CGPRT FLASH
Vol 1 No. 4 November 2003 ISSN 1693-4636

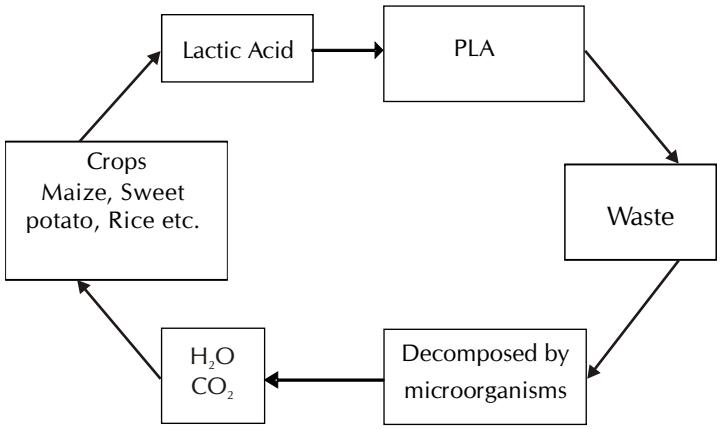
Short Article

Biodegradable Plastics from Crops: Implications from New Project in Japan

Biodegradable plastics can be used in the same way as the conventional plastics but are decomposable to water and carbon dioxide by the action of naturally occurring microorganisms such as bacteria and fungi (Figure 1). They are classified into biopolymers, natural polymers and synthetic polymers. Biopolymers are directly produced by fermentation using starch hydrolysis products (glucose etc.). Natural polymers are produced by the physical modification of natural products. Synthetic polymers are produced by the chemical modification of petroleum or natural materials. One of the major synthetic polymers is polylactic acid (PLA), which originates from crop starch. It contributes not only to decreasing oil consumption but also to the prevention of global warming because it originates from plants which absorb carbon dioxide in the atmosphere, therefore, the receipt and payment account of carbon dioxide breaks even. Meanwhile, conventional plastics, if incinerated, only increase carbon dioxide because they originate from fossil fuel.

One of the obstacles hampering the exploitation of biodegradable plastics is their high price. However, mass production plans have been started. Since 2002, Cargill-Dow in US has tried to improve price competitiveness and accelerate the diffusion of biodegradable plastics. Toyota, Japan's leading automobile producer and Sony, a well-known manufacturer of electric appliances in Japan have already incorporated biodegradable plastic into their products (Hanawa, 2002).

Figure 1. Lifecycle of biodegradable plastics, in case of PLA



Source: Hanawa, 2002.

The Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) will launch a project to support commercial production of biodegradable plastics from fiscal year 2004. A total budget of 6 billion yen during FY2004-2006, will subsidize 50-100 per cent of the technical development cost and 50 per cent of plant construction costs to a private company which will participate in the project. The planned production scale of biodegradable plastics in the project will reach 50 thousands ton per year.

The raw material to be used in the project is long-stored rice, whose stocks stored by the government climbed up to 1.55 million tons as of October 2002. The older the stored rice, the less popular it becomes for consumers. Though the total annual demand for plastics in Japan is 14 million tons, biodegradable plastics contribute only 0.02 million tons currently, because of the lack of cheap material supply (Asahi.com, 2003).

The target of the MAFF project is to address the long-stored rice problem, but the project may provide important implications to CGPRT crop demand expansion, as biodegradable plastics can be produced not only from rice but also from any other crops that are price competitive and have high starch concentration. For instance, Cargill-Dow produces PLA from maize. Cassava starch is the cheapest carbon source in Thailand and can be applied to the production of biodegradable plastics (Sriroth *et al*., 2000). Toyota is trying to use sweet potato for their PLA production in Indonesia■

Rewrite by Tomohide Sugino, Project Leader, AGRIDIV Project, CGPRT Centre.

References:

Asahi.com. Komai Kara Plastic Ryosan (Mass Production of Biodegradable Plastics from Long-Stored Rice), http://asahi.com (13 August , 2003).

Hanawa, K., 2002. Kakudai Ga Kitaisareru Seibunkaisei Plastic Sijo (Expectancy for Expansion of Biodegradable Plastics Markets), Economic notes, Development Bank of Japan.

Sriroth, K., Chollakup, R., Piyachomkwan, K., Oates, C.G., 2000. Biodegradable Plastics from Cassava Starch in Thailand, Cassava's Potential in Asia in the Twenty-first Century, Present Situation and Future Research and Development Needs. Proceeding of the sixth regional workshop held in Ho Chi Minh City, Viet Nam, February 21-25, 2000.

Flash BREAKING

New Image for Cassava in Viet Nam

The Vietnamese consider cassava as an important crop in rural and marginal areas. It has helped Viet Nam through at least two major famines since World War II and was the staple of the Vietnamese army during the wars with France and USA. Since the development of the use of starch both in rural households and modern factories, cassava is acquiring a new image as a raw material for industry. Most of the starch is used in domestic food processing, mainly for the production of monosodium glutamate, textile, paper, and other products.

CGIAR, 2003. Cassava Boom in Southeast Asia, CGIAR Newsletter.

Tapioca Major Importing Countries

The EU, the world's biggest tapioca importer, is a major buyer of Thai tapioca pellets, while Japan, Taiwan and South Korea principally import tapioca starch. Other important tapioca importers include China, Indonesia, South Korea, Malaysia, the Philippines, US, Hong Kong and Singapore.

Foodmarket Exchange.com, 2003. Tapioca, Thai Share in the World Market, September 2003.

Indonesia Pursuing Soybean Self-Sufficiency by 2006

With total imports of 1.14 million tons per annum, accounting for around 63 per cent of total consumption, Indonesia through The Minister of Industry and Trade, has targeted to achieve self- sufficiency in soybean by 2006. An import tariff increase, crop extensification, technological improvements, and partnership between growers and soybean industries, are the four expected keys to achieve the target.

Sinar Tani, 2003. Deptan Usul BM, Deperindag Canangkan Swasembada Kedelai, Sinar Tani Tabloid, 17-23 September 2003 edition, No. 3014.

Reducing Poverty in East Asia through Trade Liberalization

A key element of any poverty alleviation strategy is to improve market access for exports in which the poor have a comparative advantage. Since agriculture is the main livelihood for poor households in East Asia, reducing trade barriers for those commodities in industrialized countries will help to reduce poverty in the region. Moreover, a 50 per cent cut in tariffs is more effective than a 50 per cent cut in domestic support in industrialized countries.

Bora, B, 2002. Market Access Barriers and Poverty in Developing East Asia, World Trade Organization.

Inequality and Poverty

The persistence of high levels of inequality makes it much more difficult to reduce poverty. The higher the inequality, the less impact economic growth has on reducing poverty - for any rate of economic growth.

G. A. Cornia and J. Court, 2001. Inequality, Growth, and Poverty in the Era of Liberalization and Globalization, The United Nations University, WIDER.

More Soybean gets into China

China is predicted to increase its soybean imports following its accession to the World Trade Organization (WTO). The value of China's soybean imports reached US$ 2.8 billion in 2001, accounting for one-quarter of China's agricultural imports. Within the next decade, China will account for most of the growth in the world soybean market. Dozens of large and modern crushing plants have been constructed so that China's soybean crushing capacity far exceeds its domestic production. However, the government of China is predicted to launch various policy measures to curb import growth. China can make use of its vaguely worded regulations for genetically-modified (GMO) foods to slow imports by changing testing requirements or other aspects of the application process. China's value-added tax (VAT) policy is also an important means to control agricultural imports. While tariffs for agricultural imports are relatively low, most imported products are subject to a 13 per cent VAT for raw agricultural commodities such as soybean and 17 per cent for processed products such as vegetable oils. In addition, efforts are also ongoing to improve soybean yield and oil content ■

Based on USDA, 2003. China's Exports Outpaced Imports During WTO Year One, FAU-79-02, August 2003.

Miracle Cassava Comes True

New varieties of cassava developed by Centro Internacional de Agricultura Tropical (CIAT) have been perceived as a breakthrough for the development of cassava industries, especially in Southeast Asia. These new varieties developed from crosses between local and Latin American germplasm, increase farmers' crop yields by 20 to 40 per cent. Moreover, the roots of the new varieties have a much higher starch content. Higher productivity and starch content translate into higher income to farmers. According to CIAT's preliminary but conservative estimates, the new varieties have created benefits of nearly a half billion dollars over the last seven years.

The adoption of the new varieties in Southeast Asia has been promising. In Thailand, Indonesia, and Viet Nam, the new varieties have already spread to more than 500,000 hectares. In Viet Nam where cassava is considered as a last-resort crop, in just two years the new varieties have spread to nearly ten percent of the 283,000 hectares of Viet Nam's cassava area. Since 1996, the new varieties have spread to about 384,000 hectares or nearly a third of Thailand's cassava total area■

Based on CGIAR, 2003. Cassava Boom in Southeast Asia, CGIAR Newsletter.

High Agricultural Protection in Industrialized Countries

Under so-called trade liberalization, the agricultural sector in industrialized countries, such as OECD countries, is still highly distorted. OECD countries spend over US$ 1 billion a day to support agriculture. Across the OECD, support makes up 40 per cent of farm income, the same as in the mid-1980s. In Japan, support to rice producers amounts to 700 per cent of production costs while direct budget subsidies to producers in the European Union cost around US$ 100 billion annually. The US spends US$ 50 billion annually on direct support to its agricultural sector alone. Protection facing developing country exporters in agriculture is four to seven times higher than manufacturing in industrialized countries■

Based on World Bank, 2003. Cancun Trade Talks an Opportunity to Lift Millions out of Poverty, September 4, 2003. Priyadarshi, 2002, Reforming Global Trade I Agriculture: a Developing Country Perspective. Carnegie Endowment for International Peace, Washington, D.C .

Producer Subsidy Increasing

More than 70 per cent of subsidies in rich countries, such as Europe, Japan, and the US, are directed to large or corporate farmers. Subsidies in OECD countries amount to 330 billion of which some US$ 250 billion goes directly to the producers. This stimulates overproduction in high-cost rich countries and shuts out potentially more competitive producers from poor countries. The net effect of subsidizing the relatively rich in wealthy countries at the expense of adverse price penalties for the products of the relatively poor in developing countries aggravates global income inequality. In other words, subsidies in developed countries make the rich even richer and the poor in developing countries even poorer■

Based on World Bank, 2003. Global Economic Prospects: Overview, World Bank .

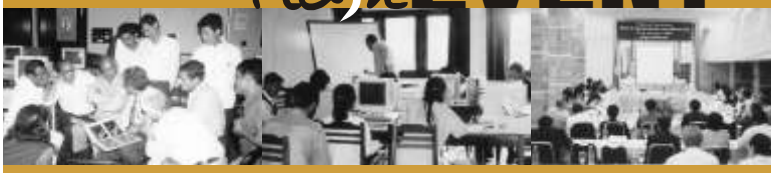
Erratum
CGPRT Flash
Vol. 1 No. 3, October 2003
Short Article: "2003/2004 Coarse Grains Booming Prospects"
Page 1, Paragraph 4, first two sentences:

World stock of coarse grains is predicted to slightly decrease in 2003/2004 to around 150 million MT, compared to 155 million MT in 2001/2002. This figure is far below the 185 million MT stocks in 2000/2001 and 2001/2002

Should be read as

World stock of coarse grains is predicted to slightly decrease in 2003/2004 to around 150 million MT, compared to 155 million MT in 2002/2003. This figure is far below the 195 million MT stocks in 2000/2001 and 185 million MT in 2001/2002.

FlashEVENT



First International Root and Tuber Symposium
9- 12 February, 2004
Palmerston North, New Zealand

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Sixth International Scientific Meeting of the Cassava Biotechnology Network (CBN) Adding Value to a Small-Farmer Crop
8 - 14 March, 2004
CIAT, Cali, Colombia

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Book Review

Strategic Environmental Assessment: An Assessment of the Impact of Cassava Production and Processing on the Environment and Biodiversity

Proceedings of the validation forum on the global cassava development strategy, Rome, 26-28 April 2000
Reinhardt H. Howeler, Christopher G. Oates and Antonio Coasta Allem
Edited by Clair Hershery
Printed by Food and Agriculture Organization of the United Nations, and International Fund for Agricultural Development, Rome, 2001

Due to its surprising adaptability to poor soil fertility and drought, one may have natural skepticism that cassava depletes soil productivity. One may also ask another question when visiting rural cassava processing industries, witnessing waste water directly pouring into public water, "Is the cassava processing industry polluting the environment?"

This book tries to answer these questions by analyzing more than 160 relevant references. It discusses the impact of cassava production and processing on the environment focusing on three items: the impact of cassava production on the environment, effects of cassava production on biodiversity, and impacts of cassava processing on the environment.

Although cassava is often perceived to be a nutrient-depleting crop, this is normally not the case. Unless yields are very high and/or plant tops are removed from the field, nutrient removal is considerably lower than that of most other crops, with the possible exception of K (potassium). Cassava also has a reputation to cause serious erosion when cultivated on slopes. This book concludes that the production of cassava on slopes generally causes more erosion on an annual basis than other crops grown under the same circumstances. This is mainly due to the fact that cassava needs to be planted at a relatively wide spacing, and that initial growth and canopy formation are slow, leaving soil exposed to the direct impact of rainfall during the first 3-4 months after planting. This book also evaluates various soil erosion control masures and concludes that erosion can be reduced by 50-90 per cent, if proper measures are implemented.

There is no clear evidence that cassava production has had a significant effect on the biodiversity of other species. However, it has sometimes led to serious deforestation which has probably contributed to less biodiversity. In northen Brazil, one of the centers of origin of *Manihot sp* (Cassava genus), the survival of wild Manihot is being threatened. This book recommends to conserve native wild Manihot, which may be used in the future for interspecific breeding.

Cassava processing can have negative effects on the environment by producing unpleasant odors and unsightly waste. Impacts on ground/surface water quality through its water use (21-76m^3 per ton of dry starch) and waste water containing organic materials (1,400-34,300 BOD mg/l) and cyanide (1.2-60 CN^-mg/l) are also discussed. This book concludes that most of the negative effects are site-specific and the long-term and broad-based impact on the environment is generally minimal and can be corrected by proper waste treatment, with technologies which are either presently available or under development.

This book summarizes these analyses as a form of recommendations for planners and policy makers. In general, this kind of recommendation tends to pursue technical efficiency and effectiveness and ignore the social or economical conditions and receptivity of farmers, who should be the major stakeholders in agro-environment issue of marginal areas. This book tries to avoid such failure by focusing not only on technologies themselves but also their economical feasibility. "In areas where chemical fertilizers are not available or are too costly, it is recommended to apply 7-10 t/ha of animal manure." "Mechanical terracing of land for cassava cultivation is seldom economically justified." "Cassava should normally not be planted on slopes of more than 15-20 per cent. (However, if cassava is the only profitable crop in the area,) contour land preparation by animal traction or hand preparation of individual planting holes is recommended." As a compliment of the recommendations, "Technical advisory notes" at the end of the book provide a technical package to increase the productivity and sustainability of cassava production and processing■

Reviewed by Tomohide Sugino, Project Leader, AGRIDIV Project, CGPRT Centre.