From neglect to market prominence

The remarkable transition of the Andean root crops maca and yacon

Michael Hermann
Outline of presentation

- Overview on Andean roots and tubers
- Examine crop transitions from neglect to market prominence (maca, yacon)
- Lessons for improved use strategies
Constraints to expanded ARTC use

- Supply constraints
  - Long crop duration
  - Specific agro-ecological requirements
  - Lack of economies of scale

- Demand constraints
  - Inconvenience of use and palatability (anti-nutritional substances)
  - Highly competitive substitutes
  - Image as poor people’s food
Case 1: Yacon (*Smallanthus sonchifolius*)
Traditional uses

Huanuco farmer unearthing yacon

Rural women selling yacon, Puno
Geographical distribution of yacon

- 1983 from Ecuador to New Zealand
- 1985 Japan
- 2000 Taiwan
- 2003 Hainan
- 2003 Philippines
- 1991 Brazil
- 1998 S. Korea
- 1 propagule!
Yacon attribute discovery in Japan

- 2/3 of root dry matter is **oligo-fructose** (highest of all known plant sources)
  - sweet, but not digested by humans
  - potential for low-calorie diets and diabetics
  - pre-biotic effect on gut health
- Anti-hyperglycemic principle in leaves
- “Food value” and appreciation of texture
Milestone: Yacon syrup and rural agroindustry innovation

ITA award 2000
Blood glucose as affected by ingestion of glucose, bee honey and yacon syrup.

- Glucose
- Honey
- Yacon 2
- Yacon 1

Legend:
- Diabetics
- Glucose intolerant
- Non-diabetics
“Unethical distribution of yacon held in trust by CIP to Japan”
Ideal para los diabéticos

Agricultores exportan yacón a Europa y Asia

PRODUCTOS PERuanOS

El Yacón

¿Jaque a la industria azucarera?

La siembra de yacón se masifica en tierras agrícolas de Cajamarca

Jaén y San Ignacio producen más de cinco mil toneladas anuales para el mercado nacional. Empresario organiza a sesenta agricultores
Yacon market presence, Lima 2003

Yacon products, Lima, August 2003

Yacon in Lima supermarket, November 2003
Health - Reuters

Root from Peru Holds Hope for Dieters, Diabetics
58 minutes ago

By Jude Webber

LIMA, Peru (Reuters) - Indeed is positively you're diabetic.

In Yahoo! Health

Sweet root good for dieters, diabetics

Tuesday, Nov 25, 2003

Root from Peru offers surprising health benefits

Vegetable holds hope for dieters, diabetics
Case 2: Maca (*Lepidium meyenii*)

Junín, 4300 m altitude
Maca: Traditional uses and indigenous knowledge

- Diet diversification and barter
- Limited, unspecified food uses, acquired taste
- Reputed to enhance fertility and physical stamina
Maca products and marketing (Lima, November 2003)
Maca exports from Peru (1995-2002)
Natural Viagra, Female Viagra, and Andean Ginseng

Natural Viagra Alternative
- Maca Benefits -

- Improves erectile tissue response.
- Increases in men: semen volume and sperm count.
- Enhances sexual performance.
- Increases libido and well being.
- Maca is a food. Its designation as an herb imparting specific health benefits is also true, but primarily maca is eaten as a food by very poor people living in a harsh environment where there is little else.

Maca 750 - Female Viagra
06/17/03

Female Viagra
In Scotland, a natural aphrodisiac being touted as the Female Viagra is 750 mg of Maca root, with no downside effects.

Pure Maca Products - Peruvian Ginseng
from The Amazon Company™

Scientific name: Lepidium peruvianum

Contraindications and Warnings
- If you observe adverse reactions, discontinue use and consult your doctor.
- Store at cool, dry temperature.
- Keep out of reach of children.

How much should I take? Maca is a food. Its designation as an herb imparting specific health benefits is also true, but primarily maca is eaten as a food by very poor people living in a harsh environment where there is little else.

Macamor
Rejuvenating Tonic for Men & Women

The Greatest 'Feel Good' Product!

Helps renew your energy and restore your "passion" for life.

Macamor™ is a blend of two highly revered ancient natural ingredients: Maca and Elk Antler Velvet. Have been used traditionally for millennia to support healthy energy, metabolism, muscle strength, stamina, and hormone balance.

"From Peru to you..."

The South American country of Peru is home to numerous beneficial plants, including maca, a legendary sex-enhancing root passed down from the Inca. I'd heard about maca for years. It has been dubbed "Peruvian ginseng," even though it bears no relation to ginseng. But like ginseng, the plant is employed to increase strength, energy, stamina, libido and sexual function, a winning combination. Check out the site.

See more at: [Macamor](#)
Scientific substantiation of folk medicine?

Reported pharmacological effects of maca

<table>
<thead>
<tr>
<th>Effect</th>
<th>Species</th>
<th>Authors</th>
<th>Journal</th>
<th>Year</th>
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<td>Enhanced sexual function, aphrodisiac activity</td>
<td>Mice, rats</td>
<td>Zheng et al.</td>
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<td>Increased testis weight and spermatogenesis</td>
<td>Male rats</td>
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<td>Improved growth and survival of juvenile fish</td>
<td>Trout</td>
<td>Lee et al.</td>
<td>Manuscript</td>
<td>2003</td>
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Maca US patents

- Maca and antler for augmenting testosterone levels
  No. 6,093,421 (2000)

- Maca extract for pharmaceutical applications
  No. 6,267,995 (2001)
  - Protects extraction procedure
  - Protects application of extract in treatment of cancer and sexual dysfunction
More trouble ahead: The *EU Novel Food Regulation*

- Conceived in response to food safety concerns of GMOs and other novel food
- Requires extensive food safety documentation for exotic foods not on the EU market before 1997
- Bans exotic foods from the EU market:
  - Maca (*Lepidium meyenii*)
  - Nangai nuts (*Canarium* spp.)
  - Stevia (*Stevia rebaudiana*)
- Discourages investment in neglected crops and is non-tariff trade barrier for biodiversity products
- Currently considered for amendment
Major lessons for improved use strategies for neglected crops

- Demand expansion made all the difference!
  - Urbanization and growing need for convenience products
  - Emerging niche markets for biodiversity products (fair trade, organic, diet diversification)

- More emphasis on the identification and scientific substantiation of relevant crop attributes
  - Market intelligence
  - Substantiation of health and nutrition claims (clinical studies)
  - Need for authoritative species and food dossiers

- Need for focused and sustained communication of attributes to target audiences
Market intelligence on biodiversity products

Vitafoods Trade Fair, Geneva, 2001

Anuga Food Fair, Cologne, 2001
Ranking of yacon publications among most downloaded CIP files
(Source: CGNET)

Cumulative 2002-2003

<table>
<thead>
<tr>
<th>No. of Downloads</th>
<th>% of Total Downloads</th>
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Total For the Files Above: 135,749 13.86% N/A

Published 1997

Published Aug 2003

October 2003

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Total For the Files Above: 16,310 26.24% N/A
IPGRI’s most downloaded files (Jan 2002-Oct 2003)

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<td>3. Physic nut (NUS series)</td>
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<td>6. Tropical fruits Asia</td>
<td>7,206</td>
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<td>8. Tropical fruits India</td>
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<td>12. Durio genetic resources</td>
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Total for the Files Above: 290,028 31.48% N/A
Benefits for the poor?

- Area expansion of small-holder production
- From boom to bust?
- Incipient contract farming and added value on-farm
- Benefits along the value chain
Maca production and prices (1994 –2002)
(Peru, Meseta de Bombón)

- Oct 0.47
- Nov - 50%
- Dec 0.23
- Jan - 33%
- Feb 0.15
- Mar + 58%
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct

US$ / kg

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct

2002

2003
Impact on farmer-managed ARTC diversity

- Re-deployment of *in situ* crop diversity
- Trend toward dominance of commercial cultivars
- Revaluation of neglected species through external interest
Reflection on indigenous/traditional knowledge (IK) and IPR protection

- Intrinsic value and pointer to product development
- Counter-productive if distorted in publications and product promotion
- Not recognized in the documentation of food safety, health and nutrition claims
- Much crop-related IK is in the public domain
- Protection of IK through defensive publishing?
  - Comprehensive description of state of the art
  - Can suggest concepts not substantiated by experimental data
  - Must be accessible
Implications for *ex situ* conservation

“The” problem:
Seed supply bypassing genebanks

- **Challenges**
  - Service attitude
  - Demand-driven characterization
  - Registration of cultivars
  - Feed-back of germplasm performance data
  - Users will contribute to conservation costs
**Marketing Approach to Conserve Agricultural Biodiversity (MACAB)**

**Task Research Institution:**
To make consumers perceive the value of crop/product attributes.

**Task of Private Sector:**
To develop new products to be placed in bigger and differentiated markets.

Diagram:
- **Market Size**
  - Small
  - Big
- **Product Price**
  - High
  - Low

Legend:
- Green dot: Targeting of marketing research
In situ conservation

Farmers, NGOs

Traders

Consumers

Enterprises

Institutional framework for improved biodiversity use and income generation

Conservation → Attribute discovery → Product innovation → Commercialization

In situ conservation

CG, NARS

Concerted action to close conservation and use gap

Participatory Market Chain Approach (PMCA)

Farmers, NGOs

Traders

Consumers
CIP’s first **MACAB** experience: **Jalca Chips®**

10% of the consumer price goes to *The Native Potato Project*