IDENTIFYING AGRONOMIC AND ENVIRONMENTAL BENEFITS / DRAWBACKS OF DIVERSE CROPS IN CEREAL/CANOLA/ PULSES CROP ROTATIONS ON SEMI-ARID CANADIAN PRAIRIES

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Diversified cropping systems, where cereal, oilseed and pulse crops are arranged in well-defined crop sequences in crop rotation systems have been shown to have several agronomic benefits, including improved input use and net productivity of crops. Rain-fed crop rotational studies conducted on the Canadian prairies have frequently used major crop groups (cereal, oilseed and pulse), and little attempt if any has been made to show how special crops would perform and contribute to carbon sequestration (C), when included into a major crop group-based crop rotation. The Canadian special crop sector has grown steadily in the past decades, and Canadian specialty crops exports valued about $1.39 billion in 2016, including both whole and processed products (Statistics Canada, Crop Report, 2016). In total, special crops include over 20 crop types for predominantly human consumption. Many field studies, especially those with special crops, conducted in western Canada over the past years have helped us understand the agronomic basics of these crops in the drier prairie regions. Nonetheless, information on how special crops influence pest infestation, water use efficiency, soil nutrient status, and crop and soil productivity, when included in crop rotation systems containing major field crops is limited or lacking. Productivity of oilseed crops is a linear function of nitrogen (N) fertilization, but increased N application increases the carbon footprint of the oilseeds. Development of improved N management practices is crucial to lowering the carbon footprint in oilseed crops.

This proposed project was designed to address concerns and gaps related to i) cost effectiveness and the carbon credits (CCs) value opportunity that the grower can use to make cropping decisions, rotational sustainability, productivity, product quality, and ii) soil-N management, by integrating special crops into major crop dominant rotations systems.

New scientific information and knowledge generated from this multi-year and multi-location proposed comprehensive study using a single standard rotation protocol to measure parameters across eco-zones will help growers make informed business decisions for their whole farm based on this new comprehensive database.

Overall, this proposed project will fill key gaps in our knowledge and so will enable the development of comprehensive information on optimizing crop rotations by including major and special crops and fertility management for economic and environmental sustainability.

Mustard 21 supports these projects to generate a large database that will provide better practice(s) for Canadian agriculture sustainability. This attempt would strengthen Canadian agriculture to help it remain globally competitive and sustainable in the long-term.