

CRABGRASS

By

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Although Crabgrass is traditionally thought of as a weed, in recent times more people are recognizing it as high quality forage. Crabgrass pasture makes it possible for livestock producers to achieve gains even during the typical summer slump period. It also allows producers to rest tall fescue pastures and stockpile it for fall and winter feeding, creating a healthier all around forage system.

Some Tennessee livestock producers have achieved over 1,000 lbs. beef/acre/year on double cropped grazed crabgrass and rye. Cases are also documented of Tennessee cattle going on full feed 21 days earlier coming off crabgrass versus coming off tall fescue. A study in Marshall County, Tennessee, showed cattle on tall fescue with 1 lb. of corn/day lost 0.33 lb./day in July and the same cattle on crabgrass with no grain gained 2.35 lbs./day in August.

The attached report on Crabgrass by R. L. Dalrymple (Noble Foundation) includes the history, establishment techniques, fertility considerations, forage production, stock performance, managing for a volunteer stand, and other information.

Known seed sources of Red River Crabgrass are:

Elstel Farm and Seeds
2640 Springdale Road
Ardmore, Oklahoma 73401
(800) 858-7333

AG Renewal, INC.
1710 Airport Road
Weatherford, Oklahoma 73096
(800) 658-1446 or
(580) 772-7059

Enclosure

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CRABGRASS

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I. INTRODUCTION

Crabgrass is the common name for numerous grass species of the genus *Digitaria*. These grasses are warm season annuals capable of natural, consistent and prolific reseeding. Crabgrass is among the highest quality of the forage grasses that grow in the warm season. They are essentially non-toxic. There is a possibility that they can accumulate harmful levels of nitrates, but that very rarely occurs.

The consistency and persistence of crabgrass as a forage is important. Some people believe that since crabgrass is not a perennial, it would not persist over a long period of time. However, many adapted perennials fail to persist over long periods of time. Decades old bermudagrass, Old World bluestems, and weeping lovegrass can be thinned or killed due to weather stresses. With adequate cultural practices, the reseeding annual crabgrass has persisted equal to or better than the perennial grasses just mentioned.

It is important to keep in mind that the crabgrasses discussed herein, are the good forage types and not the thin, short, low producing ecotypes.

II. HISTORY

Seed of crabgrasses likely entered the United States as a seed contaminant in feedstuffs and foodstuffs brought by the European, and other, immigrants. The United States Patent Office (the forerunner of the USDA) supposedly imported crabgrass on purpose in about 1849, but that has not been ascertained in government papers. This importation was to help provide forage for draft animals and other farm animals of the time. The grass was very successful, leading to its disfavor as it encroached upon the cultivated field crops, yards, and gardens of the time. Those early experiences lead to much dislike of the grass that was literally passed from generation to generation without much consideration for the merits of the grass as forage. Modern herbicides can control crabgrass in field and garden crops.

There has been an enormous change in the mind of both the producing public and the academic sector in the acceptance of crabgrass as a legitimate forage plant during the last three decades. The "River of Tradition" runs deep; and there is still much social stigma due to prior training, but it is much improved over prior times and education about the grass continues to erode that stigma.

Crabgrass supposedly evolved on the African continent. The Europeans discovered it, took it to Europe and used it to some degree, and then it was brought to the United States.

III. SPECIES OF CRABGRASS

According to Dr. Ron Tyrl of Oklahoma State University, there are 35 species of *Digitaria* naturally occurring within the United States. Some of those are not called crabgrass, but many of them do carry the common name of crabgrass. Some taxonomists believe that none of these grasses are indigenous to the United States. Others support the idea that a few species may be indigenous to the U. S.

In Oklahoma there are six different species of naturally occurring *Digitaria*, all carrying the common name of crabgrass. These common names are also delineated by calling these grasses hairy crabgrass, smooth crabgrass, large crabgrass, slender crabgrass, velvet crabgrass, etc.

All of these species are good forage quality and offer a good bite to livestock, but only three species offer consistent, good forage volumes under the correct circumstances. *Digitaria ciliaris* and *Digitaria sanguinalis* are the two most major forage species. They are often both identified as *Digitaria sanguinalis* by agronomists, but plant taxonomists and cytologists separate the two species. Both of these species have ecotypes that produce good volumes of useful forage. There are also ecotypes that are incredibly inferior and would be fairly useless forages because of such a low potential yield or short green season. *Digitaria ischaemum* is the third species of major forage use, but it is less of a good forage type. All three of these species can occur together in any combination. Naturalized crabgrass is not just crabgrass, there is much variation.

IV. REASONS TO USE CRABGRASS

There are many reasons to use crabgrass as a forage: (1) The number one reason is for high quality forage for grazing and hay during the summer. The crabgrasses offer among the highest quality summer grass forage produced in the southern plains and throughout the southeastern quarter of the United States. Crabgrass grows elsewhere in the U.S., but in less volume; (2) The second important reason for using crabgrass for forage is that it is an excellent summer choice in many double cropping systems with winter annual forages, i.e., wheat and crabgrass, etc.; (3) The third important reason is that crabgrass can be managed as a volunteer crop to mimic perennials and produce a high quality annual and thus reduce seed and some other annual cost inputs; (4) The fourth reason is to use crabgrass as a component in warm season annual mixtures. These include mixtures with forage sorghum (sudangrass), pearl millet, German (foxtail) millet, cowpeas, mungbeans, soybeans, annual lespedeza, etc.; (5) The fifth reason is to use crabgrass as a component in warm season perennial forages, i.e., bermudagrass, Old World Bluestems, alfalfa, etc.; (6) The sixth reason is to use crabgrass as a double-crop and mixture with cool season perennials, i.e., fescue, orchardgrass, smooth brome grass, and rescuegrass (Matua brome grass, Stocker brome grass, etc.); (7) The seventh reason to use crabgrass is in the management of manure effluent disposal systems of confined swine, poultry, dairy, and feedlot operations. It is a good utilizer of excess soil nutrients; (8) The eighth reason to use crabgrass is in soil conservation practices, i.e., pond dike revegetation, roadside revegetation, etc.; and (9) The ninth reason to use crabgrass is in turf management situations.

V. USES OF CRABGRASS

In the southern wheat belt and throughout the southeastern quarter of the United States, the number one use of crabgrass is as a summer component in a winter annual crop-crabgrass double crop forage regime. For example, the various winter small grains, the annual ryegrasses and annual legumes in some combination often comprise the winter component, followed by volunteer crabgrass as a summer component. This approach to grassland farming usually involves some form of favorable moderate soil renovation (tillage) to culture both crops. Crabgrass responds positively to proper soil tillage causing it to produce earlier and greater in the long term of the season or following years.

Crabgrass is sometimes used as the single crop, although this is not the major use. Some operators manage crabgrass as a single crop to maximize the production of the summer high quality forage.

Crabgrass is used as a mixture component with warm season legume mixtures. Crabgrass and annual lespedeza offers an excellent mixture for summer wherever annual lespedeza can be grown well. Crabgrass is also grown with alfalfa. A one-half to two-thirds stand of alfalfa is open enough to allow an excellent stand of crabgrass to be grown. A good level of rotational grazing is critical with these mixtures because cattle usually graze crabgrass first over alfalfa and more continuous utilization of crabgrass will severely diminish its presence in the mixture. Crabgrass has also been grown with southern cowpea, hay soybeans, grain soybeans, and mungbeans.

Crabgrass makes an excellent mixture component in forage sorghums (sudangrasses), pearl millet, German millet (foxtail millet), and corn. Crabgrass forms a more complete soil cover for soil erosion conservation than the other forages, it provides a higher quality bite, and it especially provides excellent forage and soil cover in the later portion of the season when these other forages are producing less. Some producers plant seed for a thin stand of these grasses along with crabgrass seed to establish a crabgrass field in the long-term.

Crabgrass is also grown in a mixture with bermudagrass, Old World Bluestem, Weeping lovegrass and bahiagrass. The crabgrass component within these perennial grasses offers quality forage that is not possible from the perennial grasses during mid to late summer. In order for this mixture to work, there are certain cultural practices that must be met, and rainfall must be suitable. These mixtures tend to work better in precipitation zones above 25 inches. The higher the precipitation, the better the crabgrass stays in the mixtures. Crabgrass remains in these mixtures best in Old World Bluestem. In the case of the bunchgrasses, Old World Bluestems and weeping lovegrass, there must be space of about 6 to 12 inches or more between clumps of grass to provide a mini-field for crabgrass to produce. Minimize tillage (soil renovation) to encourage crabgrass is not realistic to do in these grasses because it would permanently destroy some of the stand. The need for space for crabgrass is also true in bahiagrass, but bahiagrass will recover from light spring season tillage to thin and set back the vigor of the bahiagrass to allow crabgrass a home. The basic rule is to thin the stand to one-half to two-thirds of a full cover stand. The same applies to bermudagrass, i.e., the more soil disturbance in spring, the more the crabgrass production following that disturbance. Bermudagrass recovers from any acceptable tillage is this syndrome.

Phosphorous, potassium and lime needs must be provided for all these forage mixtures to be successful. Actual nitrogen (N) applications of 30 to 50 pounds (N) should be applied on the mixtures in about the western third of Oklahoma (about 25-inch rainfall area and less). In the central region of Oklahoma (25 to 30 inch rainfall area) N rates for the mixture tend to be 50 to 75 pounds N per acre. In regions above the 30-inch rainfall area, nitrogen rates can be 50 to 100 pounds N per acre or more. Under good rainfall conditions from Central Oklahoma and east, and with irrigation, higher rates of N can be used.

Crabgrass can be used as a planned conservation grass for revegetation of a critical area. The spreading of crabgrass seed on a dozed area, for example, will provide a quick ground cover to protect Mother Earth before a stand of permanent vegetation can be secured. Old World bluestem or bermudagrass and seed for a thin stand of crabgrass can be planted at the same time. The idea is to have just a little crabgrass to cover the earth a little sooner and let the stand develop into permanent grass as the season progresses.

Cool season perennials, i.e., fescue, orchardgrass, rescuegrass, and perhaps others can be used in a mixture or double-cropping syndrome. These mixtures perform best where the cool season grass stand is sparse and perhaps low in vigor and on loam to sandy soils. There must be a mini-field of 6 to 12 inches or more between the cool season clumps where the crabgrass can establish and produce. Some fescues, and especially excellent stands, have allelopathic influence on the crabgrass and will not allow the crabgrass to survive in the stand. Orchardgrass tends to allow growing a mixture of orchardgrass and crabgrass better than fescue. The same is true with thin smooth bromegrass. The perennial rescuegrasses (bromegrass) such as the Matua and Stocker varieties allow excellent summer crabgrass production in the stand. Purposeful thinning of the cool season component is often needed as the summer season nears to encourage crabgrass in the mixture.

VI. CRABGRASS CULTIVARS

The Noble Foundation at Ardmore, Oklahoma developed and released a variety of crabgrass named 'Red River' crabgrass. It was approved as a certifiable variety through the Oklahoma Crop Improvement

Association. This selection was named Red River because it came from a one-parent plant from the upland soils north of the Red River in southern Oklahoma. Other selections studied included plants from various regions of Oklahoma and Missouri. Since the release of Red River, it has been compared to additional selections from Oklahoma, Louisiana, Delaware, New Mexico, New Zealand and Russia. The Red River variety has remained overall the best.

A major characteristic Red River crabgrass has been consistently high production. Selections of the same species, but of different ecotype, ranged in production potential from about 1,000 pounds per acre per year up to Red River, producing a high yield of over 12,000 pounds of high quality forage per year. Red River crabgrass provides for the first time a crabgrass of known type and genetic potential.

Red River crabgrass has other desirable characteristics. It remains green for a full season, compared to some others that die one to three months before the fall frost. It is an excellent stoloniferous grass with prolific seed production for planned volunteer. It is a sod-forming grass with a medium stem and leaf size, providing excellent grazing and quality hay. It has no serious disease or insect problems.

Cultural practices are equally as important as the variety. Good management of a good variety will result in more production.

VII. ESTABLISHMENT

Crabgrass can be established from seed or vegetatively. Establishment from seed is relatively easy and vegetative propagation is not necessary except in research trials.

Good stands of crabgrass have come from plantings during winter to plantings as late as August. There are two basic planting syndromes that make up the majority of plantings. One is overseeding crabgrass seed in cool season annual grasses such as wheat. The other syndrome is planting on a good, firm, fine seedbed.

When crabgrass is overseeded in winter annual grasses, the dates of overseeding may be from mid-winter through April.

When crabgrass is planted on a good seedbed the usual dates of planting range from April through mid-June. Successful stands have come from July and August plantings, but the risk of stand failure runs high in these months. September is too late to consider planting for successful stands. Planting on good seedbeds is best done by placing the seed on a rolled seedbed and then rolling once more.

Recommended seeding rates range from one to five pounds pure live seed (PLS) per acre with about three pounds PLS/ac being a good median rate.

Seed can be planted alone from equipment capable of doing so. Few producers have such equipment and most plantings are made by blending seed with a bulk material such as dry fertilizer, dry sand, dry sawdust, granulated lime, etc. That mix can then be distributed through seeders, fertilizer spreaders, or drills.

Care should be taken to have the final planting result in seed being on the soil surface up to no deeper than one-half inch of soil cover.

VIII. TILLAGE AND NO-TILLAGE MANAGEMENT

The crabgrasses respond very favorably to proper tillage (soil renovation). Proper tillage consists of relatively thorough surface tillage during the off season of fall to spring. This tillage

may be done with discs, field cultivators, sweep plows, etc. The tillage does not have to be deep. Tillage at two to four inches is adequate.

When properly done, this tillage encouraged early stand development, increased early season production and increases total production for the season. Research has shown increases in production of, more or less, 25% to 50% are common. Increases in production of about 2,000 to 3,000 pounds per acre have been recorded from a single shallow discing.

In a single crop crabgrass regime, the area should be tilled in late winter to spring just before active crabgrass seed germination occurs. This is about April 1 in southern Oklahoma and April 15 in northern Oklahoma. The area should be dragged or rolled to reform the soil.

In a double cropping regime with cool season annual grasses, tillage can be done during fall seedbed preparation for the winter crop. That helps crabgrass the next summer, but if crabgrass is not emerged by the end of the winter crop use, the area can be tilled again. Spring tillage is the most important. If a crabgrass stand is there, it is wise to leave it, but some operators realize to response to tillage and will do so regardless of whether a stand is present. In these double crops, there are many choices: (1) till in fall and spring; (2) till in fall and no-till in spring; (3) no-till in fall and till in spring; or (4) no-till in fall and no-till in spring.

Crabgrass can be managed in no-tillage cases. Under total no-tillage management, the grass starts later, produces later, produces less, and more invaders occupy the stand. Bermudagrass, fescue, other perennials, and other vegetation become increasingly prevalent with time. In Oklahoma, crabgrass may phase out severely. It will stay for many years with good fertilization, rotational grazing, weed control, etc.

IX. SOIL FERTILITY CONSIDERATIONS

Some information on soil fertility management was presented in the mixtures information. Good natural crabgrasses and Red River crabgrass all respond to good soil fertility. The P, K, and liming needs should be supplied as indicated by soil test results. Those needs are similar to those of bermudagrass, tall fescue, small grains, ryegrass, etc.

Crabgrass responds well to added nitrogen inputs. A general rule of thumb is to supply one to two pounds of actual nitrogen per growing day of the season. For example, in southern Oklahoma there is about 228 average frost-free days. But of those 228 frost-free days, only 100 to 150 are growing days, i.e., days with adequate moisture, sunlight, and warm temperatures for crabgrass growth. Thus, a conservative nitrogen rate for southern Oklahoma on dryland is 75 to 100 pounds of N per acre. Research work illustrates that in a typical season and good soil, Red River crabgrass continues to respond well to 150 to 200 pounds of N. Under irrigation, double-cropped crabgrass can utilize 150 to over 200 pounds of N per season in split applications.

Research indicates that Red River crabgrass under irrigation can absorb up to about four pounds of actual nitrogen per day when used as a forage in a nutrient disposal system such as for disposal of poultry, swine, and cattle waste.

Crabgrass produces well on a wide range of soil pH from about 5.0 to about 7.5. The pH of 6.0 to 7.2 seems to be ideal.

X. FORAGE PRODUCTION POTENTIAL

The naturalized crabgrasses vary greatly in forage production potential and other characteristics due to ecotype variations. Some naturalized, good-producing types can produce from 4,000 to 8,000 pounds of useful forage production per acre annually. Other low-producing types may produce less than 1,000 pounds; these would obviously be relatively non-effective in farm forage production situations.

The Red River crabgrass ranges in usual yields somewhat as follows. Under a double cropping regime where there is a winter annual grass, crabgrass will usually produce 2,000 to 6,000 pounds dry weight per acre per year. Under a single crop situation on moderate quality soils and with moderate fertilization, it will produce 5,000 to 8,000 pound high quality forage per acre per year. It can regularly produce 8,000 to 10,000 pounds per acre when using inputs to do so. The highest production recorded at the Noble Foundation was over 12,000 pound dry weight forage per acre under good management on fertile soils. Dr. Herb Huneycutt at the University of Arkansas repeatedly produces over 10,000 pounds of high quality crabgrass forage per acre per year on well fertilized silt loam soils.

An Oklahoma producer has produced over 1,000 pounds of stocker cattle beef yield per acre with a winter pasture and crabgrass double crop. Noble Foundation double-cropping pastures of rye and crabgrass have produced over 860 pounds of stocker beef per acre with the natural crabgrass making about 150 pounds of that total. The potential with Red River crabgrass is much better.

XI. STOCK PERFORMANCE

The ranges in stocker cattle average daily gain (ADG) have varied from about 0.75 pounds per day on poor or mature crabgrass up to an average of about 2.25 pounds ADG on good crabgrass pasture. Typically good gains of 2.00 to 2.50 ADG have often been realized from well-managed green crabgrass pasture.

One Oklahoma producer who has pastured thousands of stocker cattle over many years advises that his cattle on bermudagrass have averaged about one pound ADG, whereas, his cattle on naturalized crabgrass have averaged 1.75 pounds ADG. That is a 75% improvement in ADG and a good testimony to the quality attributes of crabgrass. These cattle were provided grass, salt, mineral and water only and no implants or feed supplements.

Dairywomen operating grazing based dairies often mention increased lactation flow when grazing crabgrass compared to other summer grasses. This usually translated into about a 25% increase in lactation when cows grazed crabgrass forage.

Feeding trials comparing Midland Bermudagrass and naturalized crabgrass hay of the same protein content have been conducted. Stocker cattle performance was better from the crabgrass hay, averaging about 0.2 to 0.3 pounds ADG higher depending on the trial. In one trial, steers fed crabgrass hay produced 0.5 pounds per day more gain than steers on the bermudagrass hay. This added ADG from crabgrass is likely due to greater digestibility and palatability compared to bermudagrass.

XII. UTILIZATION

Crabgrass is best grazed in a rotational grazing program. It is much like most forages in that the better the rotational grazing management, the higher the production. Simulated grazing trials in research plots illustrated that good "rotational grazing" produced over 30% greater yields than more frequent and shorter use. In general, residue heights of three to six inches should be left. Recovery periods in early summer can be as little as three weeks, whereas in summer to fall they need to be three to six weeks. Regrazing at about 8 to 18 inches tall is a good target. The range depends largely on the environment of the location.

Crabgrass should be cut for hay at 12 to about 24 inches tall to leave a three to six inch stubble with a green leaf on most stems.

XIII. VOLUNTEER STAND MANAGEMENT

Crabgrass is indeterminate in maturity, i.e., it can produce new tillers and ripen seed simultaneously from June to fall. This characteristic lends crabgrass the ability to produce seed for a seedbank in and on the soil for the next season volunteer stand. By controlling residue height and recovery period, it is easy to allow sufficient shatterable seed to develop. At some point during summer, some shatterable seed should develop on about every square foot to square yard. It needs to be only enough to shell out about one-half teaspoonful in a hand of seedheads. A whole seedcrop is not necessary and is much too much.

Hay should be cut to allow some seed shatter during harvest. Uncut strips can also be left between mowing swaths. These crabgrass strips then ripen seed before the next harvest to add to the seedbank for volunteer.

XIV. ADAPTATION

Crabgrass is a "hot weather" grass. It grows best when air temperatures are about 80°F to over 100°F. The soil temperature at 2 to 4 inches for crabgrass production should be about 70°F to over 75°. Crabgrass is a "moisture-loving" grass but it does not perform well in a wetland of long-term supersaturated soils. It grows well from a precipitation belt of about 24 to over 60 inches if other conditions are acceptable. It will produce well sporadically in rainfall belts of 20 to 24 inches. It has good drought tolerance. In 1993 there were approximately 60 days during June to August and no effective rain. Crabgrass stands withstood that stress and responded rapidly when rains arrived the last week in August. During 1980, southern Oklahoma experienced record hot and dry weather with approximately 100 days without rain and 60 days of high temperatures at or above 100°F. Crabgrass produced about 1.5 tons per acre on soil moisture before the hot drought, but over 90% of the plants were dead at the arrival of fall rains. Some live plants did remain.

Producers advise that crabgrass tolerates salty conditions better than bermudagrass. It does not, however, tolerate strong alkaline soils, nor does it produce well on moderate to strongly basic pH conditions. A pH of 7.5 or above is cause for alarm. The failure or success of the crabgrass in those situations is highly variable and it must be tried to determine its success or failure.

Crabgrass produces best at a day length of 12 hours or more; the longer the day, the better the production. The order of preference for soil texture is first the sandy soils, then the loams, followed by the silt loams and the clay loams. Crabgrass performs very poorly or not at all on very tight clay loam, pure clay and silt soils or silty clay soils.

Geographically, dryland crabgrass grows well over all of Oklahoma, except the panhandle where its production is relatively low and sporadic. Naturalized crabgrass grows in every state in the contiguous United States. It occurs worldwide in mild and temperate climates. As useful forage in the United States, its dryland geographical adaptation is primarily from west-central Nebraska south to the Texas coast and east to the Eastern Seaboard. Secondary adaptations just north of that area can produce excellent crabgrass forage but in a much-compressed summer season of perhaps 45 to 60 days.

XV. LITERATURE AVAILABLE

The Noble Foundation, Ardmore, Oklahoma, has done considerable forage work with crabgrass and have produced numerous publications. The following four publications are summaries of much of that work.

Dalrymple, R. L. 1975. Crabgrass As A Forage. Pub. No. CG-75. Noble Foundation, Agriculture Division, PO Box 2180, Ardmore, OK 73402. (A summary of research and demonstration work up to that time).

Dalrymple, R. L. 1983. A Summary Of Research And Demonstration About Using Crabgrass As A Forage. Pub. No. CG-83. Noble Foundation, Agriculture Division, PO Box 2180, Ardmore, OK 73402. (A summary of research and demonstration work up to that time).

Dalrymple, R. L., J. L. Baker, & J. S. Swigert. 1991. Crabgrass Seminar and Field Day Report. Pub. No. NF-GE-91-01. Noble Foundation, Agriculture Division, PO Box 2180, Ardmore, OK 73402.

Dalrymple, R. L., R. L. Mitchell, B. C. Flatt, F. W. Dobbs, & S. H. Ingram. 1996. Crabgrass For Forage: Reprints On Management From The 1990's. Pub. No. CG-96. Noble Foundation, PO Box 2180, Ardmore, OK 73402.