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THE MARKETING - DEMAND SECTOR FOR SUNFLOWER

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Introduction

The dramatic increase in consumption of edible vegetable oils has been one of a small number of very important developments in world-wide food consumption in the past two decades. In the U.S., per capita consumption of all fats and oils increased from 45.3 pounds in 1960 to 55.5 in 1979 as the total domestic market grew by more than 20 percent (U.S. Department of Commerce, 1981). But, per capita consumption of vegetable oils increased 81 percent during this period, while fats and oils from animal sources were down by 42 percent (National Food Review, 1981).

At the world level, total utilization of edible vegetable oils has increased from about 26 million tons to 40 million tons over the past 10 years (Housh, 1982). And, although the rate of per capita increase in fat and oil consumption differs some by region, FAO data indicates that all major regions of the world have shown some increase over the past two decades.

As indicated above, part of the dramatic increase in vegetable oils consumption is the result of their substitution for animal fats and oils. Another part is attributable to rapid population growth around the world. Still a third major factor is the increased purchasing power of consumers due to higher per capita incomes. Higher per capita incomes on the world scene have also

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resulted in increased consumption of high protein animal products. This, in turn, has increased the derived demand for high protein oil seed meals, particularly for soybean meal but also for the lesser oilseed meals, including sunflower.

The dramatic growth in demand for oilseeds experienced over the past two decades has not, however, translated into easy market access for U.S. produced sunflower or sunflower products. In the sections which follow we trace the pattern of sales for U.S. produced sunflower, both in the U.S. and in export markets. Our purpose is to describe the several evolving components of the sunflower market and to suggest likely future requirements for market expansion.

Domestic Utilization of Sunflower

Domestic sunflower use can be classified in several ways. First, some sunflower seed is utilized without crushing. This includes mainly confectionary uses and birdfeed. These uses have grown over time to a volume exceeding 300 million pounds in recent years. A much larger, though more variable, volume of sunflower seed is crushed to extract the edible oil component and to produce a high protein meal. As a general rule, from three-fourths to four-fifths of the value of the crushed products is from the oil component and the balance from the high protein meal component. While virtually all of the meal product is used for animal feed, the high quality edible oil products find their way into a wide range of uses. More recently a good deal of interest has also developed in using sunflower oil as a diesel fuel substitute mainly in the operation of farm tractors.

Use of Non-Oil Sunflower Varieties

Recent year production of non-oil type sunflower (mainly in North Dakota and Minnesota) has been in the 220 to 315 thousand acre range with annual production of over 300 million pounds. About 40 percent of the non-oil seed goes for wild birdfeed use, another 40 percent enters hulled seed confectionary uses and the remaining 20 percent goes for in-shell confectionary uses (Taylor, 1981).

The demand for non-oil sunflower seed has been growing steadily in recent years, particularily in the component for confectionary use. Use of sunflower seed for wild birdfeed does not require that the seed be of a non-oil variety. There is, however, strong tradition in using the distinctively marked non-oil varieties for this purpose.

Clearly, the confectionary and birdfeed markets for sunflower seeds are premium-price domestic markets which should be developed and encouraged. But, even with modest growth, these markets will continue as only a minor demand sector (10 percent of the total quantity or less) compared to the utilization of sunflower seed for crushing. Thus, if the domestic market for sunflower is to be expanded significantly, most growth must come via the much more competitive markets for vegetable oils and high protein meal.

Use for Edible Oil

The total market for all edible vegetable oils in the U.S. from October 1979 to October 1980 was 10,673.2 million pounds. The market for edible oils excluding soybean oil was 2,180.1 million pounds. One measure of the maximum edible oil market potential for sunflower oil in the U.S. is the total amount of edible oil products consumed.

In 1979-1980 this was 11,828.3 million pounds, including animal and vegetable sources, of which sunflower oil was less than 0.5%, or 84.3 million pounds. Thus, sunflower oil currently holds only a very minor share of the total domestic edible oil market and a future market share goal of only a few percent would represent a major growth from current volume use.

The edible oils are broken down into categories of baking or frying fats, salad or cooking oils, margarine, and all other uses (Table 1), of these four categories, salad or cooking oil represents almost half of the total market for vegetable oils.

Table 1

Domestic Consumption of Selected Fats and Oils, 1979*

	Total**	All Vegetable Oils*** (million lbs.)	Vegetable Oils less Soybean Oil
Consumption in edible products	11,828.3	10,673.2	2,180.1
Baking or frying fats	4,200.8	3,149.9	491.7
Salad or cooking oil	5,271.0	5,271.0	1,118.3
Margarine	2,032.2	2,023.2	384.6
Other edible products	324.3	220.1	185.5

*Marketing year October 1, 1979 to September 30, 1980.

**Totals include animal and vegetable sources.

***All vegetable oils include cottonseed, soybean, corn, peanut, safflower, coconut, sunflower, palm, palm kernel, and the "other" fats and oils.

Source: U.S. Department of Commerce, Bureau of the Census (1981).

Table 2 shows a breakdown of utilization of selected fats and oils in major edible uses for 1979. From Table 2 it is apparent that the dominant market share in the market for all major edible oils is held by soybean oil.

Thus, for sunflower oil to increase its share in the market for fats and oils it must compete primarily with soybean oil on a price basis.

Table 2

Percent Market Share of Selected Fats and Oils Consumed in Selected Products, 1979*

	Cotton Seed	Soybean	Corn	Peanut	Lard	Edible Tallow
All edible fats and oils	5.73	71.80	4.88	1.39	4.01	5.75
Baking or frying	4.50	63.28	**	**	9.09	15.92
Salad or cooking	8.52	78.78	6.35	2.80	0	0
Margarine	1.20	81.07	10.91	0	***	***
Other products	4.74	10.67	**	**	**	**

	Safflower Seed	Sunflower Seed	Coconut	Palm	Palm Kernel	Other Fats and Oils
All edible fats and oils	0.22	0.71	2.15	2.16	0.91	0.28
Baking or frying	**	**	2.22	4.53	0	**
Salad or cooking	**	**	**	**	0	**
Margarine	**	**	**	0	0	**
Other products	0	0	40.58	7.55	33.24	**

*Marketing year October 1, 1979 to September 30, 1980.

**Withheld to avoid disclosing figures for individual companies

***5.06 lard and tallow combined.

Source: U.S. Department of Commerce, Bureau of the Census (1981).

Quality-Price Considerations for Sunflower Oil

Sunflower oil has the advantage of being the highest in polyunsaturated fats of the several major edible oils on the domestic market. It is also lighter in color than other oils, especially corn oil. However, sunflower oil is less stable than most other oils because of its' low unsaturated fatty acid content. But, sunflower oil stability can be increased by hydrogenation which will, in turn, decrease the unsaturated fat content. Among the edible oils, sunflower oil is considered a "premium" oil and used primarily as a salad or cooking oil and in margarine.[1/] Other "premium" oils that compete with sunflower oil for a similar market are: corn oil; peanut oil; and safflower oil. Within the category of "select premium" vegetable oils, the market share for sunflower oil is about 10 percent of the total (U.S. Department of Commerce, 1981). As mentioned earlier, however, price competition is keen in the domestic market for edible oils and any price premium for high quality products, such as sunflower oil, is virtually nonexistent.

Sunflower Meal

Hulls from sunflower seed are high in fiber content and, historically, this has limited the use of sunflower meal for some feeding uses. However, newer processing procedures which at least partially strip or dehull the seed produce a high quality protein meal of about 44 percent protein compared to a protein content of about 28 percent in meal containing the hulls. The higher protein-lower fiber content meal can be used effectively in the rations for poultry, swine and ruminants. Moreover, the hulls can be ultilized as a fuel

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1/ For more detailed discussion of the comparison of the quality of sunflower oil with other edible fats and oils in a variety of uses see Patterson (1982).

source in some of the newer sunflower processing plants thus giving them some economic value in their own right. Finding domestic markets for increased volumes of sunflower meal does not appear to be a problem provided they are priced competively with other oilseed meals, particularily soybean and cottonseed meals.

Sunflower Oil As A Fuel

Another component of the demand for sunflower is in the use of sunflower oil as a fuel. Since this use has not been established historically, the approach taken here is that of discussing it's prospective use.

The limited use of sunflower oil as a fuel to-date has been as a substitute for diesel fuel. Tests have been performed primarily on diesel tractor engines to examine the performance of the engines and unveil any problems associated with the use of sunflower oil as a fuel in these engines. In its utilization in diesel engines sunflower oil has been used in pure form and blended with diesel fuel in several different proportions.

The use of sunflower oil as a fuel on a regular basis can be examined in two ways, first from an economic standpoint and second from the technical feasibility side. The current economic outlook is not promising. This is due simply to the fact that sunflower oil is currently more expensive than diesel fuel. In a recent study by Bjornstad, Hillsman and Tepel (1982) an estimate was made of the diesel price increases that were necessary to bring about vegetable oil penetration into the fuel market in 1990.[2/] The study

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2/ The Bjornstad et al. study was concern with vegetable oils in general (other oils may also be used as fuels) and not specifically sunflower oil.

suggests that the real (deflated) price of diesel fuel must increase by 6 percent annually from 1980-1990 (for a compounded increase of 80 percent) to enable vegetable oils to replace approximately 25% of the diesel fuel use expected in 1990. Bjornstad et al. further suggested that lower priced soybean oil would be utilized as fuel before sunflower oil. Based on this study and the present relative prices of diesel fuel and sunflower oil one cannot make an optimistic statement on the penetration of sunflower oil into the diesel fuel market. However, Helgeson and Schaffner (1982) have suggested that the ratio of price per BTU of sunflower oil to #2 diesel fuel has declined from 4.0 for an eight month period in 1979 to 1.8 in 1981. These figures might lead one to believe that this price ratio is moving closer to one. But, barring any significant changes in U.S. oil imports it is unlikely sunflower oil would become price competitive with diesel fuel in the near future.

On the technical or engineering side, the use of sunflower oil as a fuel in diesel engines has shown some promise. There are several problems such as viscosity, filter clogging, cold weather starting, gumming and carbon buildup on engine parts that are associated with the use of sunflower oil as a fuel.[3/] But, the short term use (less than 200 hours) of sunflower oil blended with diesel fuel and proper engine maintenance appears to minimize these problems and has let engineers to approve of the short term use of sunflower oil as a diesel fuel alternative. The long term use of sunflower oil as a fuel, however, may adversely affect engine performance and durability thus long term use has not been approved overwhelmingly and is still under investigation.

3/ More detail can be found on long term and short term engine testing results in: Vegetable Oil Fuels, proceedings of the International Conference on Plant and Vegetable Oils as Fuels, published by the American Society of Agricultural Engineers, 2950 Niles Road, St.

In summary, although the short term use of sunflower oil as a fuel blended with diesel fuel is feasible from an engineering standpoint, the current economics of the matter suggest non-feasibility. The one instance that the use of sunflower oil (or other vegetable oils) may be warranted as fuel would be the case of an emergency situation. Two examples of an emergency situation would be an oil embargo or a war. In such cases, sunflower oil and other vegetable oils could be used as fuels in the production of important agricultural food products.

Processing Capacity for Sunflower

A past deterrent to expanding domestic markets for sunflower oil and meal products has been the shortage of processing capacity. Prior to 1979 there were no plants, of substantial size, designed specifically for sunflower processing. Processing of sunflower took place in plants designed for flaxseed, soybean or cottonseed oil extraction. Due to decreased demand for flaxseed oil, plants designed for flaxseed oil extraction have had excess capacities (Experience, Inc., 1979). Flaxseed extraction plants were able to utilize this excess capacity by processing sunflower seed.

New plant construction accounts for a substantial portion of the industry's currently much expanded sunflower processing capacity. Specifically, Cargill, Archer Daniels Midland and Honeymead now have crushing capacity for one million metric tons per year (Housh, 1982). Two new plant facilities in North Dakota (Midwest Processing at Velva and National Sun Industries at Enderlin) will soon add 50 percent more capacity to this total. Yet, in the 1981 marketing year only about 600 thousand metric tons of sunflower seed were available for processing. As a result, some crushing facilities were

necessarily idled because the active export market siphoned off available supplies for prices at which domestic crushers could not complete and maintain a positive crushing margin. We turn next to a brief look at this export market.

U.S. Participation In Export Markets

On the international scene sunflower seed, sunflower oil and sunflower meal are exchanged in world trade. However, the United States has only been involved in the trade of sunflower seed and oil. In Table 3 the major importers of U.S. sunflower seed from 1973-1981 are reported. A summary of the information provided in Table 3 is given in Table 4. Table 4 lists the top 5 importing countries for each year and also ranks the top importers in each year. From Tables 3 and 4 it is apparent that the Netherlands, Portugal and the Federal Republic of Germany have consistently imported relatively large quantities of U.S. sunflower seed. Since 1978, Mexico has also become an important importer.

Sunflower oil exports have recently become a significant portion of the U.S. sunflower export picture. The primary reason for sunflower oil exports being at low levels in previous years was the lack of sunflower processing facilities. As indicated earlier, processing capacity in the U.S. has since been increased. The increase in processing capacity has allowed the sunflower oil exports to increase from approximately 90,000 metric tons in 1979 to over 300,000 metric tons in 1980.[4/] Sunflower oil export data is given

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4/ These increases in seed processing capacity have allowed the U.S. to produce sunflower meal but this meal is used domestically.

Table 3

U S Sunflower Seed Exports by Destination[1/]

(metric tons)

	1973[4/]	1974	1975	1976	1977	1978	1979	1980[3/]	1981[2/]
Canada	22,361	9,695	4,705	48,862	4,980	6,969	48,454	23,836	15,033
Mexico	66	98	51	20	21,211	61,573	279,584	272,413	471,769
Finland					76			1,011	1,500
Netherlands	58,118	26,125	25,994	104,389	191,035	350,043	387,839	564,631	310,869
Belgium-Luxemborg	201	2,469	2,550	1,110	2,500	2,500	8,027	68,861	40,932
France	12,703	24,803	7,975	0.8	45,023	65,986	53,508	84,903	14,731
Germany (Fed)	48,831	80,300	112,594	183,136	183,962	231,061	291,999	119,120	75,403
Spain	220		1,408	316	12,683	12,742	1,516	850	144,321
Portugal	12,015	36,156	29,322	44,384	88,985	134,855	120,374	224,581	113,407
Italy					35,498	53,119	111,871		35,018
China (Taiwan)									1,947
Japan		151							7,496
Senegal								14,258	13,481
Rep of S Africa							13,201	13,401	13,980
Azores								1,000	
Israel								106,977	
Argentina							2,053		
Germany (Dem)							1,302		
Czechoslovakia			6,281	22,495	27,888	17,326	17,009		
Bulgaria							28,786		
Turkey			14,564	4,984					
WORLD TOTAL	175,043	184,860	201,291	398,833	621,980	941,928	1,366,281	1,505,407	1,261,206

1/ Includes only those countries whose imports are at a significant level

2/ Marketing year September 1981-May 1982.

3/ Marketing year September 1980-August 1981.

4/ Years 1973-1979 are on a calendar year basis

Sources: F.A S data for years 1978-1979 and 1981
For years 1973-1977, Francis G. Thomason, The U.S Sunflower Situation Fat and Oil Situation - 292, July, 1978

TABLE 4

Top 5 Importers of U.S. Sunflower Seed

	82	81	80	79	78	77	76	75	74	73
		Mexico Nether Spain Portugal	Nether Mexico Portugal Isreal	Nether Germany Mexico Italy	Nether Germany Portugal Mexico	Nether Germany Portugal Italy	Germany Nether Portugal Turkey	Germany Portugal Nether France	Germany Portugal Nether Canada	Nether Germany Canada Portugal
				RANK						
Country	82	81	80	79	78	77	76	75	74	73
Netherlands		2	1	1	1	1	2	3	3	1
Portugal		4	3	4	3	3	3	2	2	5
Germany (Fed.)		5	4	2	2	2	1	1	1	2
Mexico		1	2	3	5					
Isreal			5							
Italy				5		5				
France					4	4		5	4	4
Czechoslovakia							4			
Turkey							5	4		
Canada									5	3
Spain		3								

in Table 5. Prior to 1978 Germany, the Netherlands and Belguim consistently had high levels of U.S. imports but in recent years (1979-1980) Algeria, Venezuela and Egypt have become larger importers of U.S. sunflower oil.

The potential for U.S. growth in the international sunflower market depends on several factors which prevail in importing countries and in other exporting countries. In the market for sunflower seed U.S. exports compete primarily with exports from Canada and Bulgaria.[5/] If growing conditions in Canada and/or Bulgaria decline or if producers in these countries switch to other crops U.S. exports of seed could increase. Decreased output by other seed exporters would allow the U.S. to increase its market share and absolute level of exports (assuming the level of demand remains constant).

Seed importing countries where the U.S. market share might increase are Germany (over the past 4 years the U.S. market share in this major importing country has averaged only 26%), Italy and Czechoslovakia (while the latter 2 countries import less than Germany the U.S. market share of exports in these countries is quite low). Over the past three years Mexico has imported sunflower seed exclusively from the U.S. However, Smith[6/] and others have argued that these imports have been restricted by inadequate marketing facilities. If Mexican port and transport facilities are improved, Mexico can be expected to increase their imports of U.S. seed.

5/ The discussion in this and the following paragraphs is based on data contained in the following publication: Oilseeds and Products, USDA, F.A.S., Washington, D.C., May 1981.

6/ Smith, Joseph. Proceedings Sunflower Forum and Research Workshop, January 27-28, 1981, p. 3.

Table 5

U S Exports of Sunflower Seed Oil by Country of Destination[1/]
(metric tons)

	1969	1970	1971	1972	1973	1974	1975	1976	1977[5/]	1978[4/]	1979[3/]	1980[2/]
Mexico	5	42	9				17		15			6,026
Panama												1,059
Venezuela										11,202		89,139
Ecuador												0
Chile												699
Belgium	400	399	4,532	1,540	423	909	1,80.	3,989	2,059			
Germany (Fed)				352		2,130 5	1,989	4,797.5	2,399			8,596
Netherlands	1.4	1,111 5	875	6,967	12,064	4,514	4,365	8,238	584 5	1,424		53,398
United Kingdom				1,271	3,532	885		301				
Switzerland										6	806	0
Spain											9,494	4,424
Japan				570	4,683.5	235	149	305 5	171	46	4,377	10,312
Australia							14 5	567	4,548	19	2,071	6
New Zealand								247		1,381	3,637	3,600
Algeria								6,135	1,500	4,171	11,999	80,259
Egypt							520	10,679		25,251	9,675	43,437
Mauritius									139		0	219
Canada		1,760	3,352	993	120	115	300	196		34		
Germany (Dem)								6,663				
TOTAL WORLD	412	3,261	9,020	11,706	21,390	8,921	9,221	42,859	11,565	44,072	86,207	301,233

1/ Crude Oil, includes only the countries that have significant level of imports
2/ These figures represent exports from October 1980 through September 1981, presumably from the crop year of 1980
3/ These figures represent exports from October 1979 through September 1980, presumably from the crop year of 1979
4/ Data for 1978 has not been found for inclusion in this table
5/ Years 1969-1977 are on a calendar year basis

Sources 1979-1980 F.A.S data
1973-1977 Fat and Oil Situation - 292, July 1978
1969-1972 Fat and Oil Situation - 275, November 1974

Another problem that U.S. exporters face is that several of the western European countries importing U.S. seed view the U.S. as a residual supplier of seed. Many of these countries only purchase U.S. seed when their regular suppliers cannot meet domestic needs. This adds greatly to the volatility in the volume of U.S. exports. If the U.S. can establish itself as a consistent and primary source of seed to these countries, the demand faced by U.S. exporters would stabilize and the potential for growth would be enhanced.

The potential for U.S. exports on the oil side of the market is also of interest. It was only in 1981 that the U.S. exported more sunflower oil than any other country. Argentina has been the leading exporter of oil in other years. Romania has also been a consistent exporter of oil. The major importers in the world market for sunflower oil are Bulgium-Luxemborg, Germany and Czechoslovakia. Over the 5-year period 1977-1981 these countries had imports of sunflower oil averaging 41, 31 and 38 metric tons per year respectively. U.S. exports to these countries over the same period averaged 2.7, 0 and 0 metric tons. It is apparent that the U.S. could increase the total amount of oil it exports if the U.S. increased its market share in these countries. One way U.S. exporters could increase their market share in these countries would be to produce a better quality oil than other exporting countries. A better oil would be possible by improving the processing technique in a manner that would reduce the waxes and parafins in the final product.

There are several general factors that could lead to increases in U.S. participation in the international trade of both sunflower oil and seed. Three of these factors will be briefly discussed here. The first is that of the foreign exchange rate. If the value of an exporting countries currency

rises vis-a-vis the importing countries currency, the good in question becomes relatively more costly and therefore less attractive to the importer. Thus, recent increases in the strength of the U.S. dollar have hindered U.S. exports of sunflower oil and seed. If the dollar were devalued relative to an importers currency then the U.S. goods would become more attractive on a price basis. Another consideration is the value of the U.S. dollar relative to other sunflower seed and oil exporters currencies. A devaluation in the dollar relative to the currencies of these other exporters would strengthen U.S. exports.

A second factor to be considered is that of internal policies of importing countries. If an importing country protects its domestic producers of competitive oils (olive, rapeseed, etc.) or domestic processors of oils this puts the U.S. at a disadvantage. Such protection occurs in the form of quotas, tariffs, levies or subsidies. This type of protection has not been uncommon and if restrictions were lifted U.S. exports sunflower exports would benefit.

Finally, U.S. exports could be increased if any of the usual demand shifters increased. Specifically, one can look towards increases in population and/or incomes in a number of importing countries. Prime examples of this are Algeria and Egypt. Both countries import U.S. sunflower oil and if incomes in these countries increase U.S. oil imports can also be expected to increase.

The Future Market for Sunflower

Domestically, both sunflower oil and sunflower meal (particularly if the latter is produced from hulled seeds) are high quality products which can be marketed in large volume if (1) supplies are dependable and (2) sunflower

product prices are competitive with substitute oil and meal products. Because of its high proportionate value relative to the meal component, the price competitiveness of sunflower oil is of critical importance for market expansion.

In order to insure price competitiveness of sunflower oil and meal, supplies of oil-type sunflower seed must be large enough and stable enough to service both the growing but somewhat volatile export market for sunflower seed and the requirements of domestic crushers. Moreover, this must be accomplished while returning sunflower producers a competitive return from the sunflower enterprise. In the longer term these objectives can only be accomplished by an effective research and development (R & D) program for sunflower which reduces per unit production costs to a level at which it is competitive with other oilseed crops, particularily soybeans. Analyses directed at evaluating the pay-off for an effective future public sector R & D program for sunflower is now underway and will be reported in a subsequent paper.

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