

When we do this, our plans for the future, based on broad consensus, can indeed meet everyone's needs when these plans are founded on a healthy resource.

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Old World Bluestem Seedlings in Western Oklahoma

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Old World bluestems (*Bothriochloa* spp.) are an assemblage of warm-season perennial bunchgrasses first introduced into the United States in 1917 from Europe and Asia. These grasses are commonly seeded throughout much of the southern Great Plains for stabilizing marginal cropland and for increasing forage production on deteriorated rangelands. Old World bluestem seedlings can produce four times the forage of well-managed native rangeland (Coyne and Bradford 1985). Consequently, Old World bluestems are an ideal choice for seeded pastures used to complement native rangeland in an integrated forage-livestock production system (Sims and Dewald 1982).

For the past 30 years, researchers at the USDA's Southern Plains Range Research Station (SPRRS) at Woodward, Oklahoma have been studying these grasses and developing cultivars suited to the southern Great Plains. To date, the five most commonly seeded Old World bluestem cultivars are Caucasian, Plains, Ganada, WW-Spar, and WW-Iron Master. Two experimental cultivars not yet available commercially, WW-517 and WW-857, also appear useful for the future (Dahl et al. 1988, Masters and Britton 1988).

Caucasian bluestem (*Bothriochloa caucasica*) was introduced into the United States from the Soviet Union (Dalrymple et al. 1984) and was one of the first Old World bluestems to be introduced into the United States. Plains bluestem (*Bothriochloa ischaemum* var. *ischaemum*) was developed at the SPRRS and released in 1982 (Taliaferro and Harlan 1973). It is a blend of 30 morphologically similar Old World bluestem accessions collected from Afghanistan, India, Iraq, Pakistan, Turkey, and the Soviet Union (Dalrymple 1978). One of these 30 original accessions was isolated and released by the SPRRS as WW-Spar (*Bothriochloa ischaemum* var. *ischaemum*) in 1982

(Dewald et al. 1985). WW-Spar is noted for producing vigorous seedlings. Ganada bluestem (*Bothriochloa ischaemum* var. *ischaemum*) originated in Turkey and was introduced into the Great Plains in 1979 (Dewald et al. 1985). Ganada is noted for its cold tolerance. WW-Iron Master (*Bothriochloa ischaemum* var. *ischaemum*), a cultivar tolerant of iron-deficient soils, was released by the SPRRS in 1987 (Dewald et al. 1988).

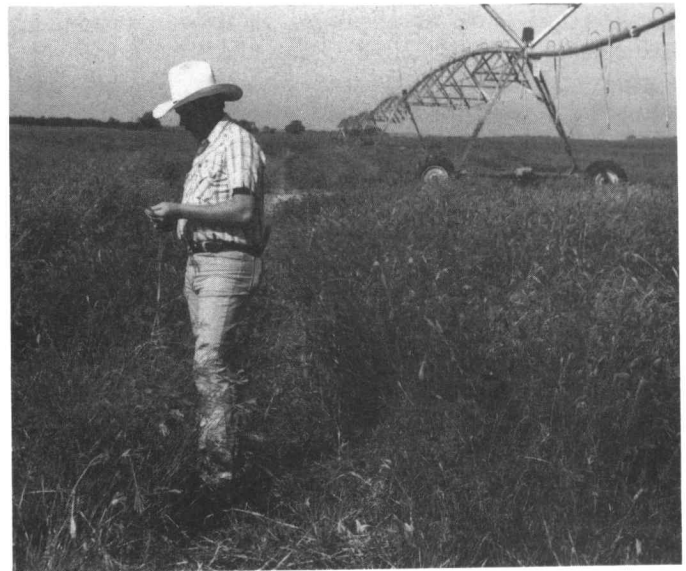


Fig. 1. Non-irrigated Old World bluestem seedlings can yield 5,000 to 8,000 lbs/acre. Production may be improved significantly where irrigation is feasible.

The development and release of these well-adapted cultivars enabled many farmers and ranchers across the southern Great Plains to establish Old World bluestem seedlings. USDA's Conservation Reserve Program (CRP) also helped proliferate Old World bluestem seedlings throughout the region. But given the uncertain future of CRP seedings and the ever-changing crop and livestock markets, many farmers and ranchers are trying to assess the future, long-term role of Old World bluestem seedlings

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in their agricultural enterprises. Thorough assessments will require information on grass establishment, forage production, and management strategies. We believe that a valuable source of this needed information is other ranchers, so we surveyed 50 western Oklahoma ranchers seeking their knowledge and experience concerning Old World bluestem seedings. We hope that the results of this survey will provide practical insights into some successful and some not-so-successful strategies for managing Old World bluestems.

Survey of Ranchers Managing Old World Bluestem Seedings

Survey Response

In February of 1990, a 26-question survey was sent to 50 ranchers who managed Old World bluestem seedings in 12 western Oklahoma counties. The list of ranchers was compiled from county agricultural extension agents, Soil Conservation Service personnel, and an Old World bluestem seed dealer. Even without a follow-up questionnaire we received 31 (62%) usable responses. The survey questions asked ranchers about their Old World bluestem management practices, including seeding, fertilization, irrigation and livestock grazing.

Background Information

Most of the respondents (77%) established their first Old World bluestem seedings during the 1980's, although one rancher's first seeding dated back to 1952. Before seeding the Old World bluestems, all of the land included in the survey was dedicated previously to growing wheat, sorghum, or cotton. One rancher commented that some of his Old World bluestem was planted on his less productive land and on those areas that were more difficult to farm. Old World bluestems appear to be a viable alternative crop for these sites.

Most of the seedings (92% of the total 7,366 acres) were either the Plains or WW-Spar cultivars, with few seedings reported of Caucasian, Ganada, or WW-Iron Master. These results were not unexpected, given that both Plains and WW-Spar were developed nearby at the SPRRS and these cultivars are well-adapted across most of the survey area.

Grass Establishment

Old World bluestems are generally considered to be relatively easy to establish on a wide variety of soils (Sims 1988), and our survey respondents agreed. In fact, 94% of respondents successfully established Old World bluestems during their first attempt, and only two respondents (6%) needed to reseed entire fields. Two other respondents reported that some portions of their fields required reseeding. The high rate of successful establishment may have been a result of the use of stubble mulch cover crops. This technique involves planting a residue-producing crop during the growing season immediately before seeding the Old World bluestems, and then seeding the perennial grass into the crop residue without further seedbed preparation. Erosion control, weed control, and reduced evaporation are potential benefits

achieved from preparatory cropping (Dahl et al. 1988). Preparatory crops were used by 74% of the survey respondents. Preparatory crops used were either wheat, sorghum, or wheat-sorghum combinations; wheat was preferred. One problem reported with sorghum was that its tall growth habit created too much shade, which impeded the growth of bluestem seedlings. The thick sorghum stubble also made it difficult to drill through, and volunteer sorghum sometimes persisted for several years.

Forage Production and Management

Old World bluestems respond well to fertilizers. So well, in fact, that fertilizing Plains bluestem with 60 lbs N per acre can almost double its annual forage production (Sims and Dewald 1982). Old World bluestems' responsiveness to fertilizer was well-appreciated by the ranchers in our survey, as 90% of them fertilized their seedings in 1989. The type of fertilizer used varied widely, but most respondents applied a nitrogen fertilizer alone. The remainder of respondents also applied phosphorus and, in a few cases, potassium. One potential problem with fertilizer application is that plant stem size and the number and weight of inflorescences increases with increasing fertilizer rates (Sims and Dewald 1982). These changes in plant structure can reduce a plant's acceptability to grazing animals (Dalrymple 1978). Prescribed burning or rotational grazing may be needed to improve palatability by reducing old dead and persistent stems.



Fig. 2. Many cattle ranchers in western Oklahoma manage their Old World bluestems with short duration grazing programs. High stock densities help prevent these grasses from becoming coarse and unpalatable.

Split applications with lesser amounts of fertilizer do not appear to increase forage yield compared with single applications (Berg 1990), and only 32% of the respondents who used fertilizer applied it in split applications. March 10 and June 4 were the average dates for the first and second applications, respectively, with about 64 lbs N applied per acre with each application. These rates correspond well with general recommendations made by Altom (1978). For those fields receiving single applications, application dates ranged from January to August and rates ranged from 30 to 220 lbs N per acre, averaging

80 lbs N per acre. We believe that applications as early as January or February and as late as August are probably less effective than applications in April, immediately before plant growth resumes. Early and late applications may stimulate cool-season plants and improve their competitiveness with the warm-season Old World bluestems.

About one-third of the seeded acreage (34%) was baled for hay in 1989. Twenty-seven percent of the hayed acreage yielded two cuttings, and none of the hayed acreage produced more than two cuttings. Average harvest dates were July 1 and August 26 for the first and second cuttings, respectively. According to our respondents, hay production averaged 2,500 lbs/acre, and ranged from 1,500 to 10,400 lbs/acre. One of the two respondents who reported 10,000 lbs/acre or more of hay harvested, used split applications of fertilizer at 32 and 48 lbs N/acre. The other respondent reporting hay production of 10,000 lbs/acre or more, fertilized with 50 lbs N/acre in both March and June and irrigated, too. Actual production values could vary significantly from these estimates, but hay production estimates from our respondents appear reasonable. For comparison, quantitative measurements of non-irrigated, well-fertilized Old World bluestems have revealed that single cuttings can yield from 5,000 to 8,000 lbs dry matter per acre (Dalrymple et al. 1984).

Forty-six percent of the ranchers used prescribed fire to help manage their seedings, while about one-third (29%) used irrigation. The amount of water applied by the irrigators varied greatly, from 1.5 inches up to 22 inches/year. The average was 7.4 inches/year. However, because 1989 was a high rainfall year, the amount of water applied would be expected to increase in most other years. One respondent stated that the annual production from his irrigated field is consistently double the hay production from his dryland seeding.

Cattle Grazing Strategies

Most respondents (94%) grazed their seedings with livestock. Beef cattle were the only kind of livestock used and included both cows and stockers. A short duration grazing (SDG) program was used by 13 of the 29 graziers. This is a surprisingly large proportion of respondents given the large managerial inputs required by SDG. Nonetheless, many ranchers apparently realize that the high utilization grazing form of SDG (Booyesen and Tainton 1978) is well-suited to management of Old World bluestems and similar improved forage species (Dahl and Cotter 1984).

Sixty-three percent of the respondents used their Old World bluestem seedings as complementary forage to allow grazing deferment of their native rangeland pastures. We believe that this is one of the greatest values of Old World bluestems.

Two of the most common grazing management problems cited by the ranchers were that (1) forage palatability was sometimes poor, and (2) that forage nutrient quality was sometimes less than livestock required. These problems have also been documented by research (Dabo

et al. 1987, 1988) and emphasize the need for intensive grazing management of these grasses. Large pastures grazed at low stock densities for long grazing periods cannot maintain Old World bluestems in a palatable and nutritious form.

Summary and Recommendations

Old World bluestems are valuable introduced grasses in the southern Great Plains. These grasses enable ranchers to increase livestock carrying capacity, provide grazing deferment for native rangelands, and provide forage reserves for drought periods. For best results, Old World bluestems should be managed intensively. Fertilization and periodic burning or mowing will help keep seeded stands vigorous and productive. Production can be improved dramatically where irrigation is feasible and economical. Old World bluestems can be harvested for hay, but palatability and nutritive content decline rapidly with advancing plant maturity. Properly managed rotational grazing programs designed with small pastures and high stock densities will provide excellent livestock gains per acre.

When asked whether Old World bluestems had met their expectations, 30 of the 31 ranchers replied favorably. It appears that Old World bluestems are truly a useful tool for ranchers in western Oklahoma. Of course, any tool is only as good as the craftsman using it. Our survey demonstrates clearly that ranchers in western Oklahoma are indeed managing Old World bluestem seedings in very successful ways.

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Economic Multipliers

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Economics is often called upon to determine the value of a given use of rangeland and, more particularly, of public lands. For example, livestock grazing permittees may cite the value of livestock produced on public lands, while timber interests value the lumber harvested and environmental groups assign value to recreational visitor days. An economic analysis may then be employed to determine not only the initial impact of the goods or services provided, but also to value any additional impacts that may arise to a region or local community.

The total impact of a dollar produced or spent in a community is often measured through the use of a "multiplier." Multipliers are commonly used in economic studies which attempt to show how important one business or industry is to a given geographic region or community. Much confusion exists, however, over the proper usage of multipliers and how they fit in an economic analysis. Multipliers are numbers which measure the magnitude of the direct and indirect effects that a given amount of production or expenditure has on a region or community. There are many different kinds of multipliers. The most commonly used are for total output, income, and employment.

There are also two types of effects, direct and indirect. A direct effect is equivalent to the initial impact of the original production or expenditure. For example, the direct effect of \$1.00 spent on some good or service in a community is 1. Indirect effects measure the additional effects the original purchase may have as that expenditure "turns-over" within the region or community. Indirect effects may range from 0 to 2 or higher.

For example, let us assume that we want to know the total impact on a community of the money received from the sale of a feeder steer. The direct effect represents the money received from the sale of the steer. The indirect

effect represents what happens to the money received from the sale of the steer. Receipts from the sale of the steer go to: (1) pay for inputs used to produce the steer and (2) provide income to the rancher.

Many of the inputs used in the production of the steer were purchased from various businesses within the region. Money spent on these inputs is considered gross receipts by those businesses which supplied them. These businesses use the money they receive to pay for inputs purchased from other businesses and to provide income

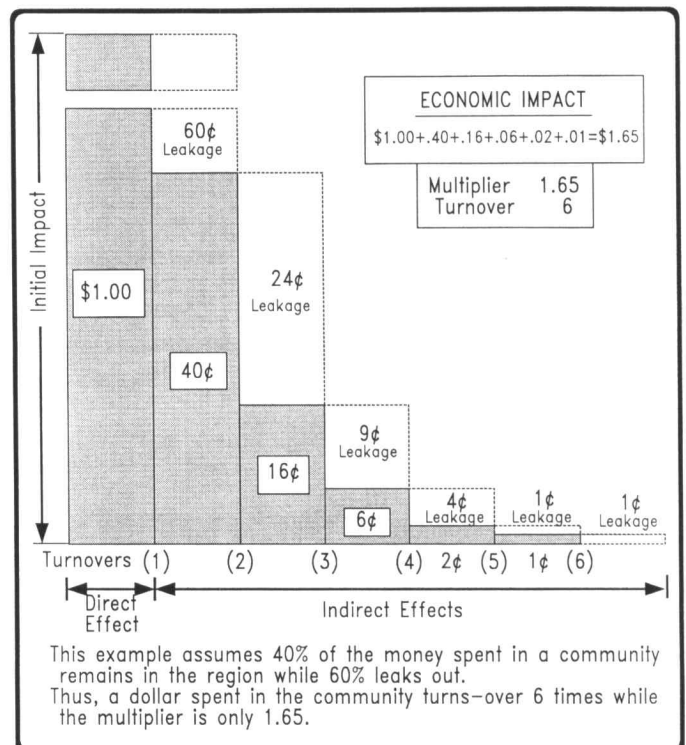


Figure 1. Example of a Multiplier.