

Enhancement of total lipid content/composition in non-GMO alfalfa and sainfoin for improved energy density and reduced methane emissions

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Completed: *In Progress. Results expected in March 2022.*

Project Title:

Enhancement of total lipid content/composition in non-GMO alfalfa and sainfoin for improved energy density and reduced methane emissions

Researchers:

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Background

Previous research has found that supplementing feed with moderate amounts of oil reduces methane production by ruminants. This phenomenon likely occurs, at least in part, because the amount of methane generated is correlated with the quantity a ruminant eats and increasing the proportion of lipids in feed would increase caloric density of the feed and therefore reduce intake. Dietary lipids have also been suggested to reduce the activity of methanogens and protozoal numbers. But increasing lipid content is difficult on cows on pasture, supplementation is often difficult to do logistically as well as expensive. Increasing total shoot lipid content (TSLC) in forages would provide a beneficial alternative.

Objectives

To improve forage quality in general, and forage lipid content in particular, for two important forage legumes grown in western Canada.

What they will do

The proposed project will build upon earlier success of this research team by using EMS-mutagenesis (non-GMO) as the basis for developing a large number of alfalfa and sainfoin mutants with increased TSLC and move germplasm closer to commercialization. Researchers will also attempt to decipher the genetic basis of high TSLC mutagenized alfalfa and sainfoin genotypes using a transcriptomics approach, and further characterize the lipid and metabolite profile of selected genotypes through metabolomics. Through this study researchers plan to use in-vitro techniques to assess various parameters related to fermentation, and initiate multi-location field studies in western Canada with high TSLC genotypes.

Implications

This research will allow plant breeders to will to continue to select for high lipid concentration alfalfa. Although no commercial cultivars will be available at the end of this trial it is a necessary step to breeding for alfalfa with a high lipid concentration.

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