**Introduction**
The U.S. remains highly dependent on fossil fuel imports and interest in producing bio-jet fuel from vegetable oils has increased. Brassicaceae oilseed crops have high oil content and quality characteristics that make them suitable for biofuel production. In addition, Brassicaceae crops have shown rotational benefits when grown with small grain cereals that predominate in the dryland Pacific Northwest (PNW).

However, few studies have examined species adaptability to PNW growing conditions, the physiological growth pattern, basic plant morphology, reaction to biotic and abiotic stresses or rotational effects.

In this study we examined yield and oil content of three fall-planted Brassicaceae species (Brassica napus, B. rapa and Camelina sativa) and six spring-planted species (B. napus, Sinapis alba, B. juncea, B. carinata, B. rapa, and C. sativa) to evaluate the adaptability of these oilseed crops in our region.

**Materials and Methods**
Field trials were grown near Moscow, Idaho in 2013 and 2014, and near Genesee, Idaho, in 2014. Tillage management at each site was consistent with regional commercial practices. The experimental design of each trial was a randomized complete block design with four replicates. Winter and spring planted trials were grown adjacent, although they were not inter-randomized. Plot dimensions were 2.5 x 4.6 m for winter crops and 3.7 x 11 m for spring crops. Each crop species and cultivar was planted at a seeding rate 1,207,500 seeds ha⁻¹. However, seeding rate for the small seeded species C. sativa was 3,850,000 seeds ha⁻¹.

Weeds and pests were controlled throughout by application of appropriate herbicides (in addition to occasional hand weeding) and insecticides.

At maturity, crops were swathed (winter only) and combine harvested, dried to 6% moisture prior to weighing, cleaned and a subsample was taken from each plot for oil content analysis.

After harvesting the oilseed crops, the complete trial area was planted to winter wheat to determine the rotational effect of the previous oilseed crop.

**Abstract**
The adaptability of six Brassicaceae species as oil crops for producing bio-jet fuel feedstock in the Pacific Northwest was examined. Seed yield and oil yield of winter cultivars were significantly higher than spring cultivars. Oil yield of the most productive (Wichita) exceeded 2100 L ha⁻¹, almost twice the highest oil yield of any spring cultivar. Brassica napus winter cultivars produced higher seed and oil yields than winter B. rapa or Camelina sativa. Among the spring-planted species, B. napus showed greatest adaptation; although B. juncea cultivars and one B. carinata line also produced acceptable yield and oil yield.

**Results and Discussion**
Highest seed yield was obtained from the two winter canola (B. napus) cultivars (Wichita, 4,491 kg ha⁻¹, and Amanda, 4,186 kg ha⁻¹) (Figure 1). Winter industrial rapeseed cultivars, Durola and Dwarf Essex, also produced high seed yield, 3,780 kg ha⁻¹ and 2,732 kg ha⁻¹, respectively. Yields of spring cultivars and species were significantly lower than the winter ones. The highest yielding spring cultivar was DKL 30-42, 1,954 kg ha⁻¹ (B. napus) followed by Oasis, 1,632 kg ha⁻¹ (B. juncea).

The highest oil yield was produced by Wichita, 2142 L ha⁻¹, Amanda, 2020 L ha⁻¹, and Durola 1983 L ha⁻¹, all winter B. napus cultivars (Figure 2). By comparison, oil yield of spring crops was markedly lower, particularly from the low oil content mustard species (S. alba, 346 and 336 L ha⁻¹) and camelina (C. sativa 467 L ha⁻¹).

Estimating simple farm returns at October 2014 prices showed highest returns from winter canola or rapeseed ($2273 ha⁻¹ or $906 acre⁻¹). Farm returns from spring canola or rapeseed was $842 L ha⁻¹ or $341 acre⁻¹. Farm returns on mustard were equal to spring canola due to traditionally higher seed value for condiment spices.

Over all cultivars and species there was no significant difference in following winter wheat yield potential.

**Conclusions**
Based on these two years of data, winter canola or winter rapeseed (B. napus) cultivars (Wichita, Amanda, or Durola) show best potential for a bio-jet fuel feedstock crop in the PNW. Based on seed and oil yield, the highest potential spring crops include canola and rapeseed, although one B. carinata line (AAC-A110) performed well.

Note that the winter crops were planted on fallow ground (common in many PNW areas), and the yield is realized over two years. Winter crops also showed lower yields in following wheat yields. The cause of the negative impact on wheat yield is not fully understood but may be related to water availability after the deeper rooted winter crops have depleted soil water.