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National Association for the Development of Biotechnology

non-food GM crops contribution to biofuels

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non-food crops

Cultivated plants not only provide food for humans and animals, but also clothes, paper, paints, oils, medicines, building materials, biodegradable plastics and fuels.

Plant breeding and farming can be substantially improved through technologies to generate better products.

crops for energy

Biomass is an attractive renewable energy source because it reduces the dependence on fossil fuels, lowering the emissions of greenhouse gases released into the atmosphere. The CO_2 produced is offset by the CO_2 absorbed by the plants that go into making it as they grow.

A viable biofuels sector would be enhanced through improvements in the crops themselves, either in the production efficiency, or in their suitability for conversion into biofuels.

economic gaps and primary task

The main obstacle to the development of biofuels is their cost. Even integrating some environmental and social positive effects of biofuels we should wait for oil prices per barrel to further increase to set up a substitution process.

Moreover biofuels should not hinder food-crop production. The intensification needed to increase yields of energy-producing present crops is not in conformity with this primary task of agriculture.

agricultural biotechnology

Can agricultural biotechnology be a major enabler of growth in the biofuel sector?

Present biofuels are not competitive price-wise with established fuels. However, the environmental benefits of biofuel and its contribution to other social priorities are such that its introduction into the market will become a reality in the near future.

Biotechnologies can contribute to bring this future closer.

GM crops for biofuels

Longer term, new plant breeding technologies offer the potential to bring additional gain in crop production efficiency, as well as improvements in processing quality and oil, sugar or starch content.

A possible development is based on enhancing crop ability to transform energy from the sun into chemical energy.

Even within the current generation of GM crops (sugarbeet and oilseed rape), significant cost savings can be made in the production of crops for biofuel, based on reduced production costs and higher yield potential of GM crops.

how can biotech be used more efficiently to produce biofuels?

Traditional crops can be used in the production of biofuels. But plant biotechnology can help produce these fuels more economically and in a more environmentaly friendly manner.

First yields of biotech crops are higher that that of conventional ones.

Second researchers are using biotechnology to develop tools to increase suitability for conversion into biofuels.

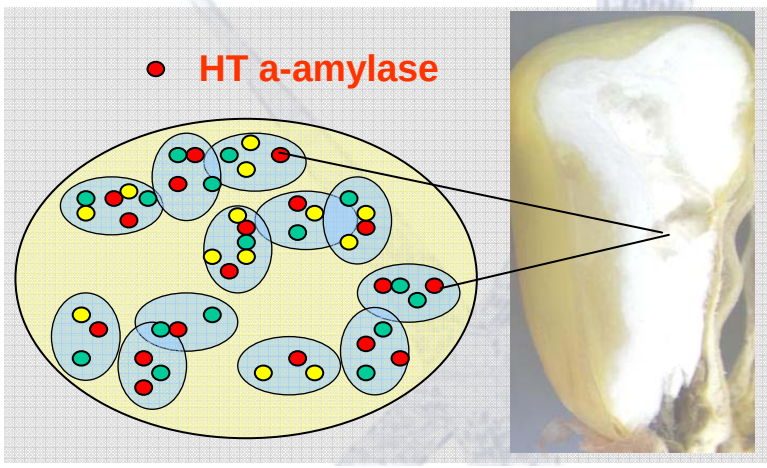
This is the case of corn hybrids with high level of amylase enzyme, for ethanol production.

corn amylase to improve ethanol production

Amylase is a digestive enzyme that breaks down long-chain carbohydrates. It is used as a critical ingredient for starch hydrolysis in the production of ethanol.

Developing corn hybrids that express high levels of a novel thermostable alpha amylase enzyme it is possible to

- substitute amylase additives,
- increase yield,
- obtain higher quality and more consistent distillers dry grain (DDG)



why ethanol?

Ethanol is the primary source of renewable fuel adapted to transportation.

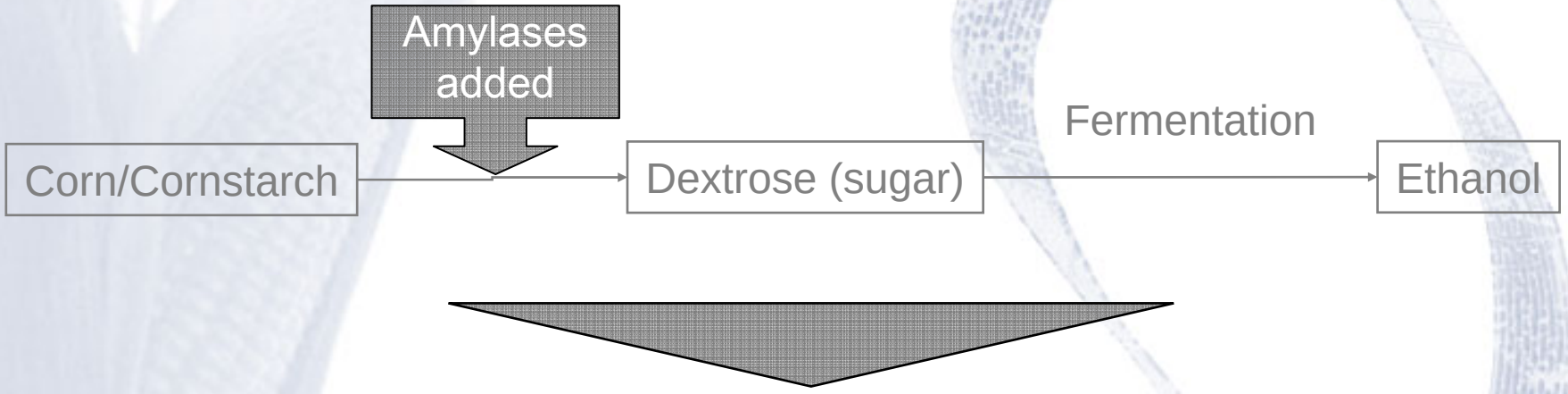
Ethanol growth has been driven by the elimination of methyl tertiary-butyl ether (MTBE) fuel additive in gasoline.

Renewable fuel standard would mandate 5 billion gallons of ethanol by 2012 and would consume about 18% of US corn.

The US department of energy set aggressive goals: 10% of the energy originating from renewable sources by 2020.

how corn amylase can improve ethanol production

The basic ethanol fermentation process goes back to antiquity

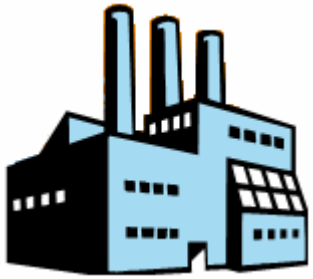


Developing a product pipeline aimed at the rapidly growing dry grind industry, relying on enzyme delivery in corn

how corn amylase will be used

Corn Amylase will be mixed with conventional corn prior to milling

Conventional corn



Blending before grinding

Distillers
Dry Grain

Corn Amylase

Ethanol

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