The Sickledrat: A Circular Quadrat Modification Useful in Grassland Studies[1]

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Highlight

A sickle-shaped modification of a circular quadrat has been used advantageously in tall-grass rangeland production studies in northeast Oklahoma. The main advantages of this quadrat are the reduction of the area concept bias in quadrat placement, ease of quadrat placement, reduction of perimeter decisions, and facilitation of precision clipping at various heights above the soil surface.

In most estimation methods of rangeland productivity, some type of area measurement is involved and some type of physical delimitation of this area is used. The ease or difficulty with which production estimates are accomplished and the statistical validity of these estimates are often a function of quadrat type, vegetation type, and sampling design.

The modified circular quadrat documented in this paper was used during the 1971 sampling season on the International Biological Program's Osage Site in Northeast Oklahoma. During the sample season, a 0.5 m^2 version of this quadrat was used to clip 156 quadrats at the soil surface, to estimate 884 quadrats on a species weight basis, and to height clip 80 additional 0.5 m^2 quadrats at 15 cm intervals from 0 to 105 cm. This particular grassland plot was dominated by little bluestem (*Andropogon scoparius*), switchgrass (*Panicum virgatum*), and indiangrass (*Sorghastrum nutans*).

The construction of the quadrat (Fig. 1) is ideal for working in tall-grass regions where one of the most time consuming jobs is quadrat placement. Use of a conventional circular quadrat is at best a frustrating experience, as placement involves working around the complete circumference of the quadrat using a pull-tug rearrangement method in order to get the quadrat to lie flat on the soil surface. Randomization also suffers as this process proceeds. Using the clear plexiglass sickledrat, quadrat randomization, location, and placement are easily accomplished as follows:

(1) The stake (Fig. 1, B) is thrown or placed according to a predetermined scheme.

(2) Location of the sample quadrat is determined by this point and the stake is pushed into the soil, using the driving cap if necessary.

(3) The sickledrat (Fig. 1, A) is placed on the stake and rotated slightly to set the point.

(4) Clipping proceeds by following the sickledrat's rotation on the stake.

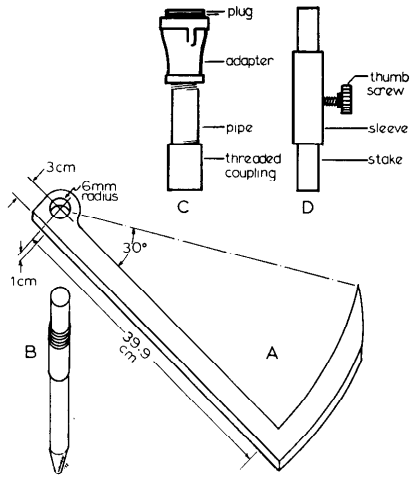

FIG. 1. Diagram of a 0.50 m^2 sickledrat (A) and associated accessaries; stake (B), driving cap (C), and height clipping guide (D).

The sharp point on the tip of the quadrat eliminates many perimeter decisions as the point slips through the vegetation dividing it precisely at the perimeter point. The height at which vegetation is clipped can be determined by the length of the stake used, or the depth to which the stake is pushed into the ground. If height interval clipping is to be done, a stake of suitable length is chosen and fitted with a smooth sleeve and thumbscrew (Fig. 1, D). The quadrat which rests above the sleeve, can then be adjusted to any desired height or interval and rotated for clipping and perimeter determination. If soil and moisture conditions warrant, the stake can be driven to the proper depth, without damage to that portion

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over which the sickledrat slips, by using the driving cap (Fig. 1, C) which screws directly on to the threaded portion of the stake (Fig. 1, B).

The basic materials used for this model were 0.25 inch plexiglass for the quadrat proper, case hardened steel for the stakes, and standard pipe and fittings for the driving cap. Many types of material could be used for the quadrat; however, the plexiglass seemed most desirable, as it is lightweight, durable, and easily repaired.

This versatile quadrat should be useful in many types of rangeland analyses.