Technical Notes:

Estimating Ratios of Live and Dead Plant Material in Clipped Plots

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Abstract

Hand separation of live and dead material from clipped plots is tedious and relatively expensive. Live and dead plant materials are easily distinguished under a microscope and can be quickly quantified. After clipping and drying, a sample can be separated in about 10 minutes.

Estimating the proportions of live and dead materials from vegetation plots is necessary for accurate determinations of forage production and is usually accomplished by hand separation. However, hand separation is expensive, especially when a large number of samples need to be separated. If an accurate method for estimating the live/dead ratio were available, large numbers of samples could be handled with greater efficiency. The purpose of this paper is to report a technique for subsampling and estimating live/dead ratios in vegetative samples.

Materials and Methods

Live and dead grass *(Sorghum halepense)* was collected and placed in a forced air drying oven until constant weights were obtained. Dry plant materials were ground with a Wiley mill to pass through 1.0-mm mesh sieve. Mixtures of the dried materials were made in a variety of proportions and were analyzed by the microscopic method described by Sparks and Malechek (1968). Only the occurrence of a live or dead fragment in a microscope field was recorded; the number of fragments per field was ignored. Two microscope slides were made for each mixture and 20 fields were analyzed for each slide. The process was repeated 3 times so that variation could be evaluated. All slides were examined at 10 × magnification.

When the microscope method is used for determining relative botanical compositions, plant materials are usually cleared to remove plant pigments (Cavender and Hansen 1970). After clearing, live and dead plant fragments are similarly colorless. During the present study, plant fragments were not cleared of pigments but were easily distinguished as green and brown fragments, respectively. In addition, slides were analyzed immediately following preparation. Because wet mounts were made, slides were rinsed clean after analysis and used again. Data expressed herein are means ± standard errors.

Results and Discussion

Mixtures containing 20 to 65% live plant material were analyzed. Known and estimated percentages were highly correlated ($r = 0.98$) and on the average estimates were only 3.5 ± 0.7 percentage points different from the known values (Fig. 1). The slope of a straight line describing the data was not significantly different from 1.0 so that for practical purposes there was a 1:1 relationship between known (Y) and estimated (X) values. Variation in the data for each mixture was small and occurred above and below known values, indicating a lack of technique bias for the experiment.

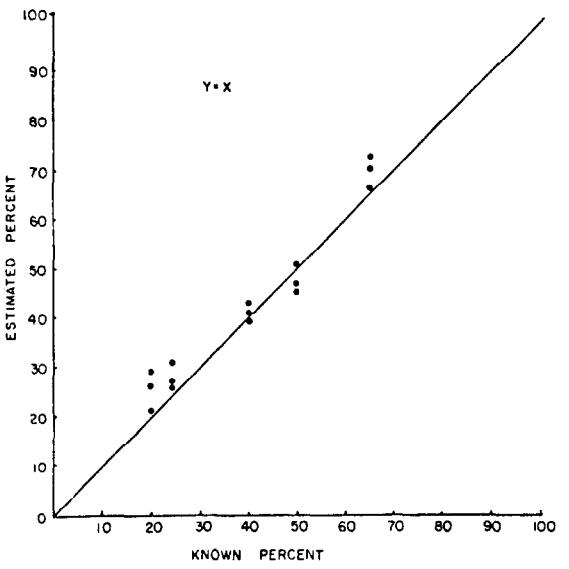

Fig. 1. *Comparison of known and estimated proportions of live plant material in ground mixtures of live and dead Johnson grass* (Sorghum halepense).

Estimation of live versus dead plant material by the method described here is reasonably accurate.

About 6 minutes were required to analyze the 40 microscope fields used to quantify the samples. If 4 minutes are allowed for grinding vegetation samples, then it is reasonable to assume that about 10 minutes are required for complete analysis. If another 10 minutes per hour are allowed for technician activities between samples, then it is reasonable to expect that 5 samples could be analyzed each hour.

The technique described here is an accurate and economical alternative to hand separation of live and dead vegetation. Since the difference between live and dead material is easy to distinguish, little training is necessary before technicians become competent to perform the analysis.

Literature Cited

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