230. Biofuels in the (arid) West: germplasm development for sustainable production of Camelina oilseed

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The emerging crop Camelina sativa has the potential to become an important biofuel oilseed crop for the extensive dryland farming regions of the West. Camelina has a number of properties that make it an already adequate oilseed-based biofuel feedstock for the Great Plains and Western US, including low input requirements. Although the species has received almost no modern breeding, the oil content of Camelina seeds is already nearly 40%, which is twice that of soybean. We focus on development of Camelina as a crop to be grown on marginal farmland with relatively low fertilizer inputs. Despite its numerous positive attributes recommending it as a biofuel feedstock for the Great Plains and Western US, needs for improvement of agronomic and oil quality traits remain. To maximize productivity and sustainability in the face of climate change, Camelina requires improved drought and heat tolerance to fit within dryland and limited irrigation agriculture. The Camelina genome has just been sequenced and assembled, providing the framework for targeted genetic manipulation. Here we seek to leverage this newly available genome, using forward and reverse genetics and natural variation to combine optimal qualities for an oilseed feedstock in the Great Plains and Western US.

Research Objectives: 1) Develop a TILLING population and utilize it to identify lines with preferred oil traits and improved heat tolerance. This resource will also be available for other important traits like germination and herbicide tolerance. 2) To develop germplasm of Camelina, by discovery and selection of loci affecting drought and heat tolerance and oil properties. 3) Leverage the detailed knowledge of lipid biosynthetic pathways in Arabidopsis and target these genes in Camelina. This can largely be achieved though mutagenesis. In addition, Camelina is easily transformed and thus there is an opportunity to radically improve and optimize the oil profile for use in modern diesel engines.