Industry News

America's native oilseed crop rediscovered

After decades of prominence as an oilseed crop overseas, America's native sunflower is becoming a major cash crop in the United States.

Sunflower oil, the No. 2 vegetable oil in the world market in volume, is gaining space on U.S. grocery shelves in highly advertised margarines and salad and cooking oils.

Domestic crushing capacity for sunflower will more than double during the next few years as five new processing plants are completed in North Dakota.

And the United States is now the world's most important exporter of sunflower oil, International Seed Crushers Association president J.E.M.Th. Randag told the group's meeting last year in Amsterdam.

A combination of factors has touched off a surge in U.S. production from 60,000 acres a decade ago to more than five million acres in 1979. To begin with, sunflower oil is a good quality edible oil. Sunflower oil contains only trace amounts of linolenic fatty acids, and thus is a fairly stable oil. It has value as a cooking oil, particularly for snack food frying, because of its high smoke point. Sunflower oil has a higher polyunsaturated fatty acid content than all major edible oils except safflower, a factor important to nutritionists and to advertising campaigns. Sunflower is generally more stable than safflower, however.

All these factors were true before the domestic production surge. So, what's new?

USDA agricultural economist Harry O. Doty told the World Soybean Research Conference II in 1979 that the major breakthroughs of the past two decades have been (1) Russian plant breeders developing sunflowerseed with 40%, rather than 20%, oil content and (2) American breeders successfully producing commercial hybrid varieties, increasing sunflower yields about 25%. These two developments have made sunflower competitive with small grain crops in the upper Midwest, particularly in the Red River Valley. One early sunflower grower was Marv Klevberg of Northwood, ND, who first began growing confectionary sunflower (birdseed and snack food) in the early 1950s in order to distribute his workload more evenly. The planting and harvesting of sunflower dovetailed neatly between his cereal grain and potato crops, even if the dollar return wasn't too good. When Russian sunflowerseed with improved oil content reached Canada in the 1960s, Klevberg and other growers began traveling to Canada each year to get some of this seed. At this point, some firms took notice also.

Cargill Inc. was to play a significant role in sunflower expansion. The firm acquired a small amount of the Canadian supply, and "we decided if there was this type seed that was good, there might be some that was better [in the Soviet Union]," recalls A.R. Baldwin, vice president for research at Cargill. "I talked to USDA about going to the Russian sunflower growing areas and ag experiment stations (including Krasnador) and was told no one from a private firm had gone there before. That's all I needed to know."

Baldwin received permission within a few weeks through the Soviet Embassy to visit the Soviet Union for a tour, but still had to get approval from the director at each agricultural experiment station he wanted to visit. About four or five directors approved, including the director at Krasnador. "We were the first Americans from the private sector to visit Krasnador," Baldwin said, "so we received a good reception, and some seed. Then, on a second visit, they agreed to provide what they called 'elite (high-oil) seed.'" Back in the United States, Cargill began propagating the high oil varieties and "with that, the cat was out of the bag and everybody was working on it."

Cargill's role in sunflower has been somewhat similar to that of A.E. Staley Co. with soybeans. The Minneapolis-based firm and others went out to farmers' meetings to try to convince farmers to grow the crop. At first, the acreage increases were slow. The development of hybrid varieties increased yields by 25%. Good Red River Valley farms now produce 1,300 and 1,500 pounds per acre routinely; up to 2,000 pounds per acre is a good yield. Plant breeders are working to produce commercial varieties that will yield 3,000 to 5,000 pounds per acre, one USDA official said at the 1979 oilseed outlook session.

Genetic improvements involved several factors in the 1960s and 70s. Gerhardt Fick at Sigco Sun Products, one of the leading sunflower plant breeder firms, identifies some of the factors as improved resistance to such sunflower diseases as rust, downy mildew and verticillium wilt to improve yield; more uniformity in flowering and

plant height; shorter varieties to make mechanical harvesting easier; and self-pollination characteristics to reduce dependence on bees. Breeders are now seeking ways to broaden maturity ranges and produce varieties adapted to irrigation and high fertility, Fick says.

Cargill and Honeymead Products began promoting sunflower in part because of declining production of and markets for flaxseed when latex paints replaced linseed-oil-based paints. The first sunflower processing plants in the United States originally processed flaxseed. Much of the land in the Dakotas and Minnesota once planted in flax is now in sunflower. Small grains, such as wheat and barley, also have lost acreage to sunflower in the northern states. In the South and Southeast, some former cotton land is now in sunflower. About two-thirds of the U.S. mills that can process sunflower also process cotton, a trend that has reached as far north as Missouri.

U.S. sunflower yield for 1979 dropped to 1,350 pounds per acre from 1,377 pounds the previous year. The sunflower Association's Don Lilleboe said the decline has been attributed primarily to some poor growing conditions at the start of the season and then an early winter storm at the end of October that caught growers with a lot of unharvested acreage. Total 1979 production was set by USDA at about 3.3 million metric tons (Table I).

Generally speaking, about two-thirds to three-fourths of the U.S. sunflowerseed crop each year has been exported, with about 1.3 million metric tons shipped during 1978 with the Common Market, Portugal and a few Eastern European nations as major buyers; Mexico became a large volume purchaser in 1978. U.S. sunflower exports were slowed in 1979 by a strike that stopped grain loading at northern ports, skewing the export patterns. Official USDA exports for 1977 and 1978 are shown in Table II; data for 1979 were not available at press time.

Siegfried Mielke, editor and founder of *Oil World Weekly*, told the American Soybean Association in 1979 that European crushers were about at their sunflowerseed crushing capacity. A new $11.1 million sunflower seed crushing plant in Amsterdam being built by Cargill is expected to be operational by October 1980; an edible oil refinery should be added within five years. Mielke estimated total world sunflowerseed production for 1978-79 at 12.8 million tons, with a total oil supply of 4.73 million tons. The growing U.S. exports led IASC president Randag to comment last year that the U.S. "has now surpassed the Russian/Eastern Europe regions as the most important exporter of sunflower oil—this is, if we combine seed and oils together in oil terms. The USA provided 85% of world sunflowerseed (exportable) supplies in 1977 and 74% in 1978. The reduced share in 1978 does not point to any halt to the U.S. expansion, indeed, U.S. seed exports in 1978 at 1.4 million metric tons were double those of 1977. It is instead a reflection of increased crops and exports from any other countries—the most significant being Argentina, which exported seed (during 1978) for the first time ever" (Table III).

Domestic use of sunflower oil is rising. In 1977/78, total domestic crush was 219,000 metric tons, with 54,000 metric tons being used domestically; in 1978/79, the domestic crush rose to about 385,000 tons with 115,000 tons of oil consumed domestically. The U.S. Department of Commerce, which collects data on oilseed production and crushings, hopes to provide data on sunflower specifically, rather than lumping it into an "others" category, where it has been for many years.

One early domestic sunflower oil processor was A.M. Wahlroos, president of Northern Sun Products, which has been crushing sunflower seed since 1974 at a plant in Gonvick, Minnesota. Whalroos says he first became interested in sunflower seed's potential around 1970 when he was working for a firm that used soybean oil as a plasticizer. He had investigated the idea of using sun oil in 1970, then later acquired the plant and established his own firm. Northern Sun initially exported all its sun oil, but in 1976 began marketing a cooking and salad oil,

Table I. U.S. Sunflower Acreage, Yield, Production

State	Area harvested (1,000 Acres)			Yield (Pounds per acre)			Production (1,000 Pounds)		
	1977	1978	1979	1977	1978	1979	1977	1978	1979
Oil varieties									
MN	449	640	1,290	1,590	1,540	1,390	713,910	985,600	1,793,100
ND	1,155	1,731	3,220	1,270	1,360	1,360	1,466,850	2,354,160	4,379,200
SD	131	159	612	960	1,120	1,230	125,760	178,080	752,760
TX	230	29	69	720	700	1,210	165,600	20,300	83,490
US	1,965	2,559	5,191	1,258	1,383	1,350	2,472,120	3,538,140	7,008,550
Nonoil varieties									
MN	69	58	57	1,350	1,490	1,360	93,150	86,420	77,520
ND	165	179	158	1,160	1,260	1,360	191,400	225,540	214,880
SD	1	1	3	800	940	1,180	800	940	3,540
TX	5	1	1	600	1,500	1,100	3,000	1,500	1,100
US	240	239	219	1,201	1,315	1,356	288,350	314,400	297,040
Total									
MN	518	698	1,347	1,559	1,536	1,389	807,060	1,072,020	1,870,620
ND	1,320	1,910	3,378	1,255	1,351	1,360	1,658,250	2,579,700	4,594,080
SD	132	160	615	959	1,119	1,230	126,560	179,020	756,300
TX	235	30	70	717	727	1,208	168,600	21,800	84,590
US	2,205	2,798	5,410	1,252	1,377	1,350	2,760,470	3,852,540	7,305,590

SOURCE: USDA ESCS Crop Production 1979 Annual Summary.

"Sunflo" across the northern United States, as far south as Illinois and Iowa. Wahlroos believes sun oil still has potential as an industrial oil, particularly as a vinyl plasticizer where he says it would be superior to ethyoxylated soybean oil.

Sunflower meal available commercially in the United States has about 28% protein and 28% fiber. Cargill estimates about 330,000 tons of low protein sun meal will be available commercially during 1979/80, rising to 439,000 tons by 1982/83. High protein sun meal, which contains about 38% protein and 18% fiber, will become commercially available during 1980/81, Cargill forecasts, with about 112,000 tons coming on the market. Supplies should rise to 413,000 tons in 1981/82 and 525,000 tons in 1982/83. Feeding tests have shown sun meal can be used for all types of livestock, but needs to be balanced with other nutrients. Sun meal is low in lysine and energy compared to other meals; but it is higher than soy meal in methionine. One Mississippi researchers has reported a 13.3% reduction in egg yolk cholesterol from hens whose ratios included 8.8% sunflower fiber.

The expansion in domestic sunflower processing capacity has begun. Archer Daniel Midland's (ADM) plant in Red Wing, Minnesota, recently was expanded from 675 tons a day to 1,000 tons a day, according to an ADM official. The crude sun oil is sold to food firms for processing into consumer products.

Cargill's former flax seed plant in Minneapolis was converted in 1967 to handle sunflower. The largest of the four existing Minnesota plants is Honeymead's Fridley plant, now capable of handling 1,200 tons per day. Honeymead's Ray Lindquist says although during the 1960s the initial production was all for export, sun oil produced now "is substantially for domestic use."

Two of the five new North Dakota plants will handle 1,500 tons per day; two will have a capacity of 1,000 tons a day and a fifth will handle 500 tons a day. Cargill is completing a 1,500-ton plant at Riverside in each central North Dakota. The $18 million plant has begun receiving seed; processing operations should begin in the fall of 1980. Cargill also is expanding sunflower storage capacity at Breckenridge, Minnesota, to 42,000 tons from 25,000 tons.

Table II. U.S. Sunflower Seed Exports

	Volume (1,000 Pounds)		Value ($1,000)	
	1977	1978	1977	1978
Total	1,371,209	2,982,542	152,540	343,641
Canada	10,979	84,874	1,571	10,882
Mexico	46,761	724,036	5,061	80,186
Nethlds	421,154	845,562	43,534	103,051
Belgium	5,512	6,614	498	889
France	99,258	104,737	9,655	12,421
Fr Germ	405,563	595,912	42,950	67,480
Germ DR	6,216	2,871	1,080	314
Czecho	61,482	37,499	8,116	4,252
Spain	27,961	133	3,025	34
Portugl	196,176	268,614	27,411	33,776
Italy	78,259	220,662	8,462	25,639
Yugoslv	11,624	0	1,107	0
Rep Saf	0	29,103	0	3,984
Others	264	1,925	70	733

Table III. Production (1,000 metric tons)

	1970/71	1975/76	1979/80 (forecast)
U.S.S.R.	6,144	4,990	5,300
Argentina	830	1,085	1,500
Rumania	770	728	820
Bulgaria	407	426	360
Hungary	192	154	280
U.S.	86	541	3,314

SOURCE: USDA Foreign Agricultural Service. Figures represent harvest in first of split years for nations in northern hemisphere, second of split years for nations in southern hemisphere.

Breckenridge is a holding station for seed before it is shipped to Minneapolis for crushing or to Duluth for export.

In Minot, ND, a group of private investors is planning a 1,500-tons-per day plant scheduled to be operational in the fall of 1981. Pillsbury has a minority interest in the plant and will provide management services.

A 1,000-ton-per-day plant is planned at Jamestown, ND, with the Sunflower Growers Co-op and PVO International Inc. in a 50-50 partnership to be known as Sunflower

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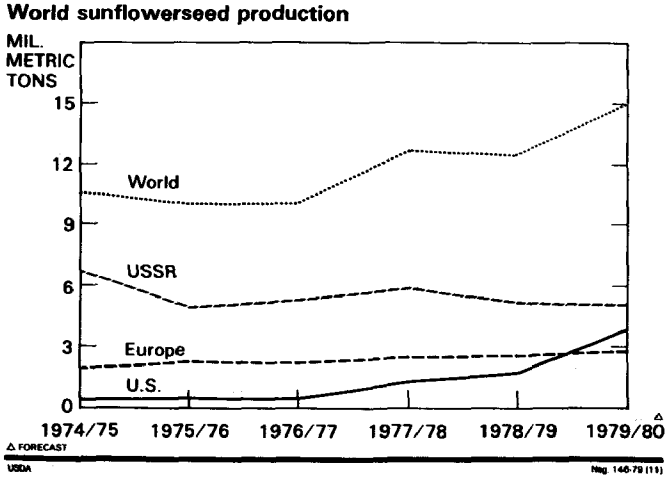
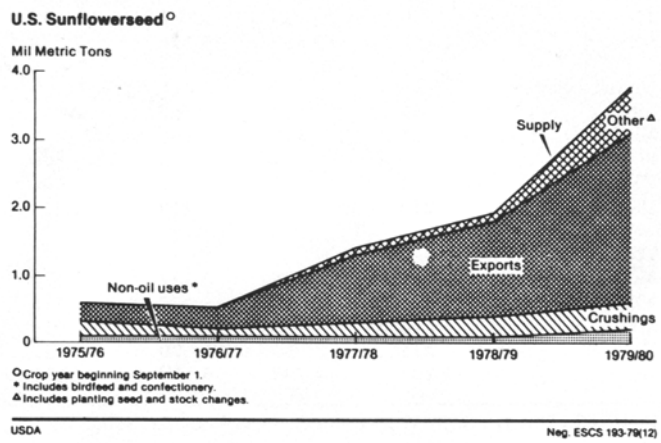
World sunflowerseed production





Products Co. of North Dakota. Completion is expected during the first quarter of 1981. Inquiries about the oil already have been received from Europe.

I.S. Joseph Company of Minneapolis and Sasetru of Argentina are nearing the point of letting contracts for construction of a 1,000-ton-per-day plant costing around $25 million. A specific site had not been selected at press time. Sasetru has two sunflower processing plants plus soybean processing units in Argentina, as well as a soybean processing plant in Belgium.

All Sun Inc. a new agribusiness firm in the Dakotas, says it plant to build a 500-ton-per-day plant at Hankinson, ND.

What's going to happen to all that product?

PVO, a partner in the new Jamestown, ND, plant, has had a sunflower oil margarine, "Sunflower Farmer," in test markets in the Midwest, but the firm declines to say anything further about the product. Lever Brothers brought the first sunflower oil margarine onto the consumer market in 1975 when it introduced "Promise." Procter & Gamble began nationwide distribution last year of "Puritan," a blend of sunflower oil with smaller amounts of soy oil. Hunt-Wesson is marketing "Sunlite," a 100% sunflower cooking oil. Other regionally distributed brands of sun oil are being marketed. As is traditional in the fats and oils business, firms are reluctant to talk about possible future products.

Sun oil researchers are still investigating ways to improve and to use the product. The higher oleic acid content of sunflower grown in the southern United States makes that oil more suitable as a frying oil for the snack food industry than is northern-grown sunflower, which has a higher linoleic content, USDA research Jim Robertson notes.

Sun oil does not require hydrogenation for use in liquid products, as does soy oil, which is an advantage when energy costs are escalating. But there is a waxlike substance on sunflowerseed hulls. Some of this substance gets into the oil and can cause clouding during storage. Removing the impurities requires special processing. USDA researcher Herb Morrison is investigating the origin and composition of the impurities, and factors affecting their elimination.

Sigco's Gary Fick notes that sunflower is a native American plant, which means some sunflower pests and diseases have had a chance to establish themselves. Soil fertility, disease and pests could become more important as plantings become more extensive and intensive.

USDA researcher D.E. Zimmer, speaking to an oilseed processing clinic last year, commented, "Sunflowers are not in any way a miracle crop. Like most crops, they are more highly adapted to some regions than to others and also respond to good management practices.

"Sunflowers, however, are the first crop since soybeans that has an opportunity to develop into a major U.S. crop." □

International sunflower conference in June

The IX International Sunflower Conference will be held June 8-13, 1980, in the Palace of Congresses and Exhibitions in Torremolinos, Malaga, Spain. Registration and program information are available from the conference secretariat, SIASA—Congresos, Manuel del Palacio s/n; Edif. Costabella, 3; Malaga, Spain.

There will be two plenary sessions during the Congress. Concurrent sessions will be held each day on plant breeding and protection, and on agronomy and processing. One morning will be reserved for meetings on special topics, discussions or other informal groups that registrants may wish to arrange.

Registration fee will be 10,000 Spanish pesatas; mid-January foreign exchange was about 66 pesatas to the U.S. dollar.

The Xth International Sunflower Conference will be held during March 1982 in Australia. Information on that conference will be available from the Secretary, Australian Sunflower Association; PO Box 360; Toowoomba; Queensland 4350, Australia.

The primary sponsor for the meetings is the International Sunflower Association, which seeks to promote sunflower research and development through international cooperation in the study of agronomy, technical problems and nutrition. Member nations each appoint one person, representing scientific and technical interests, who is engaged in the promotion of sunflowers. ISA publishes a quarterly newsletter and also sponsors the biennial international conference. Further information about ISA is available from the secretary-treasurer, Jaap J L van Waalwijk van Doom; PO Box 7; Zevenaar, The Netherlands.

In the United States, the Sunflower Association of America is the primary organization, composed of growers, elevator operators, processors and exporters. The group holds an annual meeting and publishes *Sunflower*, a magazine, nine times a year. Further information is available from the association's executive secretary, Don Lilleboe, Box 3002, 503 Broadway, Fargo, ND 58108 (701-293-7805). □

Soviet sunflowerseed processing

The following excerpt is from "Sunflower Seed in the USSR: Production, Processing and Trade" in the December 1979 issue of Sunflower *magazine. The author, Judith Goldich, is with the USDA Foreign Agricultural Service.*

"The seed is dehulled and crushed by means of either a prepress and extractor or a mechanical press system. Hulls are discarded as trash or used as fuel for the grain dryers. So-called cold press sunflowerseed oil generally is not processed further; it is delivered to bottlers and distributed as is. Hexane is used to extract additional oil from the sunflower cake after mechanical pressing; extracted oil is further processed for use in margarine or soap.

"Soviet oilseed crushing capacity was reported at eight to nine million metric tons, about 50 to 55% of which is for sunflower seed. Soybean crushing capacity, designed specifically for soybeans, was reported at 300,000 metric tons. However, most plants in the Soviet Union are combination expeller-extractor plants and are capable of handling soybeans.

"During the current five-year plan, oilseed crush capacity is planned to reach 10 million metric tons. Increased crushing capacity is planned for areas where raw material is available. New plants with a capacity of 1,500 ton per day are being planned and built now, although in the eleventh five-year plan period (1981-1985) the Soviets would like to increase optimal capacity to 2,000 tons per day.

"New plants being built for soybean and cottonseed processing will be of the direct extraction type, those that omit the mechanical pressing operation. The Soviets hope to build some direct extraction facilities for sunflower during the next five-year plan. In addition, they intend to build switch plants – in which the mechanical pressing operation can be used or skipped – in the European USSR and central Asia. The Ministry of the Food Industry hopes to build specialized soybean plants in 1980."

Sunflower oil, protein at World Congress

Sunflower Oil and Protein will be the topic for a Monday session during the ISF/AOCS World Congress to be held April 27-May 1, 1980, in New York.

Topics and speakers for the 2 p.m. session:

Factors Affecting Wax Determination and Removal from Sunflowerseed Oil, W.Y. Morris, J.A. Robertson, U.S. Department of Agriculture, USA.

Sunflower Seed Processing, Glen D. Brueske, Crown Iron Works, USA.

Sunflower Oil Processing from Crude to Salad Oil, Frank E. Sullivan, Sullivan Systems Inc., USA.

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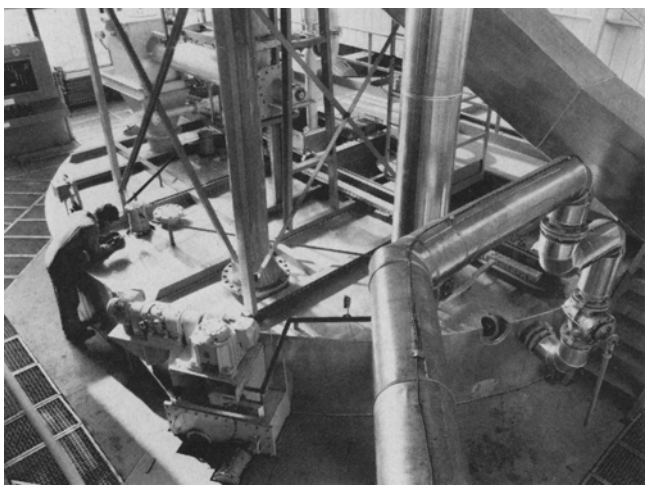
Modern processing of Sunflower Seed, H.L.S. staff, Israel.
Recent Developments in Sunflower Protein Technology, Frank Sosulski, University of Saskatchewan, Canada.
Sunflower Seed Dehulling Systems, George M. Neumunz, Neumunz Inc., USA.
Study of the Neutral Lipids of Sunflower Isolates, F. Millan, E. Vioque and M.P. Maza, Instituto de la Gase y sus Derivados, Spain.
Recent Development in the Production of Sunflower and Sunflower Oil in Hungary, J. Hollo, E. Kurucz and J. Peredi, University of Technical Sciences, Budapest, Hungary.

Other sunflower-related papers will be included in our portions of the program. A paper on sunflower lecithin, for example, will be included in the sessions on lecithin.

Full program information and registration materials are available from AOCS, 508 S. Sixth St., Champaign, IL 61820 USA. □



Simon-Rosedowns builds Yugoslavian extraction plant

Simon-Rosedowns has completed construction of a £1.5 million vegetable oil extraction plant for Industrija Ulja-Zrenjanin, Yugoslavia. The plant can process up to 600 tons of sunflowerseed a day, with the complex including equipment for seed preparation, prepressing, solvent oil extraction and filtration. Three prepresses produce a press-cake of approximately 18% oil which then is fed to a Rotocel continuous extractor to remove remaining oil.

Simon-Rosedowns reports first U.S. contract

Simon-Rosedowns Ltd. of Hull has received contracts to provide five "G"-type presses for pre-pressing of sunflowerseed to each of two new Cargill Inc. sunflowerseed processing plants: the new plant at Riverside, ND, and the new plant in Amsterdam.

The presses will handle up to 900 tons of seed per day. The sale for the North Dakota plant marks Simon-Rosedowns entry into the American market. The firm says it has sold 45 units of the "G"-type press since it was introduced five years ago; 31 are used for sunflower processing. □

Market Surfactants to rise 63% during 1978-87

Total volume of primary surfactants used in foods, drugs and cosmetics is projected to rise 63% between 1978 and 1987, increasing from 470 million pounds to 766 million pounds, with sales rising from $337.6 million to approximately $596.4 million, says a new study by Frost & Sullivan, Inc.

Demand will expand fastest in the cosmetics industry, with volume jumping from 158.8 million pounds to 306.8 million pounds. Dollar sales will rise from $152.2 million to $309.1 million, the market research firm estimates.

In the food sector, volume will rise from 284.4 million pounds to 417.5 million pounds, while sales climb from $161.2 million to $248.8 million. The food industry will remain the primary consumer of surfactants in terms of poundage; cosmetics will account for a larger share of dollar sales.

A 3-4% annual growth rate projected for such food surfactants as mono- and di-glycerides, PGME, stearoyl-2-lactylates, ethoxylated "mono- and di-," and sorbitan and POE sorbitan fatty esters.

PEG and POE fatty esters—whose cosmetics applications account for about 32% of total merchantable production—are targeted for 6% annual expansion, along with amine oxyides, alkanolamides, AOS, quaternary ammonium salts and sulfosuccinate-½-esters. This reflects the 8% annual growth forecast for the cosmetics industry.

Similarly, with shampoos rated for 9-15% annual gains into the 1980s, alkyl and alkyl ether sulfates are expected to achieve 10% yearly increases. Alkyl betains and substituted imidazoline derivatives are targeted for even higher increments, although coming off considerably smaller bases.

The functionality and digestibility of polyglycerol fatty esters, prompt an estimated annual growth of 25% through 1980 and 15% thereafter.

Finally, increases for surfactants used in drugs are expected to mirror the 8% annual gains anticipated for that market.

Sales of primary surfactants to FD&C markets are dominated by ICI Americas, which produces more "mono- and di," sorbitan and polyoxyethylene than any other domestic manufacturer. Procter & Gamble is the field's other top company, with a notable impact in alkyl sulfates among other things. Further down the scale are such broad-spectrum surfactants houses as Onyx Chemical and Glyco Chemical. On a more specialized basis, Central Soya is said to control 30 percent of Lecithin production—at 47 million pounds, the second leading primary FD&C surfactant. Additionally, Miranol Chemical, Lonza and Inolex have bolstered their positions substantially primarily through the production of surfactants used to promote mildness of shampoos.

For further information, contact Customer Service, Frost & Sullivan, Inc., 106 Fulton Street, New York, NY 10038. □

Albany Chemical plant begun

The Chemical Division of Albany International Corp. has begun construction of a new organic bulk chemicals plant in Columbus, Ohio, to provide custom synthesis of chemicals for the pharmaceutical, flavor/fragrance, and agricultural industries. Albany says the plant is the first part of a planned expansion for its chemical division, formerly known as Chemsampco Inc. □