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Drought-tolerant crop varieties developed through breeding

Success stories

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Drought is a pressing challenge for global agriculture

Innovative breeding techniques are revolutionising how we approach this issue, empowering farmers to cultivate resilient crops that can thrive even in water scarcity.

Drought-tolerant crops not only help ensure reliable harvests for farmers, but also reduce the amount of water required for agriculture.

Plant breeders have made significant progress in developing drought-resistant varieties of important staple crops

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Drought-tolerant maize in Africa

Maize is vulnerable to drought and poor soils, which can severely reduce productivity. Scientists have developed new maize varieties that can survive and produce good yields even with scarce rainfall or depleted soils.

Through conventional breeding techniques, they have identified and selected maize plants with the ability to survive and produce decent yields even when rainfall is scarce or the soil is depleted of nutrients.

These improved drought-tolerant maize varieties have been widely tested in Africa, producing 83-137% more than traditional maize under controlled drought and 26-47% more under random drought. Adopting these resilient maize types can help protect farmers' harvests and incomes in dry conditions or poor soils.

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The development and distribution of drought-tolerant maize has been a collaborative effort involving organizations like the International Maize and Wheat Improvement Center (CIMMYT), national agricultural research systems, seed companies, and NGOs.

By the early 2010s, over 2 million farmers in 13 sub-Saharan African countries were already growing these drought-tolerant maize varieties from the early research. The Drought Tolerant Maize for Africa (DTMA) project led by CIMMYT has been a major driver, releasing over 160 drought-tolerant maize varieties that have boosted productivity in dry conditions.

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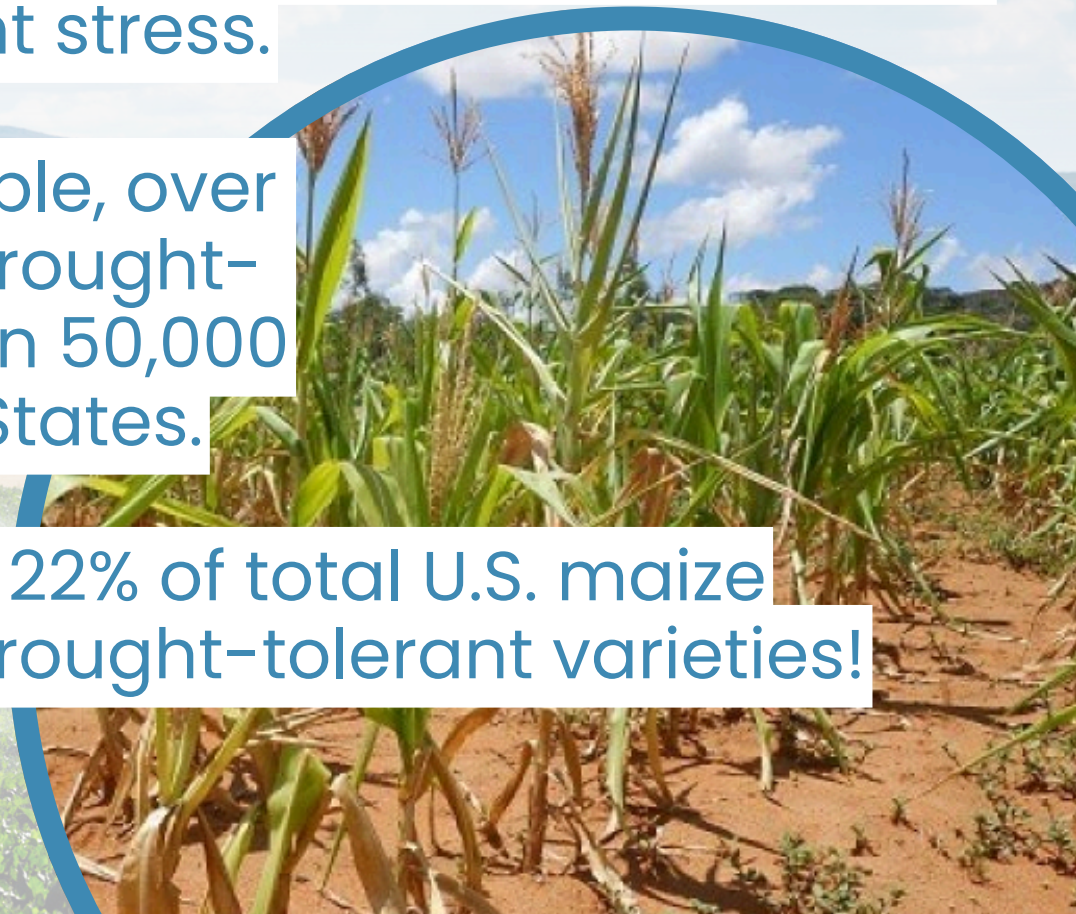
Drought-tolerant maize in the US

In the United States, the first commercially available drought-tolerant maize was introduced to farmers between 2011 and 2013.

These drought-resistant varieties were both the results of conventional breeding and genetic engineering.

In some cases, plant breeders took genes from two bacteria - Bacillus subtilis and E. coli - and inserted them into the maize. These bacterial genes help the maize plants maintain their cellular functions and stability even when they are under drought stress.

In the first year it was available, over 2,000 farmers planted this drought-tolerant variety on more than 50,000 hectares across the United States.



Five years later, in 2016, over 22% of total U.S. maize acreage was planted with drought-tolerant varieties!

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Drought-tolerant wheat: HB4 wheat

The wheat variety HB4 was created by taking a drought tolerance gene from sunflowers and inserting it into wheat using genetic engineering, with the goal of improving wheat yields in drought-prone regions.

60,000 hectares of HB4 wheat have been grown in Argentina since 2020 after it became the first country to approve the wheat for commercial production.

Field trials have demonstrated that this variety can significantly outperform regular wheat especially in drought-affected areas.

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The HB4 wheat variety has been approved for commercial production and cultivation in several countries, including Argentina, Brazil, Colombia, Australia, New Zealand, Nigeria, and the United States.

Safety assessments have shown that HB4 wheat is compositionally equivalent to conventional wheat and does not raise any food safety concerns, and studies have confirmed that HB4 wheat is nutritionally equivalent to non-genetically modified wheat varieties.

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Drought-tolerant rice

Drought is one of the most widespread and damaging environmental stresses affecting rice production, especially in rainfed areas of South and Southeast Asia.

The International Rice Research Insistute (IRRI) has been leading the development of drought-tolerant rice varieties for over a decade, with the goal of helping farmers in Asia adapt to the increasing threat of drought due to climate change. The adoption of these improved varieties has shown promising results in terms of improving yields and resilience in drought-prone rice-growing regions.

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They used a breeding method called **marker-assisted breeding**, which involves identifying DNA markers linked to desirable traits like tolerance to drought, and then using those markers to select and breed plants with the desired traits.

The adoption of these improved varieties has shown promising results in terms of improving production and resilience in drought-prone rice-growing regions.

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Climate-Smart Agriculture

The development of drought-tolerant crops improves productivity and food security, while also building a sustainable, climate-resilient agricultural system. These crops offer a solution to the increasing frequency and severity of droughts due to climate change.

By enabling farmers to grow crops that withstand water scarcity, we help them adapt to changing conditions and secure their livelihoods. This move towards climate-smart agriculture enhances food security and promotes environmental stewardship by reducing the need for water-intensive irrigation and minimising the impact on natural resources.

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