PROJECT TITLE:  **Oat Improvement for California**

STATUS:  **Continuing**

PRINCIPAL INVESTIGATOR:  **Isabel Alicia del Blanco**

COLLABORATOR:  **J. Dubcovsky**

LEVEL OF 2016-17 FUNDING:  **$12,000**

**OBJECTIVES AND EXPERIMENTS AT DAVIS, CA**

The two primary goals of the oat improvement program at UC Davis (UCD) continue to be the incorporation of additional virus resistance to BYD and CYD, which cause leaf reddening and dwarfing; and the combination of the early flowering of Montezuma in a healthier, more productive UCD cultivar. In addition, various plant types are always selected for different end-uses and environments (grain or hay/forage/green chop, irrigated or dry land).

We had the opportunity to explore the allergenic properties of oat for celiac disease through the interest of the Institute for Environmental and Public Health (IEH) laboratories. A set of twenty cultivars, including seven from CA, were analyzed using R5-Based Sandwich ELISA. Huge variability in prolamin content was detected among cultivars. Preliminary results were presented to the International Association for Food Protection Annual Meeting on July-August 2016, at St Louis, Missouri and a manuscript has been accepted by the Journal of Agricultural and Food Chemistry (Benoit et al. 2016 & 2017).

During 2016, we received the Quaker Oat Nursery that includes 108 pure lines and 160 entries from segregating populations (F2, F3 and F4) to be evaluated and selected for line/variety development. Entry sources’ include different locations within US (IL, ID, LA, MN, ND, TX, FL, and WI) as well as other countries (Canada, Argentina, Brazil, and Uruguay). This nursery will broaden the variability of our program: following observation/evaluation in single rows, the best selections will be incorporated in the crossing block.
SUMMARY OF MAJOR ACCOMPLISHMENT BY OBJECTIVE:

About 20 new crosses were made in the greenhouse during 2016/2017. The hybridizations combined new introductions and adapted California cultivars, such as UC142 with thin stem, which is highly desirable for animal foraging, and good resistance to the most common oat diseases in CA.

### Oat Crossing Block:

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All segregating populations were advanced one generation in the field. Selection for earliness, in segregating populations, was done by marking individual panicles emerging at the same time (or earlier) than the precocious check, Montezuma. In advanced generations, Montezuma-type earliness was selected by tagging individual rows. Further selection emphasized resistance to foliar diseases (mainly BYD and CYD), shorter types, and culm thinness. Around 20 elite lines are being tested in a RCBD experiment with three replications. Oat breeding plots were presented during UC Davis Field Day.

Through collaboration with the IEH Laboratories, a panel of twenty oat cultivars was analyzed for its prolamin contents. Prolamins, from wheat and other cereals, have distinct aminoacid sequences responsible for the inmunopathogenic reactions of celiac disease. Although it is supposed that oat is safer than other cereals for celiac patients, huge variability was detected among different cultivars. Some genotypes, such as UFRGS-028152, Curt and Kanota, exceeding the 20ppm prolamin threshold values, might be problematic to patients with celiac disease (Benoit et al., 2016 & 2017). The Quaker Nursery, with 280 entries, was planted in November 2016. Future efforts will focus in evaluating advanced lines and on advancing germplasm emerging from new crosses and introductions.
PUBLICATIONS AND REPORTS:


CONCISE GENERAL SUMMARY OF CURRENT YEAR’S RESULTS:

Two acres of oat breeding materials were planted at Davis during the 2016/17 crop season. Bulk populations in the F2, F3, and F4 generations are currently being evaluated, and advanced, at the Agronomy Field Headquarters of UCD. Twenty advanced lines are being tested in a 3-reps experiment. Two hundred eighty new introductions from the Quaker Nursery are in evaluation and selection. About 20 crosses of new material to the disease resistant UC142, and some other parents, were made in the greenhouse and the F1 is planted in the field. A study about prolamin content in different oat genotypes, and its potential allergic reaction for celiac disease was done in collaboration with the IEH Laboratories.

We thank the California Crop Improvement Association for previous years support. CCIA continues to be the only supporter of the oat breeding effort at UC Davis.

APPROVALS:

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