

Key achievements and contributions of WBCS over 2008-2011:

- ❖ ***Rewriting oilseed agronomic principles.*** Early in the project we recognized we needed to dispel common notions that “we can grow canola like we grow wheat”. Unique oilseed agronomic principles we established for WA included:
 - **Oilseed fertilizer/nutrient management:**
 - Nitrogen (N) and Sulfur (S) requirements per unit yield are higher than wheat
 - Oilseed uptake efficiencies and residual N recovery efficiencies are also higher, reducing fertilizer N requirements when rotational N carryover is high.
 - **Seedbed establishment and timing**
 - Winter canola seedling establishment requirements in the Mediterranean, semi-arid climate of eastern WA requires adequate moisture in the shallow seed and root zone, and moderate soil temperatures.
 - Approaches to optimizing these conditions include planting drill modifications, and timing of seeding with current weather patterns, as well as
 - early to mid-summer seeding, when soil moisture is still in seed zone, and
 - early seeding can be coupled with dual forage-grain biennial cropping of canola.
 - **Straw residue management**
 - Oilseeds tend to have lower harvest index and N harvest index than wheat, resulting in more straw and root biomass and nutrient returns to soil per unit of grain produced of good yielding oilseed crops, with greater carbon (C) and N cycling, and erosion control.
 - Conversely, poor oilseed yields and residue production due to poor seedling establishment or freeze/cold survival can reduce surface soil protection, causing greater susceptibility to soil erosion.
 - **Irrigation requirements**
 - High water use efficiency (WUE) of canola reduces irrigation water requirements
 - The higher canola WUE encourages canola incorporation into irrigated crop rotations with wheat such as in the Odessa deep well subarea where aquifer depletion incurs true costs of water to growers. Similar considerations pertain in canal water systems where WUE is an important factor.
 - **Weed management**
 - Roundup Ready™ (RR) canola in rotation with wheat provides control of pervasive weeds such as Italian rye and feral rye that develop with continuous cereal rotations. Subsequent wheat yield and quality, and rotational economics are improved.
 - Alternating RR canola with conventional chemical, non-RR canola may be necessary to avoid development of herbicide resistant weeds.
 - **Pathogen management**
 - Downy mildew was identified as a disease in camelina after observation in fields in eastern WA since 2010, and is the only prevalent disease or pest problem noted in camelina production in recent years. Further research determined the disease is seedborne, so additional studies were established to identify the source, as well as the effectiveness of seed treatments.

- **Organic canola production**
 - Feasibility was established in Puyallup, WA with cover crop enhanced fertility; weed control challenges are prevalent. Biosolids produced canola is feasible, but not USDA certified organic.
- ❖ **Oilseed analyses.** Nearly 2000 oilseed samples have been analyzed from an array of research projects since 2008. Correlating crop yield and oil analyses by AEZs, varieties, fertilizer rates, and other factors will allow more site-specific variety and management recommendations for maximum potential seed and oil characteristics for biodiesel and food oil production.
- ❖ **Commercial canola variety testing** assessed in the varied AEZs with additional support by WA State Canola Commission provides growers with information on AEZ specific variety selection.
- ❖ **Genetic modification of oilseeds**
 - **Herbicide resistant camelina lines** were isolated by non-GMO methods, and seed produced for field testing.
 - **Oilseed genes** supporting larger seed size and longer hypocotyl length have been identified for camelina and canola. As a result, deeper germination and seedling development, and higher yield potential can be realized.
- ❖ **Safflower growth and development**, water and N requirements have been characterized.
- ❖ **Policy impacts**
 - Sufficient grower and USDA ARS research plot yield data was provided to USDA Risk Management Agency for establishing crop insurance for canola producers in north central WA.
 - Conservation Districts are beginning to promote oilseed production and oilseed NRCS policies that support grower oilseed production.
- ❖ **Economics of crop rotation enterprise budgets**
 - Higher crop prices have made canola competitive in AEZ specific rotations with wheat and some alternative crops.
- ❖ **Extension outputs**
 - Annual oilseed workshop/conference has grown in scope, prominence and diversity of participation with average participation of 200 registrants, with the highest participation by growers and industry representatives.
 - 3 extension publications ([App. 1](#))
 - 46 abstracts ([App. 1](#))
 - 35 field tour events,
 - 2,375 web site visits from 25 countries, 30 states, and 51 cities in WA (stats only available Sept. 1, 2010-Dec. 31, 2011 due to website modifications)
- ❖ **Research outputs**
 - 6 refereed journal publications ([App. 1](#))
 - 6 graduate students supported

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