Abstracts: Theme 4 – Pre-release Specificity and Efficacy Testing

Optimization of water activity and placement of ‘Pesta-Pseudomonas fluorescens BRG100’—biocontrol of green foxtail

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Pseudomonas fluorescens BRG100 was selected from earlier screening studies for pre-emergent bioherbicidal activity to green foxtail and wild oat. A granular formulation, Pesta, has been developed to deliver P. fluorescens BRG100. Delivery and placement of sufficient numbers of BRG100 to inhibit or suppress germination of the weed is one of the key challenges in bioherbicide product development. However, optimization of BRG100 survival, placement and dispersion from the Pesta granule in the target zone has not been fully established. Increased shelf-life of BRG100 in Pesta may be acquired by increasing BRG100 cell membrane integrity, optimizing the water activity of the granules ($a_w$), a useful measure of the free (unbound) water that is available for use by microorganisms. Addition of maltose, 3% w/w, reduced survival of BRG100 in peat culture and in Pesta granules prepared from peat powder cultures as compared to peat powder culture and resulting Pesta without maltose. Survival of BRG 100 in Pesta was greatest with the water activity ($a_w$) adjusted to 0.2 as compared to 0.5 and 0.8 $a_w$. Placement of Pesta in-row and side-banded with green foxtail was examined in a greenhouse study. Evidence of phytotoxin damage to green foxtail by Pseudophomins A and B was observed.

Impact of natural enemies on the potential damage of Hydrellia sp. (Diptera: Ephydridae) on Egeria densa

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Egeria densa Planchon (Brazilian Elodea or Brazilian waterweed) is a South American submerged perennial in the Hydrocharitaceae that has become a weed in North America, Australia, New Zealand, South Africa and parts of Asia and Europe. It crowds out other plant species by forming dense stands, negatively affecting the native biota, as well as water sports, fishing, navigation, delivery of irrigation water and hydropower production. The larva of Hydrellia sp. (Diptera: Ephydridae) from Argentina feeds on the mesophyl, producing chlorosis (bleaching) of two to three whorls per larva, and mining the stem in between them. Under laboratory conditions, a single gravid female can cause the defoliation of whole stems. In the field, this insect has several natural enemies that attack the larvae and the pupae. We discuss its potential impact on the weed under an ‘enemy release’ situation, considering Hydrellia has both specific and generalist natural enemies.