

Novozymes is the biotech-based world leader in enzymes and microorganisms. Using nature's own technologies, we continuously expand the frontiers of biological solutions to improve industrial performance everywhere.

Hard evidence that HyaCare® makes skin moist and soft.....	3
Novozymes tailors textile enzyme portfolio to customer needs.....	4
Biowhitening - a new concept for steamed bread.....	6
New enzyme offers better wash performance at lower cost	8
Nestlé Chile aims to produce trans-free fats.....	10
New slimming diet boosts new type of beer	12



The second in a series of short articles about how biological solutions have driven the evolution of industry.

Global warming is a hot environmental issue. How do we reduce our use of fossil fuels, which add to the greenhouse effect? One alternative to the petrol used in motor vehicles is fuel ethanol. To produce ethanol from grains such as corn (maize), wheat, barley, rye or sorghum, an enzymatic treatment is required. Enzymes break down the starch into fermentable sugars. This is where Novozymes comes in. Novozymes has become a major supplier of enzymes to fuel ethanol manufacturers around the world and has developed special enzymes for this purpose.

The vast majority of ethanol is currently used as an oxygenate or octane booster in blends of around 10% with petrol. In the

JOIN THE INDUSTRIAL EVOLUTION

2

Biofuel - the fuel of the future

USA, where the production of fuel ethanol is booming, more than 1% of the total fuel used annually in vehicles consists of ethanol. There are reports of about eight to ten new fuel ethanol plants being opened every year, primarily in the Midwest.

When ethanol burns, it simply produces water and carbon dioxide. Supporters of ethanol point to the lower emissions of the greenhouse gas carbon dioxide compared to petrol. A blend of petrol and 10% ethanol emits 5% less carbon dioxide than ordinary petrol. Furthermore, the crops used to make ethanol absorb as much carbon dioxide from the atmosphere as is released when the ethanol is combusted. Ethanol also offers a chance to phase out the petrol additive methyl tert-butyl ether (MTBE), a harmful chemical.

In the USA, fuel ethanol is currently made from corn, and 7% of US corn production is used in its manufacture. For liquefaction, Novozymes' Liquozyme® SC is the market leader. The other main enzyme used in the

USA is the glucoamylase Spirizyme® Fuel. Wheat and barley are being converted into fuel with these and additional viscosity-reducing enzymes in Europe and Australia, while China is using mostly corn in brand new fuel ethanol plants.

Today, grains rich in starch are being converted into fuel ethanol, but in future cellulose will also be used. Cellulose is the most abundant organic material on Earth, and biomass such as agricultural residues could become an unlimited source of energy. One of the technical barriers is how to convert cellulose into glucose, but Novozymes has already come a long way in developing cellulases that can do this economically. If the technology becomes commercial, it could spawn a whole new industry for converting biomass into fuel ethanol and other valuable products. Local mills would need to be built near the sources of biomass. These are exciting possibilities in a world suffering from global warming and a dependence on finite supplies of oil for its fuel needs.

Published by Novozymes A/S

Customer Communications

BioTimes® is distributed four times annually (in March, June, September and December) in English, German, French, Spanish, Portuguese and Chinese.

Vol. XX, No. 1, 2005. Total circulation: 11,000

Address

Customer Communications, Novozymes A/S,
Krogshøjvej 36, 2880 Bagsvaerd, Denmark
Tel.: +45 8824 9999
Fax: +45 8824 9998
E-mail: biotimes@novozymes.com
Internet: www.novozymes.com/biotimes

Editor

Susanne Strand

Co-editors

Peter Goddard, Andrea Morgan and Brian Parsons

Copyright

Reproduction of articles from this magazine is permitted with acknowledgement of source. © Novozymes A/S. March 2005

Translation and proofreading

Borella projects

Design and graphic production

Datagraf Auning AS

Next issue

June 2005

Photos

Willi Hansen, Piotr & Co. and Novozymes

Paper

MultiArt Silk, a totally chlorine-free (TCF) paper that is made partly from hardwood pulp processed with Novozymes enzymes.

Novozymes A/S accepts no responsibility for any errors or omissions in *BioTimes* or any consequences of such. Opinions expressed in this magazine are not necessarily shared by the publishers.



Subscriptions: Free subscription is available for customers and business associates. Please register via Internet at www.biotimes.com or write to the address on the left, stating the language version you wish to receive.