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Harms, Rebecca L.; Baltensperger, David D.; Shearman, Robert C.; Laursen, Dan; Hammons, Roger; Merrigan, Tony; Krall, Jim; and Yonts, C. Dean, "NF98-377 Kentucky Bluegrass Seed Production Management in Western Nebraska and Eastern Wyoming" (1998). *Historical Materials from University of Nebraska-Lincoln Extension.* Paper 826.
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NF98-377

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Published by Cooperative Extension, Institute of Agriculture and Natural Resources,
University of Nebraska-Lincoln

Kentucky Bluegrass Seed Production Management in Western Nebraska and Eastern Wyoming

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Kentucky bluegrass has been traditionally grown as a crop in the Pacific Northwest, but now seed companies are looking to the High Plains for grass seed production. This perennial crop adds many benefits to a cropping system, including: protecting the soil from wind erosion, increasing organic matter in the soil leading to increased nutrient availability and benefiting future crops, and breaking disease and weed cycles. Kentucky bluegrass for seed production is a management intensive crop, even after a field has been established. It cannot simply be forgotten once established. It is a crop that may produce economical seed yields for three to seven years from one seeding. Irrigation, fertilization, weed control and post-harvest residue management are all important to production of this crop.

Crop Maintenance

Irrigation Management

Established Kentucky bluegrass to be grown for seed production in western Nebraska and eastern Wyoming will require irrigation. Irrigation under a sprinkler system is preferred but furrow systems also can be used with additional management. Soil water should be monitored regularly using a soil probe or other means.

Start irrigation in the spring (March-April) when the grass greens up. If surface soil moisture is depleted, green-up may be delayed. In these situations, irrigation may be needed prior to green-up. Water can be applied any time after soil temperatures at the 4-inch level are above freezing. Arid winters when snow cover is lacking may require occasional irrigation during warm, open, dry periods in the winter (November-March) in this region. During the growing season (i.e., late April to early July) the grass will gradually increase its water demand to 1.0 to 1.5 inches per week depending on stage of growth and weather conditions.

Soil water should be maintained near field capacity in the top 2 feet of soil until two to three weeks after flowering and pollination (i.e., late May to early June). When the seed is in the dough stage (three to four weeks after pollination), irrigation should be stopped. Wet soil conditions at this time will delay getting into the field to begin swathing and harvest operations.

Apply 1 inch of water immediately after burning (August- September). Apply 20-30 pounds of nitrogen per acre through the irrigation system, if feasible (see fertilization section). Post-harvest management will require enough water to develop new tillers. The following irrigations after the burn until the grass begins to green-up may range from 0.5 to 0.75 inch per week depending on soil texture. Once green-up occurs, irrigations should be increased to 1.0 to 1.5 inches per week. All irrigation should be adjusted for rainfall. Adjust irrigation rate and frequency to avoid excessive vegetative growth.

The soil profile should be filled with water to a depth of 2 feet just prior to the last fertilizer treatment in the fall (usually in mid October) so that the grass goes into the winter with a full profile of water. Apply fall fertilizer with the last inch of water through the sprinkler system. Apply 0.5 to 0.75 inch immediately after any broadcast fertilizer application. This will better maintain the fertilizer in the root profile in case of fall precipitation.

Fertilization Management

Proper fertilizer application rates and timing are critical to Kentucky bluegrass seed production. Too much fertilizer, particularly nitrogen, and the plant will be triggered to produce forage, while too little will result in deficiency symptoms. **Uniform applications are a necessity.** Care should be taken to calibrate all application equipment. Proper application rates and timing are essential for cost-effective, sustained production.

Fertilization management should be based on soil test recommendations, particularly for phosphorus, potassium, sulfur and micro nutrients (*Table I*). Nitrogen application rates range from 160 to 220 pounds per acre, depending on cultivar, stand age, soil type, irrigation practices, and field history. Timing of nitrogen application is important to maximizing yields. Most of the nitrogen is applied in the fall (i.e., mid to late October). Fall applications range from 100 to 160 pounds of nitrogen per acre. Some nitrogen should be applied immediately after field burning, usually 30 to 60 pounds per acre. This application should be followed immediately with an irrigation of 0.5 to 0.75 inch to

Table I. Phosphorus, potassium and sulfur recommendations

Soil Test (ppm)	☐	*Application (lb/acre)*
Phosphorus	☐	**P_2O_5**
0-15	☐	40-60
15-30	☐	30-40
Over 30	☐	None
Potassium	☐	**K_20**
0-100	☐	60
Over 100	☐	None
Sulfur	☐	**Sulfate/sulfur**
0-5	☐	20-30

ensure an adequate regrowth of the stand prior to the fall nitrogen application. An additional 20 to 40 pounds nitrogen per acre is applied in early spring (i.e., April) (*Table II*).

5-10	☐	10-20
>10	☐	None

Table II. Typical nitrogen application program for one-year and three-year-old Kentucky bluegrass production.

N-application timing	☐ *One-year-old field*	☐ *Three-year-old field*
Post field burning	☐ 40 lbs. N/acre	☐ 60 lbs. N/acre
Fall	☐ 100 lbs. N/acre	☐ 130 lbs. N/acre
Spring	☐ 20 lbs. N/acre	☐ 30 lbs. N/acre

Any source or form of nitrogen (e.g., urea, ammonium nitrate, ammonium sulfate, etc.) can be used effectively. Producers should base their nitrogen selection on cost effectiveness. Phosphorus and potassium applications should be made in conjunction with the post field burning and fall nitrogen application timings for best results. Apply iron at 5.0 pounds Fe+2/acre with the spring application on soils with pH >7.5.

Weed Management

Weed management is very important for the production of a quality seed crop. In established stands, 2,4-D and dicamba (Banvel) can be used for broadleaf weed control. In order to provide residual weed control, dicamba requires moisture. Label directions should be carefully followed to ensure the product's safe and effective use. If there is a downy brome (*Bromus tectorum*) or rattail fescue (*Vulpia myuros*) infestation, dicamba can be mixed with 2 pounds of diuron (Karmex). The off-type Kentucky bluegrass or other perennial grass invaders can either be rogued or spot sprayed with glyphosate (Roundup) or glufosinate (Liberty).

Disease and Insect/Mite Control

Varieties may vary in their resistance to diseases and insects, and fields should be checked frequently during the growing season. The main diseases to check for are yellow stripe rust (*Puccinia glumarum*) and stem rust (*Puccinia gramminis*). The symptoms for both of these diseases are yellow or orange-red pustules on the leaf, stem and panicles. Powdery mildew (*Erysiphe graminis*) is another problem and is identified by a white powdery covering usually on the under side of the leaves. The rusts and the mildew may be controlled with Bayleton (triadeimefon) or Tilt (propiconazole) at 4 oz/acre if applied before the diseases are too extensive. Many of the other diseases such as blind seed disease, ergot and the seed gall nematode have been properly kept in check with postharvest field burning, although ergot may flair up during damp springs.

Among the insect and mite pests associated with Kentucky bluegrass grown for seed are soil/thatch-inhibiting insects (billbugs, cutworms, sod webworms, white grubs, and wireworms) and foliage/seed feeders (aphids, grasshoppers, mealybugs, mites, plant bugs, sawflies, and thrips). These pests can be managed using proper cultural and maintenance practices coupled with appropriately timed pesticide applications.

Harvest Management

The time of harvest is determined by the moisture content of the seed (see *Table III*). Swathing is usually done in late June to early July depending on the cultivar. Swathing too early may result in

Table III. Seed moisture targets

termination of growth before seeds are fully mature and cutting too late may result in yield loss due to shattering. If shattering is a concern, swath the field at night or in the early morning. Fields should be combined when seed moisture is low enough for safe storage. The rate that the seed dries down in the windrow is determined by humidity and ambient temperatures. When combining, the relative humidity should be 40 percent or less, but this is seldom a problem in this region.

Species (windrowing)	*Swathing*	*Combining***	*Storage*
*Seed moisture**	*Seed moisture*	*Seed moisture*	
Kentucky bluegrass	28	12-13	10-12
Tall fescue	39-40	12-13	10-12
Perennial ryegrass	31-32	12-13	10-12

*Estimated moisture loss per day after swathing: Kentucky Bluegrass=3-4%, Tall fescue=2.5%, Perennial ryegrass=3%.

**Windrows are allowed to cure for approximately 10 days before combining.

Seed moisture testing is done by collecting a representative sample of seeds from the field. Weigh a small sample of the seeds (10 grams makes a good sample) and dry them in an oven at 220°F for two to eight hours. A microwave oven also can be used to dry the seed and is quicker. A medium to high setting is used at one to two minute intervals. The sample must be stirred after each minute so that it does not burn. Drying continues until the sample is no longer losing weight. Percent moisture should be calculated using the equation:

$$\frac{\text{wet weight of seed - dry weight of seed}}{\text{net weight of seed}} \times 100 = \%\ \text{moisture}$$

Seed Conditioning and Storage

Kentucky bluegrass has lint or wool on the seed, which needs to be removed before the seed can be properly cleaned. A modified hammer mill or debearder is used for this purpose. Normal seed cleaning processes then follow. In this region post harvest storage is essential. Flat storage at less than 12 percent moisture has worked well prior to cleaning because the uncleaned seed does not flow easily.

Seed Certification

Once a Kentucky bluegrass field has been established and found to meet the eligibility requirements for seed certification (e.g., seed source, isolation, seedling inspection, etc.), the grower will need to determine each year whether that field will stay in the seed certification program. If the contractor wants Certified and/or Sod Quality seed, those options should be specified in the production contract renewal.

For a field to retain its eligibility to produce certifiable seed, the following management steps must be taken on a timely basis each year:

1. Application for field inspection of eligible fields should be submitted to seed certifying agencies by appropriate date with payment of applicable fees.
2. Each seed production field should be walked, prior to harvest, by a representative of the seed certifying agency and evaluated for major factors affecting seed quality.
3. Proper isolation distance from other varieties, non certified fields, or any contaminating pollen sources should be maintained.

4. Objectionable and noxious weeds should be eliminated by roguing or other methods to prevent contamination of the seedlot.
5. Off-type plants in the variety or other grass species should be removed by thoroughly roguing each field at the specific stage(s) when differences can be determined.

Complete information on the turfgrass seed certification process in Nebraska is available from the Nebraska Crop Improvement Association, P.O. Box 830911, Lincoln, NE 68583-0911, phone 402-472-1444, fax 402-472-7904 or the designated agency for seed certification in your state.

Post-Harvest Management Options

It is essential that the grass residue is removed from the field as soon after harvest as is possible. Residue removal is necessary to allow light to penetrate into the canopy to reach the tillers to induce them to be reproductive rather than vegetative. Reproductive growth will then lead to desired yields for the next year and those that follow. Inducing reproductive growth rather than inhibiting vegetative growth also is important because it will keep the stand in rows for a longer time rather than becoming sod bound.

The standard method to remove residue is burning. Care should be taken when burning to avoid periods of fire danger to surrounding areas and times when smoke will not readily clear the area. Most areas in Nebraska require a fire permit before field burning is allowed. Permits may be obtained from your local fire district. One control method is a controlled field burn. For this procedure the grass straw should be evenly distributed across the field to add to the fuel of the fire and to have an even burn across the field. Another method is to use a propane burner. For this procedure it would probably be best to remove the straw from the field to obtain an even burn.

There are alternatives to burning such as baling and other forms of mechanical residue removal. Just remember that the objective is to remove all grass residue allowing light to reach the tillers. Kentucky bluegrass residues can be used for hay, so baling can remove residue and add revenue.

***No criticism is intended of products not listed, nor is endorsement by the University of Nebraska given to those listed. Read and follow all product labels.

Suggested Readings and Resources

1. R.E. Weed, D.D. Baltensperger, R.C. Shearman, R. Hammons and J. Krall. Establishment of Kentucky Bluegrass for Seed Production in the Nebraska Panhandle and Southeastern Wyoming, NebFact NF 96-273, University of Nebraska Cooperative Extension. 4 p.
2. L.K. Holzworth, L.E. Wiesner and H.F. Bowman. Grass and Legume Seed Production in Montana and Wyoming. Special Report No. 12, Revised 1990. Published by Bridger Plant Materials Center. 26 p.
3. R.L. Smathers, D.L. Barton, C.L. Falen and C.W. Gray. Bluegrass Seed Production. EBB3-BS-97. University of Idaho Cooperative Extension System Publications.
4. R.L. Smathers, D.L. Barton, C.L. Falen and C.W. Gray. Bluegrass Seed Establishment. EBB3-BSE-97. University of Idaho Cooperative Extension System Publications.

File NF377 under: HORTICULTURE

D-5, Turf
Issued July 1998

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Elbert C. Dickey, Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.

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