



Landowners' Guide  
*to*  
Wildlife Food Plots

CRAIG A. HARPER



Landowners' Guide  
*to*  
Wildlife Food Plots

CRAIG A. HARPER

LANDOWNERS' GUIDE TO WILDLIFE FOOD PLOTS

Craig A. Harper

© 2019 Craig A. Harper

University of Tennessee Extension  
The University of Tennessee Institute of Agriculture  
Knoxville, Tennessee 37996  
[ag.tennessee.edu](http://ag.tennessee.edu)

Photos by C.A. Harper except where noted.

Produced by University of Tennessee Institute of Agriculture  
Department of Forestry, Wildlife and Fisheries

Printed by Sheridan  
Printed in the United States of America

# CONTENTS

Introduction .....	1
Initial Considerations .....	2
Soil Fertility and Amendment .....	5
Plot Preparation and Planting .....	6
Weed and Pest Control .....	11
White-Tailed Deer .....	12
Wild Turkeys .....	24
Northern Bobwhite and Cottontail Rabbits .....	31
Mourning Dove .....	38
Waterfowl .....	45
Managing Woods Roads For Wildlife .....	50
Final Thoughts .....	55



## INTRODUCTION

Planting food plots is the most popular habitat management practice among landowners wanting to enhance habitat for wildlife. Food plots can increase available nutrition for wildlife as well as influence movements, abundance, and visibility of wildlife on a property. Planting and managing food plots also provides recreational activity, and the satisfaction of working with the land often exceeds the value of hunting and wildlife viewing for many people.

Increased available nutrition can positively influence wildlife in many ways, including weight, reproduction (both timing and recruitment), survival (adults, broods and fawns), hatchability (percentage of eggs that hatch), lactation rate, and antler development. However, do not be misled to believe if you plant a food plot you will necessarily influence any of these factors. Instead, you should adjust your expectations according to the relative productivity of the property you are working on, the surrounding landscape, and the local wildlife populations. Food plots should supplement

naturally occurring foods made available through other habitat management practices when increased available nutrition is an objective. In particular, food plots should provide a nutritious food source when the quantity and quality of naturally occurring foods decline during specific times of the year.

**In most cases, food plots should be the last step in a habitat management plan. Much more important than food plots is providing and maintaining the appropriate successional stages and vegetation types in a suitable arrangement for the desired wildlife species across the property and landscape. Until the composition and arrangement of habitat is addressed, the overall impact of a food plot program will be minimal.**

If you are serious about managing your property for wildlife, then you should contact your state wildlife agency and inquire about having the stewardship biologist in your area visit your property for an assessment and recommendations. A competent, trained professional can help you complete a management plan to help you meet your goals and objectives.



Fig 1; The value of food plots extends well beyond benefits for hunting. Working with the land instills a land ethic and leads to more holistic habitat management practices.

Fig 2; Food plots do not replace other habitat management practices, but complement them. Well-managed forests and fields provide outstanding cover as well as an abundance of forage and seed. This mixed hardwood stand was thinned and has been burned six times in the past 12 years. Cover for nesting and brooding is outstanding, and the understory produces more than 1,000 pounds of selected deer forage per acre.

Fig 3; The importance of early successional communities for various wildlife species cannot be overstated. These communities provide habitat for species that otherwise would not occur on the property and greatly enhances the quality of habitat for many others.

## INITIAL CONSIDERATIONS

The first thing you should do when thinking about planting a food plot is define your objectives. Are you merely trying to attract wildlife for hunting or viewing opportunities? Or, do you really intend to improve available nutrition for wildlife and increase the nutritional carrying capacity on the property? Are you targeting only white-tailed deer, or are wild turkeys, northern bobwhite, mourning dove, and/or other game or nongame species also a major interest? Answers to these questions influence not only what should be planted, but also how plots are managed and your overall management strategy.

## TYPES OF FOOD PLOTS

There are several types of plants used in wildlife food plots. Your objectives should identify what type of food plot you need to plant. Most plants are classified by their phenology; that is, their life cycle and timing of growth and maturation. **Annual plants** germinate, grow, flower, produce seed and die in one growing season. **Biennial plants** germinate, grow through one growing season, overwinter, then flower, produce seed and die the following year. **Perennial plants** germinate, grow, flower, produce seed, go dormant for a period through summer or winter (depending on whether they are warm-season plants or cool-season plants), then grow back from the root system the following season. They continue to do this for a few to many years, depending on the species. **Cool-season plants** grow most vigorously during the cooler months of the year. Some grow through winter (depending on your latitude), whereas some are dormant during winter. **Warm-season plants** grow during the warmer months of the year. There are annual, biennial and perennial cool-season plants commonly used in food plots. All of the warm-season plants used in food plots are annual, except perennial peanut. See Appendix 1 for a list of plantings commonly used in food plots.

## HOW MUCH TO PLANT?

The amount of acreage to plant is determined by the amount of food present on your property to support the wildlife using your property, according to your objectives. If wildlife use of your food plots is so heavy that you cannot establish a food plot or if wildlife completely consume the food plot during the season it is needed, then you need to plant additional acreage and implement additional habitat management, such as forest management, old-field management or moist-soil management, and you may need to reduce the number of animals on the property.

Where surrounding properties are primarily forested, considerable acreage in food plots (as well as forest management) may be necessary to meet your objectives. Some properties are too small to provide a variety of vegetation types, successional stages or food plot plantings. It is beneficial to work with adjoining landowners and form a cooperative program that encompasses as large an area as possible.



Fig 4; You must understand the biology and phenology of what you are planting if you hope to be successful. This plot of red clover and chicory (biennial and perennial cool-season forages) should be managed completely differently than a plot of berseem and crimson clovers (annual cool-season forages).

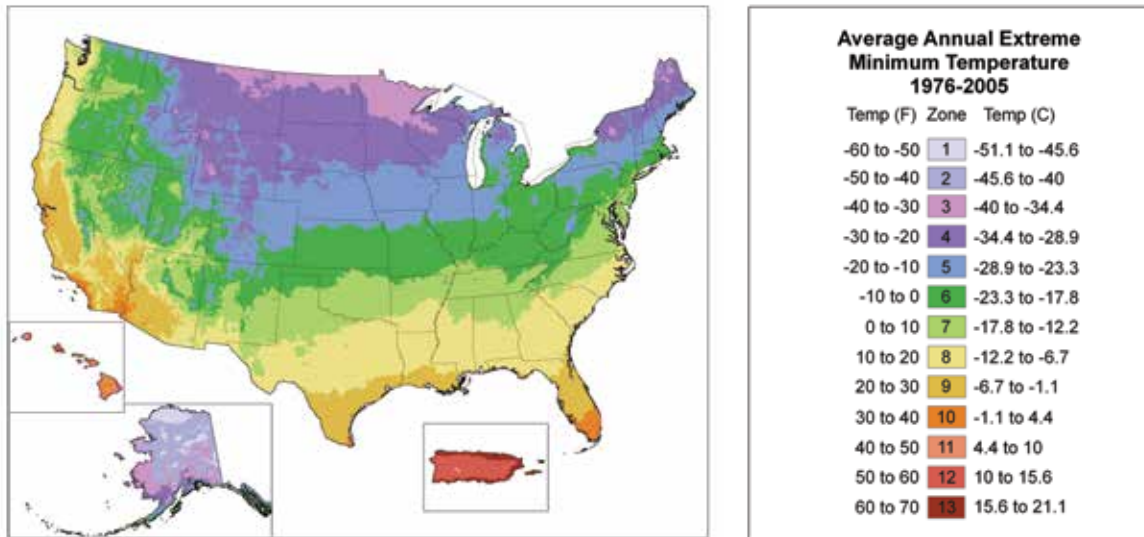


Fig 5; Climate is a major consideration when determining what to plant. This map, adapted from the US Department of Agriculture, shows plant hardiness zones. Refer to this map when considering various plantings to make sure what you are planting is adapted to the climate in your area.

### WHERE TO PLANT FOOD PLOTS

Where you locate food plots depends upon site quality, topography, proximity to cover and roads, and your access to the food plots. Soils maps available free online from the Natural Resources Conservation Service will identify the soil types and their productivity and drainage on your property. Relatively flat areas should be considered, especially if near good cover and where access with equipment is possible. Do not only consider existing openings. Some of the best areas to locate a food plot may be currently forested. Creating new openings may require large equipment, but some sites can be cleared and prepared for planting with handheld equipment, such as a chainsaw, drip torch and leaf blower. Stumps can be killed and prevented from sprouting by applying herbicide after cutting.

In general, it is not a good idea to plant food plots in view of public roads. Advertising your work only invites trespassing and poaching. If you have no alternative than to plant a food plot in view of a road, visibility can be reduced by planting evergreen trees or shrubs along the road, or you can simply allow naturally occurring vegetation to grow up along the road.



Fig 6; Identifying the best sites for food plots is important. Animal movements, habitat composition, soil fertility and equipment access should be considered. This corn plot and wheat/clover plot are intended for deer and turkeys and are located in a bottom, along a brushy creek drainage with plenty of early successional cover on both sides. These plots are out of sight of any road and have easy equipment access.



## SIZE, SHAPE AND DISTRIBUTION

Food plot size and shape may vary considerably. Food plots designed for hunting white-tailed deer may be less than one-half acre, whereas those for providing maximum nutrition during summer or those designed for mourning dove may be several acres. Most food plots are square or rectangular in shape, which facilitates operating equipment. However, small plots designed for bowhunting deer may be in the shape of an hourglass or boomerang to direct their movement and increase chance for a close shot.

Regardless of shape, it is important to measure the size of the plot so you will know how much seed, lime, fertilizer or herbicide is needed. Measuring plot size is easily accomplished with a GPS, a smartphone, a rangefinder, a 300-foot tape or by pacing.

When planting food plots for deer, turkeys and rabbits, it is important to consider distribution, especially on relatively large properties. Distribution of food plots throughout the property allows use by more animals and reduces foraging pressure on any given opening. Planting woods roads and log landings is a good way to increase food plot acreage and influence movements in forested areas.



Fig 7; Food plots can be created in various shapes to influence animal movements and hunting success. Here is an hourglass-shaped plot designed specifically for bowhunting. Deer feeding on one side of the hourglass are instinctively drawn to walk into the other side. As they do, the restricted area is relatively narrow and affords a bowhunter a high-percentage shot.

## CROP ROTATION

It is never a good idea to plant a specific plant in a particular plot year after year. Over time, insect pests, fungi, bacteria and viruses can build up and negatively impact productivity for select plantings. Various plantings also use nutrients at different rates and may drain certain nutrients from the soil. Crop rotation not only can help reduce pathogens, but also help manage nutrient availability and site productivity. Another strategy is to allow plots to remain fallow for one to two years, especially when managing annual plots. **Fallow plots should not be viewed as wasted space.** Early successional plants growing in fallow plots can provide nutritious forage, seed, soft mast and valuable cover for songbirds, game bird broods and fawns. Fallow fields also present an opportunity to remove specific undesirable weed species, with selective herbicide applications or disking.



Fig 8; Do not overlook the value of fallow fields! This was a corn food plot. There was a fair amount of corn left uneaten by spring. Instead of replanting, allowing such a field to sit fallow for a year or two provides outstanding forage and cover for many wildlife species. Even if the corn (or other crop) was all eaten, fallow rotation is an excellent strategy.

## SOIL FERTILITY AND AMENDMENT

Soil fertility is a critical factor in crop production. If you want your food plots to be productive and successful, then it is important that you amend the soil if necessary with the correct amount of lime and fertilizer for the crop you are planting. The only way to know soil fertility levels and how much lime, fertilizer or organic material is needed is to collect soil samples and have them tested. Visit your county Extension office for information on collecting and submitting soil samples for analysis.



Fig 9; It is impossible to know how much lime or fertilizer is required without collecting a soil sample and having it tested. It is the best few dollars you will spend on your food plots.

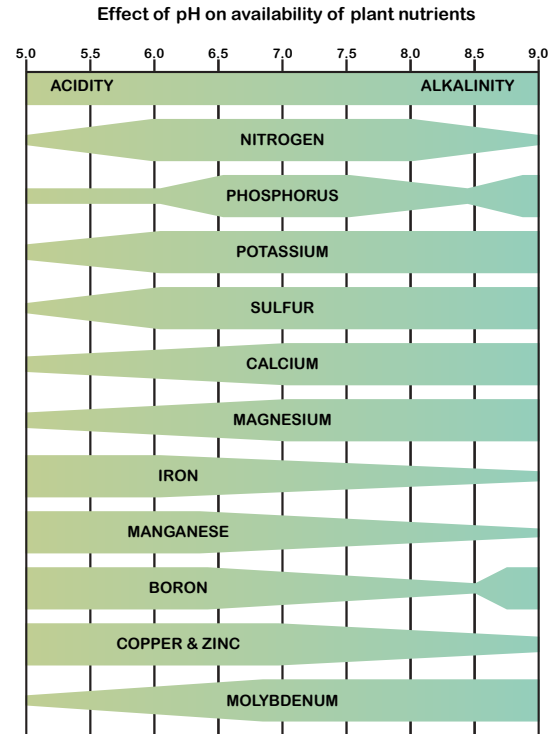


Fig 10; Soil pH should be adjusted to 6.0-7.0 to ensure soil nutrients are available to plants. Adapted from International Plant Nutrition Institute.



Fig 11; Site and nutrient availability are major considerations when planting food plots. Liming acid soils is absolutely critical to increase soil pH, improve availability of nutrients, improve nitrogen fixation among legumes, and increase herbicide effectiveness. Hiring a lime truck or renting a lime buggy from the local fertilizer supplier is most efficient to apply lime in those areas where a lime truck can get to the plot.

## IMPROVING SOIL FERTILITY

Fertilizers are most often applied with a three-point, hitch-mounted, or pull-behind spreader. Split fertilizer applications, rather than one large application, may allow plants to use added nutrients more efficiently and lead to increased production. The three numbers on a fertilizer bag refer to the grade, or the percentage of total nitrogen (N), phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ) in the bag. For example, a 50-pound bag of 15-15-15 contains 7.5 pounds of N, 7.5 pounds of  $P_2O_5$ , and 7.5 pounds of  $K_2O$ . Soil tests typically provide recommendations for the amount of phosphate or potash fertilizer needed, not actual pounds of P or K. Although commonly used, complete fertilizers often are not necessary for many food plots. A more sensible approach may be to apply a specific-nutrient (or high-analysis) fertilizer. For example, a 50-pound bag of ammonium nitrate (34-0-0) contains 17 pounds of N. One bag of a phosphate fertilizer, such as triple super phosphate (0-46-0), contains 23 pounds of  $P_2O_5$ . A bag of muriate of potash (0-0-60) contains 30 pounds of  $K_2O$ . One bag of these fertilizers usually costs a little more than a bag of 15-15-15, but you get more than twice the amount of the nutrient needed per bag and you don't apply unneeded fertilizer.



Fig 12; Fertilizer applications are most easily accomplished with a cyclone spreader. Calibrating the spreader prior to fertilizer applications is just as important as calibrating it prior to sowing seed! Here, fertilizer is being spread prior to planting a warm-season food plot.

## PLOT PREPARATION AND PLANTING

### CONTROLLING EXISTING VEGETATION BEFORE PLANTING

Preparing the site before planting is extremely important, especially if perennial weeds are present and if you are planting a perennial food plot such as ladino clover and chicory. Annual weeds are not a huge concern, especially if they are sprayed or disked before they produce seed. However, perennial grasses (especially tall fescue, bermudagrass, johnsongrass and bromegrasses) and some specific perennial forb weeds (such as curly dock and horsenettle) may present major competition problems in perennial food plots if not controlled prior to planting. An application of glyphosate is commonly used to kill existing vegetation prior to conventional seedbed preparation and prior to no-till planting. Once existing vegetation has been controlled, you can no-till top-sow seed, no-till drill seed, or prepare the seedbed using conventional tillage for broadcasting seed or using a conventional drill.

### NO-TILL TOP-SOWING

Relatively small seed, such as clovers and American jointvetch, may be broadcast into existing plant cover just before or after spraying existing plant cover. Small seed will filter down to mineral soil while existing vegetation dies and decays. Mowing after the vegetation dies may help germination and seedling survival. No-till top-sowing does not work as well with larger seed that require coverage. Frost-seeding is another example of top-sown no-till plantings. Sow small-seeded, cool-season species on top of snow and frost-heaved ground prior to thawing. No-till top-sowing is especially applicable when planting woods roads and mowed paths where plowing or heavy disking may not be possible or desirable. Seeding rates should be increased 25 percent when no-till top-sowing into existing vegetation.

### NO-TILL DRILLING

Seed can be planted with a no-till drill just before or after existing vegetation has been sprayed or after burning dead plant material. No-till drilling is advantageous in that tillage is avoided, organic material is retained and slowly releases nutrients



Fig 13; For optimal results, perennial cool-season grasses, such as tall fescue and orchardgrass, should be sprayed in the fall with glyphosate. Fields should be “clean” before spraying. This field was hayed in early October to prepare for spraying in early November. This timing allowed the herbicide to come in contact with growing grass, not dead thatch and stems from previous years’ growth. Photo by John Gruchy.

as it decomposes (if not burned), and moisture is retained in the upper soil layer. Before planting with a drill, it is imperative to calibrate the drill for the seed you are planting to know you are planting the correct amount of seed. No-till drills can be rented from many district offices of the Natural Resources Conservation Service and state wildlife agencies.

### PREPARING THE SEEDBED WITH CONVENTIONAL TILLAGE

After existing vegetation has died (usually takes one to two weeks after application of glyphosate), you can prepare the seedbed using conventional tillage, such as disking, chisel plowing or rotovating. Fertilizer and lime can be incorporated at this time also. A clean, smooth, firm seedbed is desirable for sowing small seed, such as clovers, jointvetch and alfalfa. These small-seeded forages also can be established successfully by light disking after the existing vegetation has been killed and then top-sowing. Larger seed—such as soybeans, cowpeas and lablab—do not require as fine of a seedbed. They will germinate well in a relatively coarse seedbed provided they are covered an inch or so and receive adequate rainfall.



Fig 14; No-till top-sowing works well not only in food plots, but also in other areas where you cannot disk or get large equipment, such as orchards, field edges and odd areas.



Fig 15; Drilling seed is the most efficient planting technique. Seed is planted at the proper depth, and germination rates and seedling survival are greater.

### SOIL MOISTURE IS IMPORTANT

Soil moisture is important when preparing a seedbed and planting, especially in clay soils. If the soil is too dry, dirt clods will be large. If too wet, discs or tines will clog with mud, and large clods will result once the soil dries out. When worked at the proper moisture level, dirt clods fall apart in relatively loose, small particles. You can check soil moisture by digging down 4-6 inches with a shovel and squeezing a handful of soil. If the soil sticks together in a ball, it is too wet. If it looks and feels moist, yet crumbles, it is perfect.



Fig 16a and b; Disking and/or tillage followed by cultipacking creates the perfect seedbed for broadcast sowing clovers and other small-seeded species.

If no moisture is felt and it is fairly difficult to crumble because it is hard, it may be too dry to prepare a fine seedbed for small-seeded species such as alfalfa and clovers. Soil moisture also is important when using a no-till drill, especially if drilling large seed, such as soybeans, cowpeas and sunflowers. A moist seedbed is desirable that will allow proper seeding depth (1-2 inches). A hard, dry seedbed will not allow many drills to plant at the correct depth, and seed will be at or just below the soil surface.

It is best to plant when adequate soil moisture is present to improve germination and establishment, or just prior to rain. Germination and growth usually are less than desirable when it is dry for an extended period after planting. If seed germinate and seedlings do not get adequate moisture soon, they desiccate and die. Therefore, planting by a certain date is of little concern unless there is projected rainfall.

### BROADCAST SEEDING

Seed are commonly sown with a handheld broadcast seeder when planting relatively small plots or a cyclone spreader mounted to a three-point hitch behind a tractor when planting relatively large plots (at least 2 acres). With either method, it is critical to calibrate your seeding rate by marking off a 1/10-acre area and weighing the appropriate amount of seed. Start at a low setting

and adjust up as necessary. When broadcast seeding with a handheld seeder, walk at a slow-to-moderate pace. When using a tractor-mounted broadcast seeder, be sure to record the gear, rpm and seeder setting when the correct rate and setting is determined. You will need to do this separately for different species because the seeder setting will be different for different-size seeds.

### SEEDING DEPTH

Planting or covering seed too deep is a common reason for plot failure. Grains and other relatively large seed (such as corn, grain sorghum, Austrian winter peas, cowpeas, soybeans, lablab and sunflowers) should be drilled or covered by disking approximately 1 inch deep. Cool-season grains (oats, wheat and cereal rye) germinate better when lightly covered — especially oats. Small-seeded species, such as clovers, should be covered no more than 1/4 inch (essentially not covered, but just pressed into seedbed). When mixtures of both large- and small-seeded species (wheat or oats with clovers) are planted using conventional tillage methods, the large seed should be planted first. After seeding, cover the large seed by disking, then plant the small seed, and then cultipack. Seeding depth can be a problem with some premixed commercial seed blends. With both large and small seed in the bag (such as lablab/soybeans/cowpeas with



Fig 17; More plots are planted via broadcast seeding than any other method. Special effort should be taken to ensure proper coverage and seeding rate.

grain sorghum/jointvetch/alyceclover), the small seed tend to gravitate to the bottom of the seed box and are sown before all the large seed are sown. A much better approach is to sow the seed separately, or to drill large and small seed in separate boxes, sowing each at the appropriate rate simultaneously.

### SEEDING RATES

Seeding rates for individual species are provided in Appendix 1. Recommended seeding rates for various food plot plantings typically are given as broadcast rates with conventional tillage techniques. Because of seed desiccation and less precise placement of seed, broadcast rates are greater than those necessary when using a drill or planter. When using a drill or planter, seeding rates may be reduced by 25 percent or more because seed placement is precise and germination rate and seedling survival are greater.



Fig 18; A cultipacker is the best implement to firm a seedbed after disking-in large seed, such as cowpeas, and prior to sowing small seed, such as clovers. After small seed is top-sown, cultipack again to ensure firm seed-to-soil contact. Some folks use a section of chain-link fence to smooth a plot and reduce clods prior to planting. Using such an object can lead to a finer seedbed, but it is not a replacement for a cultipacker, which is needed to provide firm seed-to-soil contact. Do not overlook this—it improves seedling survival and establishment success.

Often, several species or varieties are planted together in a mixture. When blending seed into a mixture, the seeding rate for each species is adjusted according to the number of species or varieties in the mixture, the composition preferred, timing of maturation of each species, and the growth form and desired structure of the resulting stand. The individual seeding rates for each species are not combined.

### CALCULATING PURE LIVE SEED (PLS)

Before you weigh seed to plant, refer to the seed tag on the bottom or back of the seed bag to check seed quality and calculate pure live seed (PLS). The tag should identify the variety of seed in the bag, seed origin, percentage of pure seed, percentage of inert material, germination rate, test date, and the presence/amount of weed seed. If the seed is a legume and it is pre-inoculated, the percentage weight of the seed coating also should be identified on the seed identification

tag. If you are ordering seed, the salesperson or seed representative should be able to provide this information over the phone or email.

High-quality seed should have a germination rate of at least 80 percent. Be aware of hard (or dormant) seed, which will not germinate until it has experienced freezing and thawing, so you will not see those plants for months, if at all. Seed coating represents 35-50 percent of the material in the bag. Therefore, when you consider how some of the seed will not germinate and how much of the material in the bag is not even seed, you can see how it can be important to calculate PLS to plant at the correct seeding rate. The procedure for calculating PLS is shown below.

Variety: Dixie crimson clover  
 Pure seed: 48.8 percent  
 Germination: 90.0 percent  
 Hard seed: 1.0 percent  
 Inert matter: 1.0 percent  
 Other crop: 0.01 percent  
 Weed seed: 0.01 percent

Pure seed (0.488) × Germination (0.90) =  
 0.439 (44 percent PLS)

Desired planting rate (20 pounds per acre) ÷ 0.439 = 45.5

Therefore, in order to plant 20 pounds of this crimson clover per acre, you should sow 45 pounds of material in this bag. You can see where this calculation can be a very important step toward establishing a successful planting!

### INOCULATING LEGUME SEED

Legumes are plants that bear seed in a pod and have a symbiotic relationship with certain species of nitrogen-fixing bacteria. These bacteria attach themselves to the roots of legumes, such as clovers, soybeans and cowpeas. The bacteria provide nitrogen to the plant and the plant provides energy to the bacteria. Most legume seed purchased today has been preinoculated. However, if you plant seed that has not been preinoculated (raw seed), inoculation is an important consideration because if you properly inoculate the seed, you will not need to apply nitrogen fertilizer (you save money) and weed competition will be reduced because little or no

nitrogen fertilizer was applied. Depending on the legume planted, properly inoculated seed may produce up to 200 pounds or more of nitrogen per acre. Inoculation is not necessary when planting a particular legume in a field where that legume was successfully inoculated in the past few years because those bacteria remain in the soil.



Fig 19a and b; Certified seed will have a seed tag attached that tells you exactly what you are buying and gives you information regarding seed quality. Preinoculated seed is coated to protect the bacteria that will inoculate the seed once it is planted. The coating may be yellow, blue, pink or white (such as this crimson clover seed). Regardless of color, the coating represents a certain amount of weight, and the weight of the coating should be accounted for when weighing seed to plant.

## WEED AND PEST CONTROL

Weed control is a huge factor in food plot success. Weeds can overtake the crop and limit the crop of nutrients, moisture and sunlight. Seedbank composition varies tremendously from site to site, but you should expect undesirable plants on most sites and some level of control will be necessary to maximize growth and yield of planted crops and the resulting food value for wildlife. In order to know how to control weeds in your food plot, you must be able to identify the weeds. Various herbicide recommendations for various plantings are provided in the sections below.



Fig 20a and b; In the plot above, orchardgrass, purple deadnettle, and henbit are choking out planted clovers. In this situation, a selective herbicide application (imazethapyr and clethodim) would control the competing weeds and allow the clovers to produce more forage. In the corn plot below, boneset, common ragweed, and foxtail grasses are complementing the corn by providing natural forage, seed, and desirable cover for many wildlife species. The main difference in the “weeds” found in the two plots is their value for wildlife. Those above have little or no value for wildlife, whereas those below do. However, you cannot know this unless you can identify the plants.

Insect damage and plant diseases are not as common as weed problems, but they can be a problem with any food plot planting. Aphids, armyworms, grubs, cutworms, stalk borers, rusts, molds, and other insects and diseases can reduce production of your food plots. If your planting does not look healthy, it is most likely related to nutrient availability, but you should look carefully and check for insects and signs of disease. If you think you have an insect or disease problem, call your Extension agent and ask them to come and look at your planting, or you might send them some high-resolution photos. You can go to [utcropl.com](http://utcropl.com) for detailed information on crop insect pest control. Also, check the websites of the crop and forage professionals at your land-grant university.



Fig 21; Armyworms, weevils and several other insect pests can reduce and sometimes destroy food availability in your food plots. Check plants closely periodically and make sure pests are not a limiting factor. Photo by Ryan Basinger.



## WHITE-TAILED DEER

---

More food plots are planted for white-tailed deer than all other species combined. The primary usefulness of food plots for deer is providing additional food during nutritional stress periods (lactation, antler development, late summer and mid- to late winter, depending on location) and helping deer remain at a high nutritional level. High-quality food plots can provide increased nutrition that can lead to increased body weights, increased reproduction and fawn development, and larger antlers. Of course, food plots also can be used to influence deer movements and facilitate hunting and observation.

This section highlights planting and management recommendations for food plots designed for white-tailed deer. Most of these

recommendations are from 20 years of research and demonstration conducted with my graduate students, including 10 years of cafeteria-style plot work completed across several fields where we compared many forages with respect to germination, growth, deer selectivity, resistance to grazing and nutritional quality. Additional research efforts focused on developing the best mixtures possible with respect to complementary forage growth and maturation and herbicide compatibility.

If you have questions about the quality of your food plots, visit your county Extension agent. Forage samples can be analyzed for just a few dollars. When forage quality information is coupled with a soil test, you can get an excellent idea of the amount of nutrition you are providing through your food plots.



Fig 22; Here is one of several demonstration/research fields established and maintained across Tennessee, 1999–2008. Data were collected to determine germination and growth rates, deer selectivity, resistance to grazing, nutritional quality and herbicide recommendations for a wide variety of forages. Yield and consumption were monitored through stationary and mobile exclusion cages, placed at random within each 0.10-acre plot (20 plots per field) at the end of each month. Photo by Chris Shaw.

## DEDICATING SEPARATE ACREAGE TO WARM- AND COOL-SEASON PLOTS

In many situations, planting both warm- and cool-season forage and grain plots should be considered to meet your management objectives. However, they should be planted in different fields or different sections of a field. That is, don't take away available food in preparation to plant something else. For example, iron-clay cowpeas provide nutritious forage until the first frost, and soybeans can provide a tremendous source of energy (beans) through fall and into winter. If a warm-season plot is mowed, disked

and planted to cool-season forages in September, high-quality forage is taken away at a time when natural availability is low (late summer). Likewise, arrowleaf clover provides forage through July. If a plot containing arrowleaf clover is disked in May to plant a warm-season plot, a prime food source is removed at a time when large amounts of high-quality forage is critical (just before fawning and during early antler development). An exception to this strategy is when you can no-till drill a new crop into an annual crop that has died. Examples include drilling soybeans into annual clovers and wheat when the plot is nearing maturity.



Fig 23a and b; Separate acreage should be devoted to warm- and cool-season food plots. Here (top), a border of American jointvetch was left to continue to grow until frost while the clovers were planted in the middle of the plot in early September. If all of the jointvetch plot had been disked under in order to plant clovers, all of the food in this plot would have been destroyed at a time when it was needed. An exception is when you can no-till drill a new crop into an annual crop that has matured. For example, drilling soybeans into crimson clover after the clover dies saves soil moisture and increases organic material in the topsoil. Later, once the soybeans mature, the crimson clover reseeds naturally and provides excellent forage through winter (bottom).



Fig 24a and b; Exclusion cages make it evident when deer density is too great for the forage available. Without an exclusion cage, you may wonder if bad seed, weed pressure, planting technique, soil fertility, and/or weather contributed to crop failure. Excessive deer density may not only prevent soybeans from establishing (top), but perennial clovers and wheat (bottom) as well.

## WARM-SEASON PLOTS FOR WHITE-TAILED DEER

Warm-season plots are unique in that, according to what you plant, they can provide an important food source for deer during summer and/or winter. Warm-season forages, such as soybeans and cowpeas, provide nutrients necessary for milk production, fawn growth, and antler development from late spring through early fall. Later, corn grain and soybean seed can provide a high-energy food source that can be important during winter, especially in areas where available forage is limited. Warm-season food plots are commonly planted as single species (especially soybeans or corn), but also in mixtures containing two or more species.

## GROWING AND MANAGING SOYBEANS AND CORN FOR DEER

Soybeans and corn are by far the most popular and important warm-season plantings for white-tailed deer — and for good reason. White-tailed deer prefer soybeans over all other warm-season forages, and acorns are probably the only other food deer prefer over corn during fall and winter. Not only are these crops palatable, but very nutritious as well. Soybean forage is extremely high in digestible protein and energy, and the beans are often overlooked as a source of energy during fall and winter. Corn and soybeans provide high-quality food that deer readily eat.

Growing productive plots of soybeans and corn can be complex. There are many decisions to make when choosing which variety of soybeans or corn you need to plant. Contact your Extension agent for free professional advice if you need help deciding which varieties are best for your location. Keep in mind the planting rates for corn and soybeans are provided as number of seed per acre rather than pounds per acre because seed size among varieties is variable.

Soybeans and corn are susceptible to various insect pests and fungal diseases (especially during rainy years). However, most seed are treated with a systemic insecticide that provides protection for about 25-30 days to help ensure a vigorous healthy stand. A variety of insecticides and fungicides also are available. Carefully consider your objectives and the extent of an insect or

disease problem before applying insecticides and fungicides. The thresholds for insect/disease control in food plots usually are well beyond those for production agriculture. **Visit [utcropl.com](http://utcropl.com) for detailed information on treatment thresholds and chemical recommendations on crop pest management.**



Fig 25: Although warm-season plants, standing soybeans and corn provide a tremendous food resource for white-tailed deer and many other species through fall and winter.

### *Soybeans*

Soybeans can be planted when soil temperatures reach 55 F at 2 inches deep. However, the optimal soil temperature for soybean germination is in the mid- to upper 70s. Planting rate is determined by seed count and is usually 130,000-200,000 seeds per acre. In relatively small plots where soybeans are likely to be overgrazed, the seeding rate can be increased two to four times the recommended rate. Increasing the plant population by such an amount can help the crop at least reach 12 inches or so in height and provide forage through the season. I have seen this work, but not in all places. Deer densities in some areas simply will not allow small plots to establish, regardless of seeding rate. If you are broadcasting seed, sow 80-100 pounds PLS per acre (approximately 1 ½ to 2 bags per acre). Soybean seed should be planted or covered by disking 1-1.5 inches deep, not deeper than 2 inches.

There are numerous herbicides with various applications labeled for soybeans, including preplant incorporated, preemergence and postemergence herbicides. Many soybean varieties are Roundup Ready, which are tolerant

to glyphosate, and LibertyLink varieties are tolerant to glufosinate. There also are varieties available tolerant of dicamba. Refer to herbicide labels for specific use of these and other herbicides. Continued and repeated use of glyphosate in the same field year after year has led to several weeds developing tolerance to glyphosate (as well as some other herbicides). It has become necessary to rotate use of herbicides that kill weeds with a different mode of action. Use of preemergence herbicides prior to planting in addition to postemergence herbicides after weed emergence is often necessary.



Fig 26; High-quality warm-season forages, such as these soybeans, provide nutrients needed by does that are drawn down by nursing fawns. Photo by Michael McCord.



Fig 27; This map shows the approximate zones of adaptation for soybean maturity groups. Soybeans are sensitive to photoperiod, which influences the timing of flowering. During summer, photoperiod is longer in northern latitudes than southern latitudes. Maturity groups are adapted to different latitudes. If a soybean variety within a maturity group is planted farther south than it is adapted, it will grow shorter with less yield. If planted farther north than it is adapted, it will grow, but may flower too late to produce beans.

## Corn

Time to maturity is an important consideration when choosing a variety to plant. If you are planting up North, you will want to plant a variety that matures earlier (80-100 days) than later (120 days). Corn can be planted once soil temperatures at planting depth reach about 55 F. Germination rate increases with warmer temperatures, but many producers plan to plant once soil temperatures reach 55-56 F. Corn is normally planted with a corn planter in 20- to 30-inch rows with seed 6-12 inches apart to provide 16,000-30,000 seeds per acre for optimum grain production. The lower rates (16,000-22,000) are recommended for sandy loams and relatively dry areas, whereas higher rates (24,000-30,000) are recommended for heavy clay soils that hold moisture much better. Seed should be planted 1.5-2 inches deep. If you don't have access to a corn planter, 8-13 pounds PLS of corn seed per acre (depending on variety and soil type) can be broadcast and covered by disking 1- to 2-inches deep.

Corn is a high-energy food. And availability of such food can be limiting in northern latitudes (Pennsylvania to Michigan and Iowa and northward), especially where snow cover persists for relatively long periods and available forage to support deer is lacking. However, in more southerly latitudes, winter rarely limits deer, especially down South. Corn is a heavy nitrogen user and is expensive to plant and manage. If you are going to realize the potential benefit from corn, it is important to manage soil fertility as recommended from a soil test. Although deer may flock to corn when it is available, you should carefully consider whether planting corn is worth the cost, especially when fall plantings of wheat, oats or annual clovers, for example, provide adequate digestible energy to supplement naturally occurring foods, especially where snow does not typically persist more than a few days. Agricultural producers commonly rotate corn and soybeans. Nitrogen manufactured in nodules on the roots of soybeans becomes available to other plants the following growing season. Because corn requires so much nitrogen and nitrogen is so expensive, rotating these crops increases efficiency. However, high-quality warm-season forage is much more often a limiting factor than energy from corn in winter. Meaning: in

few places is equal acreage of corn with soybeans warranted. Rotating corn plots with fallow growth or clovers also should be considered.

A variety of herbicide applications are possible when planting corn. Glyphosate can be sprayed postemergence over varieties of Roundup Ready corn. Atrazine, Bicep II Magnum or Dual Magnum may be applied preplant incorporated to control a wide variety of grass and forb weeds. Basagran or Permit can be applied postemergence to control several forb weeds and yellow nutsedge. 2,4-D, Aim, atrazine, Banvel and Clarity are other herbicides that can be applied postemergence to control forb weeds only. Before spraying, it is important to realize many “weeds” can complement corn/grain sorghum plots. Common ragweed, pokeweed, smartweeds, giant foxtail, crotons and others can provide additional seed relished by many birds, including northern bobwhite, mourning dove and several species of native sparrows. A weedy grain plot also attracts wild turkey and bobwhite broods.



Fig 28; Corn left standing can be an important food source during winter for deer and many other species, especially in relatively cold climates.

### WARM-SEASON FORAGE MIXTURES

There are several other warm-season forages that should be considered, especially when planting mixtures. It is important to consider weed control when considering a warm-season mixture. Grasses often are a problem in warm-season plots, especially johnsongrass, crabgrasses, goosegrass and broadleaf signalgrass. Considering how grass weeds can be so problematic and how grasses

are not eaten to any real extent by deer during summer, I do not include grasses in warm-season forage mixtures for deer.

### Vining legume mixture (PLS/ac)

75 pounds iron-clay cowpeas

5 pounds peredovik sunflowers

*Benefit and considerations:* Iron-clay cowpeas provide excellent forage for deer, especially during late summer and early fall when palatability of natural forage and browse has decreased. Cowpeas withstand grazing pressure relatively well, even while developing, and grow on a wide variety of sites. Although deer may browse newly appearing heads of sunflowers, they are not added to this mixture for forage, but as substrate for the cowpeas to climb and grow upon later in the season.

*Management:* Prowl, Dual Magnum or Treflan can be applied preplant incorporated to control various forb and grass weeds. A grass-selective herbicide can be sprayed postemergence for additional grass weed control if necessary. If grass weeds are not problematic and/or if deer density is so high sunflowers are overgrazed as they are establishing, grain sorghum (3 pounds) can be used in place of sunflowers.



Fig 29; This mixture produces a lot of tonnage and deer are readily attracted, especially in late summer when natural forages begin to decline in quality.

### Lowcountry mixture (PLS/ac)

10 pounds American jointvetch (*Aeschynomene*)

10 pounds alyceclover

*Benefit and considerations:* American jointvetch (also known as deervetch) and alyceclover are high-quality forages commonly planted in the Lowcountry of South Carolina and in other areas of the Deep South where the growing season is long. Jointvetch is popular in the Deep South because it is an indeterminate grower, continuing to produce tender nutritious forage that deer continue to eat until first frost (can be planted late March in Deep South and produce forage until first frost in November). However, jointvetch and alyceclover are not restricted to the South; they do well anywhere south of Zone 5. They both tolerate relatively heavy grazing pressure.

*Management:* A grass-selective herbicide can be used to control grass weeds postemergence if sprayed when weeds are young. Jointvetch and alyceclover can be established relatively well via no-till top-sowing. Kill existing vegetation with a glyphosate herbicide in the spring prior to seeding. If top-sown over existing vegetation that has been sprayed, sow 10 pounds jointvetch and 10 pounds alyceclover per acre.



### COOL-SEASON PLOTS FOR WHITE-TAILED DEER

Cool-season plots are the most popular plantings for white-tailed deer. Cool-season forages may be annual or perennial and peak in production at different times of the year, depending on latitude and the forage grown. Therefore, it is necessary to identify the specific periods when you want additional forage available and choose a planting that is productive during that period. If you intend to ensure forage availability from early fall (when warm-season forages are waning) through midwinter (when little or nothing else green is available) until midsummer (when warm-season plots begin producing tremendous amounts of forage), then a variety of forages planted in separate plots will be necessary. Most cool-season plots are planted in late summer or early fall, but mid-February through early April also is a good time to plant perennial cool-season forages in the South and through May farther north. If planted by mid-September with adequate rainfall, several annual cool-season forages will provide a grazable stand by mid-October.



Fig 30a and b (top right photo); American jointvetch (a) is highly selected by white-tailed deer. Jointvetch (taller plant) and alyceclover (round-shaped leaves in bottom of photo) complement each other very well with similar structure and growth requirements (b).

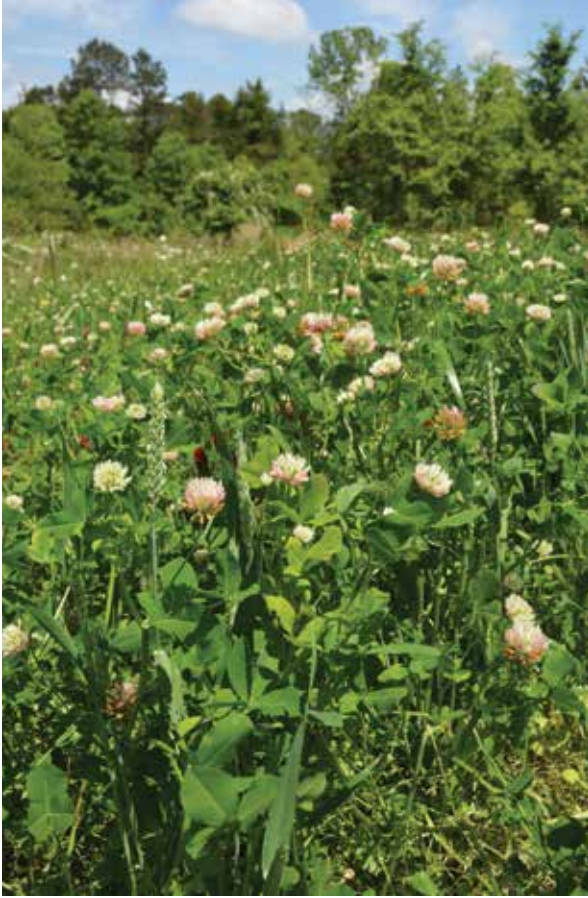


Fig 31; Clovers and cool-season grains (especially wheat and oats) are the main cool-season forages planted for white-tailed deer — and for good reason. They are productive, nutritious, deer readily eat them, and there are multiple varieties available, providing several management options.

### COOL-SEASON GRAINS

Wheat, oats and rye are often planted for white-tailed deer. All three provide high-quality forage for deer while relatively young, green and growing, but selectivity by deer decreases significantly once they begin to get large and begin to bolt (produce flowering stem). Oats are highly selected by deer, but you should plant a variety that is cold-tolerant, especially north of the Mid-South. Wheat is an outstanding forage, especially if you plant an awnless variety (a variety without the long, stiff bristles on the seedhead) because deer and other species readily

eat awnless wheat seedheads. Rye is very cold-tolerant, but grows too tall upon flowering if you are planting in a mixture. Note that I am referring to cereal rye, not ryegrass. Ryegrass is not a selected forage by deer and is extremely aggressive and difficult to control. I do not recommend ryegrass as a planting for white-tailed deer (or anything else).

I commonly add an awnless winter wheat or oats to mixtures with clovers and chicory. However, there is nothing wrong with planting either as a single-species planting. Cool-season grains can be drilled or broadcast. Approximately 120 pounds (or 2 bushels) is the suggested single-planting rate per acre but 200 pounds per acre may be warranted if intensive grazing pressure is expected. If other forages, such as clovers, are planted with cool-season grains, the rate should be reduced to 30-50 pounds per acre.

Broadleaf weeds are controlled easily in cool-season grain plots with numerous broadleaf-selective herbicides, such as Harmony Extra, 2,4-D, Aim, Banvel and Clarity. For best results, spray before weeds are 4 inches tall. This strategy will help get rid of tough-to-control broadleaf weeds and still provide high-quality forage. If you have a problem with cool-season grass weeds, such as ryegrass, it is best to consider a forb-only planting (such as crimson or berseem clover) so you can use a grass-selective herbicide. However, there are herbicides, such as Osprey and Achieve, labeled for wheat to control several annual grass weed problems, including ryegrass.



Fig 32; Oats were consistently ranked as a high-preference forage by white-tailed deer in every trial in which they were included.



Fig 33; Winter wheat provides excellent forage for whitetails through the fall and winter. We consistently recorded crude protein levels above 25 percent and acid detergent fiber levels below 25 percent from germination through April when the wheat began to bolt.



Fig 34a and b; Deer readily eat wheat seedheads, provided an awnless variety is available (top). It is common for deer (and turkeys) to eat all of the seedheads in a food plot by early July (bottom).

## COOL-SEASON FORAGE MIXTURES FOR WHITE-TAILED DEER

Most cool-season food plots for white-tailed deer are mixtures, most of which are some blend of clovers, chicory, wheat, oats and brassicas. The key to forming good mixtures is to match forages that complement each other, both in terms of maturation to extend forage availability and with consideration for weed control. The mixtures listed below are proven performers over a wide range of latitudes and climate conditions.

### The “best” annual forage mixture (PLS/ac)

- 15 pounds crimson clover
- 10 pounds arrowleaf clover
- 40 pounds wheat

*Benefit and considerations:* There is no mixture that will attract deer better than this one. Wheat and crimson clover germinate soon after planting and continue producing through winter. In Zones 6-8, crimson clover flowers, produces seed and dies in late April or early May. Winter wheat bolts and produces seedheads in May. Arrowleaf clover comes on strong and vines up through the mature wheat about the time the crimson clover dies. Deer eat the arrowleaf clover through July when it dies. Deer eat the wheat seedheads May through July, which is why I typically use wheat instead of oats. This mixture should be used as far north as the bottom of Zone 5 and where annual



Fig 35; In my experience, this is the gold standard with regard to a high-preference, high-quality, cheap, and easy-to-grow and manage forage food plot (shown in late May).



precipitation is at least 25 inches. Crimson and especially arrowleaf clover may winterkill north of that latitude. If you are in the bottom of Zone 5 through Zone 8, red clover may be added to the mixture at 8 pounds to provide forage through the end of August, enabling the mixture to provide high-quality forage for one full year without interruption.

*Management:* This mixture is as close to foolproof as it gets. It establishes very quickly and both crimson and arrowleaf clover are excellent reseeders. You can retain these clovers for years without replanting if they are not overgrazed and are able to flower and produce seed. After the arrowleaf clover dies (mid- to late July), wait a week or two, then spray the entire plot with a glyphosate herbicide to kill all incoming weeds. After weeds die (a couple weeks or so), mow the plot. Before mowing, additional wheat can be top-sown or drilled into the plot. Top-dress with lime and fertilizer (if needed) as recommended from a soil test. If the clovers were allowed to flower and produce seed, you should not need to re-sow. If the plot was overgrazed and seed production was less than desirable, top-sow or drill additional seed as needed prior to mowing. If you add red clover, you should wait to spray the plot in late August, and additional red clover seed should be top-sown.

#### **Winter greens patch (PLS/ac)**

5 pounds daikon radish  
3 pounds forage rape or kale  
1 pound purple top turnip

*Benefits and considerations:* The Brassicas (including rape, kale, turnips) and radishes can provide a great source of energy during winter. The foliage of rapes and kales typically is selected over the foliage of turnips and radishes, especially after a couple frosts. Turnips and radishes produce a taproot that may be eaten through winter. Radishes are not as cold-tolerant as rape, kale and turnips, and may be killed if temperatures drop into the low-teens. The taproot of some radishes may grow to 30 inches deep or more, effectively breaking hardpans, aerating the soil, improving drainage, and providing organic



Fig 36; A winter greens patch can be highly attractive to white-tailed deer during fall/winter. The addition of radishes or turnips in the mixture provides an additional source of energy from the taproot through winter.

material. Deer often select the taproot of white radishes, such as daikon, over other varieties. This mixture performs well as a fall-planted crop in Zones 5-8. In Zones 3-4, planting in spring is recommended.

*Management:* Brassicas and turnips should be planted relatively early compared to clovers and cool-season grains to allow substantial biomass production before hard frosts. Planting late July through August is appropriate in Zone 5, late August/early September in Zones 6 and 7, and early to mid-September in Zone 8. A trifluralin herbicide, such as Treflan, may be applied preplant incorporated to control various grass and forbs weeds, and a grass-selective herbicide can be applied postemergence to control grass weeds. Plots of winter greens should be rotated to help prevent development of fungal diseases.

#### **Standard cool-season perennial mixture (PLS/ac)**

4 pounds ladino white clover  
5 pounds red clover  
3 pounds chicory  
40 pounds oats or wheat

*Benefit and considerations:* This mixture performs very well, but do not expect to retain ladino clover on exposed sites that become excessively



Fig 37; This is as good as a perennial plot gets! Preferred perennial forages mixed with high-quality, fast-growing annuals during establishment. The clovers and chicory can be maintained for several years with proper management.

dry during the summer. A cool-season annual mixture is better suited to those sites. Expect high use of this mixture for several years, provided you manage the plot by top-dressing as needed with lime and fertilizer and with weed control. Red clover and chicory tolerate dry conditions fairly well (especially chicory). Wheat or oats are included because of their ability to provide forage as the clovers and chicory are establishing. Berseem clover is an annual clover that germinates and grows fast initially and is highly preferable to deer. It can be added (5 pounds) to this mixture for quick clover growth and attraction. However, if you plant berseem clover north of Zone 8, be sure to plant a cold-tolerant variety, which should persist through winter at least as far north as Zone 7.

*Management:* There is no preemergence herbicide that can be used with this mixture. However, given the rapid germination and early growth of wheat or oats, initial weed pressure is not usually problematic. After the wheat or oats have produced seed and died and the clovers have flowered and produced seed, imazethapyr (such as Pursuit) can be sprayed postemergence as necessary to control various weeds. A grass-selective herbicide (such as Clethodim) is recommended to control grass weeds. Spray grasses before they reach 6 inches tall.

Top-dressing the appropriate amount of lime and fertilizer in September (one year after planting) will have this perennial forage plot looking good going into fall. An insecticide treatment for white grubs (Japanese beetles and June bugs) may be necessary in the third or fourth year after establishment. Sevin (water soluble powder at 10 pounds per acre), Dylox (3.75 ounces per 1,000 square feet), Mach II (granular formulation at 1.33 pounds per acre), and Arena (water soluble powder at 10 pounds per acre) have all worked well.

#### **Dry-land perennial mixture (PLS/ac)**

10 pounds alfalfa  
5 pounds red clover  
3 pounds chicory  
40 pounds wheat

*Benefit and considerations:* This perennial mixture tolerates relatively dry conditions during summer, but expect stand thinning to occur during prolonged dry periods. Exposed sites that become excessively dry during summer should be planted to an annual cool-season mixture or not planted at all, but instead managed as an old-field. Expect alfalfa and chicory to persist for many years if top-dressed annually according to soil test recommendations and if weeds and weevils are sprayed as necessary. This mixture is not cheap.



Fig 38; Alfalfa, red clover and chicory produce highly nutritious forage for whitetails. This perennial mixture is outstanding if you can drive it (requires management), and it will perform well even on relatively dry sites. Picture taken July 5 in Zone 7.

It is important to realize the management effort needed to maintain a stand before planting.

*Management:* Alfalfa is sensitive to acid soils and low fertility, and alfalfa weevils can become problematic. To maintain alfalfa, pH should be raised to 7.0, both macro- (phosphorus and potassium) and micronutrients (especially sulfur and boron) should be applied if needed, and insecticides will be necessary to combat alfalfa weevil infestations in spring (4-8 ounces per acre of Way-Lay 3.2 AG has been successful). Incoming weeds can be sprayed with imazethapyr (Pursuit) or imazamox (Raptor) postemergence. Alfalfa, chicory and red clover flower in midsummer. After they produce seed, mow the plot to encourage fresh growth for fall. Problem grasses can be controlled with a grass-selective herbicide if sprayed before they reach 6 inches in height. Top-dress the plot with lime and fertilizer in August/September per soil test recommendations.

**Southern bottomland perennial mixture (PLS/ac)**

- 8 pounds alsike clover
- 4 pounds ladino white clover
- 12 pounds berseem clover

*Benefit and considerations:* This perennial mixture is very well-suited for Southern bottomlands that are poorly drained and moist during much of the year. Berseem clover is a high-preference annual clover that should be added because it germinates and establishes relatively quickly. Berseem is not cold tolerant, but there are cold-tolerant varieties of berseem clover, such as Frosty, that persist through winter at least as far north as Zone 7. There are no grasses (such as oats) added to this mixture because this allows a grass-selective herbicide to be applied soon after planting to control ryegrass, which usually infests most Southern bottomland fields.

*Management:* Imazethapyr (Pursuit) and/or 2,4DB (Butyrac 200) can be sprayed postemergence as needed after the clovers are well-established to control various broadleaf weeds. A grass-selective herbicide can be applied postemergence any time after planting to control grasses. This mixture should be mowed after the clovers have produced

seed (usually in August) and as necessary to prevent weeds from flowering if the plot is not managed with the appropriate herbicides. An insecticide treatment for white grubs (Japanese beetles and June bugs) may be necessary in the third or fourth year after establishment. Sevin (water soluble powder at 10 pounds per acre), Dylox (3.75 ounces per 1,000 square feet), Mach II (granular formulation at 1.3 pounds per acre), and Arena (water soluble powder at 10 pounds per acre) have all worked well.



Fig 39; All three of these clovers are highly selected by deer, and all do well in poorly drained soils, especially alsike and berseem.

**DO NOT PLANT PERENNIAL COOL-SEASON GRASSES!**

Do not include tall fescue, orchardgrass, bromegrasses, timothy, matuagrass or bluegrass in any food plot! Perennial grasses are ranked at the bottom in terms of forage preference by white-tailed deer. In our experimental plots used to determine planting recommendations for white-tailed deer, there was virtually no measure of deer grazing these grasses at all, in any year or season. White-tailed deer food habit studies over the past 50 years have noted a lack of perennial grasses in the diet, except in late winter when they have just germinated and there is little other green forage available. Not only are they not selected, perennial grasses are competitive and usually choke-out clovers by the second growing season, leaving nothing but a field of rank grass with relatively high lignin content, providing low palatability, low digestibility and little nutrition. Even if other desired forages were not choked out completely, why would you want a certain percentage of your food plot taken up by non-preferred plants with lower nutritional quality? It doesn't make sense!



Fig 40a and b; Here (top) is a plot of orchardgrass (foreground) and an adjacent plot of oats, Jan. 24, 2006. Nothing really needs to be said — the picture speaks for itself. Fresh, nutritious oats, or senescent, rank orchardgrass. The choice is yours. Here (bottom) is a lush plot of timothy, May 2, 2005. Horses may love this stuff, but deer don't! You won't find a single blade of timothy grazed in the entire plot.

	<i>Forage produced (pounds per acre — dry weight)</i>	<i>Percent eaten by deer</i>
crimson clover	3,726	78
wheat	5,736	65
rye	7,378	50
ryegrass	4,889	10
orchardgrass	2,449	3
timothy	2,486	0

A comparison of three annual grasses, two perennial grasses and crimson clover grown from October 2004 to April 2005. Data were collected at the end of each month, except April, when data were collected prior to flowering for each of the forages. It is clear the annual small grains and crimson clover are highly preferred by white-tailed deer over ryegrass, orchardgrass and timothy. Oats (variety not stated) are not included in the comparison, because they were winter-killed in January 2005.

## WILD TURKEYS

Presence and abundance of wild turkeys are influenced greatly by food availability. Food plots can influence wild turkey movements and home range size, lead to increased body weight, and help increase the percentage of eggs that hatch when nutrition is a limiting factor. Food plots also can influence poult survival, depending on what you plant and how you manage your food plots. However, before considering what to plant in a food plot, your primary considerations when managing for wild turkeys should be nest success and brood survival. Unless these are relatively high, the impact of food plots most likely will be negligible.

Therefore, if you are managing your property for wild turkeys and you are considering food plots for turkeys, you should concentrate your efforts on providing adequate nesting cover and brooding cover across your property or your efforts could be futile. Early successional areas with considerable brushy cover provide outstanding nesting cover for wild turkeys. In forested areas, improvement cuts that allow at least 20-30 percent sunlight to reach the forest floor enhance nesting cover greatly. When managing fields, nonnative perennial grasses (such as tall fescue, orchardgrass, bermudagrass, and bahiagrass) should be killed and the seedbank allowed to respond. Eradicating these grasses will improve cover for broods greatly. Succession should be managed with prescribed



Fig 41; This woods road planted to ladino clover is highly attractive to wild turkeys. Foraging and bugging opportunities are perfectly juxtaposed with a well-developed understory in the adjacent woods, which are burned every two to three years.

fire. The fire-return interval will depend on plant response and desired vegetation composition and structure, but two to five years is applicable on most sites. Make no mistake, these are the practices that increase recruitment into the fall population, not food plots. However, after recruitment is increased, food plots can keep birds in an area, influence movements and weight, and help maintain a healthy, vigorous, wild turkey population.

Both warm- and cool-season food plots should be considered when managing for wild turkeys because each provides something useful for turkeys during different seasons. Various plantings provide grain (such as corn and wheat) and other seeds (such as soybeans, buckwheat, millets, sunflowers), green forage (such as clover leaves), and tubers (chufa). Insects and other invertebrates (such as spiders) are critically important foods, for broods and are relatively abundant in many forage plots, especially clovers, alfalfa, and chicory.

### WARM-SEASON FOOD PLOTS FOR WILD TURKEYS

The primary benefit of warm-season food plots for wild turkeys is realized during fall and winter. Corn, soybeans, grain sorghum, and chufa are the primary options.

#### *Managing corn and grain sorghum plots for wild turkeys*

Follow the planting and weed control recommendations for corn provided on pages 15-16. When managing specifically for turkeys, use the widest recommended row spacing (30 inches) and the lowest recommended seeding rate. This allows more space between plants and makes the structure more favorable for wild turkeys, yet still provides good grain yield. Using relatively short corn varieties that produce corn ears 2-3 feet aboveground is another consideration that can make a corn plot more attractive and usable by wild turkeys. Large varieties with stalks 7-8 feet tall and corn ears 4-5 feet aboveground are not as attractive and the grain not as accessible for turkeys. Likewise, relatively short (3 feet tall) varieties of grain sorghum allow better visibility for turkeys and makes the seed more easily obtainable. If you want grain sorghum to be available to turkeys into winter, choose a variety

with higher tannin content that will resist bird depredation. Tannin content drops considerably after a couple of frosts, increasing palatability of red and brown sorghums during late fall and winter. If depredation from blackbirds is not a problem in your area and you want turkeys to get in the grain sorghum soon after maturation, choose a white grain sorghum, such as Hegari, that contains fewer tannins than red or brown grain sorghums.

Some people try to make the grain more accessible by silage-chopping, mowing, or simply knocking the stalks over. Unless you have grown a very tall and robust corn variety, this is not necessary. **I leave them standing.** If turkeys want or need the corn, they will get it. You don't have to knock it over or mow it. Leaving it standing provides a good measuring stick for how much you need. If you consistently have standing corn left over, you don't need to plant that much. If you choose to silage-chop or mow, do not treat more than a few rows at a time. Corn and grain sorghum seed deteriorate and decompose quickly during winter when cut or knocked over (as opposed to left standing). Silage-chopping and mowing through winter makes corn available for many other bird species, especially nongame birds. Of course, where hunting is a consideration, silage-chopping and mowing can be continued through turkey season (check your state's regulations to make sure this is legal in your state) to help keep birds in the area. Corn fields can be burned in late March/early April to make the corn readily available and to prepare the field for planting another warm-season plot, if that is an objective.

Crop rotation is important. One way to rotate corn and grain sorghum plots is to allow them to set fallow through the following summer, then plant a cool-season plot, such as clovers. Fallow corn plots provide outstanding brooding cover as "weeds" establish in the plot. Toward the end of summer (two to three weeks before dove season), silage-chop or mow the plot. Later, you could plant a cool-season plot.

### *Planting and managing soybeans for wild turkeys*

Follow the planting and weed control recommendations for soybeans provided on pages



Fig 42; Corn plots do not have to be silage-chopped or mowed for wild turkeys. This plot (in March) was left standing through winter and turkeys have been feeding in the plot all winter long. Corn plots at this time of year can be a primary food source and very attractive to wild turkeys.



Fig 43; Corn plots allowed to set fallow the year after planting can provide outstanding brooding cover for wild turkeys. Depending on the forbs that respond from the seedbank, the perfect "umbrella" cover develops, protecting broods while they feed upon bugs and various seed below.

14–15. Soybeans are planted for wild turkeys to provide high-energy food during fall and winter. Turkeys may forage for insects in soybean plots in summer, but the primary consideration when growing soybeans for turkeys is seed production. Therefore, they should be allowed to stand through winter, or at least as long as seed are available. The height and structure of vegetation highly influences use of an area by turkeys. When planting soybeans for turkeys, I like to use an MG 4 or 5 soybean (see Fig 27 on page 15) with a relatively short, bushy canopy and plant on a

wider spacing (30-inch rows or broadcast) with lower plant populations (50,000-80,000 seed per acre, or 80-85 pounds per acre broadcast).

*Planting and managing chufa for wild turkeys*  
Chufa is a variety of yellow nutsedge and a popular planting for wild turkeys. Turkeys scratch-up and eat the nutlike tubers produced among the roots of chufa. Chufa grows well in a variety of soil types. However, it is more difficult for turkeys to scratch into heavy clays and turn up the roots and get to the tubers than when chufa is planted in loamy soils. I do not recommend planting chufa in clay soils. If you do, you will need to disk the plot in the fall to make the tubers available. Maximum tuber production usually occurs in sandy loam soils and bottomlands with full sunlight where moisture is not limiting. Drought conditions severely reduce tuber production and plant survival.

Chufa can be planted with a drill or planter, or the tubers can be broadcast and covered 1-2 inches by disking. Planting rate is approximately 50 pounds per acre. Chufa does best in fertile soils. P and K should be raised according to soil test recommendations. Top-dress with a nitrogen fertilizer (60 pounds N per acre) when plants reach approximately 6 inches in height and rain is in the forecast. Planting chufa in rows allows cultivation for weed control. Combining cultivation with the appropriate herbicide applications is the best strategy for clean, productive chufa plots. Many forb weeds can be controlled postemergence with 2,4-DB (use Butyrac 200, not 2,4-D as it may kill chufa, especially at 2- to 3-quarts per acre), Banvel or Clarity. Problem grasses can be controlled postemergence with Clethodim or Poast. When growing chufa, it is important to rotate the crop each year, which will encourage healthier plants and help manage plant density. Chufa plots typically volunteer the year after planting.

### COOL-SEASON FOOD PLOTS FOR WILD TURKEYS

Cool-season plots are most popular for wild turkeys and for good reason. Turkeys cannot resist a lush green plot in late winter through spring, and after nesting, various types of cool-season plots harbor plentiful insects for broods.



Fig 44; Standing soybeans are highly attractive to wild turkeys. Soybeans are a high-energy food source that will hold turkeys in an area as long as the beans are available and the birds are not disturbed. Turkeys have been feeding in this plot regularly through winter (seen here in February).



Fig 45; A field of chufa can be a magnet for wild turkeys. The energy-rich tubers should be available throughout fall and winter.

Annual cool-season plots provide foraging opportunities through fall and winter and, depending on what is planted, may provide a seed source (such as wheat) the following summer. Perennial cool-season plots may provide forage in fall, spring and summer. Clovers and alfalfa are most readily eaten and the insects associated with these plots are a critical source of protein and calcium for wild turkeys. Chicory leaves also are readily eaten by wild turkeys and if allowed to bolt and produce seed, the structure of flowering chicory is desirable for brood cover.

Management and arrangement of cool-season plots greatly influence use by wild turkeys. Perennial cool-season plots should not necessarily be managed as those for white-tailed deer. The presence of certain weeds, such as ragweed, pokeweed, crotons, goldenrods and horseweed, can make clover/alfalfa plots more attractive for broods during summer. Instead of keeping perennial plots “clean,” you should tolerate a little coverage of certain weeds for the structure they provide. Enhanced structure enables perennial cool-season plots to provide cover as well as forage and insects, which is very important for broods. Mowing should be limited. Mowing once in late summer (August) will prevent many of the annual weeds, such as ragweed and horseweed, from seeding and becoming too dense the following year. Perennial weeds, such as pokeweed or goldenrod,

can be reduced if they are too dense by spot-spraying with a selective herbicide, such as Pursuit or 2,4-DB in late spring. Annual cool-season plots should be allowed to go fallow through summer to provide good brood cover.



Fig 46; Clover plots are highly attractive to wild turkeys, both for the forage and associated insects. Note the additional habitat management for wild turkeys on this property (burning woods in the background and a standing “weedy” cornfield).



Fig 47a and b; It’s OK to have a few “weeds” in a perennial plot for turkeys! Plants such as common ragweed and horseweed provide structure that make the plot more attractive to broods. These annual forbs can be mowed late in the growing season before they go to seed. The top picture was taken in early August and two broods were using the plot. We mowed the plot in late August. The following spring (bottom), the perennial clovers are looking great.



### Perennial bugging plot

10 pounds alfalfa

5 pounds red clover

3 pounds chicory

30-40 pounds wheat or oats

*Benefits and considerations:* There is no other plant that attracts grasshoppers and other insects as much as alfalfa. Both alfalfa and red clover provide excellent forage that turkeys readily eat. Adding red clover in the mixture helps diversify the structure, making it more attractive to turkey poults. The larger and taller stems of alfalfa and red clover (as opposed to ladino white clovers) make them perfectly suited for brooding. About 30 pounds of wheat or oats when planting this mixture for turkeys works well. The wheat not only provides forage and seed production, but also provides a “nurse” crop while the alfalfa and red clover establish.

*Management:* Alfalfa is sensitive to acid soils and low fertility, and alfalfa weevils can become problematic. Amending the soil per soil test recommendations is critical, which may include addition of micronutrients (especially sulfur and boron). Insecticides will be necessary to combat alfalfa weevil infestations in spring (4-8 ounces per acre of Way-Lay 3.2 AG has been successful). Most undesirable broadleaf weeds can be controlled with Pursuit or Raptor postemergence in spring. Grass-selective herbicides can be tank mixed with imazethapyr or imazamox to control grasses if sprayed before they reach 6 inches in height. Top-dress the plot with lime and fertilizer in August or September as recommended by a soil test. Do not mow this plot until late summer to allow broods to benefit from the cover. Allow the chicory to bolt and flower and remember, certain “weeds” can make this plot more attractive for wild turkeys because of the structure they provide.



Fig 48; It is early August and wild turkey broods have used this plot of alfalfa, red clover, chicory and wheat extensively. It may look “unkempt” to some, but this plot has provided exactly what wild turkey broods have needed through the summer—insects, good forage, and structure that affords protection, but still allowing mobility. It is about time to mow the plot and top-dress as recommended from a soil test to encourage fresh growth during fall prior to winter senescence.

### **Strutting and brooding plot**

40-50 pounds wheat or oats

15 pounds crimson clover

*Benefits and considerations:* If you are south of Zone 5 and want a “green plot” for turkeys to feed, strut and display in during late winter/early spring, this is it! No other clover will attract turkeys more during spring than crimson. After the crimson clover dies (May), the plot will be attractive through midsummer as the turkeys feed on the wheat or oat seedheads. Be sure to use an awnless (or beardless) variety of wheat. Varieties with long awns on the seedheads are not eaten as readily by turkeys or other wildlife species.

*Management:* This mixture establishes very quickly and crimson clover is an excellent re-seeder. You can retain crimson clover for years without replanting if it is not overgrazed and it flowers and produces seed. When managing specifically for turkeys, I manage this mixture

a little differently than the *Best Annual Forage Mixture* for deer. After the wheat or oats mature in early June, monitor incoming weeds. If desirable weeds are present (such as ragweed, pokeweed and crotons), sit back and allow them to grow and provide the best brooding cover you could ask for! If undesirable weeds (such as horsenettle, curly dock, morningglories and sericea lespedeza) are problematic, you have some herbicide options. Of course, glyphosate can be used to control forb and grass weeds. Forb-selective herbicides (such as Harmony Extra, Clarity and 2,4-D) can be used to control broadleaf weeds. If both desirable and undesirable broadleaf weeds are present, spot-spray the undesirable ones and allow the desirable ones to continue to grow. Spray weeds with glyphosate in late summer before the crimson clover germinates. Grasses can be controlled with a grass-selective herbicide. In late summer (a couple weeks after spraying), mow the plot. Mowing will “release” the re-seeding crimson clover. Top-dress with lime and fertilizer

Fig 49; Plots of crimson clover and wheat are used extensively by wild turkeys, especially during late winter/early spring prior to nesting. Later in summer, the plots are attractive for broods as various forbs from the seedbank, such as ragweed and horseweed, germinate and grow after the clover and wheat have died.



(if needed) as recommended from a soil test. Additional wheat or oats can be top-sown before mowing or drilled into the plot after mowing. Typically, a fair amount of wheat or oats will re-seed into the plot and do not need to be drilled into the plot until year three.

### USING WHEAT FOR SUMMER ATTRACTION AND WEED CONTROL

If you have fields with tough-to-control broadleaf weeds, you should consider planting wheat by itself. Not only does wheat provide an attractive forage through fall and winter, but cool-season broadleaf weeds are easily controlled with Harmony Extra, Clarity or 2,4-D without killing the wheat. After the wheat matures, the wheat seedheads are readily eaten by turkeys and other wildlife (be sure to plant an awnless variety of wheat). Warm-season weeds can be controlled after the wheat matures with glyphosate. If glyphosate-resistant weeds are present, you can use any forb-selective herbicide labeled for fallow areas. If allowed to continue to set fallow, these fields can provide excellent brooding cover the second summer after planting as more desirable forbs become established from the seedbank.

If you plant wheat specifically for wild turkeys, use a lighter seeding rate (80 pounds per acre) as opposed to a heavier seeding rate for deer forage production (120-200 pounds per acre). A relatively light rate will encourage better growth from the seedbank for brooding cover after the wheat matures and will not have as much thatch at ground level.



Fig 50; Do not overlook the value of wheat and oat seed when managing for wild turkeys. This gobbler's crop was full of oat and wheat seed, which was growing in a mixture of clovers. Photo by Ryan Basinger.



Fig 51; Wheat plots allowed to set fallow can provide outstanding cover for wild turkey broods. "Weeds," such as ragweed, horseweed, ironweed, sumpweed, pokeweed, fleabane, sticktight, boneset and wingstem, provide superb umbrella cover for broods moving about underneath, while they feed on seeds and invertebrates.

## NORTHERN BOBWHITE AND COTTONTAIL RABBITS

**Northern bobwhite** (bobwhite quail) may eat seed from a number of food plot plantings. However, food is rarely a limiting factor for bobwhite. A lack of suitable cover is almost always what limits bobwhite populations in the eastern US. **Most importantly, quail require a relatively open landscape.** Quail populations do not persist in forested landscapes. Quail populations have declined across the eastern US because the landscape in most areas where quail once occurred has become more forested and more fragmented with urban and suburban areas. Also, the open areas that remain do not support quail because they are covered with hayfield or pasture of non-native grasses (that do not provide suitable structure at ground level) or they are double-cropped from woods to road, leaving little or no cover available for quail to nest, raise broods, loaf and escape predators. Food plots do not remedy any of these situations. In fact, no study in the eastern US even shows quail responding positively to food plots. Therefore, food plots should not be planted specifically for bobwhite, or with hope that food plots will have a beneficial effect on the quail population.

Bobwhite nest in herbaceous vegetation, such as grasses and forbs. Native grasses, especially broomsedge bluestem, little bluestem and sideoats grama, have been promoted for nesting cover. However, recent research indicates grasses are not required for bobwhite to nest successfully; quail nest just as successfully amongst forb cover. Quail broods frequent “weedy” fields and areas of sparse brush/shrubs as they search for insects and other invertebrates. Areas managed for brood cover should be relatively open at ground level with a canopy of forbs overhead. This type of environment enables quail chicks in search of invertebrates to move about easily while protected by the “umbrella cover.” Forbs that should be encouraged for bobwhite include ragweeds, pokeweed, old-field asters, partridge pea, beggar’s-lice, native lespedezas, geraniums, milk pea, butterfly pea, perennial sunflowers, smartweeds, 3-seeded mercury and crotons. Grasses that provide seed for bobwhite include annual panicgrasses and foxtail

grasses. Brambles and shrubs, such as blackberry, sumac, wild plum and elderberry, as well as sprouts of oaks, hickories and other trees scattered throughout an area provide protective cover for loafing and escaping predators. Thickets of dense brush and blackberry provide critical winter cover



Fig 52a,b; This is the structure presented by tall fescue (top) and orchardgrass (bottom). These grasses inhibit travel for young quail and wild turkeys, reduce seed and invertebrate availability, and inhibit the seedbank from germinating. These grasses are not “wildlife friendly” and should be eradicated.



Fig 53a, b, c; These scenes are typical across the northern bobwhite's distribution in the eastern US, and people wonder why they don't see quail anymore. Closed-canopy woods, housing developments, large double-cropped fields, non-native pasture grazed to the ground, and a landscape maturing to forest do not support quail. Food plots do not help quail in these situations. A change in land-use practices and successional stages at a landscape level is necessary to reverse the trend in declining bobwhite populations.



Fig 54a and b; Plant communities dominated by native forbs and grasses with scattered brambles and shrubs provide high-quality habitat for northern bobwhite. Population response to management is greatest in open landscapes dominated by such cover, not forests or other nonhabitat. This is true whether you are in the South (Kyker Bottom Refuge, Tennessee; top) or Midwest (Black Kettle WMA, Oklahoma; bottom), but proper habitat management is a tremendous limitation in the eastern US where annual precipitation exceeds 30 inches per year.

bobwhite need to escape predators and harsh weather. Shrub cover must be adjacent to or within potential loafing and feeding areas.

**Eastern cottontails** (rabbits) primarily eat green forbs and grasses when available, but they also eat bark from saplings and browse when necessary, especially fall through winter. Forage food plots can benefit rabbits greatly at this time. Suitable cover for rabbits is somewhat similar to that of quail, but optimal cover for rabbits is more on the brushy side. Areas with considerable early successional cover, including abundant brushy thickets less than head high, are magnets for rabbits. This type of cover can be created by eradicating nonnative perennial grasses, such as tall fescue and bermudagrass, and allowing native forbs and grasses with scattered shrubs to establish. Fields of tall fescue can be especially detrimental to rabbits as the endophyte fungus associated with tall fescue is toxic to rabbits, leading to lower weights and smaller litters, not to mention the poor structure at ground level and lack of overhead cover afforded by tall fescue.

Weedy/brushy areas that provide cover that rabbits and quail require has to be maintained by disturbance, otherwise trees will grow and

groundcover will be shaded out. The best way to maintain cover for rabbits and quail is prescribed fire. Disking also can be used to encourage annual forbs and influence plant composition and structure in fields. Herbicide applications, mechanical disturbance and chainsaw work also can be used to maintain early successional communities. **However, prescribed fire is strongly recommended to manage habitat for quail and rabbits.** Burning consumes dead vegetation, recycles nutrients, stimulates fresh plant growth, creates an open structure at ground level, makes seed and invertebrates more available, and maintains an early-successional plant community. The timing and frequency of fire when managing specifically for quail or rabbits differ. Refer to *Managing Early Successional Plant Communities for Wildlife in the Eastern US* for complete information on managing these areas for quail and rabbits.

Burning requires firebreaks, which are necessary to prevent fire from getting into areas not intended to burn. In addition to restricting spread of fire, firebreaks can be planted to provide additional food resources. Thus, *linear strips of food* surrounding and within *blocks of cover* represent good habitat arrangement for quail and rabbits.



Fig 55; Optimal cover for rabbits is dense, largely dominated by shrubs or tree sprouts, but retains herbaceous groundcover for nesting and foraging. This structure and composition is maintained on most sites with a fire-return interval of four to five years.



Fig 56; Planted firebreaks and other linear strips within blocks of cover provide rabbits an excellent food source in proximity to protective cover. Photo by Mark Cunningham.

### WANT MORE QUAIL?

If so, then you first should understand how quail **require** an open landscape for healthy populations to persist. **The northern bobwhite is not a woods bird!** If you find quail using closed-canopy woods, that is an immediate indication of poor-quality habitat. Look around your property. Do you see lots of woods? What about on the properties surrounding you? If you are in a forested landscape, there may be nothing you can do to increase the quail population. In general, a minimum of 500 acres should be considered for quail management. And on that 500 acres, optimally, there should be no closed-canopy woods. Forested areas, including hardwoods and pines, should be cleared or thinned to allow at least 50-80 percent sunlight into the stand. Then, the understory must be managed with frequent prescribed fire to maintain a plant community desirable for quail and not allow a young forest to regenerate. (Note: are you really interested in managing your property for quail? If so, read this paragraph again and take a look on Google Earth and see what your property and the surrounding properties look like.)

Next, consider your open areas. Do you see tall fescue, orchardgrass, timothy, bromegrasses, dallisgrass, bahiagrass, and/or bermudagrass? If so, then your next step toward enhancing bobwhite habitat and increasing the bobwhite population should be eradicating these grasses and converting those areas into suitable cover. Don't be afraid if some brambles and shrubs establish. Bobwhite need them for loafing and escape cover, as well as the food they provide. Do you have areas of dense native grasses? Perhaps you planted them. Regardless, you need to reduce grass density in those areas by using an herbicide application or disking. Bobwhite don't have to have grass! If you have more than 30 percent coverage of grass in open areas, you can make those areas much more productive for bobwhite by reducing grass coverage and promoting more forb cover. And make sure protective shrub cover is not more than 100 yards apart.

Perhaps this seems extreme. Well, to see a rebound in bobwhite populations in areas where they used to be abundant but

now absent, extreme measures are needed. Not planting food plots. And there is no need to worry about eyeworms, diseases, fire ants, raccoons and hawks. None of that matters if there is no habitat! People quickly discover that while it may not be possible to control predators, they can control predation to an acceptable level by establishing and maintaining the type of cover bobwhite require. And finally, yes, releasing pen-reared birds can provide some fun shooting, but they cannot be used to re-establish quail populations. If so, quail would be everywhere! Their survival rate is simply too low.



Fig 57; Bobwhite populations have increased in many agricultural areas throughout the South and Midwest after establishing/promoting field borders of native grasses and forbs around crop fields. The concept is simple: bobwhite populations increase when additional habitat is provided. Here, a border of broomsedge, brambles and forbs has been allowed to establish around a soybean field, providing cover and food for quail.



Fig 58; Northern bobwhite. Photo by Dale Rollins.

Firebreaks can be planted to almost any planting that you would use in a field. Exceptions include plantings that require larger acreage, such as corn and soybeans, which do not typically perform well in relatively narrow strips. Depending on your objectives, both warm- and cool-season plantings may be used. Bobwhite may benefit most from plantings that produce abundant seed that is available in fall/winter, as well as forages that harbor abundant insects in summer. Rabbits eat the green forage of clovers, chicory, alfalfa, wheat and oats, as well as peas, beans and grain produced by warm-season plantings. Regardless of planting, it is critically important the planted strips are adjacent to good cover, otherwise, the plantings will receive little or no use because the animals will be overly exposed and vulnerable to predation.

**The “Best” annual cool-season firebreak mixture (PLS/ac)**

15 pounds crimson clover  
5 pounds arrowleaf clover  
40 pounds wheat

*Benefit and considerations:* This mixture provides an attractive green strip for rabbits during winter, and of course deer, wild turkey, groundhog and other species will use it as well. You can plant it in late summer or early fall after a late summer burn, or it can be planted in late winter in the South after burning in February or early March. If you plant in late summer and intend to burn the following winter, be sure to check for debris in the firebreak before burning. It is not necessary to include arrowleaf clover, but rabbits will use the overhead cover of arrowleaf clover as it grows over the wheat in June and July.

*Management:* After the arrowleaf clover matures and dies in July, spray the firebreak with glyphosate to kill weeds that have come in, then mow the dead material in early August and allow the crimson and arrowleaf clovers to reseed. Another option is to allow the firebreak to go fallow. The clovers will reseed, but better clover growth will be realized if weeds are controlled and the firebreak is mowed in early August.



Fig 59a and b; A mixture of crimson and arrowleaf clover and wheat works extremely well in firebreaks. Not only does it provide outstanding forage and a high-quality seed source, but it also provides a relatively safe and reliable “green” firebreak through early spring, if planted the previous fall. This firebreak (a) was planted in late August along an old skid road in the middle of a cutover. It provided forage through winter and spring. It is now late July. One strip (left side of picture) was mowed in June after the wheat had matured and dried. As you can see, it reseeded very well. There were more rabbit droppings in this firebreak than anywhere I have ever seen. Firebreak (b) shows how the same mixture provides green forage through winter around a field managed for quail and rabbits.



### **“Just wheat” firebreak (PLS/ac)**

60-150 pounds wheat

*Benefits and considerations:* There is nothing wrong with planting wheat by itself in a firebreak. High-quality forage is provided through winter and a good seed source is available for bobwhite and many other species the following summer. I like to use a higher rate (120-150 pounds) when managing the firebreak specifically for rabbits, and a lower rate (60 pounds) when managing for northern bobwhite or wild turkey. The lower rate provides better structure at ground level for birds. Wheat is a better choice than oats in firebreaks because of the value of the wheat seedheads and because wheat is less susceptible to winter-kill from Zone 7 northward. Winter-killed leaves of oats burn readily and a fire is likely to creep across a firebreak with dead leaves (either from dead grass or fallen leaves from trees). Be sure to plant an awnless variety of wheat.

*Management:* Depending on seedbank composition, broadleaf weeds can be controlled with Harmony Extra, Clarity or 2,4-D. If desirable forbs arise from the seedbank, do not spray. Increased growth can be achieved with a midwinter application of 30-60 pounds of N per acre. Allow the wheat to stand after it matures. Many wildlife species will eat the grain, especially if you plant an awnless variety of wheat. Wheat will re-seed fairly well. When it sprouts, top-dress with 30-60 pounds N per acre if the wheat is pale green.



Fig 60; Firebreaks planted to wheat provide excellent forage through winter, and later the seedheads are eaten by many wildlife species. Such areas left fallow then provide optimal brooding structure for northern bobwhite and wild turkey.

### **Perennial firebreak mixture (PLS/ac)**

10 pounds alfalfa  
5 pounds red clover  
3 pounds chicory  
40 pounds wheat

*Benefits and considerations:* This perennial mixture provides outstanding forage for rabbits from spring through early winter. It also is a great source for insects during summer for bobwhite. The three perennial components provide outstanding forage for at least three to four years, making this mixture applicable for firebreaks around fields that will not be burned for a few years. The wheat also provides grain bobwhite and other species eat, and there is probably no other plant that attracts grasshoppers as much as alfalfa. This mixture performs very well when planted around upland fields that are well-drained. If you plant on a site that is more moist, or if you do not want to manage alfalfa, you can replace alfalfa with 5 pounds of ladino clover.

*Management:* Grasses can be sprayed with a grass-selective herbicide after the wheat matures. Many undesirable forbs can be controlled with Pursuit, Raptor or 2,4-DB. Broadleaf weeds should be sprayed when young. When managing firebreaks with this mixture, a few desirable forbs, such as ragweed, pokeweed and goldenrod may appear. The structure provided by these forbs makes the firebreak more attractive for bobwhite and turkey broods. Unless necessary to keep undesirable weeds from producing seed, do not mow this mixture until August. Top-dress with lime and fertilizer in late summer as recommended by a soil test.



Fig 61; This perennial firebreak mixture provides high-quality forage and also offers favorable structure for quail and wild turkey broods.

### **Vining legume firebreak mixture (PLS/ac)**

50-75 pounds iron-clay cowpeas  
5-10 pounds peredovik sunflowers

*Benefit and considerations:* Iron-clay cowpeas produce forage as well as seed for rabbits, bobwhite, deer, turkeys and other species. Sunflowers are included at a relatively light rate to provide substrate for the cowpeas to vine up on. If rabbits and deer are the objective, go with higher rate of cowpeas and lower rate of sunflowers. If quail and turkeys are the objective, go with lower rate of cowpeas and higher rate of sunflowers for better structure at ground level and more seed. Cowpeas can be substituted with Quail Haven soybeans (30 pounds) if desired.

*Management:* Prowl, Dual Magnum and Treflan can be applied preplant incorporated for weed control. A grass-selective herbicide can be applied postemergence for additional grass weed control. Consider establishing the firebreak the width of your sprayer instead of the width of your disk when planting this mixture for greatest effectiveness and efficiency. If you choose to add grain sorghum (3 pounds) to the mixture, do not use herbicides.



Fig 62; Iron-clay cowpeas and peredovik sunflowers provide forage and seed for several wildlife species. The planting rate of each can be adjusted depending on your focal species. Establishing the firebreak the width of your sprayer instead of the width of your disk facilitates management.

### **Annual “Upland Bird” firebreak mixture (PLS/ac)**

7 pounds Egyptian wheat  
7 pounds white proso millet  
3 pounds grain sorghum

*Benefit and considerations:* If you are looking to provide additional seed for bobwhite and other birds in an area with a lot of deer, you should consider this one. Deer eat very little grass during summer; therefore, this mixture does well even where deer density is high. Seed production is excellent for a variety of birds, including northern bobwhite, mourning dove and wild turkey, as well as many songbirds, including northern cardinal, several species of sparrows, juncos, northern flicker and others. Partridge pea (0.5 pounds) may be added if desired (plant short, “non-improved” variety if possible).

*Management:* Undesirable broadleaf weeds can be controlled with 2,4-D, Aim, Banvel or Clarity. If partridge pea is added, broadleaf herbicide options are limited to 2,4-DB.



Fig 63; Egyptian wheat grows tall and provides good cover for ground-feeding birds, such as northern bobwhite, northern cardinal, chipping sparrow and white-throated sparrow. Mourning dove will forage where the structure is open at ground level with bare ground. Grain sorghum and various millets can provide additional seed. Several plants germinating from the seedbank (such as partridge pea) also may provide additional seed.

### Annual “Bobwhite firebreak” mixture (PLS/ac)

10 pounds common or Korean (Kobe) lespedeza  
0.5 pound partridge pea

*Benefit and considerations:* Northern bobwhite relish seed from these annual lespedezas and partridge pea, which are available through winter, making areas planted to this mixture attractive feeding spots from December through February. If not already present in the seedbank, partridge pea is a good addition to this mixture. Although they are annual species, these lespedezas and partridge pea re-seed readily.

*Management:* The best time to plant (inoculate seed, disk, top-sow, cultipack) is mid-February through early April, depending on your location, which coincides with when burning often is conducted to maintain early successional cover. In years after the lespedezas and partridge pea have established, they can be stimulated to reseed by light disking December-February. Weed-free lespedeza/partridge pea firebreaks are possible by spraying Pursuit preemergence. Postemergence applications of Pursuit over established firebreaks also will be effective if weeds are sprayed when young. Problem grasses can be controlled postemergence with a grass-selective herbicide.



Fig 64; Seed of common or Korean lespedeza and partridge pea are readily eaten by northern bobwhite through fall and winter. Note how this firebreak goes through the middle of good early successional cover.

### MOURNING DOVE

Mourning doves are attracted to many different seeds and grains, including sunflowers, millets, grain sorghum, corn, buckwheat and sesame. Relatively large fields (5-20 acres or more) are recommended to attract large numbers of doves. Doves do not scratch and are “weak-beaked.” Therefore, they prefer loose grain (as opposed to corn still attached to the cob) or other seed in open areas with plenty of bare ground. Creating this environment is best accomplished by providing “clean,” weed-free fields and by silage-chopping, burning, mowing or disking to make seed available and feeding sites attractive.



Fig 65; Millet and wheat seed can be made more accessible for mourning doves by mowing or burning. Photo by Marion Barnes.



Fig 66; Doves are strongly attracted to loafing lines within a dove field or dead trees along the edge of a dove field. Photo by Bill Smith.

Doves prefer fields with some structure nearby, such as trees or power lines, that allow them to perch and loaf near the field. An excellent way to provide perching sites is to plant dove fields along or adjacent to powerlines. If a powerline is not nearby, you can erect poles in a line through the middle of the field and string a cable from the top of each pole. Another way to provide perching sites is to kill trees along the edge of the field and leave them standing. Doves are strongly attracted to dead trees around a good dove field.

Weed control can be a problem in dove fields, but be aware many naturally occurring “weeds” (such as pokeweed, ragweed, barnyardgrass, tropic croton, pigweeds, geraniums and foxtail grasses) produce seed readily eaten by doves and actually can make a food plot more attractive to these birds. Preemergence herbicides are recommended where weed control is necessary. Planting single species, instead of mixtures, can make weed control easier, depending on weed composition.

### JUXTAPOSING SINGLE-SPECIES PLANTINGS FOR DOVES

Planting a section of a field in a single species adjacent to another section(s) with a different species is highly recommended because maturation of different species varies such that a fresh seed source can be available from early summer through winter. For example, buckwheat and browntop millet mature and provide dry seed within 60-65 days, sesame requires 100 days, sunflowers approximately 110 days, and grain sorghum and corn will need 100-145 days, depending on variety. When several species with different maturation dates are mixed together, the field cannot be managed (silage chopped, burned, mowed, disked) until the latest maturing species is ready. If single species are planted in separate sections of a field, a fresh seed source can be available June through the end of winter. For example, wheat planted in the fall provides seed in June. Millets or buckwheat planted in the spring provide seed July through August. Millets and buckwheat planted in mid- to late June mature in August or September, and sesame, grain sorghum and corn planted in the spring can provide seed from late August through winter, depending upon management. Management strategies include



Fig 67; Single-species plantings, such as these sections of sunflowers, browntop millet and corn, allow several management options. The separate crops are cut at different times because of varying maturation dates. This strategy also allows for better weed control (as there is no labeled herbicide for many seed mixtures) and can enable double-cropping in some cases if desirable. Photo by Marion Barnes.

burning or mowing millet and wheat, and silage-chopping or mowing sunflowers, sesame, grain sorghum, and corn when the seed/grain has matured and is dry.

### PLANTING AND MANAGING MILLETS FOR MOURNING DOVES

Millet seed is highly selected by doves. Browntop millet may be preferable for some areas because it is not as prone to chinch bug damage as proso millets. Browntop millet requires approximately 65 days for dry seed as compared to 80 days for foxtail and proso millets. Top-sow 25 pounds of browntop or foxtail millet or 30 pounds of dove or white proso millet per acre on a well-prepared seedbed and cultipack. Seed also can be drilled at approximately 30 percent reduced rate. There are no labeled preemergence herbicides for millets. Broadleaf weeds can be controlled with several forb-selective herbicides, such as 2,4-D, dicamba or Harmony Extra. Spray broadleaf weeds when they are young and when millets are 4- to 8-inches tall. Mature millet fields can be burned or mowed to make seed more available. Using a hay rake after mowing will remove thatch and make seed readily available. Burning is the best way to provide a clean, open structure at ground level that mourning doves prefer.



Fig 68; Millet seed, such as this giant foxtail millet, is a favorite food of mourning doves.

### PLANTING AND MANAGING SUNFLOWERS FOR MOURNING DOVES

Sunflower seeds contain lots of energy and are a preferred food source for mourning doves. Peredovik sunflowers (black-oil type) can be top-sown over a well-prepared seedbed at 25 pounds per acre and covered by disking approximately 1 inch. Or they may be planted or drilled at approximately 8 pounds per acre in 38-inch rows. Planting in rows allows considerable weed control via cultivation. Prowl, Dual Magnum or Treflan should be applied preplant incorporated or Prowl, Spartan or Dual Magnum may be applied preemergence. Clethodim or Poast may be used for postemergence grass control. Beyond can be applied postemergence to Clearfield sunflower varieties only. Applications should be made before weeds exceed 3-5 inches in height and when sunflowers are in the 2- to 8-leaf stage. Do not apply Beyond to sunflower varieties that are not resistant/tolerant to imidazolinone herbicides. Preplant incorporated applications of Prowl and postemergence applications of Beyond can be used with Clearfield sunflower varieties for optimum weed control. Sunflower fields are best managed by silage chopping sections or strips before and during dove season. If you don't have access to a silage chopper, mowing will help make seed available, but seed are not scattered as well as with a silage chopper.



Fig 69; It's hard to beat a field of sunflowers for dove hunting. Here, two sections of this field have been planted to sunflowers, but one section (foreground) was planted later than the other to prolong availability of sunflower seed. A section of corn also has been planted specifically for doves adjacent to one of the sunflower sections. Various sections will be managed by silage chopping to make seed available throughout fall and winter. Note also the loafing line that was erected specifically for doves.



Fig 70a and b; Dove fields may be defoliated with glyphosate (requires couple weeks) or gramoxone (requires a few days) prior to silage chopping to provide optimal conditions for feeding doves (note the open structure at ground level).

## MANAGING CORN AND GRAIN SORGHUM FOR MOURNING DOVES

Grain sorghum and corn both are readily eaten by doves. If you want grain sorghum available for doves into winter, choose a variety with higher tannin content that will resist bird depredation. Tannin content drops considerably after a couple of frosts, increasing palatability of red and brown sorghums during late fall and winter. If depredation from blackbirds is not a problem and you want grain sorghum to be as attractive as possible soon after maturation, choose a white grain sorghum, such as Hegari, that contains fewer tannins than red or brown grain sorghums. Follow the planting recommendations for corn provided on pages 15-16. Weed control is important when managing corn fields specifically for doves. Dense grass weeds can be especially problematic for doves because of the thatch produced. Doves like to feed on bare ground. Corn fields are best managed for doves by silage chopping. Corn and grain sorghum seed deteriorate and decompose fairly rapidly once cut. Do not expect corn or grain sorghum cut in late summer to be good into winter. If you only have one field and want to spread usage out over a longer time period, do not manage the entire field at once, but leave some to cut later in the season. Try to manage grain sorghum and corn so grain is available from late summer through winter.

A variety of herbicide applications are possible when planting corn and grain sorghum. Glyphosate can be sprayed postemergence over varieties of Roundup Ready corn. Postemergence applications may be applied anytime from emergence until the V8 stage (eight leaves with collars) for corn or until the corn reaches 30 inches in height, whichever comes first. If you are planting non-Roundup Ready corn and grain sorghum, atrazine, Bicep II Magnum or Dual Magnum may be applied preplant incorporated or preemergence to control a wide variety of grass and forb weeds. However, realize grain sorghum seed must be treated with Concep seed safener before applying Bicep II Magnum or Dual Magnum. Basagran or Permit can be applied postemergence to control several forb weeds and yellow nutsedge. 2,4-D, Aim, atrazine, Banvel and Clarity are other herbicides that can be applied postemergence to control broadleaf weeds.



Fig 71; Silage chopping portions of the field from late summer into winter can continually attract doves and provide good late-season hunting opportunities. Photo by Robin Mayberry.

Pursuit can be applied preplant incorporated, preemergence or postemergence in Clearfield varieties of corn only (do not apply Pursuit to non-imidazolinone varieties of corn).

Remember to read and follow all label directions when applying herbicides. It is important to identify the weeds you have before spraying postemergence when managing for doves. Common ragweed, pokeweed, crotons and many others can provide additional seed relished by doves.

## PLANTING AND MANAGING BUCKWHEAT FOR MOURNING DOVES

Buckwheat is easy to grow, matures quickly (within 60 days), and doves readily eat the seed. Buckwheat most often is top-sown at 40 pounds PLS per acre over a well-prepared seedbed. Seed may be covered by light disking, but it is



Fig 72; Buckwheat germinates fast, grows fast, and produces seed fast.

not necessary. Cultipacking after top-sowing is important. Buckwheat also can be drilled at approximately 25-30 pounds (PLS) per acre. Buckwheat is a vigorous reseeder. If planted relatively early (late April in Zones 7-9), you should get three crops from one seeding even without disking. As seed mature and drop, doves will be attracted and begin feeding. Much of the seed will sprout and begin growing. The same scenario will play-out for the reseeded crop. If the structure at ground level is too dense with dead vegetation or if undesirable weeds are establishing, lightly disk the plot. That will create more bare ground space, make seed available, and effectively reseed another crop of buckwheat. There are no labeled herbicides to control broadleaf weeds in buckwheat. Grass weeds can be controlled with a grass-selective herbicide.

### PLANTING AND MANAGING SESAME FOR MOURNING DOVES

Sesame (also known as benne) is another good seed producer for doves. Like buckwheat, sesame should be considered where broadleaf weeds are not severe. Sesame is quite drought tolerant and does well in a variety of soils, including sandy soils. Sesame is best planted in 38-inch rows at about 6 pounds PLS per acre. Planting in 38-inch rows is highly recommended to allow cultivation for weed control and to create bare ground that doves prefer to feed on. Prowl, Treflan or Dual II



Fig 73a and b; Sesame can be a great attraction for late season doves. Sesame seed is high in oil content and crude protein. Here, sesame was planted adjacent to sunflowers. After the sunflower seeds are eaten, the sesame will be mature and the doves will move into the sesame.

Magnum may be applied preplant incorporated to help control various grass and forb weeds. Refer to herbicide labels to make sure applications are legal in your area or state. Grass weeds can be controlled with Clethodim or Poast.

### PLANTING AND MANAGING WHEAT FIELDS FOR MOURNING DOVES

Wheat seed matures in early June, can provide seed throughout summer, can be managed in a number of ways, and (in some states) can be top-sown and hunted over during the early dove season. There is no other planting for doves that provides that flexibility! Seed availability in summer provides food for nesting doves and attracts doves to your property earlier in the season.

Wheat can be top-sown over a well-prepared seedbed or it can be drilled. Normally, wheat is

planted for doves and winter cover at 120 pounds (2 bushels) per acre. Broadleaf weeds can be controlled postemergence with 2,4-D, Aim, Banvel, Clarity and Harmony Extra. If you have a problem with annual ryegrass, Achieve and Osprey may be applied postemergence. However, if you have a problem with ryegrass, I recommend you plant a forb so you can use grass-selective herbicides to control the ryegrass over a 2- to 3-year period. Be persistent and do not let ryegrass go to seed!

When managing wheat fields for doves, spray the plot if there is considerable coverage of weeds with a glyphosate herbicide or gramoxone after the seedheads have matured and dried (usually in June). After the weeds die, burn or mow the wheat to make the seed readily available to doves. If weeds were not dense and the plot was relatively clean at ground level, mowing can produce desirable results. If mowed, cut the wheat just below the seedhead and not down low near the ground. Mowing just below the seedheads will reduce thatch buildup, scatter the seed better, and provide better feeding conditions for doves.

The US Fish and Wildlife Service regulates restrictions placed on dove hunting. The USFWS allows dove hunting over mowed or cut grain fields as well as fields grown specifically for doves and other wildlife. In addition, “Lands planted by means of top-sowing or aerial seeding can be hunted [for doves] where seeds are present solely as the result of a normal agricultural planting or normal soil stabilization practice. Normal agricultural planting, harvesting, or post-harvest manipulation means a planting or harvesting undertaken for the purpose of producing and gathering a crop, or manipulation after such harvest and removal of grain, that is conducted in accordance with official recommendations of State Extension Specialists of the Cooperative State Research, Education, and Extension Service of the U.S. Department of Agriculture.” (Note: By policy, the Service does not make a distinction between agricultural fields planted with the intent to harvest and those planted without such intent as long as the planting is in accordance with Cooperative Extension Service recommendations.) (Excerpts from Title 50, Code of Federal Regulations, Parts 20.11 and 20.21i)

Therefore, dove hunting over harvested and



Fig 74; It’s late June and this wheat is ready to mow or burn to make seed available for doves. If many weeds are present, spraying the field with 1 quart per acre of a glyphosate herbicide two weeks prior will facilitate burning. Note the line wire through middle of food plot and adjacent corn and sunflower plots. Good times await here in September!

unharvested agricultural fields is legal, **providing your state wildlife agency allows it.** Furthermore, it is legal to hunt doves over fields of top-sown or drilled winter wheat where the seedbed has been prepared and as long as the seeding rate does not exceed that recommended by the State Agricultural or Cooperative Extension Service, providing the state wildlife agency has not implemented additional restrictions or regulations on managing fields for doves. **Always check current federal and state laws before manipulating and hunting fields for doves.**

Recommended rates for top-sowing winter wheat on a prepared seedbed (UT Extension)<sup>1</sup>.

Use	Seeding rate <sup>2</sup>	Seeding dates
Winter cover, wildlife enhancement, or fall grazing	100-150 pounds (2-3 bushels) per acre	Aug. 15-Nov. 1

<sup>1</sup>These planting rates are applicable to Tennessee. If you do not live or hunt in Tennessee, check with your state wildlife agency and Cooperative Extension Service to determine what is legal in your state.

<sup>2</sup>Seeding rate may be increased 50 percent if using combine-run seed.



## PLANTING AND MANAGING MIXTURES FOR MOURNING DOVES

If you are just planting one field and had rather plant a mixture than single species for doves, there are several options. However, it is important to keep weed control in mind if undesirable seed is present in the seedbank.

### **Millet mixture (PLS/ac)**

10 pounds white proso millet  
10 pounds dove proso millet  
10 pounds browntop millet  
3 pounds grain sorghum

*Benefit and considerations:* Research indicates white proso millet is the preferred seed for mourning doves, followed closely by dove proso millet and browntop millet. Regardless of type, if a good crop of millet is established, doves will come. The propensity for doves to feed on grain sorghum seed is no secret; however, non-target birds (such as house sparrows) may be a problem in some areas.

*Management:* Undesirable broadleaf weeds can be controlled with 2,4-D, Aim, Banvel or Clarity.

### **Grain mixture (PLS/ac)**

6 pounds corn  
5 pounds grain sorghum  
5 pounds peredovik sunflowers

*Benefit and considerations:* A variety of grains will attract doves and other wildlife species. This planting rate will leave the corn plants not more than about 4 feet apart, ensuring adequate pollination. Be aware, there are no labeled herbicides for this mixture.

*Management:* If weeds are likely to be problematic, you should consider another mixture or a single-species planting. This mixture is ready to silage chop once the corn has matured and dried. If cut in sections or strips, this plot can provide seed well into winter.



Fig 75; A variety of millets and grain sorghum readily attracts doves. Photo by Ryan Basinger.



Fig 76; A blend of corn, grain sorghum and sunflowers will attract large numbers of doves. It is important to realize not all weeds are bad when managing a dove field. Seed from common ragweed and giant foxtail in this field were eaten by doves and several other birds.

## WATERFOWL

Relatively flat fields that can be flooded 6-18 inches are excellent sites to plant for ducks and geese. If you can construct a shallow dike with a water-control structure (such as a flashboard riser), you can flood the field using rainfall or pumped water and attract waterfowl. Flooding should occur by late August if you are down South trying to attract early migrating blue-winged teal or wood ducks that hatched in the area. Otherwise, flooding should be initiated in November with full flood by early December (according to your region and objectives). Drawdowns should be initiated in February or March (according to your region) and completed by late April, if another crop is to be grown.

Food plots for ducks cannot be manipulated like those for doves. Federal regulations allow waterfowl hunting over standing crops (food plots) and harvested crops (flooded or not). However, crops can be manipulated only by standard agricultural practices used to establish, manage, and harvest the crop. Grain or other seed inadvertently scattered during harvest operations or as you enter or exit the field while hunting, placing decoys, or retrieving birds is **not** considered bait. **Nonetheless, you should always check the current US Fish and Wildlife Service and state hunting regulations before hunting.**

The crop planted is obviously an important decision. Not only should waterfowl be attracted to the crop and it provide nutrition, but rate of decomposition must be considered. Soybeans, for example, is not a good crop to flood for ducks because soybeans decompose rapidly after inundation (70 to nearly 100 percent over 90 days) and soybeans may cause food impaction in a duck's crop, which can be fatal. Regardless of crop planted, it also is important to realize agricultural grains do not represent a complete diet for waterfowl. Although many grains contain lots of energy that can be metabolized, they do not contain the amino acids, vitamins and minerals needed for migrating and wintering waterfowl to maintain body mass. Therefore, naturally occurring moist-soil plants should be encouraged as well, either in the same flooded unit or in an adjacent flooded unit, to provide optimum feeding conditions for waterfowl.

An added benefit of naturally occurring moist-soil plants is they persist much longer than agricultural crops. Many moist-soil plants (such as smartweeds, sedges, panicgrasses) experience only 20-25 percent deterioration after 90 days of flooding.



Fig 77a and b; Constructing a shallow dike across a flat field can enable you to provide excellent feeding and loafing areas for waterfowl. A water control structure allows the water level to be manipulated when fields are flooded. Top photo by Ryan Basinger; bottom photo by USDA-NRCS.



Fig 78; Areas containing naturally occurring moist-soil plants, such as this smartweed, provide highly attractive seed that contain vitamins and minerals that are critical for migrating and wintering waterfowl.

### WILD MILLET (OR DUCK MILLET)

Wild millet may include Japanese millet (*Echinochola frumentacea*) as well as barnyardgrass (*E. crusgalli*). Wild millet produces an abundance of seed relished by ducks. It is commonly planted by top-sowing seed on mud flats in spring in and around shallow wetland areas, including beaver ponds. Wild millet also can be planted in fields with shallow dikes that can be flooded using water control structures. Seed may be top-sown (25 pounds per acre) on a well-prepared seedbed and cultipacked, or it can be drilled after competing vegetation has been killed, usually with an application of glyphosate. Top-dress with 30-60 pounds N per acre when the wild millet reaches 4-6 inches in height. Wild millet can be flooded shallowly, but not inundated, soon after establishment to help provide weed control. Undesirable broadleaf weeds also can be controlled with 2,4-D, Aim or Banvel. Wild millet has a maturation date of approximately 55 days after germination and a deterioration rate of 57 percent after 90 days of inundation. Although wild millet will mature relatively quickly, increased seed yields greater than 1,000 pounds



Fig 79; Wild millet (*Echinochola frumentacea*, shown here) whether planted or naturalized provides a good seed source for migrating and wintering waterfowl. The US Fish and Wildlife Service allows you to manipulate (burn, mow, disk) moist-soil vegetation for duck hunting. However, it is illegal to manipulate planted crops, whether grown for ducks or agriculture.



Fig 80; Chiwappa millet produces larger seedheads than standard Japanese millet, but it needs to be planted earlier because it requires 120 days to mature. Photo by Ryan Basinger.

per acre are commonly realized if wild millet is planted prior to July 1. Later plantings may yield less than 500 pounds per acre. Armyworms sometimes can become problematic, especially when wild millet is planted relatively early (June). They can be controlled with an insecticide application, such as 4-8 ounces per acre of Intrepid. *Chiwappa* is a variety of *E. frumentacea* that is taller and produces larger heads and additional seed per plant. It should be planted earlier (by June 1) because it requires 120 days for maturity; 20 pounds per acre is recommended.

Wild millet (especially *E. frumentacea*) usually reseeds naturally in wetlands where previously planted if it is allowed to mature and produce seed. "Naturalized" wild millet (that coming up naturally, at least one growing season after it was planted) can be manipulated legally, as can other naturally occurring, moist-soil plants. What this means is, it is legal to mow, disk or burn a naturalized stand of wild millet if nothing else has been planted with the naturally occurring millet. [Note: This manipulation is allowed by the US Fish and Wildlife Service. However, state wildlife agencies may place additional restrictions that do not allow manipulation. Always check both federal and state laws before managing areas for waterfowl to make sure you are legal.]

### TAME MILLETS

A variety of "tame" millets can be planted for ducks. The millets are easy to grow, have low fertility requirements, and mature relatively quickly. Follow soil-test recommendations for liming and fertilization. Seed should be top-sown on a well-prepared seedbed. Cultipack before and after top-sowing. Apply 30-60 pounds N per acre when millets are 4-6 inches tall. Timing of maturation differs among the millet species. If planting relatively early in the growing season (June), you can plant any of the millets you want. If you are planting relatively late in the growing season, you might want to plant browntop millet because it matures more quickly than the other tame millets (see Appendix 1). My favorite tame millet mixture includes white proso (20 pounds per acre) and browntop (10 pounds per acre). If taller structure is desirable, replace browntop with pearl millet, which will grow 4-6 feet tall.

White proso millet has a maturation date of 70 days and a low deterioration rate after 90 days of inundation. Pearl millet remains standing for a while after flooding, which lengthens its availability and helps retain seed quality longer because its deterioration rate is approximately 70 percent after 90 days of inundation. Foxtail millet can be used in place of browntop if desired.

A big advantage to planting millets for ducks is broadleaf weed control. Without a forb included in the mixture, it is easy to control cocklebur, morningglories and other problematic broadleaf weeds with several forb-selective herbicides, such as 2,4-D, Aim or Banvel. If broadleaf weeds are not problematic and if you are planting relatively late in the growing season, you can include buckwheat (10 pounds PLS per acre) with the browntop millet. If you add buckwheat, you have no herbicide option.



Fig 81; Browntop and proso millets are easy to grow and readily eaten by ducks. If broadleaf weeds are not a problem in the field where you are planting, buckwheat can be added to the millets if desired.

### PLANTING AND MANAGING CORN AND GRAIN SORGHUM FOR DUCKS

Standing corn plots can be particularly attractive during mid- to late winter when other foods may be scarce. Realize, it is illegal to hunt over corn that has been manipulated (other than harvesting for grain). That is not a problem because ducks can shuck an ear of corn to get to the grain, and the larger duck species may knock the stalks over if they cannot reach the corn from the water, particularly if relatively short varieties are planted. Flooded standing corn also provides

cover ducks use for loafing and protection from wind. If the corn has been harvested, expect approximately 50 percent of the available waste grain to deteriorate within 90 days after inundation.

Grain sorghum can be planted for ducks, but it is not as preferable to ducks as corn, rice or millets, and grain sorghum is highly susceptible to red-winged blackbird damage in wetlands. Depending on water depth, short varieties of grain sorghum (such as WGF or wild game food) may be used to make seed more available for ducks. Grain sorghum has a deterioration rate of 42 percent after 90 days. White proso (10 pounds per acre) or pearl millet (10 pounds per acre) and/or buckwheat (20 pounds per acre) can be added if desired. If so, decrease grain sorghum rate to 4 pounds per acre.

Weed control is not as important when managing corn fields that are going to be flooded for waterfowl as it is for doves. Remember, some of the “weeds” may be beneficial and ducks can eat corn from the cob, so the structure at ground level is not as important. Nonetheless, where undesirable weeds, such as cocklebur, are expected, you might consider the appropriate herbicide applications. As with upland food plots, crop rotation is important. Corn and grain sorghum planted for ducks can be rotated with millets/buckwheat, chufa or left fallow. Do not overlook the value and attractiveness of moist-soil management for ducks (analogous to early successional vegetation for quail, rabbits, white-tailed deer and wild turkeys).



Fig 82; Flooded corn provides much-needed energy and attractive loafing cover for migrating and wintering waterfowl. When the water level is near the corn ears, ducks have easy access to the grain. Photo by Bill Smith.

## PLANTING AND MANAGING RICE FOR DUCKS

Rice can provide large seed yields with lots of digestible energy for migrating and wintering ducks. Optimally, rice should be grown on flat ground that can be flooded for weed control. Planting success generally is best when rice is sown (100 pounds per acre) on a prepared seedbed (that can be flooded later) by disking or drilling about 1 inch deep. Rice also may do well if not flooded while growing, but it does require considerable moisture, such as a bottomland field that doesn't drain very well. Don't expect to grow rice in dry conditions. Rice can be top-sown on mud flats or in shallow water (no more than 2- to 3-inches deep). Medium-grain rice varieties generally have better seedling vigor and produce more seed than long-grain varieties. Medium-grain varieties also may be preferred by ducks.

Soil should be amended according to soil test, and 90 pounds of N should be applied when the rice is approximately 2-3 inches in height and another 90 pounds of N 60 days later. Rice will respond best if flooded shallowly (2-4 inches) when it is about 6-8 inches in height for seven to 10 days, then drained. Obviously, flooding provides adequate moisture, but it also helps with weed control. It is best to apply N just prior to rain if irrigation or controlled flooding are not possible. Facet or Prowl may be applied preemergence or postemergence, and Basagran or Permit may be applied postemergence to control various forb and grass weeds. 2,4-D or Storm also can be applied postemergence to control forb weeds. Be sure to check herbicide labels before any application because there are several restrictions and limitations when spraying rice. Also, be sure the "weeds" you are trying to control aren't actually desirable plants for ducks. Wild millet, smartweeds and various panicgrasses complement rice when grown for ducks by providing a diversity of food.

Fig 83a and b; Rice is grown primarily along the coast and major rivers. Here (top) is a rice plot for ducks in the Lowcountry of South Carolina with scattered volunteer Chiwappa millet heading out. The ability to shallowly flood rice for weed control is desirable, but not absolutely necessary. Rice can be grown in bottomland fields that remain fairly moist through the summer.



## PLANTING AND MANAGING WHEAT FOR WATERFOWL

Some waterfowl, especially American wigeon, green-winged teal and Canada geese, readily eat young, green, growing grasses and forbs. Winter wheat can complement warm-season food plots (such as corn and millets) or moist-soil vegetation by providing green vegetation outside the edge of the flooded field.

Wheat sown in late summer/early fall can be flooded after it gets about 6 inches tall. I like to plant wheat along the edge of the flooded area. As it rains through the duck season, the water level will fluctuate along this zone and ducks will often concentrate their feeding along this zone, consuming both the green wheat and invertebrates. Wigeon, teal, mallards and Canada geese will dabble along the flooded zone and “dry feed” above the water line. Providing a diversity of foods, such as a grain/seed plot as well as a green plot, is highly attractive for a variety of duck species.

Wheat may be top-sown and lightly disked-in, or drilled at 120 pounds per acre. Fertilize according to soil test recommendations and apply another 30-60 pounds of N before flooding. Broadleaf weeds are controlled easily in wheat plots with numerous broadleaf-selective herbicides, such as Harmony Extra, Aim, Banvel and Clarity. Weed control is especially useful when planting wheat in these moist areas where cool-season forbs such as buttercups, henbit, purple deadnettle and chickweeds can be problematic, actually competing with the wheat and limiting growth. Spray weeds before they are 3-4 inches tall.



Fig 84a and b; Wigeon, green-winged teal, mallards and Canada geese readily eat flooded wheat. Here (top), wheat has been planted along the outer edge of a moist-soil management field (shown Nov 6). Approximately three months after flooding (bottom; shown Feb. 21), you can see how the ducks and geese have grazed off the green growing wheat.

## MANAGING WOODS ROADS FOR WILDLIFE

Planting and maintaining woods roads (or logging roads) can do more than prevent erosion. Planted woods roads become linear wildlife openings. Linear openings are particularly important to many species of wildlife in forested areas where early successional vegetation and high-quality forage are limiting. Planting woods roads can increase overall food plot acreage without clearing additional openings and help disperse forage throughout a property. Planted woods roads can impact more animals per planted acre than food plots when roads traverse and wind through an area, intersecting the home range of more animals.

Many of the same forages used in food plots can be planted on woods roads; however, some are better suited than others. For example, crimson clover, subterranean clover and white clovers are relatively shade tolerant. Ladino white clover persists well on roads traversing through bottomlands and on hillsides with an eastern or northern exposure. Ladino white clover may not, however, do well on southern or western exposures, especially from the Mid-South southward. Red clover and alfalfa do not respond to traffic as well as white clovers. Taller forages, such as arrowleaf clover, are not desirable on roads and do not stand up to traffic well. If the road has been closed and is essentially no longer used by vehicular traffic, it truly can be treated as a linear opening and planted to anything you might consider for your other food plots, provided sunlight is not limiting. If the road is gated, yet still receives considerable traffic from land managers or hunters, it probably should be graveled. These roads still can be managed for wildlife by clearing and planting the sides of the roads. All of the principles and procedures for establishing food plots that were covered previously also apply when planting woods roads. However, plowing and heavy disking are not possible or desirable on roads where large roots may be just under the soil surface and where vehicle travel will continue. Light disking, no-till top sowing, and drilling seed are recommended techniques when planting woods roads.

Soil pH often is a limiting factor along woods roads, especially where acidic leaves and

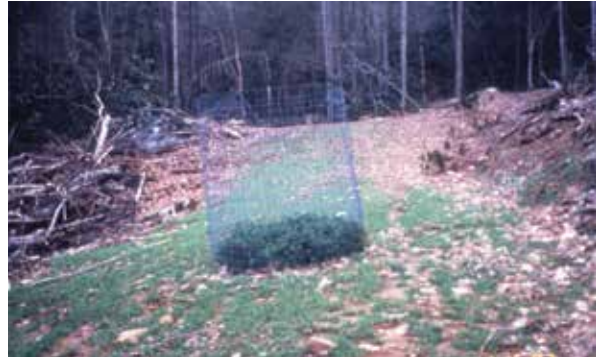


Fig 85; Woods roads can provide much-needed nutrition when planted to high-quality forages (as opposed to perennial cool-season grasses). This road in the mountains of North Carolina was planted to clovers and has received heavy use by white-tailed deer, wild turkeys, black bears and ruffed grouse.



Fig 86; An option for frequently traveled roads is to plant the sides of the road after daylighting. The sides of this road were planted to crimson clover and wheat and receive tremendous use by white-tailed deer and wild turkeys.

needles have fallen and accumulated over the years and where topsoil has been removed. Another limitation when planting woods roads is the amount of sunlight reaching the road. At least four hours of direct sunlight is desirable to maintain planted forages. Unless the adjacent forest stand has been thinned or regenerated recently, the road will need “daylighting” — that is, some trees will need to be killed and/or felled along at least one side of the road to allow sufficient sunlight to reach the road for desirable forage production. You do not have to remove all the trees. For example, you can leave residual trees with mast-bearing potential and remove the others.





Fig 87; Woods roads that do not receive much traffic can be planted. This road was initially planted to ladino white clover and oats. After three years, a solid stand of clover remains. Encroaching japangrass (*Microstegium vimineum*) has been sprayed along the sides. Can't you just see deer feeding or a gobbler strutting along this road?



Fig 88; High-quality forage can be limiting in winter for several wildlife species. This old skid trail was cleared and now serves as a linear wildlife opening and allows vehicular access into areas of the property previously not accessible. Photo by Jim Phillips.

Soil erosion and siltation often are associated with woods roads and logging decks after logging. In fact, research from the Coweeta Hydrologic Lab near Otto, North Carolina, reported more than 95 percent of the erosion and siltation into creeks following logging comes from improperly constructed and planted roads, not the logging itself. Because erosion and siltation is such an important factor, many land managers have been led to the false assumption that it is necessary to include perennial cool-season grasses, such as tall fescue or orchardgrass, in a mixture sown on woods roads. This assumption is not true and certainly counterproductive for wildlife! Remember, there is no planting that corrects poor road construction, especially on those roads that receive vehicle traffic. Excessive slope is corrected with a bulldozer and gravel, not seed.

Germination and growth of annual cool-season grasses (such as wheat) are considerably faster than perennial cool-season grasses, which is important to prevent erosion from winter rains. The preference for oats and wheat as forage over perennial cool-season grasses, was illustrated in the table on page 23. The value of wheat seed and the resulting cover for brooding wild turkeys and northern bobwhite also was covered previously. Planting awnless wheat also benefits ruffed grouse in the same manner when implemented on woods roads where grouse occur.

Logging roads usually are planted soon after the logging operation is finished. However, planting logging roads November through February or in July is a waste of time and money in most areas, during most years. Nothing is going to germinate and establish a root system anytime soon if planted in November through January. Frost-seeding clovers often is conducted in February/March, but most cool-season plantings should be conducted August through October, depending on your location. Warm-season plantings should be sown mid-April through June. If a road needs to be sown in late spring or early summer, a warm-season annual planting should be considered. If planting can wait until late summer, plant a cool-season forage.

## RUFFED GROUSE DON'T LIKE ORCHARDGRASS EITHER!

We collected 53 ruffed grouse during March 2000-2002 in western North Carolina to determine the physiological condition of grouse and see what grouse were eating during late winter. The effort was part of a regional project — the Appalachian Cooperative Grouse Research Project — that studied the ecology and management of ruffed grouse in the central and southern Appalachians. Crop contents from all birds killed were identified, weighed, and preserved. All of the grouse were killed from gated woods roads initially planted in an orchardgrass and white-dutch clover mixture. Leaves and flowers of herbaceous plants were found in 92 percent of the 53 crops examined and comprised 40 percent of the material in the crops over the three-year period. Other foods included evergreen and deciduous leaves, acorns, ferns, soft fruits, buds and twigs. Of the herbaceous material eaten, cinquefoil, clover and wild strawberry represented the vast majority, followed by avens and ragwort.

The interesting thing was that orchardgrass, which was the dominant cover on most of the roads, was not present in any of the grouse crops. In fact, the graduate student who sorted through crops of 326 grouse from North Carolina, Virginia, West Virginia, Kentucky, Maryland and Pennsylvania reported, “Grasses were not eaten much at all at any site in any year. I did get a few grasses in crops, but their quantities usually were not measurable and were classified as ‘trace’ (<0.1 gram dry mass). It seemed like grouse only ate grass incidentally while foraging on the forbs in between the grasses.” (Bob Long, 2007, MS Thesis, West Virginia University).

Figs 89a, b, c; This woods road was limed, fertilized and sown with a mixture of white-dutch clover and orchardgrass in the fall of 1993. By July 1995, the clover was out-competed and disappeared from the site, resulting in a road of orchardgrass, which offered poor structure for poults and fewer invertebrates. Nonnative perennial cool-season grasses should never be included in a planting mixture where wildlife is a consideration. Ruffed grouse (bottom). Photo by Appalachian Cooperative Grouse Research Project.



**Perennial woods road mixture (PLS/ac)**

6 pounds ladino and/or intermediate white clover  
40-50 pounds wheat

*Benefit and considerations:* Perennial white clovers grow well along woods roads, even where sunlight is somewhat limited, providing forage for lots of wildlife species. Wheat germinates and grows relatively quickly, helping prevent soil erosion while providing high-quality forage. The amount of wheat planted on a woods road might be increased a little over that for a food plot, especially on areas of the road where slope is a little steeper. Choose a variety of ladino and/or intermediate white clover that is adapted to your site. The clovers will be retained longer on sites that are not overly dry during summer. Chicory and red clover can be added if desired. If so, add 2 pounds chicory and 5 pounds red clover and reduce white clover to 4 pounds and wheat to 40 pounds.

*Management:* Pursuit and/or 2,4-DB can be sprayed postemergence to control various weeds after the wheat matures. Clethodim or Poast can be sprayed postemergence to control problem grasses, such as jangrass (*Microstegium vimineum*). Plateau (8-12 ounces per acre) also can be applied after the wheat dies to control jangrass and other undesirable plants along the road without harming perennial white clover. The road can be mowed after the clovers have produced seed (late summer) and as necessary to prevent weeds from flowering if the road is not managed with the appropriate herbicides. Or, desirable incoming forbs and grasses from the seedbank can be allowed to pioneer into the road and provide good brood-rearing cover for wild turkeys and ruffed grouse.

**Annual cool-season woods road mixture (PLS/ac)**

15 pounds crimson clover  
40-50 pounds wheat

*Benefit and considerations:* This annual mixture establishes quickly and provides lots of high-quality forage, especially during winter when green forage is limited.

*Management:* Spray incoming weeds in July with a glyphosate herbicide. Mow a couple weeks after weeds die. The crimson clover will reseed naturally and you can retain good clover cover on the road for many years. Another option is to allow the weeds to grow, especially if there are desirable forbs and grasses. Where jangrass (*Microstegium vimineum*) is problematic, the glyphosate application mentioned above will kill it, or you can use a grass-selective herbicide, or you can use 8-12 ounces per acre of Plateau.

**Annual cool-season woods road planting (PLS/ac)**

150 pounds wheat

*Benefit and considerations:* If all you need is temporary cover and you intend to allow the seedbank to establish cover along the road, just sowing wheat is an excellent strategy. Sowing a road to wheat protects it from erosion. In addition, forage and seed for wildlife are provided (be sure to plant an awnless variety of wheat). Unless excessive topsoil was removed, naturally occurring annual grasses and forbs in the seedbank will germinate and provide excellent cover for various wildlife species after the wheat matures and dies. Wild strawberry, annual panicgrasses, beggar's lice, cinquefoil, asters and blackberry provide forage, soft mast and seed for deer, turkey, grouse, black bear and songbirds, while the perfect structure for brood cover is created.

*Management:* Several forb-selective herbicides, such as Harmony Extra, 2,4-D and Clarity, can be used to control undesirable broadleaf weeds, such as chickweeds, henbit and purple deadnettle, in fall/winter while the wheat is establishing.

**Annual warm-season woods road mixture (PLS/ac)**

12 pounds browntop millet  
12 pounds foxtail millet  
20 pounds buckwheat

*Benefit and considerations:* If logging operations finish in spring or early summer, a warm-season planting mixture may be the best option. Planting a road with cool-season forages during that time of year usually is a waste of time and money,

especially south of Zone 5 (see Figure 5 on page 3). Buckwheat and millets germinate very quickly; stabilize the soil; grow through the summer; and provide forage and seed for deer, rabbits, black bear, wild turkey, ruffed grouse and a host of nongame birds. Unless the road was cut deep and the seedbank removed, expect grasses and forbs germinating from the seedbank to dominate the following year.

*Management:* Once the warm-season mixture produces seed, a cool-season mixture can be sown in late summer/early fall, especially if additional cool-season forage is needed or if possible erosion through fall or winter is a concern. The road can be disked lightly to prepare a seedbed and a cool-season mixture top-sown, then cultipacked, or the cool-season mixture can be drilled. Another option is no-till top-sowing white clover over the existing warm-season mixture after it has produced seed.

## FINAL THOUGHTS

---

Planting and managing food plots is an involved process, and it can be complex. However, if you take it step by step and follow the recommendations provided, you will be successful and should have fun doing it. Without question, planting and managing food plots can be very rewarding. To work with the land and watch wildlife respond and benefit from your efforts can be intoxicating. Working with the land instills a land ethic, which unfortunately is quickly disappearing in our society today.

As you consider what to plant in your food plots, be aware of marketing and advertisements. Many of the commercial blends available are sensible and will work well for a specific purpose. However, many do not represent the best planting for your objective. Don't be misled or fooled by advertisement claims that sound too good to be true, or by statements that suggest you cannot blend your own mixture that fits your objectives perfectly well. There is no trophy in the bag. High-quality food plots and healthy wildlife populations are the result of planning, persistence and hard work.

I hope you have learned from this publication that food plots are a relatively small component of habitat management, and that food plots are not a surrogate for or replace other practices, such as forest and old-field management. Hopefully, your interest in food plots will encourage you to do more with your property and begin to incorporate more holistic habitat management. If you haven't already, I highly recommend you spend some time with a Certified Wildlife Biologist® and a Registered Forester and develop a comprehensive management plan for your property.

## ACKNOWLEDGEMENTS

---

Much of the information provided in this publication is available because of the work of several of my graduate students who worked with food plots as part of their graduate project or a side project: Ryan Basinger (2001-03), John Gruchy (2003-07), Chris Shaw (2004-07), Marcus Lashley (2007-10), Michael McCord (2006-11), Jessie Birkhead (2009-12), Seth Basinger (2010-2013), Ashley Unger (2010-14), Wade GeFellers (2016-19), and Katie Harris (2016-19). They spent countless hours helping with soil testing; burning; plowing; disking; rotovating; liming; fertilizing; planting; spraying; collecting coverage, biomass and nutritional data; grinding samples; and running nutritional assays. They have become outstanding wildlife biologists and managers. I greatly appreciate their efforts, and I am very proud of them.

## APPENDIX 1

### Planting information for various crops.

<i>Crop species</i> <sup>1</sup>	<i>Seeding rate</i> <sup>2</sup> (lbs/ac)	<i>lbs/</i> <i>bushel</i>	<i>Approximate</i> <i>days to dry seed</i>	<i>Planting date</i> <sup>3</sup>	<i>Planting</i> <i>depth</i> (inches)	<i>Optimum</i> <i>pH</i>	<i>USDA Plant</i> <i>Hardiness</i> <i>Zone</i>	<i>Preferred soil type</i>
<b>COOL-SEASON LEGUMES<sup>4</sup></b>								
Alsike clover (perennial)	10	60		Aug 15-Oct 15; Feb 15-May 1	1/4	5.8-6.5	3-8	Adapted to cool climate; tolerates wet bottomland soils
Arrowleaf clover (annual)	10	60		Aug 15-Oct 15	1/4	6.0-6.5	6-10	Fertile, well-drained sandy loams and light clay; good re-seeder
Balansa clover (annual)	8	60		Aug 15-Oct 15	1/4	5.8-7.5	5-9	Grows on wide range of soils, including wet bottoms
Ball clover (annual)	6	60		Aug 15-Oct 15	1/4	5.8-7.0	7-10	Sandy loams and clay loams; tolerates poor drainage and relatively low fertility; good re-seeder
Berseem clover (annual)	20	60		Aug 15-Oct 15	1/4	5.8-7.5	5-9	Tolerates poor drainage; high fertility requirements; not cold tolerant, but winter hardy variety available; poor re-seeder; not shade tolerant
Crimson clover (annual)	20	60		Aug 15-Oct 15	1/4	5.8-7.0	5-10	Well-drained sandy loams to heavy clays; moderately shade tolerant, but winter hardy variety available; good re-seeder
Red clover (biennial)	12	60		Aug 15-Oct 15; Feb 15-May 1	1/4	6.0-7.0	4-9	Sandy loam to clay; wide range of moisture regimes; fairly drought tolerant
Rose clover (annual)	20	60		Aug 15-Oct 15	1/4	6.0-7.0	7-10	Well drained sandy loam to clay; tolerant to low soil fertility and drought; good re-seeder
Subterranean clover (annual)	25	60		Aug 15-Oct 15	1/4	5.5-7.0	7-10	Sandy loam to clay; moderately shade tolerant; tolerates both dry and moist sites as well as low fertility; fair re-seeder
White (including ladino and intermediate) clover (perennial)	6	60		Aug 15-Oct 15; Feb 15-May 1	1/4	6.0-6.5	3-10	Sandy loam to clay; moderate fertility requirements; mildly shade tolerant; tolerant to poor drainage
Alfalfa (perennial)	15	60		Aug 15-Oct 15; Feb 15-May 1	1/4	6.5-7.5	3-9	Well-drained loams; high P,K,S,B requirements; moderately drought tolerant
Austrian winter pea (annual)	50	55		Aug 15-Oct 15	1-2	6.0-7.0	3-8	Loam to heavy clay; moderate fertility requirements
Birdsfoot trefoil (perennial)	10	60		Aug 15-Oct 15; Feb 15-May 1	1/4	5.8-7.0	3-9	Widely adapted; moderately tolerant to drought and poor soil drainage

<i>Crop species<sup>1</sup></i>	<i>Seeding rate<sup>2</sup> (lbs/ac)</i>	<i>lbs/ bushel</i>	<i>Approximate days to dry seed</i>	<i>Planting date<sup>3</sup></i>	<i>Planting depth (inches)</i>	<i>Optimum pH</i>	<i>USDA Plant Hardiness Zone</i>	<i>Preferred soil type</i>
<b>COOL-SEASON GRASSES</b>								
Oats (annual)	100-150	32	170	Aug 15-Oct 15; Feb 15-Mar 15	1-2	6.0-6.5	5-10	Sandy loam to clay; well-drained
Rye (annual)	100-150	56	180	Aug 15-Oct 15	1-2	5.8-6.5	3-10	Sandy loam to clay; well-drained
Triticale (annual)	100-150	48	180	Aug 15-Oct 15	1-2	5.8-6.5	3-10	Sandy loam to clay; well-drained
Wheat (annual)	100-150	60	180	Aug 15-Oct 15	1-2	6.0-7.0	3-10	Light-textured soils; not in poorly drained or heavy clay
<b>WARM-SEASON LEGUMES<sup>4</sup></b>								
Alyceclover (annual)	20	60		Apr 1-June 15	1/4	6.5-7.0	4-10	Sandy loam to clay
American jointvetch (annual)	20	60		Apr 1-June 15	1/4-1	5.8-6.5	4-10	Sandy loam to clay
Catjang cowpeas (annual)	30			Apr 1-June 15	1/2-1	5.8-7.5	4-10	Widely adapted; well-drained soils
Iron-clay cowpeas (annual)	75-100	60	110	Apr 1-June 15	1/2-1	5.8-7.5	4-10	Well-drained soils; drought tolerant; tolerates relatively low fertility
Lablab (annual)	25-40			Apr 1-June 15	1	5.8-7.5	5-12	Well-drained soils; drought tolerant; tolerates relatively low fertility
Soybeans (annual)	130,000-200,000 seeds per acre or 75-150 pounds	60	125	Apr 1-June 15	1-2	5.8-6.5	4-10	Widely adapted; well-drained soils
Re-seeding soybeans (annual)	40			Apr 1-June 15	1/2-1	5.8-6.5	4-10	Well-drained soils
Perennial peanut	50-100 bushels of sprigs per acre			Jan-Mar	1 1/2-2	5.5-6.0	lower 8-10	Sandy and sandy loam soils
Florida beggarweed (annual)	10			Apr 1-June 15	1/4	5.8-6.5	8-10	Sandy loam to clay
Korean lespedeza (annual)	15	45		Feb 15-June 15	1/2-1	5.8-6.5	7-10	Widely adapted; tolerates relatively low fertility; not wet soils
Partridge pea (annual)	1-4		110	Feb 15-Jun 15	1/2-1	6.0-6.5	3-9	Sandy loam to clay

<i>Crop species</i> <sup>1</sup>	<i>Seeding rate</i> <sup>2</sup> (lbs/ac)	<i>lbs/ bushel</i>	<i>Approximate days to dry seed</i>	<i>Planting date</i> <sup>3</sup>	<i>Planting depth (inches)</i>	<i>Optimum pH</i>	<i>USDA Plant Hardiness Zone</i>	<i>Preferred soil type</i>
<b>WARM-SEASON GRASSES</b>								
Corn (annual)	16,000-30,000 seeds or 10-15 pounds	56	145	Apr 1-May 15	1-2	5.8-7.0	3-10	Widely adapted, well-drained soils; high fertility requirements
Grain sorghum (annual)	8	50	120	Apr 15-June 15	1	5.8-7.0	3-10	Widely adapted, well-drained soils; moderate fertility requirements
Egyptian wheat (annual)	15		110	Apr 15-June 15	1/2	6.0-7.0	3-10	Widely adapted, well-drained soils; moderate fertility requirements
Browntop millet (annual)	25	50	65	Apr 15-July 15	1/4-1/2	5.8-7.0	3-10	Well-drained soils; moderate fertility requirements
Foxtail millet (annual)	25	40	80	Apr 15-June 15	1/4-1/2	5.8-7.0	3-10	Well-drained soils; moderate fertility requirements
Wild millet (annual)	25	35	55	May 1-Aug 15	1/4-1/2	5.8-7.5	3-10	Loams and clays; tolerates shallow flooding after establishment; moderate fertility requirements
Pearl millet (annual)	25	48	100	Apr 15-June 15	1/4-1/2	5.8-7.0	3-10	Well-drained soils; moderate fertility requirements
Dove proso millet (annual)	30	50	80	Apr 15-June 15	1/4-1/2	5.8-7.0	3-10	Well-drained soils; moderate fertility requirements
White proso millet (annual)	30	50	80	Apr 15-June 15	1/4-1/2	6.0-7.0	3-10	Well-drained soils; tolerates dry sites; moderate fertility requirements
Rice (annual)	100	45	150	Apr 15-June 1	1	6.0-7.0	3-10	Poorly drained soils; not on sandy soils; prefers shallow inundation

<i>Crop species</i> <sup>1</sup>	<i>Seeding rate</i> <sup>2</sup> (lbs/ac)	<i>lbs/ bushel</i>	<i>Approximate days to dry seed</i>	<i>Planting date</i> <sup>3</sup>	<i>Planting depth (inches)</i>	<i>Optimum pH</i>	<i>USDA Plant Hardiness Zone</i>	<i>Preferred soil type</i>
<b>OTHER PLANTINGS</b>								
Buckwheat (warm-season annual)	40	40	60	Apr 15-Aug 15	1/2-1	5.8-7.0	3-10	Widely adapted; tolerates relatively low fertility
Burnet, small (cool-season perennial)	20			Aug 15-Oct 15; Mar 1-May 1	1/4	5.8-7.0	3-10	Widely adapted; moderate fertility requirements; drought tolerant; does not tolerate poor drainage
Chicory (cool-season perennial)	10			Aug 15-Oct 15; Mar 1-May 1	1/4	5.8-7.0	3-10	Widely adapted; drought tolerant
Chufa (warm-season perennial)	50		110	Apr 15-June 1	1-2	5.8-7.0	3-10	Sandy or loam soils; avoid clay soils; moderate fertility requirements
Radish (cool-season biennial)	10-12			Aug 1-Oct 15	1/2-1	6.5-7.0	3-10	Widely adapted; does not tolerate wet soils
Rape and kale (cool-season annual)	6-8	50		Aug 1-Oct 15	1/2-1	5.8-7.0	3-10	Widely adapted; high fertility requirements
Sesame (warm-season annual)	12	46	100	Apr 15-June 1	1/2	6.0-7.0	3-10	Well-drained loams and clay; medium P and K
Sugarbeet (cool-season biennial)	8	23		Apr 1-May 31; Aug 1-Sept 15	1/4-1/2	6.5-7.5	4-6	Well-drained loams (avoid heavy clay or sand); high fertility requirements
Sunflower (warm-season annual)	25	32	110	Apr 15-May 15	1-2	5.8-7.0	3-10	Well-drained soils; high P and K requirements
Turnip (cool-season biennial)	4-5	55		Aug 1-Oct 15	1/4	5.8-7.0	3-10	Widely adapted; high fertility requirements

<sup>1</sup>Annual plantings complete their life cycle in one growing season, and depending on the plant, variety, and management strategy, may or may not reseed. Biennials normally require two growing seasons to complete their life cycle. Perennials continue living after flowering and producing seed and, depending on management, may be present for many years.

<sup>2</sup>All seeding rates in this chart are for a single-species broadcast planting. When planting mixtures, the seeding rate for each species included should be reduced according to the number of species in the mixture, the composition preferred, and the growth form and desired structure of the resulting stand. Drilled plantings typically require approximately 25 percent less seed, depending on plant species. All seeding rates are based on Pure Live Seed (see pages 9–10).

<sup>3</sup>Appropriate planting dates vary with location. The approximate dates shown in this chart are for USDA Plant Hardiness Zones 5–9 (see Fig 5 on page 3). For Zones 3 and 4, many cool-season species are best planted in the spring, as opposed to the fall. There are even specific varieties of some species, such as spring wheat and spring oats, for these regions.

<sup>4</sup>All legume seed should be inoculated with species-specific inoculant prior to planting unless the seed was purchased preinoculated.



## NOTES

---



AG.TENNESSEE.EDU

Real. Life. Solutions.™

PB 1874 (08/19) Programs in agriculture and natural resources, 4-H youth development, family and consumer sciences, and resource development. University of Tennessee Institute of Agriculture, US Department of Agriculture, and county governments cooperating. UT Extension provides equal opportunities in programs and employment.

Disclaimer: This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication.

Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others that may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product. The author, the University of Tennessee Institute of Agriculture, and University of Tennessee Extension assume no liability resulting from the use of these recommendations.