

Forage/Livestock Systems Research Unit

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<http://www.depts.ttu.edu/forageresearch>

‘WW-B. Dahl’ Old World Bluestem
Bothriochloa bladhii (Retz) S.T. Blake



‘WW-B. Dahl’ Old World Bluestem is a warm-season, perennial ‘tufted’ bunch grass. This grass was collected originally near Manali, India and tested at the Oklahoma Agricultural Experiment Station at Stillwater, OK beginning about 1960. In the mid-1960's, plants were sent to the Southern Regional Plant Introduction Station, Experiment, GA and from there seed were sent to the Southern Plains Range Research Station, Woodward, OK where the grass was tested in the program under the direction of Chet DeWald. Bill Dahl, a professor in Range Science at Texas Tech University, conducted tests with this grass under dryland conditions at the TTU Range Research Ranch at Justiceburg, TX. In 1994, WW-B. Dahl, named for Dr. Bill Dahl was released jointly by the USDA-ARS, USDA-SCS, Texas Tech University, and the Texas Agricultural Experiment Station.



Photo: Vivien Allen

Plant Characteristics

Dahl is a warm-season perennial ‘tufted’ bunchgrass with an upright growth habit. A single plant, when mature, can cover as much as a square yard. Stand longevity appears excellent with 10-year old stands now documented with no indication of stand losses. It has dark green leaves and plants reach a mature height of 2.3 to 3 feet with stems and flowers reaching heights of over 5 feet. In trials at Texas Tech, dry matter yields of Dahl were similar to those of ‘Caucasian’ Old World Bluestem [*B. caucasica* (Trin.) C.E. Hubbard ‘Caucasian’] but were higher than yields from several varieties of *B. ischaemum* [(L.) Keng. var. *ischaemum*] including ‘Plains’, ‘Spar’ and ‘Iron Master.’ Unlike the other old world bluestems, Dahl remains leafy and vegetative throughout much of the growing season and only begins to reach a flowering stage in September with seed maturity and seed shedding in October. Observations suggest that various stresses including drought stress can result in earlier flowering, however.



Photo: Philip Brown

‘WW-B. Dahl’ old World Bluestem

Emergence and growth over time



Dahl emergence June 18



Dahl June 24



Dahl June 27



Dahl July 4



Dahl July 11



Dahl July 15

Peak growth of Dahl can be expected to occur by mid- to late-July but is influenced by timing and amount of available moisture and fertilizer applications. Total seasonal dry matter production under dry land conditions in a single seasonal harvest ranged from 1 to 2 tons/acre at Woodward, OK (<http://www.sprrs.usda.gov/owbmanage.htm>). At New Deal, TX, total dry matter yields under dryland

conditions averaged about 1.5 tons/acre when harvested twice (late July and September) while with irrigation to replace 100% of ET, yields averaged about 8 tons/acre.



Dahl July 23



Dahl August 24 – minimal water



Dahl seed heads in field - September 22

Photos: Philip Brown

Dahl is rich in essential oils that gives it its distinctive odor generally described as a pleasant smell. There is evidence that *Bothriochloa* species, characterized by containing these oils, have insect deterrent properties including resistance to the fall army worm (*Spodoptera frugiperda*) and other insects (see Insect Deterrent Properties section).

Forage Quality

Research at TTU has consistently shown that concentrations of crude protein in Dahl forage are about 1 to 2% higher than in the other old world bluestems listed above. Concentrations of crude protein have averaged between 3.5 to 4% during December and January in dormant forage while concentrations range

from 9 to 12% during the active growing period from May to July. Crude protein concentrations begin to drop rapidly by July, however, and supplementation of crude protein to grazing animals may be needed in the later part of the growing season as well as to livestock grazing winter dormant forage. Mineral concentrations in Dahl indicate that grazing animals may need supplementation with phosphorus, copper, and zinc. Plant concentrations of sulfur suggest that both the plant and the grazing animal could benefit from sulfur fertilization.

Fertilization

Applications of about 60 to 90 lbs of nitrogen/acre annually has generally been sufficient to optimize yields. Based on research with other old world bluestems and limited water resources, higher nitrogen fertilization rates appear unwarranted in most cases. Phosphorus is needed for a healthy root system and should be applied per soil test recommendations. Phosphorus may also be important for seed production of this grass and for seed germination and early seedling growth at establishment. Other nutrients should be applied as the soil tests indicate. In calcareous soils, some iron deficiencies have been observed which result in a yellowing of the leaf material. Zinc deficiency may also occur and should be monitored.

Recommendations for sulfur fertilization are best based on plant tissue analysis. Concentrations of sulfur in plant tissue should generally be at least 0.2% for plant and animal nutrition and both plant and animal responses in growth and live weight gains have been observed in response to applications of about 30 to 60 lbs of sulfur/acre annually, when leaf tissue samples are much below 0.2% sulfur.



Photo: Paul Green

Establishment of Dahl Old World Bluestem



Photo: Philip Brown

WW-B. Dahl should be planted in late April or early May at a rate of 2 lbs pure live seed (PLS)/acre. Establishment can be by broadcast or drilling into a prepared seedbed or can be no-till established. Seed should be planted NO deeper than 1/4 inch with 1/8 inch the ideal depth. Seeds are more often planted too deep than too shallow. A firm seedbed is essential for establishment and cultipacking the soil is usually necessary. If a pickup truck driven across the area leaves noticeable wheel track depressions, then more packing of the soil is likely necessary.

Broadcasting seeds onto a granular surface of a well-prepared seedbed and cultipacking is adequate to get good establishment. If using a drill, it must be equipped to handle 'fluffy' seeds. These drills usually have paddles or fingers that push the seed down into the drill box openings. Drilling seeds will generally have a higher success rate and has the advantage of being able to identify seeds germinating in rows as opposed to random placement from broadcasting.

Young seedlings are very small, are hairy at the leaf collar, and generally lie prostrate on the ground often being overlooked at this stage of development. It is easy to not recognize plants until the fall when this grass goes through stem elongation and flowering.

For no-till planting, surface residue should be minimized. Too much trash prevents good seed to soil contact. The trash is often pushed down in front of the coulter and seed are placed in the fold preventing them from germinating. At least 50% bare ground should be present if no-till planting is attempted. Be sure that existing vegetation is killed 6 to 8 weeks before planting. No-till planting can conserve moisture and soil, fuel, require less time, and reduce weed competition but requires excellent conditions of the soil and surface cover to ensure success.

For any method of planting, the seedbed should be free of weeds. Weed control prior to planting is very important. This seedling is very slow to establish, and growth is slow throughout the first several months after planting. Competition from weeds during this period can be severe. If weeds are present after plants begin to emerge, shredding frequently is helpful to reduce competition. Herbicides can be used. Consult your local herbicide specialist for recommendations. Precipitation in optimum amounts and times or the ability to surface irrigate newly planted stands are crucial to seed germination and establishment success.

Grazing Management



Photo: Philip Brown

Growth of forage begins generally in early May with grazing available by mid-May. The response of this forage to water and fertility inputs is greater during the first part of the growing season than by August through September. Quality of the forage is also higher during the first half of the growing season than in later months. Thus, it is more efficient to optimize the use of the grass during May through July than in August and September.

Stocking rates should be high enough to maintain a canopy height of about 5 inches. Understocking leads to patch grazing and undergrazed areas become over mature and of low quality. This grass appears tolerant of close grazing but prolonged defoliation to canopy heights of less than 3 inches is not recommended. Likewise, gains of grazing animals will be lower when there is too little forage for grazing. An intensive rotational stocking method does not appear to be needed or beneficial to either the plant or the animal. In fact, seed production later in the season may be reduced if defoliation is lax during the growing season. It appears to be more important to manage stocking rates to target a consistent defoliation height with an alternative complementary paddock to supplement grazing if forage becomes limiting. If undergrazing is occurring, consider confining livestock to a smaller area of the paddock and harvesting the remainder for hay. Grazing should be terminated at least by September 1 to allow plants to regrow and regain energy stores to survive through the winter.

Dahl old world bluestem can be accumulated (stockpiled) during August and September for grazing during winter as standing hay. Additional fertilizer may be applied in August along with supplemental

irrigation to increase fall growth. Crude protein will be low (3.5 to 4%) by December and a crude protein and energy supplement will be needed for animals grazing the stockpiled forages during winter.

Animal Performance



Photo: Chance Van Dyke

Research at Texas Tech has shown daily gains of grazing steers of about 2.5 lbs/day during the early part of the grazing season (May and June). As the season progresses, daily gains will decrease without supplementation of crude protein. Daily gains of steers grazing the stockpiled forage during January and February have been low (0.4 lbs/day) even with supplementation but grazing this forage avoids the need to burn excess forage in spring and can provide a good source of roughage to compliment grazing of winter rye or wheat pastures and may lower the chance of bloat in animals grazing small grain pastures. In grazing trials at TTU, lambs grazing Dahl old

world bluestem had higher daily gains and gains per acre than those grazing Plains, Spar, and Iron Master and were similar to lambs grazing Caucasian.

Hay Production

Dahl old world bluestem makes excellent hay that is palatable to livestock. Total seasonal yields can be expected to be between 1 to 8 tons/acre depending on rainfall and the ability to provide supplemental water through irrigation. Limited data from Texas Tech suggests that harvesting in mid-July is the optimum time for hay cutting. Harvesting either earlier or later appears to reduce total seasonal yields. After a seed harvest in October, the residual biomass can also be harvested as hay, but quality will be lower at this point.



Photo: Philip Brown



Photo: Paul Green

Seed Harvest

Managing Dahl for a seed harvest can provide additional income. Seed are mature and ready to harvest in October and can reach 50 lb PLS/acre. Stockpiling the forage for winter grazing allows for a seed harvest to occur with little effect on the winter forage supply. Seed yields and quality have been variable, and more information is needed on management strategies to optimize seed production. Seed prices have ranged from less than \$14 to more than \$20/PLS1b making this

component a valuable commodity. The seed mature at different rates making multiple harvests necessary to maximize yields. Once approximately 50% of the seed is ‘slipping’ (seed strip off in response to light pressure when the flower slides through your hand), the initial harvest can be made. Once the seed is at this point of development, it is very vulnerable to wind and rain as the seed are easily shattered. If adverse weather occurs for an extended period, the potential for losing the seed harvest exists. If a freeze occurs, the seed must be harvested within 24 hours. Harvesting of this grass requires special harvest equipment and can be commercially harvested.

Insect Deterrent Properties

Dahl fields appear to have some resistance to the Red Imported Fire Ant (RIFA; *Solenopsis invicta* Buren; Hymenoptera; Formicidae) and livestock grazing Dahl may have fewer pestiferous flies. Recent observations suggest almost complete absence of red imported fire ant mounds in Dahl bluestem fields (Britton et al., 2002). Conversely, RIFA mound population densities in nearby bermudagrass and other forage fields were very high on central Texas ranches. Additionally, observations suggest suppression of fly populations on cattle grazing Dahl bluestem pastures. Reduced fly populations would improve cattle performance and could reduce pesticide requirements. Information is needed to further define the effects of Dahl bluestem on fire ant populations and pestiferous flies. Insect resistance in several grasses of the genus *Bothriochloa* has been suggested previously (Zalkow et al., 1980; Pinder and Kerr, 1980). Volatile oils that give this grass its distinctive odor have been identified by several authors and may be related to insect deterrent properties. Perhaps these are the reasons why cattle grazing Dahl pastures appear less susceptible to pestiferous flies.



Photo: Vivien Allen

Conclusions

WW-B. Dahl is one of the most promising introduced warm-season perennial grasses in the Texas High Plains. It has excellent longevity and potential for grazing, hay, and seed production, drought tolerance under dryland conditions, and has exhibited excellent yields and weight gains for cattle under irrigation. Its growth pattern of remaining vegetative through most of the growing season while entering the reproductive stage in fall lends itself well to a combination of grazing, stockpiling for winter grazing, and seed production. This grass provides an excellent component of an overall grazing system that includes grazing of winter annual small grains, high in crude protein, as a compliment to stockpiled Dahl (Allen et al., 2005).

References

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