allele in *Arabidopsis*. Even with this 30% increase in hypocotyl length in camelina, we have shown that these larger seeds and taller seedlings can dramatically enhance emergence from deep planting (8 cm) in dry soil (Figure 2).

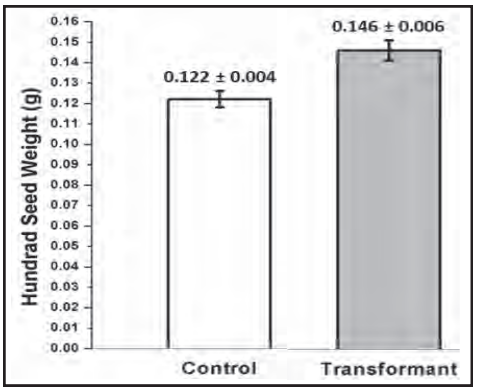

Fig. 1. Seed size is increased in *Camelina* The average weight of 100 wild-type (control) seeds is compared to the transgenic line used in Figure 2.

Fig. 2. *Camelina* plants expressing the *Arabidopsis sob3-6* mutation can emerge from deep planting in dry soil. Ten seeds (left: non-transgenic, right: transgenic) were planted on 1 cm of moist Palouse silt/loam and then covered with 8 cm of dry silt/loam. All seeds germinated however, no wild type seeds could emerge from this deep planting. Five transgenic seeds emerged and three survived. This experiment has been repeated twice.

Development of Camelina Lines Resistant to Group 2 Herbicides

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In the high rainfall, annual cropping zone, Group 2 residual herbicides (imidazolinones and sulfonylureas) continue to pose a major constraint to producing oilseed crops, particularly canola and camelina. After extensive field, greenhouse and laboratory testing, we have identified one mutant population in camelina that shows resistance to all Group 2 herbicides tested. This mutant occurred in the Cheyenne background and we have crossed it to Calena. Several large F2 families were planted in the field in June 2011 and sprayed with Pursuit. Seed from vigorous plants were harvested and planted in duplicate plots at Lind in late winter 2011. Seeds from single plants were again selected and were planted in yield plots this spring.

We hope to release a WSU cultivar in 2013 and we have already sent seed of the original mutant in the Cheyenne background to two different commercial breeding programs. We expect the SM4 mutation to be incorporated into several widely grown cultivars in the future, and expect this to reduce risks associated with camelina production in most regions.

Biennial Canola – A Three-for One Forage + Oil + Meal Crop

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Growing winter canola in eastern Washington is difficult without a fallow period or irrigation. Stand establishment after crop harvest in late summer can be problematic due to low soil moisture, and if seeding dates are later than recommended for the region, the canola plants may be too small to survive low winter temperatures. Good stands are not always easy to establish in late summer even when planting into fallow. A biennial canola study on 17 acres near Pullman examined early-planted, interseeded winter canola and spring peas as a potential source of forage, and a means of seeding into available soil moisture. Peas were planted on July 1, 2010, followed by canola seeding the next day. The field was swathed and windrows harvested on September 8,