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LAUNCH

THE DURABLE RUST RESISTANCE IN WHEAT PROJECT

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Comments of Norman E. Borlaug

I want to begin my remarks by paying special tribute to Mexican wheat researchers and farmers of Sonora, who helped to develop the high-yielding wheat cultivars and crop management technologies that revolutionized wheat production in Mexico and later in many parts of the world. Sonoran farmers also produced and exported thousands of tons of improved wheat seed that initiated the Green Revolution in Asia and elsewhere. Later, the warmth of the Sonoran people welcomed several thousand wheat trainees from around the globe, who came to learn about modern research and development.

When I arrived in 1945, the original Yaqui valley experiment station was in shambles. There was no machinery left, no electricity, and the windows were broken. Nevertheless, that's where I stayed, sleeping on a cot and cooking over an outdoor stove. The station superintendent, Ing. Ricardo Leon Manso, had little or no budget but was still eager to support our work. Critical to our success, however, were several Yaqui farmers. I would like to acknowledge two in particular. One was the late Ing. Rafael Angel Fierros, a new farmer just getting started, who helped us with machinery. The other was Aureliano Campoy, who farmed the land next door to the experiment station. He, too, loaned us machinery and helped us in many ways.

In a very real way, then, the Yaqui valley is the birthplace of the Green Revolution. Some 63 years ago, precisely in April, I was about to harvest my first wheat experiments, in search of developing improved stem rust resistance and yield potential in the wheat varieties being used by farmers in this valley. So it is fitting that the launch of this new wheat research project on developing durable rust resistance in wheat be held here.

The need to develop rust-resistant varieties as quickly as possible led to the genesis of "shuttle breeding." Initially, our objective was to speed up the breeding process. Since it was far too hot to grow wheat in the northwest during the summer, we searched for a site in the central highlands. We found ideal locations in the Toluca valley and at Chapingo in the valley of Mexico City. However, the summer and winter season locations were 10 degrees latitude apart, from 22° N

in the Yaqui valley to 12° N in the Toluca valley and Chapingo, and more than 2,000 meters different in elevation above sea level. The climates differed greatly between these growing environments, from relatively hot temperatures in the north, where virtually all moisture was supplied through irrigation, to cool mountain climates in central Mexico, where it rained heavily two to three times a week and where there was always dew in the morning, ideal conditions for the build up of disease inoculums. Through this system, not only were we able to advance two breeding generations per year, but we also were able to develop photoperiod insensitive wheat cultivars with resistance to a broad spectrum of rust races.

Shuttle breeding in Mexico was complemented by international multi-location testing, which ushered in a golden age in wheat improvement. Enormous quantities of new genetic diversity were introduced into wheat breeding programs worldwide, accelerating the development of a continuing stream of high-yielding, disease-resistant wheat varieties.

For more than 50 years, we had no major change in stem rust organism any place in the world. But in 1999, first reported in Uganda, then in Kenya and Ethiopia, and now in the Middle East, Yemen, Sudan and Iran, a new race of stem rust, called Ug99 (and several variant strains) has evolved that is capable of severely damaging perhaps virtually all of the world's commercial bread wheat.

Out of the stem rust pandemics of the Americas in the 1950s came new institutional mechanisms for cooperation, including international nurseries and training programs, which eventually led to the creation of CIMMYT and the other CGIAR centers, including ICARDA, headquartered in Syria. The global wheat fraternity developed during the past 50 years through these international networks for research and training is still alive, although not as vibrant as it once was.

I believe that the new wheat research project funded by the Bill and Melinda Gates Foundation can go a long way in helping to build the type of international research and development coalition needed to contain and defeat this new and extremely dangerous global disease threat. Such collaboration is central to sustaining progress in individual wheat improvement programs and also to ensure that international surveillance and control systems are in place to protect against pandemic disease attacks.

Most of those who are in attendance today will face the challenge of producing the science and technology to increase world cereal production by at least 50 percent over the next two decades, and to do so in environmentally more sustainable ways. The tasks are enormous but do-able. So let's get on with the job. There is no room for complacency. God bless you all and God speed you in this important work.