Feed the Future Country Fact Sheet

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New Technologies Quicken Development of Climate-Resilient Wheat in South Asia

Daljit Singh

Jared Crain (left), Kansas State University graduate student, assists with phenotyping using a modified Phenocart in India.

Crippling climate changes, coupled with a growing population, threaten food security, economic welfare and social harmony in South Asia—a region heavily dependent on wheat for its nutrition and income. But in the race to fight hunger, the development of new wheat varieties that can withstand harsh growing conditions is severely hindered by traditionally laborious and time-consuming breeding processes. The **Feed the Future Innovation Lab for Applied Wheat Genomics**, led by Kansas State University, works with the International Maize and Wheat Improvement Center (CIMMYT) and the Borlaug Institute for South Asia to address this issue. It is creating new solutions and technologies to get high-yielding, climate-resilient wheat varieties into the hands of farmers in India and Pakistan years sooner.

In this effort, the Applied Wheat Genomics Innovation Lab has developed three new data collection technologies that are designed to speed up phenotyping, the process of gathering field data on plant characteristics, thereby enabling breeders to develop climate-resilient varieties at a much faster pace. These innovations, described below, are some of the first affordable technologies that could be developed on a large scale and implemented in states, countries and research locations throughout the world.

Phenocart: An inexpensive, locally adapted technology that collects and analyzes phenotypic data via computer instead of by hand. The Phenocart can be modified, using readily available items like bicycles, to fit the needs of Indian scientists where fields are inaccessible by tractors. “This technology will allow researchers to collect data to assist in crop breeding and identify lines that are best suited for target environments,” said Jared Crain, a Kansas State University graduate student working with the Innovation Lab.

Unmanned aerial vehicle (UAV): Another high-throughput and inexpensive phenotyping platform that greatly accelerates the breeding cycle. UAV can facilitate the development of climate-resilient and resource-efficient varieties, promoting environmentally friendly agriculture.

Field Book: A simple and free app for Android devices that will help the breeding community to significantly reduce time and mistakes, resulting in better selections. Trevor Rife, a Kansas State University graduate student and one of Field Book’s developers, estimates that the app can save researchers and breeders one-third the time of hand-written notes. “Researchers at CIMMYT, for example, may have 10,000 plots in a field trial, so a one percent error rate is pretty substantial,” said Rife. “Field Book can eliminate those human errors and speed up the turn-around time for analysis”.

As a whole, the Applied Wheat Genomics Innovation Lab is working to use affordable, consumer-grade equipment to tackle some of the world's largest problems, like feeding nine billion people by the year 2050.