dti

PROJECT PROFILE NO PP213

BIOFUEL PRODUCTION FROM PLANT BIOMASS

OBJECTIVES

- To develop a stable thermophilic micro-organism able to produce high yields of ethanol from a variety of hydrolysed lignocellulosic feedstocks which are cheap and readily available.

SUMMARY

The cost of production of bioethanol for fuel is prohibitively high compared with gasoline, due to the expensive sugar or starch feedstock required, the low production rates and the inability of conventional yeast fermentation to utilise the pentose sugars found in plant biomass. Some yeasts have been engineered to utilise pentose sugars but these modified yeasts produce a significantly decreased, economically unviable, ethanol yield.

Other microorganisms that can utilise biomass-based feedstocks produce low yields of ethanol, even when genetically modified to alter their metabolism. Moreover there are pathogenic variants of these organisms and during fermentation the risk of infection by pathogenic bacteria is high. These problems mean that current non-yeast technology requires the use of labour intensive, expensive and aseptic batch operations.

A continuous bioethanol process based on the mixed sugar feedstocks derived from the hydrolysis of abundant and inexpensive plant biomass would have major economic advantages, could accelerate the uptake of ethanol as a transport fuel, reduce dependency on petroleum products, and lead to significant environmental advantages.

Many thermophilic bacilli are able to grow on hexose and pentose sugars, separately and in mixtures, and have been shown to produce ethanol as one of a number of other metabolites, mainly organic acids. Thermophilic bacteria

have tremendous potential in the production of ethanol. Their high temperature fermentations offer reduced cooling costs, direct recovery of ethanol from the hot culture and high productivities, because of high growth rates and yields. This project aims to manipulate such thermophilic organisms to eliminate the organic acid production and maximise ethanol formation.

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COST

The total cost of this project is £585200. The Department of Trade and Industry (DTI) is contributing £234080 and TMO Biotech Limited the balance.

DURATION

23 months – December 7th 2004 to October 31st 3006.

Further renewable energy information from the DTI Technology Programme: New and Renewable Energy, and copies of publications, can be obtained from:
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