Assays for Predicting Mycoherbicide Formulation Compatibility

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Formulation is one of the major factors that determine mycoherbicide effectiveness and marketability. There are many choices for formulation components, ranging from registered agricultural products to novel substances such as sunscreens, humectants, and starches. Generally the first step in developing a mycoherbicide formulation is compatibility screening with the agent. Compatibility testing of these products, alone and in combinations, can consume a great deal of time and resources. If a rational approach to screening, based on adjuvant chemical structure, were developed, formulation development could be accelerated significantly. The objectives of this research are to examine the relationship between adjuvant chemistry and biocontrol agent species, and to identify a rapid, accurate laboratory screening assay. Thirty-three commercial and experimental adjuvants were used with four Alternaria species in this study. Three assays were compared: 1) a standard germination assay was performed by inoculating adjuvant-incorporated water agar plugs with spores briefly submerged in water, and assessing percent germination after 8 hours incubation; 2) a hydrated germination assay was performed by hydrating spores for 8 hours in the formulation before inoculating plain water agar plugs; 3) a radial growth rate assay was conducted by measuring the fungal growth rate on adjuvant-incorporated PDA. The four species reacted similarly to the adjuvants, and discreet responses to different chemical classes were observed. However, the correlation of results between the three assays was inconsistent. To determine which laboratory assay best predicted actual performance, select adjuvants were tested further by rating disease development of a single Alternaria agent in the presence of the adjuvants on Canada thistle (Cirsium arvense). Preliminary results suggest that a reliable and quick laboratory assay can be developed.