

# Science IMPACTS



## The Challenge

Stripe (yellow) rust disease threatens wheat crops every growing season. In recent years, outbreaks have become more frequent and severe with climate change, decimating harvests and leaving smallholder farmers devastated.

**To combat Ethiopia's 2010 wheat stripe rust epidemic, a fast-track crop research and rust-resistant seed distribution program not only delivered future protection to the farmers, but also brought higher yields and incomes.**

When stripe rust swept across Ethiopia in 2010, prompted by that year's unusually cool temperatures and above average rainfall, it caused significant losses and economic hardship. Appearing unexpectedly, this destructive fungal disease severely stunted and weakened wheat crops, affecting an estimated 400,000 hectares (ha) nationwide. The country's farmers had few protections: the vast majority depended on highly susceptible varieties and had limited access to inputs that could resist the disease and sustain production.

Along with loss of income, food and nutritional security were seriously weakened as the price of wheat shot up and many families could manage only one meal a day.

## Tackling stripe rust disease

In an urgent bid to avert crop failures the following year, an initiative was implemented by the Ethiopian Institute of Agricultural Research (EIAR), backed by ICARDA, to rapidly strengthen the national wheat breeding program. The project, funded by USAID, worked quickly to develop, release and rapidly distribute rust-resistant, high-yielding wheat varieties to scores of farmers.

ICARDA's scientists screened more than 5000 cultivars and landraces for resistance to all forms of wheat rust and used their genetic materials to breed cultivars with all-round resistance to the disease – suitable for a variety of environmental and climatic conditions. Over 2,200 lines of seed varieties found their way to EIAR for further screening. The project involved private seed enterprises, seed companies and cooperatives to drive large-scale seed multiplication.

However, the initiative's unique success lay in the rapid distribution of improved seeds to the farmers. A novel participatory on-farm seed multiplication strategy significantly cut the time-lag between the development and distribution of quality seeds. Participating farmers were required to release the seed they had multiplied, making it quickly available to neighboring farmers – a critical factor for success in effectively combating a rapidly evolving disease like stripe rust.

## Changing mindsets: Farmer field days

Despite the proven benefits of using improved wheat varieties, many reluctant farmers continued to rely on the cultivation of traditional crops. Promotions by seed companies selling traditional seeds compounded the problem further as these varieties are high yielding, even though they were highly susceptible. While large farms can afford expensive fungicides for protection, they expose smallholder farms to diseases and uncertainty, risking their incomes.

Farmer field days helped promote the new varieties through demonstrations. Seeing firsthand the positive impacts of the new technology, field days became popular events where farmers and researchers could discuss and disseminate best practices.

## Succeeding beyond expectations

The project has delivered improved seeds to over 13,200 farmers across 45 districts, far exceeding its target of 4,000 farmers per year. Since its inception, the initiative has reached 45 districts throughout.

The project has directly distributed approximately 618 tons of seeds and a further 19,258 tons through informal exchange or formal sale. In total, the new rust-resistant wheat varieties reached an estimated 400,000 ha during the project's initial two years, **benefiting over 67,600 people.**



*Farmer field days allowed farmers to tell their stories and change the mindset of reluctant farmers.*

*Average yields of improved wheat reached 3.7 tons/ha in 2011-12 and 3.3 tons per ha in 2012-13 – much higher than the national annual average of 2 tons/ha.*

## Secure crops, renewed hope

Solid performance over the past couple of years has allowed many farmers to invest their hard-earned money in vital inputs like machinery and fertilizer for even higher productivity gains, or to pay for the education and healthcare of their families and children. Although several farmers are apprehensive of change, more and more are being convinced and adopting the improved varieties.

The initiative plans to continue the development of resistant varieties, improve seed distribution networks, and implement early warning systems to counter the evolving nature of rust disease and safeguard Ethiopia's wheat farmers so the devastation of 2010 is never repeated.

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