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Possible approaches for technology transfer by international research centers: A case history of potato in Kenya

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Outline of presentation

- Introduction to the Syngenta Foundation for Sustainable Agriculture.
- Current model, importance and status of seed systems in sub-Saharan Africa (SSA).
- Improving capacity of quality potato seed production though introduction of new technology and involvement of private sector in Kenya.
- Observations on pattern of introduction of new potato varieties derived from International Potato Center (CIP) germplasm.
- Possible strategies for accelerated technology transfer.

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The Foundation and Syngenta: aligned and operating co-creatively

The Foundation is a non-profit organization established by Syngenta under Swiss law.

The Foundation can access company expertise, but is legally independent and has its own Board.

We focus on “pre-commercial farmers”; Syngenta works primarily with commercial growers. The Foundation is free to choose the most suitable products and methods for its projects. Syngenta is one of many potential partners.

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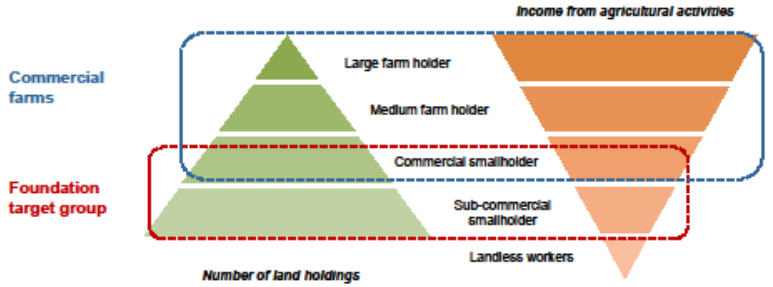
Value creation for small farmers



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Our mission

- Increasing productivity of pre-commercial farmers
- Enabling sustainable resource management
- Linking farmers to input and output markets

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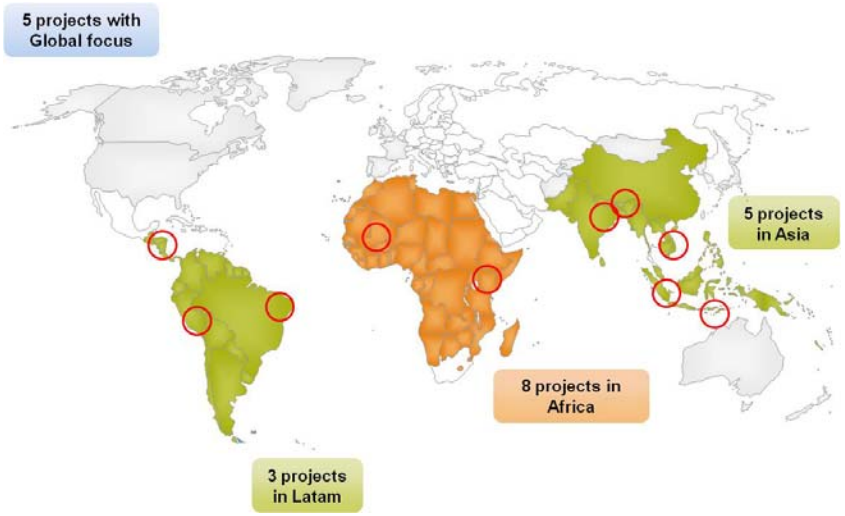
Where do we work?



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Intensification: low cost greenhouses






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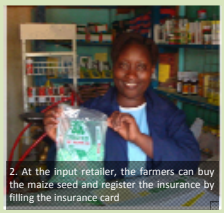
Business Development: insuring risk in technology investment in Kenya

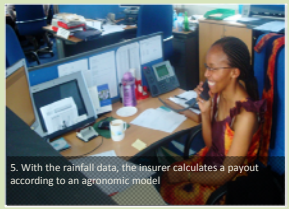
Investing in inputs with weather index-based insurance

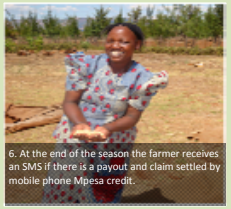

1. Farmers learn about the insurance through farmers group meetings.


2. At the input retailer, the farmers can buy the maize seed and register the insurance by filling the insurance card


3. The registration of the insurance is completed by sending an SMS, recording each farmer into a database


4. A local weather station records the rainfall and sends the data to the insurance company


5. With the rainfall data, the insurer calculates a payout according to an agronomic model

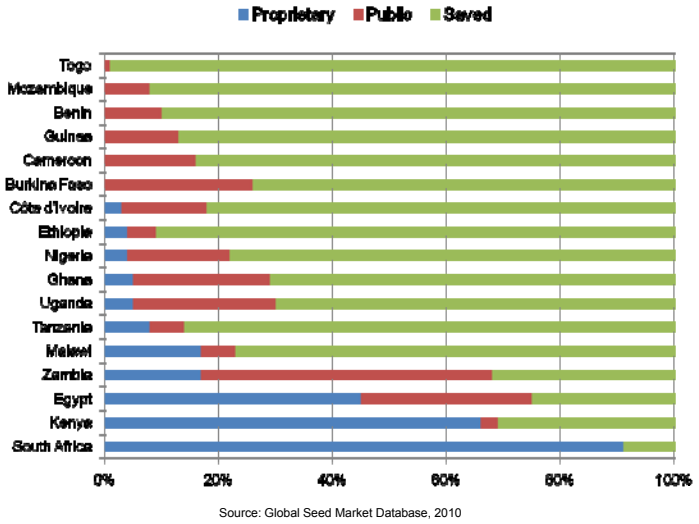

6. At the end of the season the farmer receives an SMS if there is a payout and claim settled by mobile phone Mpesa credit.

Current model and importance of sustainable seed systems

- Goal of public funded plant breeding programs of the international centers (IARCS) is adoption of improved germplasm by smallholder farmers through seed of improved varieties.
- IARCS traditionally distribute advanced lines to national programs (NARS) who develop and diffuse varieties.
- Sustainable seed systems are key in transferring technology to farmers, as well as a source of quality planting material.
- “Business model” for hybrid seed such as maize is well understood but less so for open pollinated and vegetatively propagated crops. Lack of availability of quality seed of improved varieties is a key component of yield gap in SSA.

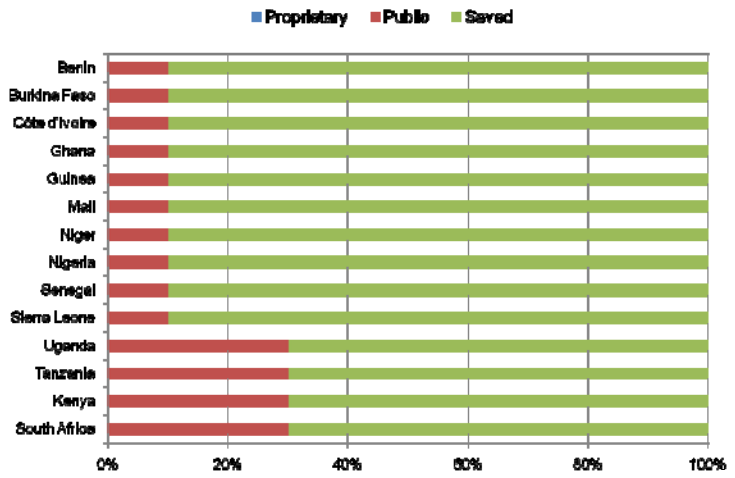
In Africa, most seed systems are informal (farmer-based) and low-yielding

Area share of maize seed types



Source: Global Seed Market Database, 2010

Predominance of informal rice seed as source of planting material.



Source: Global Seed Market Database, 2009

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Importance of potato in East Africa

- Second crop after maize in Kenya.
- Important short-cycle cash and subsistence crop in highlands of East Africa.
- Demand growing at 3.1% p.a.
- Average yields of 7.8 t/ ha (FAOSTAT 2005) but many progressive farmers achieve 25t/ha and current varieties with on farm yield potential of more than 30t/ha.
- Less than 1% of seed planted is quality seed compared with 20% in India and China and 30% in Brazil.

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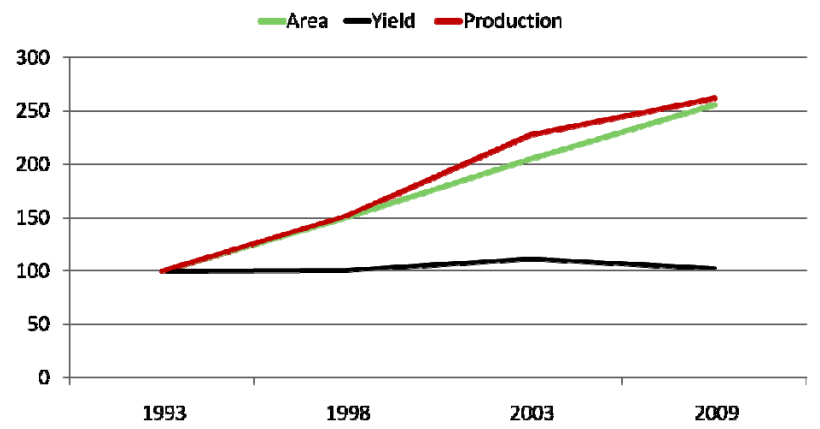
Potato production in SSA



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New technology, public sector support and private sector investment were key to success in Kenya *(3G strategy).*

Aeroponics technology.

- Technology reduced cost of production of minitubers from 10 cents to 4 cents and increased multiplication rates from 5:1 to 50:1.
- Private sector invested more than $250K cash to establish technology in Kenya.

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Large commercial farms can be successfully linked to smallholder enterprises.

Peterson, farm manager, Kisima Farm, Timau, Kenya.

- Large (up to 9000 ha) commercial farms (total of 5) served as specialist high grade potato seed multipliers.
- Kisima farm producing 500t of potato seed p.a. within 18 months.
- Capacity to reach 2000t within 36 months.

Linking farmers to commercial value chains leverages additional technical support.

Deepa Industries extension officer, Bomet, Kenya.

- Ware growers linked to Nairobi processing companies via contract farming.
- Generates demand for quality seed and inputs
- Company developed extension service to improve quality of supplied product.

Small entrepreneurial seed multipliers can earn significant income and act as ambassadors at community level.

Christine Nashuru, Transmara, Kenya.

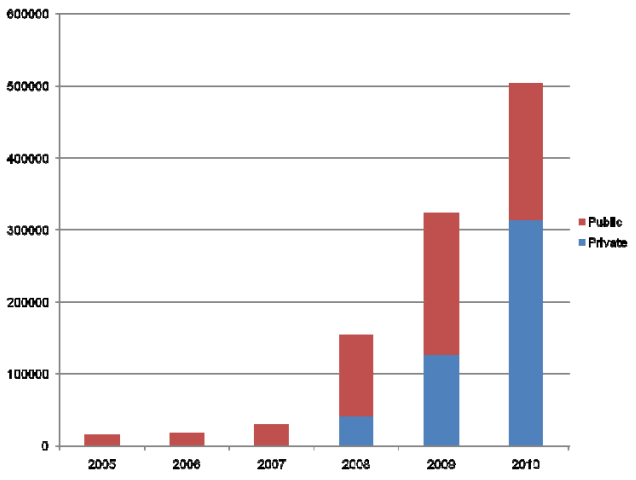
•Trained as secondary seed multiplier in 2008.
•Important source of quality seed at the district level.
•Now trains other women in the community.

Seed as an investment: small-holder farmers should be thought of as businesses too.

John and Ann Njihia, Kiambu West, Kenya.

•Bought 2 x 5Kg bags of certified seed for KSh 300 and harvested 200Kg in 2010.
•Intends to sell half (worth KSh 2000) and retain other half to multiply seed to supply to neighbors (worth KSh 30,000).
•Quality seed has a natural multiplier effect on livelihoods.

Public and private production of potato mini-tubers in Kenya (controlled by KEPHIS).



Pattern of potato variety (originating from CIP germplasm unless indicated) release (KARI) in Kenya from 1981

Variety	Date of first cross	Date of release	Characteristics	Area adopted
Asante	1981	1998	Early, LB resistant	10 %
Tigoni	1981	1998	LB resistant, good processor, good storability	20 %
Kenya Faulu	1998 (cross of CIP clones)	2002	Medium LB resistant, good processor, good storability	0% never bulked
Kenya Karibu	1998 (cross of CIP clones)	2002	LB resistant, good processor, good storability	1% limited bulking
Kenya Mavuno	1998 (cross of CIP clones)	2002	Early, LB resistant, good processor,	0% never bulked
Kenya Sifa	Mexican variety	2002	High LB resistance,	0% never bulked
Purple Gold	1991	2010	LB resistant, very good processor	0- bulking
Kenya Mpya	1993	2010	Veryhigh LB resistant	1 - bulking
Sherekea	1993	2010	Veryhigh LB resistant, good processor	0- bulking

Observations on variety development for "orphan crops" within IARC context

- Breeding programs not necessarily market oriented and NARS selection programs sometimes don't reflect grower or market needs: farmers often selecting different material.
- NARS often do not have sufficient resources (IARCs also?) for effective variety development, registration and dissemination.
- Possible confusion between international treaty obligations and national PVP legislation.
- Progress made on regional harmonization of variety registration in SSA but some way to go on seed trade harmonization.

Lessons learned

- Private sector has skills, resources and knowledge, that suit it for seed production, to extend public sector capacity and should be an important development partner.
- Private sector will invest but may require some initial risk management and ongoing technical backstopping if a new enterprise:
  - 50% initial capital subsidy in potato case
  - Limited provision to buy some seed in first year- customer of last resort
  - Free technical backstopping
  - Aid with marketing and links to markets
- But- private sector capacity is limited in many countries in SSA.
- Public sector critical for regulatory (quality control) function and variety development.

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Opportunities to in seed and variety development.

- To develop cross-center partnerships and platforms to evaluate promising germplasm and promote accelerated variety development (progress in Kenya) and diffusion models with NARS and regulatory partners.
- Evaluate fair and transparent models (leveraging private sector investment, expertise and equitable benefit sharing) for offering commercial licences to varieties derived from IARC germplasm to private sector seed companies.
  - Targeted crop model examples to build evidence base.
- Jointly exploring and promoting IPR mechanisms and strategies for disseminating “material under development” (International Treaty) through PVP systems.

A possible strategy for accelerated technology transfer of improved germplasm

- Improve SSA smallholder access to quality seed of improved varieties of a range of strategic crops to levels seen in India or China today, through private sector provision and linked to credible demand-led value chains.
- Re-evaluate thinking on appropriateness of IPG concept in relation to variety development amongst public sector breeders (IARCS and strong NARS) and the development of more impact and market oriented programs (through development of innovative partnership PPPs and building the “evidence base”).
- Development of benefit sharing models, linked to PPPs, that incentivize private sector engagement and provide long term sustainable income streams for public breeding and germplasm conservation systems.

Acknowledgements

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- Private Seed producers
- ADC
- GTIL

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