Keeping Time with Food:

Plant-mediated diapuse initiation in *Leptinotarsa decemlineata*, the Colorado potato beetle.

Latitudinal expansions of insect populations often require significant ecophysiological adaptations for the synchronization of seasonally dependent life cycles. Particularly, northern expanding populations originating from subtropical regions must develop novel mechanisms for the recognition of appropriate diapause cues for successful colonization and establishment. Critical photoperiods represent the dominant cue for diapause initiation in most insect species found within temperate regions. However, within newly migrating populations, less dominant cues (e.g. critical temperatures, food quality, moisture, etc) may emerge as vital signals for survivorship as evolutionary changes lag temporally behind geographic migration. In an attempt to uncover the presence of such alternate cues, we investigated the effect of plant mediated cues on diapause behavior within the *Leptinotarsa decemlineata*, the Colorado potato beetle (CPB). CPB is the primary insect pest on the common potato within North America. Its current geographic range expands from central Mexico to Quebec, CA. We tested the effect of photoperiod changes on plant growth of potatoes in a common garden experiment and the subsequent effect of these growing conditions on diapause incidence in Vermont collected beetles. Our results revealed a significant effect of short-day (8:16 L:D; 10:14 L:D) photoperiod growth regimens on diapause initiation. Over 60% of beetles feeding upon plants grown under short day conditions initiated diapause compared with 20%< of beetles in the long day treatment. These results underscore the importance of host based diapause cues in the successful colonization of latitudinally expanding herbivorous insect populations. Furthermore, as agricultural landscapes increase in size and global distribution, the likelihood of new pest expansions may be linked to the distribution of traits facilitating cue recognition within migrating populations.