

REGRESSION ANALYSIS - A POWERFUL TOOL FOR THE WEED SCIENTIST

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Abstract. Regression analysis is a powerful tool that is little used by weed scientists except for the rather complex procedures of determining physiological interaction, i.e. synergism or antagonism, in herbicide mixtures (2, 4). Regression modelling is, however, far more useful than mean separation procedures such as Duncan's multiple range test, often used with analysis of variance in the weed science literature, because it alleviates the need for complex, and often statistically invalid, multiple comparisons (1).

Data are presented for two experiments in which regression analysis allows confident expression of a relationship that is not revealed, or uncertain, from analysis of variance.

The problem of designing an experiment to detect a difference of a stated size is discussed by Steel and Torrie (3). Using the equation given by them the following table was calculated for one of these experiments (data not shown) to give confirmation of statistical results obtained by regression analysis.

Comparison to detect treatment differences at 5% with 90% probability	A v. B	C v. D	E v. F
Value of difference (arcsine units)	0.798	0.192	0.049
Number of replicates needed	Lab. data, variance 3.4% of mean		
	3	25	360
	Field data, variance 30% of mean		
	14	200	3000

The experiment which produced the data for these calculations involved eight replicates of 23 treatments. Owing to the suitability of these data for regression analysis, the validity of small differences between certain treatments was confirmed, when in a two treatment comparison, for which regression analysis could not be applied, a ver much larger experiment would have been necessary.

It can be seen that, given the variability commonly found in field experiments, at least with perennial weeds, the number of replications needed for a randomized block experiment of the required precision becomes impossibly large.

REFERENCES

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