Potato Storage Management: A Global Perspective

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Driving Change in Storage Management

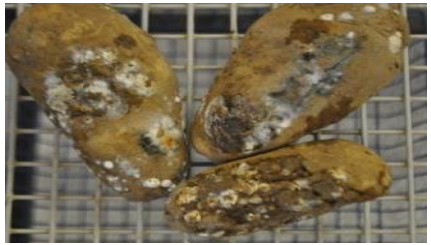
- Research
- Education
- Technology

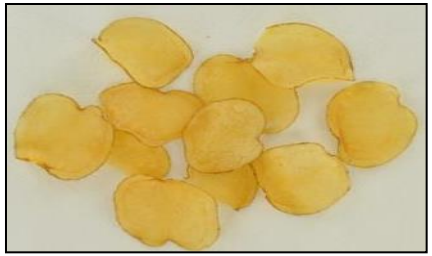
- Market, Consumers and Economics

➢Reduce losses and maintain quality

Minimizing Losses

- Duration – market and demand
- Transpiration and respiration
- Disease, pests, animals
- Sprouting
- Quality – processing; consumer acceptance, appeal and taste, edible





Location driven storage structure and management

- Climate – emerging global markets
- Field agronomics
- Market criteria and location
- Resources

Africa. Photo by Dr. Joe Guenthner, University of Idaho, USA

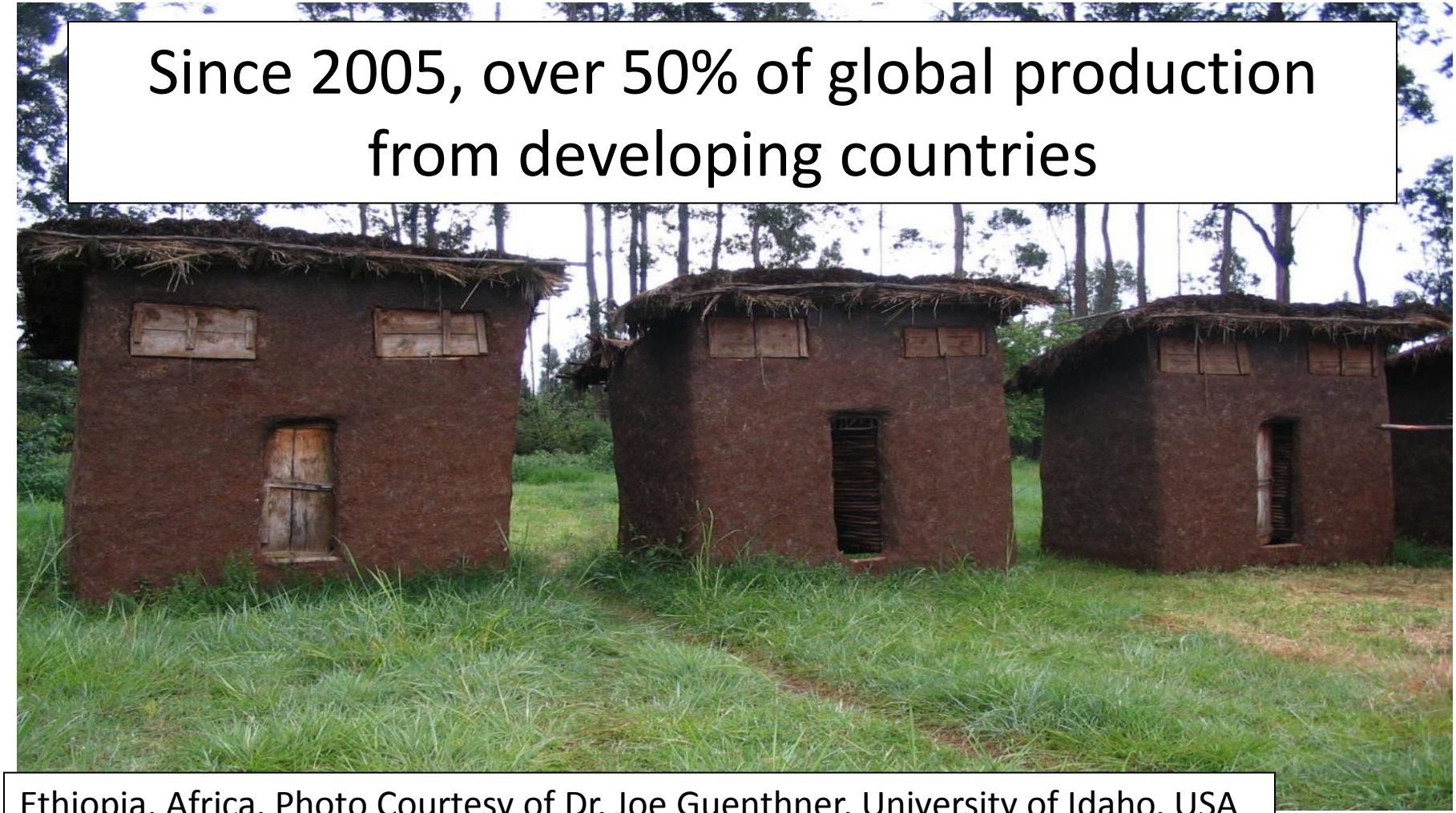
Storage Management

- Foundation of basic management
  - Quality into storage
  - Ventilation, humidity, and temperature control
  - Even and consistent air distribution
  - Sufficient insulation
  - Ease of access and sanitation
- Evolving implementation and application of basics

Evolving and emerging technologies

- Research and technology
- Variety development
- Sprout and disease control
- Modernization of structure and control systems
- Continuous collection of data
- Food safety
- Quality requirements high

Since 2005, over 50% of global production from developing countries



Ethiopia, Africa. Photo Courtesy of Dr. Joe Guenthner, University of Idaho, USA

Developing regions

- Agri-business versus individual or communal storage
- Capital investment and maintenance costs
  - Public and private
- Quality expectations and market needs
- Education on fundamental and creative application of storage
- Simple to complex technology can aid storage challenges – research opportunities

China. Photo courtesy of Allan French, Simplot, USA

Developing regions

- Locally derived materials and construction methods
- Design structure and management key to minimizing losses from disease, pests, animals, environment
- Security and identification
- Use basic fundamentals of storage management
  - Ventilation, Temperature, Humidity
- Sprout control
- Expectations and duration of storage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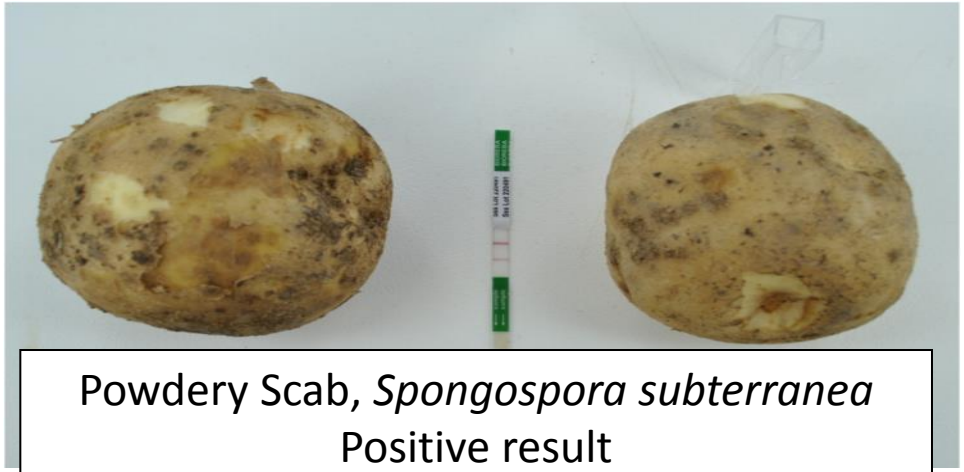

Powdery Scab, *Spongospora subterranea*
Positive result

Pythium leak, *Pythium ultima*
positive result

Blood Glucose Monitor
for Quick Potato Glucose Level

Underground potato storage in Turkey. Photo courtesy of Dr. Mike Thornton, Univ. of Idaho, USA

Saudi Arabia. Photo by Khalid Al-Morsy, Leha Agriculture

Photos courtesy of Shreekant Zamindar, Chatrakaran Cold Storage, India

Global Storage Examples

- Sichuan Provence of China
  - Seed production
- Ethiopia and Kenya of Africa
  - Seed and ware subsistence/local sale
- Pacific Northwest of the United States
  - Volume for year-round supply
  - 60% + process
  - Global market distribution

Seed storage in Sichuan Provence, China

Photos courtesy of Dr. Xiyao Wang, Sichuan Agricultural University, China

Eupatorium adenophorum for sprout inhibition

证书号第1000032号

发明专利证书

发明名称：一种用紫茎泽兰延长马铃薯贮藏期的方法

发明人：王西瑶；刘帆；倪苏；杨先泉；王学贵；黄雪丽；詹君；王余明
刘晨；彭洁；杨昆

专利号：ZL 2010 1 0200874.3

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专利权人：四川农业大学

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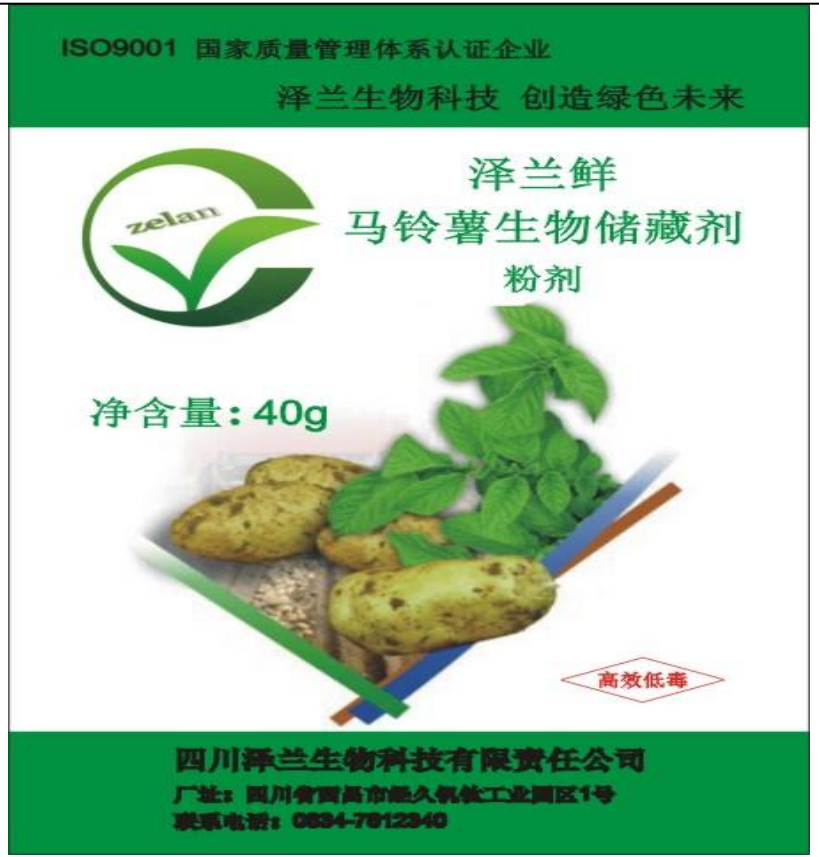


Slide courtesy of Dr. Xiyao Wang, Sichuan Agricultural University

Seed Potato Storage in Ethiopia, Africa. Diffuse light storage

Ethiopia, Africa. Photo Courtesy of Dr. Joe Guenthner, University of Idaho, USA

Ware Potato Storage in Kenya, Africa

Kenya, Africa. Photo Courtesy of Dr. Joe Guenthner, University of Idaho, USA

Kenya, Africa. Photo Courtesy of Dr. Joe Guenthner, University of Idaho, USA

Process Potato Storage in Pacific Northwest of North America

Sophisticated Control Systems: Ventilation, Temperature and Humidity; Sensors

Evaporative cooling pad and centrifugal humidifier

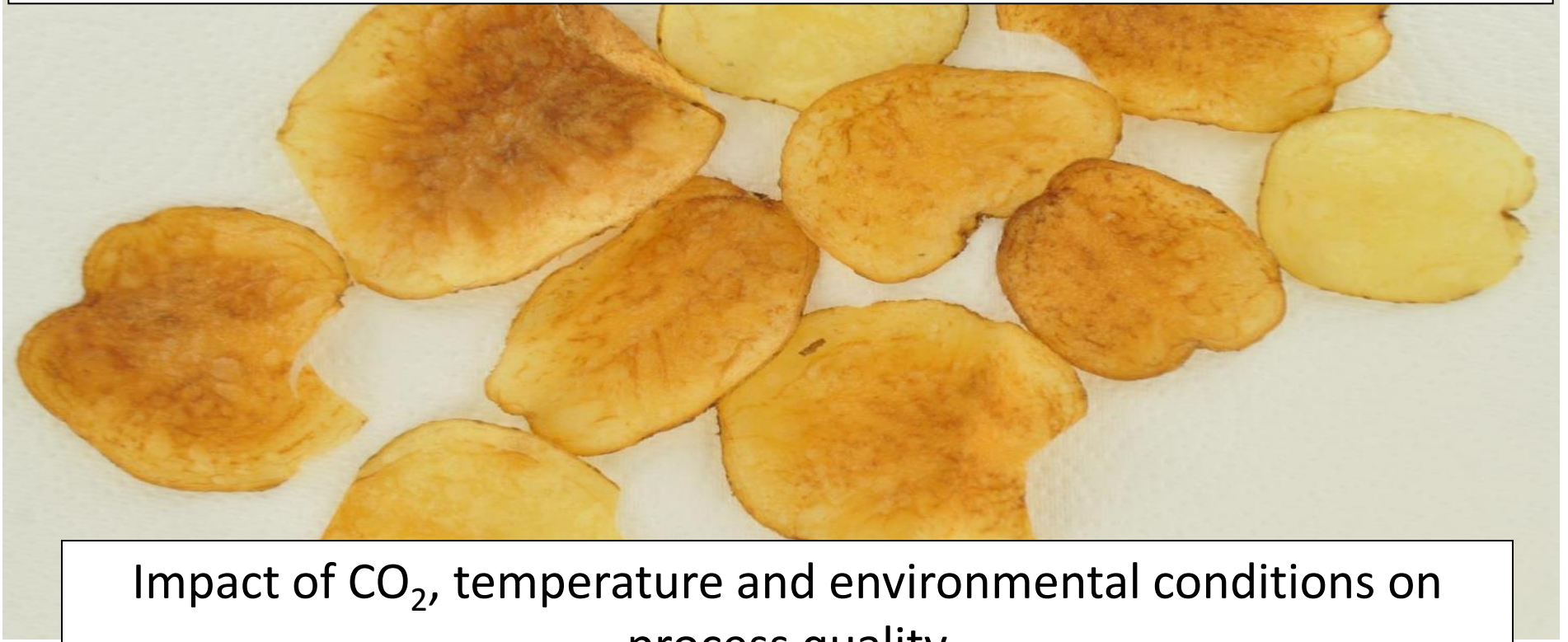
Air wall with computer controlled fan for condensation management

Efficiency and Sustainability

- Storage “check” (eg. StoreCheck in UK)
  - Ventilation flow/rate, efficiency and distribution
  - Refrigeration
  - Humidification
  - Sensors
  - Energy consumption
  - Sanitation

- Use of evaporative cooling pads
- Use of variable frequency (speed) drive to control fan speed
  - Energy consumption significantly reduced (up to 85%)

Hot climates (eg. Saudi Arabia) or cold climates (eg. Canada) with reliance on refrigeration or lack of daily outside air



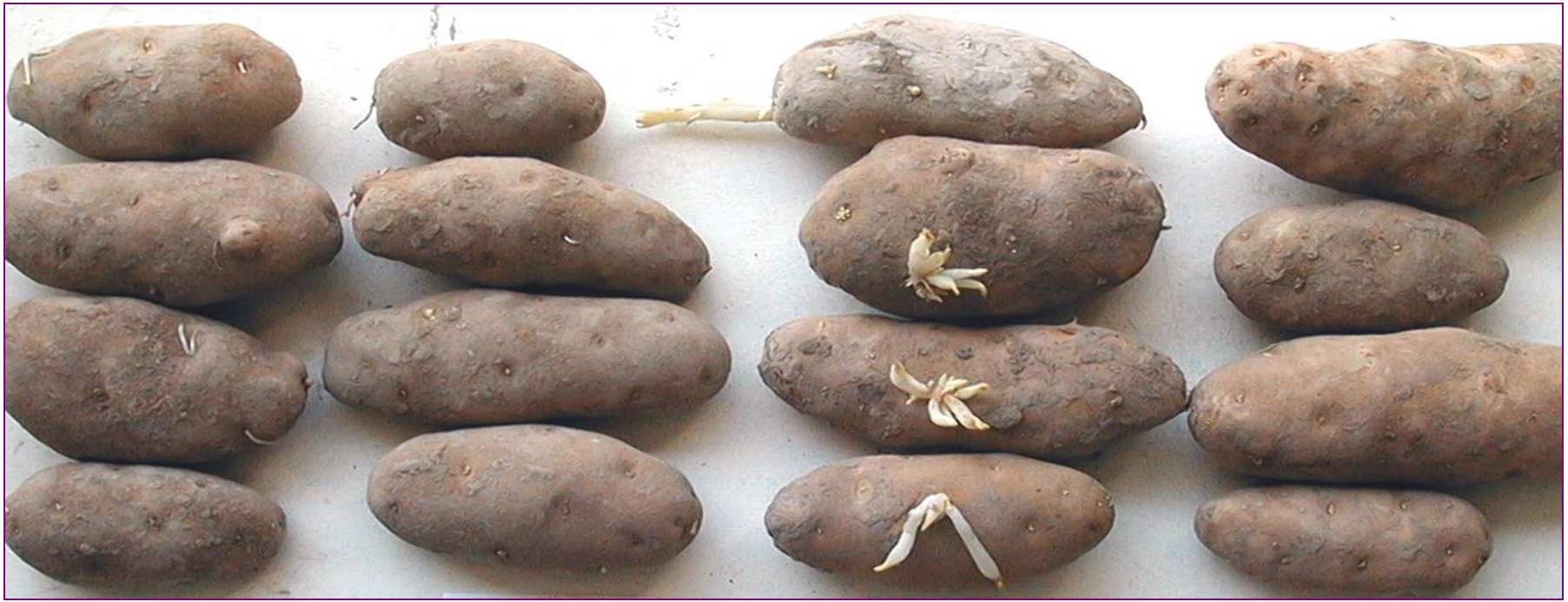
Impact of CO_2, temperature and environmental conditions on process quality

Sprout control

- Storage temperature; variety selection
- Chlorpropham (CIPC)
  - Stewardship– “Be CIPC Compliant” in Great Britain
  - Application and efficacy
  - Export
- Alternative products
  - Essential oils (mint, clove, carvone, muna, others)
  - Naphthalene based
  - 3-decen-2-one
  - Ethylene
  - Others
- Programs or mixtures with CIPC

Saudi Arabia. Photo by Khalid Al-Morsy, Leha Agriculture

Thermal clove oil application to potatoes in storage (USA).



Spearmint Peppermint Untreated CIPC

Russet Burbank after 9 months in 7.2°C storage
(8 applications of mint oil)

Ranger Russet after application of 3-decen-2-one

Russet Norkotah after application of Muńa oil (*Minthostachys setosa*)

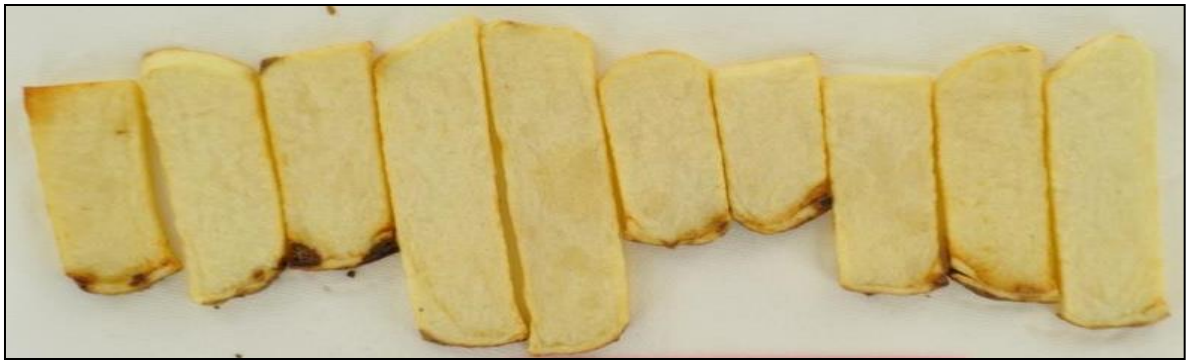
Collaborative work with Dr. Kurt Manrique at CIP, Peru

Sprout control of seed

- Storage temperature; variety selection
- Chemistries with limited or desired impact on production
  - Essential oils or plant based material
  - Naphthalene
  - Ethylene
  - Others

Global Opportunities

- Research
  - Variety specific management
  - Disease and sprout control
  - Structure and management efficiency
- Education
  - Access
  - Fundamentals
  - Adaptation
- Technology
  - Goal of uniformity and quality



World Production

Year	Tons
2003	314,902,750
2012	368,868,768

17% increase in 10 years