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PHOTOGRAPHY AS A WEED RESEARCH AID^(°)

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INTRODUCTION

In conducting research evaluation the weed control activity of herbicides in vegetables and other crops, the investigator, on occasion, is pressed for time often resulting in either inadequate or erroneous sampling. The reasons are many and varied for this inability to dedicate the necessary hours, often required, to this sometimes lengthy procedure of counting individual weed species.

It is known that ; 1/ A photograph made of and parallel to a plane surface, and at a fixed, known elevation will consist of a near constant area that may be calculated in the unit of measurement desired ; 2/ When an object of known dimension is placed on this plane surface, and then the photograph made, the exact area in the photograph may be calculated, and ; 3/ If the photograph of this plane surface with a scale object included, is made on transparency film, processed and mounted, the exact area may be reproduced, if necessary through manipulation of the projector.

The purpose of this paper is to present results obtained utilizing the above statements in relation to the reliability and exactness of counting weed species photographed from a given size versus counting of the species in the same plot in the field.

MATERIALS AND METHODS

A Canon^(°°°) camera, model TLB with a FD 50mm f 1.4 lens was comfortably hand held at an elevation of 1.45m (4.75ft) and the area viewed through the lens was measured to be 60cm (1.97ft) wide and 91cm (2.99ft) long, or an area of 0.55m² (5.89ft²). A template was made to these dimensions from 0.63cm (0.25in) plywood, for use throughout this experiment.

Lids having a diameter of 5.5 cm (2.17in) were spray painted white and used as scale indicators. For plot and treatment identification, plastic letters and numbers with adhesive backing, for easy removal were used, being affixed to the upper surface of the scale indicator.

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(°°°) Trade names are used solely for purpose of providing specific information. The mention of trade names does not constitute a guarantee or warranty of equipment or materials by the Agricultural Experiment Station of the Univ. of P.R., or an endorsement over other equipment or materials not mentioned.

To maintain the depth of field and have the scale indicators with plot and treatment identification in focus, small sections of plastic pipe of different lengths were made available to elevate the scale indicator to the same height of the weed seedlings.

A herbicide experiment in progress for 34 days at the Isabela Substation was chosen to evaluate this photographic method. This experiment was a partially balanced incomplete block, three treatments ; six replications, with the objective to determine the effectiveness of EC and WP formulations of the preemergence herbicide Sencor (metribuzin) at the 0.84kg ai/ha) rate on tomato "Walter".

One mini-plot within each treatment was selected at random. The template was placed on this selected area, and with the scale-identification marker in place, the mini-plot was then photographed. The plot was then marked with stakes and cord and the template removed. This procedure was repeated, until all treatments were photographed.

All weeds in the staked plots were then hand harvested, and separated according to specie, counted and recorded.

The transparencies, made on Kodachrome 25 daylight (KM) film were processed and mounted. The slides were projected on a screen of white paper measuring 41.9cm (16.5in) by 68.6cm (27.0in) which provides an area large enough for seedling identification and marking. Felt point marker pens of assorted colors were used to mark the seedlings projected on the paper. The same color of pen was used to mark each weed species. The individual dots, thus representing a single specie, were counted and recorded.

RESULTS AND DISCUSSION

The weed count per plot by actual field count was evaluated against the slide method using a regression analyses. The results are summarized in table 1. It is clearly evident that there is no statistical difference in the slide count method as compared to the field count method. In all cases, the individual weed species gave correlation coefficients of 0.9x and over, with six having correlation coefficients of 0.99.

The fact that the slide count method is just as accurate as the field count method, provides the researcher in weed control investigation with a valuable tool in his field work. Where time is limited in the field, the use of the slide-count method permits the researcher to obtain his data without loss of accuracy.

The time involved in counting weed species either from the slides or in the field is the same, however, the former is more convenient, and a permanent record has been made.

The so called "normal" lenses, those that have a focal length of $f = 50\text{mm}$ are better adapted to this type of work than the "wide angle" lenses, which may have some distortion, particularly in the corners. Macro lenses are well adapted, permitting close-up photography up to 22.8cm (9.0in) from the subject. The area photographed with a macro lens is usually smaller than the same area photographed with a normal lens.

Although it is beyond the scope of this paper, it should be mentioned that there was no significant difference between EC and WP formulations of metribuzin in weed control. Neither formulation gave effective control of *Cyperus rotundus*, *Echinochloa colonum*, *Oxalis martiana*, or *Euphorbia heterophylla*. The species *Amaranthus dubbis*, *commelina diffusa*, *Parthenium hysterophorus*, *Portulaca oleraceae* and *Richardia scabra* were effectively controlled.

Table 1 - The statistical evaluation of the yield count vs slide count method of making weed counts.

Weed species	Weed count/plot		Multiple correlation Coefficient field vs slide
	Field	Slide	
Amaranthus dubius	16.0	15.7	0.99924xx ^(°)
Commelina diffusa	1.0	0.7	0.94280xx
Cyperus rotundus	21.3	20.0	0.97233xx
Echinochola colonum	319.3	312.2	0.99979xx
Euphorbia heterophylla	316.7	313.0	0.99963xx
Oxalis martiana	145.7	142.7	0.99827xx
Parthenium hysterophorus	18.3	18.0	0.99712xx
Portulaca oleraceae	104.0	100.7	0.99933xx
Richardia scabra	5.0	4.3	0.97053xx

ABSTRACT

Preliminary results are presented which indicate that a given number of mini-plots may be photographed as transparencies during emergencies or periods of heavy work load, and be previewed at a more convenient later date, with the same effectiveness as actual weed population counts made at the same time as the transparencies. The procedure used is outlined. There was no significant difference between weed species counted in the field and weed species counted from slides made of the same plots, at the same time.

RESUMEN

Presentamos resultados preliminares indicativos de que cualquier numero de parcelas pequenas pueden fotografiarse como diapositivas durante emergencias o periods de trabajo excesivo, para verlas mas tarde en fecha conveniente, con la misma efectividad en el contaje de yerbajos que pudiera hacerse al momento de tomar las transparencias. A continuacion explicamos el metodo usado. No hubo diferencias significativa alguna entre los yerbajos contados en el campo y aquellos contados con la ayuda de las transparencias hechas de las mismas parcelas a la misma hora.

(°) Significant statistically at the 1-percent level