

RESIDUES, (pause) SOIL SURFACE (pause) EROSION, (pause) COMPACTION, (pause) STABILITY (pause) and DEPTH.

Programs for range sites not listed with a variable stocking rate (e.g., 0.4 AUM/Ac) do not prompt for site quality.

After selecting appropriate site quality, the calculator prompts by displaying "RANGE COND?". The numeric value of the range condition for the site is punched into the calculator (e.g., 70). The machine then calculates the stocking rate and converts data to acres per AUM for display (e.g., AC:AUM=4.8).

The range specialist now knows current range condition and estimated grazing capacity while standing on the site. If visual considerations of site indicate rates are somewhat high or low, adjustments to stocking rate value can be made by punching button for "ADD P.Z." or "SUBT P.Z.".

Usefulness of Program

This program was developed before we began the range survey on the Crow Indian Reservation. The calculator was used to determine stocking rates on approximately 300,000 acres during 1981 field season. We are very pleased with the

functionality of the calculator and program. Adjustments in stocking rate were possible in the field as site conditions warranted. We noted large areas of Kentucky bluegrass and timothy that were in poor range condition class but had considerable forage. We were able to adjust for unusual deviations in plant vigor, plant density, and topographic features such as numerous rocks, steep slope, and soil erosion.

Repeated determination of stocking rates in the field allowed us to develop an excellent perspective in relating stocking rates to existing vegetation and other site factors. Thus, we feel that variability in range sites over a large area can be assessed and handled in a professional manner.

The program and its placement in HP-41CV are too complicated to include in this paper. Individuals interested in details are invited to contact the senior author.

Literature Cited

- Ross, Robert L., Earl P. Murray, and June G. Haigh. 1973. Soil and vegetation inventory of near-pristine sites in Montana. USDA, SCS. 55 p.
- Zacek, Joseph C., Harold E. Hunter, T.A. Brown, and Robert L. Ross. 1977. Montana grazing guides. USDA, SCS. 74 p.

Little Bluestem for the Northern Plains

Dwight A. Tober, Erling T. Jacobson, Russell J. Haas

Editor's Note: Most of us are probably not aware how new cultivars are developed. This article adequately describes the process.

Native grasses are vital to the livestock industry in the Northern Great Plains. They add stability to the economic base and longevity to erosion and sediment control practices. Little bluestem (*Schizachyrium scoparium* [Michx.] Nash) is a native, warm-season bunchgrass, dominant in the drier mixed-grass prairie on sandy soils or on shallow soils along ridges and steep slopes. Where moisture conditions are more favorable little bluestem occurs naturally in association with tall grass species.

Problem

There are no commercially available cultivars of little bluestem adapted to the northern plains. Increased use of native species for range seeding, surface mine revegetation, critical area planting, and recreational area development has prompted the need for additional commercially available warm-season grasses such as little bluestem. This species is a high forage producer, nutritious to livestock prior to matur-

ity, and capable of providing excellent ground cover on shallow, droughty sites.

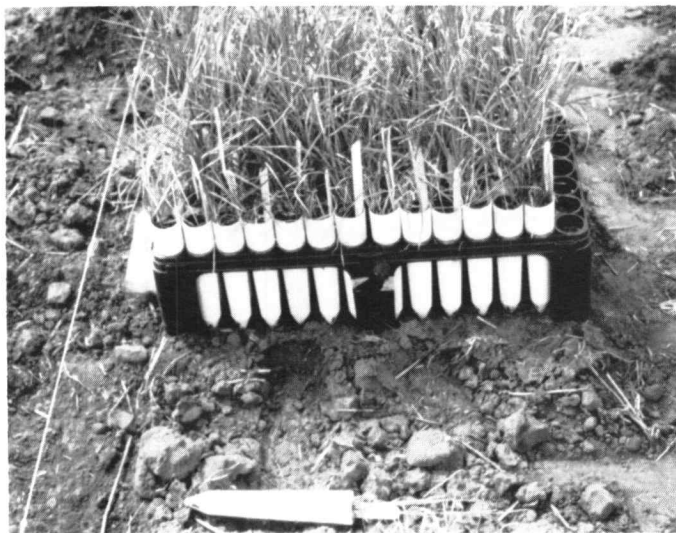
Objective

In 1979 the United States Department of Agriculture, Soil Conservation Service Plant Materials Center, located at Bismarck, N.D., initiated a project to assemble, select, and release one or more cultivars of little bluestem for conservation use in the Northern Great Plains. The procedures outlined in this article may have application in the assembly and evaluation of other native species needed for revegetation purposes.

Assembly

The Bismarck Plant Materials Center (PMC) serves the three-state area of North Dakota, South Dakota, and Minnesota. Because of the variety of climate and soil in this region, the collection area was extensive and included 23 major land resource areas. Two to four sites per county in each state (except northeastern Minnesota) were sampled, depending on the size and diversity of the county. Six vegetative subsamples were collected at each site. Each subsample, approximately 6 inches square and 8 inches deep, was placed in a plastic bag and labelled. It was the intent to

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Vegetative propagation and transplanting from cone-tainers helped ensure plant establishment.

sample a broad genetic base of superior little bluestem plants from diverse soil textures. Selection criteria included characteristics such as plant size, leafiness, disease resistance, persistence on droughty sites, and seed production. Areas that may have been artificially seeded were avoided. Accession data collected at each site included information such as legal description, elevation, slope, precipitation, soil series, and range site.

A total of 588 range sites were sampled. More than 3,500 individual plants were brought back to the PMC for processing. Nationwide, the Soil Conservation Service has a network of field offices that provide technical assistance to local Conservation Districts. Without collection assistance from these field offices, an assembly of this magnitude would not have been possible.

Processing

As the samples arrived at the Bismarck PMC, accession numbers were assigned and information recorded in the accession register. In October, 1979, two ramets (individual pieces) were removed from each parent plant and transplanted into separate cone-tainers. The potting material was a sterilized mixture of equal parts perlite, peat moss, and loam topsoil. The plants were then grown under controlled

greenhouse conditions during the winter months. Air temperature in the greenhouse was adjusted to maintain a soil temperature of 60° F, suitable for the continued growth of warm-season grasses. Liquid fertilizer was applied every 2 weeks through watering. Our experience is that if the cone-tainers are top-watered, firmness of the potting medium should be checked at regular intervals to avoid air pockets which may slow plant growth. Bottom watering in trays will alleviate this problem.

Daylength is another critical factor in growing little bluestem during the fall and winter months. Continued growth of little bluestem in the greenhouse required 18 hours of light each day.

Four released varieties of little bluestem were included in the project as standards of comparison. These were 'Blaze' and 'Camper', developed and released by the Nebraska Agricultural Experiment Station, and 'Aldous' and 'Cimmaron' from the Kansas Agricultural Experiment Station and the Soil Conservation Service. They were transplanted into cone-tainers and handled in the same manner as the field samples. Sixty ramets of each variety were added to the assembly.



Rachel Bergsagel, Biological Aid, and Dale Darris, Soil Conservationist, measuring one of the more than 7,000 little bluestem plants being evaluated for superior traits.

During May 1980, after 5 months of growth, initial survival and vigor ratings were assigned to document growth response in the greenhouse. The plants were trimmed to facilitate handling and minimize stress during transplanting to the field. They were randomized in trays according to the planting plan and set outdoors in a lath house to adjust to the change in environment.

Transplanting

The initial evaluation plots are located at the United States Department of Agriculture, Agricultural Research Service, Northern Great Plains Research Center at Mandan, N.D. The soil is a Williams silt loam. A randomized complete block planting plan was used with a total of 12 blocks, 6 in each of 2 replications.

More than 7,000 individual spaced plants were transplanted to the field beginning in June, 1980. Two inches of



A highly variable plant population was evident the second growing season.

sprinkler irrigation water was applied prior to transplanting because of dry soil conditions. A planting line was used to space plants at 42 inches and allow for cross-cultivation. Planting tools were used with the end piece machined to the same size as a cone-tainer. Rolling the cone-tainer in the palms of the hand allowed the sample to pull free without disturbing the roots. Root development was extensive and filled the cone-tainer of most samples.

Extra plants grown in the greenhouse were used as end rows to offset the border effect often encountered in block plantings. The plots were sprinkle irrigated following transplanting because of the dry summer. After establishment, the evaluation plots were cultivated as needed. No chemical weed control was used.

Initial Evaluation

A second vigor rating was given to all plants in October, 1980. Average maximum leaf height and average basal width were also recorded. Vigor ratings ranged from two (2) being the best, to nine (9) the poorest. Two was the highest vigor rating assigned because the plants were still at different stages of growth and had not yet been tested for winter hardiness. Approximately 50% of the plants had vigor ratings of 3, 4, or 5, while 8 percent did not survive due to low vigor.

A highly variable population of little bluestem was evident the second growing season. Growing conditions were excellent as abundant June and July rainfall favored warm-season grasses. Irrigation was discontinued after initial establishment the first year. Plant height (culm and leaf), width, seed amount, disease, lodging, and maturity were evaluated. Winterkill was noticeable on some of the southern plants. Plant size generally increased from north to south. All accession information and yearly data is being entered into the Soil Conservation Service National Plant Materials Data System for storage and retrieval.

Selection

Initial selection of superior plants will be made at the end of 1982 growing season. Additional data will be collected on the selected plants during 1983. Characteristics such as seed and forage yield, regrowth, and date of maturity will be documented. Ramets from these superior plants will be transplanted into cone-containers and grown in the greenhouse. Isolated crossing blocks will be established with these plants during the summer of 1984 for the purpose of seed increase. When adequate seed has been harvested, field evaluation plantings will be made in areas representative of the plants' origin. During this stage, characteristics such as seedling vigor, forage production, digestibility, and drought tolerance will be recorded under actual field conditions. Release of an adapted cultivar(s) will be made when field testing is completed.

Summary

A broad based vegetative assembly of native little bluestem was made in a three state area. Subsamples were vegetatively removed from the parent plants and grown in a greenhouse. An initial evaluation planting was established in 1980 including more than 7,000 individual spaced plants. Many characteristics are being evaluated before superior plants will be selected and increased in crossing blocks. As increased seed becomes available, the plants will be further evaluated under field conditions in the area where they were collected.

Little bluestem is a drought tolerant, warm-season, native bunchgrass adapted to a variety of conditions. Its deep, fibrous root system is an excellent soil binder in erosion control. The development of a commercially available northern seed source will greatly aid revegetation efforts in the northern plains.

What's Cookin'?

The National Capital Section of SRM plans to prepare and print a Trail Boss Cookbook. The idea was discussed with the Advisory Council and Board of Directors at the Calgary meeting and blessed by both bodies.

The objectives of the project are (1) to raise revenues for the Society and individual Sections; (2) to put rangeland, the Society, its logo, and a few salient facts concerning rangeland before a broader spectrum of the public; (3) to provide the public a high quality, unique cookbook at a reasonable cost; and (4) to promote the use of range products.

The cookbook will feature cuisine associated with the "Early American West," spiced with culinary delights from the range livestock industry of Mexico, Canada, the Asian, African, Indian, European and Australian continents, and wherever SRM members live and work. The lore of cowboys, cattlemen, sheepherders, vaqueros, gauchos, and tribal herdsman intrigues millions of people. We hope to take advantage of that intrigue and the current cowboy and western fad in the United States in the marketing of the Trail Boss Cookbook. In order to make this effort successful, we need 25 to 30 recipes from each Section. Thus, we are asking you to appoint an Ad Hoc Committee to give this project the

attention it deserves in your Section. We would like to have recipes from trail menus, recipes brought forward from chuck wagon meals, and lots of good ole modern day ranch hand recipes, including meats, breads, beans, salads, chili, barbecue, game, desserts, etc. We suggest that your committee communicate with owners and operators of old, historical or otherwise famous ranches for one or more of their favorite recipes. At the same time, get the ranch brand and a brief historical account of the ranch or other significant or unique facts that would add interest to the cookbook. We hope to recognize the source of many recipes and to sprinkle interesting tidbits or trivia throughout the cookbook concerning the origin or interesting facts concerning the ranch. Because of space limitations, obviously we cannot guarantee to use all recipes, associated facts and trivia submitted, but please submit them for the editors' consideration none-the less.

Submit recipes to Donald T. Pendleton, 1518 Sadlers Wells Drive, Herndon, Va 22070. If you have questions, you may call me at (703) 437-5132 off-duty hours and at (202) 447-2752 during work hours.—**Donald Pendleton**