

ABSTRACTS
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VARIATION IN FEMALE SEX PHEROMONE AND MALE CHOICE AND NO-CHOICE ASSAYS IN *Cadra cautella*

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The female sex pheromone of *Cadra cautella* is a two-component blend of (*Z,E*)-9,12-tetradecadienyl acetate (*Z9,E12-14:Ac*) and (*Z*)-9-tetradecenyl acetate (*Z9-14:Ac*). An earlier study documented considerable heritable variation in pheromone component titers and ratio. This study used choice and no-choice assays to quantify the consequences of variation in blend ratio in terms of male orientation behavior. Results from the no-choice assays demonstrated no effect of blend ratio on male wing-fanning and flight initiation behaviors. The number of males contacting the point source was not independent of blend ratio. Significantly more males contacted point sources of blends of both pheromone components than point sources of the major component (*Z9,E12-14:Ac*) alone. Results from the choice assays were consistent with weak stabilizing acting on blend ratio. The no-choice assays suggest that in male *Cadra cautella*: 1) the initiation of orientation flight is independent of blend ratio; and 2) location of the point source is independent of blend ratio provided both pheromone components are present. The choice assays suggest that unlike the no-choice assays there are consequences associated with variation in blend ratios that can be measured in terms of male orientation behavior. The significance of these results, are contingent on whether choice or no-choice assays are behaviorally relevant and will be discussed.

MULTI-RESPONSE PERMUTATION PROCEDURES, THE ASSUMPTION OF HOMOGENEITY OF VARIANCES AND TRAP CATCH DATA

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Few data sets generated as a part of trapping studies are able to satisfy the assumptions of normality and homogeneity of variance, in particular those with negative controls. In general, published studies rely on transformations to satisfy the assumption of normality. Unfortunately, data transformed to meet the assumption of normality will not necessarily satisfy the assumption of homogeneity of variance. Using eight key words commonly

adults are attracted to ripe tart cherries, but the compounds involved have yet to be identified.

Claiming Uncertainty: Filling data gaps in risk assessment of transgenic Bt crops
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Genetically engineered crops with novel forms of pest resistance are under scrutiny by researchers and regulatory agencies for risks associated with increased fitness, competitive ability, and invasiveness of wild crop relatives that may obtain insect-resistance traits through gene flow. Risk assessment research on the impacts of insect herbivores on plant population dynamics is vital for informing regulatory decisions on transgenic insect-resistant crops. To estimate the effect of damage by Bt-susceptible lepidopteran herbivores on the rate of population spread of weeds, we compared Bt-spray protected wild radish (*Raphanus sativus*) and wild mustard (*Brassica rapa*) plants to plants inoculated with cabbage butterfly larvae (*Pieris rapae*) along the central coast of California. The contribution of lepidopteran herbivory at each stage of the life cycle to the overall decrease in population growth was explored using Life Table Response Experiments, showing whether the effect of insect-resistance can convert stable or decreasing population trajectories into increasing ones, thereby leading to significant changes in invasiveness. Our results show populations of wild radish and mustard being impacted differently by protection from lepidopteran herbivores. I discuss the opportunities and constraints of risk assessment research for public policy.

DIVERSITY OF LADY BEETLES (COLEOPTERA: COCCINELLIDAE)
ASSOCIATED WITH ALASKAN AGRICULTURAL CROPS
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Little information is available on the abundance and seasonality of beneficial insects associated with Alaskan agricultural crops. A survey was conducted during 2004 and 2005 to assess the relative abundance and species diversity of coccinellids in Alaskan agricultural habitats. Organic and low-chemical-input farms producing potatoes, rhubarb, and other vegetable crops near Fairbanks, Delta Junction, Nenana, and Palmer, Alaska were chosen as study sites. From May to September, coccinellids were sampled weekly along field margins with water pan traps and yellow sticky cards. Specimens were also collected by hand picking/visual examination and sweep netting of foliage at sporadic intervals throughout the season during 2005. Additionally the University of Alaska, Fairbanks, Museum of the North (Fairbanks, AK) insect collection was examined to provide baseline diversity information. Eleven species of coccinellid were collected in

from agricultural areas. Of the species collected, *Hippodamia tredecimpunctata tibialis* (Say), *Hippodamia quinquesignata quinquesignata* (Kirby), and *Coccinella transversoguttata richardsoni* Brown were the most abundant and probably provide the most promise as naturally occurring biological control agents. The introduced species *Hippodamia convergens* Guerin and *Coccinella septempunctata* (L.) were collected in low numbers.

GUSTATORY AND OLFACTORY RESPONSES OF *LYGUS HESPERUS* EXPOSED TO ARTIFICIAL DIETS CONTAINING POTASSIUM CHLORIDE

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Four multiple diet choice bioassays, a single no-choice diet choice bioassay, and Y-tube olfactometer bioassays were conducted to identify the response of adult western tarnished plant bugs, *Lygus hesperus* Knight to artificial diets containing potassium chloride (KCl). Four, multiple diet choice bioassays were conducted to determine the feeding response of *L. hesperus* when exposed simultaneously to five artificial diet treatments containing different amounts of KCl. For the first bioassay we used standard clear parafilm diet packets and for the second bioassay we used dark green parafilm diet packets to hold the various diet treatments. Regardless of the color of the diet packet, the lygus bugs overwhelmingly selected the 0% KCl diet treatment over the diets containing 3, 6, 9, or 12% KCl. The third and fourth multiple diet choice bioassays were identical to the first bioassay, except that the concentrations of the KCl-treated diets were reduced to 0.5, 1.0, 1.5 and 2.0% and 0.1, 0.2, 0.3, and 0.4% KCl, respectively. The lygus consistently selected the control diet over all diets containing more than 0.5% KCl. However, when the concentration of KCl in the diet was reduced to $\leq 0.4\%$, there were no significant differences in feeding activity exhibited by *L. hesperus*. We then examined the behavior of *L. hesperus* by direct observation on a single diet choice (i.e., a no-choice bioassay) feeding arena. Twenty *L. hesperus* were placed in individual feeding arenas and observed for 15 min each. The arenas contained either a standard control artificial diet or a 12% KCl diet treatment. Overall, we observed 22 lygus feeding events lasting an average of 411 (± 64) seconds on the control diet and only three feeding events lasting an average of 11 (± 3) seconds on the KCl-treated diet. Finally, we tested the olfactory response of *L. hesperus* that were simultaneously exposed to a control artificial diet and a diet containing 12% KCl in a Y-tube olfactometer bioassay. Of the 95 adults tested, 47 selected the normal diet and 48 selected the KCl-treated diet. These results indicate that there are no olfactory cues emitted by either of the artificial diet treatments that either attract or repel lygus. The results from these studies strongly suggest that KCl negatively affects lygus feeding behavior by functioning as a strong feeding deterrent and not as a visual or olfactory deterrent.