SAGEBRUSH-GRASS RANGE SAMPLING STUDIES: SIZE AND STRUCTURE OF SAMPLING UNIT

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SAMPLING is an ever-existent problem in range research. The evaluation of the effect of experimental range practices on range forage production, the determination of the extent to which vicissitudes of climate influence plant growth, and studies of relationships between plant cover and intensity of erosion require measurement of vegetation. But it is seldom economically possible or practically desirable to observe, measure, or harvest the herbage from every plant on a range area. Usually some method of sampling is resorted to whereby data taken on a small fraction of the area are assumed to represent the whole. From these data are derived the mean or average (x) as an estimate of the true area mean, and the standard deviation (s) as an estimate of population variability. Only rarely do either of these two estimates coincide with the true value. Provided that both estimates are representative, however, the standard error of the mean, s/√n, furnishes the necessary information for determining the probable range of difference between the true mean and the estimated mean, that is, the sampling error.

Theoretically, sampling error may be used to set up fiducial limits (7, pp. 200-1), (14, p. 62) within which the true mean might lie. Thus used, odds would be 19 to 1 (fiducial probability, 95%) that the population mean lies between the 5% limits, or that there are only 5 chances in 100 that it will fall beyond these limits. The unbiased estimate of the standard deviation is additionally useful for predicting the approximate sampling percentage needed on other similar areas to secure a mean with an allowable range of error.

In any study of sampling two aspects must be considered, viz., representativeness and accuracy. Statistically, a sample may be considered as representative if estimates derived from the sample values tend in repeated samplings to give the corresponding population values (2). This representativeness is attained only when each individual of the population is given an even chance of being included in the sample. Accuracy of sampling is affected by method of sampling unit placement, by size and structure of the sampling unit, and by sampling percentage.

Efficient prosecution of range investigations depends on both representativeness and accuracy of sampling. Value of data from well-designed experiments may be seriously impaired by inadequate sampling intensities; costs of sampling may be increased unnecessarily by inefficient plot size or structure, or through lack of care in planning; or the validity of conclusions may be subject to question if the estimates lack representativeness.

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3Numbers in parentheses refer to “Literature Cited”, p. 682.