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WSU Organic and Perennial Wheat Breeding Program

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The winter wheat breeding program at Washington State University has been in existence since 1894, and today in Washington the most commonly grown winter wheats in all market classes were developed at WSU. For the first 50 years of the WSU winter wheat breeding program, varieties were developed and grown under low chemical input systems. By the mid 1950s, agriculture (and the breeding pro- gram along with it) had changed to systems that relied more and more on chemical inputs. important traits for organic farming conditions may be considered unimportant in high chemical input systems and therefore ignored and/or overlooked within conventional breeding programs. For example, if seeds of breeding lines are routinely treated with a fungicide before planting, useful traits such as resistance to the fungus Pythium, which causes damping off, or tolerance to stinking smut may go unnoticed. In addition, certain wheat varieties may be effective in reducing weed pressure (conventionally accomplished with herbicides) through increased nutrient use efficiency, allelopathy, horizontal canopy coverage and/or height development rates.

Three years ago we began to transition 11 acres of university farm ground to certified organic status and this year the certification has been completed. For the first time we have certified organic ground for use by researchers at WSU- Pullman. We also have established breeding nurseries directly in farmer's fields. We thank the Jorgenson brothers of St. Andrews and Sara and Joe Delong of St. John for donating their time, land and expertise to help us breed wheat varieties specifically for organic and low input systems in the Pacific Northwest.

Organic Winter Wheat Breeding Program
We are utilizing 162 winter wheat varieties that were grown in the PNW under very low input systems for over 100 years, from 1842 (the first year wheat was grown in WA) to 1955. Though none of the old varieties could compete today in terms of yield and quality, they potentially possess valuable traits that could significantly enhance the disease resistance, weed competitiveness and nutrient uptake of modem varieties. We have crossed all the old varieties to our most modem public varieties with the goal of combining important low input related traits with high-productivity traits, and developing varieties that will do very well in organic and low input systems. The winter wheat varieties that we breed for organic and low input systems will also be of interest to conventional farmers who are interested in more sustainable practices such as reducing herbicide, fungicide and fertilizer inputs.

Perennial Wheat Breeding Program Washington is one of the most productive wheat growing regions of the world and at the same time eastern Washington is one of the most highly erodible agricultural areas in the nation. Most of the year our Palouse hills make for postcard perfect days. But there are days when heavy rains fall on unprotected soil and we find ourselves looking away rather than watch as literally tons of soil wash from the hills into the Palouse River. To help reduce erosion in the wheat fields of the Palouse, we are developing perennial wheat that will live for many years and can be harvested each year. The idea of perennial wheat is not new. It was researched in Soviet Russia for many years and at the University of California, Davis from 1940 to around 1965. Both programs stopped work because the yields did not match those of annual or traditional wheats. But agricultural scientists today realize that the benefits of such a

crop extend far beyond yield.

In our perennial wheat breeding program we have selected plants that have now been alive in the field for 4 years, and some plants are much older in the greenhouse. The main source of the perennial growth habit is found in native wild wheat grasses. These wild wheat grasses will hybridize naturally with wheat, and after years of selection we have developed wheat varieties that continue to live in the fall. Our perennial wheat program is a long-term project that has been in place for 6 years now. Professor Tim Murray, the chair of Plant Pathology at WSU, is also involved in the program and together we see this work as the type that distinguishes university research from most private research programs. That is, our perennial wheat breeding program is far reaching and with an ultimate goal of public good and not of commercialization.

The WSU Mission

Modem varieties must enable fanners to reach their production goals and at the same time have positive impacts on non-farm community members and the environment. At WSU we are breeding organic and perennial wheat that we feel will help achieve these goals. Our program is not losing sight of its original mission of breeding in the public interest. We carry this mission with us everyday into the laboratory, greenhouse and field. Our research is designed to benefit the farmer and the public, and our varieties will be kept in the public domain. Through our research we are developing new organic and perennial wheat varieties that will better enable family farmers to survive in today's agricultural economy and will aid them on their path toward a more sustainable agriculture in the Pacific Northwest. WSU has a rich tradition of ser- vice in the public interest. To maintain this tradition, varieties developed in the WSU winter wheat breeding program must remain in the public domain.

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