IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

International Wheat Yield Partnership

Research to Deliver Wheat for the Future

- **Richard Flavell, Chair of IWYP Science and Impact Executive Board**
- **Jeff Gwyn, Program Director, IWYP**

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Goal

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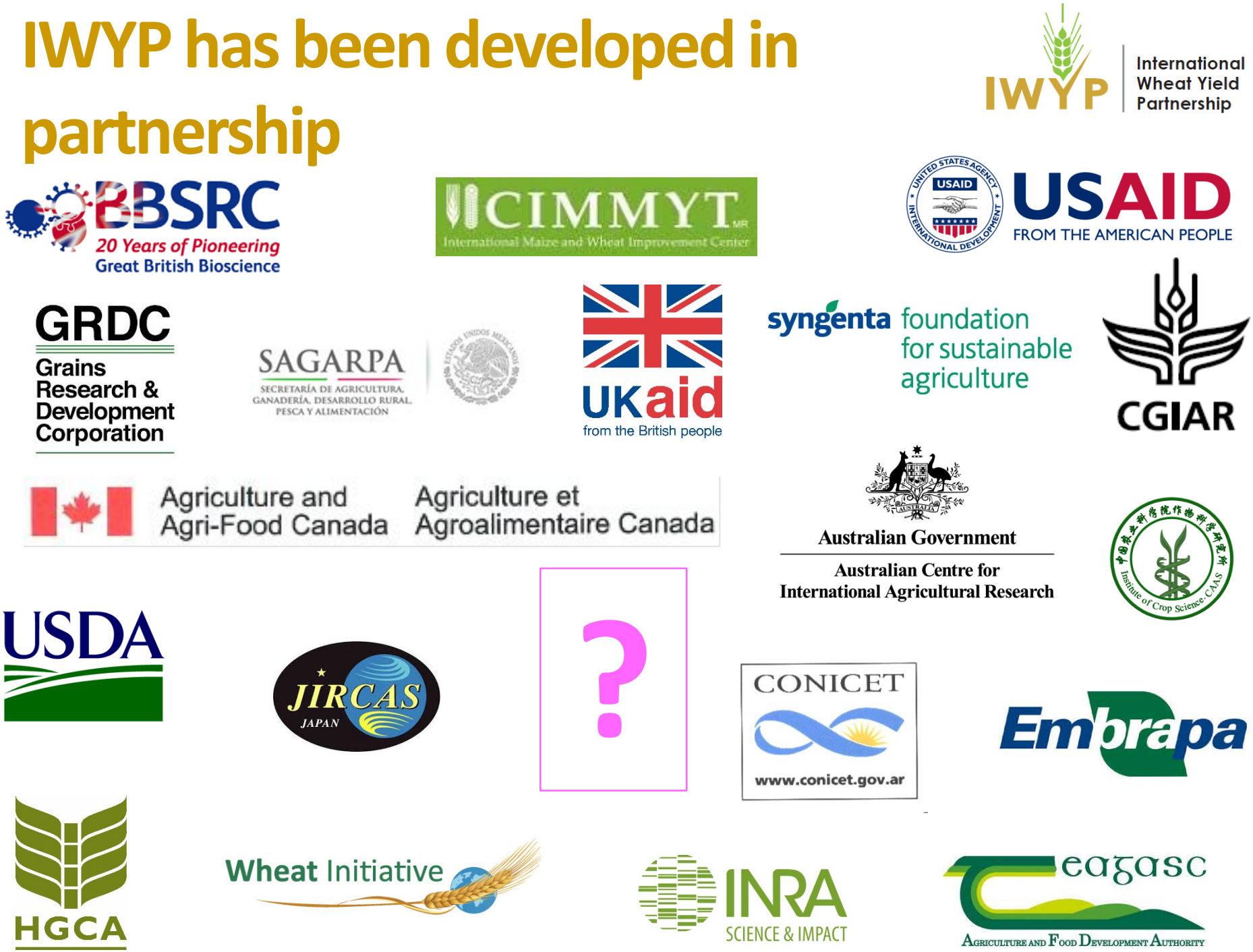
To increase wheat yield potential by up to 50% in 20 years:

- Exploit the best relevant science base worldwide
- Incorporate and evaluate in elite germplasm
- Transfer germplasm to leading relevant breeding programs around the world, public and private

- To be inspired and managed by an independent management team and structure, linked with the private sector and developed with state of the art technologies

- To be focused on delivery with a high degree of urgency

IWYP has been developed in partnership



How the Agenda was Established

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- A Technical Committee met to address how to increase substantially the **genetic yield potential** of wheat and produced a report
- Six themes were recommended around the concept of creating plants that act as better photosynthesis machines
- These were similar to what had been selected previously by CIMMYT and colleagues as part of the Wheat Yield Consortium

Carbon Fixation and Grain Yields

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Canopy and Biomass Building

Senescence and grain filling

Optimize carbon fixation and canopy growth/architecture

Optimize flowering time

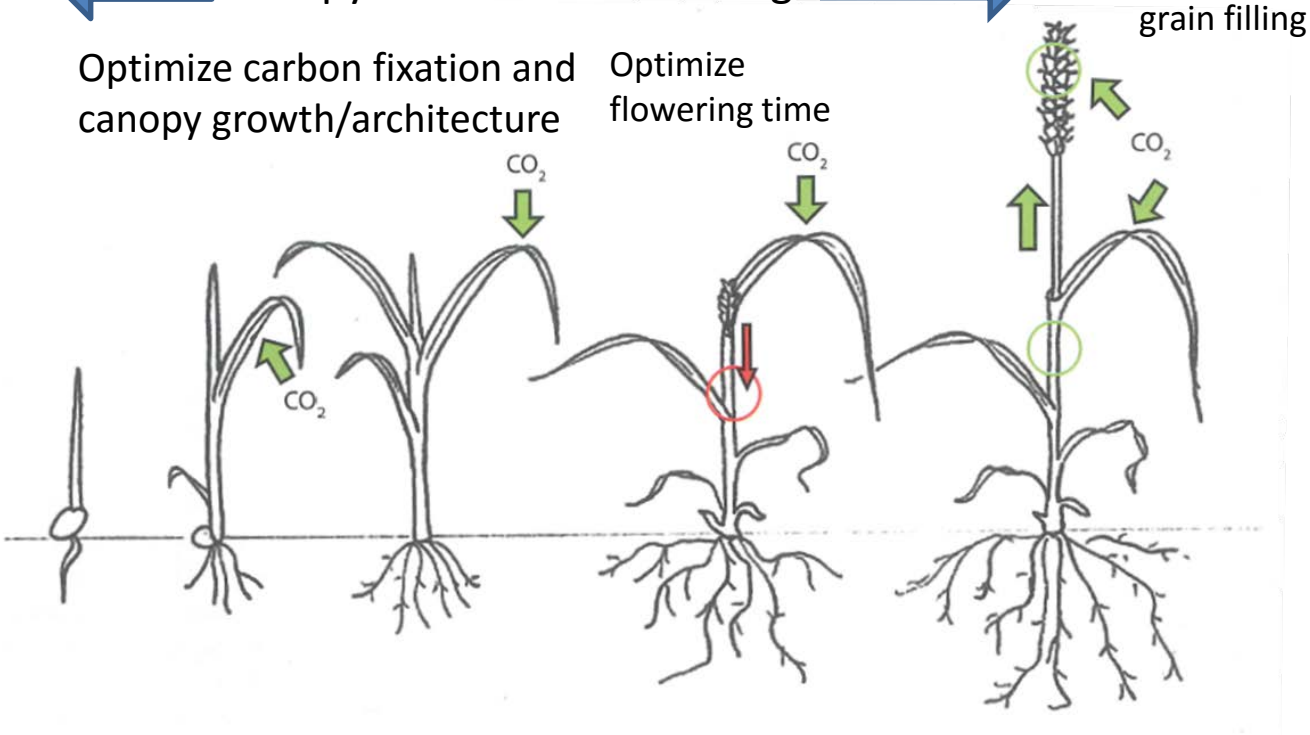

Figure 3. Stages of development in a cereal crop are shown where provision of sufficient photosynthate can have major effects on yield potential. Photosynthetic activity of the first source leaves can drive early canopy closure, and carbon fixed pre-anthesis can be stored in stems (red arrow and circle) and later remobilised (green circle). Persistent photosynthetic leaf area late in grain-filling (or 'staygreen') can 'finish' the crop.

Six Project Areas

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- A and B: Improving light capture and conversion into more biomass during growing season using:
  - wheat and wheat related genetics
  - proven transgenes
- C: Maximizing grain yields from increased biomass by maintaining or improving harvest index
- D: Building elite, improved lines for transfer to other breeding programs
- E: Taking advantage of discoveries from other initiatives
- F: Breakthrough technologies for wheat breeding

Opportunities Around the World

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- Screening new germplasm for higher biomass
- Screening wheat relatives for more efficient photosynthesis at multiple temperatures
- Selecting variant architecture, e.g. awns with high photosynthetic outputs
- Looking for variant Rubisco enzymes in wheat relatives
- Selecting better Rubisco activase genes
- Changing Rubisco genes
- Improving the efficiency of regenerating Rubisco substrate

Private Sector Engagement

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- Help guide, assess and assist the research program and the broad deployment of outputs of the IWYP
- Make specific contributions: Advise the Executive Board in priority setting, share germplasm, technology services, product development
- Receive early insights into progress, access to grants process, access to improved germplasm and networking with leaders

Making It Happen

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Jeff Gwyn, Program Director

Program Development

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IWYP will support research by a range of mechanisms:

- Competitive funding calls to attract world class science
- A breeding and research hub supported by technical platforms based at CIMMYT
- Alignment of existing and directly relevant research
- Flexible mechanisms to allow funding partners to contribute resources
- Sharing with the private sector

IWYP will also:

- Facilitate the partnership with the private sector
- Work with other International Programs
- Manage IP and licensing

Overall Approach

A Bit "Unique" for a Public Funding Mechanism

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- Not seeking to answer singular questions but rather to make high impact discoveries that can be integrated into a holistic program with a defined output
- Target discoveries and outputs that are leading, linked, building, durable, and portable
- Projects framed around urgency and success
- Program will be managed using a project management structure
- Projects to be defined by time lines, milestones and deliverables, i.e., metrically driven
- Program will result in high yielding germplasm that gets into the hands of farmers

To Drive Traits Towards the Market

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- Define genetic basis of each trait using phenotype and molecular markers
- Transfer trait(s) to elite germplasm using markers
- Stack traits to create super engine, optimizing phenology and harvest index
- Evaluate germplasm in field settings
- Pre-breed and select
- Release to worldwide breeding programs

Integrating Results

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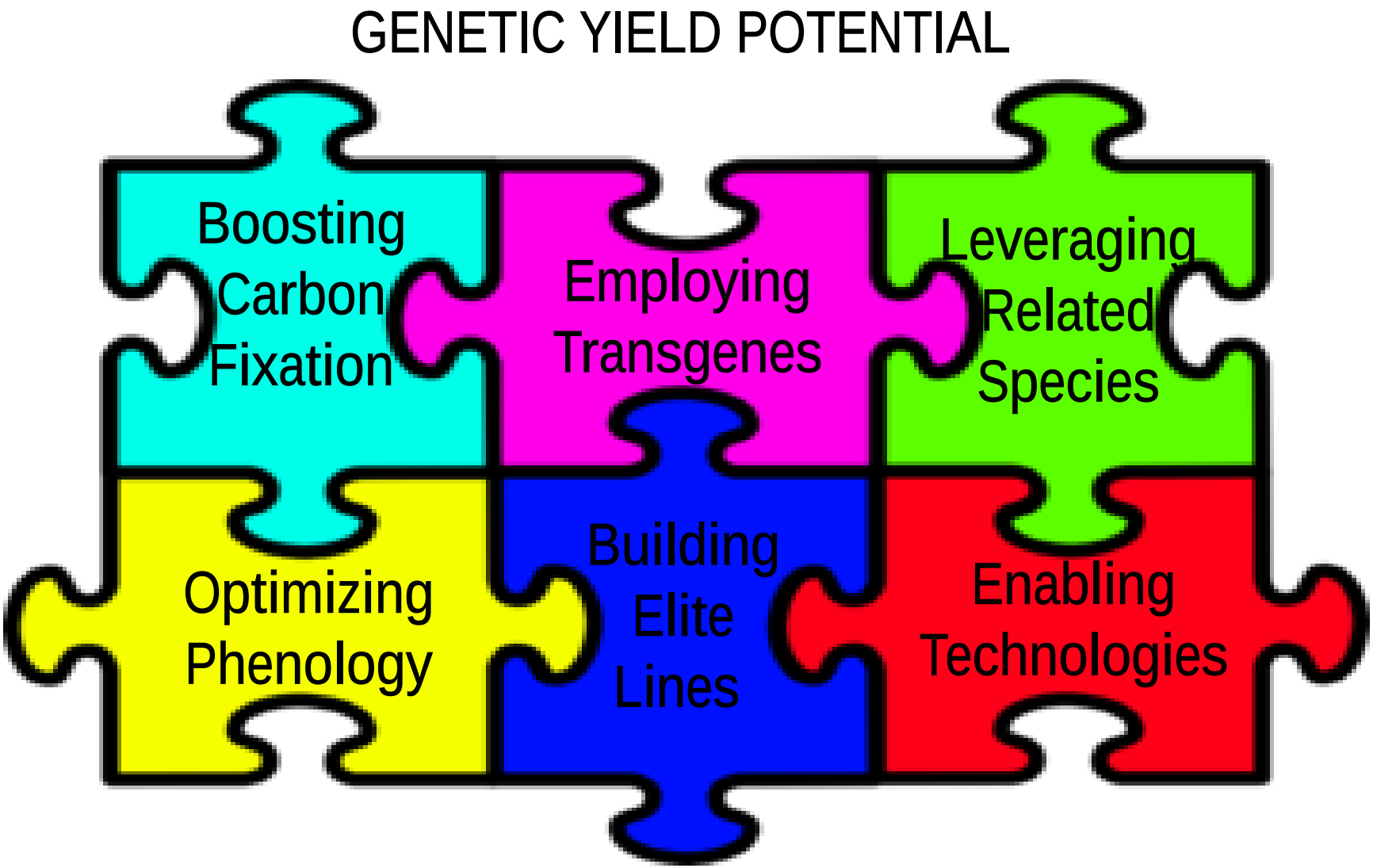

Anticipated Outcomes

Increase genetic yield potential by 50%

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- Stronger and elevated state-of-the-art wheat breeding programs
- Breeding systems and new phenotypic assays for stacking traits
- First lines reaching national programs from more productive breeding programs
- Knowledge of genetic variation traits for carbon capture through to biomass and grain yields
- IWYP training programs generate a greater cadre of trained scientists and breeders
- Stronger industrial sector for delivering higher yielding varieties

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Thank You

Questions ?

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