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Native Warm-Season Grasses and Legume Buffers for Wildlife Habitat Enhancement in Agricultural Landscapes

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Information in this publication was compiled by **Trey Cooke**, Delta Wildlife, Inc. Wildlife components in this publication were adapted from the M.S. research of **Ross Conover**, working under the direction of the **Eric Linder** and **Wes Burger** at Mississippi State University.

Photographs were provided by Delta Wildlife, Inc.

For information on the contents of this publication, contact:

Trey Cooke
Delta Wildlife, Inc.
P.O. Box 276
Stoneville, MS 38776

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Introduction

Riparian buffers and grass filter strips have been proven to reduce sedimentation and other nonpoint source agricultural pollutants throughout the country. Standard practices have included the establishment of bermudagrass, fescue, and other plant materials. While these plant materials do provide significant water quality benefits, they do not provide significant wildlife benefits. Other plant materials can be used to effectively reduce sediment and nonpoint source agricultural pollutants while also providing significant habitat for the Northern bobwhite quail and other grassland songbird species. The most beneficial suite of plant materials includes a mixture of native warm-season grasses (NWSG) and legumes.

Various USDA conservation programs and practices can be used to establish NWSG and legume buffers and field borders. However, plant material selection, planting rates, buffer widths, site preparation, planting, establishment, and management are all critical to optimize both water quality and wildlife benefits. This document will describe the proper use of NWSG and legumes in buffers and field borders and the data that supports their use in both water quality and wildlife applications.

Plant material selection

There are hundreds of species of NWSG and legumes. Breeders, naturalists, and producers have also isolated different varieties and selections. Each species and variety is specific to a set of conditions, most often associated with regional climate, rainfall, soil types, and latitude. For this reason, it is critical to select the proper species and varieties for each application. There are many resources that can be used to help make these selections including the USDA Plant Material Program centers.

A mixture of little bluestem, big bluestem, Indiangrass, partridge pea and Kobe lespedeza may be the most widely accepted mixture and can be used with success throughout most southern states (figs. 1 and 2). Variety selection is still important since some varieties do better in different parts of the country.

Other plant materials may also be included for added water quality and wildlife benefits depending on existing habitat and landscape conditions. In landscapes that are void of woody vegetation, it may be advisable to add shrubs to the mixture. These additions could include bicolor lespedeza, Thunbergii lespedeza, or wild plum.

Figure 1 Partridge pea and NWSG mixture

Figure 2 Partridge pea and Kobe lespedeza

While NWSG (fig. 3) do provide a significant erosion control function, it may be advisable to add switchgrass to the mixture on sites with a slope greater than 5 percent. Switchgrass should also be used on sites where erosion is excessive.

Planting rates

NWSG and legume buffer planting rates (tables 1 through 4) depend on the application. Planting rates for water quality purposes will be higher than planting rates for wildlife. Planting rates used to address both water quality and wildlife concerns should be somewhere in the middle. However, if an average rate is used, it must be understood that water quality and wildlife benefits will both be slightly diminished when compared to planting rates for each specific purpose.

Buffer widths

Minimum and maximum buffer widths have been topics of discussion, research, and even arguments over the past decade. There is a basic agreement between biologists and water quality professionals that no buffer should be less than 30 feet in width. However, little has been agreed upon concerning the maximum width of a buffer. Maximum widths should be determined by the size of a field to be buffered, slope of the field, and soil type. Generally, buffers do not need to be more than 180 feet wide to provide optimum water quality and wildlife benefits although exceptions may occur.

Figure 3 NWSG

Table 1 NWSG and legume buffer mixture for water quality

Plant material	Rate/acre	Planting dates
Little bluestem	4 PLS	March – May
Big bluestem	2 PLS	March – May
Indiangrass	2 PLS	March – May
Kobe lespedeza	12 lb	March – April
Partridge pea	4 lb	February – April

Table 2 NWSG and legume buffer mixture for wildlife

Plant material	Rate/acre	Planting dates
Little bluestem	1 PLS	March – May
Big bluestem	.5 PLS	March – May
Indiangrass	.5 PLS	March – May
Kobe lespedeza	12 lb	March – April
Partridge pea	4 lb	February – April

Table 3 NWSG and legume buffer mixture for both water quality and wildlife

Plant material	Rate/acre	Planting dates
Little bluestem	2 PLS	March – May
Big bluestem	1 PLS	March – May
Indiangrass	1 PLS	March – May
Kobe lespedeza	12 lb	March – April
Partridge pea	4 lb	February – April

Table 4 Additions to NWSG and legume buffers

Plant material	Rate/acre	Planting dates
Bicolor lespedeza	10 lb	March – April
Thunbergii lespedeza	10 lb	March – May
Wild plum	6-in x 6-in spacing (seedlings)	January – March
Switchgrass	2 PLS	March – May

Site preparation

NWSG may be planted with no-till drills into heavy residue and/or stale seedbeds. Although this technique is not preferred, success can be found if proper site preparations are made. If a no-till planting technique is necessary, glyphosate should be used as a burn down 2 to 4 weeks prior to planting. Immediately before planting, a 4-ounce per acre application of Imazapic herbicide is needed. This application will not harm the NWSG and partridge pea, but it will suppress germination and growth of Kobe lespedeza initially.

Preferred site preparation for the planting of NWSG includes intensive seedbed preparation and herbicide applications. Sites should be disked thoroughly and culti-packed. The seedbed should be extremely firm and cleaned 2 to 4 weeks prior to planting. A herbicide application should be used for burn down. A 4-ounce per acre pre-emergence application of Imazapic is also recommended. This site preparation technique has been proven to be the most successful. Always read label directions when applying herbicide.

Planting

NWSG seeds (fig. 4) are fluffy and cannot be planted with standard drills or grass seeders. A special fluffy seed drill must be used to plant NWSG (fig. 5).

NWSG planting may begin in February in most southern states and late March in midwestern states. A late frost or snow will not harm NWSG seed after planting. Planting early is generally considered better than planting late.

Legumes should be planted with a drill equipped with a legume seed box to properly regulate planting rates. Furthermore, legumes must be inoculated prior to plantings. EL-type inoculate should be used on partridge pea and all lespedezas. Legumes can be planted at the same time as the NWSG.

Drills should be calibrated to plant the proper rate of seed. The NWSG may be mixed together for planting in the fluffy seed box just as the legumes may be mixed in the legume box. Both should be planted into a firm, clean seedbed.

Figure 4 Fluffy NWSG seed

Figure 5 Specialty planter for fluffy seed

Establishment

NWSG are slow to germinate and establish. In natural NWSG ranges, fire and/or cold winters are required for seed germination. Production NWSG seed is generally kept in cold storage through the winter before being planted. However, this procedure does not always produce results commensurate with natural conditions. It must be understood that most NWSG seeds will not germinate during the first growing season unless conditions are perfect.

Under optimum conditions, NWSG germination will take approximately 12 weeks. **Under normal conditions, it may take up to 3 years before all NWSG seeds germinate.** Legumes should germinate and grow well during the first growing season (fig. 6). After germination, NWSG seedlings will grow slowly until first frost. Seedlings rarely reach a height of 36 inches in the first year. During the second growing season, these seedlings should reach a height of 4 to 5 feet. After three growing seasons, NWSG general reach maturity and a maximum height of 5 to 7 feet.

If first or even second year NWSG germination is poor, it can be addressed with a prescribed fire 12 to 14 months after the initial planting. Fire will also aid legumes in their natural reseeding process. NWSG germination after a prescribed fire is exceptional. If it is not, the planting can usually be deemed a failure.

To further aid NWSG and legumes during their initial establishment, post-emergent herbicide applications of imazapic can be used (fig. 7). A rate of 4 to 8 ounces per acre should be used. Higher rates are recommended on sites with intense native weed competition.

Management

NWSG and legume buffers do require periodic management after establishment, especially in cases where the buffers will be managed for wildlife purposes. Over time, the NWSG will become excessively thick, choking out the legumes. This is acceptable from a water quality perspective, but it significantly reduces the wildlife habitat value. Some bare ground component must be left in tact for small mammals and ground birds like the Northern bobwhite. To keep the buffers from becoming too thick, they must be thinned periodically by disturbance.

Thinning should be encouraged when all bare ground inside of the buffer is completely covered by thatch or the NWSG plant density becomes thick enough to engulf the entire soil surface. If a majority of the bare ground is covered with thatch, a prescribed fire may be used. This will encourage additional NWSG growth, but will remove all the thatch. If NWSG plant density is the problem, an herbicide application of glyphosate may be used a rate up to 16 ounces per acre in the

Figure 6 First year growth under optimum conditions

Figure 7 Herbicide application reduces native weed competition

middle of the growing season. A prescribed fire should follow this herbicide application in early spring of the next year.

Even if the buffers do not become too thick for wildlife habitat purposes, a prescribed fire should be used every 3 to 4 years. This will perpetuate the natural reseeding process of the legumes, reduce thatch created by the NWSG, and keep the buffer clean of invasive woody vegetation.

Avian response to NWSG and legume buffers

Established NWSG and legume buffers can be excellent habitat for small mammals, grassland songbird species, and the Northern bobwhite quail. NWSG provide cover and nesting habitat while legumes provide an abundant food resource (fig. 8).

Research has documented significant increases in avian diversity, abundance, and reproduction in field edges with NWSG and legume buffers compared to field edges without buffers. Similar results have been documented at the landscape level when farms with NWSG and legume buffers were compared to farms without buffers.

- Winter and breeding season transects were used to identify 116 species of birds utilizing 28 miles of NWSG and legume buffers in agricultural landscapes in the Lower Mississippi Valley.
- Seventy-four species of birds were found during the breeding season in NWSG and legume buffers compared to 58 species found in nonbuffered field edges.
- Winter results were similar—66 species used the buffers compared 43 species found in nonbuffered field edges.
- A total of 16,777 birds used buffer field edges compared to 5,959 birds found in nonbuffered field edges.

Nesting density in 30-foot-wide NWSG and legume buffers was found to be six times greater than in field edges without buffers. Nesting density in buffers between 30 feet and 99 feet were 38 times greater.

Research has also indicated a significant response by Northern bobwhite quail in NWSG and legume buffers. Research in Mississippi, Tennessee, and Georgia have shown a three- to seven-fold increase in quail numbers after NWSG buffers were established.

Figure 8 Birds typically nest in the center of NWSG clumps