Practical considerations in the design and analysis of controlled environment experiments. (Z08-baker141943-Oral)

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Abstract:

Many plant scientists view plants as near perfect integrators of the environment to which they are exposed. Because of constantly changing environmental variables in the field, field experiments are often repeated across different years and/or locations in order to achieve reliable conclusions. Growth chambers permit holding multiple environmental variables constant while studying various physiological processes in response to one or more systematically altered environmental variables. However, growth chamber studies can be impacted by a variety of usually ill defined 'chamber effects' as well as low levels of replicated experimental units due to cost constraints. To overcome limitations in experimental units, experimental designs of growth chamber experiments often include repeated sampling, multiple experimental 'runs', partially replicated treatment structures and much more reliance on regression analyses compared with simple mean separation. We conclude that future growth chamber studies aimed at precisely quantifying 'chamber effects' should greatly enhance the utility of information gained from these experimental systems.

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