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FACT SHEET

ABIOTIC STRESS TOLERANT RICE & WHEAT: SOUTH ASIA

CEREAL CROP DEMANDS IN SOUTH ASIA

Improving the productivity of cereal crops in South Asia, specifically rice and wheat, has become a focal area for international agricultural research. Rapid population growth combined with an increasing demand for scarce water resources and the projected impacts of climate change on the region, which is already home to 30 percent of the world's malnourished people, requires the development of new crop varieties that are both higher yielding and tolerant of abiotic stresses including drought, heat, salinity and soil nutrient deficiency. The need to increase productivity is further underscored as the majority of arable land is already being cultivated and is increasingly lost to urbanization and degradation, meaning more grain will have to be produced on less land and in an environmentally sustainable manner.

Source: Saharah Moon Chapotin

Output of an Indian rice harvest

BIOTECHNOLOGY

Modern biotechnology, including transgenic approaches, is an important tool to address these challenges. Through public-private partnerships with biotechnology companies, USAID is supporting the development of genetically engineered (GE) rice and wheat varieties that require less water, have higher intrinsic yield, utilize soil nutrients more efficiently and can tolerate drought and saline conditions using a combination of genes conferring these traits. Additionally, these partners will also be engaging with public and private sector counterparts to distribute improved seeds to resource poor and smallholder farmers through novel business models and methods of market segmentation. This work improves the resilience of cropping systems and complements the development of stress tolerant varieties through traditional breeding and marker assisted selection by the USAID and Gates Foundation funded Cereal Systems Initiative for South Asia (CSISA). Seed based solutions, as described here, are attractive as they provide a significant boost to productivity without the need for additional equipment or major changes in farming practice, and are scale-neutral in their relevance for both large and small producers.

Source: Saharah Moon Chapotin

Indian women working in a rice paddy

REGIONAL IMPACT

In 2007, the International Food Policy Research Institute estimated a benefit of $2.5 billion USD if improved varieties with a locally optimized mixture of these abiotic (and biotic) stress tolerance traits were adopted on 30% of Indian rice and wheat acreage. Furthermore, the new varieties would increase the efficiency of production, reduce nitrogen runoff and greenhouse gas emissions, conserve scarce fresh water and help farmers adapt to climate change impacts. Although the technologies are initially being evaluated in India, they also have broad applicability across the rest of South Asia.

PROJECT STATUS

Improved rice and wheat varieties are currently being evaluated in laboratories, greenhouses and confined field trials. Confined field trials in India are planned to begin in 2011-2012 and project partners are evaluating additional partnership opportunities across South Asia.

USAID Partner Organizations: Arcadia Biosciences (US), Maharashtra Hybrid Seeds Company (India), Ceres, Inc (US)

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