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Lecture on 10/16/17 at the Norwegian Institute of Bioeconomy (NIBIO)
Topic request to discuss use of Controlled Environments to Address Important Ecological questions regarding Biodiversity, Land Use, and Invasions Resulting from Climate Change. These discussion will focus on graduate students in related fields**.**

Title:
Discussion of Yellow Starthistle Response to Photosynthetic Irradiance, Photoperiod, and CO_2

Yellow Starthistle (*Centaurea solstitialis*) is a native annual weed of Eurasia and since introduction into the United STates has become an invasive and noxious weed. It grows in a rosette habit during the vegetative state and usually bolts in summer to produce a large and branched flowering stem. Time to flowering in Yellow Starthistle has been attributed to photoperiod, nitrogen nutrition, temperature, and water stress. We executed a series of studies to investigate the role of light, both photoperiod and photosynthetic photon flux, on flowering and development in Yellow Starthistle. Treatments were presented in 4 ways:

1) varying day length with constant photosynthetic photon flus (PPF) – providing increasing daily integrated Photosynthetic Photon (PP) exposure with longer day lengths
2) varying day length while adjusting PPF to maintain daily PP exposure for all treatments
3) extending photoperiod treatments beyond common 12-h photosynthetic period with low light levels to maintain both PPF and daily PP across all treatments
4) reciprocal exchange of plant among photoperiod treatments

Yellow Starthistle appears to be a long-day plant with a critical day length requirement between 14-h and 16-h to induce transition from vegetative to floral stages in development. PPF and daily absorbed photons did not affect time to vegetative / floral stage transition, but did affect factors such as biomass accumulation and canopy parameters such as specific leaf mass.

Reciprocal exchange of plants between floral inducing and inhibiting photoperiod treatments, starting at 2-weeks post germination, had no effect on to flower. Flowering was determined by photoperiod experienced during the first 2-weeks (or less) post germination.

Yellow Starthistle net photosynthetic response to elevated atmospheric CO2 concentrations over a range of photosynthetically active radiation flux rates and temperatures will also be presented and discussed.