Historical Sensitivity of Common Plant Species Used In Non-Target Terrestrial Plant Testing

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ABSTRACT

Non-target terrestrial plant (NTTP) studies are used to assess the potential effects of agrochemicals on seedling emergence and vegetative vigor. Seedling emergence studies assess the exposure effects on emergence and growth in accordance with OECD 208 or U.S. EPA 850.4100 guidelines. Vegetative vigor studies assess the exposure effects on young plants in accordance with OECD 227 or US EPA 850.4150 guidelines. Dependent on the regulatory objective, these studies often require defining a no observed effect rate or various ECx values and may include testing up to 10 species of common plants. The inherent variability in this testing coupled with other challenges (hormesis, frequent shallow dose responses, lack of standardization for replication or planting density) presents significant issues in conducting this testing and interpreting the data. While increasing replication or testing additional application rates can increase the statistical power of these tests, this is often not feasible due to the resources required to conduct larger studies. In this poster, we summarize an extensive historical database for both seedling emergence and vegetative vigor studies. Tomato most frequently generated the lowest reported endpoint for studies while no effect levels were common representing 84% of endpoints related to ANOVA comparisons. PMSD was not a clear indicator of sensitivity with regards to toxic effects and no clear trends were observed across compound classes or modes of action.

METHODS

- Compiled endpoint data from 32 seedling emergence and 25 vegetative vigor studies
- Assessed species sensitivity in terms of lowest reported endpoint for each test type as well as across compound class and mode of action
- Assessed sublethal endpoint Percent Minimum Significant Difference (PMSD) for each species across test types

DATA COMPILATION SUMMARY

	NOEC/LOEC	EC_{25}	No Effect
Seedling Emergence	942	99	823
Vegetative Vigor	691	127	541
Total	**1633**	**226**	**1364**

Figure 1: Number and type of endpoints included in the assessment. No effect values encountered were in regards to ANOVA comparison.

Analysis of historical data demonstrates tomato is most sensitive of commonly used species

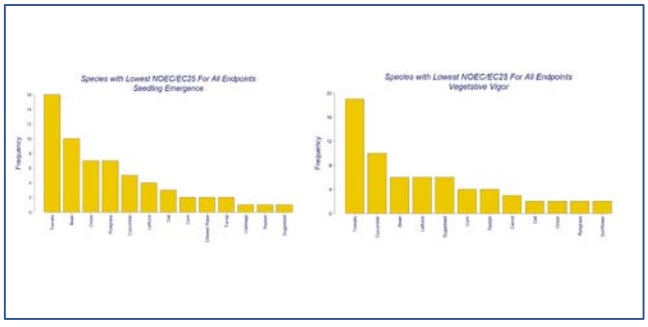

Figure 2: Frequency distribution comparing individual species sensitivity for complete seedling emergence and vegetative vigor data sets.

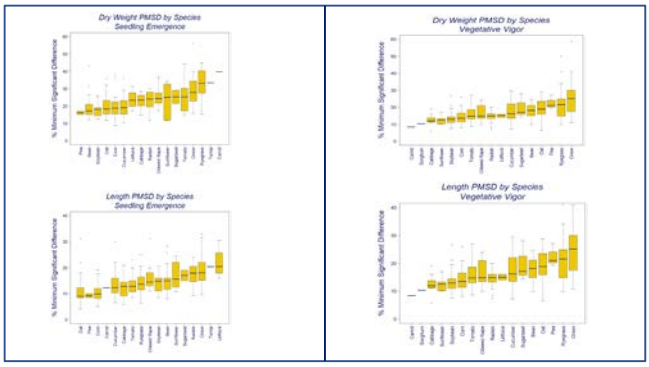

Figure 3: Box and whisker plots of PMSD data for sublethal endpoints in seedling emergence and vegetative vigor data sets. Open circles represent outliers.

CONCLUSIONS

- Tomato most frequently generates the lowest endpoint in both seedling emergence and vegetative vigor tests
- No effect outcomes were common for the data set and was observed for 84% of the total ANOVA endpoints
- PMSD was not a clear indicator of sensitivity suggesting a difference in statistical sensitivity and true toxicity
- No clear sensitivity trends across compound classes or modes of action

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