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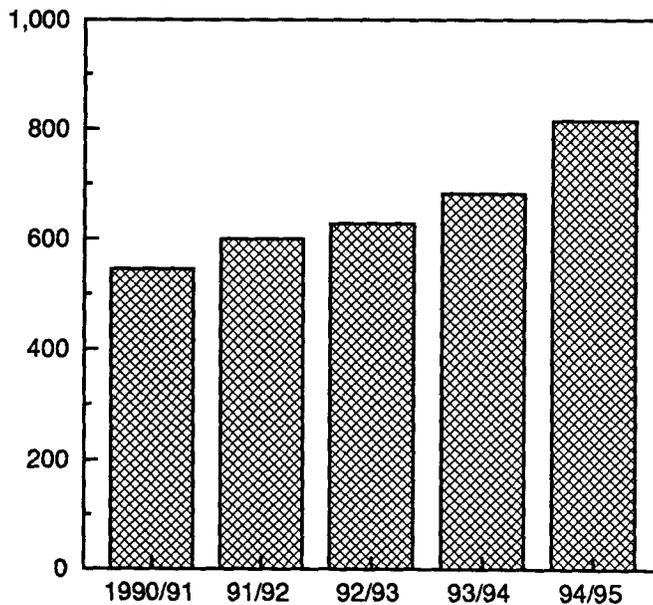
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Industrial Uses Of Agricultural Materials

Situation and Outlook Report

Industrial Use of Corn

Million bushels



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Summary

Strong Economic Growth and Environmental Regulation Boost Industrial Uses of Agricultural Materials

Projects funded by USDA's Cooperative State Research Service, Office of Agricultural Materials, are expanding markets for industrial oilseeds, such as crambe and lesquerella, and hypoallergenic latex and other products from guayule. USDA's Alternative Agricultural Research and Commercialization Center has selected 20 projects from the 160 proposals submitted for funding in fiscal year 1994. The projects funded in fiscal 1993 have begun to penetrate and expand targeted markets.

USDA's Agricultural Research Service (ARS) continues to expand its technology transfer activities. In fiscal 1993, ARS more than doubled the number of agreements signed with industry to develop ARS technology. Projects at the U.S. Department of Energy (DOE) are developing high-volume chemicals from biomass. DOE's Office of Industrial Technologies recently completed a technical and market analysis of the current top-50 commodity chemicals produced in the United States. The analysis is being used to evaluate research and development opportunities for using biomass feedstocks.

The consensus of private forecasters is that the U.S. Gross Domestic Product will grow 3.6 percent in 1994. Because of strong economic growth and continued implementation of the Clean Air Act Amendments of 1990 (CAAA), corn use to produce industrial starch and fuel alcohol is forecast at 683 million bushels in 1993/94, up almost 9 percent from 1992/93. In 1994/95, use is expected to reach 816 million bushels, up nearly 20 percent from the 1993/94 forecast.

In lieu of new "green" legislation, the demand for starch, primarily cornstarch, is expected to grow in tandem with the overall U.S. economy. One use of cornstarch is in the production of citric acid, the main acidifier (by volume) used by the food and pharmaceutical industries. Current domestic consumption of citric acid is estimated at 360 million pounds annually, which requires approximately 16 to 18 million bushels of corn.

About 15 percent of the plasticizers produced in the United States is derived from plant matter, mostly vegetable oils, and the market is growing 3 to 5 percent a year. The market for epoxidized soybean oil may expand tremendously if it can be incorporated into paints and coatings to replace volatile solvents. The CAAA requires paint manufacturers to reduce volatile organic compounds in their formulations.

New regulations issued by the U.S. Environmental Protection Agency in the last few years make diesel fuel subject

to sulfur standards and engine-emission requirements, which may open niche markets for biodiesel. Beginning October 1, 1993, diesel fuel for on-highway uses must be low in sulfur. High-sulfur diesel fuel may still be sold, but it must be dyed blue and can only be used in off-road applications. The recent change to low-sulfur diesel fuel for on-road vehicles has raised questions about the lubricating properties of the reformulated fuel. An upcoming field test will examine the lubricity of biodiesel/petroleum diesel blends.

Inflation-adjusted lumber prices are volatile but are trending upward over the long term, reflecting lower public timber harvests and other supply and demand factors. In response, engineered wood products and wood substitutes are becoming more attractive. The market for laminated wood I-joists and beams, laminated veneer lumber, and glue-laminated (glulam) materials is expected to double from 1992 to 1997. Steel framing is making some inroads into traditional lumber use, but wood remains the predominant building material for residential construction in the United States.

In mid-April 1994, Taxol, previously approved for the treatment of ovarian cancer, was also approved by the U.S. Food and Drug Administration (FDA) to treat breast cancer. The demand for Taxol is expected to increase. To date, deriving paclitaxel (the bulk drug containing Taxol) from the bark of the Pacific yew tree is the only FDA-approved process. However, recent advances in semi-synthetic production methods, particularly needle- and twig-derived paclitaxel, are expected to replace bark harvest. Such a process is pending FDA approval.

A study found that the energetic and economic feasibility of converting beef tallow to biodiesel was generally positive. The cost of producing tallow-based biodiesel ranged from 92 cents to \$1.67 per gallon, depending on the price of the tallow feedstock, the price received for the glycerine coproduct, and the type and size of the transesterification unit. With diesel prices averaging 71.2 cents during the last couple of years, biodiesel must find a market niche to compete, possibly as blends with petroleum-based diesel to meet Clean Air Act requirements.

New coproducts from ethanol production offer potential for improving its profitability. However, technical challenges must be overcome before this potential can be realized. Research is underway to find new specialty chemical or foodgrade products that can be economically produced. These products will probably serve high-value niche markets.