Table 1. Presence of blackened and spotted bitterbrush seed in cages with and without Say stink bugs.

	Cages with bugs	Cages without bugs
Number of cages	21	15
Number of seeds	1,742	1,944
Completely blackened seeds (%)	84.3	1.5
Seeds with necrotic spots (%)	0.0	8.3

in late May and early June. Numbers of bugs per cage ranged from two to eight and averaged 3.7. A high mortality rate of bugs necessitated periodic replacements until July 2. On July 10, shortly after natural seed drop in the area, all seeds were removed from the cages and examined for blackened or spotted areas. Results are shown in Table 1.

The large percentage of blackened seed in cages containing Say stink bugs leaves little doubt that this insect induced the blackening. The few blackened seed in the bug-free cages may have resulted from feeding by stink bugs outside the cages; by inserting their beaks through the screen, these insects could have reached some encaged seed. Necrotic spots appeared only on seed in the bug-free cages; this suggests that stink bugs are not responsible for spotting. Absence of spotting among seed exposed to stink bugs has not yet been explained. Perhaps some of these seed had been spotted prior to feeding by the stink bugs, but the subsequent blackening obscured the spots.

In a second test, adult Say stink bugs were introduced into two of four plastic bags containing unhusked seed collected in mid-June. After bugs had been in the bags three days, the husks were removed from the seeds, and examination disclosed that all 79 seeds exposed to the bugs were blackened. None of the 79 seeds from the bug-free bags were blackened, but 27 of them had necrotic spots.

The evidence casts strong doubt on the assumption that the same insect is responsible for both types of seed damage. Stink bugs probably could not have reached all the ultimately blackened and spotted seed (9.8 percent of total) in the bug-free cages from the outside (Table 1). Nor is it likely that the extent of feeding by stink bugs inside the cages and plastic bags would be so uniformly heavy that not one of the affected seed would be merely spotted rather than completely blackened. Thus, while the Say stink bug has been established as the cause of bitterbrush seed blackening, the cause of necrotic spotting remains unknown.

Presence of small holes within some of the necrotic areas still casts suspicion on some sucking insect as the causative agent. Psyllid (*Psylla* spp.) nymphs were abundant between seed husks and calyx tubes during the period of seed development. This sucking insect may damage bitterbrush seed, but we do not yet have proof.

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A DEVICE FOR CUTTING UNIFORM INCH-HEIGHT SEGMENTS OF PLANTS AND PLANT PARTS

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The study of plant species through inch-height segments was initiated in 1938 by Lommasson and Jensen and has continued to this day. Difficulties hampering this approach, however, are that more commonly used methods either produce inaccurate data or consume so much time that insufficient data are available for analysis.

Hand shears are often used, but: (1) only small grass plants may be cut in this manner; twigs or bunchgrass of considerable diameter cannot be handled; (2) portions of the vegetation fly off and are lost; and (3) wrapping the plant spirally with string or tying off each individual segment increases the time considerably.

A conventional paper cutter is more commonly employed. Although the paper cutter will handle slightly larger material, it has the same disadvantages—and another which is more serious. The cutting blade does not strike solidly against a chopping block. Instead, the blade shears down alongside the steel plate at the edge of the paper cutter. On larger samples this creates a diagonal cut. Segments are one inch at the point of first contact with the knife, but shear off at an angle to lose or gain as much as ¼ inch. This creates inaccuracies in the data.

An inexpensive cutter was developed for overcoming the above defects. This device eliminates the necessity of tying or wrapping, retains 100 percent of the sample, and provides uniform segments with cuts perpendicular to the long axis of the sample.

Materials

Quantity	Item	Size
1	Rough Lumber	2″ x 12″ x 36″
1	Plywood	¾″ x 12″ x 34″
1	Oak board	¾″ x 2″ x 12″
1	Oak guide	¼″ x ⅜″ x 24″
2	Steel Corner Braces	1½″ x 18″
1	Machete	18″ or longer
1	Sheet acrylic plastic	24″ x 24″
1	Tube plastic glue	
6	Bolts	¼″ x 3″

[1] *Forest Service, U. S. Department of Agriculture, with headquarters at Fort Collins, Colorado, in cooperation with Colorado State University. Research reported here was conducted at Albuquerque in cooperation with the University of New Mexico.*

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Hand shears are often used, but: (1) only small grass plants may be cut in this manner; twigs or bunchgrass of considerable diameter cannot be handled; (2) portions of the vegetation fly off and are lost; and (3) wrapping the plant spirally with string or tying off each individual segment increases the time considerably.

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1	Bolt	½" x ¾"
6	Lock washers	¼"
1	Lock washer	½"
10	Wood screws	¾"
1	Flat washer	½" x 2"

Construction

The cutter may be constructed from material usually found in most home workshops. Any wooden materials with sufficient weight to hold the device steady during operation may be substituted for the board and plywood. Most sizes of steel strap iron may be bent in a 90° angle to replace the corner braces. Any thin flat steel bar that will hold an edge or can be tempered may be used to make a cutting bar or knife. A machete, however, functions well and may be obtained in most places rather cheaply.

The size of the device may be changed to handle the item to be cut (branches, twigs, or grasses). Materials used in construction will vary accordingly.

The parts are assembled as shown in the expanded diagram (Fig. 1). Not more than ½ inch of the plastic box should rest on the edge of the oak chopping block. The steel corner braces with machete attached should be so positioned that the cutting edge slides down along the face of the box. The finished product should resemble the assembled view (Fig. 1). A line is then etched and inked on the plastic box one inch from the cutting edge of the knife. When cutting old or extremely dry vegetation that may shatter, it is usually advisable to bevel the leading ⅜ inch of the oak chopping block within the plastic chute. Do not bevel back to the point of impact of the knife.

When placed on a desk-high table, the device is at an optimum working level for most people. A chair placed under the plastic chute will hold most paper bags over the mouth of the chute. The plant to be cut is slid along the guide to insure perpendicular cuts. When the ends of the sample coincide with the black line on the chute, the knife is brought down sharply. This severs the whole segment and at the same time seals the orifice so that all vegetation must go down the chute and into the sack.

Discussion

When two operators are available, one chopping and one bagging, as many as 150 plants may sectioned in one day. A single operator is limited agement Research Project at Alexonly by the rapidity with which he can change paper bags. There is little or no variance in size or shape of samples. There is no loss of vegetative matter. Stems up to one inch in diameter and grass plants with a field diameter of 13 inches have been handled easily with this device.

Approximately 15,000 samples were cut with this device without a single breakdown. Maintenance consists of occasionally sharpening the knife blade. The frequency of this will depend upon the density and quantity of material being severed.

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FUMIDOR FOR HERBARIUM CASES

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A convenient fumidor for herbarium cases has been devised at the U.S. Forest Service's Range Man-

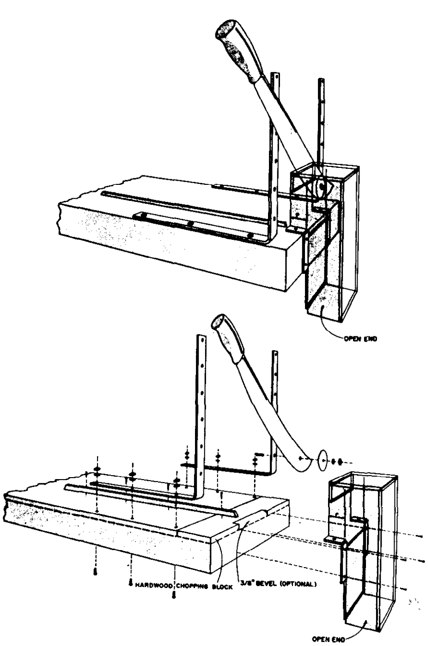

FIGURE 1. Assembled view and expanded diagram of device.

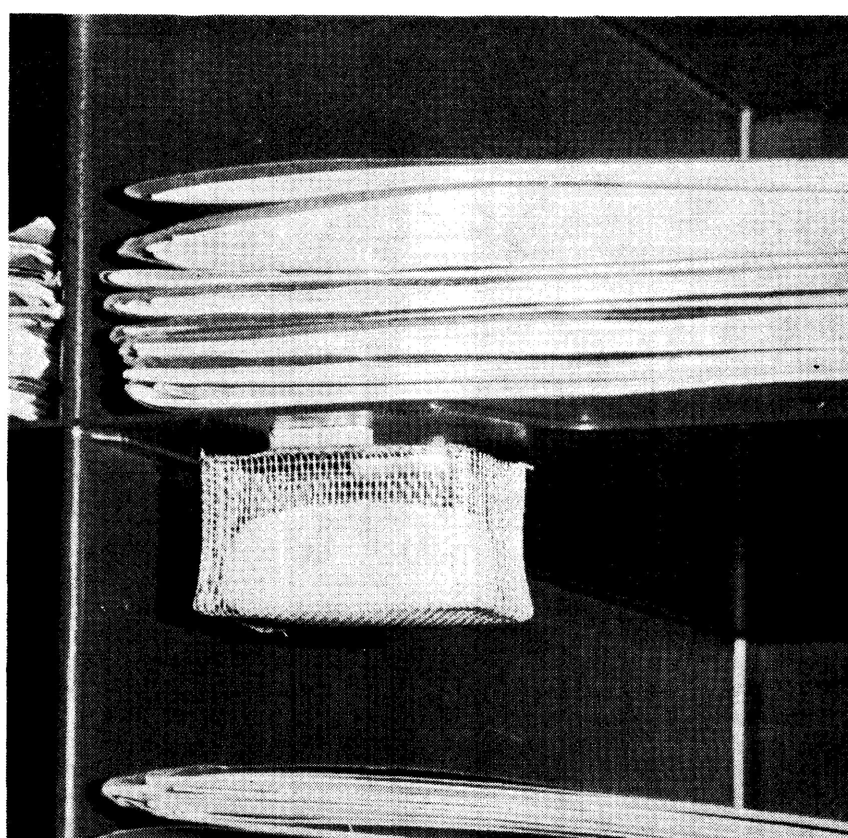

FIGURE 1. Fumidor under herbarium shelf.