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Agricultural science and innovation for rural vitalization and global food security

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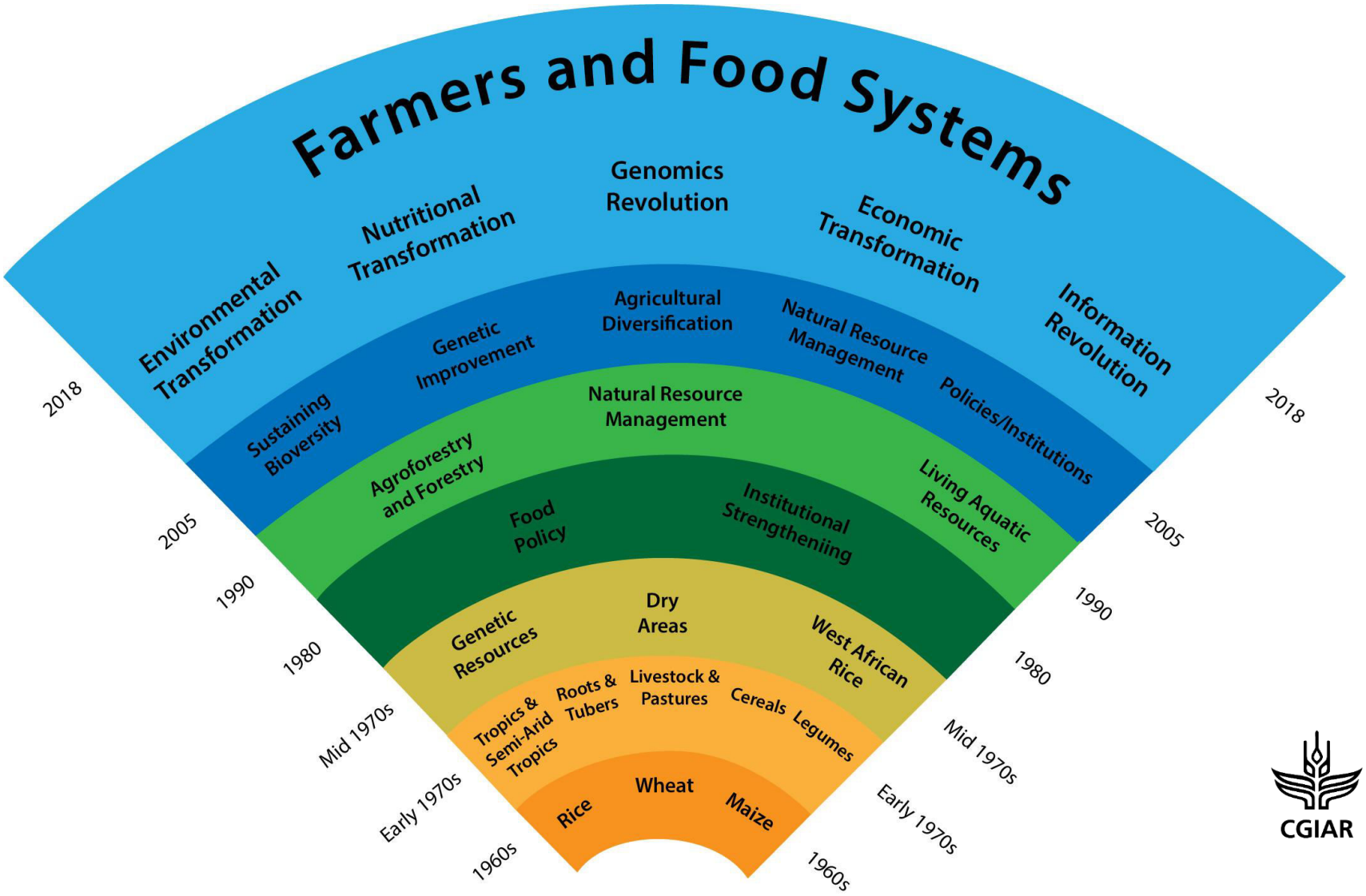
1960-70: Yield increase and Green Revolution

- Norman Borlaug (Nobel Peace Price 1970)
- Development of semi-dwarf, high-yield and disease-resistant varieties, 1960s-70s
- CIMMYT created (Rockefeller and Ford Foundations, and Mexican Government)

1960-2018: Scientific expansion and diversification



Addressing complex global issues

Food – the way we grow, catch, transport, process, trade, and consume it – is central to the main challenges facing humanity.

FOOD SECURITY

Agricultural output must increase in harmony with the natural environment by improving access to quality inputs, extension services and innovations along the value chain

HEALTH

2016 saw this decade's first increase in the number of more than 800 million people are chronically undernourished. Two billion people suffer from micronutrient deficiencies, an equal number are overweight or obese.

ENVIRONMENT

Agriculture accounts for about 70% of global water withdrawals and is the biggest cause of forest loss. Additionally, a third of the world's soil is classified as degraded.

CLIMATE

Climate change and climate shocks put the most vulnerable people at risk. Heat, drought, flood, and unpredictable growing seasons harm farmers and production systems.

PROSPERITY

More than 85% of the world's 1.2 billion youth live in developing countries where meaningful employment and entrepreneurial opportunities are limited – contributing to migration and political insecurity.

Source: CGIAR Narrative document, 2018

Harnessing innovations for impact will be knowledge intensive

To solve these complex challenges, CGIAR partners with governments, national research institutes, civil society and the private sector on 5 global transformations.

GENOMICS REVOLUTION

To accelerate development of a new generation of crops and animals, to improve yield, as well as increase nutrient content and market value.

NUTRITION TRANSFORMATION

To tackle chronic malnutrition, hidden hunger and the availability of safe, healthy and diverse foods.

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ECONOMIC TRANSFORMATION

To revitalize rural economies, bring value to consumers, and leverage the power of economic growth to reduce poverty.

ENVIRONMENTAL TRANSFOMATION

To drastically cut the environmental cost of agriculture and reverse land degradation by scaling up climate-smart agriculture.

INFORMATION REVOLUTION

To deliver impact-at-scale by harnessing the power of agriculturally relevant data and analytics for farmers, businesses and governments.

2016-2030: Delivering the Sustainable Development Goals

CGIAR System Level Outcomes

REDUCE POVERTY

IMPROVE FOOD AND NUTRITION SECURITY

IMPROVE NATURAL RESOURCES AND ECOSYSTEM SERVICES

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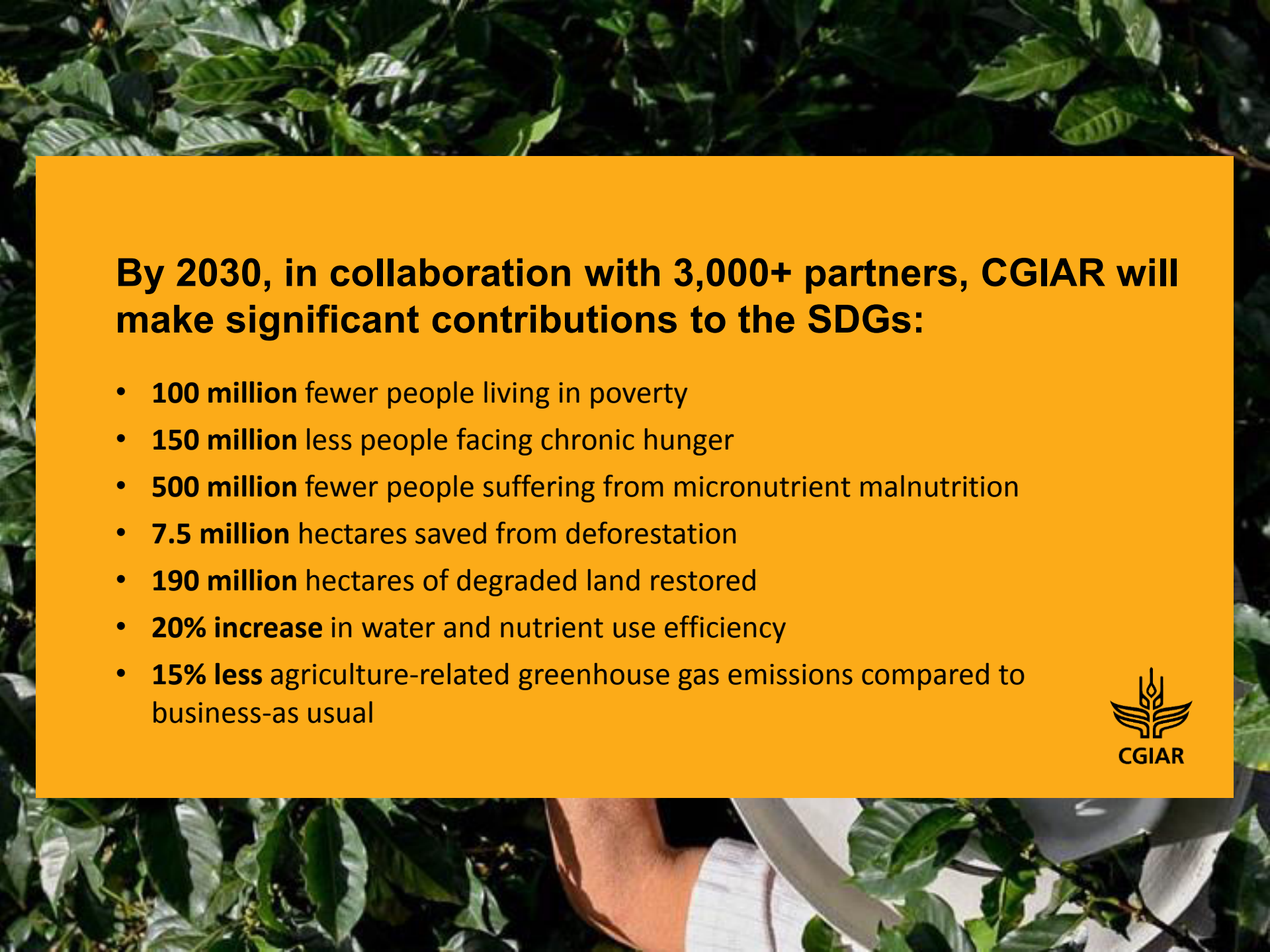

By 2030, in collaboration with 3,000+ partners, CGIAR will make significant contributions to the SDGs:

- **100 million** fewer people living in poverty
- **150 million** less people facing chronic hunger
- **500 million** fewer people suffering from micronutrient malnutrition
- **7.5 million** hectares saved from deforestation
- **190 million** hectares of degraded land restored
- **20% increase** in water and nutrient use efficiency
- **15% less** agriculture-related greenhouse gas emissions compared to business-as usual

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OUR ASSETS

15 top-class research centers

CGIAR's global network of 15 research centers contributes to an unrivaled mix of knowledge, skills and research facilities able to respond to emerging development issues.

3,000+ partners

Unequalled partnerships network of more than 3000 partners from national governments, academic institutions, global policy bodies, private companies and NGOs.

70 countries

We have a local presence in over 70 countries with a deep knowledge of customs, values and market operations in developing countries.

50 years experience

A wealth of experience and knowledge spanning 50 years that builds on a track-record of innovation and world-class research.

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The world's largest agricultural research network

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CGIAR fills a unique global niche

- **Storage**: Mobilizes a global store of seeds with its platform of 11 CGIAR Genebanks to safeguard the world's largest and most diverse crop and forage collections
- **Genetic Gain**: Creates new improved varieties of plants, livestock and fish
- **Approaches**: Develops new climate smart and gender aware tools and approaches to help farmers, farming and food systems
- **Policy**: Works closely with governments to help turn knowledge into impacts

AfDB to invest $120 million to boost cassava and others

Better farming practices key to combating desertification and drought

WLE Director promotes payments for ecosystems services at EAT Forum

Daniel Debouck: The man who knows his beans

G7 can tackle five priorities with one investment: agricultural research

Gender takes center stage at European Development Days

Can our environment survive our food needs? We asked 11 eminent water scientists

Blogs.WorldBank.org: Secrets to successful irrigation management from Central Asia

More people, more food, worse water?

Miracle mangrove "land builders" adapt to ocean rise amid climate change

TheDiplomat: The Impact of Migration on Water Scarcity in Central Asia

Livestock-enhanced diets in the first 1,000 days of life: Pathways to better futures in low-income countries

CGIAR's mega Programs and Platforms

Agri-Food Systems CGIAR Research Programs

The first of these is the innovation in Agri-Food Systems which involves adopting an integrated, agricultural systems approach to advancing productivity, sustainability, nutrition and resilience outcomes at scale.

CGIAR Research Program on Fish

CGIAR Research Program on Forests, Trees and Agroforestry

CGIAR Research Program on Grain Legumes and Dryland Cereals

CGIAR Research Program on Wheat

CGIAR Research Program on Livestock

CGIAR Research Program on Maize

CGIAR Research Program on Rice

CGIAR Research Program on Roots, Tubers and Bananas

Global Integrating Programs

The second cluster consists of four cross-cutting Global Integrating Programs framed to work closely with the Agri-Food Systems Programs within relevant agro-ecological systems.

CGIAR Research Program on Agriculture for Nutrition and Health

CGIAR Research Program on Climate Change, Agriculture and Food Security

CGIAR Research Program on Policies, Institutions, and Markets

CGIAR Research Program on Water, Land and Ecosystems

Research Support Platforms

Three research support Platforms will also underpin the research of the whole system.

CGIAR Platform for Big Data in Agriculture

CGIAR Excellence in Breeding Platform

CGIAR Genebank Platform

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CGIAR approach to International Mega-Programs: the CGIAR Research Programs (CRPs)

CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas

CGIAR RESEARCH PROGRAM ON Maize

CGIAR RESEARCH PROGRAM ON Wheat

CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

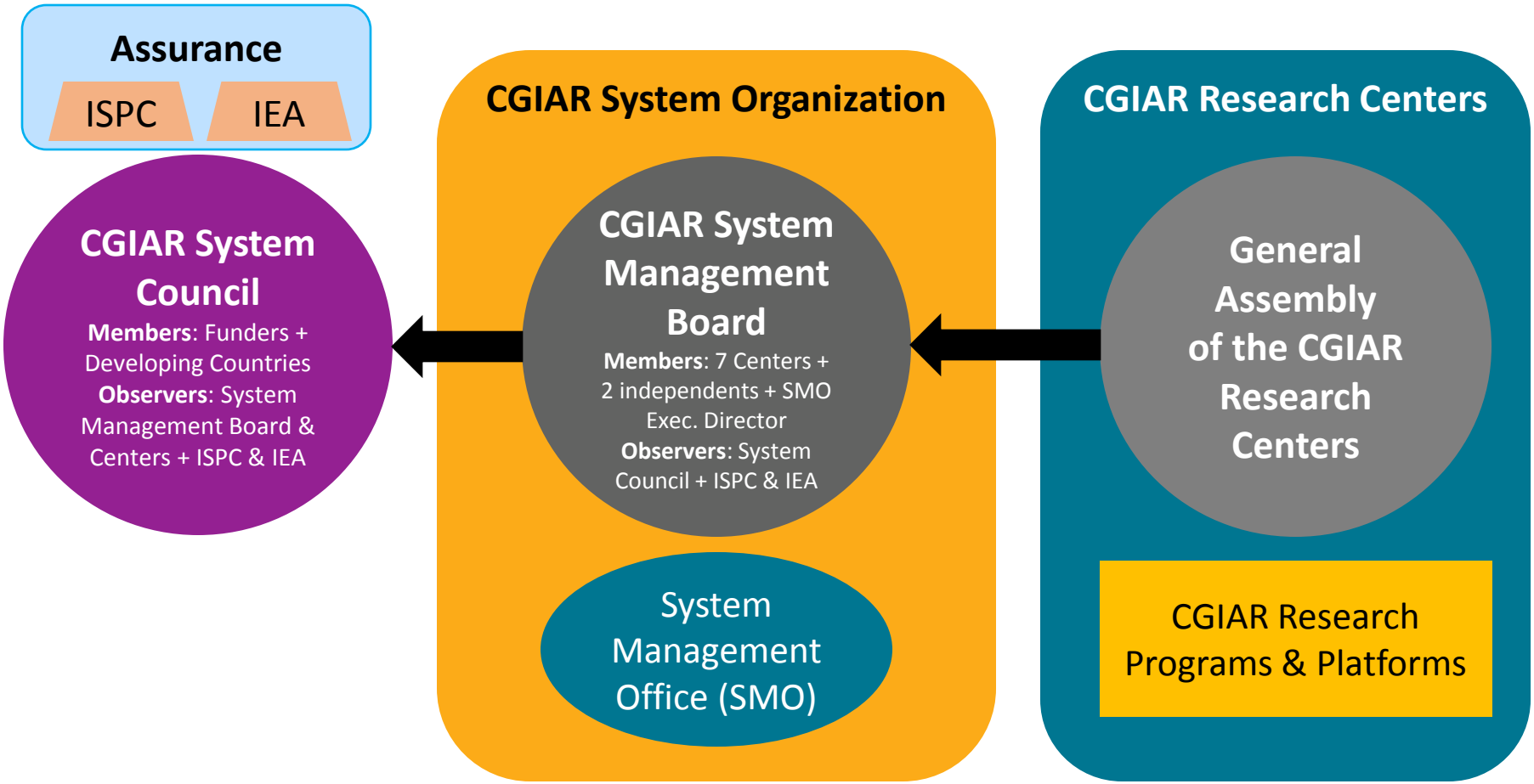
CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security — CCAFS

CGIAR RESEARCH PROGRAM ON Livestock

CGIAR RESEARCH PROGRAM ON Forests, Trees and Agroforestry

CGIAR RESEARCH PROGRAM ON Rice

CGIAR structure & governance



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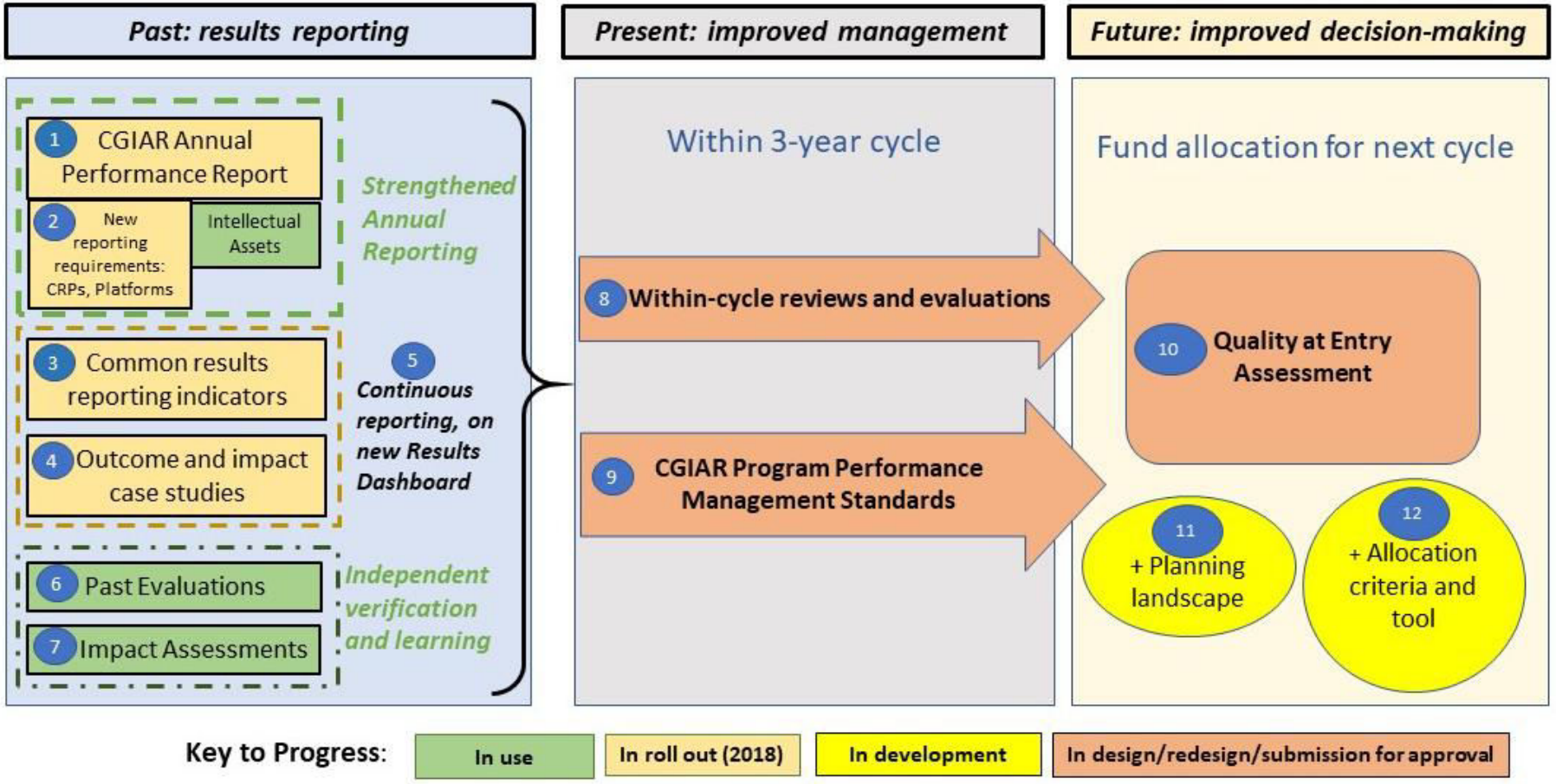
6th System Council Meeting
16 and 17 May 2018
Berlin, Germany
CGIAR_SC6
6systemcouncil



Past: results reporting

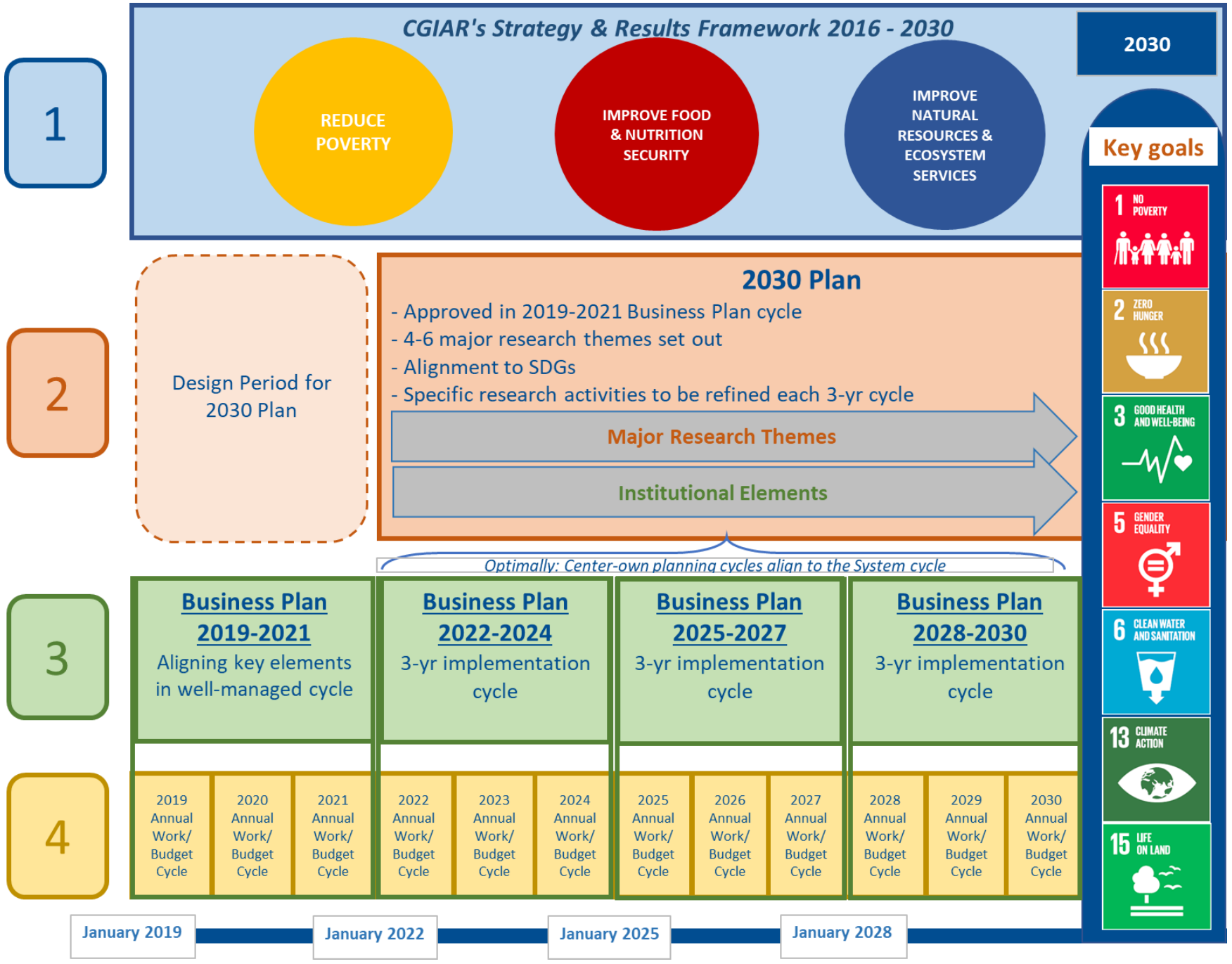
1. CGIAR Annual Performance Report
2. CRPs/Platform reporting requirements
3. Common results reporting indicators
4. Outcome and impact case studies
5. Program Results Dashboard
6. Past Evaluations
7. Impact Assessments

Present: improved management

8. Within-cycle reviews and evaluations
9. Program Performance Management Standards

Future: improved decision-making

10. Quality at Entry Assessment
11. Planning landscape
12. Allocation criteria and tool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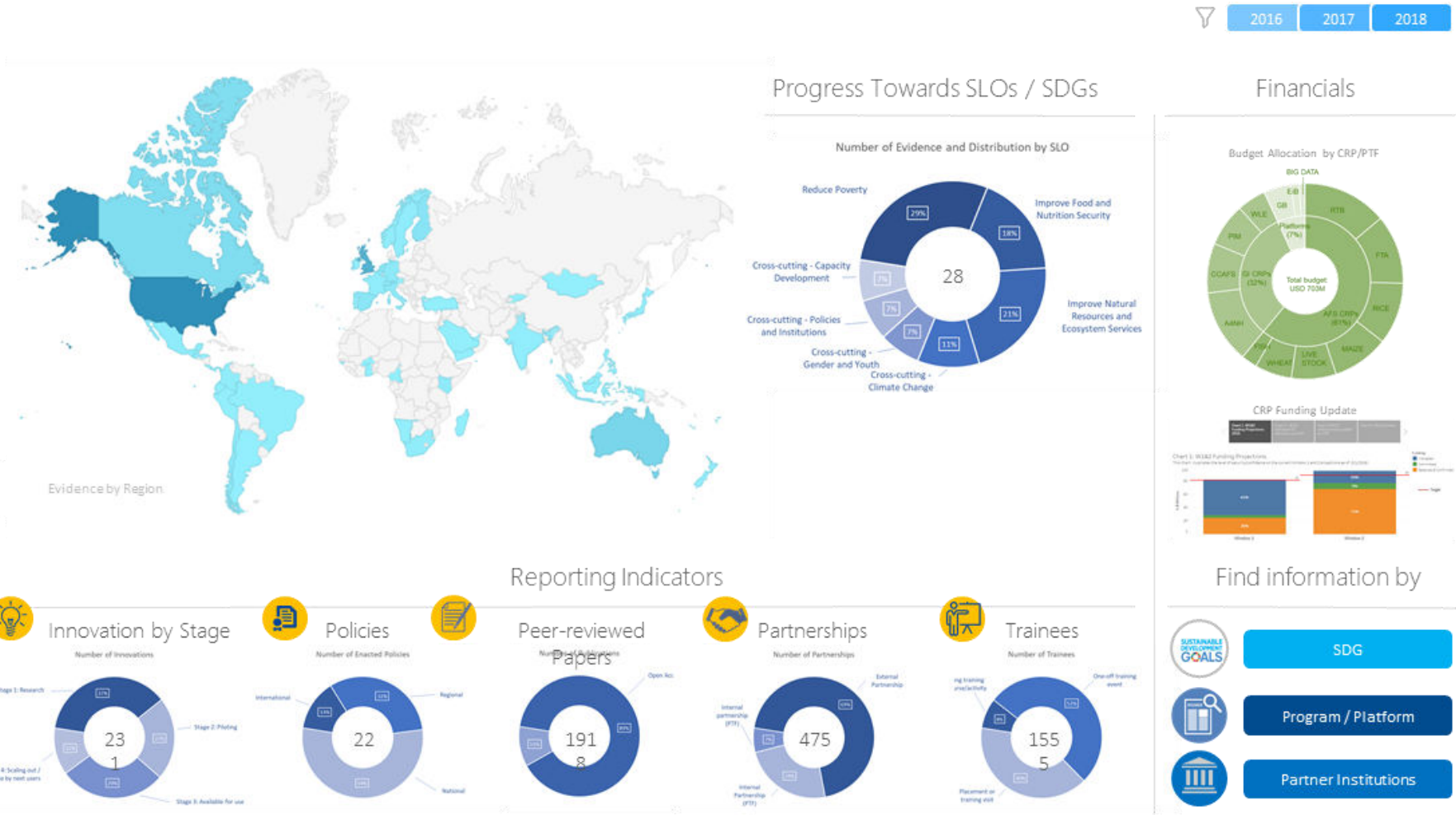
CGIAR's Strategy & Results Framework 2016 - 2030
REDUCE POVERTY
IMPROVE FOOD & NUTRITION SECURITY
IMPROVE NATURAL RESOURCES & ECOSYSTEM SERVICES
2030
Key goals
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
13 CLIMATE ACTION
15 LIFE ON LAND
2
Design Period for 2030 Plan
2030 Plan
- Approved in 2019-2021 Business Plan cycle
- 4-6 major research themes set out
- Alignment to SDGs
- Specific research activities to be refined each 3-yr cycle
Major Research Themes
Institutional Elements
Optimally: Center-own planning cycles align to the System cycle
3
Business Plan 2019-2021
Aligning key elements in well-managed cycle
Business Plan 2022-2024
3-yr implementation cycle
Business Plan 2025-2027
3-yr implementation cycle
Business Plan 2028-2030
3-yr implementation cycle
4
2019 Annual Work/ Budget Cycle
2020 Annual Work/ Budget Cycle
2021 Annual Work/ Budget Cycle
2022 Annual Work/ Budget Cycle
2023 Annual Work/ Budget Cycle
2024 Annual Work/ Budget Cycle
2025 Annual Work/ Budget Cycle
2026 Annual Work/ Budget Cycle
2027 Annual Work/ Budget Cycle
2028 Annual Work/ Budget Cycle
2029 Annual Work/ Budget Cycle
2030 Annual Work/ Budget Cycle
January 2019
January 2022
January 2025
January 2028

CGIAR Program Performance Progress Dashboard



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CGIAR scientific papers published in ISI journals

CGIAR Research Programs	2014	2015	2016
Agriculture for Nutrition and Health (A4NH)	137	147	127
Climate Change, Agriculture and Food Security (CCAFS)	114	119	118
Aquatic Agricultural Systems (AAS)	49	32	28
Dryland Cereal (DC)	47	49	14
Dryland system (DS)	127	83	95
Forests, Tree and Agroforestry (FTA)	328	281	276
Grain Legumes (GL)	8	82	108
Global Rice Science Partnership (GRISP)	218	289	297
Humidtropics	17	36	29
Livestock & fish	48	70	45
MAIZE	64	132	111
Policies, Institutions and Markets (PIM)	98	129	102
Roots, Tubers & Bananas (RTB)	92	103	112
WHEAT	107	167	204
Water, Land & Ecosystems	150	141	142
Total	**1604**	**1860**	**1808**

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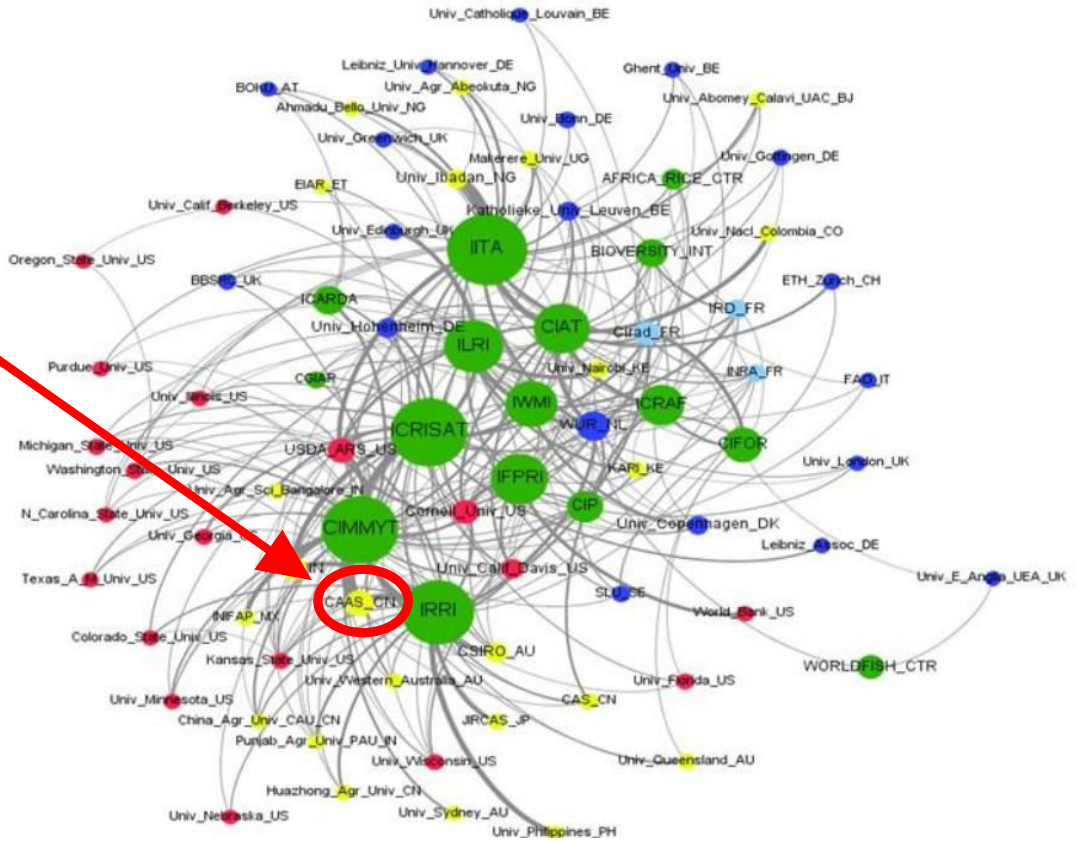
International collaborations and ISI papers

1. WUR
2. **CAAS**
3. USDA
4. Cornell University
5. CIRAD
8. IRD
14. INRA



From "CGIAR bibliometric study, 2003-2012", Odile Bédu (Agreenium), Dominique Fournier (INRA), December 2013

http://www.cirad.fr/en/news/all-news-items/articles/2014/institutionnel/cirad-is-the-leading-french-partner-in-cgiar-co-publications

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CGIAR and China: Productivity & competitiveness

Global Rice Array action sites (phenotyping, genotyping, etc.) in Southeast Asia, South Asia, China, Latin America, and Africa with local resources available. **Guangdong** Province is interested in joining with support from the Provincial Government; additional provinces such as **Yunnan** and **Guangxi** expected to join later in 2018.

Expansion of C4 mutant screening capacity: IRRI-CAAS collaboration to formulate a joint laboratory in the Biotechnology Research Institute in Beijing to become operational later in 2018 and funded by CAAS China.

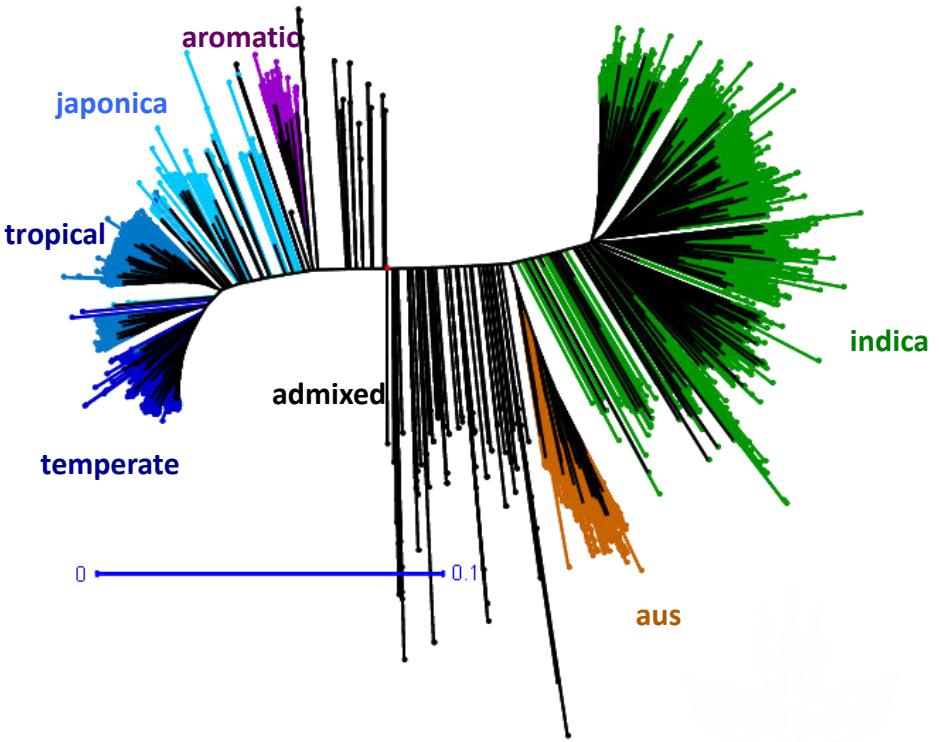
CGIAR and China: Science & innovation leadership

Sequencing 3,000 rice accessions… 10,000?

中国农业科学院 CHINESE ACADEMY OF AGRICULTURAL SCIENCES

华大基因 BGI

Led By IRRI — GRiSP Global Rice Phenotyping Network — *Science for a food secure future* — CGIAR Research Program on Rice Global Rice Science Partnership



From Alexandrov, et al. SNP-Seek database of SNPs derived from 3,000 rice genomes. Nucl. Acids Res. 2015;43(D1):D1023-D1027

Kindly provided by Dr. Ken Mc Nally (IRRI/GRiSP)

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CGIAR and China: High-impact transformation

Studies of the **release and adoption of modern *potato* & *sweetpotato* varieties** in major producing countries in Asia (Bangladesh, China, India, Indonesia, Nepal, Pakistan, Papua New Guinea, Philippines, Vietnam) and Latin America (Peru) in collaboration with SPIA, RICE, Yunnan Normal University and INIA (Open Access datasets & publications in 2018).

With Guangzhou Agricultural Academy of Sciences (GDAAS) facilitation of regional **NARS R&D platforms** and development of **Foc TR4 resistant *banana* materials** for testing in endemic regions.

Impact assessment of ***potato* variety** *Cooperation 88* (C88) in Yunnan Province.

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CGIAR and China: Feeding the world

- 120 million tons Wheat harvested annually in China
- 30+ years of CAAS & CIMMYT collaboration on wheat
- Germplasm exchange, training scientists
- 260 wheat varieties (mostly semi-dwarf) released from crosses with CIMMYT material
- Yield doubled until 1980 with 20% reduced area (genetic gain)
- Need for more resilient varieties, e.g. drought: Heat & Drought Tolerance to Combat Climate Change (HEDWIC)

Thank you

Xiè xiè dà jiā de guān zhù