Materials Plant Program

TECHNICAL NOTES

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SEED PRODUCTION OF BLUE WILDRYE

by

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Introduction: Blue wildrye (*Elymus glaucus* Buckley), is a rapid developing, short-lived, perennial, bunchgrass native to the central and western United States. Typical habitats include open woods, prairies, thickets and moist or dry hillsides from sea-level to 10,000 feet. Blue wildrye exhibits intermediate shade tolerance, preferring full sun to partial shade. While more abundant on moist soils, some populations are considerably drought tolerant. This species shows extensive differentiation into ecotypes and ecospecies (Snyder, 1950) suggesting genetic adaptation to broadly divergent environments. Important characteristics that have contributed to its broad adaptation include: high seed production, ability to reseed itself, high seedling vigor, and quick establishment of ground cover.

Blue wildrye can provide fair to good forage for big game and livestock early in the growing season and is reported to be relatively compatible with tree plantings compared to certain other grasses (Hafenrichter et al., 1968). Other potential uses include restoration of native plant communities and rehabilitation of cut-over woodlands. However as a pioneer species, it is primarily recommended for quick, self-perpetuating cover and as a native alternative for erosion control on steep, eroded slopes, roadsides, or fire damaged sites. A number of ecotypes and selections have been increased by USDA Natural Resources Conservation Service (formerly the Soil Conservation Service), Plant Materials Centers (PMCs) and others since the 1930s. The variety `Arlington' was released in 1995 by the Corvallis, Oregon PMC in cooperation with Oregon State and Washington State Universities.

The PMC at Corvallis has been evaluating and increasing ecotypes of blue wildrye since 1959. This technical note summarizes seed production methods used by the PMC during its most current increases from 1984-1995. The methods described apply to 9019633 (Arlington), 9019690 (source: Elkton, OR), and other Corvallis PMC accessions and may not work as well for

other selections or varieties under these conditions. Information provided herein is intended only as a preliminary guide. Further testing is still needed to determine the best management (weed control, fertilization, etc.) and harvest practices (harvest timing and post-harvest residue management) for optimal seed yield and quality.

Site Selection: Blue wildrye is best grown for seed on well to moderately well drained, moist, medium textured soils on terraces or uplands. It does not tolerate poor drainage or prolonged flooding. This species generally prefers moderately acid to neutral soils (pH 5.5-7.0).

New stands of blue wildrye establish rapidly, nearly as fast as perennial ryegrass (*Lolium perenne*). Although it will compete well with many grass and other weed seedlings, fields previously used for vigorous introduced grasses should be avoided unless fallowed for at least a year. Old perennial or annual ryegrass (*Lolium perenne* ssp. *multiflorum*) fields should be particularly avoided if significant volunteer seedlings are expected. Allowed to mature, annual ryegrass seed is very close in size, length and weight and especially difficult to separate from blue wildrye seed lots once contaminated.

Blue wildrye is a highly self-fertile, self-pollinated, perennial species. However, for seed increase of native collections (source identified materials), effective isolation distances are unknown. Minimum isolation distances for foundation, registered, and certified seed production for Arlington blue wildrye have been suggested (Table 1). Check for the presence of wild stands of blue wildrye that may occur on adjacent lands, especially woodlands.

Seedbed Preparation: The seedbed should be moist, fine, very firm (adult footprint barely visible), weed free, and depending on the drill used, mostly free of residue. Soils with high populations of any weed seeds or seeds of competitive grasses should be avoided. Vigorous seedlings depend on incorporating a starter fertilizer with nitrogen (20-40 lbs/a). Soils with less than 45 ppm phosphorous (P) and 150 ppm potassium (K) should receive 15 lbs P/a and 15-25 lbs K/a (Youngberg, 1980). However, traditional use of a preplant starter fertilizer has sometimes been avoided at the PMC because of increased competition from broadleaf weeds. One alternative has been to prepare the seedbed, allow weeds to germinate, then kill emerging seedlings prior to sowing. A complete fertilizer (e.g. 200 lbs/a 16-16-16) is broadcast after the grass seedlings are well established.

Seeding Dates and Methods: Spring seeding can be accomplished from late March through early May. Fall seeding without carbon banding (Lee, 1973) has been used at Corvallis but weeds were a problem, especially annual bluegrass (*Poa annua*). Without banding, do not fall sow unless the field has been fallowed for several years and is relatively free of weeds or other crop seeds that can volunteer readily. Blue wildrye appears to have little if any inductive requirements for flowering. Fall seeding and even early spring seedings can produce a partial seed crop the first growing season under favorable conditions.

The recommended seeding rate is 8-10 lbs/a when drilled (30-55 seeds per foot of row). Seeding depth should be no greater than 1/2 inch. In untilled rows the spacing should be 12-18 inches for maximum yields. A row spacing of 30-42 inches is necessary when mechanical cultivation is used for weed control. Seeding rate can be reduced to 3-4 lbs/a in wider rows (28-51 seeds per foot of row). The seed germinates readily within 6-10 days and no special seed treatment or stratification is required.

Weed Control in New and Established Stands: Many broadleaf weeds can be controlled with herbicides listed for general grass seed production (William, et al., 1995). Annual bluegrass may be a problem, especially in fall seeded stands and during the first year prior to canopy closure. In older fields, rattail fescue (*Vulpia sp*.) can also become increasingly abundant. There are no chemicals labelled for control of these or other annual grasses in blue wildrye. Careful site selection, chemical seedbed preparation, mechanical weed control, and the spot treatment of contaminated areas with an approved herbicide are alternatives. Carbon banding is a proven method for fall establishment of other grasses in the Willamette Valley (Lee, 1973), and the method has been used successfully in trials with blue wildrye. However, associated herbicides, such as diuron, are not specifically labelled for use on this species. For chemical seedbed preparation of grass seed fields, certain herbicides are listed that may be applicable (William et al., 1995). Follow all label instructions and consult with the Extension Service before applying any pesticide.

Insects and Diseases: Insects have not been considered a problem in fields of blue wildrye grown for seed at the PMC, Corvallis, OR. Signs and/or symptoms of leaf and stem rust (*Pucinnia sp.*) varies between populations and from year to year. With one exception, levels of rust were considered minor and no control program was undertaken. Natural populations of blue wildrye from sites with substantially different elevations, climates, soils, etc. than the seed production area may be more susceptible. For possible control recommendations refer to the Pacific Northwest Disease Control Handbook (Koepsell and Pscheidt, 1995).

Irrigation and Fertilization: Irrigation is useful in the establishment of blue wildrye during dry springs. With sufficient moisture, fertilizer and weed control, a partial seed crop may be possible the first full growing season, whether seeded the prior fall or the same spring. Blue wildrye has little or no inductive (vernalization) requirement for flowering. Established stands are managed without irrigation.

Until more data is available, the following fertilization guidelines are suggested on established fields: Apply nitrogen (N) fertilizer at an annual rate of 20-40 lbs/a in September or October and 75-100 lbs/a in the spring using a split application in March and April. Potassium (P) may become limiting with repeated residue removal by baling. Recommended minimum soil levels of P for grass seed crops like tall fescue (*Festuca arundinacea*) and ryegrass (*Lolium sp.*) grown in the Willamette Valley of Oregon is 100 ppm. For blue wildrye, soils can range from well to somewhat poorly-drained and moderately coarse to fine textured. Sulfur (S) should be applied each spring at the rate of 15 lbs/a. Recommended soil pH is 5.2 to 6.8. Lime according to soil test.

Seed production usually peaks in the second and third growing seasons then declines steadily. Arlington, like blue wildrye in general, is naturally short-lived (grazing intensity, fertility, and other site specific conditions will influence longevity). It may be advantageous to reseed a new field every third or fourth year, especially if volunteer seedlings or weedy annual grasses are becoming a problem. Volunteer seedlings of blue wildrye may prohibit certification of a stand unless the "seed class" can be advanced each year. For example, a "foundation" field could become "registered" the next year and "certified" the year after that. Certification standards for Arlington have been proposed (application for variety acceptance).

Seed Harvest and Yield: Seed of Arlington and other blue wildrye populations shatters readily when mature. To reduce losses, fields can be swathed during soft dough or at the onset of ripening when the seedheads (spikes) turn purple. This stage normally occurred between late June and mid-July at the Corvallis PMC. The seed was left in windrows to dry before combining. Because the seed is close in size to that of annual ryegrass (190,000 seeds/lb), similar combine settings and modifications are suggested. (Arlington averages 160,000 seeds/lb.) Due to excessive herbage, ground speeds must be very slow (less than 1.5 mph). Other harvest methods, such as the use of a seed stripper, have been effectively used on other native grasses with awns, and may be an alternative for blue wildrye.

Harvest aftermath should be removed by baling then mowing the stubble to a height of 2-3 inches. A propane field burner can be also be used to remove residue. Any advantage of burning (thermal treatment) over baling and/or mowing (nonthermal treatment) in terms of seed yield is yet to be established (Darris et al., 1996). However, greater residue removal is known to improve the effectiveness of certain herbicides.

Seed yields of Arlington blue wildrye averaged approximately 400 lbs/a at Corvallis, OR (based on three years of field and plot data) and over 1000 lbs/a at Mt. Vernon, WA (based on two years of plot data). Other select populations of blue wildrye have ranged from 350 to 750 lbs/a.

Seed Processing and Storage: During seed processing, the seed should be de-awned gently with a debearder or brush machine to improve flow characteristics and ease of handling. A standard air screen machine is adequate for cleaning awned and de-awned seed. Weed seeds of annual bluegrass and annual fescue are relatively simple to remove. The seed of Arlington and other blue wildrye populations appears to be short-lived (2-3 years). It should be stored under optimal cool, dry conditions. Seed moisture content (8-10%), low temperature (e.g. 35-40 degrees F) and low relative humidity (e.g. 20-40%) recommended for most grass seed is suggested.

Table 1. Minimum Isolation Distances for 'Arlington' blue wildrye

	Seed Classes:		
Acres	Foundation	Registered	Certified
less than 5	1320 ft	660 ft	330 ft
more than 5	900 ft	300 ft	165 ft

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