Sunflower Protein

Agricultural Utilization Research Institute

Minnesota Overview

Sunflower's main utilization is for the production of oil. The meal that remains after the extraction of oil is for animal feed. The meal is high in protein and could be a good source of protein ingredient for food use. Estimates of Minnesota's sunflower yields in 2016 were 1,465 lb/acre, with sales totaling more than $23 million. Minnesota's average price for sunflower in 2016 was $2/cwt higher than the national average of $17.40/cwt. This higher selling price may incentivize Minnesota farmers to enter into, or expand, sunflower production.

Increasing sunflower production would make this crop readily available for protein ingredient production. There is still some financial risk, as sunflower yield and protein content is dependent upon soil nitrogen, phosphorus and potassium levels. Some farmers will need to increase their production budgets to include the costs of soil fortification.

Nutritional quality

On a dry basis, sunflower seeds contain between 20 and 40 percent protein. Defatted sunflower meal is often around 30 percent protein, but can reach levels as high as 53 to 66 percent when extracted using an organic solvent. Besides having low lysine content, sunflower protein meets all other amino acid requirements. Sunflower protein contains about 20 percent branched-chain amino acids, essential for muscle repair. Given the low digestibility of this protein, the PDCAAS score is relatively low at 0.6.

Currently available protein ingredient forms

Sunflower protein powders for human consumption are available, and have about 50 percent protein. Inexpensive, large-scale processing methods to isolate sunflower proteins, however, are currently lacking.

Potential functionality and applications

Sunflower protein may potentially be a functional protein due to relatively good solubility. Sunflower protein is often a byproduct of oil extraction and usually denatured during processing, reducing solubility and functionality. If protein fractions are isolated without being denatured, sunflower proteins may become soluble over a range of ionic strength and pH. Sunflower seed protein has been incorporated into beef and dairy and cattle feed, but its use in food is confined to protein powder available in the

Sunflower Facts

- High in protein
- Relatively low PDCAAS score
- Susceptible to plant diseases
- Drought-resistant
- Protein is often a byproduct of oil extraction
- Allergenicity is rare
- Good solubility
- Seeds are non-GM

market from Natures Plus, advertised as organic, allergen-free, vegan and high in branched-chain amino acids. Limited research is available on sunflower protein functionality for food applications.

Advantages

Sunflower seeds are widely available and high in protein content. When the protein is extracted under mild conditions, the solubility and functionality is preserved. Compared to other proteins, allergenicity to sunflower protein is rare. Sunflower seeds are also non-GM, which further expands their potential market and eliminates barriers related to governmental deregulation and consumer acceptance.

Barriers

Research of sunflower protein is limited. The current oil extraction process is detrimental to the protein quality. Additionally, removal of chlorogenic acid (CGA) is necessary for the protein to be consumed by humans. Removal of CGA will also add to the cost of sunflower protein production. For farmers, the largest barrier to sunflower production is a lack of varieties resistant to production challenges. Disease and insect resistance is obtainable only though time-consuming methods, such as traditional backcrossing. GM sunflower seeds may become available in the future but, currently, the market is too limited to negate the costs of their development.

Feasibility

Yields and sales of sunflower in Minnesota demonstrate that production is possible. Sunflower is susceptible to common Minnesota plant diseases, which can reduce yield. Although these issues have a negative affect on sunflower yield, they are counterbalanced by the advantages of sunflower crops, such as the drought-resistance of some genotypes and the benefits of adding sunflower to wheat and barley crop rotations. Currently, available processing methods present barriers to commercial production of sunflower protein ingredients. Before wide-scale production become feasible, less-expensive, non-denaturing methods to eliminate CGA that preserves the protein nutritional and functional properties will have to be developed.

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