AAAS meeting examines fuels and chemicals from oilseeds

Traditional industrial uses of oilseeds and new fuel and chemical applications will accelerate in coming years if petrochemical prices rise higher than vegetable oil prices, predicts Everett H. Pryde, research leader of the Oilseed Crops Lab at the USDA Northern Regional Research Center in Peoria, Illinois. Pryde was one of six speakers to address the topic "Fuels and Chemicals from Oilseeds: Technology and Policy Options" at the 148th National Meeting of the American Association for the Advancement of Science in Washington, DC, on Jan. 5, 1982.

Arranged by Robert P. Morgan and Eugene B. Schultz, Jr. (Dept. of Technology and Human Affairs, and Center for Development Technology, Washington University, St. Louis), the session examined the potential for deriving fuels and chemicals from oilseeds and the economic and environmental feasibility of cultivating oilseed crops on marginal lands.

Commercial seed oils already contribute more than 1 billion pounds annually to the industrial materials economy in the United States, with edible oils contributing almost twice as much as inedible oils, according to Dr. Pryde. Researchers reported on studies of new fuel and chemical applications that will increase the demand for seed oils.

Kenton R. Kaufman, professor at North Dakota State University in Fargo, feels that vegetable oils show promise as replacements for and as extenders for diesel fuels. He reports that short-term results have been excellent when using sunflower oil as a fuel in unmodified diesel engines, noting that power levels of diesel engines have been maintained when using pure sunflower oil, though fuel consumption has increased to compensate for differences in the heat content of the two fuels.

But long-term results are variable, says Kaufman. The most promising application is the use of sunflower oil in indirect-injection diesel engines. This type of engine, run by South African researchers on pure sunflower oil for 2,300 hours, showed no abnormal wear or coking of injectors. Direct-injection prospects are less promising. A major problem is injector coking, which leads to piston deposits, cylinder scoring, and lubricating oil contamination. However, there's some positive news from South Africa, where researchers carried out a field test using a direct-injection diesel engine operating on a blend of 20% sunflower oil and 80% diesel fuel. Kaufman called for additional research into direct-injection applications of seed oils, since most agricultural diesel engines use this type of engine.

As new uses for seed oils develop, so will demand. Several speakers addressed the question of how to increase oilseed supplies to meet this future need.

In order to meet future demands for seed-oil-based chemicals and fuels, more acreage must be devoted to oilseed crops. Dr. Shultz warns of the conflict that may arise should oilseed crops for fuels and chemicals compete with food crops for prime farmland. Dr. Shultz suggests that novel oilseed plants and trees could be cultivated on marginal lands in order to ease pressure on good land needed for food. Wet, dry, hilly, and saline soils in East Africa, India, and in the southwest and southeast United States are areas he identified as potential sites for cultivating novel oilseed crops.

One of these crops is the Chinese tallow tree, described by Herbert W. Scheld, senior scientist at the University of Houston and director of research for SIMCO, Inc. in Houston. The tree, according to Scheld, is capable of yielding seeds in excess of 10,000 pounds per acre which are composed of an edible tallow and a liquid, drying oil. Seeds contain up to 50% total fat and a meal that is about 10% protein. Scheld described the oil as being mostly triglycerides of linolenate, linoleate, and oleate, with a significant fraction of an "estolide" containing two rare unsaturated fatty acids, 8-hydroxy-5,6-octadienoic acid and *trans*-2,*cis*-4-decadienoic acid, which may be valuable as intermediates for chemical syntheses.

Besides the Chinese tallow tree, there are many other diverse sources of seed oil for fuel and chemical uses. Robert Kleiman, a research leader of the Horticultural and Special Crops Lab at the USDA Northern Regional Research Center, spoke about a survey undertaken at the Research Center, in which seeds from some 8,000 different plant species collected worldwide from the wild revealed a wealth of diverse lipid structures. Many of these lipids could have possible applications as industrial chemicals, says Kleiman. The fatty acids or the whole oil could be used in plastics, coatings, lubricants, surfactants, and adhesives. Other seed oil constituents, such as wax esters or terpenes, could also be valuable.

The survey, according to Kleiman, identified seeds with exceptionally high oil contents: 50 species contained between 60 and 70% oil, and another 88 species contained between 50 and 60% oil. Kleiman believes that these findings are especially significant for developing nations, where such seeds may be collected from the wild and either pressed to produce liquid fuel or burned directly as solid fuel.

While perennial oilseed farming creates little soil disturbance, enables return of vegetative residues to the soil, and may slow desertification and deforestation, it is not without its risks. On marginal lands, fragile ecosystems may not be able to support the crops, Schultz warned, pointing out that fertility of marginal lands often declines rapidly with use.

More research is needed to overcome such obstacles to widespread cultivation of oilseeds for fuel and chemical applications, but speakers agreed that the future looks promising. U.S. Rep. George E. Brown heightened expectations with reports of legislation introduced in the U.S. House and Senate that would create the Arid Lands Renewable Agricultural Resources Corporation. The proposed bills would provide for price guarantees, loan guarantees, loans, and joint ventures to secure strategic and industrial materials from such plants as jojoba, guayule, and buffalo gourd. These crops, all native to the American Southwest, are drought-resistant and more tolerant of salinity than commercial crops. Brown said that these crops, which produce products in demand by industry and the armed forces, "are at the threshold of commercial production,"

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and that private industry cannot be expected to make the necessary development investments on its own.

Brown admits that he is not very hopeful of getting the legislation signed by President Reagan. Perhaps we'll know more by the time the International Conference on Plant and Vegetable Oils as Fuels rolls around in August. □

IFT fats, oils summary published

"Fats in the Diet: Why and Where?" was released by the Institute of Food Technologists the week of the Conference on Dietary Fats and Health.

The report is the latest in a series of 18 "scientific status summaries" published by IFT since 1972. Basically the report explains what fats and oils are, some of the terminology involved, what foods contain fats and oils, why fats and oils are used as functional ingredients in some foods and briefly lists the various recommendations on fats in the diets that have been made in recent years.

The summary was published in the December 1981 issue of *Food Technology*. Single copies are available for $1 each from the Institute of Food Technologists, 221 N. LaSalle St., Chicago, IL 60601.

Aflatoxin, mycotoxin course

The Tropical Products Institute will hold its annual course in aflatoxin analysis from March 29 through June 11, 1982, for scientists from developing nations. The course includes lectures on analytical methods, bioassay, sampling, toxicology and other factors with a practical course and demonstrations on analysis with two weeks' specialization in a commodity of the participant's choice. Further information is available from the Training and Visitors Unit, Tropical Products Institute, 127 Clerkenwell Road, London EC1R 5DB England. □

Oilseeds symposium

The Society of Economic Botany plans to present a symposium of at least 12 papers on "U.S. Oilseeds Industry—Germplasm to Utilization" during its 23rd annual meeting to be held June 14-17, 1982, at the University of Alabama in University, Alabama. Information is available from C. Earle Smith, Jr., Anthropology, Box 6135, University of Alabama, University, AL 35486. □

International symposium slated

An international symposium on the Synthesis and Applications of Isotopically Labeled Compounds will take place June 6-11, 1982, in Kansas City, Missouri. Sponsored by the Midwest Research Institute, the symposium will provide a general overview of the most recent work in this field and its significance for the future.

The scientific program, which consists of two plenary lectures, 14 scientific sessions, and several poster sessions, will address areas such as HPLC, tritium NMR spectroscopy and applications, isotopes in organic and bioorganic chemistry, and radiochemical analysis, purification and storage.

Registration materials and additional information may be requested from the Midwest Research Institute, 425 Volker Blvd., Kansas City, MO 64110. □

St. Louis IFT meets April 12

The St. Louis section of the IFT will hold its annual Midwest Suppliers Night on Monday, April 12. There will be a table top display from 2:30 to 6 p.m., followed by a social hour and dinner. For more information, please contact Maxine Isert, American Soybean Association, PO Box 27300, St. Louis, MO 53141 (314 432-1600). □

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For producers looking for ways to hedge their crop returns, the Chicago Board of Trade's Larry Schmidt said sunflower seed futures trading will begin April 1, 1982, on the CBT. The Minneapolis exchange, which has offered sunflower seed contracts, hopes increased trading will result from the new contract in Chicago.

To help make U.S. sunflower more competitive, Cargill donated $12,000 to the sunflower group for seed research, particularly to improve plant resistance to pests and disease.

If U.S. producers are to be supplying 4.0+ million metric tons of sunflower seed by 1986, it will require increased acreage plus improved yields. The producers at the first NSA meeting were enthusiastic about the crop and said they were expanding acreage. But they were not a representative sample, being producers attending a commodity growers' meeting. Some said neighbors were increasing production; others said neighbors were decreasing production.

Larry Kleingartner, executive director for the sunflower group, said the organization had not, as of mid-January, done any surveys to try to determine farmers' intentions as to planting. Conversation with seed company representatives, however, indicated seed sales were about the same to slightly higher than the previous year. As sunflower is the last crop to be planted in that region, final acreage will depend not only on prices for competing crops at planting time, but also on weather conditions to a limited extent.

Without increased yields, the U.S. would need close to 7 million acres of sunflower seed to grow 2.0 million tons for export and 2.0 million tons for domestic use plus seed. The first USDA acreage estimate on 1982 sunflower plantings won't be available for a month or more. But obviously with tight supplies, U.S. domestic processors are going to have to compete with export markets for the 1982 crop. And, if they succeed, then the processors will need to find outlets for their oil and meal.

A good crop, with bumper yields, might provide sufficient supply and net return per acre to keep growers happy with net return per acre and processors happy with the per-hundredweight price they pay for seed. □

Viewpoint

Fats and oils outlook

New marketing aspects in U.S.S.R., Brazil

The following article was prepared during December by David Bartholomew, a frequent contributor to JAOCS News. He is manager of the oilseeds department for Merrill Lynch Pierce Fenner & Smith Inc. at the Chicago Board of Trade. In this article, Bartholomew notes that the Soviet Union is much more concerned with financial aspects of oilseed purchases than it was a year ago and that the government of Brazil has relaxed export regulations. Both developments could affect U.S. oilseeds markets.

The new year 1982 brings two important changes in the marketing of soybeans and their products, and other commodities as well. One of these changes relates to dealings with the Soviet Union. The other concerns export policy of Brazil. Both will affect marketing aspects of the United States and the rest of the world.

Soviet Union

Following the U.S. embargo in early January 1980, Russia became an aggressive buyer in other parts of the world, particularly Argentina. Naturally, cash basis premiums made a spectacular jump, but the Soviets paid the price anyway. This was mainly because of political pride. Price was of little concern if they could embarrass Washington by proving the the embargo was futile.

Moreover, Soviet leaders were anxious to diversify their purchases so as to be less susceptible to interruptions caused by politics, labor unions, weather, war etc. Ultimately, it would be to their economic advantage in the future if there were more competition among sellers. So it was considered a bit of clever strategy, both politically and economically, to dispense some largesse toward Argentina for short-term and long-term advantage.

Economic planners in Moscow felt comfortable with that policy because of two projections, both of which were later proven wrong. First, they expected their 1981 crops would be much better, but they were not. Second, they expected prices of gold and other precious metals and petroleum would continue to advance or at least not drop, but they did drop. These are the principal items sold to secure foreign exchange with which to buy food and feed imports.

Thus, it is now seen that there is a critical economic crunch in Russia. Import needs continue large, but resources to pay for them are diminished in value. Consequently, the word going around business circles in Argentina is "the honeymoon is over." Negotiations over commodity purchases are once again mostly related to price fluctuations of minute proportions. Political pride has taken a subordinated position. The country making the best deal in monetary terms will get the business.

There is nothing that suggests a reduction in total tonnage to be imported, despite the financial pinch. In fact, with the unrest in that part of the world it seems politically mandatory to import all that can be physically received.

Brazilian Export Policy

The government of Brazil has decided to allow more freedom in export marketing. The primary motive is to increase earnings from foreign trade. Next is to reduce expenditures of the government used to support internal industries. It has been recognized that too much government control can result in inefficiencies in marketing. Freedom to make sales at the most opportune time can result in greater profitability and therefore an improvement in foreign trade exchange earnings. Obviously, it would be better for the Brazilian economy if profits were made from the market rather than from government subsidy. This philosophy can be extended to all major commodities. Initially, it applies to soybeans and their products. It is easiest to begin there because it is a younger industry and there are less complications with other exporting countries.

The principal exchange that has been made is to eliminate the export quota system beginning March 1, 1982, with the new crop. Under the quota system, there were periodic allocations among members of the industry allowing them to make export sales. From time to time the government would review the status of shipments if the domestic markets for soybean oil and meal were being adequately supplied. There was always a fear that internal prices might be too high and thereby aggravate inflation if too much were exported.

The primary concern was for soybean oil rather than meal. There still is a concern to protect domestic supplies of soybean oil, and, of course, there could be a problem with no export quota. So this is addressed by a new program of establishing a national pool of 1.5 million MT of soybean oil.

Each crusher will be requested to declare a contribution to that pool. To induce participation in the pool, crushers will be granted a low cost operating loan. The loan will be for 80% of the export value of the quantity designated for