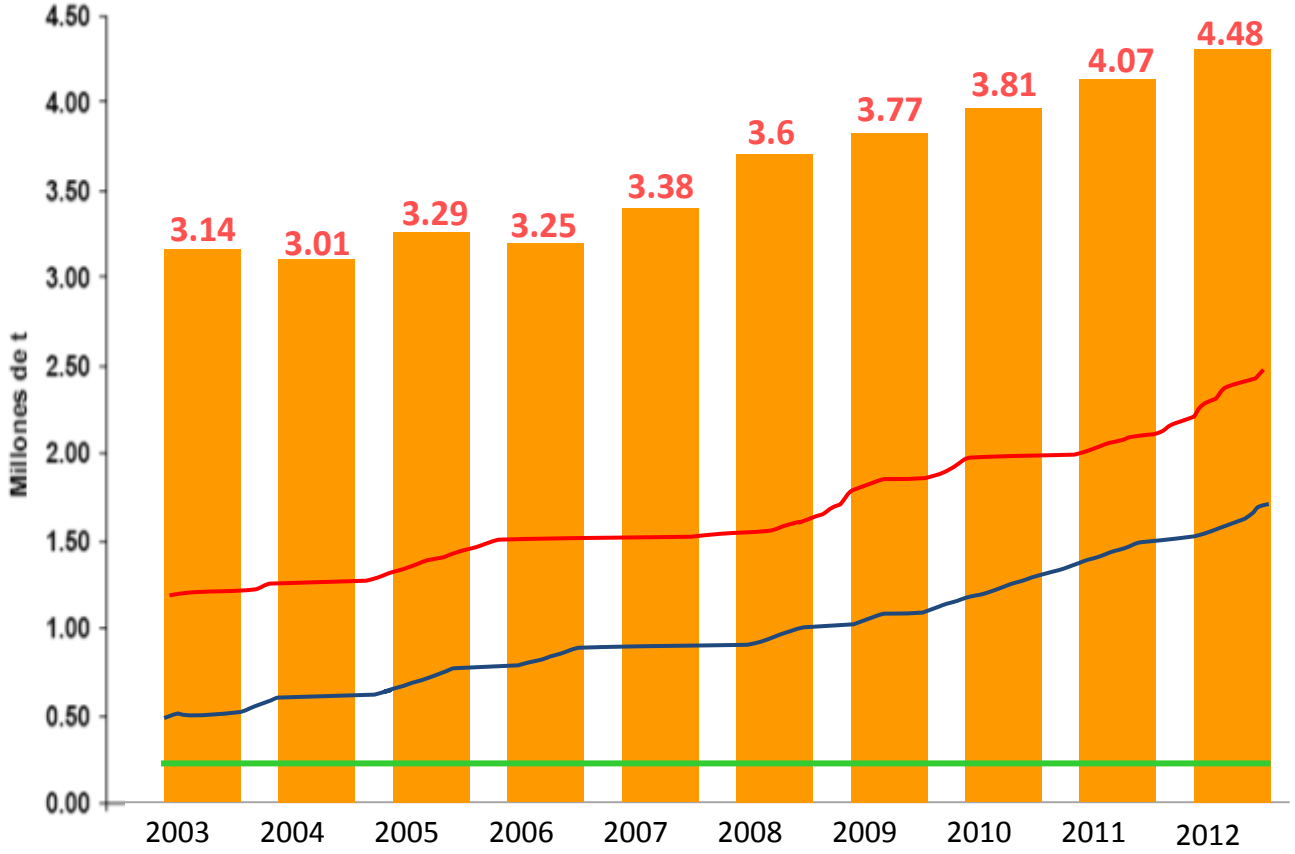


- Potato seed health management

Degenerated potato seed

- Andean weevils
- Tuber moths
- *Rhizoctonia*
- *Pectobacterium*
- Viruses

The role of certified seed in the potato boom in Peru



M. Ordinola (2013)

Production (millions of t) Yield Price Certified seed

5

New threats to potato production in South America

New threats

Zebra chip (ZC) – suspected in Ecuador and Colombia

Tomato spotted wilt virus (TSWV) – Argentina

New threats

Tomato chlorosis virus (ToCV) – Brazil

Potato yellow vein virus (PYVV) – increasing problem in Colombia

Other viruses: Identification of a high diversity of viruses by deep sequencing

6 Recent research approaches

Breeding varieties with pest/disease resistance

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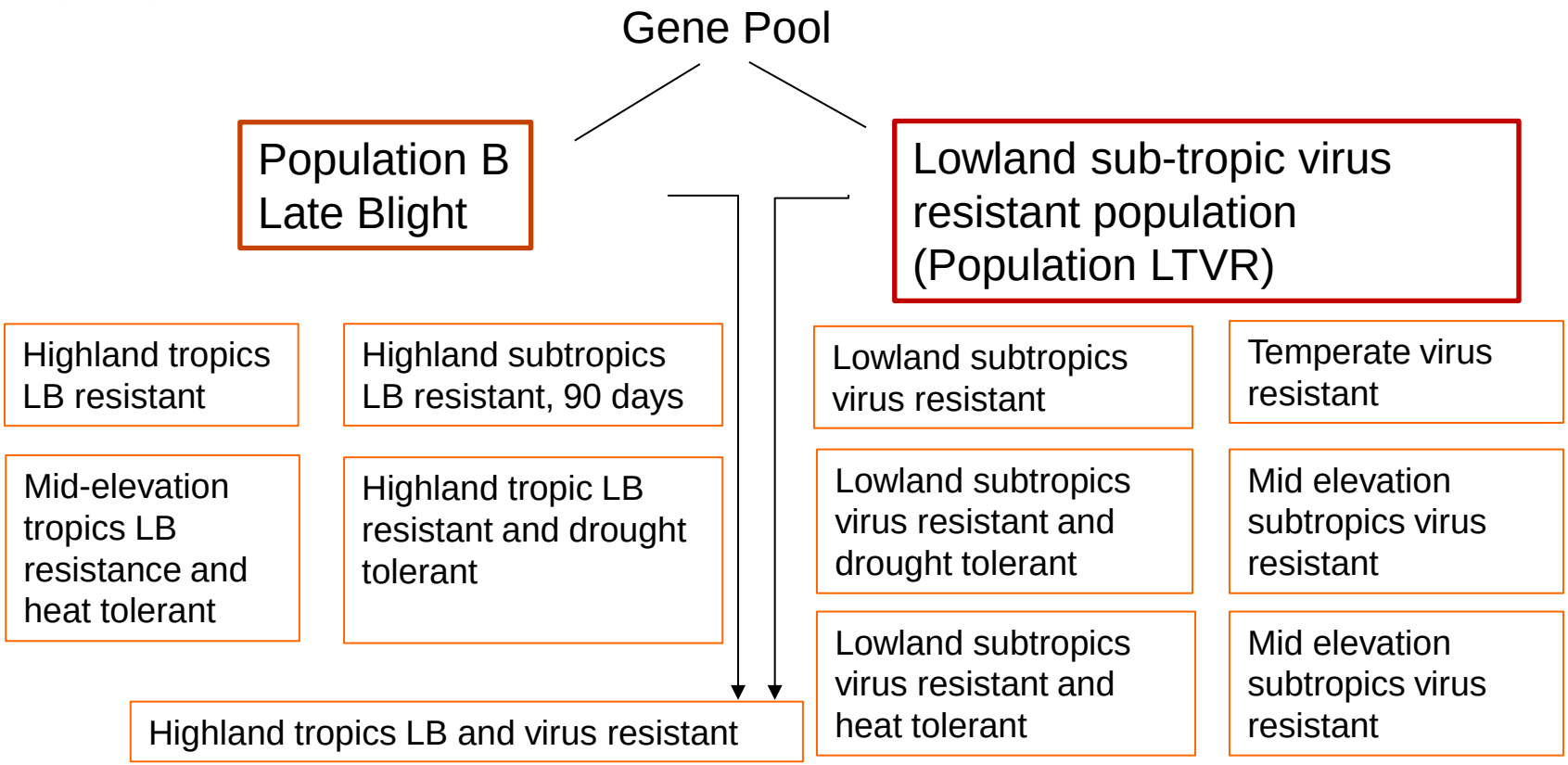
International Potato Center's advanced breeding populations



Technological innovation for Pest Management in the Andes

Plastic barriers for the control of Andean Potato weevil

Attract-and-kill for the control of moths in field and storage: (AdiosMacho-*Po* and AdiosMacho-*St*)

Talco-*Btk* for the control of moths in storage

New IPM technologies for potato in the Andes

Potato IPM highlands >3800 m

Pest scouting

1 Plastic barriers

Application of selective insecticides*

Healthy seed

Potato IPM highlands <3800 m

Pest scouting

3 Talco-*Bt*

1 Plastic barriers

Application of selective insecticides*

2 Attract-and-kill

Healthy seed

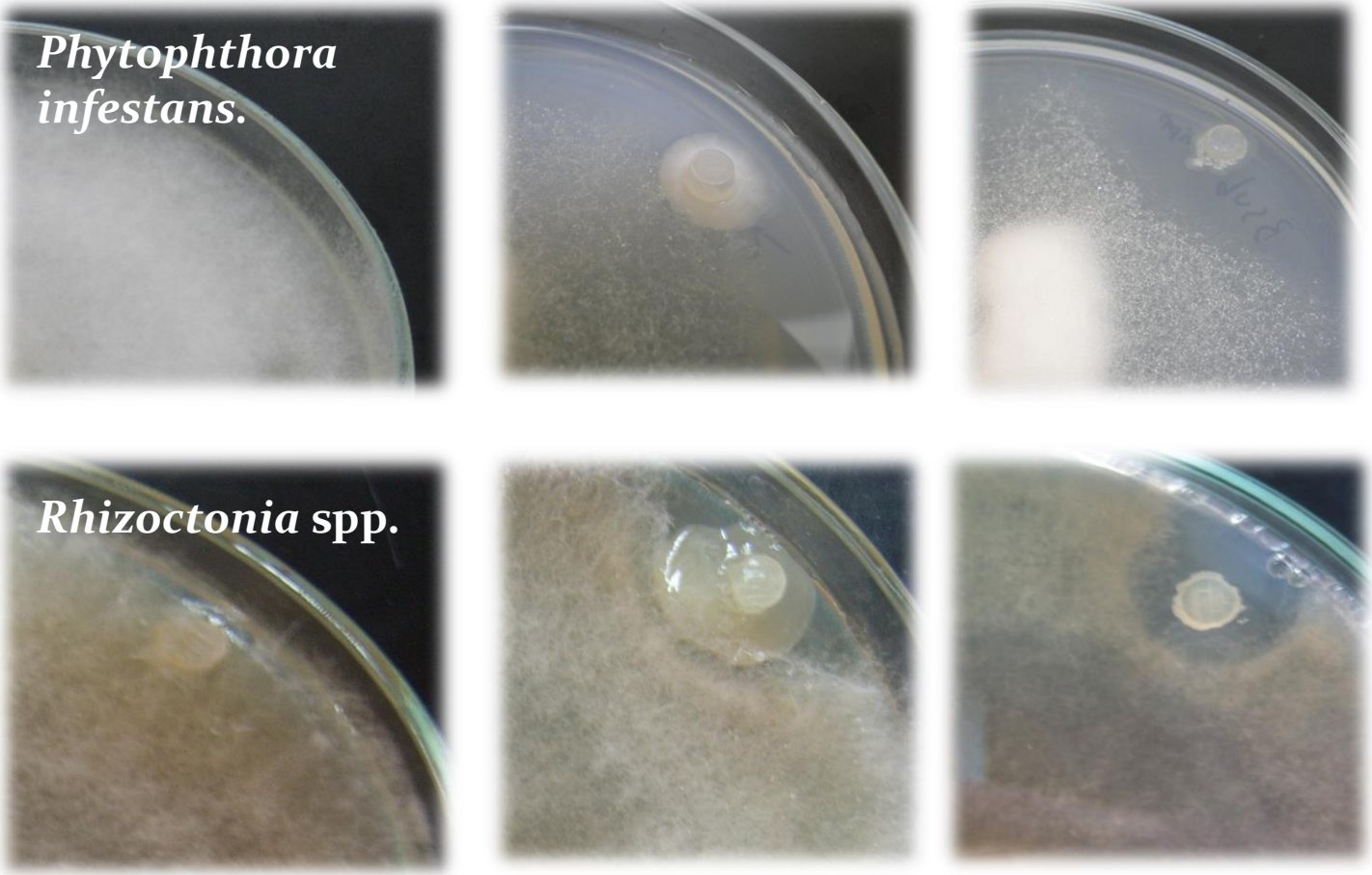
2 Attract-and-kill

Planting | **Emergence** | **Vegetative development** | **Harvest** | **Storage**

*Might be necessary, if *Epitrix* spp. occurs in high populations or in potato monoculture!

The technologies have to be embedded into the best cultural practices for potato and each pest!

Beneficial microorganisms
Biocontrol agents



Quantifying potato seed degeneration in the Andes

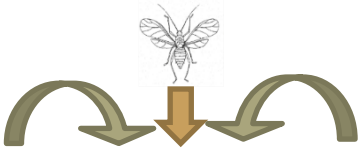
How much does potato seed degenerate after subsequent generations of multiplication? - Variety, Altitude Management

Seed Potato for the following crop

Planting of farm produced seed

Plant selection

Tuber selection storage



Aphid abundance

Incidence of virus at emergence, flowering, tubers
DAS-ELISA: PVY, PVX, PLRV, PVS, ALPV, APMoV

Incidence of seed-borne diseases and pest damage
Visual inspection

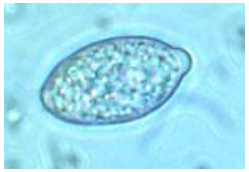
7

Challenges and opportunities related to late blight management

Late blight management

Integration of practices

Spore showers



- Selection of resistant variety
- Seed selection
- Distance between plants and between rows

- Planting date
- Field selection
- Elimination of weeds/ volunteers

Fungicide control

Sanitation

Appropriate irrigation

Vine/foliage killing

- Timely harvest
- Tuber selection
- Appropriate storage

Timely high hilling

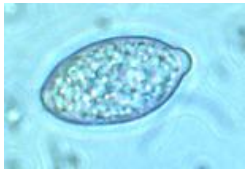
Timely land preparation

Planting | Emergence | Vegetative development | Tuberization | Maturity - Senescence

Late blight management

Integration of practices

Spore showers



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Vine/foliage killing

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- Appropriate storage

Planting | Emergence | Vegetative development | Tuberization | Maturity - Senescence

Challenges

Breed resistant varieties

- **Quantify varietal resistance**
- **Get resistant varieties to farmers**

Improve fungicide control

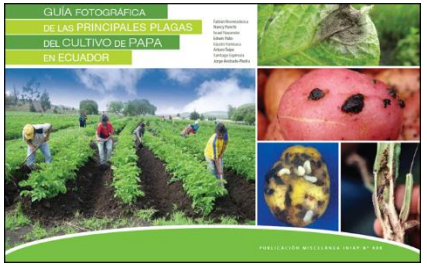
- **Integrate fungicide and host resistance**
- **Identify low environmental impact alternatives**
  - **E.g. Phosphonates, Bio-control agents, Chitosan**

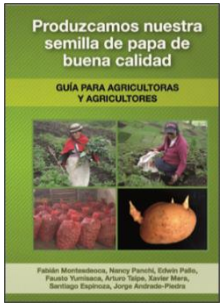
Improve farmer management capacity

Know *P. infestans* better, how does it evolve?

Opportunities

- ✓ Public – Private collaboration
  - ✓ Get resistant varieties to farmers – braking down barriers related to transfer of breeding material
  - ✓ Improve fungicide control
- ✓ Farmer capacity
  - ✓ Collective action, small-farmer associations





Thank you!

p.kromann@cgiar.org

The International Potato Center (known by its Spanish acronym CIP) is a research-for-development organization with a focus on potato, sweetpotato, and Andean roots and tubers. CIP is dedicated to delivering sustainable science-based solutions to the pressing world issues of hunger, poverty, gender equity, climate change and the preservation of our Earth's fragile biodiversity and natural resources.
www.cipotato.org

CIP is a member of CGIAR. CGIAR is a global agriculture research partnership for a food secure future. Its science is carried out by the 15 research centers who are members of the CGIAR Consortium in collaboration with hundreds of partner organizations.
www.cgiar.org