



Improved Crop Varieties: an Imperative for Agrifood Systems Transformation

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**Plant Production
and Protection**



Hunger and malnutrition persist!

The Enormity of the Task

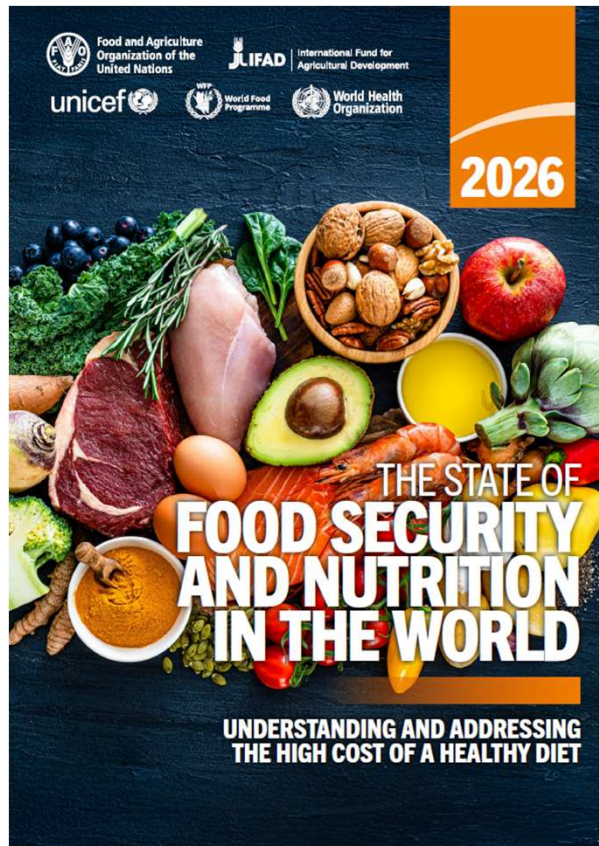
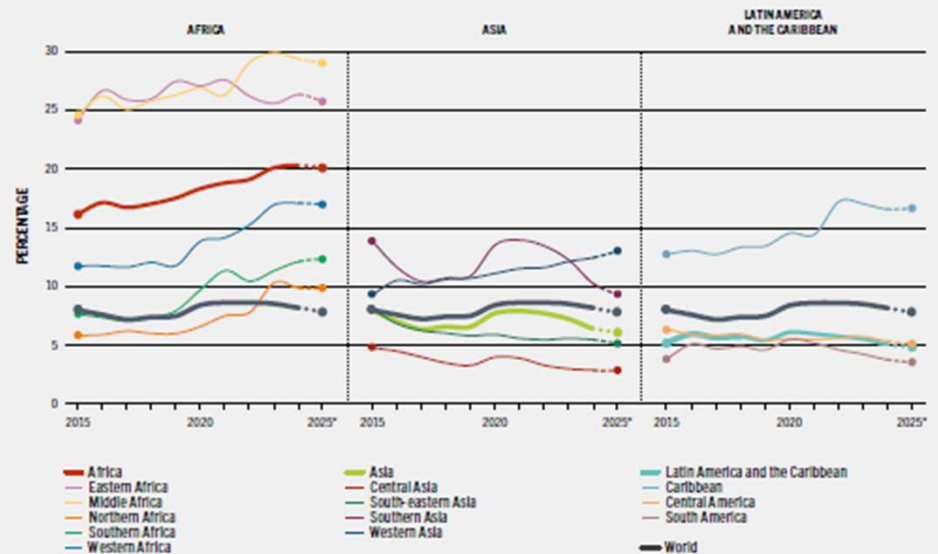


FIGURE 2.2 MOST SUBREGIONS OF ASIA AND LATIN AMERICA AND THE CARIBBEAN HAVE SHOWN STEADY PROGRESS IN REDUCING HUNGER IN RECENT YEARS, AND NEW ESTIMATES POINT TO A HALT TO THE PROLONGED UPWARD TREND IN HUNGER IN AFRICA

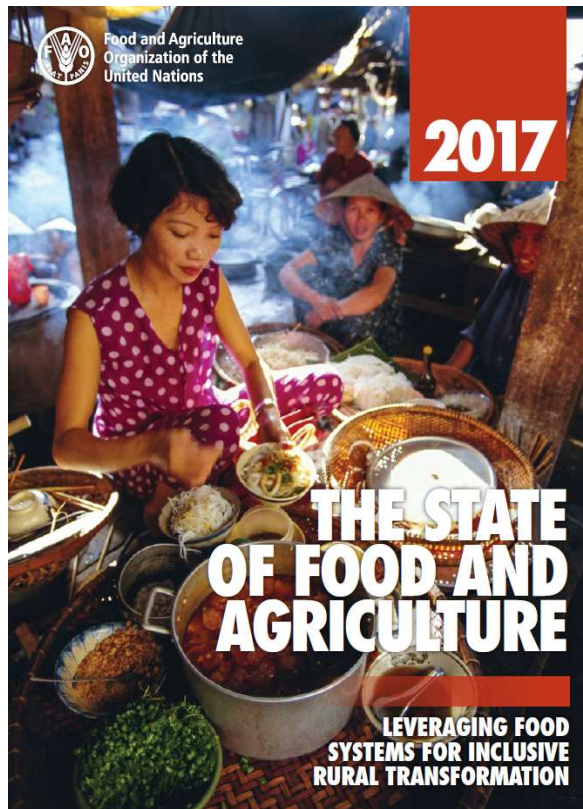


NOTES: Only regions for which data were available for all the subregions and the prevalence of undernourishment (PoU) was greater than 2.5 percent are shown. Eastern Asia is not shown because the PoU has been consistently below 2.5 percent since 2011. Values are based on the point estimates; the full ranges of the values for the years 2020 to 2025 can be found in the [Supplementary material to Chapter 2](#). * Projections based on nowcasts for 2025 are illustrated by dotted lines.

SOURCE: FAO, 2026. FAOSTAT: Suite of Food Security Indicators. [Accessed on 21 July 2026]. <https://www.fao.org/faostat/en/#data/FS>. Licence: CC-BY-4.0.

“Eliminating hunger by 2030 remains an elusive target.”

The Enormity of the Task



“Feeding humanity will require a 50 percent increase in the production of food and other agricultural products between 2012 and mid-century”.



SUSTAINABLE DEVELOPMENT GOALS



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The Food and Agriculture Organization of the United Nations



- Specialized agency of the United Nations
- Established in 1945
- Membership as of 2026
 - ❖ Members : 193 Member Nations and 1 Organization - the European Union
 - ❖ Associate Members: 2 – Faroe Islands, and Tokelau



FAO's response: business-as-usual not an option



Strategic Framework 2022-31



BETTER PRODUCTION



Ensure sustainable consumption and production patterns, through efficient and inclusive food and agriculture supply chains at local, regional and global level, ensuring resilient and sustainable agri-food systems in a changing climate and environment



BETTER NUTRITION



End hunger, achieve food security and improved nutrition in all its forms, including promoting nutritious food and increasing access to healthy diets



BETTER ENVIRONMENT



Protect, restore and promote sustainable use of terrestrial and marine ecosystems and combat climate change (reduce, reuse, recycle, residual management) through MORE efficient, inclusive, resilient and sustainable agri-food systems



BETTER LIFE



Promote inclusive economic growth by reducing inequalities (urban/rural areas, rich/poor countries, men/women)



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Crop production systems

80%
of all food
is plant-based

Cereals, roots, tubers, pulses, fruits
and vegetables provide

60% of total dietary energy, and

50% of the average protein
supply



98%
of the oxygen
we breathe is
produced by
plants



Plant production and protection at FAO



Operational and normative work on

- Seed systems
- Agronomics
- Plant health
- Innovations as accelerators



“There are no good crops
without good seeds!”

- Dr QU Dongyu, FAO DG



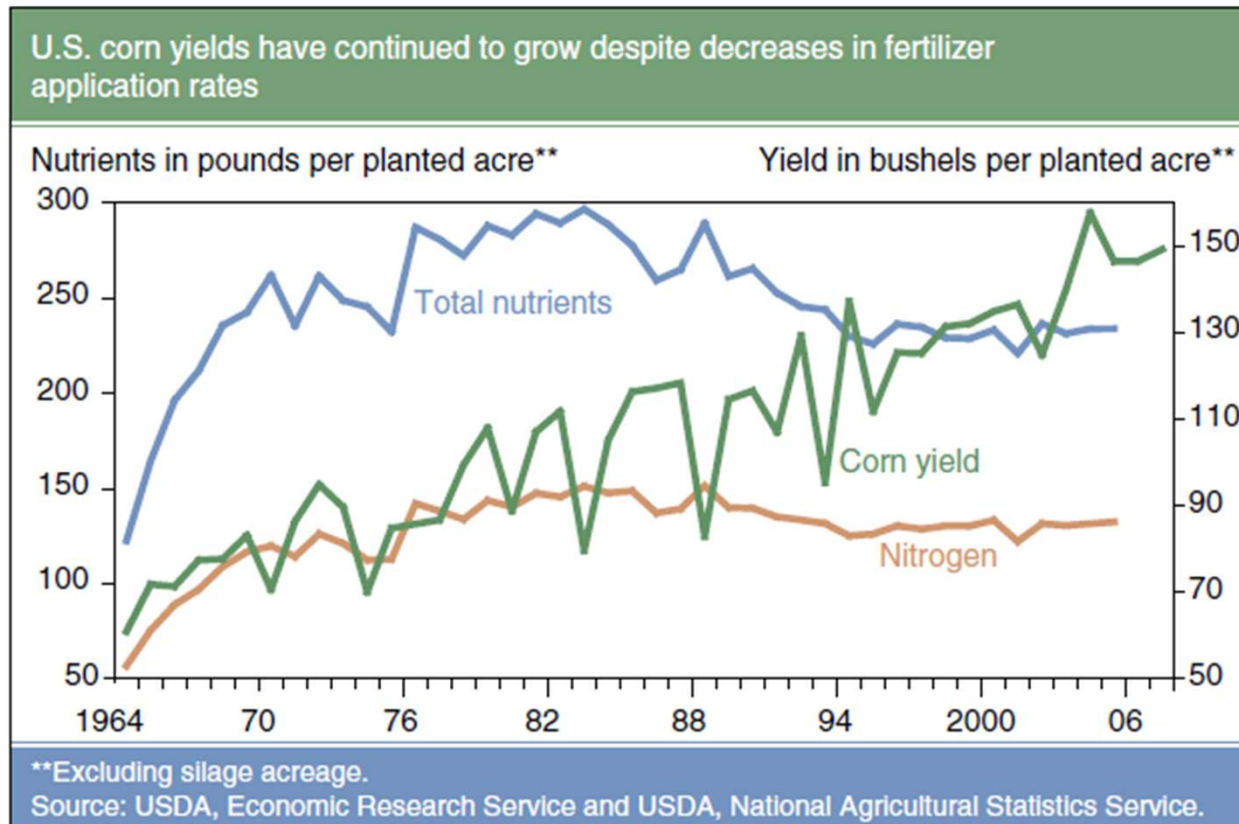
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Improved crop varieties are key

- Improving crop productivity
- Improving yield stability and disease and pest resistance
- Enhancing nutritional content of crops
- Minimizing adverse environmental impacts

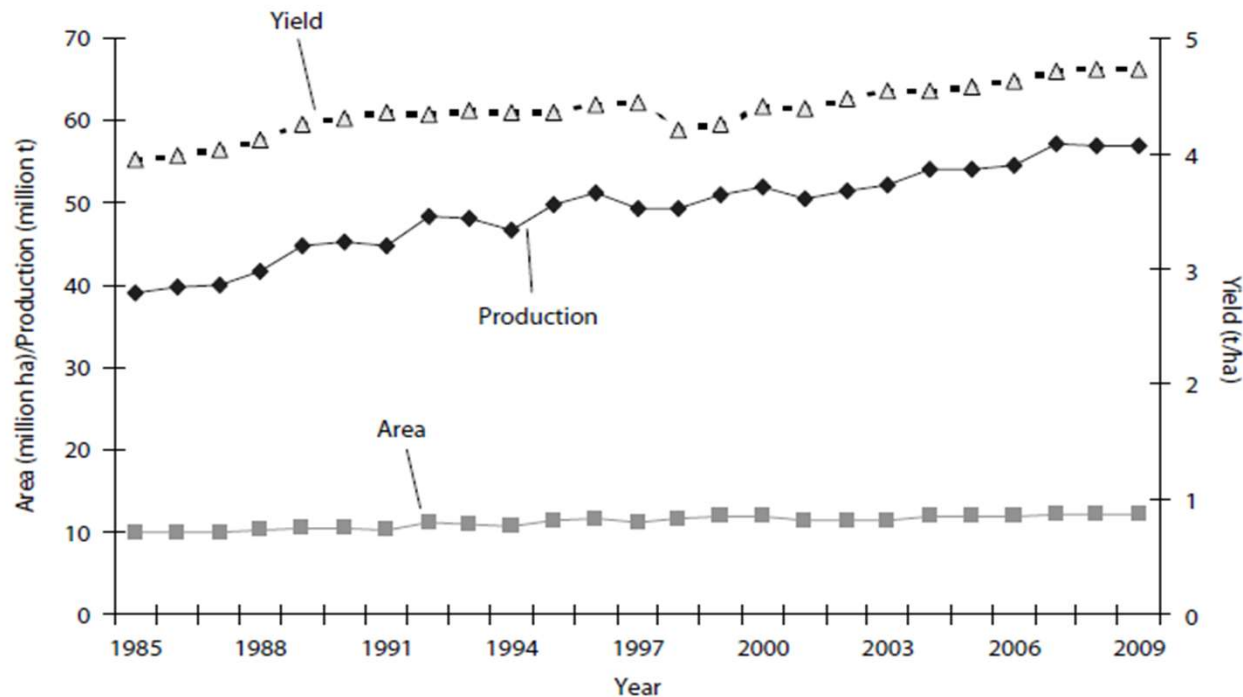


Cause for optimism: Genetic gains



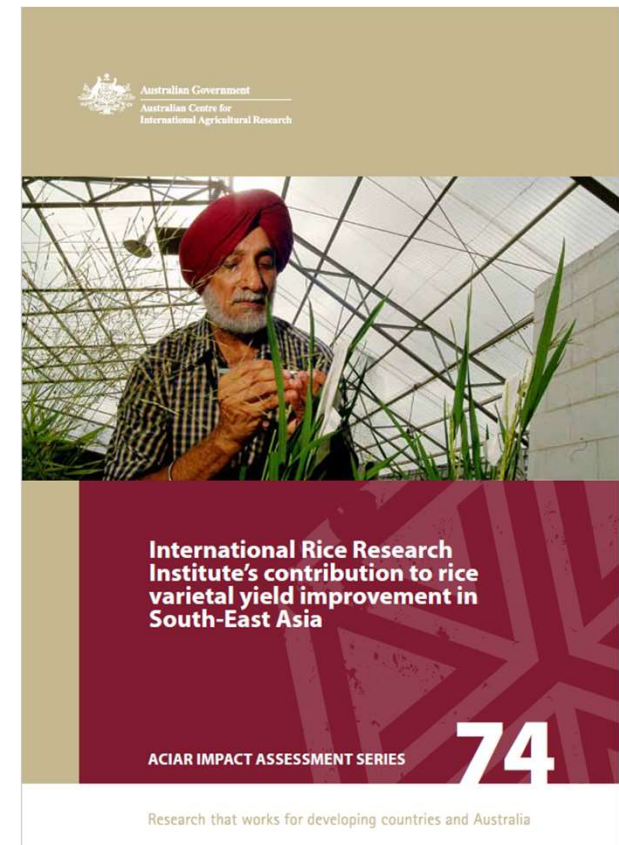
Heisey, 2009

Cause for optimism: Genetic gains



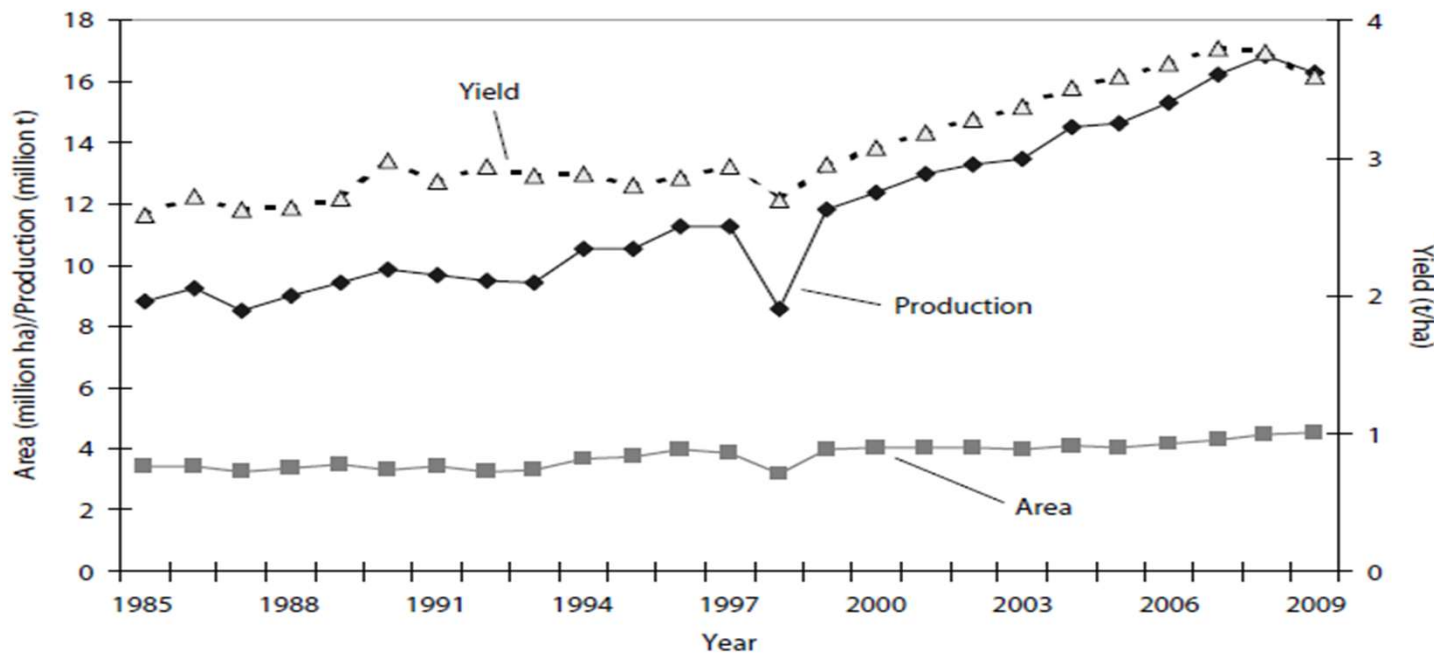
Area, production and yield of rice in Indonesia since 1985

Brennan and Malabayabas, 2011



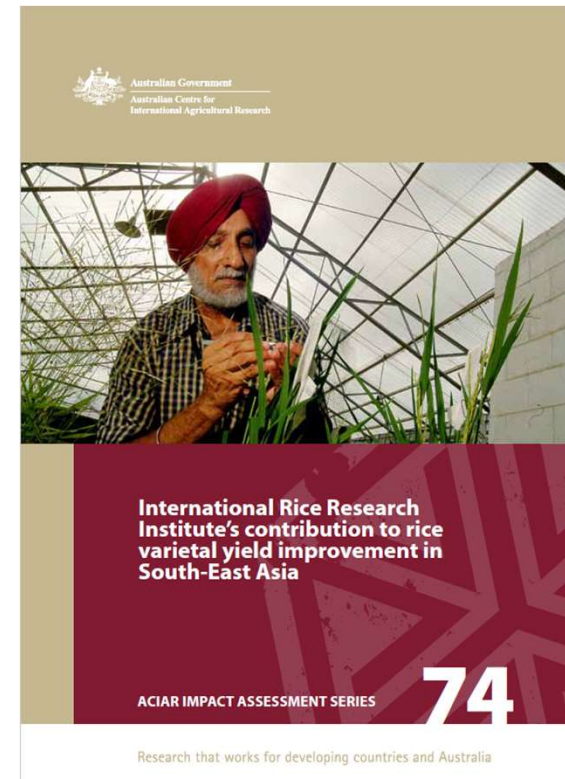
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Cause for optimism: Genetic gains



Area, production and yield of rice in the Philippines since 1985

Brennan and Malabayabas, 2011



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The Challenge



Measuring the Effectiveness of
Crop Improvement Research in
Sub-Saharan Africa from the
Perspectives of Varietal Output,
Adoption, and Change:
20 Crops, 30 Countries, and
1150 Cultivars in Farmers' Fields

July 2014

ISPC and SPIA, 2014
Walker and Alwang (Eds.), 2015

Table 4.2. Adoption of MVs of food crops in SSA in 2010

Crop	Country observations	Total area (ha)	Adopted area (ha)	% MVs
Soybean	14	1,185,306	1,041,923	89.7
Maize-WCA	11	9,972,479	6,556,762	65.7
Wheat	1	1,453,820	850,121	62.5
Pigeonpea	3	365,901	182,452	49.9
Maize-ESA	9	14,695,862	6,470,405	44.0
Cassava	17	11,035,995	4,376,237	39.7
Rice	19	6,787,043	2,582,317	38.0
Potatoes	5	615,737	211,772	34.4
Barley	2	970,720	317,597	32.7
Yams	8	4,673,300	1,409,309	30.2
Groundnut	10	6,356,963	1,854,543	29.2
Bean	9	2,497,209	723,544	29.0
Sorghum	8	17,965,926	4,927,345	27.4
Cowpeas	18	11,471,533	3,117,621	27.2
Pearl millet	5	14,089,940	2,552,121	18.1
Chickpea	3	249,632	37,438	15.0
Faba bean	2	614,606	85,806	14.0
Lentils	1	94,946	9,874	10.4
Sweetpotato	5	1,478,086	102,143	6.9
Banana	1	915,877	56,784	6.2
Field peas	1	230,749	3,461	1.5
Total/weighted average	152	107,721,630	37,469,577	34.78

Improved crop varieties developed by CGIAR centres account for only about 30% of the acreage of the crops planted by farmers in sub-Saharan Africa.



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The Challenge

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ORIGINAL PAPER

Seed systems smallholder farmers use

Shawn McGuire¹ · Louise Sperling²

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Abstract Seed can be an important entry point for promoting productivity, nutrition and resilience among smallholder farmers. While investments have primarily focused on strengthening the formal sector, this article documents the degree to which the informal sector remains the core for seed acquisition, especially in Africa. Conclusions drawn from a uniquely comprehensive data set, 9660 observations across six countries and covering 40 crops, show that farmers access 90.2 % of their seed from informal systems with 50.9 % of that deriving from local markets. Further, 55 % of seed is paid for by cash, indicating that smallholders are already making important investments in this arena. Targeted interventions are proposed for rendering formal and informal seed sector more smallholder-responsive and for scaling up positive impacts.

Keywords Informal and formal seed sectors · Agricultural investment · Markets · Smallholder · Delivery · Access to seed

Introduction

Seed sector development specifically geared to smallholder farmers has attracted substantial investment in recent years.

The writers share first authorship.

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As examples, from 2007 to 2012, the World Bank funded 87 seed sector projects, worth \$ US 513 million, with a strong focus on the vulnerable (Rajalahti 2013) and, in the same period, the Alliance for a Green Revolution in Africa's Program for Africa's Seed Systems (AGRA/PASS) dispensed 112 grants totaling \$35,244,164 and geared to improving smallholder livelihoods (SourceWatch 2012).

The broad rationale for focusing on seed sector interventions is that seed is a vehicle for delivering a range of advances, all of which can benefit smallholders. Seed can be the conduit for moving new varieties, giving farmers access to more productive, yield-enhancing traits. New seed is linked to strategies for raising nutrition, as with biofortified varieties selected for elevated micro-nutrient levels (Bouis and Welch 2010). Further, in response to climate variation, stress-tolerant varieties or clusters of diverse varieties are promoted as 'good practice' to enhance system resilience: multiple options can allow farmers to shift crop or variety portfolios in response to changing conditions (McGuire and Sperling 2013). Hence, seed is a vehicle linked to promoting productivity, nutrition and resilience: one entry point can potentially move forward multiple goals.

Varied and often opposing philosophies shape seed sector development and much depends on what actors see as the starting point for system entry. Organizations such as AGRA/PASS invest their resources mainly in private sector seed business development, that is, in the promotion of private commercial seed and formal sector input companies. In contrast, select non-governmental organizations (NGOs) and donors have signaled the need to support more locally-driven initiatives and particularly those that organize around what are called informal, farmer-based, local or traditional

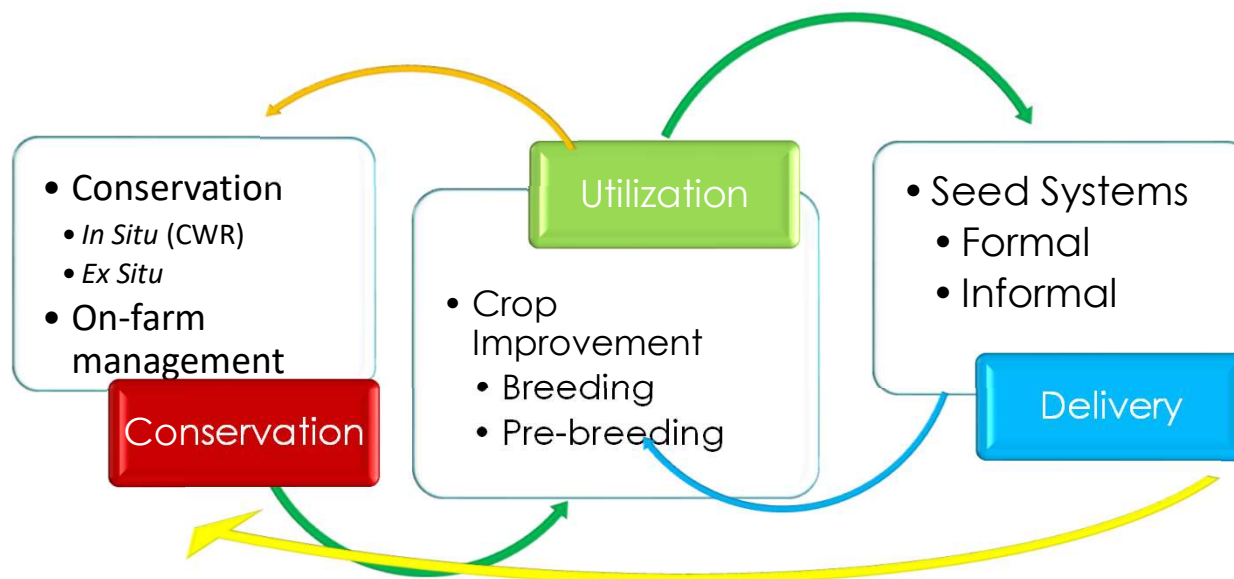
Less than 10% of all seeds used by farmers in sub-Saharan Africa is quality-assured

McGuire and Sperling, 2016



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Manage PGRFA as a Continuum



FAO's support to seed systems

Enhancing farmers' access to quality seeds and planting materials of suitable crop varieties

achievements across conservation of PGRFA, plant breeding, seed delivery, & normative mechanisms

20

countries supported

295M

USD Investments

568

Requests addressed

100

projects in 38 countries



Management of PGRFA

- Conservation in situ, ex situ and on-farm management
- Crop varietal development

Seed security

Seed system restoration advanced in Afghanistan, Syria, Ethiopia, Sudan and Ghana.

Normative work

- SOW-III published,
- Sessions of the ITWG and Commission held
- Convening on opportunity crops



Plant Production and Protection

FAO's support to seed systems - tools



Food and Agriculture
Organization of the
United Nations

COMMISSION ON
GENETIC RESOURCES
FOR FOOD AND
AGRICULTURE

Voluntary Guide for National Seed Policy Formulation



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FAO's support to seed systems - tools



A six-module Seed Toolkit (English, French and Spanish)

- Development of Small-Scale Seed Enterprises
- Seed Processing
- Seed Quality Assurance
- Seed Sector Regulation
- Seed Marketing
- Seed Storage

Guidelines on Seed Legislation



Thank you!!!