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Economic Contribution Of The United States Sunflower Industry^{SR}

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Sunflower, a plant native to North America, was first discovered in the 16th century by early European explorers. Sunflower seed was taken back to Europe, where the plant eventually found its way east into Russia. It was in Russia that the plant became an important food crop. The plant was subsequently reintroduced to North America by Russian immigrants. Sunflower has since continued its expansion, not only in the United States, but throughout the world, to become the fifth largest oil seed crop in the world.

United States, in recent years, has ranked among the top six countries in world sunflower production (National Sunflower Association various issues). However, in the last ten years, sunflower oil has accounted for only 4 percent of all domestic edible oil production (following soybean oil, corn oil, and cottonseed oil) (U.S. Department of Agriculture 1994). Over the last ten years, sunflower oil consumption in the U.S. has averaged less than 2 percent of all edible oil use (U.S. Department of Agriculture 1994).

importance to regional economies, (2) demonstrating the economic consequences of future policy decisions affecting the industry, and (3) documenting unquantified components of the sunflower industry for use by policymakers and businesses within the industry. McCormick et al. (1992) and National Sunflower Association (1991) provide an overview regarding many aspects of the U.S. sunflower industry; however, economic measures of the industry have not been published.



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Sunflower, contrary to levels of domestic oil use, is an important crop to many Great Plains states in terms of crop production and associated processing activities. Yet, sunflower lacks sufficient overall size to be recognized as a major crop in the United States. Benefits of an economic impact study of the industry include: (1) highlighting the crop's

OBJECTIVE

The purpose of this report is to estimate the economic contribution (direct and secondary effects) of the U.S. sunflower industry to the national economy and to the regional economies of sunflower-producing states.

INDUSTRY STRUCTURE

The U.S. sunflower industry is actually composed of three distinguishable subindustries: sunflower oil industry, confection industry, and birdfood industry. While each industry is in fact part of a larger domestic industry, each has specific and separate functions within the framework of the U.S. sunflower industry.

The *sunflower oil industry* includes all activities associated with oil sunflower, except oil sunflower sold as birdfood. The sunflower oil industry centers predominantly around oil sunflower crushing, which produces crude sunflower oil. Sunflower meal is also produced from oil sunflower crushing, although the crushing process is undertaken to produce oil. Sunflower oil consumed domestically in the United States typically undergoes several refining processes to make the oil edible for human consumption. Other activities in the sunflower oil industry included oil seed, crude oil, and refined oil exports and domestic consumption of sunflower oil.

The *confection sunflower industry* includes all the activities of processing, preparing, packaging, distributing, and selling edible sunflower for human consumption. Confection sunflower are traditionally consumed as ingredients in snack mixes, nuts and seeds for direct consumption, baking inputs, salad toppings, and other miscellaneous uses. Confection sunflower not suitable for human consumption after initial

processing were considered part of the birdfood industry.

A portion of the U.S. sunflower industry contributes to the U.S. birdfood industry. The U.S. birdfood industry predominantly uses oil-type sunflower; however, confection sunflower are also sold as birdfood. In recent years, the demand for oil sunflower in birdfood markets has increased, creating competition with traditional oil sunflower uses. The *birdfood segment* of the sunflower industry involves all activities associated with preparing, packaging, distributing, and selling sunflower for birdfood.

DISCUSSION

A general discussion of the procedures and methods used in the study is divided into (1) industry supply and disappearance, (2) value of crop production, (3) sunflower processing, (4) export activity, (5) domestic consumption, and (6) input-output analysis.

Industry Supply and Disappearance

Supply and disappearance were averaged for oil and confection sunflower to eliminate yearly fluctuations that typically occur in crop production, imports, exports, and domestic use.¹ Similarly, industry supply and disappearance were also averaged for sunflower oil and sunflower meal.

Oil sunflower use in the U.S. averaged 1,144,600 tons,² which included 1,134,300 tons from domestic production and 10,300 tons from imports and changing

¹The study was based on sunflower industry activity from 1991 through 1993. Most quantities and values were averaged during that period.

²All quantities in this report are metric tons.

inventories. Crushing activities dominated oil sunflower use, accounting for nearly three-fourths or 847,000 tons of all oil sunflower disappearance. The birdfood industry used 236,450 tons of oil sunflower or 20.7 percent of overall supply. Oil sunflower exports and planting seed use accounted for the remaining 3.6 percent of oil sunflower disappearance.

Confection sunflower use in the U.S. averaged 243,100 tons, which included 196,500 tons from domestic production and 46,600 tons from imports and changing inventories. All confection sunflower, except hybrid seed, were assumed to be processed into whole seed, kernel, and birdfood products. The confection industry produced about 35,300 tons of birdfood, 51,800 tons of kernel, and 70,600 tons of whole seed annually. Annual exports of confection products were 62,000 tons, which included 30,500 tons of kernel and 29,500 tons of whole seed.

The sunflower oil industry produced 348,700 tons of crude sunflower oil and 406,700 tons of sunflower meal. Approximately 226,150 tons of sunflower oil were exported annually from the U.S. Crude oil comprised 97 percent of all sunflower oil exports. Annual exports of sunflower meal averaged 38,200 tons.

Value of Sunflower Production

Oil and confection sunflower production statistics for all major sunflower-producing states were averaged during the study period. Marketing-year prices for each state were weighted by state production to determine average sunflower values. Weighted average sunflower prices for oil and confection sunflower were multiplied by crop yields to determine average crop value per acre in each state. Gross revenue per acre, which included adjustments for crop insurance reimbursement and disaster payments, was multiplied by total acres in

each state to determine overall crop value. Budgets were developed for each state to estimate expenditures and returns from oil and confection sunflower production.

Sunflower Processing

Processing activity provides the foundation for much of the economic impact of the sunflower industry. As with most food-based industries, raw commodities undergo various degrees of preparation and manufacture before becoming consumer products. This is especially true for the sunflower industry, since processing is not only used to create domestic products, but is also needed to generate virtually all of the industry's exports. Processing in the U.S. sunflower industry can be divided into oil, confection, and birdfood activities.

Sunflower Oil

Impacts from crushing activities were estimated by first determining the quantity of oil and meal produced and the amount of oil sunflower crushed. The direct impact from crushing was estimated by subtracting the value of sunflower crushed from the value of crude oil and sunflower meal produced. Firms involved with sunflower crushing were surveyed to obtain expenditure data. The information was then used to allocate the direct impacts to various economic sectors. Expenditure and revenue information from oil refining was obtained from industry contacts.

Confection

Processing of confection sunflower was divided into primary processing (i.e., sizing, cleaning, dehulling) and secondary processing (i.e., salting, roasting, packaging). The direct impact from primary processing was estimated by subtracting the value of confection sunflower processed from the combined

values of primary confection products (i.e., whole seed, kernel, and birdfood). Direct impacts from primary processing were allocated to economic sectors based on information obtained from a survey of confection processors. The direct impact from secondary processing was estimated by subtracting the value of whole seed and kernel at the primary processing stage from the value of those products after undergoing secondary processing. A secondary processing budget was developed and used to allocate the direct impacts to economic sectors.

Birdfood

Processing activity for birdfood was limited to activities involving preparation of seeds for use by birdfood manufacturers. Direct impacts from primary processing were estimated from a survey of birdfood processors in the Upper Great Plains. The initial processing of confection sunflower into birdfood was considered part of the confection industry; however, those seeds were considered part of the birdfood industry after the initial processing stage.

Export Activity

The U.S. sunflower industry exports oil seed, hybrid oil and confection seed, crude sunflower oil, refined sunflower oil, sunflower meal, confection in-shell, confection kernel, and miscellaneous confection products. Direct impacts from exporting sunflower products were estimated as the additional economic activity created by transportation, maritime activity, and handling and trader margins. Transportation impacts were an estimate of the transportation costs incurred to move the commodity from local collection points or processing plants to ports of export. Maritime activity was limited to the shipping costs incurred within the United States that are in addition to the economic activity covered by free-on-board (f.o.b.)

prices. Handling and trader margins were the residual of the export value at point of export less transportation costs and commodity values at the last handling stage.

Domestic Consumption

The value of sunflower products at the retail level was included in the industry impacts. Average retail prices for sunflower oil and most confection sunflower products were determined from information obtained from a national market research firm. Retail birdfood prices were determined from industry sources. Domestic consumption included the economic activity created by the transporting, consumer packaging, distributing, marketing, and retailing of sunflower products.

Input-Output Analysis

Economic activity from a project, program, or policy can be categorized into direct and secondary impacts. Direct impacts are those changes in output, employment, or income that represent the initial or direct effects of the project, program, or policy. Secondary impacts (sometimes further categorized into indirect and induced effects) result from subsequent rounds of spending and respending within the economy. Input-output (I-O) analysis traces linkages (i.e., the amount of spending and respending) among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). An economic sector is a group of similar economic units or activities (e.g., communication and public utilities, retail trade, etc.).

The process of spending and respending can be explained by using an example. A single dollar from an area wheat producer (*Households* sector) may be spent for a loaf of bread at the local store

(*Retail Trade* sector); the store uses part of that dollar to pay for the next shipment of bread (*Transportation* and *Agricultural Processing* sectors) and part to pay the store employee (*Households* sector) who shelved or sold the bread; the bread supplier uses part of that dollar to pay for the grain used to make the bread (*Agriculture-Crops* sector) ... and so on (Hamm et al. 1993).

RESULTS

The economic contribution of the U.S. sunflower industry was estimated from production, handling, transportation, processing, packaging, distribution, consuming, and exporting activities. Results were divided into primary and secondary economic impacts, employment, and tax revenues.

Direct Economic Impacts

Farmers and producers generate direct economic impacts to area economies through expenditures for production inputs and returns to unpaid labor, management, and equity. Processing firms also generate direct impacts through expenditures for processing and manufacturing inputs and net returns from operations. Supplemental activities, such as transportation, maritime activity, retail trade, etc., also generate direct impacts through expenses and returns from their operations.

Sunflower Production

Sunflower production in the U.S. averaged 2.58 million acres from 1991 to 1993. The 2.58 million acres of sunflower generated \$268 million in production expenditures and \$48.8 million in returns

to unpaid labor, management, and equity. Total direct impacts (expenditures and returns) from sunflower production were estimated at \$123 per acre or \$316.8 million (Table 1).

Oil sunflower in the U.S. averaged 2.2 million acres. The 2.2 million acres of oil sunflower generated \$222.5 million in production expenditures and \$35.2 million in returns. Confection sunflower production in the U.S. averaged 396,000 acres. The 396,000 acres of confection sunflower generated \$45.5 million in production expenditures and \$13.6 million in returns.

Sunflower Oil Industry

Direct economic impacts from the U.S. sunflower oil industry were generated separately for exports, primary processing (handling, crushing, and refining), and domestic consumption of sunflower oil and meal.

The U.S. sunflower oil industry crushed 847,000 tons of oil sunflower which generated \$49 million (\$58 per ton of oil sunflower) in annual direct impacts. Approximately 128,500 tons of crude sunflower were refined annually, generating a total direct economic impact of \$11.3 million annually.

Approximately 116,000 tons of refined sunflower oil were consumed domestically. The direct impacts from domestic consumption of sunflower oil (i.e., transportation, bottling, distribution, and retailing) were estimated at \$124.9 million or \$1,076 per ton. Over 90 percent of all sunflower meal was consumed domestically as livestock feed. Total direct impacts were estimated at \$12.2 million or \$33 per ton.

**TABLE 1. ANNUAL DIRECT IMPACTS OF THE UNITED STATES
SUNFLOWER INDUSTRY, BY ECONOMIC SECTOR AND INDUSTRY
ACTIVITY, 1991 THROUGH 1993**

Economic Sector	Direct Impacts by Sunflower Industry				Total Direct
	Sunflower Production	Sunflower Oil	Confection Sunflower	Birdfood Activities	
----- 000s dollars -----					
Construction		2,965	2,480	1,208	6,653
Transportation		33,190	19,492	11,630	64,312
Comm and Pub Util	4,272	10,399	11,297	1,043	27,011
Ag Proc and Misc Mnfg		35,736	6,524	38,064	80,334
Retail Trade	181,385	80,794	162,514	51,123	475,816
Fin, Ins, and R Estate	55,960	10,171	11,127	3,126	80,385
Bus and Pers Service		10,256	9,717	832	32,316
Prof and Soc Service		2,061	389	559	3,008
Households	51,822	52,898	51,258	28,788	184,767
Government	11,894	2,727	861	922	16,404
Total Direct Impacts	316,844	241,198	275,668	137,296	971,006

Exports of oil seed, sunflower oil, and sunflower meal were estimated to generate \$25 million in direct impacts. Direct impacts from elevator handling and transportation, crushing, and refining activities were estimated at \$79.1 million. Domestic consumption of sunflower oil and meal was estimated to generate \$137.1 million in annual direct impacts. All U.S. sunflower oil industry activities were estimated to generate \$241 million in annual direct impacts (Table 1).

Confection Sunflower Industry

Economic activity for the confection industry can be broken into processing, exports, and domestic consumption. The direct impact per ton of confection sunflower processed was estimated to be \$132. Approximately 241,400 tons of confection sunflower were initially processed each year, generating an annual direct impact of about \$31.8 million.

Approximately 60,300 tons of confection sunflower (kernel and whole seed) were salted and roasted, which generated \$16.6 million in direct economic impacts or \$275 per ton processed.

About 45 percent (in-shell equivalent) of the confection sunflower processed was exported. About 62,000 tons of confection sunflower products (i.e., kernel, whole seed, hybrid seed, and miscellaneous products) were exported, which generated a direct impact of \$10.2 million or \$164 per ton.

About 62,400 tons of confection sunflower were consumed in the U.S. annually. Across all confection sunflower uses, domestic consumption was estimated to generate \$217.1 million in direct impacts. Total annual direct impacts from the confection sunflower industry were estimated at \$276 million (Table 1).

Birdfood Activities

About 271,750 tons of sunflower were consumed as birdfood in the U.S. annually (236,450 tons of oil sunflower and 35,300 tons of confection). The direct economic impact from primary processing of oil sunflower was estimated at \$45.4 million annually or \$192 per ton. Domestic consumption of sunflower for birdfood was estimated to have a direct economic impact of \$91.9 million annually. Primary processing and domestic consumption of sunflower for birdfood was estimated to generate a total annual direct impact of \$137.3 million or \$507 per ton (Table 1).

Secondary Economic Impacts

Secondary economic impacts were estimated separately for sunflower production, sunflower oil industry, confection sunflower industry, and birdfood activities. Direct impacts of \$316.8 million from sunflower production in the United States generated about \$482 million in secondary impacts. Direct impacts of \$241 million from the U.S. sunflower oil industry generated about \$462 million in secondary impacts. Direct impacts of \$276 million from the U.S. confection sunflower industry generated about \$417 million in secondary impacts. Direct impacts of \$137.3 million from the birdfood activities generated about \$285 million in secondary impacts. Annual secondary impacts from the U.S. sunflower industry were estimated at \$1.65 billion.

Areas of the economy with the greatest secondary impacts included the *Households* (\$556 million), *Retail Trade* (\$437 million), *Miscellaneous Manufacturing and Agricultural Processing* (\$98 million), *Finance, Insurance, and Real Estate* (\$96 million), *Agriculture-Crops* (\$81 million), *Agriculture-Livestock* (\$77 million), and *Government* (\$76 million) sectors. Each dollar of direct impacts (industry-wide) generated about \$1.70 in secondary impacts.

Total Impacts

Total annual economic impact of the U.S. sunflower industry was estimated at \$2.62 billion (Table 2). Sunflower production and sunflower oil industry activities each generated over \$700 million in annual impacts. Confection sunflower activities and birdfood activities generated another \$693 million and \$423 million in annual impacts, respectively.

The economic sectors with the greatest impacts included *Retail Trade* (\$913 million), *Households* (\$741 million), *Miscellaneous Manufacturing and Agricultural Processing* (\$178 million), *Finance, Insurance, and Real Estate* (\$176 million), *Communication and Public Utilities* (\$101 million), and *Government* (\$93 million) (Table 2).

North Dakota, the largest sunflower-producing state and the state with the greatest amount of processing activities, generated the most sunflower-related economic impacts (\$712 million). Total impacts from sunflower activities was \$223 million in Minnesota, \$194 million in South Dakota, \$92 million in Kansas, \$25 million in Colorado, \$16 million in Nebraska, and \$13 million in Texas. Relatively small sunflower acreage and noticeably less overall processing activities contributed to the substantially lower level of impacts in sunflower-producing states other than North Dakota.

Employment

Direct employment is a measure of the number of full-time equivalent (FTE) jobs within an industry. Secondary jobs are an estimate of employment outside of an industry, but employment that is created from the industry's economic activity.

TABLE 2. TOTAL ANNUAL ECONOMIC IMPACTS OF THE UNITED STATES SUNFLOWER INDUSTRY, BY ECONOMIC SECTOR AND INDUSTRY ACTIVITY, 1991 THROUGH 1993

Total Economic Impacts by Sunflower Industry					
Economic Sector	Sunflower Production	Sunflower Oil	Confection Sunflower	Birdfood Activities	Total
----- 000s dollars -----					
Agriculture-Livestock	23,675	20,722	21,633	14,626	80,656
Agriculture-Crops	9,427	28,519	11,871	27,462	77,279
Nonmetal Mining	1,073	1,264	1,124	696	4,157
Construction	16,017	16,697	16,360	8,957	58,031
Transportation	3,233	35,677	22,327	13,088	74,325
Comm and Pub Util	28,427	29,723	31,313	11,425	100,888
Ag Proc and Misc Mnfg	14,674	70,305	22,742	70,378	178,099
Retail Trade	314,472	200,893	277,860	119,984	913,209
Fin, Ins, and R Estate	84,836	36,715	36,505	18,180	176,236
Bus and Pers Service	23,186	20,231	19,033	6,436	68,886
Prof and Soc Service	15,458	15,319	13,391	7,875	52,043
Households	232,510	200,728	196,846	110,889	740,973
Government	31,948	26,298	21,590	12,695	92,531
Total Economic Impacts	798,936	703,091	692,595	422,691	2,617,313

Direct employment was estimated for the primary processing activities in all three major sunflower industries. Although full-time employment for sunflower production was not estimated, about 9,900 farms in the U.S. raised sunflower in 1993 (U.S. Department of Commerce 1995). Sunflower oil crushing activities employed 315 FTE jobs in 1993. Confection processing activities were responsible for 583 FTE jobs, birdfood processing activities supported another 144 FTE jobs, and activities relating to hybrid sunflower development and sales supported 52 FTE jobs. Total direct employment was estimated at 1,094 FTE jobs.

Direct employment in sunflower-related industries is difficult to quantify. Many of the positions (employment)

affiliated with the sunflower industry (i.e., those outside of production and processing) exist in other industries. Most of the jobs outside of primary sunflower processing are within industries that are supported only in part by the sunflower industry. The sunflower industry does directly affect jobs in industries such as grain handling, transportation, and product merchandising; however, actual quantification of those jobs is not clear.

Secondary employment was estimated based on the volume of business activity created by the industry. Sunflower production indirectly supported 9,200 FTE jobs. Sunflower oil industry activities indirectly supported 10,155 FTE jobs. Confection sunflower activities indirectly supported 8,740 FTE jobs. About 5,255 FTE jobs were indirectly supported by

sunflower-related birdfood activities. All sunflower activities combined indirectly supported 33,350 FTE jobs annually in the United States.

Tax Revenue

Tax collections are another important measure of the economic impact of an industry. Some of the interest in estimating tax revenue generated by an industry stems from public awareness of the importance of tax revenue to local and state governments. In an era of reduced federal funding, revenue shortfalls, and growing public demand on governments to balance their budgets while providing constant or increased levels of services and benefits, tax collections have become an important factor in assessing economic impacts.

The U.S. sunflower industry generated about \$16 million, \$6.2 million, and \$1.9 million in sales and use, personal income, and corporate income taxes, respectively, in the sunflower-producing states. Producers and farmers also were directly responsible for \$11.9 million in property taxes. Included in the industry's direct impacts were about \$928,000 in property taxes, \$313,000 in sales and use taxes, and \$483,000 in other taxes (state and federal income and miscellaneous taxes) paid by processing firms as part of their operations. Total annual taxes generated by the sunflower industry were estimated at \$37.6 million.

SUMMARY AND CONCLUSIONS

The purpose of this report was to estimate the economic contribution (direct and secondary effects) of the U.S. sunflower industry to the national economy and to the regional economies of sunflower-producing states. Overall economic activity of the U.S. sunflower industry was categorized into naturally

distinct industry groups and was based on averaging industry quantities and values from 1991 through 1993.

Sunflower production averaged 2.58 million acres and 1.3 million tons in the U.S., which generated \$316.8 million in direct impacts. Sunflower production generated another \$482 million in secondary economic impacts for a total economic impact of \$799 million.

The sunflower oil industry centered around producing crude sunflower oil and sunflower meal. Most of the sunflower meal was consumed domestically (90 percent) while over 65 percent of the sunflower oil was exported. Annual direct impacts for the sunflower oil industry were \$241 million, which generated another \$462 million in secondary economic impacts.

The confection sunflower industry produced 35,300 tons of birdfood, 51,800 tons of kernel, and 70,600 tons of whole seed annually. About 55 percent of all confection products (excluding birdfood) were consumed domestically. The confection sunflower industry was estimated to generate \$276 million in direct impacts and \$417 million in secondary impacts.

About 271,750 tons of sunflower (236,450 tons of oil sunflower and 35,300 tons of confection sunflower) were consumed as birdfood in the U.S. Direct impacts from birdfood activities were estimated at \$137.3 million, which generated an additional \$285 million in secondary impacts.

Collectively, sunflower production, the sunflower oil industry, the confection sunflower industry, and birdfood activities generated \$971 million in direct impacts annually from 1991 through 1993. The \$971 million in direct impacts generated an additional \$1.65 billion in secondary

impacts. Total economic impacts for the industry were estimated at \$2.62 billion.

Direct employment in the U.S. sunflower industry (i.e., processing and hybrid seed activities) was estimated at 1,094 full-time equivalent jobs. The U.S. sunflower industry indirectly supported 33,350 full-time equivalent secondary jobs. Economic activity associated with the U.S. sunflower industry generated \$37.6 million in annual tax revenue.

North Dakota incurred the greatest total economic impacts of the seven major sunflower-producing states (\$712 million). North Dakota was followed in total economic impacts by Minnesota (\$223 million), South Dakota (\$194 million), and Kansas (\$92 million). Collectively, the minor sunflower-producing states and other states involved with processing and distributing sunflower products incurred about \$1.34 billion in total economic impacts.

Each acre of sunflower planted (average of oil and confection) generated \$1,015 in total economic activity, or expressed alternatively, each ton of sunflower produced generated \$1,970 in total business activity. Confection sunflower generated \$1,749 in total economic activity per planted acre (\$3,525 per ton harvested) while oil sunflower generated \$516 in total economic activity per planted acre (\$990 per ton harvested). For every 77 acres of sunflower planted or 40 tons of sunflower harvested, one secondary full-time equivalent job was supported. Each acre of sunflower planted generated \$14.70 in tax revenue (property taxes and industry generated taxes).

Sunflower is a regional crop that can be grown competitively with other regional crops in the Upper Great Plains. The crop has the distinct advantage over many of the region's crops in that almost the entire crop (both in terms of oil

sunflower and confection sunflower) receives some, if not all, of the processing needed for export and/or domestic consumption within the region.

Initial economic analysis indicates that changes in sunflower production likely have the greatest effect on the economies of sunflower-producing states. Changes in sunflower production are felt most in the sunflower-producing states because of (1) concentrations in acreage and processing activities and (2) because those impacts remain almost entirely within the states' economies.

The greatest impacts (the most net value added) among all industry activities (both in terms of per unit impacts and percent of all impacts) are generated through the stages and activities of domestic consumption. Direct substitution of domestic use for exports would be unlikely to change the impacts in sunflower-producing states, but would increase the impacts throughout the rest of the nation. The magnitude and distribution of industry impacts in the future will depend upon changes in sunflower supply and corresponding changes in demand for sunflower products.



REFERENCES

- Coon, Randal C., F. Larry Leistritz, Thor A. Hertsgaard, and Arlen G. Leholm. 1985. The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages. Agricultural Economics Report No. 187, Agricultural Experiment Station, North Dakota State University, Fargo.
- Hamm, Rita R., JoAnn M. Thompson, Randal C. Coon, and F. Larry Leistritz. 1993. The Economic Impact of North Dakota's Health Care Industry on the State's Economy in 1991. Agricultural Economics Report No. 296, Institute for Business and Industry Development and North Dakota Agricultural Experiment Station, North Dakota State University, Fargo.
- McCormick, Ian, Cecil W. Davison, and Roger L. Hoskin. 1992. The U.S. Sunflower Industry. Agricultural Economic Report No. 663. Economic Research Service, United States Department of Agriculture, Washington, D.C.
- National Sunflower Association. Various Issues. U.S. Sunflower Crop Quality Reports. National Sunflower Association, Bismarck, North Dakota.
- National Sunflower Association. 1991. Sunflower Handbook. National Sunflower Association, Bismarck, North Dakota.
- U.S. Department of Agriculture. 1994. Oil Crops: Situation and Outlook Report. OCS-41, United States Department of Agriculture, Economic Research Service, Commodity Economics Division, Washington, D.C.
- U.S. Department of Commerce. 1995. 1992 Census of Agriculture, United States. Bureau of the Census, U.S. Department of Commerce, Washington, D.C.

This report is a summary of a larger report entitled Economic Contribution of the United States Sunflower Industry by Dean A. Bangsund and F. Larry Leistritz, Department of Agricultural Economics, North Dakota State University, Fargo, ND 58105 (701) 231-7441.

This study was funded by the National Sunflower Association.

