Wheat Science into the 21st Century – Challenges and Opportunities

The 8th International Wheat Conference was the first such event held in Russia. Russian wheat research has had a long and vibrant history, with some of the most widely grown hallmark varieties developed by Russian scientists. Bezostaya bred by N.I. Lukyanenko in Krasnodar was possibly the variety with the greatest impact on winter wheat improvement globally. The varieties Aurora and Kavkaz made a major impact on global wheat production as donors of the 1B/1R translocation. St. Petersburg is also the home of the Vavilov institute, and Nickolai Vavilov is undoubtedly one of the greatest scientists of all time.

After decades of food stability, in 2008 we all experienced a food price crisis. In 2005, when the 7th International Wheat Conference was held in Argentina, the global wheat price was at a near historic low of USD140 per ton. Three years later, prices had exploded, reaching a peak of USD 600 per ton. National and international policy makers finally woke up to a world of volatile global food production followed by speculative food prices. Soon thereafter, restricted access to affordable food resulted in mass popular demonstrations.

These price rises should have benefited farmers, but the price spikes came at a time when wheat production faced some very serious challenges. Gains in wheat yields obtained by most farmers worldwide have stagnated during the past decade. Globally, nearly 75% of all water is used in agriculture, and suitable supplies of affordable water for irrigation are becoming scarcer. More nitrogen is applied to wheat globally than to any other crop, but in developing countries 60% of applied nitrogen never reaches the wheat plant. Aditionally, all too soon, we are projected to run out of minable phosphorus – well before we run out of oil. All of these barriers to wheat grain yield were discussed throughout this conference.

The climate is also changing! With each one degree increase in temperature, wheat yields decrease by ten percent. A hotter than "normal" spring or summer means less grain will be harvested. And, what is "normal" weather? – we now experience more extremes in temperature and rainfall? A special session of this conference was held to discuss the impact of climate change on wheat production worldwide.

What has also changed recently is the growing involvement of the private sector in wheat improvement. I feel this is a good trend, as there is an urgent need to attract more investments in wheat research, and public-private partnerships are one proven strategy to accomplish this.

Molecular tools are now used routinely in wheat improvement, but compared to other crops, wheat falls behind in the application of new technologies. Yes, the wheat genome is gigantic and difficult to deal with – every wheat chromosome has more DNA than the entire rice genome – but this is also a reflection of the much smaller investment in wheat than in some of the other crops, and there will be presentations on the progress made in molecular breeding, and on research that is moving forward on the sequencing of the entire wheat genome.

In September 2009, Norman Borlaug passed away. He has influenced so many of us, with his vision for very pragmatic and focused approaches to affect impacts in farmers' fields. On his last day, he spoke to a colleague about a sensor that allows farmers to apply nitrogen fertilizer much more accurately. "Take it to the farmers" were his last words. This admonition is a reminder to all of us here – whatever we do, and especially whatever is presented during this meeting, and at future International Wheat Conferences, our efforts must eventually make an impact in farmers' fields.

In order to meet the future demand for wheat, we need not only to improve wheat varieties with economic and sustainable agronomy practices, but we need the support of good policies, governance, and trained and inspired young scientists.

These proceedings represent the state of the art in wheat science, presented during the largest International Wheat Conference ever held, with 600 scientists representing 77 countries that together produce 99% of all wheat Worldwide. These proceeding will serve to positively affect wheat science and farmers throughout the world.

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