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Seed Science Center



To Feed the Future
we must first *seed* the future

Dr. Manjit K Misra, Director, Seed Science Center
Dr. Joseph Cortes, former Global Seed Program Leader
Iowa State University

“Global Seed Trade – Challenges & Opportunities”

SEED WORLD 2019, Sept 19, 2019
Indian Council of Food and Agriculture



*“I have great faith in a seed.
Convince me that you have a
seed there, and I am prepared
to expect wonders”*

— Henry David Thoreau

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Grand Challenges of the 21st century

- Food and Nutrition
- Energy
- Health
- income
- Environment



* Climate Change is Accelerating the Challenges:
Quality Seed is a Key Driver of the Solution

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Quality Seed Statistics

- 80% of farmers in many developing countries are not using quality seed.
- Almost 50% of the farmers are women, yet they earn 10% of the income and receive 5% of all technical assistance in agriculture.



Vision:

“Quality Seed for All Farmers”
with Particular sensitivity to women and children

*Supply
Access*



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Global Seed Industry Trends

- Global seed market is on the rise, current (\$56B), increasing to \$78B in 2022.
- Global seed trade is also on the rise (\$11.289B in 2017) due to:

high demand for quality seed

less land available for seed production

Consolidation (top seed companies: Monsanto and Bayer, Dupont and Dow, Syngenta and Chem China, Groupe Limagrain, Land O' Lakes).

- Large multinational concentrate on few major crops → lots of opportunities for SME.

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2017 SEED EXPORTS (Total 11,289 million US dollars)

Country	Exports (Million US Dollars)	
Netherlands	2040	
France	1801	
USA	1712	
Germany	783	
Hungary	480	
India	101 (\$86M in 2016)	
	Vegetable	66
	Flowers	2
	Field Crops	33

Source: International Seed Federation (ISF)

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2017 SEED IMPORTS (11,289 million US dollars)

Country	Imports (Million US Dollars)
Netherlands	1017
USA	1003
France	769
Germany	693
Italy	540
India	121
	Vegetable 77
	Flowers 9
	Field Crops 35

Source: International Seed Federation (ISF)

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Enhancing Seed Trade- Challenges & Opportunities

OUTLINE:

- Seed policies and regulations (remove trade barriers)
- Seed industry enhancement and development of new seed enterprises
- Quality management (to meet export requirements)
- Acceptance of emerging technology
- Developing a new generation of industry leaders who understand seed trade issues



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Facilitating the Movement of Quality Seed Globally for Improving the Livelihoods of Farmers through:

- Seed Policy & Regulation
- Seed Industry Development
- Process Management
- Biosafety



Strengthened seed sector in more than 70 countries in past 25 years



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Regional Harmonization
of Seed Regulatory
Frameworks to
Facilitate Trade

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Regional Harmonization to Facilitate Trade

AREAS:

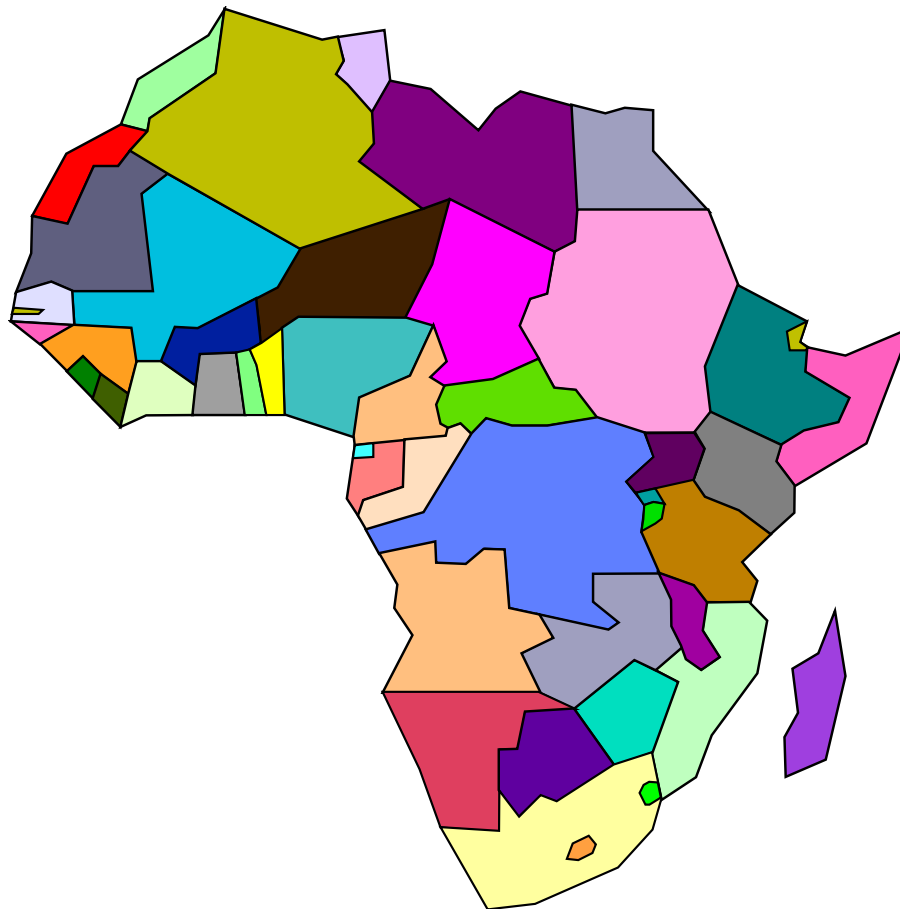
- Variety release system
- Certification/accreditation system
- Plant variety protection
- Phytosanitary measures

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AFRICA



EAC – SADC- ASARECA - COMESA

COMESA

Burundi
Comoros
DR Congo
Djibouti
Egypt
Eritrea
Ethiopia
Kenya
Libya
Madagascar
Malawi
Mauritius
Rwanda
Seychelles
Sudan
Swaziland
Uganda
Zambia
Zimbabwe

SADC

Angola
Botswana
DR Congo
Lesotho
Madagascar
Malawi
Mauritius
Mozambique
Namibia
Swaziland
Tanzania
Zambia
Zimbabwe
South Africa
Seychelles

ASARECA

Burundi
DRC
Ethiopia
Eritrea
Kenya
Madagascar
Rwanda
Sudan
Tanzania
Uganda



EAC
Kenya
Uganda
Tanzania
Burundi
Rwanda



Comoros
Djibouti
Egypt
Libya



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Regional Variety Release System

- **EAC** (Eastern Africa Community)
 - Approved a common catalog
- **SADC** (Southern Africa Development Community -14 countries)
 - Approved a common variety release system in June 09
- **COMESA** (19 countries)
 - Common variety release system and Catalogue and database approved October 2012 for 12 crops
- **ECOWAS** (West Africa 17 countries)
 - West Africa approved a common variety release system on Dec 08

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Seed Policy Harmonization for the COMESA Region

PARTNERS:

- Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA)
- Africa Seed Trade Association (AFSTA)
- Iowa State University

GOALS:

- Harmonization of seed policies and regulations in 19 COMESA member states (Eastern and Southern Africa)
- Promote cross-border seed trade among COMESA member states and beyond

COMRAP Consultative Workshop July 2010 Lusaka, Zambia



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Seed Policy Enhancement in African Regions (SPEAR)

Funded by The Bill & Melinda Gates Foundation

Grantee and Partners: Iowa State University (ISU), National Seed Trade Associations of Malawi, Zambia, Nigeria International Crop Research Institute for the Semi-Arid Tropic (ICRISAT) and Permanent Inter-States Committee for Drought Control in the Sahel (CILSS)

“Increase productivity on small farms in Malawi, Zambia, and Nigeria by implementing policy changes to augment the number of released varieties of, and enable production of basic seed through the efforts of licensing by seed authorities to the private sector.”

GOALS:

- Implement regional agreements on variety release in Malawi, Zambia, and Nigeria.
 - Update national variety release systems.
 - Provide resources for data management and training.
 - Ensure timely analysis and decision-making of candidate varieties.
- Develop a mechanism to provide seed to seed companies on a timely and equitable basis.



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Regional Seed Certification Accreditation and Testing

- **ECOWAS** (17 countries)
 - Common seed certification standards
 - Seed certification accreditation

- **EAC**
 - Common seed certification standards
 - Seed certification accreditation for persons and/or entities

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Phytosanitary Measures

- Quarantine pest list based on science
- Phytosanitary accreditation

- **National Seed Health System**

The National Seed Health System (NSHS) is a program **authorized by USDA-APHIS and administered by the Iowa State University Seed Science Center** to accredit both private and public entities to perform health testing activities needed to issue of Federal phytosanitary certificates for the international movement of seed (Valued at \$1.2B annually from US)



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Quarantine Pest Reduction for Phytosanitary Certification of Seeds Based on Science

Region	Selected Crops	Initial Pests	Final Pests
Central America	5	82	2
East Central Africa	6	35	7
MERCOSUR	11	50	10
Asia Pacific Countries	10	158	49
Andean Pact	7	379	112
SADC	18	87	26
COMESA	12		

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Do Regional Regulatory Frameworks Contribute to Seed Trade Expansion?

Central America

- After 2 years of harmonized seed agreements, intra-regional trade increased 23% (FELAS)



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COMESA Variety Catalogue: 16 Maize and 4 Potato

CROP AND YEAR OF RELEASE ON COMESA VARIETY CATALOGUE			COMPANY NAME / HOLDER
DK777	Kenya, 2016	Zambia, 2015	Monsanto
DKC90-89	Kenya, 2012	Zambia, 2010	Monsanto
DKC80-33	Kenya, 2004	Zambia, 2007	Monsanto
DKC80-31	Kenya, 2003	Zambia, 2002	Monsanto
PHB 3253	Kenya, 1996	Zambia, 1995	Pioneer
PHB30G19	Kenya, 2006	Zambia, 2007	Pioneer
P3812W	Kenya, 2012	Zambia, 2011	Pioneer
P2859W	Kenya, 2012	Zambia, 2009	Pioneer
MRI 514	Zimbabwe	Zambia, 2001	MRI-Syngenta
MRI 624	Zimbabwe	Zambia, 1998	MRI-Syngenta
MRI 634	Zimbabwe	Zambia, 2000	MRI-Syngenta
Sagitta	Zambia, 2015	Kenya, 2014, Egypt, 2013	HZPC Holland BV
Taurus	Zambia, 2015	Kenya, 2015	HZPC Holland BV
Panamera	Zambia, 2015	Kenya, 2015	HZPC Holland BV
PAN 4M-21	Swaziland, 2015, Zimbabwe, 2011	Malawi, 2008	Pannar
Mid Year Review 2011/2012 Financial Year PAN 4M-23 Zimbabwe, 2013 Zambia, 2015			Pannar

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ECOWAS

- West Africa Regional Variety Catalogue (Rice, maize, sorghum, millet, cowpea & groundnuts)
- 1400 Varieties Registered
- Certified Seed 2011/2012 = 11%
- Certified Seed 2014/2015= 25%
- Breeder Seed Produced: 147 tons

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Emerging Technologies

- CRISPR genome-editing (Less controversy for trade, more affordable in most cases, positive impact for R&D, Crop improvements ranging from disease resistance to flavor, potential to reduce timelines for marketing products)
- Digital Technologies (Drones, Artificial Intelligence, IoT will facilitate)
 - IP protection of Technologies is the key for seed trade (must reduce fake seed)
 - Socio Economics is as important as science

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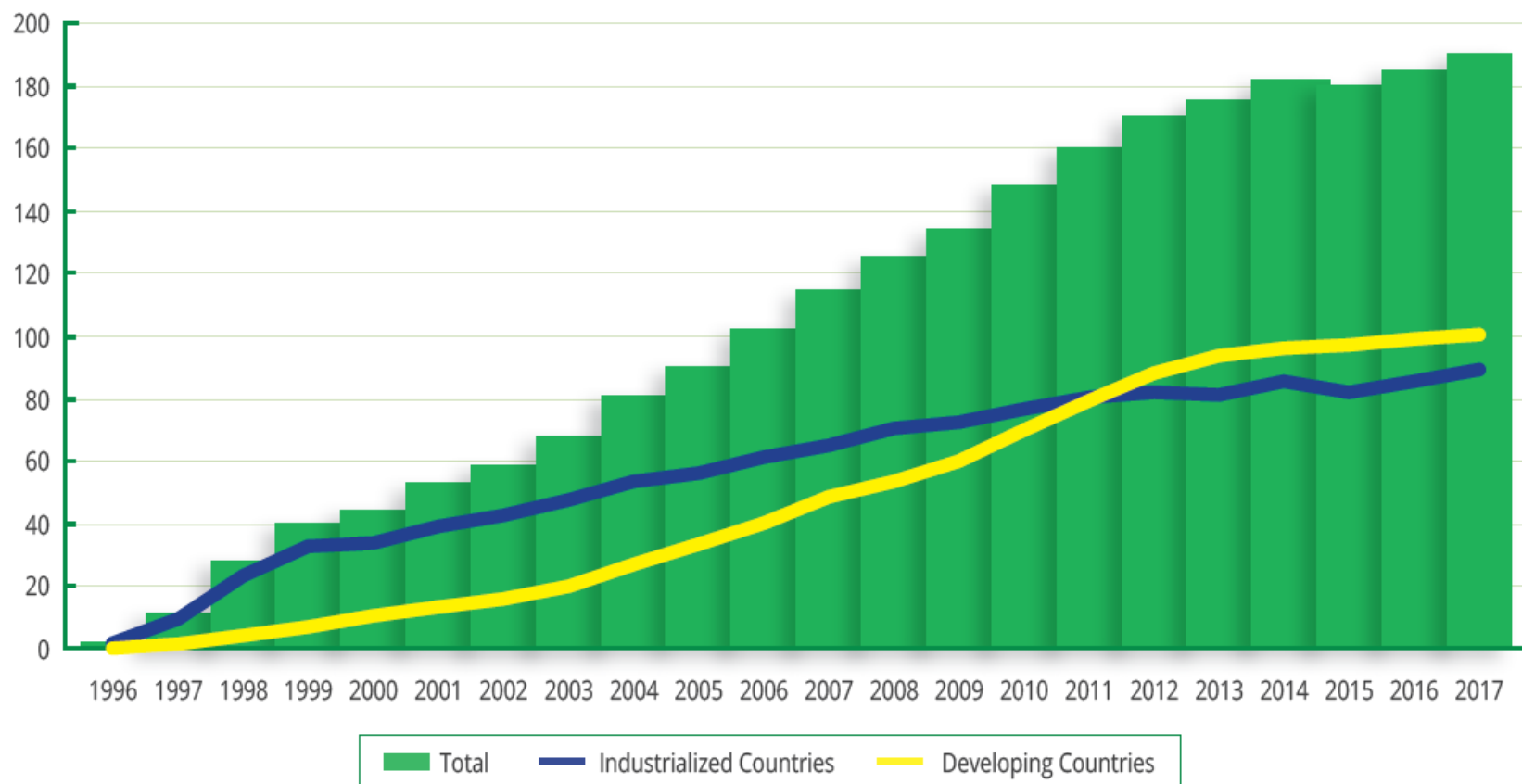


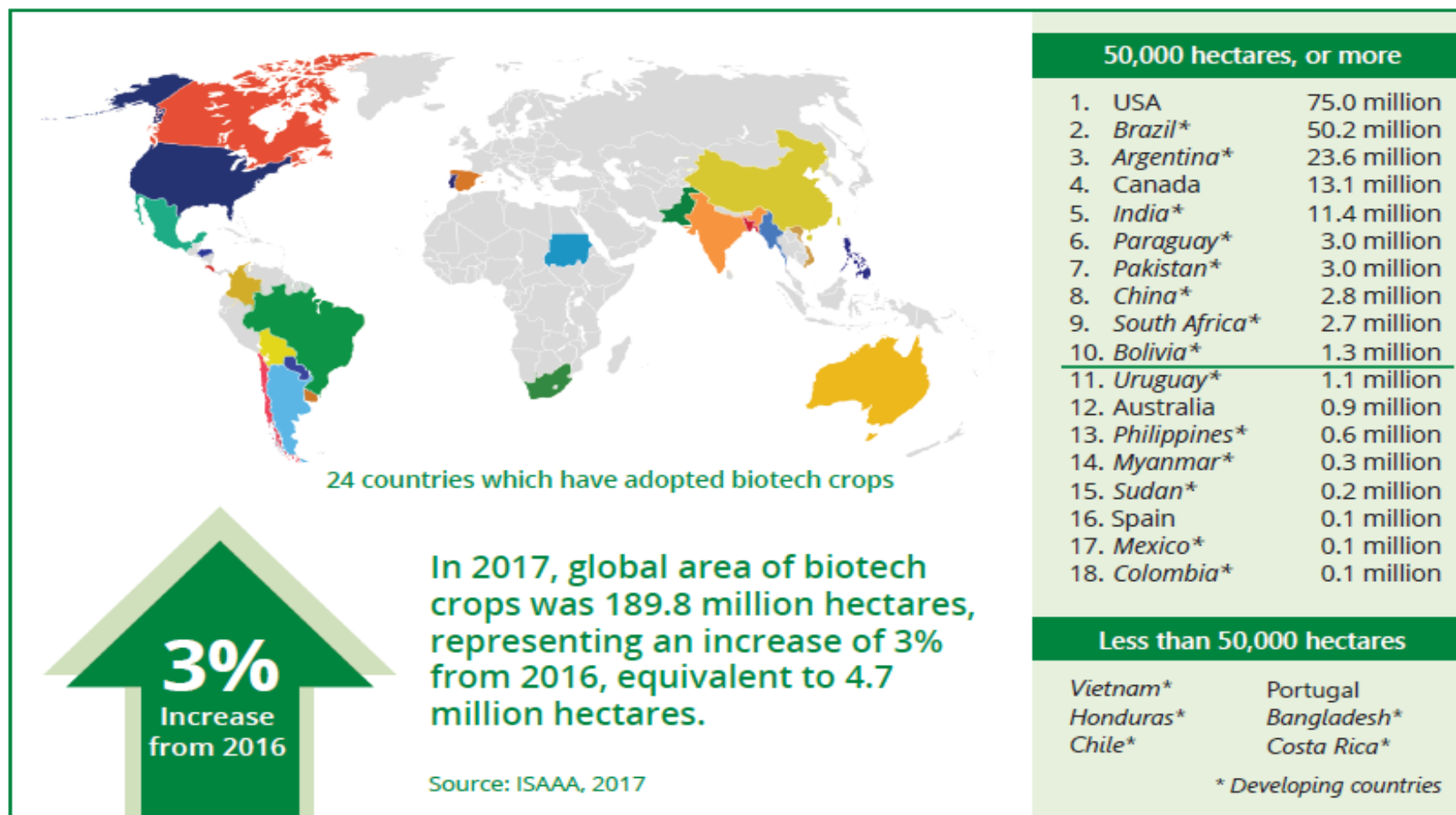
Figure 1. Global Area of Biotech Crops, 1996 to 2017: Industrialized and Developing Countries (Million Hectares)

Source: ISAAA, 2017

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Figure 2. Global Area (Million Hectares) of Biotech Crops, 1996 to 2017, by Country, Mega-Countries, and for the Top Ten Countries

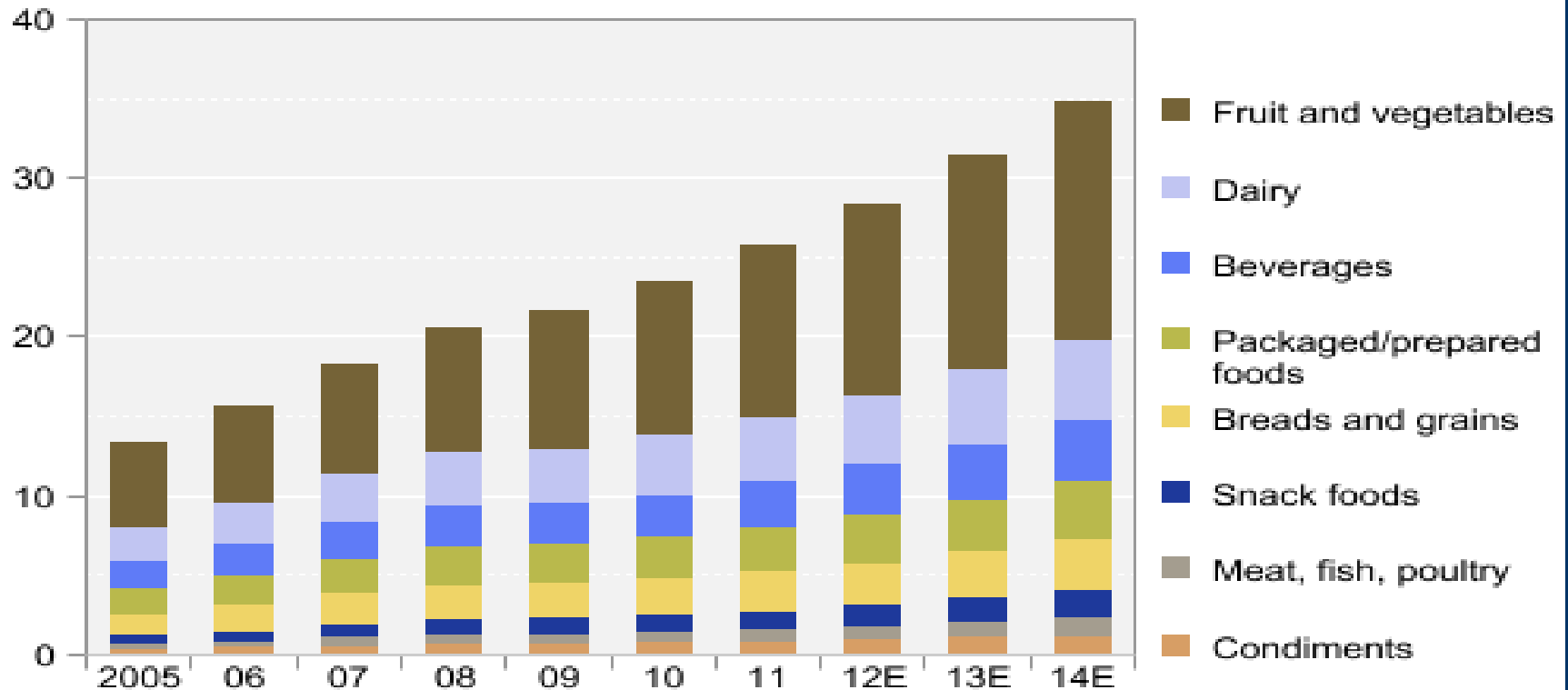


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U.S. organic food sales by category, 2005-14E

\$ billion



Note: E=estimate.

Source: USDA, Economic Research Service using data from Nutrition Business Journal.

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Meeting quality requirement of importing countries
Black nightshade Soybean Separation Examples



Black Nightshade



Shriveled Nightshade Separation

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Soil Ped Removal

- Many soil peds are not round and can be removed using a spiral
- Results are shown from an ISU study of soil ped removal
- Spiral was very effective at initial separation of soil peds



Spiral Discard

Gravity Discard

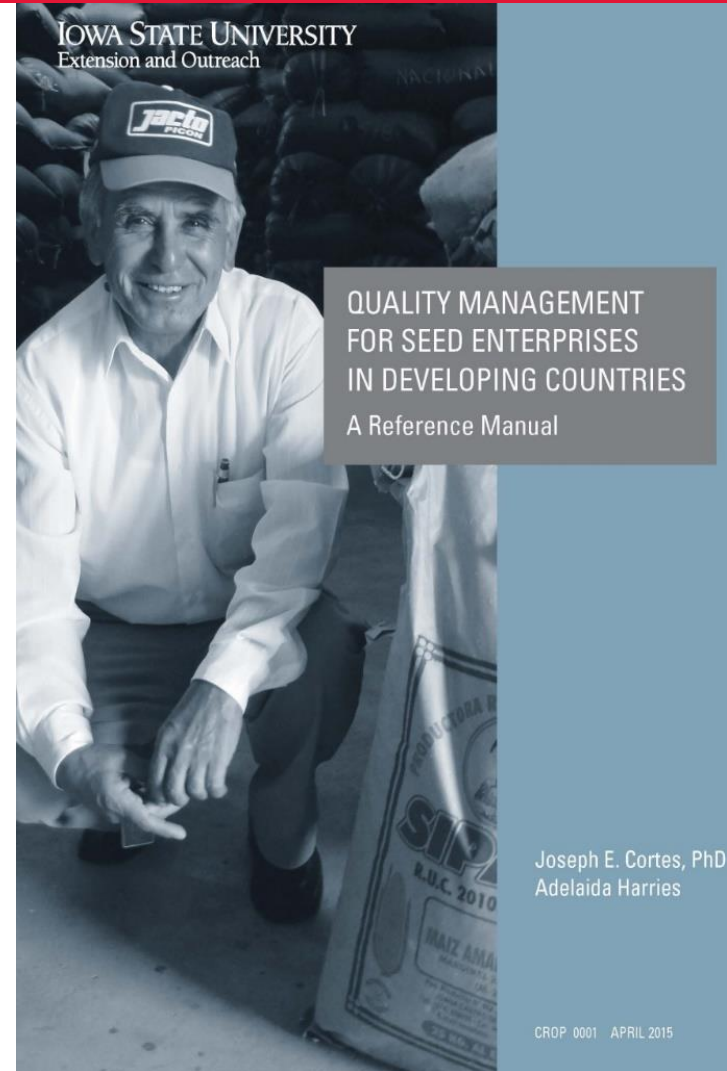
Gravity Good

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Quality Management

- Not just managing seed quality, it is also the quality of your management (people)
- Accomplished through process management which ask the questions:
- Who
- What
- When how
- The manual (on right) has been downloaded by 1500 companies/institutions
- Translated in Spanish



Joseph E. Cortes, PhD
Adelaida Harries

CROP 0001 APRIL 2015

www.seeds.iastate.edu/brochures-publications

Quality Management for Seed Enterprises in Developing Countries

Seed Import/Export Procedures Manual for Government Agencies

Model Seed Act for Southern Africa Countries

Process Management Manual to Access the Safety of Food Feed Derived from Biotechnology Plants

Confined Production Processes for Non-Food Corn

Procedures Manual for Phytosanitary Accreditation for Seed Export

Process Management Manual for Release into the Environment of Genetically Modified Agricultural Organisms (Available in English and Spanish)

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Seed industry building (Training)

- Seed Quality
- GMO
- Purity Short Course
- Germination
- PCR
- Organic Products Quality
- Seed Corn Conditioning
- Soybean Seed
- Gravity Table
- Color Sorter
- Variety Release
- Seed Certification
- Seed Testing
- Quality Manual Development
- Plant Variety Protection
- Phytosanitary Measures



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Seed Industry

Building:

Prepare

Tomorrow's Seed

Industry Leaders

who understand

seed trade and

Business

SOLUTION:

Online Graduate Program in Seed Technology & Business



PROGRAM CURRICULUM

- Introduction to the Seed Industry

SEED SCIENCE

- Quantitative Methods for Seed
- Crop Improvement
- Seed Health Management
- Seed Physiology

SEED TECHNOLOGY

- Seed Production
- Seed Variety, Testing & Technology
- Seed Conditioning & Storage
- Quality, Production & Research Management

BUSINESS ADMINISTRATION

- Accounting & Finance
- Strategy & Planning
- Organizational Behavior
- Information Systems
- Marketing & Logistics
- Seed Trade, Policies & Regulations

CREATIVE COMPONENT

- Independent Project

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Seed Industry Building: Regional/global facilities Example: Enterprise Management Institute (SEMI)

ISU's Seed Science Center, the University of Nairobi (UoN), and the International Maize and Wheat Improvement Center established a Seed Enterprise Management Institute at the College of Agriculture and Veterinary Science in Kabete, Kenya to enhance the existing companies and develop new seed enterprises in Africa.



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Example 2: Mega Seed Park in Andhra Pradesh, India

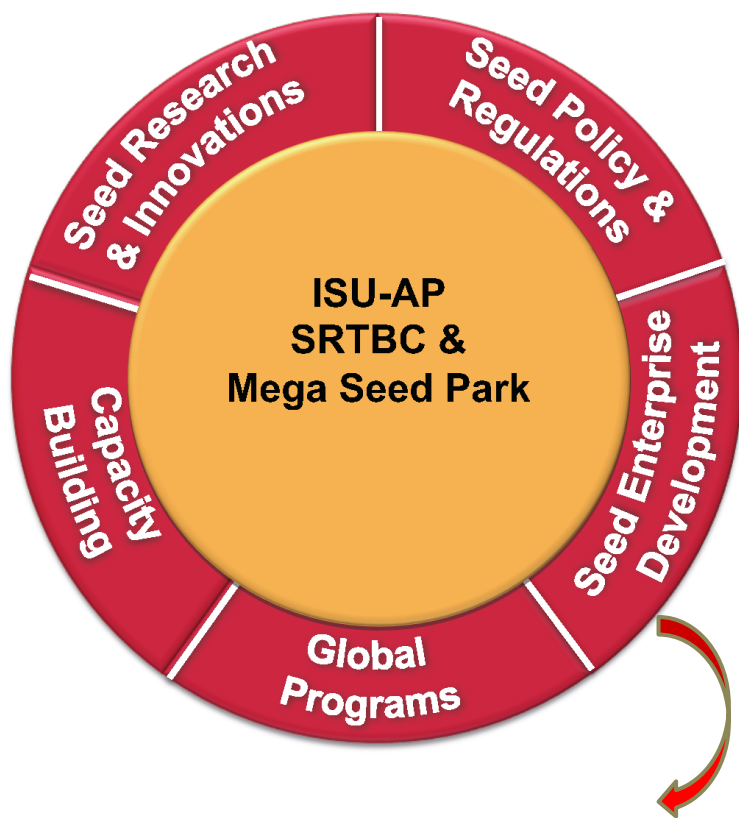


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Concept of ISU-AP SRTBC Mega Seed Park



Seed Technology

Innovation

Business



To feed the future, we must first seed the future
Thank you.