International Wheat Yield Partnership

Purpose, Science, Progress

Jeff Gwyn, PhD

Program Director

iwypprogdirector@iwyp.org

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

The Facts

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

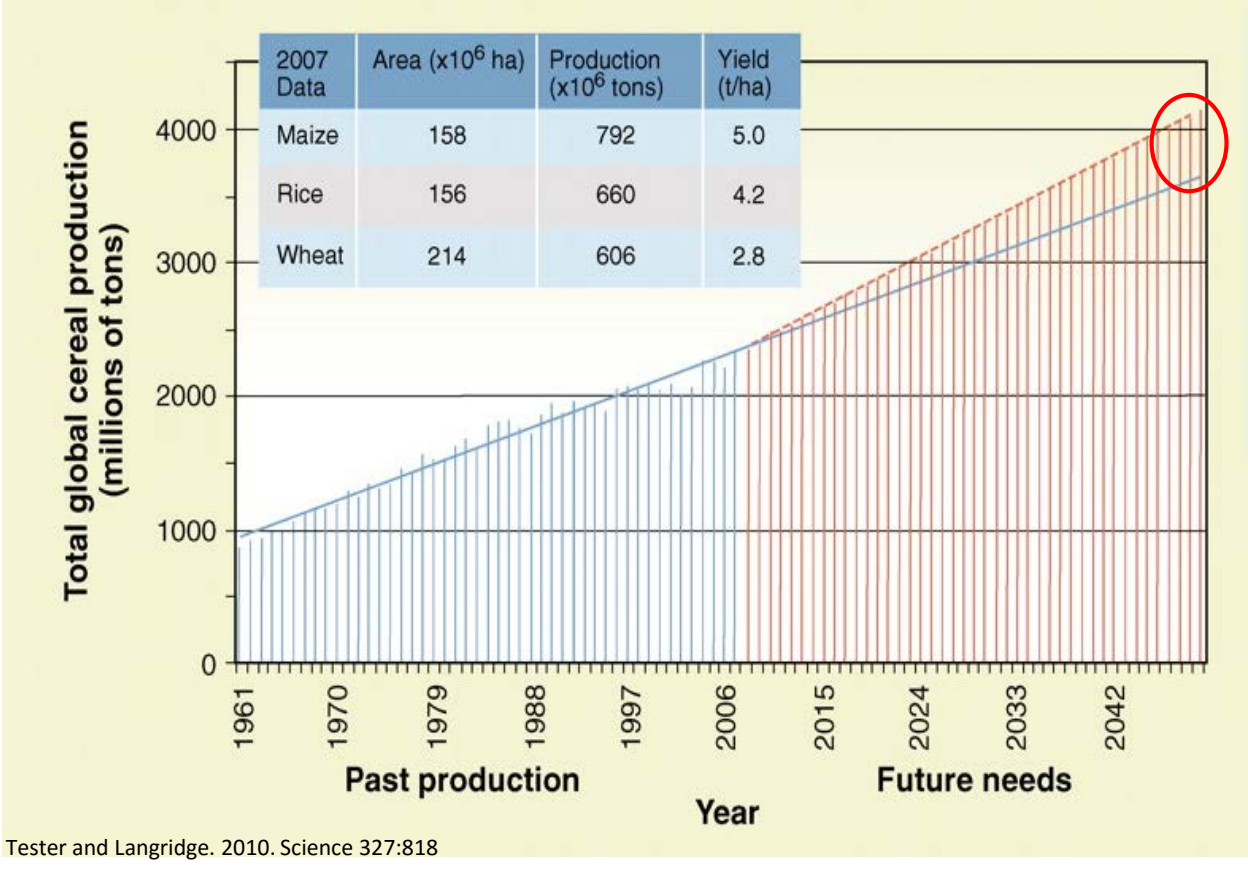
Wheat is essential to global food security

Wheat is the most widely grown of any crop globally (230m ha) and accounts for:

- 21% food calories
- 20% protein

Increase in Cereal Production Necessary to Feed 9+ Billion People by 2050

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future



Tester and Langridge. 2010. Science 327:818

Will require a 60+ % increase in wheat production to meet food demands by 2050

IWYP Goal

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

Increase the genetic yield potential of wheat by 50% in 20 years

Why ?

- Because others are not focused here
- Because this is urgently required and not enough progress is evident

How ?

- By combining the best ideas internationally
- By enabling scientific breakthroughs (US ~$100 mio / first 5 years)
- By coordinating outputs, linking breakthroughs to validation and assessment, delivery to breeding programs, pushing deployment

IWYP has been Developed in Partnership

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

WHEAT INITIATIVE

USAID FROM THE AMERICAN PEOPLE

CIMMYT International Maize and Wheat Improvement Center

BBSRC 20 Years of Pioneering Great British Bioscience

USDA

INRA SCIENCE & IMPACT

CGIAR

syngenta foundation for sustainable agriculture

+?

GRDC Grains Research & Development Corporation

Australian Government
Australian Centre for International Agricultural Research

SAGARPA
SECRETARÍA DE AGRICULTURA, GANADERÍA, DESARROLLO RURAL, PESCA Y ALIMENTACIÓN

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

How IWYP Operates

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

- Flexible mechanisms to allow Stakeholders to contribute resources
- Competitive Calls to build international teams for impact
- Alignment of existing directly relevant research (Aligned Programs)
- A breeding and research Hub supported by technical platforms and testing systems based at CIMMYT
- Linking with the private sector
- Connecting with other national and international programs
- Inspired and managed by an independent board and team to integrate discoveries into a coordinated and focused program
- Projects are metrically driven (timelines, milestones, deliverables) and focused on delivery with a high degree of urgency

IWYP Science Philosophy

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

"WHY JUST IMPROVE ON WHAT'S BEEN DONE BEFORE WHEN YOU CAN TOTALLY RE-IMAGINE IT"

IWYP Seeks to Create & Implement Step Changes

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

The goals and criteria that the IWYP associates with its initiative are purposely very demanding

- Research sought must be creative, forward-looking and driven to discover approaches to *substantially* increase the genetic yield potential of wheat
- IWYP is seeking breakthroughs in genetic yield potential beyond what is expected to occur in ongoing breeding programs
- Requires new or different approaches and/or novel techniques with a relatively high degree of risk
- Seeking discoveries that are as durable and portable as possible

IWYP's Science Target Areas

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

- X Heat tolerance
- X Drought tolerance
- X Disease tolerance
- X Lodging, other agronomic characteristics, etc.
- X Agronomic practices
- X Etc.
- ✓ IWYP's focus is **genetic** yield potential -> integrate these discoveries with other essential traits and improvements, such as those above, into elite germplasm for delivery to breeding programs

IWYP's Research Scope Areas

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

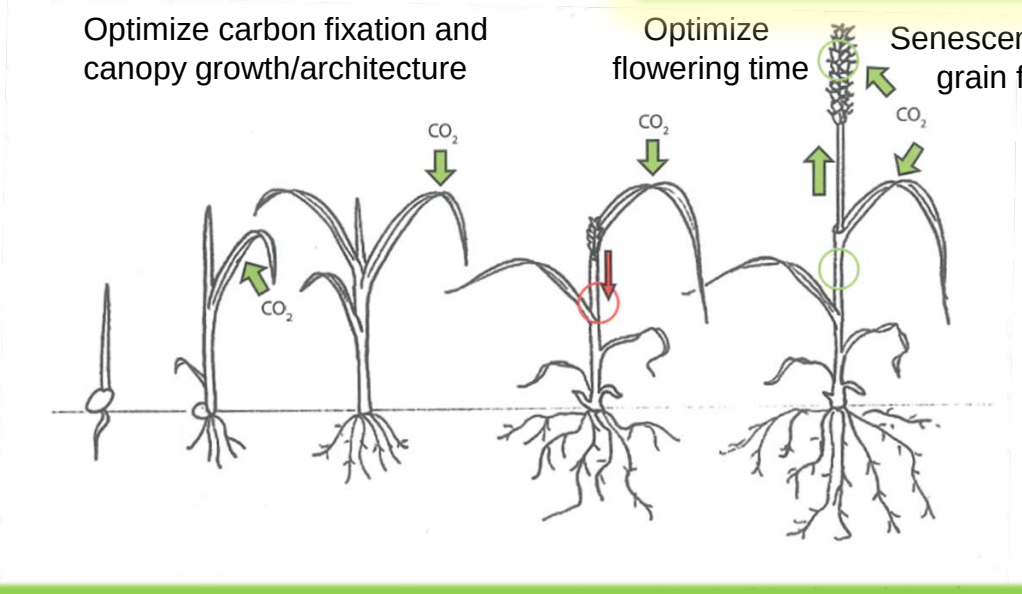
- Discovery / creation of genetic variation in wheat that boosts the fixation of carbon into biomass for subsequent transfer to grains
- Maximizing grain yields from enhanced carbon capture and biomass through optimizing plant phenology
- Building elite lines for dispersal to other breeding programs
- Taking advantage of discoveries coming from other species
- Breakthrough enabling technologies to transform cereal breeding

Carbon Fixation and Grain Yields

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

Canopy & Biomass Building

Seek to build a better photosynthetic engine



Process -> find the traits -> proof of concept -> define underlying genetics -> tools for utilization -> prebreeding -> validation -> varietal development -> delivery

Carbon Fixation and Grain Yields

IWYP International Wheat Yield Partnership

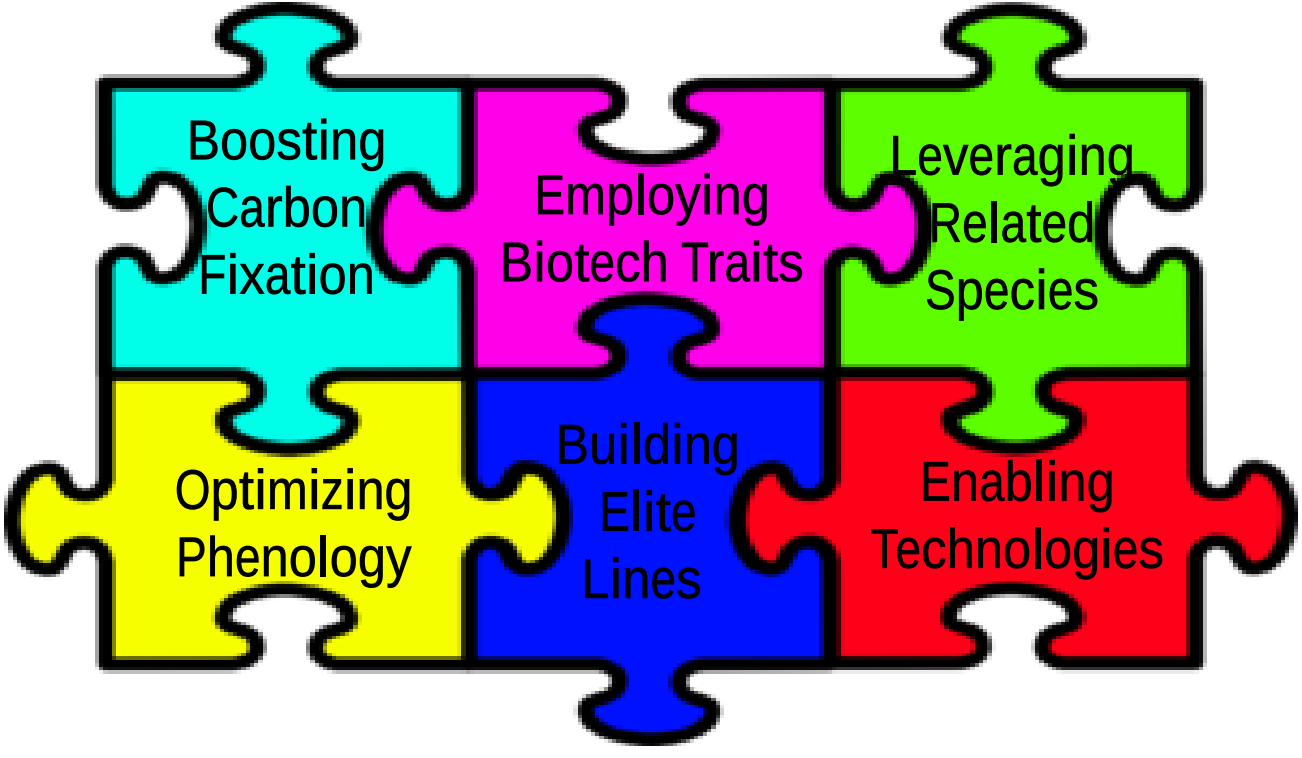
Research to Deliver Wheat for the Future

Integrating Results

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

GENETIC YIELD POTENTIAL

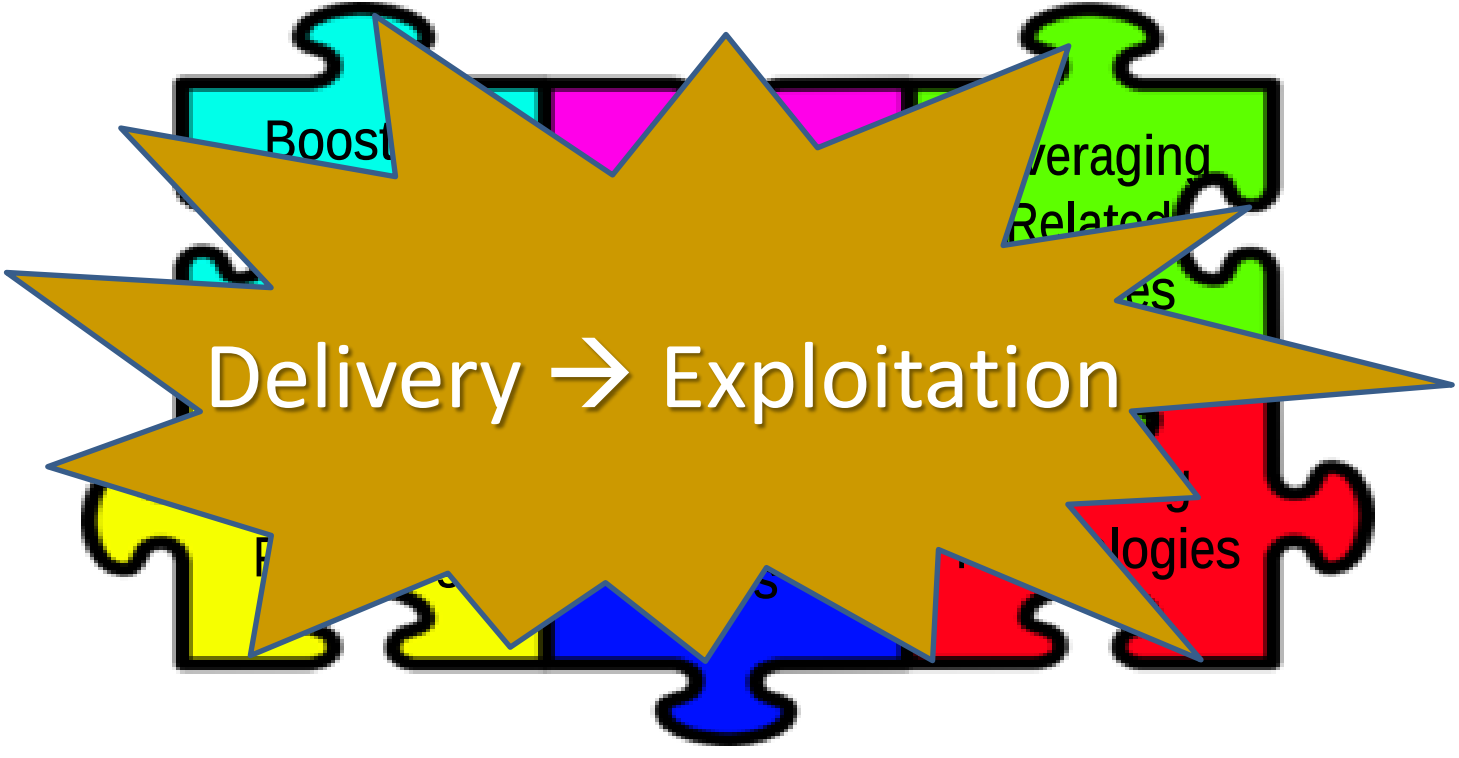


Integrating Results

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

GENETIC YIELD POTENTIAL



IWYP Research & Breeding Hub

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

Hub-focused research at CIMMYT in Mexico:

- ✓ Brings all discoveries into a single source to compare and combine to seek synergies
- ✓ Cross-referencing between research Areas is easier and resources are used more efficiently
- ✓ Results representative of major wheat production environments
- ✓ Research and breeding is conducted side-by-side encouraging maximum utilization of discoveries and accountability of both
- ✓ Release to worldwide breeding programs
- ✓ Enables the IWYP to drive the discoveries/traits toward the market

IWYP Just Reached an Important Milestone

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

Just completed our first competitive Call for research funding

- Large number of Pre-Proposals were received
  - 41 different countries were involved in the submitted projects
  - A subset of Pre-Proposals was selected based on fit to research scope followed by international expert peer review
- Invited applicants submitted Full Proposals
  - Full Proposals were assessed by an international expert peer review panel
- Selection was made by the IWYP SIEB Board based on international expert peer review, funding considerations and research portfolio needs
- Funders have responded with decisions on projects to support

Outcome – Selected Projects

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

- The total value of the funded research is around US $20 million
- Involves various institutions and research teams in:
  - UK, AUS, USA, MEX, IND, ARG, ESP
- Science topics of the funded research projects include:
  - Finding and employing traits and genes to increase photosynthesis
  - Genes to boost spike development
  - Reducing respiration and thereby enhancing photosynthetic efficiency
  - Optimizing canopy architecture to increase carbon capture and conserve nitrogen
  - Using selected genes to increase biomass and yield
  - Optimizing phenology leading to increased harvest index
- Further details about the projects and institutions involved with be announced in the next few weeks

Components of the IWYP Research Portfolio

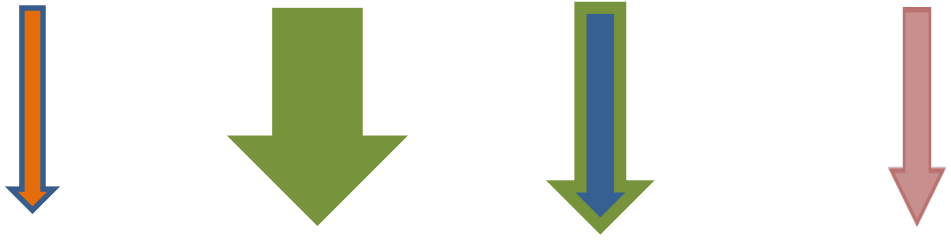
IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

Funded in companies

Funded via IWYP

IWYP Aligned Programs

Funded and published separately



IWYP Portfolio of Research and Future Options for Impact

Next Steps for IWYP

IWYP International Wheat Yield Partnership
Research to Deliver Wheat for the Future

- Coordinate and integrate research projects and discoveries
- Help drive discoveries toward delivery to breeding programs
- Conduct future Calls:
  - IWYP
  - Aligned
- Increase our science team with more Aligned Programs
- Increase number of funding partners
- Increase the amount of funding available, more research
- Continue to build and capitalize on public-private partnerships

Get Involved in IWYP

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

- Scientists:
  - ✓ Look out for future Calls
  - ✓ Consider your research programs and assess if suitable for being an IWYP Aligned Program
- Industry:
  - Collaborate in research projects
  - Become a private partner
- Funders: help bring more science, resources and people to generate breakthroughs in wheat yield potential
- All:
  - ❖ Take note of the IWYP Hub at CIMMYT and it's potential for moving discoveries downstream towards making impact
  - ❖ Help IWYP bring impact where it matters … in farmer's fields
  - ❖ iwypprogdirector@iwyp.org or www.iwyp.org

Thank You

IWYP International Wheat Yield Partnership

Research to Deliver Wheat for the Future

iwypprogdirector@iwyp.org