TECHNICAL NOTES

A ROTARY LAWN MOWER FOR SAMPLING RANGE HERBAGE[1]

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Workers in range research have long felt the need for rapid and accurate methods of obtaining herbage-yield samples from low-growing range vegetation. The sickle-bar mower has been used with some success, but it is better adapted to sampling higher-yielding pastures. Reel-type power lawn mowers have been tried but are generally unsatisfactory because of the bunchy nature of many range grasses and because they do a poor job of cutting the taller stems (Brown, 1954). Rotary mowers mounted on garden tractors have been adapted for harvesting forage plots by adding an herbage collection device; however, these were heavy, custom-made machines (Fortmann, 1956; Howell, 1956).

Of the various types of mowers, the rotary appears to be the best adapted to sampling range vegetation because it can effectively cut both low-growing leaves and tall stems. In 1958, a rotary mower equipped with a detachable grass catcher was announced. This note describes a test of this mower on seeded ranges.

The rotary mower tested[2] is an 18-inch rotary lawn mower powered by a 2.25-hp 2-cycle gasoline engine. It is equipped with a rigid plastic grass catcher that attaches to the rear of the mower. For transporting, the handle and catcher can be removed and the entire mower carried in an automobile trunk. In operation, the rotor, which is equipped with 4 replaceable cutting blades, cuts and chops the herbage and then blows it into the plastic grass catcher. The grass catcher containing the herbage sample can be quickly removed and the two weighed together and then the clipped herbage can be easily dumped or sampled for moisture or chemical determinations.

Tests using a small sickle-bar mower, a type commonly used in agronomic herbage sampling, and the rotary mower were conducted on two stands of crested wheatgrass *(Agropyron desertorum)* located on the Colorado State University Foothills Range near Fort Collins, Colorado. Area 1 is a low-yielding stand planted in 1942, whereas, area 2 is a vigorous, high-yielding stand planted in 1956.

Ten sample plots 34 inches wide and 16½ feet long were mowed with each mower on each area. Plots of this size required one pass with the sicklebar mower and two with the rotary mower. A border 3 feet wide was mowed around the sets of plots prior to actual sampling. The samples were taken by mowing from one border to the other (and back again in the case of the rotary mower). Two men took turns using the mowers so that each man mowed five plots on each area with each mower.

With the rotary mower, herbage samples were collected and weighed in the grass catcher, which will hold about 5 pounds of green herbage. Sample-plot size must be adapted to the capacity of the grass catcher. With the sickle-bar mower, the mowed

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[2] *The rotary mower tested was the Deluxe Turbo-vac Grass Catching Rotary (model 75) made by the Jacobsen Manufacturing Company. The mention of commercial products and companies in this paper does not imply that they are endorsed or recommended by the Department of Agriculture over others of a similar nature not mentioned.*

Table 1. Average time per plot to obtain an herbage sample and average herbage yields per acre obtained with a rotary lawn mower and a sickle-bar mower on two stands of crested wheatgrass near Fort Collins, Colorado.

	Average time per plot (seconds)		Average herbage yield (pounds per acre green weight)	
	Rotary mower	Sickle-bar mower	Rotary mower	Sickle-bar mower
Area 1 (old stand):				
Man A	30	64	820	727
Man B	30	60	885	978
Average	30	62	848	848
Area 2 (young stand):				
Man A	31	83	3,932	4,472
Man B	30	80	3,895	3,895
Average	30	81	3,913	4,184

herbage was raked and placed in a large cloth sack for weighing. All weighing was done with a hand-held milk scale. The time for sampling each plot from the time the mower entered the plot until the herbage sample was placed on the scales was recorded. The plots were mowed to a 1½-inch stubble, the shortest stubble obtainable with the sickle-bar mower. (It is possible to cut to a lower height with the rotary mower.)

With the rotary mower, each plot was sampled in less than half the time required with the sickle bar mower (Table 1). The saving in time with the rotary resulted from not having to rake the herbage and put it into a sack before weighing.

The average herbage yield obtained by the two mowers differed little (Table 1). However, more green leaves were left uncut and more mowed green leaves were left on the ground when the sickle-bar mower was used. The close agreement between the two mowers in average yield appeared to result from raking dry stems from the ground when the sickle-bar mower was used; these dry stems made up for the green leaves left on the plot. This dry material in the sample would upset any chemical analyses. The rotary mower showed little tendency to pick up dry stems lying on the ground. Yields and times varied less when the rotary mower was used. There was a much greater variation between men for average herbage yields with the sickle-bar mower than with the rotary.

Some difficulties were experienced with the rotary mower. When the ground was dry and loose, considerable dust was discharged. Some of this dust was collected in the grass catcher with the herbage and could influence chemical analyses. The cutting rotor is equipped with 2 vanes to increase suction. These were removed to reduce the amount of dust picked up, but the problem was not entirely eliminated. When used without the grass catcher in place, the mower would sometimes discharge debris and small stones back past the operator at a considerable velocity. The mower can be converted in a few minutes to side discharge to avoid this hazard by use of the metal baffle plate furnished. The rotary mower chops the herbage into such small pieces that separation by species would be impossible.

In spite of the above-mentioned disadvantages of this rotary mower, it does appear to have a great deal of promise for sampling range vegetation and warrants more extensive field testing at other locations.

LITERATURE CITED

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ADDITIONAL MODIFICATIONS OF THE POINT FRAME

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Heady and Rader (1958) presented some modifications of the point frame that they found particularly suitable for the short, thick cover of the California annual type. This note describes further modifications that we believe improve the apparatus for use under the conditions encountered in southern Idaho.

The frame shown in Figure 1 is made of extruded aluminum angle 1x1x⅛-inch. A piece 83 inches long will provide the U-frame and crosspiece. The third leg, which is hinged at the top with a 2x⅞-inch T-hinge, is 18 inches long excluding the attached point and is made of 1x 5/16-inch aluminum bar stock. The three points, fastened to the ends of the legs, are cut from 1x⅛-inch spring steel and are hardened to minimize blunting.

The over-all height of the frame is 21 inches, width 22 inches, and the crosspiece is positioned 11½ inches from the tips of the points on the legs. The crosspiece is cut out at each end so that the outside face (back side in photo) is flush with the