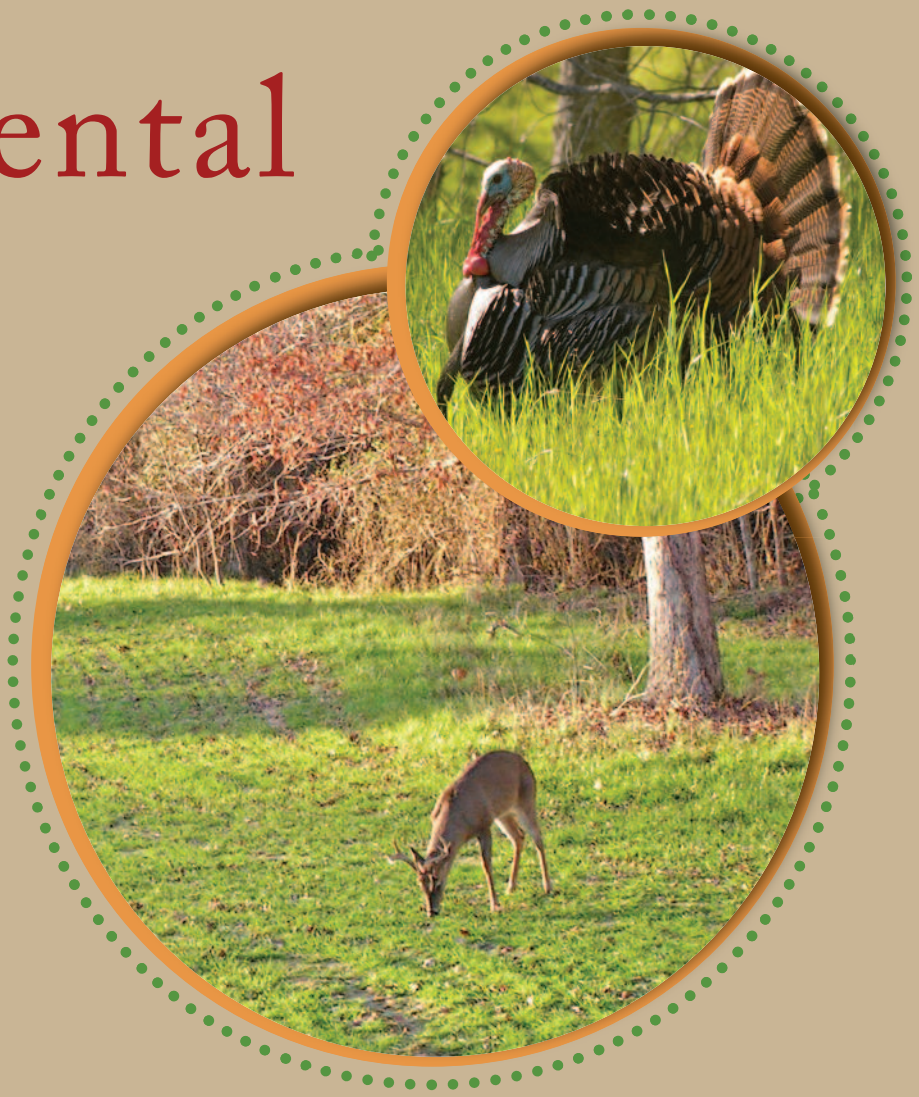
Supplemental Wildlife Food Planting Manual *for* the Southeast



MISSISSIPPI STATE UNIVERSITY™

EXTENSION SERVICE

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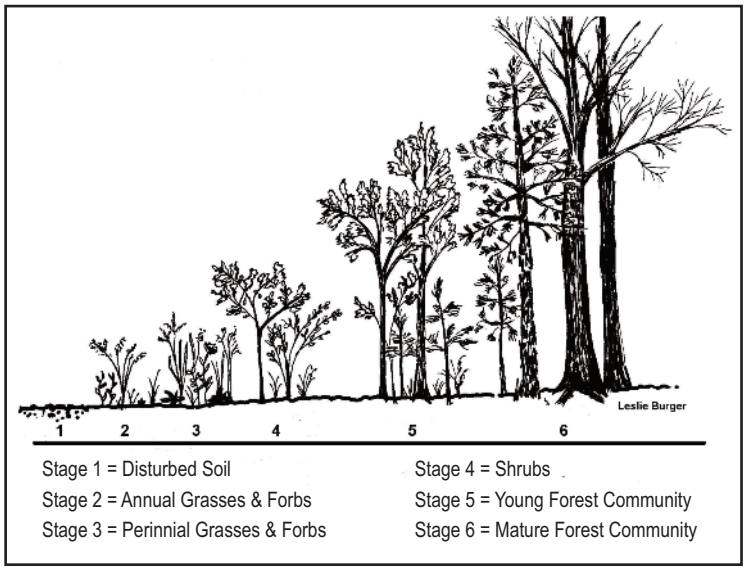
Wildlife species require suitable areas to survive and increase population numbers. These areas must provide the food, cover, and water needs of different animal species. Together, these components create an animal's habitat. This publication provides information about wildlife habitat management techniques and food plantings that will increase natural food production and supplement the diets of game species. Supplemental food plantings are not to be considered an alternative to sound habitat management practices. Management of native vegetation, from forbs (broadleaf weeds) and grasses to mature trees, impacts habitat quality much more than any food planting or supplemental efforts. This publication is written to help landowners, recreation clubs, and hunters in the southeastern United States better manage habitats for white-tailed deer, eastern wild turkey, bobwhite quail, mourning dove, rabbits, and various waterfowl species. It briefly reviews wildlife habitat and food planting management techniques to increase natural food production and supplement the diets of game species. Also, these same techniques benefit many nongame wildlife species. Information in this guide is based on proven wildlife management techniques, experience of wildlife managers, and ongoing wildlife research.

Managing Plant Succession

Plant succession is the process where one plant community gradually replaces another and eventually results in a community of little change, or a climax community. Wildlife managers often "set back" succession to create more diverse, early successional habitats. Good wildlife habitat management requires some knowledge of this process and its benefits to various wildlife species.

Early successional habitats provide cover and nutrient-rich forages for many wildlife species. Soil and vegetation disturbances, if done correctly, can greatly improve wildlife habitat and reduce the need for food plantings. Disking, burning, and mowing are some common types of soil and vegetation disturbances that set back succession and stimulate new plant growth.

Areas where these practices have been implemented are excellent for providing nesting and brood rearing habitat for bobwhite quail, turkeys, and songbirds. These disturbed areas also provide cover and forage for deer and rabbits. In addition, early successional wetland areas often provide waterfowl with more seed and invertebrate foods.



The stages of secondary succession.

Soil Disturbances

Soil disturbances, such as disking, can prepare seedbeds for planting and change the natural composition of plants by removing thicker, undesirable grasses and creating space for more desirable legumes and seed producers. Such soil disturbances change perennial plant communities back to seed-producing annuals. You can encourage native legumes (partridge pea, beggar weed, vetches), other broadleaf annuals (croton, ragweed), and large-seeded grasses by winter-to-spring disking of fields and other openings.

The best method of disking is strip disking and/or alternate patch disking. Strip disking works best with old fields and pastures and stands of open timber. Strip disking is done by disking strips 30 to 50 feet wide and leaving alternating, undisturbed strips about as wide between them. Alternate patch disking is generally more suitable for narrow openings, such as road and utility rights-of-way. For more information on strip disking, refer to MSU Extension Publication 2032, *Strip Disking and Other Valuable Bobwhite Quail Management Techniques*.

Both Johnsongrass and cogongrass propagate from rhizomes. Disking these species increases stem densities and encourages growth. ***Remember to consider the "lay of the land" when disking areas with slope, and always disk on the contour to prevent or minimize erosion.***

Vegetation Disturbances

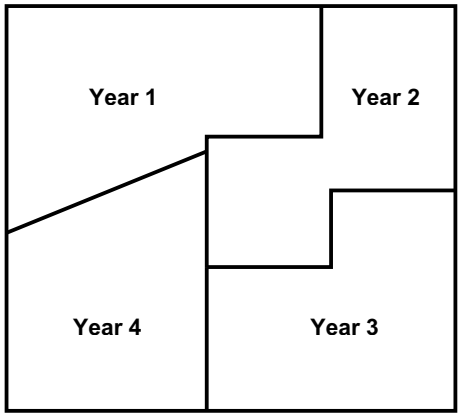
Mowing or bush hogging often is useful in preparing sites for herbicide spraying, disking, and road maintenance. Also, mowing food plots of clover helps reseed stands and stimulates new plant growth that provides more nutritious deer and rabbit forages. However, mowing entire fields is ***not*** recommended as a good wildlife management practice. Mowing lays down upright vegetation, eliminating nesting and fawning cover. Furthermore, mowing promotes perennial vegetation and reduces habitat diversity (a mixture of many species of perennial and annual plants).

Mowing to manage wildlife should be done on a very limited basis. Because of potential negative impacts on ground-nesting wildlife, do not mow openings and rights-of-way from mid March to mid September.

Prescribed Burning

Prescribed burning often is the most economical and beneficial tool in wildlife management. It is also controversial because of possible landowner liability and health concerns resulting from poor smoke management. Many native plant species that are beneficial to wildlife depend on fire for seed production, increased stand diversity, and nutrient cycling. Prescribed burning often is used in pine or upland mixed pine hardwood stands to reduce dry fuel hazards, control undesirable hardwood competition, and prepare sites for replanting trees or agricultural crops. Besides timber management benefits, wildlife benefits include ground exposure, increased seed production and dispersal, and increased nutrient-rich forage and browse production. Although a 2- to 3-year burning cycle is ideal for bobwhite quail, an average 3- to 5-year burning cycle is best for maintaining habitat diversity for many other game species. The best wildlife burn is a patchy or incomplete burn, which will increase habitat diversity each year. In doing so, you maintain different plant stages, ensuring enough food production and good reproductive, escape, and resting cover. A prescribed burning rotation should consist of burning one-third to one-fifth of the habitat.

Historically, upland communities throughout the landscape of the southeastern United States burned on an average of 1 to 5 years. Prescribed fire on a 3 to 5 year burning cycle is an economical way to increase and maintain habitat diversity.



Example of a tract of land on a 4-year burn rotation.

In general, prescribed burning is not recommended during the nesting periods (mid March to mid September) for bobwhite quail, wild turkey, rabbits, and other ground-nesting species of interest. However, summer fire periodically can be useful for controlling hardwood brush in uplands. Professional help is available from state or federal agency wildlife biologists, forestry specialists, and private consultants. Also, be sure to ask about cost sharing benefits for prescribed burning on your property.

The following are some safe burning conditions that benefit wildlife:

- ✓ Burning in January and February, when temperatures are lower than 40 °F.
- ✓ Burning with wind speeds of 3 to 10 mph.
- ✓ Burning with a relative humidity of 50 to 70 percent.
- ✓ Burning at night when the humidity is higher, for safety reasons. **NOTE:** ***Smoke is harder to manage at night.***
- ✓ Burning with a backfire where possible.

The goal is to keep fire between ground level and 18 inches high. Be careful when burning in merchantable timber stands that you do not damage or reduce timber value. Although the cambium layer of most hardwood species can stand only 120 °F of heat, some upland hardwood species, such as post oak and blackjack oak, are relatively fire tolerant. For additional details regarding use of prescribed fire, see MSU Extension Publication 2283, *Prescribed Burning in Southern Pine Forests: Fire Ecology, Techniques, and Uses for Wildlife Management.*

Always consult a natural resources management professional experienced in the legal and proper use of prescribed fire before burning. Many states, including Mississippi, have prescribed

burn laws that may require permits, training, certification as a burn applicator, and written plans to be afforded some level of liability protection. For additional details regarding legalities of prescribed fire, see MSU Forest and Wildlife Research Center Bulletin FO351, *Legal environment for forestry prescribed burning in Mississippi*.

Openings

Openings are various-sized areas in the landscape where sunlight reaches the ground and may be food plots, old fields, pastures, or natural openings of native grasses and forbs. These are important landscape features because they increase habitat diversity, providing food and cover for many species of wildlife. Areas established in natural openings are best maintained through prescribed burning and/or strip disking.

In addition to agricultural lands, some examples of openings that benefit wildlife are power line, gas line, road rights-of-way, fire lanes, "day lighted" roads, and timber harvest areas. In long, narrow openings such as rights-of-way, do not plant the entire area in food plantings. Alternate patches of plantings and disked areas are more wildlife friendly. A combination of food plantings and natural openings often is the best approach for managing a property.

Timber harvest practices, such as clearcuts, can create openings and increase habitat diversity. Small, irregularly-shaped clearcuts within larger tracts of timber provide diverse habitat edges, excellent nesting, brood-rearing and escape cover, and large amounts of nutrient-rich forage/foods. Depending on initial tree spacing and site quality, a clearcut may provide good quail and rabbit habitat for up to 3 to 4 years after replanting. Also, best deer browse occurs 2 to 4 years following a complete timber harvest. With proper thinning and burning, these areas can provide excellent wildlife habitat throughout the life of the timber stand.

Food Plot Size and Placement

Food plot size may vary from several acres to much smaller. When establishing food plots, scale them to the animal species you are interested in managing. For example, if managing for deer, establish a 1- to 3-acre plot per 100 acres. If you want to manage for smaller species, such as quail or rabbits, it is best to establish ¼- to ½-acre plots every 15 to 20 acres. Dove fields should be large enough to safely accommodate the potential number of hunters. Generally, habitat management plans should address a small percentage of the total managed land to be planted in food plots.

Food plot locations that might not impact timber production very much include wide fire lanes, power line rights-of-way, logging roads, old log-loading decks, and small, salvaged spots of timber. Another option is to "daylight" and overseed ***private*** roadsides. ***Establishing and planting food plots close to public roads is not recommended***. It encourages poaching and presents a hazard to motorists (deer/car collisions).

As a general rule, establish food plots at least 100 yards inside property boundaries. Also, if you plan to hunt over a food plot, check your state game laws and make sure the plot is the required distance from a public road. ***Never place your hunting stand where you will be shooting in the direction of a public road or residential area.***

Some other factors to consider when establishing food plots:

- ✓ Use soil maps to help choose food plot locations; avoid dry ridges, deep sands, and heavy clays. Unless waterfowl is the target species, do not plant areas that routinely flood.
- ✓ Locate near cover and/or water.
- ✓ Consider the "lay of the land," and do not locate food plots on sites that might erode.
- ✓ Available sunlight is a major consideration in food plot placement. While some plants and shrubs tolerate shade, most do not.
- ✓ Plant perennials on sites with the best soils and annuals on sites with lower quality soils.

Soil Quality and Fertilization

It is important to provide high quality palatable foods for a variety of wildlife throughout the year. In doing so, you can offset times when native food sources are scarce or animal needs are high. Therefore, determining soil quality and correcting problems in pH and fertility are the first steps in food-plot preparation.

We strongly recommend that you soil test.

Soil test results provide different nitrogen (N), phosphorous (P), potassium (K), and lime (pH) recommendations for particular plant varieties. You should soil test yearly on food plots of annual plantings and every other year on food plots of perennial plantings. The recommended method of soil sampling is to collect a handful of topsoil (dig or probe down 4 to 6 inches) from 10 to 20 locations throughout the plot. Mix the soil samples well in a container, and remove a small sample (1 cup) to be tested. Label the bag or container of soil with your name, address, and crop(s) to be planted in the plot(s). If sampling soils in more than one food plot, be sure to label each soil sample accordingly. When testing soil quality, collect and submit soil samples at least 3 months before planting to allow time for processing. You can obtain soil testing kits and information on analysis of soil samples from the Extension Service or Natural Resource Conservation Service (NRCS).

Planting food plots without proper liming and fertilization wastes time and money, and in most cases, does not help wildlife. Not only are plantings unable to reach their potential in growth and forage production, but in most cases they do not meet the nutritional needs of wildlife. If you do not have the time or money for soil testing, most cereal grains use a complete fertilizer with equal amounts of nitrogen (N), phosphorous (P), and potassium (K) applied at the rate of 200 to 400 pounds per acre. NPK is expressed as a number on the fertilizer sack, such as 13-13-13. Most legumes, though, require a fertilizer with very little or no nitrogen, such as 0-20-20.

Fertilizer is sold in formulations expressed as ratios. These ratios are the percentage of N, P, and K in each bag of fertilizer. For example, 100 lbs of 34-0-0 contains 34 lbs N, 0 lbs P, and 0 lbs K. So, a soil test requiring 300 lbs/acre of nitrogen for a 2 acre food plot needs 1,764 lbs/acre or 36, 50-lb bags/acre of 34-0-0. Fertilizer formulations or multiple fertilizers should be matched to the required nutrients.

(300 lbs of N per acre)/(.34) = 882 x 2 acres = 1764 lbs of N

Using untreated animal manures as fertilizer poses a disease risk to wildlife. Poultry litter can expose turkey and bobwhite quail to blackhead disease and avian pox.

Most soils in the southeastern United States tend to be acidic and require some agricultural lime to adjust soil pH levels within a desirable range. Most forage crops do best at pH values between 5.8 and 6.5. Adjusting soil pH within optimal range of forage crops maximizes growth and increases yield, fertilizer efficiency, palatability of forages, and even herbicide effectiveness. ***Also, it saves money, especially since plants often do not use fertilizer when it is applied to soils with improper pH.***

A drop spreader or lime buggy is best for even applications of agricultural lime. A cyclone spreader also may be used, but works best when applying pelletized agricultural lime.

Lime moves and reacts slowly and should be applied 3 to 6 months before planting. Lime is not water soluble and should be incorporated into the soil whenever possible. Apply lime according to soil test results. For details regarding soil quality and fertilizer, see MSU Extension Publication 2363, *Soil Tests for Wildlife Food Plots*.

Preparing Food Plots

Some farm equipment is needed to plant and maintain wildlife food plots. A tractor large enough to pull 5-foot implements is sufficient in most cases. Also, ATVs and equipment specifically designed for use with ATVs have become popular in recent years. Useful implements include a heavy-duty mower (bush-hog), disk, broadcast spreader/seeder (cyclone spreader or drop spreader), and/or a small grain drill or row planter that will accommodate at least two rows. Although a grain drill or row planter is not essential for most plantings, it can be useful in making productive grain plots, and you can use it to plant more level areas with little or no soil preparation (no-till). A hand-seeder is often useful for planting small-seeded crops, such as clovers and cool-season annual grasses. It is also useful for seeding places too dangerous, too small, or too wet to safely and efficiently operate machinery.

Some preparation before planting often is required for wildlife food plots. If perennial weeds (such as bermudagrass or morning glory) dominate a plot, a ***postemergence,*** broad-spectrum herbicide application followed by mowing and/or burning may be necessary before the first tilling. This is almost always necessary when practicing no-till planting.

Depending on the degree of the weed problem and species being planted, a ***preemergence*** herbicide application may also be necessary at planting time. If using a preemergence herbicide, make sure it is appropriate to use with the chosen forage crop(s). For more information regarding herbicide use, consult the label and/or a certified herbicide applicator. ***Always read each label carefully, and follow instructions explicitly.***

Till methods (disking or plowing) are the most commonly used means for preparing and planting wildlife food plots. Some pre-planting preparations to consider with till methods are early tillage and establishing a good seedbed. Tilling the soil a few weeks to several months before planting allows ample time for turned-under vegetation decompose, and builds soil nutrients and helps control weeds.

hand seeder

sprayer

disk

cultipacker

Establishing a firm seedbed produces the best results for most forage crops, especially small-seeded crops that require shallow planting. After tilling the soil at planting time, prepare a firm seedbed by rolling the plot with a cultipacker. If you cannot get a cultipacker, you can usually establish a firm seedbed with one good rain followed by several days of sunshine. If you seed the plot with a broadcast seeder, distribute the seed and then roll the plot a second time with the cultipacker to press the seeds into the soil. If you plant with a row planter or drill, prepare a smooth, firm seedbed by rolling the plot with a cultipacker once before planting.

No-till planting methods include using a no-till drill or overseeding using a hand seeder or cyclone seeder/spreader to broadcast seed directly on top of exposed soil or already present vegetation. No-till is most practical for places where soil tends to erode, newly established roads or fire lanes, or steep terrain.

When overseeding exposed soil areas susceptible to severe erosion, cover the areas with a wheat straw or pine straw mulch to help prevent soil erosion and hold seeds in place. Be aware that using material such as bahiagrass or bermudagrass hay as mulch may lead to these grasses becoming established. Also, make sure straw mulch is from a reputable source and free of cogongrass and johnsongrass.

Supplemental Forages

Research indicates that no one particular supplemental forage variety can meet all the needs of one wildlife species year-round. Nutritional studies of white-tailed deer have shown that when range conditions are excellent, deer with unlimited access to supplemental feed pellets continue to prefer native plant forages. Therefore, best management practices would dictate that a combination of sound habitat management and a good food plot program including warm- and cool-season forages bring the best results. Select adapted varieties based on soil and site characteristics, nutritional value, cost, and the wildlife species managed. When experimenting with different varieties and planting combinations, plant small areas as test plots before establishing larger plots.

Why Use Exclusion Cages?

Exclusion cages are an excellent way to monitor wildlife use of food plots. The cages allow you to compare forage growth inside the cages with forage eaten outside the cages.

Exclusion cages were used to monitor wildlife use of this alfalfa food plot.

strawberry bush

greenbriar

partridge pea

When managing for wildlife, highest priority should be given to increasing native plant species that provide cover and have greater nutritional benefits than supplemental wildlife plantings.

Planting Mixtures/Strip Plantings

Regardless of season, food plots planted with seed mixtures of two or more forage crops are an excellent way to maximize benefits of wildlife food plantings. Mixed-forage plots provide wildlife with more diverse forages and cover and often are used by more wildlife species than a single-crop plot. Furthermore, mixed-forage plots can provide year-round use on smaller acreage and if one crop does not make, a second or third crop probably will produce.

Mixed-forage plots may be planted using either a broadcast seeder or grain drill. Small-seeded mixtures, such as those containing a combination of cool-season annual grasses, clovers, and chicory are commonly broadcast, while large-seeded mixtures, such as those containing combinations of corn and soybeans, are best drilled in rows. Drilling large-seeded mixtures in rows improves forage and seed production. A popular method of diversifying mixed-forage plots that need to be drilled is to plant several long, alternating strips (20- to 40-ft wide) of varying seed mixtures.

Cool-season mixed clover plot – early May

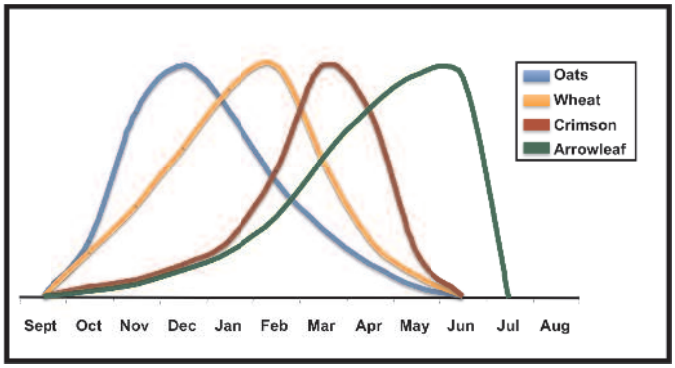
The same plot, post-mow, in early October

When making a customized seed mixture of two or more forage crops, reduce planting rates for each species to the percentages you want. For example, in a mix of wheat and ladino and red clovers made up of 40 percent wheat and 30 percent of each clover, do not use full planting rates of each. Instead, multiply full rates of each by the desired percentage (120 lbs/acre wheat x 0.4; 12 lbs/acre red clover x 0.3; 5 lbs/acre white clover x 0.3). This gives you a customized seed mix of 48 pounds wheat, 3.6 pounds red clover, and 1.5 pounds ladino clover per acre. Overplanting within mixtures wastes money and reduces forage because of plant competition and overcrowding.

Some examples of mixtures that work well in a single plot[a].

Mixes	Planting Dates
Deer & Turkey	
Corn & Iron-Clay Cowpeas or Wildlife Soybeans	May 1 – June 1
Alyceclover & Deer Jointvetch	May 1 – June 15
Arrowleaf [b] & Crimson Clovers, Oats, Wheat, Austrian Winter Peas, Brassicas	Sept. 1 – Nov. 1
Ladino White Clover, Oats, Wheat, Chicory	Sept. 1 – Nov. 1
Bobwhite Quail	
Kobe Lespedeza & Partridge Pea	March 1 – April 1
Mix of Corn or Egyptian Wheat & Quail Haven Soybeans	April 1 – June 1
Wheat & Birdsfoot Trefoil	Sept. 1 – Oct. 15

[a] Often a seed dealer can customize seed mixtures at a much lower price, while maintaining the same or similar contents as prepackaged mixes. If buying a prepackaged seed mixture, check bag contents and prices with several vendors.
[b] You may substitute red clover for arrowleaf clover.



Peak production times and life of a forage mix containing four different cool-season annuals.

A cool-season mixed plot of oats, wheat, crimson, and arrowleaf clovers at about ten days post-planting. Notice the differences in growth between the grasses and clovers.

Legume Seed Inoculation

Before planting ***legumes***, inoculate the seeds with a ***plant-specific*** packet of inoculum-containing bacteria (rhizobium) that fix nitrogen to the nodules of legume roots and enhance nitrogen production and intake by plants. Inoculants are especially helpful

when you are planting legumes in newly established food plots that may have low soil nitrogen levels. Inoculating legume seeds increases foliage and seed production of legumes, decreases fertilizer cost, and builds soil quality. Inoculant is not expensive and can be the difference between a legume planting success and failure. Follow inoculant package instructions for amount of seed treated and inoculant mixing instructions. Many legume seeds are now available pre-inoculated. ***Do not allow fertilizer to touch inoculated seed; the salts in fertilizer may kill the bacteria.***

White-Tailed Deer

Photo by Tes Randle Jolly

Habitat and Food Requirements

Home range size of white-tailed deer varies based on habitat quality. Under relatively good habitat conditions, bucks have an average home range of about 640 acres (1 square mile). Does usually have a much smaller average home range of about 300 acres.

The three basic habitat requirements for white-tailed deer are food, water, and cover. Except during years of severe drought, availability of water is seldom a concern in the southeastern United States. So, food and cover often are the focus in white-tailed deer habitat management. White-tailed deer are flexible in their habitat requirements and can live within a wide range of habitat types. A landscape of early successional habitats (minimal timber canopy), mature hardwood forests, managed pine forests, and various types of openings meet most habitat requirements of white-tailed deer.

White-tailed deer are ruminants (four-compartment stomach). They eat a variety of leaves and buds of shrubs and trees, lichens, mushrooms, vines, hard (acorns) and soft (fruits) mast, forbs (broadleaf weeds), cultivated crops, and some grasses during winter. Although they eat a variety of foods, they are concentrate selectors and selectively forage for high-quality, palatable, and easily digestible plant parts.

During spring and early summer, naturally occurring deer browse is high in protein and complex carbohydrates. Body fat stores are increased during the fall and early winter months with a variety of mast crops, such as persimmons and acorns, which are good sources of carbohydrates. The two most critical seasonal periods for white-tailed deer are (1) summer, when adult females are lactating and bucks are growing antlers and food quality is lower, and (2) late winter, when food quality and quantity are low, and mast from oaks and other trees is scarce. It is during these time periods that food plots are most beneficial to deer.

The ***minimal*** protein levels in forage required for antler development vary with age, but 16 to 18 percent is likely needed to maximize antler size. Younger animals that are actively growing require much higher levels of protein than adult animals. Weaned fawns require up to 20 percent protein for optimum growth. Active management of native vegetation and an effective food plot program (cool- and warm-season annuals and perennials) can ensure the availability of forages with more than 16 percent protein.

Herd Management

Deer numbers should be kept within carrying capacity of the land so adequate nutrition is available. Herd management should focus on letting bucks grow older and reach their genetic potential for body and antler size, while harvesting adequate numbers of antlerless deer. On areas that have too many deer, over-browsing of native deer foods reduces the availability of nutrients, thus hurting the quality of deer. Harvest strategies should focus on maintaining deer populations at levels the habitat can support.

- ✓ **Concentrate selector:** Animals that selectively forage for palatable and easily-digested plant parts.
- ✓ **Palatability:** The acceptability of feed as influenced by taste, smell, structure, or other plant characteristics such as toxic properties, thorns, and fiber content.
- ✓ **Digestibility:** The ability of forages to be transformed into basic nutrients the digestive system can absorb and use as nourishment (generally viewed as feed consumed minus undigested materials in the feces).

Habitat Management

Forests and old fields are the most common habitat types that can be significantly improved through proper habitat management. Closed-canopy forests offer little forage for deer other than acorns and soft mast. Reducing tree canopy cover by selectively thinning timber stands increases deer forage in the forms of shrub and herbaceous plant growth and may improve your timber stand as well. Converting old fields and pastures to native grasses, forbs, and shrubs is another management strategy that can yield big dividends. Many times applying selective herbicides and prescribed burning are needed for both forest and field management.

The following are some suggestions for improving deer habitat:

- Conduct intermediate thinning of managed pine stands and select thinning in hardwood stands to increase production of native forages.
- Timber clearcuts in small compartments (5 to 10 acres) can provide good deer habitat for up to 5 years after harvest. Clear-cutting in small, irregularly-shaped compartments in addition to leaving streamside management zones (SMZs) where applicable increases and diversifies habitat edges.
- Prescribed burning and/or strip disking (fall and winter) of open timber stands and permanent openings on a 3- to 4-year rotational basis increases forage yields and improves palatability and nutrition of native plants.
- "Day lighting" private roadsides and fire lanes in wooded areas stimulates growth of native forages and increases cover.
- Instead of mowing, use selective herbicides to control undesirable woody brush you cannot successfully control with prescribed fire and disking. Do not mow, burn, or disk when deer are fawning.

Eastern Wild Turkey

Habitat and Food Requirements

The eastern wild turkey has an average home range of more than 3,000 acres, with hens having smaller home ranges on average than mature gobblers. The ideal turkey habitat must contain nesting, brood-rearing, foraging, and roosting areas. These habitat types can be managed for in pine plantations (thinned and burned), hardwood stands, and mixed-pine hardwood stands. Properly managed openings are also important. A range of 10 to 30 percent of the total area to be managed for turkeys should be in small to large, permanent, grassy openings.

Photo by Tes Randle Jolly

If timber management is your main objective for a tract of land, you can easily manage for turkeys as well. Turkeys often use pine plantations that are in the 3- to 5-year regeneration stage as nesting areas. Later in the rotation, thinned and burned pine plantations serve as excellent brood-rearing and feeding areas. You can use prescribed fire in pine stands as young as 10 years old and commercial thins can be done as early as 13 to 17 years in the rotation. Also, leaving streamside management zones (SMZs) when you harvest timber is a management practice that benefits turkeys and wildlife in general. SMZ's are strips of standing timber (hardwoods and/or pines) left along creeks and drains to protect water quality. In addition, SMZs provide travel corridors and mast production for many wildlife species.

Although it requires large acreages to manage self-sustaining turkey populations, you can make local areas more attractive to turkeys and increase their use on small tracts of land. If you manage smaller tracts of land, consider forming a cooperative with neighbors who also are interested in turkey management. Minimizing human disturbance and providing increased protection are critical to managing turkey populations. Gates and other ways to control access are often necessary.

Photo by Tes Randle Jolly

Nesting and Brood-rearing Cover

Turkey hens commonly nest along the edges of old fields, rights-of-way, clear cuts, and in forest stands having open overstories and well-developed understories. Nesting cover is characterized by native grasses, forbs (broadleaf herbaceous plants) and low-growing shrubs up to 3 feet high. Hens prefer to build nests near logging slash, next to logs or stumps, or under low-hanging vegetation that hides them from both avian and mammalian predators. Suitable nesting cover in old fields, rights-of-way, and timber regeneration sites is provided when vegetation is left undisturbed by disking, mowing, or prescribed burning for 3 to 5 years.

Ideal brood-rearing habitat is characterized by a mixture of grasses and annual forbs that grow up to about 2 feet tall and cover bare ground underneath. This allows turkey poults to move about under cover and catch insects but is low enough to allow the hen to watch for predators. Good brood habitat typically exists within 1 to 2 years of the soil being disturbed by disking (preferably during October to February) or prescribed burning. Some habitat types turkey broods use as "bugging" areas are burned pine stands, clear cuts and select timber harvest areas, utility rights-of-way, old fields, and pastures. Nesting and brood-rearing cover should be close to one another so turkey poults can move undetected from thicker nesting cover to foraging areas.

The following are some suggestions for improving turkey habitat:

- Manage for and retain some stands of pure hardwood or mixed pine-hardwood stands within pine-dominated landscapes. For example, SMZs and slopes between upland and bottomland sites are generally more suited for hardwood species than pine.
- Manage for and retain a variety of different oak species in the 30- to 40-year age range to increase the chances of an annual acorn crop.
- Thin young hardwood stands at 20 to 35 years to speed up crown development and mast production.
- Use prescribed fire and herbicide applications to manage for an open understory of desirable soft mast producing trees and vines among pine and hardwood stands.
- Cool-season prescribed burning and /or strip disking of timber and openings on a 3 to 4 year rotational basis provide food and nesting and brood-rearing cover for turkeys. For pine saw timber rotations, the best basal area (cross sectional square footage of trees on a per acre basis) for turkey is a range of 40 to 60 square feet per acre.
- Instead of mowing, use selective herbicides for controlling undesirable woody brush you cannot successfully control with prescribed fire and disking. Do not mow, burn, or disk when turkeys are nesting.

Food Habits

Turkeys are strong scratchers and use a diet of animal and plant matter. During their first 2 weeks of life, turkey poults feed almost entirely on protein-rich insects. After 4 weeks old, they need a diet like those of adults, which is mainly a variety of plant matter (seeds, leaves, fruits, tubers, forbs, grasses) and insects. In addition to grassy "bugging" areas, cool- and warm-season food plantings that provide desirable foliage, fruit, and seed production are beneficial. During fall and early winter months, turkeys use hard mast crops of oaks, pines, beeches, and several other fruit-producing trees and shrubs.

Northern Bobwhite

Habitat and Food Requirements

The northern bobwhite or "bobwhite quail" has an average home range of about 40 acres and requires an environment that must provide food and cover throughout the year. Proper cover for the daily and seasonal needs of bobwhite quail is often the most limiting factor to population growth. Bobwhite quail are an early successional species and thrive in open habitats composed of native grasses, forbs, and shrubs. Landscapes made up of a mixture of old fields, agricultural fields, and open (thinned and burned) woodlands are ideal for managing bobwhite quail populations. Often, landowners focus on food plantings, but instead should focus on providing the necessary cover for reproduction and escaping predators before thinking about supplemental food plantings.

Nesting and Brood-rearing Cover

Quail nesting cover is characterized by native bunch grasses like broomsedge and little bluestem. Suitable nesting cover is provided when 2 or 3 years growth of these grasses is not disturbed by disking, mowing, or prescribed burning. This provides a structural environment in which bobwhite quail may build a well-concealed nest at the base of a clump of broomsedge or other native grass.

Brood-rearing habitat is characterized by more annual plants, such as ragweed, partridge pea, and other forbs that grow up to cover bare ground underneath. Good brood habitat is typically provided within 1 to 2 years of the soil's being disturbed by disking (preferably during October to February) or prescribed burning. Bare ground with overhead cover is essential for chicks to move about freely and catch insects while also being concealed from predators. Nesting and brood-rearing cover must be provided near one another so newly-hatched chicks to move from thicker nesting cover to areas with more bare ground concealed by overhead plant cover.

Thicket Cover

Cover where bobwhite quail can escape predators and have a protected resting place is the final critical quail habitat component. Thicket cover in the form of blackberry and other vine thickets and wild plum or sumac thickets provides excellent escape and resting cover. Although popular, bi-color or shrub lespedeza can become an invasive plant pest (especially in woodlands) if it is not properly managed. Thus, it is best to manage for native shrubs. Too much thicket cover may exclude growing space for nesting and brood-rearing cover. Therefore, thickets should be maintained in patches or strips throughout the property, rather than covering entire fields or forests. As a general rule, maintain about 5 to 10 percent of total property acreage in scattered, shrub and vine thickets spaced about 100 to 200 yards apart.

Reduced basal area and prescribed fire combined to transform this tract of upland pine woods into ideal bobwhite quail habitat.

The following are suggestions for improving quail habitat:

- Prescribed burning and strip disking (fall and winter) on a 1- to 3-year rotational basis are the best management practices to maintain native plant community structure and composition for bobwhite quail and other wildlife.
- Instead of mowing, use selective herbicides for controlling undesirable woody brush you cannot control by prescribed burning and disking.
- Leave 30-foot or wider buffer zones of native grasses and forbs between cultivated crops and tree lines, and alongside ditch banks, roadsides, and fence rows. Also, leave stalks of harvested crops standing when possible.

Borders of native grasses and forbs surrounding agricultural fields provide excellent bobwhite quail habitat.

- Break up large, open fields by planting hedgerows of native shrubs and vines. Hedgerows provide food sources, escape cover, and serve as travel corridors to and from feeding and nesting areas. Also, planting shrubs instead of trees removes tall observation posts for hawks.
- Harvested timber stands can provide good quail habitat for up to 3 to 4 years after harvest. For saw timber rotations, thinning, prescribed burning, and disking are beneficial quail management techniques. The best basal area (cross sectional square footage of trees on a per acre basis) for bobwhite quail is a range of 40 to 60 square feet per acre.

Supplemental Foods

Supplemental food plantings often provide some critical food resources during late winter and early spring when food is most limited. However, too much supplemental food planting can negatively affect habitat quality. Planting entire fields in food plots reduces available nesting cover. Maximize nesting, brood-rearing, and scattered thicket cover first (proper habitat management will produce an abundance of natural foods). Once these habitat components are in place, plant supplemental food crops in strips or small patches near secure thicket cover. As a general rule, plant no more than 5 to 10 percent of acreage in supplemental food plantings. For additional details regarding bobwhite quail habitat management, see MSU Extension Publication 2179, *Ecology and Management of the Northern Bobwhite*.

Mourning Dove

Habitat and Food Requirements

Mourning doves in the southeastern United States are migratory game birds that may be residents or actual migrants from other regions of North America. Migrant doves begin arriving in the Southeast during early fall with migrations continuing through the winter.

Doves are strict granivores and feed primarily on the seeds of forbs, grasses, and small grains with occasional use of berries and hard mast. They seek food by sight and prefer to land in areas where the ground is bare and then walk to a food source. Dove feet are not adapted for strong scratching on the ground for food. Therefore, recently prepared/ harvested grain fields and timber harvest areas attract doves because of the clean ground and scattered seeds.

In addition to food sources, doves need areas in which to obtain "grit" and water. Grit is small bits of gravel and larger grains of sand. It is an important component of the dove diet because it helps grind food in the gizzard. A water source (such as a farm pond) within one mile of the food source is ideal. Doves prefer watering areas with little cover and few trees around the edges. Also, they rarely go directly to the water, but prefer to first loaf nearby in trees or on power lines.

Establishing a Dove Field

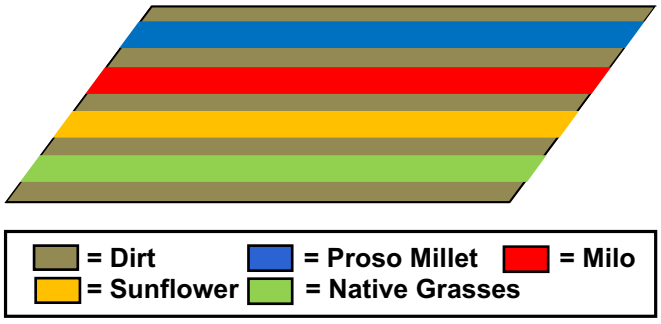
Traditional agriculture fields are ideal places to hunt mourning doves. However, landowners and/or land managers can create their own dove fields for hunting. The following is a list of considerations when choosing a site to establish a dove field:

- Hunting fields should be at least 5 acres in size; larger fields often will attract proportionately greater numbers of birds.
- Connectivity between agricultural fields, thus increasing the chances of attracting more birds.
- Near water: creeks, ditch channels, or farm ponds with exposed shorelines.
- Fields with some type of vertical relief (such as swags or rises) throughout seem to increase the attractiveness for migratory birds.

Strip Management

A popular approach to managing for and attracting mourning doves is what we call "strip management." This simply refers to strips of grain crops and native vegetation established in 15- to 20-feet wide, alternating bands across a field. An excellent example is alternating strips of millet, milo, sunflower, bare dirt, and native forbs and grasses. Remember to leave 5-feet wide dirt strips between each band of grain crops or native vegetation. Periodically throughout the growing season (May through August) you need to control weeds in the dirt strips. For best results either disk or pull a "do-all" through the dirt strips about once every two weeks.

Strip management is a popular practice for attracting mourning doves.



A diagram demonstrating a dove field with alternating strips of grains, bare dirt, and native grasses.

It is important to plant summer grain crops no later than May 15 if you want to attract doves for September shoots. Crop production is maximized if drilled, but broadcasting seeds, followed by light disking and dragging, produces acceptable results. Begin harvesting or mowing portions of the field(s) 2 to 4 weeks before the expected shooting dates. Because the waste grain and bare ground are critical to attracting doves to the field, weekly or biweekly harvesting or mowing until the shooting date might help hold doves on the field.

Including native vegetation in your strip management protocol is both cost effective and highly attractive to doves. Native vegetation, especially the grasses, typically represents 90 percent of the mourning doves' normal diet. Also, in most cases native vegetation is already growing or their seed is present in the seed bank, thus saving time and planting costs. Once broadleaf weeds and grasses have become established in these strips, the next step is to manage for species you want to promote. The most common method is to monitor these strips carefully and apply an herbicide in the growing season that eradicates the less desirable broadleaf plants. If too many undesirable broadleaf plants invade these strips, use an herbicide application to deter broadleaf plants and leave only the grasses.

Dove fields can easily be overharvested but can be retained by using a harvest schedule. Schedules might include shooting only in afternoon hours, regulating all-day shoots (if legal) to one per week, or stopping shoots at least 1 hour before sunset to allow doves time to feed and water before roosting.

Mourning doves are federally regulated migratory birds, and you should pay very close attention to federal and state regulations regarding dove field management. Normal and acceptable agricultural practices typically have been considered legal dove shooting areas. However, consulting with wildlife biologists or enforcement officers helps avoid illegal field situations.

Recommended preparation and planting dates for dove field management.

Preparation & Planting Dates	Activity to Be Performed
April 7 – 15	Mechanical or chemical site preparation
April 15 –25	Plant sunflowers
May 15 – June1	Plant Dove Proso or Brown-top Millet
April 20 – May 1	Plant Milo

Waterfowl

Habitat and Food Requirements

The southeastern United States is an important region in North America for migrating and wintering waterfowl. Bottomland hardwood swamps, coastal marshes, and flooded agricultural lands serve as critical habitats for ducks and geese. Portions of

Impoundments planted with grains, such as Japanese millet and/or corn are excellent areas for attracting waterfowl.

Moist soil units provide critical winter habitat for waterfowl in the Southeast.

the Lower Mississippi Alluvial Valley (LMAV) alone winter about 5 million ducks and geese annually. Although public refuges and wildlife management areas provide excellent habitat for waterfowl, private lands, especially those in grain production or those currently being managed for waterfowl, play a large role in providing additional resources for waterfowl. So, managing private lands is vital.

Ducks common to the southeastern United States are perching, dabbling, and diving ducks. Perching ducks are resident and migratory wood ducks. Dabbling ducks include mallard, gadwall, northern pintail, northern shoveler, American wigeon, and blue-winged and American green-winged teal. Dabbling ducks feed in shallow water by "tipping-up" or "dabbling" on the water surface. They have diverse diets of natural and agricultural seeds, tubers, foliage, and aquatic invertebrates.

Common diving ducks, including canvasback, lesser scaup, ring-necked duck, bufflehead, redhead, and common goldeneye, and hooded mergansers, dive below the water surface to feed. Shallow impoundments are rarely managed for diving ducks, but they often use catfish and minnow raising ponds. Diving ducks feed on a variety of aquatic invertebrates, plant seeds, and tubers and mergansers forage on fish.

Canada, white-fronted, snow, and Ross's geese are common goose species in the Southeast, especially in the LMAV. Geese feed on natural seeds, tubers, roots, green browse, and agricultural seeds.

Impoundments and Greentree Reservoirs

Cover, food, and shallow water are important components of managed waterfowl impoundments for habitat. Farm/beaver ponds and other impoundments of at least 5 acres can be made attractive to waterfowl. Food plantings of corn, grain sorghum, and Japanese and browntop millets can provide excellent foraging habitat, especially for ducks. You can remove trees not producing small acorns and other duck foods from the pond's edge to allow seed-producing grasses and sedges (moist-soil plants) to flourish. You can control water levels where beavers are active by using the Clemson pond leveler or similar devices.

Another technique used in waterfowl management is the greentree reservoir (GTR). This involves constructing a levee in a hardwood drain or bottom (with an adequate water source such as a creek, sizeable watershed, or spring) that contains red oaks (such as water, willow, cherrybark, Nuttall oaks). Water levels are controlled by a structure such as a weir or flashboard riser. The timber is flooded in late fall to an average depth of about 12 inches and often attracts good numbers of dabbling ducks, depending on mast crops. ***Do not flood hardwood forests until their leaves change color in the fall. Also, drain GTRs in winter (February) before tree buds begin to swell.*** Landowners and clubs interested in this technique can receive additional technical assistance regarding location, permits required, and/or cost estimates from the Natural Resources Conservation Service, state wildlife agency, Ducks Unlimited, and U.S. Fish and Wildlife Service. Most areas appropriate for establishing GTRs are considered wetlands and likely require ***federal and state permits*** before development.

You can use similar techniques with agricultural production areas, pastureland, and any impoundment that has a water-control structure. You can drain these areas between March and June and promote native food production by disking and fertilizing the soil or planting them to crops that tolerate some flooding. For additional details regarding waterfowl management, see MSU Extension Publication 1864, *Waterfowl Habitat Management Handbook for the Lower Mississippi River Valley*.

Mast-producing hardwoods (oaks and beeches) in flooded greentree reservoirs provide a critical food source for wintering and resident ducks in the Southeast.

Cool-Season Plantings

Grasses

Oats
Avena sativa

- **Description:** A cool-season, annual small grain that is less cold tolerant than wheat and rye but provides preferred early fall forage. Quail and turkey eat the seeds. Forage is used by rabbits and turkey and by deer in early stages of growth. Oats are an excellent planting choice for sandy soils.
- **Soil Adaptation:** Adapted to well-drained, light-textured soils (sandy loam to clay).
- **Planting Dates:** August 15 through October 15
- **Soil pH Range:** 5.8 to 6.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 8-24-24 at time of planting and 100 lbs/ac of 34-0-0, 30 days postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 90 lbs/ac; broadcast 120 lbs/ac. Cover seed 1 inch deep.
- **Varieties:** Arkansas 604 & 833, Buck Forage, Buck Magnet, Chapman, Coker, Dallas, Florida 501, Harrison, Horizon 314, Rogers, TAM 606
- **Companion Plants:** Austrian winter peas, clovers, vetch, rye, triticale, and wheat.
- **Management:** Apply an additional 150 lbs/ac of 34-0-0 in February if you want a seed crop.
- **Recommended Herbicides:** A postemergent application of 2,4-D (1 to 3 pts/ac) or Harmony Extra XP (0.3 to 0.6-fl. oz/ac) or Banvel (1 pt/ac) can be used to control undesirable broadleaf plants.

Rye
Secale cereale

- **Description:** A cool-season, annual small grain (similar to wheat) with good cold tolerance. Quail eat the seeds; rabbits and turkeys use forage, and deer browse it heavily in fall and early winter. Rye grows very fast and loses its protein levels early. When allowed to mature, rye can provide bugging areas for quail and turkey in early summer.
- **Soil Adaptation:** Adapted to well-drained soils (sandy loam to clay).
- **Planting Dates:** August 15 through October 15
- **Soil pH Range:** 5.8 to through 6.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 8-24-24 at time of planting and 100 lbs/ac of 34-0-0, 30 days postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 90 lbs/ac; broadcast 120 lbs/ac. Cover seed ½ to 1 inch deep.
- **Varieties:** Elbon, Wrens Abruzzi, Wondergraze, Vitagraze, Wintergrazer 70, Maton, Bates
- **Companion Plants:** Austrian winter peas, clovers, vetch, oats, and wheat.
- **Management:** Deer palatability is often reduced if vegetation reaches 9 to 12 inches in height in late winter or spring. Mowing at this time can increase palatability and use but reduces seed production. If you want seed production, do not mow, but apply an additional 150 lbs/ac of 34-0-0 in February.
- **Recommended Herbicides:** A postemergent application of 2,4-D (1 to 3 pts/ac) or Harmony Extra XP (0.3 to 0.6-fl. oz/ac) or Banvel (1 pt/ac) can be used to control undesirable broadleaf plants.

Triticale
Triticosecale spp.

- **Description:** A cool-season, annual small grain that is a hybrid cross of rye and wheat. Dove, quail, and turkey eat seeds. Rabbits and turkeys use forage, and deer browse heavily all winter. When allowed to mature, triticale can provide bugging areas for quail and turkey in early summer.
- **Soil Adaptation:** Adapted to well-drained, moist soils (sandy loam to clay).
- **Planting Dates:** August 15 through October 15
- **Soil pH Range:** 5.8 to 6.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 8-24-24 at time of planting and 100 lbs/ac of 34-0-0, 30 days postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 90 lbs/ac; broadcast 120 lbs/ac. Cover seed 1 inch deep.
- **Varieties:** Tamcale 5019, Beagle 82, Trical 102 & 336
- **Companion Plants:** Austrian winter peas, clovers, vetch, and oats.
- **Management:** Apply an additional 150 lbs/ac of 34-0-0 in February if you want a seed crop.
- **Recommended Herbicides:** A postemergent application of 2,4-D (1 to 3 pts/ac) or Harmony Extra XP (0.3 to 0.6-fl. oz/ac) or Banvel (1 pt/ac) can be used to control undesirable broadleaf plants.

Wheat
Triticum aestivum

- **Description:** A cool-season, annual small grain, widely planted; seeds are a highly favored food of doves, quail, and turkey. Rabbits and turkeys use forage, and deer browse it heavily all winter. Geese graze wheat in later winter. Wheat has good cold tolerance and produces forage all winter. When allowed to mature, wheat can provide bugging areas for quail and turkey in early summer.
- **Soil Adaptation:** Adapted to well-drained to moist soils (sandy loam to clay). Tolerates poor drainage.
- **Planting Dates:** August 15 through October 15 (See management suggestions)
- **Soil pH Range:** 5.8 to 6.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 8-24-24 at time of planting and 100 lbs/ac of 34-0-0, 30 days postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 90 lbs/ac; broadcast 120 lbs/ac. Cover seed 1 inch deep.
- **Varieties:** Commercial forage varieties, Longhorn, Lockett, GA Gore, Saluda
- **Companion Plants:** Austrian winter peas, clovers, vetch, oats, and rye.
- **Management:** Deer palatability is often reduced if vegetation reaches 9 to12 inches in height in late winter or spring. Mowing at this time can often increase palatability and use but also reduces seed production. MOWING MAY NOT BE NECESSARY IF YOU PLANT WHEAT AFTER SEPTEMBER 15. If you want seed production, do not mow, but apply an additional 150 lbs/ac of 34-0-0 in February.
- **Recommended Herbicides:** A postemergent application of 2,4-D (1 to 3 pts/ac) or Harmony Extra XP (0.3 to 0.6-fl. oz/ac) or Banvel (1 pt/ac) can be used to control undesirable broadleaf plants. Where annual ryegrass is a problem weed, we recommend a postemergent application of Finesse (0.75 to 0.9 fl oz/ac), Powerflex (3.5-fl. oz/ac), Osprey (4.75-fl. oz/ac), or Hoelon (7-fl. oz/ac). DO NOT APPLY HERBICIDES WHEN YOU USE WHEAT IN SEED MIXTURES WITH LEGUMES OR BRASSICAS UNLESS RECOMMENDED ON SPECIMEN LABEL.

Legumes

Arrowleaf Clover
Trifolium vesiculosum

- **Description:** A cool-season, reseeding, annual legume. During spring, plants grow to heights of 40 to 50 inches under optimal conditions. Seeds mature from late June through early August. Arrowleaf clover is less palatable than some of the other clovers but still provides choice forage for deer and rabbits. Its foliage attracts insects and creates bugging areas for turkeys around food plot edges.
- **Soil Adaptation:** Adapted to well-drained sandy loams to light clay soils.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.8 to 6.8
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 250 lbs/ac of 0-20-20 in the fall of the next calendar year after establishment.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 10 lbs/ac; broadcast 15 lbs/ac. Cover seed ¼ inch deep.
- **Varieties:** Meechee, Yuchi, Amclo, Apache
- **Inoculant Strain:** O
- **Companion Plants:** Cool-season annual grasses, crimson clover.
- **Management:** Reseeding may be encouraged by mowing and/or light disking in October, followed by an application of 250 lbs/ac of 0-20-20.
- **Recommended Herbicides:** A postemergent application of Select 2EC (8-fl. oz/ac + 1% crop oil), or Poast Plus (2 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Ball Clover
Trifolium nigrescens

- **Description:** A rapid growing, cool-season, annual legume that grows on sites not suitable for other clovers. Provides foliage and insects for turkeys and forage for deer. Ball clover has a short growth season, and only produces from mid March to May.
- **Soil Adaptation:** Adapted to sandy loams and clay loam soils; tolerates poor drainage and acidic soils.
- **Planting dates:** September 1 through October 15
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 250 lbs/ac of 0-20-20 in the fall of the next calendar year after establishment.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 2 lbs/ac; broadcast 3 lbs/ac. Cover seed ¼ inch deep.
- **Inoculant Strain:** B
- **Companion Plants:** Oats and wheat.
- **Management:** Encourage reseeding by mowing and/or light disking in September followed by applying 250 lbs/ac of 0-20-20.
- **Recommended Herbicides:** A postemergent application of Select 2EC (8-fl. oz/ac + 1% crop oil), or Poast Plus (2 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Crimson Clover
Trifolium incarnatum

- **Description:** A cool-season, annual legume that can grow as high as 2 feet. Because it grows quicker and seeds out earlier than most clovers, you may use it in combination with other clovers. Crimson clover provides forage for deer and rabbits and foliage and insects for turkeys. In addition to its value as a wildlife food planting, it is an excellent crop to plant for erosion control and beautification.
- **Soil Adaptation:** Adapted to well-drained sandy loams to heavy clays; moderately shade tolerant; tolerant of acidic soils.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.5 to 7.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 200 lbs/ac of 0-20-20 postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 20 lbs/ac; broadcast 30 lbs/ac. Cover seed ¼ inch deep.
- **Varieties:** Auburn, Autauga, Chief, Dixie, Talladega, Tibbee
- **Inoculant Strain:** R
- **Companion Plants:** Austrian winter peas, cool-season annual grasses, other annual clovers, and vetch.
- **Management:** Crimson clover is a strong reseeder and may be enhanced by mowing and/or light disking in September. Follow with an application of 150 lbs/ac of 0-20-20 after disturbance.
- **Recommended Herbicides:** A postemergent application of Select 2EC (8-fl. oz/ac + 1% crop oil), or Poast Plus (2 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Ladino White Clover
Trifolium repens

- **Description:** A cool-season, short-lived perennial legume that is highly productive and low-maintenance. A great clover for providing deer and rabbit forage and foliage and insects for quail and turkey. Produces from October through June.
- **Soil Adaptation:** Adapted to silty loam to fertile clay soils; mildly shade tolerant; tolerates poor drainage.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 200 lbs/ac of 0-20-20 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting rates:** Drill 4 lbs/ac; broadcast 5 lbs/ac. Cover seed ½ inch deep.
- **Varieties:** Osceola, Regal, Louisiana S-1, Patriot, Durana, Regalgraze
- **Inoculant Strain:** B
- **Companion Plants:** Cool-season annual grasses and red clover. High production varieties should be planted alone.
- **Management:** Reseeding can often be enhanced by light disking and/or mowing in September and applying 150 lbs/ac of 0-20-20. Grass control is often required in spring.
- **Recommended Herbicides:** A postemergent application of Select 2EC (8-fl. oz/ac + 1% crop oil), or Poast Plus (2 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two or more applications 3 to 4 weeks apart may be necessary. BERMUDAGRASS: Apply Select 2EC in the fall to control bermudagrass. Another option is to kill the entire plot with multiple glyphosate applications; cultivate using deep tillage, and replant the following year. APPLICATION TIMING IS VERY IMPORTANT IN CONTROLLING PERENNIAL GRASSES. Postemergence applications of Pursuit (4-fl. oz/ac) or Butyrac 200 (1- 2 qt/ac) are recommended to control some broadleaf weeds. When applied in late spring, Pursuit provides some preemergence control of undesirable grasses, such as foxtail, johnsongrass, and crabgrass. Where horse nettle is a problem, we recommend spot applications of Grazon or Surmount. DO NOT USE AS A BROADCAST APPLICATION; both Grazon and Surmount KILL CLOVERS.

Red Clover

Trifolium hirtum

- **Description:** A cool season, short-lived perennial legume that provides preferred forage for deer, rabbits, and turkeys. Produces March through July; this late production provides excellent insect bugging areas and brood habitat for turkey and quail.
- **Soil Adaptation:** Adapted to sandy loam to upland clay soils; moderately drought tolerant.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.8 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 200 lbs/ac of 0-20-20 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 8 lbs/ac; broadcast 12 lbs/ac. Cover seed ¼ inch deep.
- **Varieties:** Kenland, Redland Max, Redland Graze, Redland III, Bulldog, Kenstar
- **Inoculant Strain:** B
- **Companion Plants:** Grows best alone, but you can plant it in mixes with cool-season annual grasses and ladino white clover.
- **Management:** Mow and/or lightly disk in October every two years and fertilize with 0-20-20 at the rate of 150 lbs/ac.
- **Recommended Herbicides:** A postemergent application of Select 2EC (8-fl. oz/ac + 1% crop oil), or Poast Plus (2 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Subterranean Clover

Trifolium subterranum

- **Description:** A cool-season, annual legume that makes excellent plots in short-rotation pine and provides forage for deer, rabbits, and turkeys. Subterranean Clover is NOT a strong fall or winter producer. Most production occurs from March through May. This production window provides excellent bugging opportunities for quail and turkeys.
- **Soil Adaptation:** Adapted to sandy to loam soils; good shade tolerance.
- **Planting Dates:** August 15 through October 15
- **Soil pH Range:** 5.8 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 200 lbs/ac of 0-20-20 postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 15 lbs/ac; broadcast 20 lbs/ac. Cover seed ¼ inch deep.
- **Varieties:** Mt. Barker, Woogenellup, Daliak, Clare, Nuba, Nungarin
- **Inoculant Strain:** WR
- **Companion Plants:** Cool-season annual grasses and vetch.
- **Management:** Encourage reseeding by mowing and/or fall disking and fertilizing with 0-20-20 at a rate of 200 lbs/ac.
- **Recommended Herbicides:** A postemergent application of Select 2EC (8-fl. oz/ac + 1% crop oil), or Poast Plus (2 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Alfalfa
Medicago sativa

- **Description:** A cool-season, perennial legume widely used by deer, rabbits, and turkey in the spring through fall. Provides seeds, insects, and foliage for turkeys and is used some by quail. It is the most expensive and labor intensive supplemental food planting.
- **Soil Adaptation:** Adapted to well-drained, fertile loams; somewhat drought tolerant.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 6.5 to 7.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-46-0 and 250 lbs/ac of 0-0-60 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed that is within the proper pH range.
- **Planting Rates:** Drill 15 lbs/ac; broadcast 20 lbs/ac. Cover seed ¼ - ½ inch deep.
- **Varieties:** Alfagraze, Amerigraze 401 & 702, Ameristand, Bulldog 505
- **Inoculant Strain:** A
- **Companion Plants:** None; grows best alone.
- **Management:** When grazing pressure is not adequate, occasional mowing and removal of clippings from the plot are necessary. Mow in spring and late summer to keep shoots green and tender. Apply 100 lbs/ac of 0-46-0 and 150 lbs/ac 0-0-60 annually after the first mowing. Alfalfa has a high requirement for the micronutrient boron, and an application of 20 lbs/ac of 10 MOL Borax every three years is usually necessary to meet these requirements. Alfalfa is susceptible to insect damage from alfalfa weevils, leafhoppers, armyworms and nematodes. Closely monitor plots for insect damage and treat quickly if signs appear. Use Pounce (6 to 12-fl. oz/ac) or Mustang (4-fl. oz/ac) to control alfalfa weevils and leafhoppers. Soil test annually to monitor pH and large potassium requirements.
- **Recommended Herbicides:** See ladino white clover.

Austrian Winter Peas
Pisum sativum

- **Description:** A cool-season, annual legume. Produces from fall to spring, providing foliage for deer and turkeys. Grows well in grass mixes. Seeds mature from May to June.
- **Soil Adaptation:** Adapted to loam to clay soils, well-drained to moist.
- **Planting Dates:** September 1 through November 1
- **Soil pH Range:** 5.6 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or use 100 lbs/ac of 0-20-20 at time of planting. Note: P and K levels have to be low to warrant a fertilizer application.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 30 lbs/ac; broadcast 40 lbs/ac. Cover seed 1 inch deep.
- **Varieties:** Granger, Fenn, Melrose
- **Inoculant Strain:** C
- **Companion Plants:** Cool-season annual grasses.
- **Management:** Mowing followed by disking in August can help reseed plantings.
- **Recommended Herbicides:** None.

Birdsfoot Trefoil
Lotus corniculatus

- **Description:** A cool-season, short-lived perennial legume. Mostly planted for quail and turkey. Foliage attracts insects and creates good bugging areas for quail and turkeys. Deer and rabbits browse foliage. Grows up to 2 feet.
- **Soil Adaptation:** Adapted to a wide range of soil types; somewhat drought tolerant; tolerates poor drainage.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 200 lbs/ac of 0-15-30 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 6 lbs/ac; broadcast 10 lbs/ac. Cover seed ¼ inch deep.
- **Varieties:** AU Dewey, Fergus (best in a mix with grasses or other legumes)
- **Inoculant Strain:** K
- **Companion Plants:** Cool-season annual grasses and vetch.
- **Management:** Mow and/or lightly disk in late October to encourage reseeding. Apply 0-15-30 at a rate of 200 lbs/ac yearly, as needed to assist with reseeding and increase stand vigor.
- **Recommended Herbicides:** See ladino white clover.

Vetch
Vicia spp.

- **Description:** A cool-season, annual legume that vines or trails. Grows rapidly in late winter and early spring but does not provide fall forage. Deer and rabbits heavily browse foliage. Provides foliage for turkeys, and quail and turkeys eat the seeds. Its foliage attracts insects and creates bugging areas for quail and turkeys if stands are not too thick. NOT TO BE CONFUSED WITH CROWN VETCH, A PERENNIAL LEGUME AND LESS DESIRABLE WILDLIFE FORAGE.
- **Soil Adaptation:** Adapted to well-drained, medium textured soils. Tolerates acid soils.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.4 to 6.8
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 20 lbs/ac; broadcast 30 lbs/ac. Cover seed 1 inch deep.
- **Varieties:** Bigflower Vetch (most preferred by deer); Hairy Vetch-Madison, Auburn, Americus, Oregon, Lana; Common Vetch-AU Olympic, Willamette
- **Inoculant Strain:** C
- **Companion Plants:** Cool-season annual grasses and clover.
- **Management:** To enhance reseeding, disk plot every third year in August and apply 150 lbs/ac of 0-20-20 yearly, as needed to assist with reseeding and increase stand vigor.
- **Recommended Herbicides:** None

Other Forbs

Brassicas
Brassica spp.

- **Description:** A group of erect, cool-season annuals (greens). Although nutritionally comparable to other forages, studies have shown deer often prefer Brassicas less than other cool season forages.
- **Soil Adaptation:** Adapted to a wide range of soil types.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 15-15-15 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 5 lbs/ac; broadcast 10 lbs/ac. Cover seed ¼ - ½ inch deep.
- **Varieties:** Available varieties of Rape, Kale, Turnip, Canola
- **Companion Plants:** Best planted alone, but can be mixed with cool-season annual grasses and/or Austrian winter peas.
- **Management:** Brassicas are good reseeders, and disking in August can increase their reseeding ability. Applying 100 lbs/ac of 34-0-0 in February increases nutrition and subsequent use.
- **Recommended Herbicides:** A postemergent application of Poast Plus (0.5 to 1.5 pts/ac) can be used to control undesirable grasses. A preemerge application of Treflan (1 to 2 pts/ac incorporated into the soil) may be used to control undesirable grasses and broadleaf plants.

Burnett, Small
Sanguisorba minor

- **Description:** A cool-season perennial forb planted mainly for quail. It is a small, creeping, seed-producing plant.
- **Soil Adaptation:** Requires fertile, well-drained upland soils.
- **Planting Dates:** March 1 through May 1
- **Soil pH Range:** 6.0 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 15-15-15 postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 5 lbs/ac; broadcast 10 lbs/ac. Cover seed ¼ - ½ inch deep.
- **Varieties:** Delar
- **Companion Plants:** Clovers.
- **Management:** None.
- **Recommended Herbicides:** A postemergence application of Select 2EC (8-fl. oz/ac + 1% crop oil), or Poast Plus (2 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Chicory, Forage

Cichorium intybus

- **Description:** A perennial herb and member of the lettuce family that can produce high yields. Forage chicory is planted in the fall, develops a few leaves at ground level during winter and in spring, begins rapid growth until it blooms in late summer. Newly planted forage chicory plots can produce for 3 years.
- **Soil Adaptation:** Adapted to a wide range of soil types and moderately drought tolerant.
- **Planting Dates:** September 1 through October 15
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 15-15-15 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 2 lbs/ac; broadcast 4 lbs/ac. Cover seed ¼ - ½ inch deep.
- **Varieties:** Choice, Puna, Puna II, Brow Tyne, Six Point, Oasis
- **Companion Plants:** Oats, wheat, and clovers (crimson, ladino, or red).
- **Management:** When stand declines, reseed. Applying 100 lbs/ac of 34-0-0 in March increases palatability, nutrition, and production.
- **Recommended Herbicides:** A postemergence application of Select 2EC (8-fl. oz/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Warm-Season Plantings

Grasses

Browntop Millet
Urochloa ramosum

- **Description:** A warm-season annual grass that grows up to 3 feet. Seeds are eaten by dove, ducks, quail, turkey, and songbirds.
- **Soil Adaptation:** Well-drained soil; good drought tolerance.
- **Planting Dates:** May 1 through August 1; for dove fields, plant 80 days before the season; for waterfowl impoundments, plant in late July through early August and flood several weeks before hunting date.
- **Soil pH Range:** 5.0 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 8-24-24 and 100 lbs/ac of 46-0-0 at time of planting. NITROGEN RATES GREATER THAN 50 LBS/AC MAY PROMOTE MORE VEGETATIVE GROWTH AND LESS SEED PRODUCTION.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 15 lbs/ac; broadcast 25 lbs/ac. Cover seeds ¼ to ½ inch deep.
- **Varieties:** Commercial varieties (60 to 65-day maturity)
- **Companion Plants:** Grain sorghum, Japanese millet, and sunflower, usually in alternating strips.
- **Management:** Mow field plantings in alternating strips, starting about 2 weeks before the season to attract doves. THIS TYPE OF MANIPULATION IS ILLEGAL FOR WATERFOWL. For quail and turkey, leave stems standing throughout the dormant season, and allow grain to fall naturally. You can set back seed maturation by mowing at a height of at least 10 inches above ground. However, this practice reduces seed yield.
- **Recommended Herbicides:** Apply 2,4-D (1 to 3 pts/ac) or Banvel (1 pt/ac) postemergence to control undesirable broadleaf plants such as sicklepod or cocklebur. Some broadleaf weeds and grass weeds are acceptable and may improve the quality and diversity of wildlife plantings.

Proso Millet
Panicum miliaceum

- **Description:** A warm-season annual grass that grows to heights of 6 feet. Seeds are eaten by dove (often called dove millet), ducks, quail, turkey, and songbirds.
- **Soil Adaptation:** Adapted to well-drained, moderately fertile soils.
- **Planting Dates:** May 1 through June 30
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 at time of planting and 200 lbs/ac of 34-0-0. Apply half the rate of 34-0-0 at time of planting and the other half 14 days, postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 15 lbs/ac; broadcast 30 lbs/ac. Cover seeds ¼ to ½ inch deep.
- **Varieties:** Dove Proso, White Proso (75-day maturity)
- **Companion Plants:** Grows best alone.
- **Management:** Mow field plantings in alternating strips, starting about 2 weeks before the season to attract doves. THIS TYPE OF MANIPULATION IS ILLEGAL FORWATERFOWL. For quail and turkey, leave stems standing throughout the dormant season, and allow grain to fall naturally.
- **Recommended Herbicides:** Apply 2,4-D (1 to 3 pts/ac) or Banvel (1 pt/ac) postemergence to control undesirable broadleaf plants. Some broadleaf weeds and grass weeds are acceptable and may improve the quality and diversity of wildlife plantings.

Foxtail Millet
Setaria italica

- **Description:** A warm-season annual grass that varies in height according to variety. Seeds are eaten by dove, quail, turkey, and songbirds.
- **Soil Adaptation:** Adapted to well-drained, moderately fertile soils.
- **Planting Dates:** May 1 through July 1
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 at time of planting and 200 lbs/ac of 34-0-0. Apply half the rate of 34-0-0 at time of planting and the other half 30 days, postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 15 lbs/ac; broadcast 25 lbs/ac. Cover seeds ¼ to ½ inch deep.
- **Varieties:** Common, German, Hungarian (90-day maturity)
- **Companion Plants:** Usually out-competes other grasses; grows best alone.
- **Management:** Mow field plantings in alternating strips, starting about 2 weeks before the season to attract doves. For quail and turkey, leave stems standing throughout the dormant season, and allow grain to fall naturally.
- **Recommended Herbicides:** Apply 2,4-D (1 to 3 pts/ac) or Banvel (1 pt/ac) postemergence to control undesirable broadleaf plants. Some broadleaf weeds and grass weeds are acceptable and may improve the quality and diversity of wildlife plantings.

Japanese Millet
Echinochloa frumentacea

- **Description:** A warm-season, annual reseeding grass that is a very popular planting for ducks. Japanese millet grows to heights of 2 to 4 feet and can withstand shallow flooding during growth. Seeds are eaten by dove, duck, quail, turkey, and songbirds.
- **Soil Adaptation:** Grows best on moist to wet (loams and clays), moderately fertile soils.
- **Planting Dates:** May 1 through August 1; set planting date by maturation requirements.
- **Soil pH Range:** 5.2 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 at time of planting and 200 lbs/ac of 34-0-0. Apply half the rate of 34-0-0 at time of planting and the other half 30 to 45 days postemergence, depending on maturity date.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed or direct seed onto exposed mud flats.
- **Planting Rates:** Drill 12 lbs/ac; broadcast 25 lbs/ac. Cover seeds ¼ to ½ inch deep.
- **Varieties:** Common, Chiwapa, Golden Millet (80-to-120-day maturity, depending on variety)
- **Companion Plants:** Grows best alone, but you can mix it with browntop millet.
- **Management:** Mow field plantings in alternating strips, starting about 2 weeks before the season to attract doves. THIS TYPE OF MANIPULATION IS ILLEGAL FOR WATERFOWL. If planting to attract ducks, flood 2 weeks before the season. For quail and turkey, leave stalks standing throughout the dormant season and allow grain to fall naturally. You can set back seed maturation by mowing at a height of at least 10 inches above ground; this practice reduces seed yield.
- **Recommended Herbicides:** Many associated moist soil plants improve plantings for waterfowl and other wildlife. Apply 2,4-D (1 to 3 pts/ac) or Grandstand (1 pt/ac) postemergence to control undesirable broadleaf plants, such as perennial smartweed. Where spray drift is a consideration because of adjacent crops, such as cotton or soybeans or desirable hardwood trees we recommend a postemergence application of Aim EC (0.5 to 2.0-fl. oz/ac) + 0.25% v/v non-ionic surfactant (2 pts/100 gals of spray solution).

Corn
Zea mays

- **Description:** A warm-season annual grain, high in carbohydrates (provides energy); highly favored by wildlife.
- **Soil Adaptation:** Widely adapted; performs best on sites with well-drained, highly fertile soils.
- **Planting Dates:** March 15 through June 1
- **Soil pH Range:** 5.8 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 200 lbs/ac of 0-20-20 at time of planting and 450 lbs/ac of 34-0-0. Apply half the rate of 34-0-0 at time of planting, and side dress with the other half 20 to 30 days postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 12 lbs/ac in 30- to 40-inch wide rows; broadcast 15 lbs/ac. Cover seeds 1 inch deep. BROADCAST PLANTING IS NOT RECOMMENDED FOR THIS CROP.
- **Varieties:** Commercial varieties, Dwarf Tropical (those that produce low-growing "ears" are best for wildlife).
- **Companion Plants:** Cowpeas, lablab, soybeans (commercial and/or wildlife).
- **Management:** IF PLANTING TO ATTRACT WATERFOWL, YOU CANNOT MECHANICALLY MANIPULATE PLANTED CROPS IN THE SAME YEAR OF PLANTING. You can plant Japanese millet and cereal grains together to provide height/diet diversity. If managing for doves, mow in alternating strips, starting about 2 weeks before the season. For deer, rabbit, quail and turkey, leave stalks standing throughout the dormant season and allow grain to fall naturally. If drilled, plantings of cowpeas, soybeans, or lablab between rows provide high protein deer forage during mid to late summer; and lush foliage attracts insects and provides good “bugging” areas for quail and turkeys.
- **Recommended Herbicides:** For conventional cropping systems where you want to attract waterfowl, a preemergence application of a tank mix glyphosate herbicide (2 pts/ac) and Atrazine (4 pts/ac) allows desirable grass weeds to persist after corn is established. Where you want to attract wildlife other than waterfowl, we recommend a Roundup Ready cropping system. In a conventional cropping system we recommend a preemergence application of a tank mix of Atrazine (4 pts/ac). When planting warm-season legumes with corn, use a preemergence application of Dual II or Prowl 3.3 EC (2 to 4 pts/ac).

Egyptian Wheat
Sorghum vulgare

- **Description:** A warm-season, annual sorghum that often grows 8 feet high. Dove, quail, turkey, and songbirds eat the seeds.
- **Soil Adaptation:** Widely adapted, well-drained soils.
- **Planting Dates:** April 1 through June 1
- **Soil pH Range:** 6.0 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 0-20-20 and 200 lbs/ac of 34-0-0. EXCESSIVE NITROGEN RATES MAY PROMOTE PREMATURE LODGING.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 5 lbs/ac; Broadcast 15 lbs/ac. Cover seeds ½ inch deep. Best to plant in strips or alternate patches; can strip or patch plant alternately with other warm-season grasses.
- **Companion Plants:** Corn, millets, cowpeas, lablab, wildlife soybeans, sunflower
- **Management:** Mow in alternating strips, starting about 2 weeks before the season to attract doves. For quail and turkey, leave stalks standing throughout the dormant season and allow grain to fall naturally. The stalks often lodge and make seed available while providing cover.
- **Recommended Herbicides:** If you plant Egyptian wheat alone, we recommend a preemergence application of a glyphosate herbicide (2 pts/ac), Atrazine (4 pts/ac), and Dual II (2 to 4 pts/ac). When planting with warm-season legumes, use a preemergence application of Dual II. IF USING DUAL AS A PREEMERGE HERBICIDE, EGYPTIAN WHEAT SEED MUST BE TREATED WITH CONCEPT OR SCREEN.

Grain Sorghum
Sorghum bicolor

- **Description:** A very hardy, warm-season annual with tall, medium, and dwarf varieties. Excellent food for dove, quail, turkey, songbirds, and less often, ducks.
- **Soil Adaptation:** Widely adapted; well-drained soils. Moderately drought tolerant.
- **Planting Dates:** April 15 through June 15
- **Soil pH Range:** 5.6 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 at time of planting and 200 lbs/ac of 34-0-0. Apply 1/3 the rate of 34-0-0 at time of planting and side dress with the other 2/3 when plants are at the four-leaf stage.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 8 lbs/ac in 36-inch wide rows; broadcast 15 lbs/ac. Cover seeds 1 inch deep. BROADCAST PLANTING IS NOT RECOMMENDED FOR THIS CROP.
- **Varieties:** Kafir, Hegair, Dwarf Milo, commercial varieties (90- to 115-day maturity, depending on variety)
- **Companion plants:** Browntop millet, corn, cowpeas, wildlife soybeans, lablab, and sunflower.
- **Management:** IF PLANTING TO ATTRACTWATERFOWL, YOU CANNOT MECHANICALLY MANIPULATE PLANTED CROPS IN THE SAME YEAR OF PLANTING. See recommendations for corn and Egyptian wheat.
- **Recommended Herbicides:** When you plant grain sorghum alone, we recommend a preemergence application of a glyphosate herbicide (2 pts/ac), Atrazine (4 pts/ac), and Dual II (2 to 4 pts/ac). When planting with warm-season legumes, use a preemergence application of Dual II. IF USING DUAL AS A PREEMERGE HERBICIDE, SORGHUM SEED MUST BE TREATED WITH CONCEPT OR SCREEN.

Legumes

Alyceclover
Alysicarpus vaginalis

- **Description:** A warm-season annual legume that provides forage in summer and early fall. Especially important to white-tailed deer; holds up well to grazing pressure.
- **Soil Adaptation:** Suited to most moderate to well-drained soils, including bottomland sites.
- **Planting Dates:** May 1 through June 15
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ acre of 0-46-0 and 50 lbs/ac 0-0-60 postemergence (once stand is established).
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 15 lbs/ac; broadcast 20 lbs/ac. Cover seeds ¼ inch deep.
- **Varieties:** NA
- **Inoculant Strain:** EL
- **Companion Plants:** Plant with forage cowpeas and/or joint vetch.
- **Management:** Mowing and/or disking in late October may help reseeding. Apply 100 lbs/ac of 0-46-0 and 50 lbs/ac of0-0-60 the following May.
- **Recommended Herbicides:** A preemergence application of Pursuit (4-fl. oz/ac) or Prowl 3.3 EC (1 to 3 pts/ac) will control many warm-season annual weeds. Use a postemergence application of Select (10-fl. oz/ac) or Poast Plus (2 to 3 pts/ac) to control grass weeds. You can also use an early postemergence application of Pursuit to control grass weeds.

Cowpeas
Vigna unguiculata

- **Description:** A warm-season annual legume browsed by deer and rabbits. Seeds are highly used by quail and turkey but rarely eaten by dove.
- **Soil Adaptation:** Adapted to well-drained soils, from sandy loams to heavy soils.
- **Planting Dates:** May 1 through July 1
- **Soil pH:** 5.2 to 7.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 before planting, and disk into the seedbed.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 15 lbs/ac in 24- to 36-inch wide rows; broadcast 45 lbs/ac. Cover seeds ½ to 1 inch deep.
- **Varieties:** Iron Clay, Red Ripper, Combine
- **Inoculant Strain:** EL
- **Companion plants:** Egyptian wheat, grain sorghum, corn, other warm-season annual peas.
- **Management:** Large plots may be required in areas of high deer density. If seed is not consumed, disking in April can encourage reseeding.
- **Recommend Herbicides:** A preemergence application of Pursuit (4-fl. oz/ac) or Prowl 3.3 EC (1 to 3 pts/ac) will control many warm-season annual weeds. Use a postemergence application of Select (10-fl. oz/ac) or Poast Plus (2 to 3 pts/ac) to control grass weeds. Where sicklepod is a problem, we recommend a postemergence application of either Frontrow (0.4-fl. oz/ac), Blazer (2 pts/ac), or Butyrac 200 (2 pts/ac). You can also use an early postemergence application of Pursuit to control grass weeds.

Deer Jointvetch
Aeschynomene americana

- **Description:** A warm-season annual, reseeding legume growing to 6 feet tall. The foliage is highly palatable and withstands heavy grazing pressure by deer. Provides excellent forage for deer; dove, quail, and turkey eat the seeds. AESCHYNOMENE CAN BECOME INVASIVE WHEN PLANTED NEAR WATERFOWL IMPOUNDMENTS OR RICE FIELDS.
- **Soil Adaptation:** Adapted to a wide range of soil types; light-textured soils and dry upland sites, including well-drained sandy soils. Also grows on poorly drained, moist soils.
- **Planting Dates:** March 15 through June 15
- **Soil pH Range:** 5.0 to 6.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 0-20-20 postemergence (once stand is established).
- **Soil preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 15 lbs/ac; broadcast 20 lbs/ac. Cover seeds ¼ to ½ inch deep.
- **Varieties:** Lee, Glenn
- **Inoculant Strain:** EL
- **Companion Plants:** Alyceclover
- **Management:** Depending on grazing pressure, reseeding may be enhanced by early spring mowing and disking. Reapply 100 lbs/ac of 0-20-20 yearly or as needed in the fall.
- **Recommend Herbicides:** A preemerge application of Pursuit (4-fl. oz/ac) or Prowl 3.3 EC (1 to 3 pts/ac) will control many warm-season annual weeds. Use a postemergence application of Select (10-fl. oz/ac) or Poast Plus (2 to 3 pts/ac) to control grass weeds. You can also use an early postemergence application of Pursuit to control grass weeds.

Lablab
Lablab purpureus

- **Description:** A very drought-tolerant, fast-growing, erect, warm-season legume that is weakly perennial and does not readily reseed. Highly preferred by deer. Used widely in south Texas.
- **Soil Adaptation:** Grows on well-drained, sandy, upland sites; does not tolerate wet soils.
- **Planting Dates:** April 1 through June 1
- **Soil pH Range:** 5.5 to 7.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 before planting and disk into the seedbed.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 5 lbs/ acre; broadcast 10 lbs/ac. Cover seeds 1 inch deep.
- **Varieties:** Rongai, Highworth, Rio Verde
- **Inoculant Strain:** EL
- **Companion Plants:** Alyceclover, millet, corn, and grain sorghum.
- **Management:** Seedlings are not competitive; keep seedbed free of weeds. In areas of high deer density, you may have to prevent grazing for the first month following germination to allow establishment. Reseed each year.
- **Recommend Herbicides:** A preemergence application of Pursuit (4-fl. oz/ac) or Prowl 3.3 EC (1 to 3 pts/ac) will control many warm-season annual weeds. Use a postemergence application of Select (10-fl. oz/ac) or Poast Plus (2 to 3 pts/ac) to control grass weeds. Where sicklepod is a problem, we recommend a postemergence application of either Frontrow (0.4-fl. oz/ac), Blazer (2 pts/ac), or Butyrac 200 (2 pts/ac). You can also use an early postemergence application of Pursuit to control grass weeds.

Lespedeza, Annual
Kummerowia spp.

- **Description:** Kobe, common, and Korean lespedeza are reseeding annual legumes. Kobe and common grows about 6 to 10 inches in height, and Korean grows about 12 to 18 inches high. All produce highly preferred seed for quail, but less used by turkey.
- **Soil Adaptation:** Adapted to well-drained soils; primarily sandy loams to clay loams. Shade tolerant.
- **Planting Dates:** March 1 through April 1
- **Soil pH Range:** 5.8 to 6.5
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 0-20-20 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 20 lbs/ac; broadcast 30 lbs/ac. Cover seeds ½ inch deep.
- **Varieties:** Common, Kobe, Korean
- **Inoculant Strain:** EL
- **Companion Plants:** Native warm-season grasses, partridge pea.
- **Management:** You can promote reseeding by light disking in October and fertilizing with 100 lbs/ac of 0-20-20 the following March.
- **Recommend Herbicides:** Use a postemergence application of Select (10-fl. oz/ac) or Poast Plus (2 to 3 pts/ac) to control undesirable grasses.

Partridge Pea
Chamaecrista fasciculata

- **Description:** A reseeding, warm-season annual legume with small, fern-like leaves, yellow flowers, and short pods containing hard, black seeds. Grows naturally along roadsides, fence rows, ditch banks, and in fallow fields. Seeds are a staple of quail and late summer foliage creates excellent "bugging" areas for quail and turkey.
- **Soil Adaptation:** Grows naturally on all soils throughout the southeastern United States, especially following disturbance.
- **Planting Dates:** February 1 through May 1
- **Soil pH Range:** 4.8 to 7.5
- **Fertilization:** Not required on fertile sites; infertile sites require 100 lbs/ac of 0-20-20 applied following stand establishment.
- **Soil Preparation:** Partridge pea can be planted on closely mowed grasses and lightly disked in, or planted in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 6 lbs/ac; broadcast 10 lbs/ac of scarified seed. Cover seeds ½ to 1 inch deep.
- **Varieties:** Lark Selection, Showy, Commanche
- **Inoculant Strain:** EL
- **Companion Plants:** Annual lespedeza, native warm-season grasses.
- **Management:** Disk or burn in mid through late winter about every third year to ensure proper reseeding. Increase seed production by applying 100 lbs/ac of 0-20-20 in May.
- **Recommended Herbicides:** When planting in mixes with native warm-season grasses a preemergence application of Plateau (6 to 10-fl. oz/ac) will control perennial grass and broadleaf weed species.

Soybeans
Glycine max

- **Description:** A warm-season annual legume. Provides excellent forage for deer and seeds for dove, quail, and turkey.
- **Soil Adaptation:** Adapted to most soil types and conditions.
- **Planting Dates:** April 15 through June 1
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 50 lbs/ac of 0-46-0 and 50 lbs/ac of 0-0-60 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 30 lbs/ac in 32- to 46-inch wide rows; broadcast 60 lbs/ac. Cover seeds ½ to 1 inch deep.
- **Varieties:** Commercial varieties, Hutchinson, Tyrone, Large Ladd
- **Inoculant Strain:** S
- **Companion Plants:** Corn, Egyptian wheat, and grain sorghum.
- **Management:** Large plots may be required in areas of high deer density and you may have to prevent grazing for the first month following germination to allow plots to become established.
- **Recommended Herbicides:** Roundup Ready systems are recommended; use a preemergence application of Pursuit (4-fl. oz/ac) or Prowl 3.3 EC (1 to 3 pts/ac) to control many warm-season annual weeds. Use a postemergence application of Select (10-fl. oz/ac) or Poast Plus (2 to 3 pts/ac) to control grass weeds. Where sicklepod is a problem, we recommend a postemergence application of either Frontrow (0.4-fl. oz/ac), Blazer (2 pts/ac), or Butyrac 200 (2 pts/ac). You can also use an early postemergence application of Pursuit to control grass weeds.

Soybeans, Wildlife
Glycine spp.

- **Description:** A trailing/climbing, warm-season, annual legume. Provides excellent forage for deer and rabbits and seeds for quail and turkey.
- **Soil Adaptation:** Adapted to most soil types and conditions.
- **Planting Dates:** April 15 through June 15
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 50 lbs/ac of 0-46-0 and 50 lbs/ac of 0-0-60 at time of planting.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 10 lbs/ac in 32- to 46-inch wide rows; broadcast 25 lbs/ac. Cover seeds ½ to 1 inch deep.
- **Varieties:** Laredo, Quail Haven, White-tail Thicket
- **Inoculant Strain:** S
- **Companion Plants:** Corn, Egyptian wheat, and grain sorghum.
- **Management:** In areas of high deer density, you may have to prevent grazing for the first 30 to 60 days after germination to allow plots to become established. Works well in seed mixtures with corn, Egyptian wheat, and grain sorghum; the vines climb the stalks. May reseed naturally if disked in early spring. High deer populations may result in little or no reseeding of stand.
- **Recommended Herbicides:** Roundup Ready systems are recommended; use a preemergence application of Pursuit (4-fl. oz/ac) or Prowl 3.3 EC (1 to 3 pts/ac) to control many warm-season annual weeds. Use a postemergence application of Select (10-fl. oz/ac) or Poast Plus 2 to 3 pts/ac) to control grass weeds. Where sicklepod is a problem, we recommend a postemergence application of either Frontrow (0.4-fl. oz/ac), Blazer (2 pts/ac), or Butyrac 200 (2 pts/ac). You can also use an early postemergence application of Pursuit to control grass weeds.

Other Forbs

Buckwheat
Fagopyrum esculentum

- **Description:** A warm-season annual grain. Deer, rabbits, and turkey eat the foliage and dove, quail, turkey, and songbirds eat the seed.
- **Soil Adaptation:** Widely adapted to fertile and infertile soils. Grows best on well-drained sites.
- **Planting Dates:** May 1 to June 1
- **Soil pH Range:** 6.0 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 100 lbs/ac of 0-20-20 and 150 lbs/ac of 34-0-0 once stand is established.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 40 lbs/ac; broadcast 60 lbs/ac. Cover seeds ¼ to ½ inch deep.
- **Varieties:** Japanese, Silverhull, Common Gray, Mancan, Manor, Royal, Tokyo
- **Companion Plants:** Sunflower, millets, and grain sorghum.
- **Management:** Can mature quickly (65 to 80 days), and seed production is hurt by high temperatures, so early planting is best. Lodging is common.
- **Recommended Herbicides:** None Recommended.

Sunflower
Helianthus annuus

- **Description:** A warm-season annual that is a highly sought and favored food source for mourning doves. Seeds are also used by many songbirds with moderate use by quail and turkey. Black oil hybrid varieties are recommended.
- **Soil Adaptation:** Best adapted to fertile, well-drained soils.
- **Planting Dates:** April 1 through May 15. If planted for doves, plant 135 days before first intended hunting date (April 15 to ensure seed maturity for dove shoots for September 1 season).
- **Soil pH:** 5.4 to 7.0
- **Fertilization:** Apply fertilizer according to soil test recommendations, or apply 150 lbs/ac of 0-20-20 + 350 lbs/ac of 34-0-0. Apply 0-20-20 before or at planting; half the 34-0-0 rate can be applied at planting and the remainder applied 10 to 14 days, postemergence.
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 4 lbs/ac in 36- to 38-inch wide rows; broadcast 15 lbs/ac. Cover seeds 1 to 2 inches deep. BROADCAST PLANTING IS NOT RECOMMENDED FOR THIS CROP.
- **Varieties:** Commercial Black Oil Hybrids, Peredovick (110 to 120-day maturity for all varieties)
- **Companion Plants:** Millets, grain sorghum; usually in strips.
- **Management:** Excellent results have been observed when applying 100 to 120 units/ac liquid nitrogen with a "knife rig" at 10 to 14 days postemergence. Such postemergence nitrogen applications may reduce browsing damage by deer. You can mow several strips through the plot to clean the ground and scatter the seeds; start about 2 weeks before dove season. YOU MUST CONTROL WEEDS FOR DOVE FIELDS BECAUSE DOVES REQUIRE BARE GROUND TO FEED.
- **Recommended Herbicides:** Dual Magnum (1 to 1.5 pts/ac) and Spartan (3 to 5 fl. oz/ac) should be tank-mixed and applied preemergence to provide the best results for grass and broadleaf weed control. A postemergence application of Select 2EC (6 to 16 fl. oz/ac + 1% crop oil), or Poast Plus (1 to 2.5 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary.

Chufa
Cyperus esculentus

- **Description:** A warm-season sedge that produces small, underground, nut-like tubers that are choice foods for turkey, deer, and ducks.
- **Soil Adaptation:** Grows on sandy to silty clay soils; grows on moist sites and can tolerate short duration flooding if plants are not completely submerged.
- **Planting Dates:** April 1 through June 1
- **Soil pH Range:** 5.5 to 7.0
- **Fertilization:** Soil tests are recommended, or apply 100 lbs/ac of 0-20-20 at time of planting and apply 100 lbs/ac of 46-0-0 postemergence (once the stand is established).
- **Soil Preparation:** Plant in a well-prepared, firm seedbed.
- **Planting Rates:** Drill 25 lbs/ac in 24- to 36-inch wide rows with 9-inch spaces between plants, or broadcast 40 lbs/ac. Cover tubers 1 inch deep.
- **Varieties:** Cypress Knee, Turkey Gold, Wingmaster
- **Companion Plants:** Grows best alone. Can be broadcast with Japanese millet for waterfowl plantings.
- **Management:** IF PLANTING TO ATTRACTWATERFOWL, YOU CANNOT MECHANICALLY MANIPULATE PLANTED CROPS IN THE SAME YEAR OF PLANTING. For waterfowl, you can broadcast chufa onto exposed mudflats after drawdown. Sites require 90 to 100 days without flooding to maximize tuber production. Flood sites at a shallow level from October to December to provide waterfowl access. We recommend that you uproot and expose some tubers for wildlife to find. Once species have discovered the tubers, they begin to dig them. Encourage second-year crops by light disking in March and reapplying 100 lbs/ac of 0-20-20 and 100 lbs/ac of 46-0-0 (only if the stand reoccurs). Chufa is a delicacy to raccoons and wild hogs and can be severely damaged if plots are small and populations are high. Rotate crops to avoid nematode infestations.
- **Recommended Herbicides:** A postemergence application of Select 2EC (10-fl. oz/ac + 1% crop oil), or Poast Plus (2 to 3 pts/ac + 1% crop oil) can be used to control undesirable grasses. Two applications 3 to 4 weeks apart may be necessary. Apply Banvel (1 pt/ac) postemergence to control undesirable broadleaf plants. DO NOT USE BANVEL + 2,4D.

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