

NEW IWYP TRIAL NETWORK TO FIND WINNING TRAITS AND LINES

IWYP is a trait-based program. As such, accurate data and information on the performance of new lines as it relates to the contribution of specific traits to yield require designed experiments conducted in relevant field environments. Field trials across different growing conditions are typically used to supply these data. The IWYP Spring Wheat Hub at CIMMYT has utilized the existing International Wheat Improvement Network (IWIN) for field evaluations at ~100 sites in multiple countries each year. This extensive GxE data aid IWYP to develop new, higher yielding, climate resilient germplasm. IWIN is a voluntary system that relies on donation of advanced lines in exchange for return of trial data. In this system, trials in specified environments and collection of extensive phenotypic data are typically not possible. To address this, the IWYP Hub at CIMMYT has implemented a new dedicated international trialing system called the “IWYP Yield Potential Trait Experiment” (IYPTe) network. This enables the Hub to contract trials at specific locations, prescribe agronomic practices and collect specified phenotypic data on important yield potential traits.

The 1st IWYP IYPTe was distributed to 15 selected locations worldwide representing a wide range of irrigated spring wheat environments for the 2020/21 season. This first IYPTe served as a pilot to evaluate how well the trials could be managed by our partners and to assess the quality of data collected. Data collected on 16 agronomic and physiological traits were analyzed to confirm the relationships between yield and other traits established previously in experiments at the IWYP Hub at CIMMYT in Mexico. The results from the 1st IWYP IYPTe confirmed the association of grain yield with various traits including final biomass, harvest index, grain number, spikes per square meter, internode 3 length, canopy temperature and chlorophyll content difference between the flag leaf and the 3rd leaf. Specifically, the length of internode 3 was positively correlated with grains per square meter and, being easy to score, is a breeder friendly selectable phenotype. The data also validated the strategy that combining parents with complementary “source” and “sink” traits correlated with yield has the potential to achieve the level of genetic gains IWYP is seeking and will help inform future breeding strategies with respect to which traits need to be combined in target environments.

Data from the 2nd IWYP IYPTe trial is currently being collated. The objectives, experimental design, methodologies, crop management practices and data collection were adjusted as necessary relative to the learnings from the 1st IYPTe. The IYPTe network has the capacity to generate high quality data and so help find the best traits and spring wheat lines developed at the IWYP Hub at CIMMYT and will help further refine our breeding strategies to meet our goals.



Figure 1. Distribution of IYPTe testing locations