FACT SHEET – 2002

Tillage/Renovation for 'Red River' Crabgrass

Introduction: The 'Red River' variety of crabgrass and naturalized forage ecotypes (native) of annual crabgrasses are used for grazing and hay forage, conservation, and other uses in a very wide range of circumstances. These uses include primarily the species of *Digitaria ciliaris, D. sanguinalis, and D. ischaemum*. There are many needed management inputs, just like any other crop, for the *stand and production* to be successful and *upper level.* These inputs include: proper planting or volunteer management, adequate fertilization and/or legume input, good grazing and haying practices, weed control by grazing, haying, mowing, or herbicides, good mixture and double cropping procedures, soil tillage/renovation, and other things. This fact sheet deals with the tillage/renovation aspect. This information is primarily *relevant to managing for volunteer stands and production*, but the basics apply to new plantings, too.

Research and Demonstration Results: We have seen numerous times in our fields, and other producer fields, the benefits to off-season (fall to spring) tillage for crabgrass forage. We are in favor of minimized tillage to limit input expenses, but we know adequate tillage can greatly help greatly for this forage. When I researched and used crabgrass while at the Noble Foundation, we recorded many tillage responses. Some of them are summarized as follows. Noble foundation is given credit for this work.

A major negative response to crabgrass stand and total production was from tillage done after crabgrass germination started, stands emerged, or stands were producing. There are some exceptions, but generally, for crabgrass's sake, do not till after germination starts.

Usual field responses were that crabgrass production following proper tillage was better than short-term no-tillage by 15% to over 50%. Disked areas produced up to 260% of non-disked areas.

In one case, an area disked in early spring produced 6480 lbs/acre compared to 3120 lbs/acre in the non-disked area. Both areas received 55 lbs /acre nitrogen during summer. An area tilled just after seedling emergence had near zero production because it did not re-establish.

Average total production in lbs/acre from a two-year trial from volunteer stands illustrated that in some years no-tillage failed to produce June or July forage, whereas disk tilled areas regularly produced June and later forage at a much higher level overall. At the 60 lbs/acre nitrogen rate, fall and spring disking produced 3550 lbs/acre while no-tillage produced 2900 lbs/acre. The tilled area made 22% more grass in total. In these trials, tilled areas produced up to 260% of no-tilled areas. No-till areas never produced more than tilled areas. The soil was a medium quality soil.

In general, the more thorough the surface tillage before germination and the better the soil is re-firmed, the better the stand (planted or volunteer) and early production. The deeper the tillage, and the looser the final renovation, the later the forage is available, but the greater the total production if stands develop well. Moldboard plowing and re-firming showed good results in total, but *early season yields were non-existent*. The same is true with deep disking or chiseling. These tests show the importance of the input, but we know there are successful no-tillage stands, too.

Tillage versus No-Tillage: Tillage operations are best, but the crabgrasses are used successfully in tillage and no-tillage syndromes. The absence of tillage, does not always dictate failure of crabgrass, but tillage helps greatly to increase production. No-till cases tend to be primarily where the grass is used in mixtures with bermudagrass, bahiagrass, Old World bluestems, fescue, orchardgrass, Stocker bromegrass, and other perennials. During warm seasons of good moisture and other acceptable management, the crabgrass can function very well and be useful forage in these mixtures. Even in these cases, light and thorough soil surface tillage in the off season produces a better stand and good production (see photograph).

There are cases when a grazier chooses to minimize equipment input in a winter pasture-crabgrass double crop, and tillage is skipped for a season or more. Volunteer crabgrass may produce in these cases, but it is later and at lower production levels than where adequate tillage is done. *If this type of double crop is no-till year after year, the crabgrass usually lessens each year and is very erratic, other vegetation invades, and ultimately there is little crabgrass pasture left.*

The 2001 dry summer season in Oklahoma produced many examples of the great differences possible. There were many cases where lightly tilled (disked or sweep plowed) and re-firmed soil at winter pasture end produced excellent crabgrass pasture and no-tilled areas had very poor to zero pasture. Adequate tillage is good when it can be done where the soil, terrain, and equipment are acceptable.

Timing of Tillage: Essentially, all tillage for *crabgrass* should be done during the *off-season*. In Oklahoma, this is generally sometime during September to early April. Tillage *for crabgrass* should usually *never* be done after crabgrass seedlings emerge. To do so causes the stand to be damaged and it may have to re-emerge following more rain. That rain may be too late that year.

In pure crabgrass areas where double cropping or mixtures are not a part of the forage program, tillage is best done *just before active germination.* This date is usually just before, at, or shortly after the date of the last spring killing freeze or as deciduous trees bud.

In cases where crabgrass is grown in perennial grass mixtures, the helpful soil surface tillage can be done *anytime during fall to spring when the perennial forage residue is short*. The closer to spring that the tillage is done, generally the better. Sometimes, this type of tillage is done on a paddock by paddock basis, as these areas are properly grazed or hayed and available for the treatment. Tillage in these areas will need to be light to moderate so perennial stands persist. Generally 30% to 50% of the soil surface should be renovated.

In the cases where crabgrass is used as a double crop with winter annual forages, the *fall tillage* usually done for winter pasture, hay or grain *helps the crabgrass the next summer.* But, spring tillage alone or additional *tillage at winter's end is even more helpful.* In the case of cereal (grain) rye, and crabgrass double crop, the rye quits early enough in spring to do the spring tillage for crabgrass without destroying an early crabgrass stand. Fall and spring tillage is possible with

rye. *Take the rye out extra early*. An alternative is to no-till rye in early fall in short crabgrass stubble and *be sure to do the tillage in the spring*. That has worked well with good fertilization.

When crabgrass is double cropped with wheat, oats, barley, triticale, annual ryegrass, Stocker bromegrass, and many winter legumes, the volunteer crabgrass stand is often present in late April to May or early June before the winter forage use is complete. My view is *not to destroy a crabgrass stand*, even under no-till in spring, but to *fertilize and manage it*. So, in this case, the fall tillage at planting is usually the best. In these cases, in the areas of the southeast United States where early summer rains are more likely, some producers go ahead and do the spring tillage late and go for a more productive second stand. I do not like to do that in Oklahoma, as there is a great risk of not getting rain until fall, and not getting a second stand in time.

Moisture is Important: Adequate soil moisture, from good rainfall or irrigation, amounts and distribution helps to make either tillage or no-tillage production better. Good moisture can make a no-tillage case successful, but that same situation under tillage is greatly better. *Without good moisture no-tillage is more likely to be poor.* Rain or irrigation is always needed after spring tillage for crabgrass germination, stand development, and production.

Tillage Tools: Tools to till soil for crabgrass are wide and varied and regionally different to a slight extent. Listed as follows, in order of light to more intense tillage, are common tools used for this purpose: drag spiketooth harrow, chain harrow, aerator, mulch-treader, sweep plow, field cultivator, chisel plow with sweep points, shallow chisel plow with chisel points, tandem disk, offset disk, and moldboard plow. There are others such as the combination disk-cultivator-roller type tools like the "Do-All" brand and others. Many of these tools can be run shallow to deep. We primarily use a disk, but also the chisel plows and mulch-treader. Regardless of the tool used, *the final seedbed should be dragged, rolled, or packed to smooth and refirm* the soil for good seed to soil contact. Re-firming may not make sense, but results show it is best.

A heavily pugged (trampled) winter pasture or permanent grass such as bermudagrass and fescue will be "tilled" by that treatment. Volunteer crabgrass will invariably be better there than a non-pugged area without some tillage.

Ranges of Intensity of Tillage: The most important thing is to *till relatively shallow and as thorough at that depth as possible*. For example, using a disk, field cultivator, chisel with sweeps, or a sweep plow at *two to four inches deep is excellent* if the seed bank in the upper soil profile is good. But, there will be some positive effect from only scuffing the soil surface up to working at only two inches deep. This shallow tillage is more useful in perennial grass stands. Extremely deep tillage from a sharp point chisel plow, offset disk, or moldboard plow often buries seed too deep for early and good volunteer stands. These tillages are sometimes needed, but are not usually recommended. When managing *new stands*, where there is little seed bank in the upper soil profile, it is very important to till *very shallow at two to three inches* the first few seasons after the original planting to assure placing of some seed for volunteer close to the top of the soil for good stands. A field cultivator, chisel plow, and disk all work well for this type tillage. *Always* drag, roll, or pack to refirm and smooth the area. Rain completes the work.

Other Fact Sheets and Information: We have other fact sheets available on request. Subjects are: planting and early management, double cropping, managing for volunteer, using nurse crops and companion forages, and legume mixtures. The Noble Foundation web page has some information also. Check it at www.noble.org and scan for agricultural publications. Be free to contact us directly for more information.

One of our excellent paddocks of volunteer Red River Crabgrass on sandy soil in bermudagrass in October. This was achieved with light fall tillage at winter pasture seed broadcasting time, fertilization for both crops, and rotational grazing for recovery of the crabgrass.