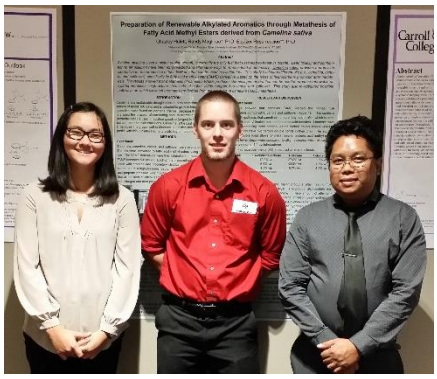
Advancing Bio-Based Chemicals and Next-Generation Fuels from Montana's Agricultural Crops

Figure 1. Camelina oil extraction.

With the steady decline of manufacturing employment in Montana and as the search for alternative energy sources continues, industrial oilseed crops pose a unique opportunity in addressing these issues. This collaborative research effort between Advanced Fuels Center, Montana State University-Northern (AFC-MSUN) and Montana State University Billings (MSUB) aims at establishing and maintaining a biorefinery utilizing Montana-grown industrial oilseed crops. If a local facility can process industrial oilseeds, such as camelina and carinata, and is able to pay producers a competitive price, there is potential for an oilseed-based biorefinery that will boost Montana's manufacturing employment and will meet industries' greener portfolio. The establishment of this biorefinery will provide sustainable growth in Montana's agriculture and manufacturing industry in two ways: [a] the research is expected to generate numerous Montana jobs and will allow the investment to be leveraged by attracting businesses and [b] the research can address the federal government's thrust of utilizing alternative energy sources to achieve a cleaner environment.

In order to achieve these goals, AFC-MSUN has been actively partnering with companies namely, Elevance Renewable Sciences, Inc. and Calumet Montana Refining. The patented process by AFC-MSUN has the capability to synthesize industrial oilseeds into high-value bio-based chemicals and next-generation fuels. Within the first quarter of this research, the researchers have successfully generated renewable high-octane chemicals. MSUB has also been developing a process to produce fuel pellets from underutilized biomass sources, such as agricultural byproducts and lawn clippings, and potentially from secondary product stream from seed oil extraction (e.g., camelina meal). This combined effort is anticipated to improve the economics and environmental performance of camelina-based aviation fuel.



Annual Fall Social, American Chemists' Society Montana Section.

Figure 3. Synthesis of renewable high-octane chemicals

To justify that this novel process will be economically sound and environmentally friendly, the researchers have procured the necessary tools to conduct a comprehensive techno-economic and life cycle analyses. These tools are not only critical to this research but also relevant to integrating student education and real-world applications. MSUN students from agriculture and civil engineering department were employed to assist in data collection and analysis.

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