



The energy crisis has become a major concern to all governments today, due to the high petroleum cost and climate change resulting from non-renewable energy use.

Alternative bioenergy sources

In response to the petroleum crisis, the principles of environmentally friendly, and renewable bioenergy gained popularity. This has led to increasing interest in alternative power/fuel research such as biofuel (ethanol, methanol, and biodiesel), and plant breeding is a major venue in making many of the bioenergy alternatives a reality.



Plant Breeding solutions

Plant breeding is the art and science of genetically improving plants for the benefit of humankind. Plant breeders have been developing new varieties not only for food, feed and fiber, but also for fuel.

Plant Breeding: provides the best options and strategies to develop varieties for bioenergy production, like the ones developed in Brazil.

Plant Breeding contributions to bioenergy

Plant breeders are selecting the best crops and within these crops the best varieties for bioenergy production. For example, breeders are selecting the highest sucrose-content sugarcane varieties. The sugar production has been dramatically increased from 1900's sugarcane varieties of 4.2 ton/ha, to 1990s varieties of 13.8 ton/ha (Jackson, 2005).

Example in the market: Ethanol and methanol may replace fossil fuels as a means of energy storage, fuel and raw material for synthetic hydrocarbons and their products. Ethanol fuel, produced from sugar-cane, has been widely used as a biofuel alternative to gasoline in cars in Brazil.



Improved varieties



More ethanol production



Less expensive fuels



Underutilized crops

Plant breeding offers opportunities to make biodiesel become reality for a wide range of agro-ecological conditions. Many of the underutilized crops can be selected for biodiesel commercial production, such as jatropha and oil palm. These species are adapted to environments not suitable to grow food crops, making an economic alternative that helps reduce poverty and rural migration. However, as these species have undesirable traits such as excessive plant height and heterogeneous maturation, plant breeding is essential in making them agronomically more attractive.

Underutilized crops that can be exploited by plant breeding to develop varieties adapted for biodiesel production

Crop species	Oil production (kg/ha/year)
Oil palm (<i>Elaeis guineensis</i>)	7 061
Macahuba palm (<i>Acrocomia spp</i>)	3 775
Jatropha (<i>Jatropha curcas</i>)	1 588
Soybean (<i>Glycine max</i>)	374



Plant Breeding can develop jatropha varieties better fit for commercial production

Improved jatropha with high oil content and uniform maturity

Bioenergy will create crop and market alternatives for resource-poor farmers, improving the economy and contributing to environmental preservation.

Strategic Directions

- Policy-makers, governments, scientists, and the private sector must be highly coordinated, so varieties developed by plant breeding fulfill their objective in making bioenergy a reality worldwide.
- Public-private partnerships in bioenergy breeding activities will offer great benefit to all sectors, increasing gross domestic product, and making the world less dependent on just a few energy sources.