

# Sunflower, soybean, safflower and sesame: the power of 4 in nutrition

## Abstract

With the increasing world population many disorders and diseases are also increasing on the same pace. Leading to many complexities such as rise in food demand, outbreak of new diseases, hunger, starvation, malnutrition, PCOS in many females and even death. Increasing agriculture is not the solution to overcome this problem. A dire need to change the trend towards nutritionally beneficial crops is need of time. Examples of these crops are of high nutritional value (sunflower, soybean, safflower and sesame).

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## Introduction

It is believed that by 2030 the population will be increased by ten folds. This continuous rise in human population leads to many problems like rise in food demand, outbreak of new diseases, hunger, starvation, malnutrition and even death. Food production for human consumption is essential for healthy living.<sup>1</sup> Over time, many farmers have turned to conventional farming practices, using chemical fertilizers for better crop yields and productivity, and these have systemic adverse effects on crop yield, soil physical and chemical properties, water as a result of surface runoff, and the microbial ecological imbalance.<sup>2</sup>

Persistent use of chemical fertilizers by plants has channeled into a plant food chain system and caused disease symptoms in humans.<sup>3</sup> How can we avert the threats of some of these farming challenges? It is imperative to critically elaborate biotechnologically modern approaches suitable in the agricultural system to improve crop yields and productivity without threats to the environment (Grieve et al., 2019). The problem is not to intensify agriculture but to increase per acre cultivation and use of high nutritional crops.

Recently another problem is emerging in females around the world. Approximately 30% of young women have a hormonal disorder called polycystic ovary syndrome. Women with PCOS often have insulin resistance (the body doesn't use insulin well), which leads to too much insulin in the body. Increased production of androgens, or male hormones, is also a hallmark of PCOS. These hormonal abnormalities can cause metabolic and reproductive disorders. With each patient having varied symptoms from weight gain to cystic acne and many more. With the best possible solution to overcome this problem are going gluten, dairy and sugar free and increasing nutritional supplements with maximum benefits. Thus, the cultivation of plant-based high-value foods such as tubers, oilseeds (sunflower, safflower, sesame and soybeans), fruits, and vegetables can help to overcome the issues of malnutrition and excessive agriculture as these crops contain maximum nutritional benefits.<sup>4,5</sup>

## Sunflower

Sunflower seeds (*Helianthus annuus* L.)<sup>6</sup> contain 55-68% oil (Ali et al., 2007). Its oil is premium for its good taste, high smoke point, dietary quality, and lack of linolenic acid and high content of unsaturated fatty acids (Joksimovic et al., 2006). Its oil is also enriched

with vitamins A, D, E and K and is free from any toxic elements (George et al., 2000). It's also a great source of phosphorus, nicotinic acid, and calcium.<sup>7</sup> A hundred pounds of sunflower achenes contain 35% high-protein flour (Michael and Jeri, 2004). Therefore, it can also be used as animal feed and birdseed etc. (Robert et al., 1993). Being drought tolerant makes it suitable for both irrigated and rain-fed areas (Aslam et al., 2002). Risk of heart problems.<sup>8</sup> Its oil is very stable, since it has a lower degree of hydrogenation with prolonged storage (Gomes et al., 2013). Some nutritional benefits are listed below in Figure 1.



Figure 1 Nutritional benefits of Sunflower.

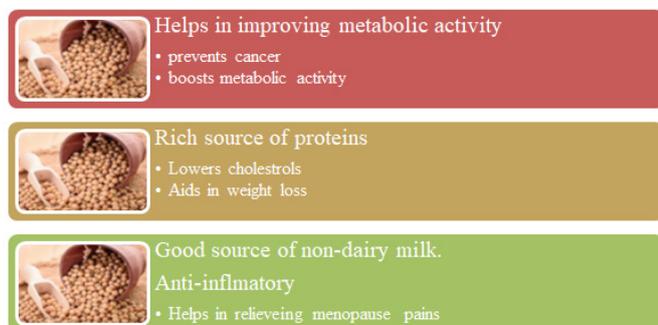
## Soybean

Soybeans (*Glycine max* L.) are considered an oilseed that contains several beneficial nutrients, including protein, carbohydrates, vitamins, and minerals. Dry soybeans contain 36% protein, 19% oil, 35% carbohydrate (of which 17% is dietary fiber), 5% minerals and several other components including vitamins. Table 1 show the different nutritional content of soybeans and their by-products. Soy protein is one of the most cost-effective sources of dietary protein. Soybean protein is considered a good substitute for animal protein and its nutritional profile is almost similar to that of animal protein, with the exception of sulfur-containing amino acids (methionine and cysteine), since soybean proteins contain most of the essential amino acids necessary for animal and human nutrition required are. Studies in rats showed that the biological value of soy protein is similar to that of many animal proteins such as casein when fortified with the sulfur-containing amino acid methionin.<sup>9</sup> Major health benefits are gown in Figure 2.

**Table 1** Nutritional profile of four S's

| Nutrients     | Sunflower | Soybean | Safflower | Sesame |
|---------------|-----------|---------|-----------|--------|
| Fats          | 53%       | 20.60%  | 83%       | 49.50% |
| Proteins      | 37%       | 65%     | 3%        | 30.30% |
| Carbohydrates | 15.40%    | 23.20%  | 0%        | 18.80% |
| Sugar         | 3.60%     | 10%     | 0%        | 11%    |
| Fiber         | 22.60%    | 24.50%  | 33%       | 37%    |
| Cholesterol   | 0%        | 0%      | 12%       | 0%     |
| Saturated fat | 14%       | 9%      | 19.40%    | 21%    |
| Omega-3       | 3.75%     | 83%     | 49%       | 22.70% |
| Omega-6       | 136%      | 54.80%  | 48.80%    | 121%   |
| Vitamin A     | 0.13%     | 0.11%   | 0%        | 0.33%  |
| Calcium       | 7.80%     | 27.70%  | 12%       | 99%    |
| Magnesium     | 77.40%    | 66.70%  | 21%       | 84.80% |
| Zinc          | 32%       | 44%     | 33%       | 55%    |
| Phosphorus    | 21%       | 33%     |           | 70.50% |

Source: Vegan nutrition tracker

**Figure 2** Major health benefits of Soybeans.

### Safflower

Safflower (*Carthamus tinctorius* L.) is a multipurpose crop grown for its valuable edible oil (polyunsaturated and monounsaturated fatty acids) and as a garden crop (vegetable and cut flower). It is also grown for flavoring and coloring foods such as herbal tea, cattle feed, pharmaceuticals, dyes, paints and biodiesel. The aim of this study was to evaluate the influence of safflower genotype on the nutritional quality of whole seeds used as livestock feed. Nine safflower genotypes (eight exotic and one local) were grown in winter and summer. Seeds were harvested at physiological maturity and analyzed for various nutritional variables. Dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), and ash varied significantly by genotype and growing season. Seed mineral content (P, K, Mg and Na) also varied between genotypes. Whole safflower seeds have great potential to

serve as excellent cattle feed in semi-arid conditions (Lee et al., 2004). Benefits of safflower are Figure 3.

**Figure 3** Benefits of safflower.

### Sesame

Sesame seeds (*Sesamum indicum* L.) contain nutritionally whole seeds and seed cakes contain 22-25% and 22-35% protein; 43-50% and 9% oil; 11 and 23% carbohydrates; 3 and 4% minerals Whole sesame seeds contain a total of 6.3 g of dietary fiber; ash 5.3 g; iron 10.5 g, sodium 60 g; potassium 725 g; calcium 1,160 g and phosphorus 616 g; vitamin A 10g/100g, thiamine 0.98g/100g; riboflavin 0.24 g/100 g; Niacin 5g/100g (Saleem et al., 2019). Amino acid and fatty acid composition. Benefits of sesame on health are Figure 4.<sup>10-13</sup>



**Figure 4** Benefits of Sesame on health.

## Conclusion

The benefit of four oilseeds cannot be denied hence their nutritional importance Table 1.

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## Conflicts of interest

The author states there are no conflicts of interest.

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