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Developing a Green Biorefinery Approach for Rural Processing of High-Value Camelina and Sorghum Co-Products

Abstract.

Camelina and sorghum are two promising crops for biofuel production; however, current approaches utilize only a limited fraction of sorghum or camelina to produce biofuel, and the remaining parts are treated as waste. The wasted portions of camelina seed and sorghum contain high value fractions that can be used in food, industrial, and nutraceutical industries. Therefore, there is a critical need for innovative approaches for complete utilization of camelina and sorghum during biofuel production to expand economic opportunities offered by these crops.

The goal of this project is to develop an integrated green biorefinery approach based on supercritical carbon dioxide (SC-CO_2) technology to utilize wastes obtained from processing of camelina seed and sorghum for biofuel production to obtain several high value fractions and products to be used in food, industrial, and nutraceutical industries. This project will generate novel nanoporous aerogels from camelina seed mucilage, a new lecithin source for food industry, astaxanthin and bioactive proteins and peptides from both camelina and sorghum for food and nutraceutical industries, and natural wax for both food and industrial applications. With this approach food and fuel will be generated together without any competition.

This project will establish a foundation for efficient utilization of energy crops and co-products to enable profitable camelina and sorghum production and utilization for biofuel production. This will put UNL at the forefront of next-generation energy crop research. The technology that will be developed will also be deployable at relatively low cost, scalable, and useful for multiple bioenergy feedstocks. This will facilitate the application of the technology in rural settings to support the economical sustainability of these communities and to create new market opportunities for Nebraska farmers to minimize the economic impact of periods of low commodity crop prices.