

POTENTIAL UTILIZATION OF SUNFLOWER OIL
IN THE UNITED STATES

By

Leif R. Anderson
Oil Trading Department
Drew Chemical Corporation
Parsippany, New Jersey

In a report given at the First International Sunflower Conference in 1964 at Texas, A & M University by Professor R. G. Robinson from University of Minnesota, sunflowerseed was given the title of the potential "OIL KING" when compared to other domestically produced oilseeds. This label was given, when considered on both a pound per acre yield, and an oil yield per pound of seed when grown in areas suitable to this crop.

Unlike other available oils, sunflowerseed oil seems to strike an ideal compromise between nutritional value and edible oil stability. In directly comparing sunflower oil to other domestic oils, we find, soybean oil, while not quite equal to sunflower oil nutritionally, also suffers as an edible oil in that stability is a real factor. Although as freshly processed oil, it may be bland in flavor, on standing for a period of time this flavor tends to revert to a disagreeable grassy or beany note. To overcome this, technicians have developed a touch hydrogenation process with controlled storage and handling conditions. By using this process, some of its nutritional value is diminished.

Cottonseed oil, although highly unsaturated contains a relatively substantial amount of saturates 27%, as compared to 15% for sunflower oil, making sunflower oil more desirable nutritionally, and for some uses cottonseed oil requires extra processing steps in order to make an acceptable edible oil.

High oleic safflower oil, while highly stable is not as nutritionally desirable as sunflower oil. The polyunsaturates to saturates ratio for high oleic safflower oil is 1.6 to 1 as compared to better than 6.2 to 1 for sunflower oil.

Safflower oil, when unhydrogenated contains more essential fatty acids than sunflower oil, but is highly unstable in nature. When hydrogenated, the stability of safflower oil may be improved, but only at the cost of some essential fatty acids.

Corn oil while almost as nutritionally acceptable as sunflower oil is not as stable nor as easily processed, and therefore, for some edible uses is not as desirable.

Peanut oil is not as nutritionally desirable as sunflower oil, however, it does have a stability which is slightly better.

When most of our other domestically produced oils, even when deodorized begin to develop off flavor characteristics, these characteristics, in almost

all cases vary from slightly disagreeable to highly disagreeable to the average American. Sunflowerseed oil even when off flavor it is generally characterized as having a mild nut-like but still pleasant flavor.

In comparing sunflower with other domestically produced oil, it is apparent that it can be utilized to advantage for current uses of our other oils. After sunflowerseed is dehulled, there remains a very fine wax coating placed there by nature to protect the seed as it develops. In the crushing process, this wax is picked up in the crude oil. It can be removed by a simple winterization or centrifuge process. This wax appears harmless and the only reason it need ever be removed is because of the appearance it gives to a refined liquid salad oil.

Once dewaxed, refined sunflower oil can be used as a fine salad oil with excellent comparative stability and nutritional value for the consumer. When used as a salad oil, it has a light yellow color and a delicate flavor. This same oil may be used for frying purposes, where it is a more desirable frying medium than soybean oil because of its lack of linolenic acid, which when heated forms a catalyzed polymer formation. This creates a thickening and darkening of the oil which causes a build up in the frying or deep fat frying vessel. Products fried with liquid sunflower oil will usually tend to absorb less of the frying oil than when fried with most other domestic vegetable fats.

As a commercial deep fat frying medium, sunflower oil has found acceptance, when available, for use in potato chip frying as it produces a clean flavored and crisp chip. Refined liquid sunflower oil offers an ideal frying oil to a large segment of the rapidly expanding "snack food" industry. This industry is greatly concerned with the shelf life of its products when placed for sale on the display shelves of retail outlets. A product fried with sunflower oil will remain in good condition far longer than products fried in some other oils. Wider use in this area has been held back due to a lack of the continuity of supply in this country.

As a base for hardened baking shortening, sunflower oil is at least as desirable as soybean oil. Shortening prepared with sunflower oil, as a base, produces improved flavor stability and performs in baking at least equal to shortening produced from soybean oil.

In frying shortening applications, the hydrogenated sunflower oil product is superior to the soybean oil product in polymer build up, flavor retention, and in some instances has lower oil retention in the fried pieces.

For use in margarine, when sun oil is hardened for this product by conventional methods a definite graininess develops which is undesirable. However, various methods have been developed to overcome this problem. Once the graininess problem is overcome, a superior type margarine is produced, with fine flavor, flavor stability and fine nutritional benefits and overall frying characteristics. Some manufacturers have already begun to market a sunflower margarine in this country and the American housewives in some areas are already aware of the attributes of sunflower oil margarine.

In the field of hard butters, sunflower oil products may show promise. Because of its triglyceride structure, hardened, or fractionated hardened sunflower oil may make available an improved hard butter for the confectionery coating industry.

When considering the potential use of sunflowerseed oil for edible purposes, a rather intangible factor should not be overlooked. Every school child, from the first grade on, is made aware of the importance of the Sun as a source of health giving qualities. The sunflower has borne its name for several centuries and just the name itself implies nutritional value.

The application of sunflower oil as an industrial oil is one with which this country is familiar. Due to its low linolenic acid content, it has found favor with the American paint industry. A large move away from linseed oil base paints for some uses has taken place in recent years in favor of the lower linolenic acid content soybean oil. It is the linolenic acid in paints that allows oxidation, which causes yellowing in white paint over a period of time after application. Soybean oil contains about 8% linolenic acid, but in sunflower oil the linolenic acid is less than 1%.

When considering the potential utilization for sunflower oil in this country, we see a great potential for increased usage for industrial application, but this usage is overwhelmed with the potential for edible purposes.

Certainly one of the major factors which deterred a more rapid development of sunflowerseed production and consequent availability of the resultant oil in this country, was the pessimistic prediction of price levels of domestic and world produced vegetable oils made just over a year ago. These pessimistic estimates were caused basically by a second consecutive billion bushel plus domestic soybean crop, a lowered support price on soybeans, and an expanding supply of sunflower oil from the Soviet Union. However, it didn't take long for the world vegetable oil supply to revert to a very delicate supply and demand balance. This is shown by the current Decatur price of soybean oil at 11.00 cents per pound when the predictions last year were for a price level of about 7.50 cents per pound.

As for the future of vegetable oil demand, when we consider the continuing trend in world population and the fact that a large segment of the world is lacking in sufficient food availability, the demand for vegetable oils should continue to expand as a relatively inexpensive source of food energy.

Domestically our soybean oil production was 6.8 billion pounds during 1969. During the same period, the production of the premium oils was 466 million pounds of corn oil, 1,459 pounds of cottonseed oil, and 188 million pounds of peanut oil. These three premium oils represent a total 31% of our soybean oil production. With various import tariffs and restrictions on imported oils, our domestic production of sun oil has only to find its proper place among these premium oils. Presently, the premium oils are trading at from three to four cents per pound over crude soybean oil. While our overall price level of vegetable oil is somewhat related to the price of soybean oil, the above figures indicate that the American consumer is willing to pay a premium price for a premium product. It would be interesting to speculate what would have happened to the price level of the premium oils during the 1964-68 period when our cottonseed availability fell almost in half if it hadn't been for technical laboratory developments which developed a process making soybean oil more acceptable to the consumer as a general purpose salad and cooking oil.

If sun oil was to find its place as only 5% of the domestic market for premium oils, with a per acre yield of 1,200 pounds and an oil yield of 45%, a yield level which appears reachable in the very near future, we could easily support a crop of over 190,000 acres. From the best information I have been able to compile, the total high oil content sunflower acreage for the 1969-70 crop year was about 63,000 acres. With a yield of approximately 1,200 pounds of seed per acre and an oil yield of about 41%, the total crop measured in resultant oil was about 24 million pounds as compared to 105 pounds, if sunflower oil can obtain only 5% of the premium oil market. This would indicate that our domestic usage could easily support a crop of 190,000 acres, as indicated above, vs. a crop of 63,000 acres we grew this current year.

While the use of 5% is certainly arbitrary, and extremely conservative, it does demonstrate that a sizeable increase in the sun oil acreage would have minimal effect on the price level obtained for sunflowerseed oil. As the years go by and our domestic sun oil production becomes an ever larger part of our total domestic oil supply, its price relationship to soybean oil will become more sensitive. At this time, it is virtually impossible to estimate at what level of production this would be.

Neither corn, peanut or cottonseed oil give any indication of any sharp increased availability in the foreseeable future and with a continuing increase in the total demand, the place for sun oil in the domestic oil picture is already prepared.

With continuing close cooperation between the agronomists, grower, processor and refiners, sunflowerseed will be able to take its place as an oilseed in our domestic picture and truly gain its place as the "OIL KING" of the oilseeds.

* * *