that coneflower depresses the growth of brome in the field. However, ground
had the same effect on brome.

For sheep toxicity studies, aerial
parts of coneflower (seed heads, stalks,
and leaves) were collected from the
aspen site and were air dried, ground,
mixed, and prepared in feeding units.
On the first day, the material was
pumped into the rumen of each of
tree test animals at the rate of one,
two-thirds, and one-third pound, re-
spectively. When no symptoms of dis-
tress had developed by the following
day, the two lower doses were increased
to 1½ lb. each, and the feedings were
continued for an additional 3 days.
Observations and inspections of the
animals during and after the 4-day
trial showed no evidence of toxicity
or distress of any kind.

Under laboratory conditions, cone-
flower extract in low concentrations
can effectively inhibit germination and
seedling growth of some seeded grasses,
and extracts from species considered
to be nontoxic duplicate coneflower's
inhibiting effects on other plants. Carnahan and Hull (1962) found that
extracts from three range plants (cone-
flower, tarweed, knotweed) produced
abnormal germination in seeds of in-
termediate wheatgrass and radish and
that even intermediate wheatgrass ex-
tract had the same effect on radish
germination. During the study re-
ported here, we found that mountain
brome extract had an inhibiting influence on closely associated mountain brome
in the field, the effect should be detect-
able in growth characteristics other
than stem number per clone. Varying
soil and light conditions and differing
competitive capacities of closely asso-
ciated species are more likely explana-
tions for particular growth effects in a
particular location. Also, if coneflower
were significantly toxic to grazing ani-
mal, the effect probably would have
been apparent from the large doses
given in the force-feeding experiment.
Therefore, although coneflower is un-
desirable because of its status as an
unpalatable increaser, it does not pose
a special threat because of toxic or
inhibitory characteristics.

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Electric Shears for Plot
Harvesting

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**Highlight**

Battery powered electric shears can
reduce hand labor required to harvest
small forage plots. Extra rechargeable
batteries extend capacity to operate
shears for several hours. Such shears
will clip alfalfa and native range
gasses more uniformly than when har-
vested with conventional hand sickle.

The hand labor required to harvest
forage on small plots can be reduced
by using battery powered, electric
shears. Such shears have been used
successfully to harvest alfalfa and native
range grass plots. Alfalfa and native
range grasses were clipped more uni-
formly and more easily, than when harvested with a conventional hand
sickle. Weeds larger than alfalfa stems
were difficult to cut with the shears.

Small rechargeable batteries are con-
tained in the body of the shears; a
battery charger is included with each
shears. The capacity of the small bat-
teries was not sufficient for lone opera-
tion. Operating time between battery
charges was increased by adding an ex-
ternal battery pack, with no modifica-
tion of the shears. The battery charger
included with the shears can be used
to charge the battery pack.

Four rechargeable nickel cadmium
1.25 volt, 0.4 ampere hour battery cells,
series connected, will provide sufficient
capacity to operate the shears for sev-
eral hours. A laboratory test of the
shears' performance, with the shears
running, but not cutting, gave a run-
ing time of about 30 minutes with
the internal batteries, and about 3
hours with the battery pack.

The male charging connection of the
shears will fit the female connection
on polarized television power cords. The
battery pack is connected to the shears
by plugging the battery pack cord into
the charging connection on the shears.

The battery pack can be housed in a

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**Fig. 1. Shears, charger, charging adapter, and battery pack.**
Construction and Use of an Inexpensive Rain Gauge

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Highlight
An inexpensive, wind-proof rain gauge was devised for measuring precipitation at remote locations. The gauge can be constructed from a funnel, gasoline can and assorted lumber and metal. Gauges in use over one year have withstood winds in excess of 50 miles per hour. Ease of installation and minimal maintenance requirements make the gauge desirable for remote or inaccessible locations that are visited infrequently. Protection from livestock may be necessary if rubbing is a problem.

An inexpensive rain gauge with wind-proof stand was developed while establishing studies to characterize the phenology of vegetation in West Texas. The gauges were to be left for periods of up to three weeks. Various gauges were considered but found to be unacceptable. The small glass vial type, while being less expensive, limited data collection to the frost-free period. Official Weather Bureau gauges were considered to be too expensive.

Materials Needed
1. Diston, No. ECS 2 shears with battery charger (H. K. Porter Co., Inc., Danville, Va.)
2. Male polarized TV power cord receptacles.
3. Plastic box 9 x 15 x 6 cm, or other suitable container for holding battery cells.
4. Nickel cadmium, 1.25 volt, 0.4 ampere hour battery cells.
5. Polarized TV power cord (“cheater cord”).

Construction, Installation and Use
A list of materials for the construction of an inexpensive rain gauge is found in Table 1. The rain gauge is assembled by cutting out the center of the filler cap of the gasoline can and then brazing the funnel spout into it. The cap gasket is cut to form a ring to seal the cap when the cap and can are assembled.

The stand is made by nailing four pieces of 1 x 12 inch lumber into an open-ended box with inside measurements of approximately 11 inches on a side. The two pieces of 2 x 4 inch lumber are nailed into one end of the box flat leaving an opening approximately 3 inches wide and 11 inches long. The stands can be painted white for protection from the weather.

1 Published with approval of the Director of the Texas Agricultural Experiment Station as TA9424. Received October 8, 1971.
3 Haas, R. H. Unpublished data.