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Partnerships are Critical to Advance Agriculture for Food and Nutritional Security in a Changing Climate

The 2023 Report from FAO, IFAD, World Food Program, UNICEF and the WHO on the “State of Food Security and Nutrition in the World” has been published recently. It concludes that global hunger, as measured by the prevalence of undernourishment, remained relatively unchanged from 2021 to 2022, but far above pre-covid pandemic levels, affecting around 9.2% of the global population in 2022 compared with 7.9% in 2019. The Report estimates that ~120 million more people faced poverty in 2022 than in 2019. Further, ~2.4 billion people were moderately or severely food insecure in 2022, of which 900 million (11.3% of the world population) were severely food insecure. The Report also projects that ~600 million people will be chronically undernourished by 2030, an estimated 120 million more than if the pandemic and the war in Ukraine had not occurred. Such poverty and deficiencies in diets lead to other social, economic and political problems underscoring these issues are of crucial importance to us all.

While it is well-known that there are many causes of undernourishment and food insecurity, it is inescapable that 1) inadequate crop yields, 2) inadequate resilience of yields to biotic and abiotic stresses and 3) affordability are major contributors. Because wheat is the crop with the world’s largest acreage and a major source of carbohydrates and protein, these issues are extremely relevant to global wheat production and the rationale for IWYP’s existence.

New Science and Plant Breeding

Public and private wheat breeding companies continue to make year-on-year yield gains, but these gains are relatively small and each gain frequently costs more than previous gains. This creates obstacles for further investment, especially in less-developed countries. The forward projections based on current rates of yield gain fall well short of what will be required to sustain even current levels of nourishment in the world’s continuously expanding population (estimated by FAO to be ~10 billion by 2050). Further, these projections do not account for new emphases on reducing the amounts of land and fertilizers used for agriculture and the likely shortages of water emerging from changes in climates.

New scientific discoveries and enhanced understanding of the wheat genome and genetics are accumulating rapidly. However, such information is not readily translated into higher yields or greater climate resilience because the crucial traits to be improved are the outputs of thousands of genetic variants and their interactions which have been intensely co-selected to function together to make high yielding plants in specific environments. Thus, the new knowledge emerging from brilliant research, mostly in academia, needs to be analyzed, assessed and interpreted in the contexts of elite germplasm and in each of the environments where wheat is grown.

The Necessity for Partnerships

These facts create limitations on what academia and breeding programs can achieve on their own to increase annual rates of gain. Partnerships between those making the discoveries and those assessing the value of the discoveries and learning how to integrate them into elite germplasm are essential for increasing the probability that future crop yields can meet global needs. Effective partnerships for global grand challenges such as this must include scientists in academia, funding bodies and technology providers, all intimately linked with private and public sector breeders. IWYP was established to be one such partnership. Its associated scientists and Funders have achieved much in bringing new understanding to wheat breeding, new methods and gains in yield in both good and poorer environments, and have opened up conduits for bringing new options into breeding programs of the world. IWYP is built on an efficient and effective model, but continuously seeks to adapt and evolve to be ever more targeted on creating and driving the bold leaps that the world requires.

