Improved Needle Point Frames for Exact Line Transects

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Description of the Apparatus

An improved needle point frame for exact line transects in dense herbaceous vegetation was developed (Fig. 1). The apparatus consists of a rigid duralumin bar (B) of about 2.40 m long, with rectangular section (10 cm × 1.8 cm) bounded, at both ends, by a tightening nut system (S). After pushing into the soil two support-stakes (PS), the bar is fixed horizontally at the desired height, by the tightening nut system and with the help of a nivel, in such a way that the point of the needle (A), at its highest position, should be just above the "roof" of the vegetation. The upper part of the bar (B) is a ball-race and shows 80 small alveoles (a) spaced 2.5 cm center to center. The diameter of these alveoles corresponds to the diameter of a small ball linked to a sliding system (SC) surrounding the bar. This sliding system includes mainly two holes (0₁, and 0₂); which command the vertical position of a needle-holder (PA), a handle (b), a ball (u) held by a flexible rod (f) and a rubber-covered metallic cylinder (CM). This produces a sliding friction between the system (SC) and the bar, whose corresponding part is covered with a strip of emery-cloth. This hole allows the rapid, easy and regular movement of the needle.

The needle holder (PA) (Fig. 2) comprises:

1) A metallic handle (m) 2 cm in diameter; this is screwed on to a metallic rod T, 8 mm in diameter and about 50 cm long with inside screw-cutting at its ends.

2) A spiral spring (R), 30 cm long, surrounding the rod and whose extremities press on two discs (r), allowing the needle to come back to its initial position after observing hits of vegetation along a vertical line, up and down at a given "point."

3) A piece (P) with outside screw-cutting at both ends, the upper for receiving the lower part of rod (T), the lower for receiving the upper part of a sheath (G), 1 mm in diameter and about 12 cm long. A very thin needle (A) with a little cylinder (c) at the upper end, is put in the sheath (G) and locked. The needle is about 0.5 mm in diameter and 16 cm long; it may be twisted easily but it can also be changed rapidly and readily.

Methods of Use

At every point, the needle is slowly pushed down through the vegetation to the ground. The repeated hits of the sharp needle point at any plant part are recorded. Hits are registered on special forms. The needle is then moved to the next position.

The apparatus described allows great accuracy and repeatability of measurement (Poissonet et al., 1969). However, careful observation and therefore trained operators are its limitations. It is cumbersome and must be handled...
A New Approach to Estimating Herbage Moisture Content

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Highlight

Moisture contents of different species of range plants growing under generally similar conditions are closely related during the period of peak herbage development. From regression equations that express those relationships, moisture content of several species can be predicted within reasonable limits from the content of one or more associated species.

Moisture content is an important but generally neglected attribute of range vegetation. It commonly influences or relates to palatability, nutrient content, and flammability of herbage; to susceptibility of plants to damage from frost and trampling; and to droughtiness of range sites. It influences water and salt consumption by range animals, their grazing habits, and patterns of range use. It must be measured or eliminated before herbage production can be expressed in terms of dry weight. If production is used in computing grazing capacities, important variations in herbage moisture content should be recognized (Sharif and West, 1968).

Although several methods for measuring herbage moisture content are available (Magee and Kalbfleisch, 1952; Henderson, 1953), most are cumbersome and time consuming. A more expedient means is needed to increase sampling efficiency and extend the usefulness of moisture determinations. This Note provides evidence that moisture content of plants growing under generally similar conditions is closely interrelated, and may be predicted from the content of one or more associated species.

Study Area and Methods

Herbage samples for moisture determination were obtained from grasslands on Black Mesa, 30 miles west of Gunnison in southwestern Colorado at an elevation of 9,800 feet (Fig. 1). The rolling terrain provides good drainage and a variety of exposures. Most of the 25- to 30-inch annual precipitation falls as snow. Upon melting, it provides abundant moisture for plant growth.

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2 Forest Service, U.S. Department of Agriculture, with headquarters at Fort Collins, Colorado, in cooperation with Colorado State University.

Fig. 1. Herbage samples for moisture determination were obtained from Black Mesa grasslands in southwestern Colorado.

Most plants are in bloom by mid-July. When rainfall is abundant and well distributed, they remain green and relatively succulent throughout the summer. More commonly, however, moisture content declines and plant color fades with advance of the season. The more common plants, along with records to illustrate typical moisture contents at a given time and place, are listed in Table 1.

Herbage samples of several of the more productive species—3 grasses, 7 forbs, and 1 shrub—were collected on 44 occasions over a 4-year period. The 484 samples (44 for each species) provided a basis for determining how moisture content of one species varies with respect to that of another. Correlation coefficients, regression equations, and standard errors of estimate were computed for all possible paired combinations of records for the 11 species.

A total of 149 herbage samples collected on 16 subsequent occasions over another 4-year period provided a basis for testing the predicting reliability of the regressions. Moisture content of those samples was predicted independently on the basis of the measured content of Idaho fescue and aspen fleabane.

On each sampling occasion, the current growth of several plants of each species was harvested. Herbage was bagged, weighed immediately, air dried for 1 to 3 months at room temperature, and reweighed. Moisture content was computed as a percentage of net fresh weight. Collection dates varied from July 23 to August 27, and stages of plant development from preflowering to seed ripening. A sample of each species was obtained from each of 19 sites, most of which were about 1 acre in size.

In a separate study, five composite samples of Idaho