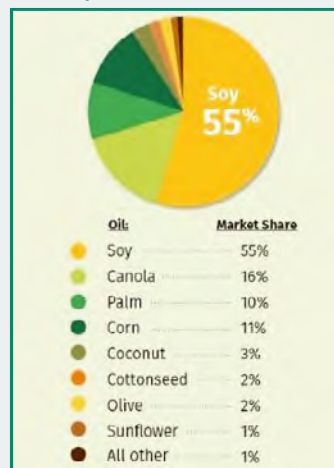


The untapped potential of soya bean oil in South Africa



Figure 1: US edible vegetable oil consumption.



In South Africa, sunflower seed oil is still the most commonly used bottled oil. In the United States (US), however, the most widely available and widely used oil is soya bean oil. According to a 2013 publication by the United Soybean Board (USB), approximately 60 to 75% of all fats and oils used for human consumption in the US is derived from soya bean oil.

Due to its neutral flavour and well-balanced fatty acid profile, it is a versatile oil with various uses such as cooking, frying, baking, preparing salad dressings and other food production uses. It is also preferred by consumers, since it is low in hydrogenated fat, contains no trans-fatty acid (TFA), is high in poly- and monounsaturated fats and high in essential fatty acids. According to the USB, it is the principal source and primary commercial source of vitamin E and omega-3 fatty acids in the US diet.

There may very well be untapped potential for the production of soya bean oil for human consumption in South Africa. Local soya bean production for oil is estimated at 190 000 tons, with 200 000 tons being imported. A total of 390 000 tons are consumed locally each year, compared to a total of 450 000 tons of sunflower seed oil.

Heart health and oil

In the early 1980s, research showed that animal fats and tropical oils typically used for frying, baking and confectionary increase blood cholesterol levels. This has raised concern over its contribution to heart disease, which forced food manufacturers to consider alternatives. (*Trans-fat update: Food Products and Design Supplement 2007*).

Many companies turned to partially hydrogenated vegetable oils, low in saturated fat and free of dietary cholesterol. This was considered ideal for frying, baking and giving the desired texture to foods, without the undesirable effects of saturated fats.

Hydrogenation is a process which adds crystal structure, making oils act like a semi-solid or solid fat. It increases the oil's stability and shelf life, and the shelf life of products it is added to. During this process, fatty acids

convert to trans form, producing TFAs. This makes oil adaptable to many uses. Dairy and meat products naturally contain trans-fats too.

Despite this, 21st century research showed that trans-fat – like saturated fats – also negatively impacted health. Research showed that trans-fat causes higher cholesterol levels and contributes to increased morbidity and risk to heart disease. It also promotes inflammation, causes endothelial cell damage and affects insulin sensitivity.

Need for healthier alternatives

In 2004, the US Food and Drug Administration (FDA) published regulations requiring producers of packaged food products to label the content of trans-fat in their products. The FDA further warned consumers to limit their intake of TFAs.

Consumers have consequently had a heightened interest in knowing which fats are 'good' or 'bad', and as a result food manufacturers have seen a demand for foods free of TFAs, low in saturated fats and rich in beneficial fatty acids such as omega-3s. Fuelled by this and the FDA's decision to include TFAs on food labelling, the fats and oil industry has diligently developed new ingredients and improved technologies, producing oils that preserve the structure and taste of foods without the negative health effects.

Healthier oils can be produced in a number of ways:

- Inter-esterification allows highly saturated hard fat and liquid vegetable fats to combine and produce fats with the best characteristics of both types of fat. This allows the production of customised fats with a range of melting points, increased stability and added creaminess. It can be used for margarine, baked goods and confections. Inter-esterified products are trans-fat-free and considered cholesterol-neutral.
- Hydrogenation modification involves modified techniques for producing highly hydrogenate oils, but producing minimal trans-fats.
- New varieties of seed have been bred to select seed mutations with modified fatty acid composition. Seed breeding and genetic engineering can produce oils with a targeted omega-3 fatty acid content, high- or mid-oleic acid content or low-linolenic content.

Alternatives to trans-fat oils

A switch to saturated fats is also seen as an alternative to hydrogenated fats, but benefits should be weighed against the negative effect on blood cholesterol levels.

Soya bean oil is an ideal alternative to other oils high in trans-fat. It is also high in healthy fatty acids and one of the few plant-based sources of omega-3. Research has shown that soya bean oil is a viable alternative to trans-fats, since it contributes to cardiovascular health.

Although its trans-fat content has also been up for discussion in the US, collaborative efforts by the USB are underway to bring enhanced soya oil traits to the marketplace which are trans-fat free

and higher in healthy fatty acids. As a result, the US soya bean industry reintroduced low linolenic soya bean oil as a substitute for partially hydrogenated vegetable oil products.

Benefits of soya bean oil:

- Clean and natural taste that consumers prefer.
- Almost imperceptible smell enhances foods.
- High emulsifying ability makes it adaptable.
- Adaptable to bottled form and for use in other products.
- Ideal for baking, frying, confectionary, margarine and shortening.
- Provides essential fatty acids and vitamin E.
- Cholesterol-free and low in polyunsaturated fat.
- Low in hydrogenated fat and trans-fat-free.
- Various soya bean oil traits to choose from.

(Source: USB)

Various uses of soya bean oil

Soya bean oil is the natural extraction of whole soya beans. Besides the bottled version found in almost every American kitchen, soya bean oil is also widely used in everyday food products and for preparing food service products.

In the US, oils sold at grocery shops labelled as vegetable oil are usually 100% soya bean oil or a blend of soya and other oils. It is also used for manufacturing margarine and in shortening. It has also become an invaluable replacement for hydrogenated fats at food companies such as Kellogg's and Kentucky Fried Chicken (KFC).

The popularity of soya bean oil in the US can be attributed to its adaptability, large production volume and supply security. Another reason this oil is so popular among consumers is its high essential fatty acid (EFA) content and low TFA content, making it an ideal partial replacement for hydrogenated vegetable oils that are usually high in trans-fats.

Soya oil for custom needs

This also spurred a desire for seed producers to develop a soya bean with increased oil

yields and modified fatty acid composition. Genetically engineered (GE) seeds produce oils with a targeted fatty acid composition, such as soya bean oil with increased omega-3 fatty acids.

Soya bean production can therefore be customised to provide producers with an oil featuring the desired fatty acid composition and no trans-fats. For instance, a soya bean oil can be produced with 3% less linolenic acid compared to the 7% less in conventional soya bean oil.

A high-oleic soya bean oil can also be produced, containing more than 50% oleic acid versus up to 30% – making it more stable, less easily oxidised, having a long shelf life and used for deep-frying. This means the oil does not need hydrogenation and therefore trans-fats are eliminated. There are also varieties that offer increased omega-3s.

Although soya bean oil is already low in saturated fat compared to other oils, research has been conducted to develop soya bean oil containing even less saturated fat. It for example contains 7% less saturated fat than the traditional 15%.

Food products

Soya bean crops can also be processed into a number of different food products. Soya bean protein is a common alternative to meat-based proteins, and can be enjoyed fresh (edamame) or processed into tofu or other meat protein replacements.

Another common use is for soya milk production and it can also be used as dairy alternatives such as soya cheese or yoghurt. Such alternatives to animal products have become popular globally and in the local market, as consumers grow more aware of the role they play in a healthy diet and lifestyle.

Soya beans can also be turned into fermented products such as tempeh (soya cake) and the popular Asian condiments, miso and soya sauce (tamari/teriyaki). Other uses include gluten-free flour, infant formulas, soya nut butter, concentrated and isolated soya protein for supplements such as protein shakes and bars, and soya fibre that is produced from the hulls removed during initial processing.

References available from the author at email ursula@veeplaas.co.za.