



# Biotechnology for Sustainability

## What is Drought Tolerance?

Drought tolerance refers to how well a plant can deal with dry or drought conditions. Many native plants are able to survive with very little water for long periods of time, but generally with slow growth and low productivity. In crop plants, yields can be reduced markedly in years when water supplies are inadequate, even if only for part of the growing period. The ability to survive water stress and to continue to produce high yields when re-watered would be valuable for stabilizing the yield of crop plants. Around the world, plant breeders have been working hard to produce varieties of drought-tolerant agricultural crops. By enhancing the tolerance of crops to drought stress, farmers will be more successful in years when moisture is low, particularly in areas which frequently have water shortages. This would result in more consistent food production, as yields would be improved even under water limiting conditions.

## Significance

For crops, climate-related natural disasters, including drought, are the leading source of risk and uncertainty in agriculture. Drought can significantly reduce the amount of food produced and can even kill the plants, which require an adequate amount of water to grow successfully. Today, scientists are targeting many food crops and utilizing new technologies, including genetic engineering, to produce crops that can maintain consistent yields in years when water is limiting. These plants have the potential to significantly enhance agricultural sustainability, particularly in regard to larger acreage field crops. While this biotechnology trait is not yet on the market, several varieties are currently undergoing field trials and these foods may begin appearing in stores as early as 2012.

## Crops to Watch

Many crops have been improved through traditional breeding to tolerate or adapt to the amount of water available in a given location. Below are three crops which have been improved through biotechnology that have the potential to significantly affect the lives of many.

**CORN** – Over 86 million acres of corn were grown in the U.S. in 2009; however, this crop is particularly sensitive to water limitations. Companies are in various stages of testing corn varieties that have been genetically modified to tolerate periodic drought and continue to provide high yields when water is scarce. Using this technology in corn has the potential to reduce the costs of production for farmers, decrease competition for water resources and improve overall yields.

**CANOLA** – Canola is one of the most important oil producing crops and is grown primarily in Europe, China, Canada, India and Australia. By enhancing the ability of canola to tolerate conditions of reduced water availability, this crop will likely be able to be productively grown in many additional regions of the world. Plant scientists are working to ensure that these drought-tolerant varieties continue to produce normal yields under normal conditions, while producing greater yields than conventional varieties when stressed.

**UCDAVIS**  
DEPARTMENT OF PLANT SCIENCES  
College of Agricultural and Environmental Sciences

**ASPB** education  
foundation

