



MSc thesis defense seminar for: **Angela Phung**

When: **January 6, 2017 at 9:00 am**

Where: **University of Alberta; Biological Sciences Bldg. CW 313. Edmonton, Alberta.**

Angela's project has been supervised by Dr. Cameron Carlyle and Dr. Jessamyn Manson.

### **The effects of defoliation on growth, reproduction and pollination of a non-native legume (*Astragalus cicer*) in the mixed grass prairie**

Herbivory can lead to trade-offs between plant growth and reproduction as defoliated plants lose initial resource investments and have reduced photosynthetic capacity. This trade off can lead to less investment into reproduction relative to growth and have repercussions for floral traits, pollinator attraction and plant reproduction. I investigated the effect of timing and intensity of artificial herbivory on the growth, floral traits, pollinator visitation and reproduction of an exotic perennial legume, *Astragalus cicer* L. My study was conducted in a native mixed grass prairie grazed by cattle. Over two summers, I clipped plants and measured the production of inflorescences, pollinator visitation, and production of vegetative and fruit biomass to evaluate the impact of low or high intensity clipping either earlier or later in the growing season. In 2015, I additionally measured nectar production.

In my first study, I found that high intensity clipping led to smaller plant spread, but stem biomass did not differ among treatments, and in 2014, high intensity clipping produced more stem growth compared to low intensity treatment. Late-high intensity clipping also produced more leaf biomass compared to late-low intensity clipping in 2015. In 2014, late-high intensity clipping treatments led to lower fruit biomass and late clipping treatments led to a lower fruit to vegetative biomass ratio. My results demonstrate that *Astragalus cicer* L. can partially compensate for herbivory at high clipping intensities, which may also facilitate reproductive compensation, especially when plants are clipped earlier, prior to flowering.

In my second study, I found that late-high intensity clipping led to fewer numbers of inflorescences and lower visit length per pollinator, while a late clipping intensity negatively affected nectar sugars per flower, fruit and seed production, and seed size. However, treatments did not affect other measures of pollinator visitation. Aside from effects on nectar production, effects on number of inflorescences, pollinator visitation and reproduction were mostly limited to 2014. Plants exhibited a greater compensatory response in the second summer. Since pollinator visitation had a weak effect on plant reproduction in 2014, herbivory may not affect plant reproduction indirectly through changes in pollinator visitation, but may directly affect plant reproduction through changes in resource availability.

The compensatory abilities of *Astragalus cicer* L. via vegetative regrowth may help to explain its abundance and success in grasslands despite recurrent herbivory by cattle. However, late grazing during flower development can negatively affect floral resources available to pollinators and plant reproduction, and can potentially lead to consequences for long-term fitness of *Astragalus cicer* L.