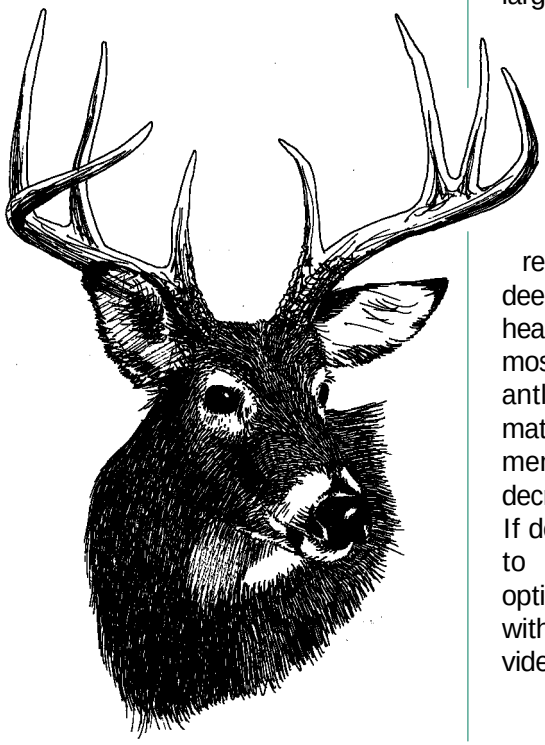
PRIVATE LAND PARTNERSHIPS
WORKING TOGETHER FOR WILDLIFE

WHITE-TAILED DEER

White-tailed deer live in every county in Michigan and use many different habitats across the state. Their ability to use a variety of habitats was one of the factors that allowed the deer herd to grow from a half million animals in 1972 to nearly two million in 1989. To outdoor enthusiasts who watch or hunt deer, this is exciting. However, to others, deer are considered to be a management problem. For instance, many areas of the state are overpopulated with white-tailed deer and for some farmers, fruit growers, and rural landowners, high numbers of white-tails pose an economic problem. They may also have a tremendous negative impact on our plant communities. Therefore, as deer populations increase, there is an inevitable result of habitat deterioration, lowered deer production and health, and frequent deer die-off. Too many deer also make for unsafe driving conditions. Thus, consider these negative impacts before deciding to manage for deer. Remember that your decisions will affect not only yourself, but also your neighbors.



To effectively manage the entire population of white-tailed deer in your area, you would need 600 to 3000 acres. However, if you would like to attract deer to your area you can do this with a minimum of 10 to 20 acres. The number of deer in an area depends on the kind and quality of habitat available, and the rate of deer loss. Currently, there is an annual surplus of deer because there is a large amount of quality habitat.

Since adult deer have few natural predators, harvesting deer through hunting helps to keep the herd in balance. A deer herd can increase rapidly, therefore, it is necessary to remove at least one- quarter of the deer herd each year to maintain a healthy and stable population. In most cases, half of these deer are antlerless. In addition, managing mature forests and discouraging fragmentation will help control or decrease deer numbers in your area. If deer are a problem, you may want to consider these management options. You may also wish to consult with a wildlife biologist who can provide guidance with this problem.

Deer Habitat

Deer thrive best in areas with young forests and brush where they feed on buds, branches, fresh grass, and green leaves that are close to the ground. In an older forest, these resources are not within their reach. If a forest stand is too old to support deer, quality habitat can be created by logging and developing forest openings. If existing habitat is fields, croplands, marshes, or other young cover types, deer habitat improvement may involve the planting of grasses, trees, shrubs, or annual food plots.

It is important to note that habitat needs for whitetails vary by season and area of the state. Deer, in different parts of Michigan, use different types of cover. In northern Michigan, deer may use a conifer swamp during cold winter days and venture out to feed on brush and young trees during milder days. Farmland deer may bed in woodlots, protect their fawns in cattail marshes, and feed in corn fields. Suburban deer may bed in cemeteries, graze on golf courses, and seek cover on a brushy hillside behind a shopping center.

Spring and Summer

When spring arrives, deer are looking for green growth to help them recover from limited and low-quality winter food. Deer feed throughout the early morning and spend the rest of the day bedded down along the edge of a field or in heavy cover such as cattail swales. They feed again from dusk until midnight spending

the remainder of the night resting in seclusion.

During spring and summer, it is important to have fields that green up early. They favor early growing grasses and legumes such as Canada wild-rye, June grass, orchard grass, blue grass, timothy, and clovers like medium-red, alsike, and ladino.

Because of the lower nutrient value of winter foods, it is important for does to increase their nutrient intake in spring to prepare for fawning. Improved nutrition promotes healthier fawns and better antler growth. Mineral blocks placed near field edges can be beneficial only if quality spring food is available.

During late May and early June, does enter the period when birthing and raising this year's fawns are their primary focus. Michigan deer are very productive animals. More than 90 percent of the adult does become pregnant, and most carry twins. The herd size may increase at an average annual rate of 20 to 30 percent. In some areas, the population may double in three years.

During summer, food is much more abundant than at other times of the year. Summer foods include leaves of select trees and shrubs such as aspen, red maple, white ash, blackberries, dogwoods and sassafras. Important grasses for food include orchard grass, timothy, blue grass, redtop, wheat, and oats. Deer also eat agricultural crops of corn, soybeans, buckwheat, clovers, and alfalfa. Common ragweed, lamb's quarter, jewelweed, orchids, garden vegetables, and ornamentals are also heavily grazed.

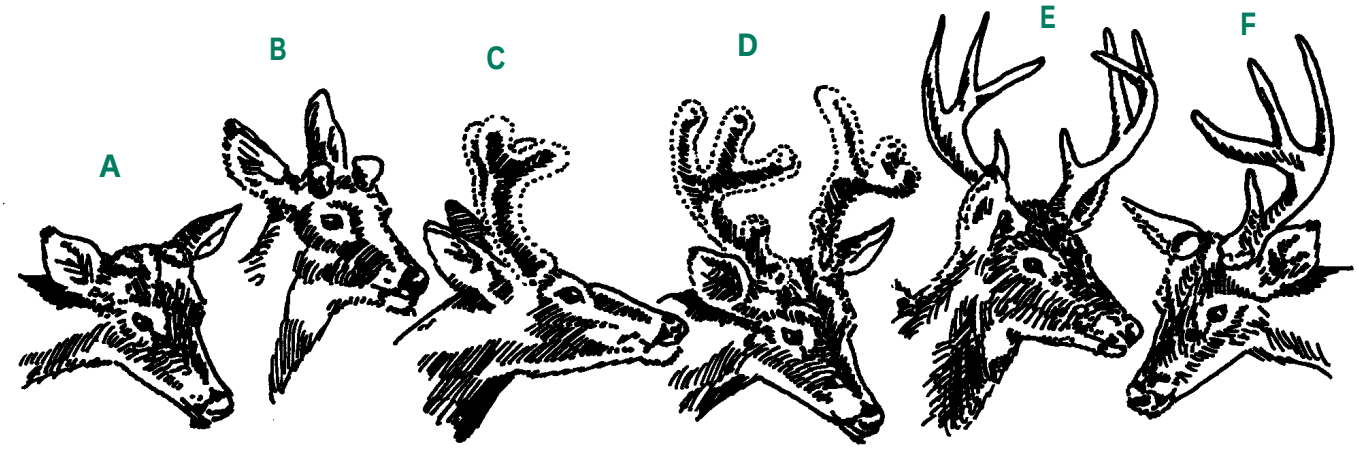
Autumn

The major activity for deer in autumn is breeding. During this time deer move considerable distances as part of their breeding behavior and in response to changes in food supplies. Autumn nutrition is important to deer since their physical condition as they approach winter has a strong bearing on their survival. During this period, deer must build fat reserves to help them survive. Fall foods must be abundant and high in nutritional value. Important foods include acorns, beech nuts, crabapples, maple and dogwood leaves, willow, and brambles. Preferred agricultural crops include corn, soybeans, apples, and fall-planted grains such as wheat.

Vegetative cover used during autumn is similar to that used during summer months. Open areas are used during the night, while in daytime brushy areas are preferred. Standing corn is not only a high quality food source, it is also often used during the fall as escape cover, as well as travel and resting sites. Quality fall cover includes cattail swales, standing corn, switchgrass fields, and plantations of young pines 10 to 20 years old.

Winter

Winter is the most critical season of the year. Deer mortality can be excessive if food and thermal cover are inadequate. Winter losses in local areas can range from as low as five percent in quality food areas to 50



(A) January 30 — Recently shed, pedicles healing.
(B) March 15 — New antler growth beginning.
(C) May 1 — Antlers begin to branch
(D) June 30 — All tines are formed, growth will continue until velvet is shed.
(E) September 15 — Antlers fully developed.
(F) January 15 — Antler shedding occurs.

percent where food resources are severely restricted. Winter mortality depends on winter severity, and quality and quantity of available food.

During winter, protection from the cold and wind is important. Cover can be provided by hardwood and conifer swamps, brushy areas, and dense switchgrass or pines. Swamp conifers and hemlock are important because they help slow the wind and serve as thermal cover. Three to 10 acre dense plantations of spruce or Jack pine, 10 to 25 feet tall, also provide beneficial winter cover.

Important winter food sources include white pine, white cedar, red maple, yellow birch, dogwood, viburnum, sumac, and aspen. Since the major food during this season is woody browse, branches, buds, and leaves must be within reach to provide benefits. These foods are abundant in wooded areas that have had recent logging activity.

Deer movements during the winter months decrease and they may spend most of their time near winter cover. It is important that they find food within one-quarter mile of this cover. In areas of adequate soil quality and growing season length, agricultural crops planted near winter cover are of considerable value.

Management Activities

The following are options to consider when managing for deer:

•*Aspen management:* Clearcut one to ten acre areas on a rotating basis so that the overall stand has a chance to regenerate every 40 years. These cuttings should be at least 100 feet wide, irregularly shaped to provide maximum edge, and well distributed to prevent an over-concentration of deer. The goal is to conduct one or two cuttings within every 40 acres of forest, every ten years. For maximum regeneration, cut the trees in winter. To provide escape cover, leave clumps of aspen or other tree species within clearcuts larger than 15 acres. Also spare one to three standing dead or dying trees per acre because these provide den sites for wildlife.

•*Oak management:* Manage the stand for full crowns and reduced competition from other trees. Thinning oak and beech stands allow the remaining trees to grow into large, more consistent nut-producing trees as well as promoting new growth. Thin 20 - 50% of the canopy every 10 - 20 years. This management option is optimal for areas with lower populations of deer since areas with high populations will have less regeneration because of heavy browsing on saplings.

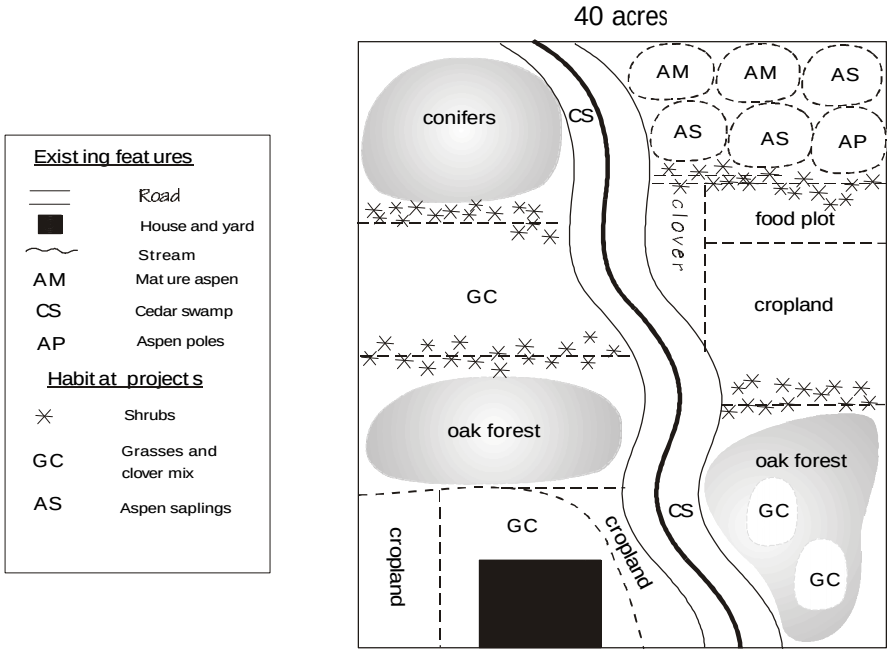
•*Northern forest management (hemlock and white cedar)*: Cutting in these areas is discouraged. These tree species have dif-ficulty regenerating when heavily browsed. The best habitat contains 70 percent canopy closure. These conditions reduce ground-level snow accumulations, provide warmer nighttime temperatures, and decrease wind chills. Deer are able to subsist on the choice woody browse within such stands.

Deer food: Aspen leaves and branches, acorns, and crabapples

•*Grassland management:* Maintain areas one to five acres in size per 40 acres. Openings should be at least 100 feet wide and irregularly shaped. Once established, openings should be maintained by mowing or burning. Plant high quality travel corridors of trees, shrubs, or grasses for food and cover. Plant early growing grasses for spring food near woods, fencerows, wetlands, and brushy areas. These fields should be 1 to 5 acres in size and at least 60 feet wide. Fields on east- or south-facing slopes are preferred since they are likely to green up earlier. Ideal fawning areas consist of grassy areas located next to forest edges, with heavy, concealing ground cover. Fawning areas produce higher quality forage if mowed and fertilized in August every third year.

Techniques to Deter Deer

Where deer are considered a nuisance because of crop damage, many



This map is an example that demonstrates the many management options discussed throughout this chapter. The option(s) you choose should depend not only on your goals, but the location, condition, and present use of your land.

techniques can be practiced to protect crops or reduce crop losses. Planting lure crops of buckwheat, turnips, clover, corn, or soybeans on idle land, or set-aside lands may encourage deer to eat less crops designated for harvest. Plant these lure crops between major woodlands and production fields. Increasing woodland foods may also deter deer from your crops. Although there are some habitat changes and crop management techniques that reduce crop loss to deer, hunting is the most effective and least expensive way to control crop damage.

There may be special hunting permits available for landowners with extensive deer problems. These permits may be obtained by landowners with documented cases of agricultural and horticultural damage. Other permits may be obtained by landowners in areas with documented deer diseases that affect livestock, human health, the welfare of the deer herd or an area of serious deer over population. These special permits may be used to harvest antlerless deer only, and do not count against a hunter's regular bag limit.

In summary, it is relatively easy to attract deer to your property. However, it is difficult for a landowner to manage an entire population. Remember, if you attract deer, there are negative impacts that may occur not only to your land but the surrounding. Choose your management options carefully to either maintain, increase, or decrease deer on your property.

FOR ADDITIONAL CHAPTERS CONTACT:
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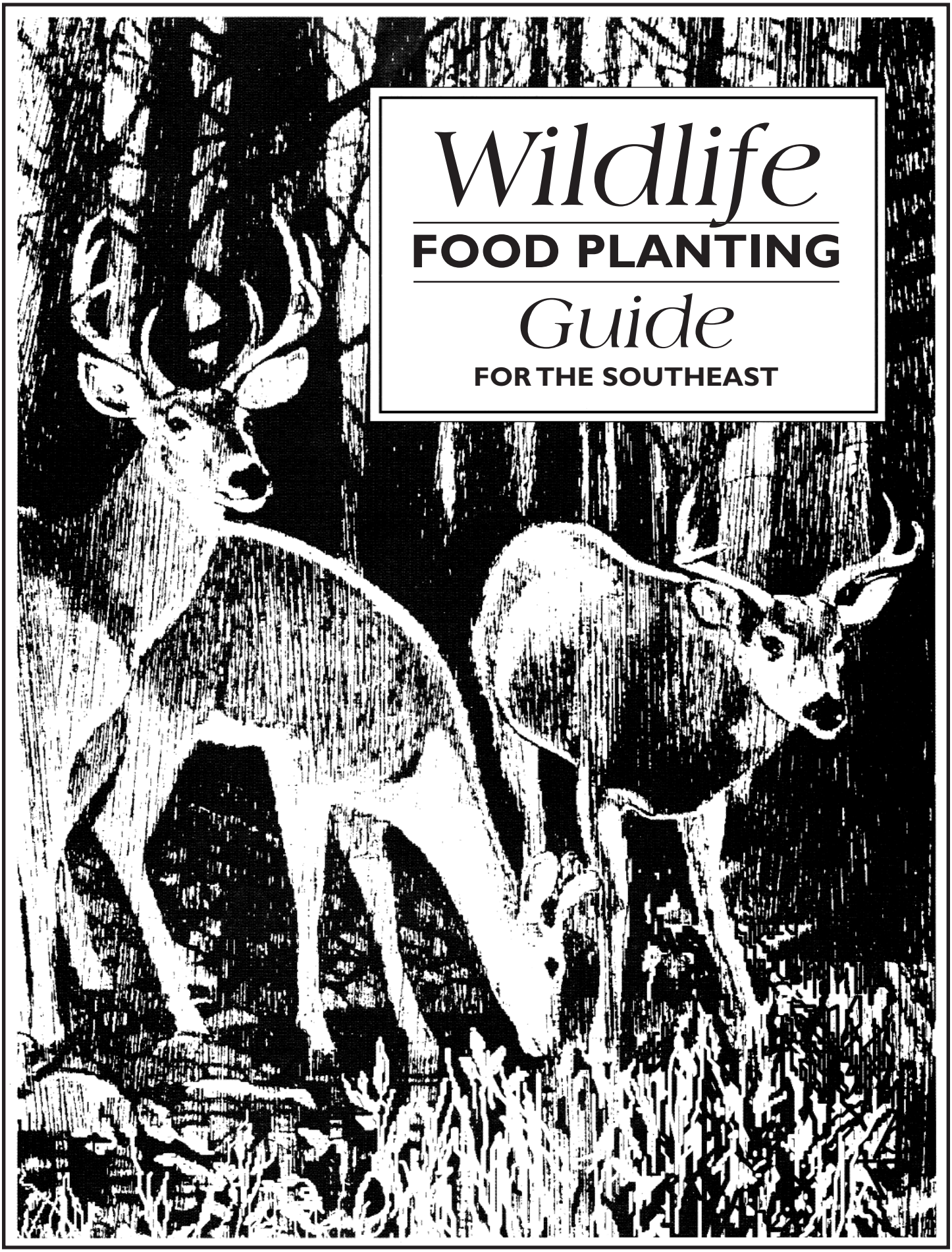
Private Land Partnerships: This partnership was formed between both private and public organizations in order to address private lands wildlife issues. Individuals share resources, information and expertise. This landowner's guide has been a combined effort between these groups working towards one goal: Natural Resources Education. We hope this guide provides you with the knowledge and the motivation to make positive changes for our environment.

Revised August 2004



Wildlife
FOOD PLANTING
Guide
FOR THE SOUTHEAST

Wildlife FOOD PLANTING Guide

FOR THE SOUTHEAST

Contents

Diverse habitat, including a mixture of different forest types and openings, is important to meeting needs of wildlife.

Disking strips in openings next to timber sets back natural succession, which helps meet needs for early successional species such as bobwhite quail.

Prescribed burning in pine forests is one of the most important cost-effective and beneficial tools forest and wildlife managers use.

Wildlife FOOD PLANTING Guide FOR THE SOUTHEAST

Wildlife require suitable, healthy living areas to survive and increase population numbers. The living areas must provide the food, cover, space, and water needs of different animals. Together, these components create an animal's habitat. Management of native vegetative species, from forbs (weeds) to mature trees, will impact habitat quality more than any food planting or supplemental efforts. Also, for many wildlife species, especially the ones mentioned in this publication, habitat management must include proper protection and harvest.

This guide has been designed for the Southeast to help landowners, recreation clubs, and hunters better manage populations of white-tailed deer, eastern wild turkey, bobwhite quail, mourning dove, and various species of waterfowl. These same techniques also will benefit many nongame wildlife species.

This guide covers several wildlife habitat and food-planting management techniques. The techniques provide information to increase natural food production, supplement the diets of game species, improve recreation, and to manage populations to meet user objectives. This guide is based on proven wildlife management techniques and ongoing wildlife research and is written to provide information that will help meet recreational and management objectives.

Soil and Vegetation Disturbances

Soil quality determines wildlife habitat and population potential. Soil disturbances, such as timber harvest, disking, mowing, and prescribed burning, can improve wildlife habitat, and, if you do it correctly, can reduce the need for food plantings. However, for the best vegetative habitat diversity and to help in wildlife harvest and viewing, you might want a mixture of both natural vegetation and food plots.

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. Disking also increases insect production. The best method of disking is "strip disking." This technique works best with fields (pastures or agricultural) and rights-of-way but may also be used in stands of open timber. The key is to disk strips that are 30 to 50 feet wide to leave similarly undisked strips in between them. Do this alternately across the length of the field or area. You should disk strips every 3 years or so for quail.

Strip disking is excellent for providing nesting and broodrearing habitat, insect production, and important seed (food) production for quail and turkeys. As an example, blackberries, an important food to deer, turkeys, and quail, grow on an average 3-year rotation and can be promoted on a 3-year disking schedule. Aquatic plants (such as maidencane and smartweed), which are important duck foods at certain times, can be encouraged by spring and summer disking in drawndown ponds or marshy areas. Legumes (such as partridge pea, beggarweed, vetches), forbs (such as croton, ragweed), and large seeded grasses can be encouraged with winter-to-spring disking of fields and plots. Always disk on the contour to prevent or to minimize soil erosion.

Mowing is used primarily for the bobwhite quail and wild turkey. Late-winter (February) and late-summer (August) mowing attracts insects that are critical in the diets of juvenile birds. Late-summer mowing of grassy plots and fallow fields can increase nutrient availability of plants by providing fresh, green growth. The highest nutrient availability in grasses is in the first 8 inches of growth. Mowing can also help provide browse for deer.

Prescribed burning is the skillful use of fire to natural fuels, under confinement, to get planned benefits for forest or wildlife. Prescribed burning often is the most economical

and beneficial tool in wildlife management. It is also a controversial because of possible landowner liability and smoke management health concerns. Prescribed burning is often used in pine or upland mixed pine hardwood stands to reduce dry fuel hazards, to control hardwood competition, and to prepare sites for replanting of trees. Besides these timber management benefits, wildlife benefits include ground exposure, seed spread, legume spread, hardwood butt sprouts, and growth of nutrient-rich forbs, vines, and browse. **Only responsible, trained, experienced persons should do prescribed burning! Report all unattended fires to state forestry personnel.**

Landowners must have a burning permit to burn in any state. You can get the permit by contacting the state forestry agency. Also, several states, including Mississippi, have prescribed burn laws that might require training, certification as a burn applicator, and written plans before burning. Although a 1- to 2-year burning cycle is ideal for quail, an average 3- to 5-year burning schedule is best for maintaining habitat diversity for many other game species. A 3- to 5-year burning rotation consists of burning 1/3 to 1/5 of the habitat each year. By doing so, you maintain different plant stages in the habitat, ensuring enough food production and good reproductive, escape, and resting cover.

Here are some safe burning conditions that can bring greatest wildlife benefits:

1. Burning in January and February, when temperatures are lower than 40 °F.
2. Burning with wind speeds of 3 to 10 mph.
3. Burning with a relative humidity of 50 to 70 percent.
4. Burning at night when the humidity is higher, for safety reasons. (Note: Smoke is harder to manage at night, though.)
5. Burning with a backfire where possible.

Do not practice any of these during the critical March to August nesting periods for bobwhite quail, turkey, and other ground-nesting species of interest.

The goal is to keep fire between ground level and 18 inches high. Limit burning to fields or stands of pine at least 10 years old. Restrict fire from hardwood stands. Unlike southern yellow pines, the cambium layer of most hardwood species can stand only 120 °F of heat. The best wildlife burn is a patchy or incomplete burn, which will increase habitat diversity.

You can get professional help from state or federal agency wildlife biologists, forestry specialists, and private consultants. Many state forestry agencies will schedule and conduct burns on private lands for a small fee.

Openings

Openings are various-sized areas in the habitat where sunlight reaches the ground. Openings are critical for a variety of species. They provide low growth that attracts insects and provides green forage and other foodstuffs near ground level for deer, quail, turkeys, and other species. Openings can vary in size from a few square feet to many acres. A list of a few different openings might include pastures, agricultural fields, power lines, gas lines, road rights-of-way, and timber harvest areas. For example, turkeys can thrive in forested habitats that have anywhere from 15 to 60 acres of opening per 100 acres of habitat.

These areas naturally provide food and cover for wildlife but can also be controlled or planted to various crops. For example, you can strip plow or mow them and/or plant to foliage, such as bahiagrass or clover that attracts insects. Bobwhite quail and turkeys often nest near these areas, which serve as good sources of food and cover.

Clearcuts (harvest cuts) can be used to create openings and, if planned and harvested properly, can provide diverse habitat edges, excellent cover for nesting, brood rearing, and escape, and lots of nutrient-rich forage/foods. Small, irregularly shaped harvest cuts with streamside management zones (strips of timber left along drains) provide excellent habitat, if these areas are part of a mix of different habitat types. Depending on initial tree spacing and site quality, an area that has been harvest cut might provide good quail habitat for up to 3 to 4 years after replanting. Later in the rotation, if pine is being grown, with proper thinning and burning, these areas can again provide excellent habitat. Best deer browse occurs 2 to 4 years following complete timber harvest, and food and cover benefits can continue for years with proper timber/wildlife management.

Group selection, individual tree selection, thinning, seed tree, and other methods of timber harvest can create small to large openings that can be suitable for planting. These harvests, when paired with other practices, such as burning, can magnify benefits to wildlife species.

Forest openings provide important components for wildlife species and also can be suitable for planting supplemental forages.

Clear-cuts (harvest cuts), as shown in this aerial view, provide good, early succesional habitat for some species. Streamside management zones (SMZ's) protect water quality and provide travel and feeding areas.

White-tailed deer are known to feed on more than 700 different species of plants and are characterized as browsers.

Supplemental forages (cool and warm seasons) can help meet late-summer and winter (stress periods) needs of white-tailed deer.

Honeysuckle (Lonicera japonica) is likely the most important vine in the Southeast for white-tailed deer and can be enhanced with fertilizer.

Blackberry (shown) and dewberry (Rubus species) are important native vines. They provide browse and fruit.

Fruit-bearing hardwood trees, shrubs, and vines that provide food (including browse) for deer in the Southeast include the follwing:

Trees

Beech
Black Cherry
Blach Haw
Black Locust
Crab Apple
Dogwood
Hackberry
Honey Locust
Mulberry
Oaks
Persimmon
Redbud
Red Maple
Sassafrass
Wild Plum

Shrubs

American Beautyberry
Elderberry
Gallberry
Rhododendron
Serviceberry
Sumac
Witch Hazel

Vines

Blackberry
Greenbriar
Honeysuckle
Muscadine
Poison Ivy
Virginia Creeper

White-Tailed Deer

Habitat and Food Requirements

The white-tailed deer (doe) has an average home range of at least 1 square mile (640 acres), while mature bucks may range more than 3,000 acres annually. When basic biological needs for white-tailed deer are met on a suitably sized unit of land, deer might be less likely to leave, unless pressured by people, environmental conditions, or other animals. Mature hardwood forests, mixed pine-hardwood forests, pine forests (including managed plantations and natural forest), and open fields are some habitat types useful in helping meet habitat requirements.

The white-tailed deer browses on grass and other plants. It has four stomachs that help digest various foods, making it versatile in its feeding habits. It eats a variety of leaves, twigs, bark, buds of trees and shrubs, plus hard and soft fruits, vines, forbs, lichens, mushrooms, cultivated crops, and some grasses.

As far as nutrition, the two most critical times for white-tailed deer are late summer, when deer population levels are high and food quality is poor, and late winter, when food quality and quantity are low and mast (fruit) from oaks and other trees is scarce. These are times food plots can be good for deer. If at least one percent of an area is planted in food plots, the plots can positively benefit white-tails.

During the spring and early summer, deer browse is high in protein and complex carbohydrates. At this time, weights are increased for winter. Body fat stores are increased during the fall and early winter months with a variety of mast crops, including red and white oak acorns, which are good sources of carbohydrates.

Wild turkeys pick up seed heads, green forage, and insects in grassy openings. Hens prefer to nest near openings.

Eastern Wild Turkey

Habitat and Food Requirements

The eastern wild turkey has an average home range of about 1,500 to 3,000 plus acres, with hens having smaller home ranges on average than mature gobblers. It is hard to manage wild turkey populations on small tracts of land, but it can be done. Protection with gates and other ways to control access is critical to managing wild turkey populations.

The ideal habitat for turkey production includes a mixture of intensively managed (thinned and burned) pine plantations, natural pine forest, mixed pine-hardwood forest, mature hardwood forest (upland, bottomland, or creek bottom) for travel and mast production, and properly maintained roadsides and openings for reproductive, broodrearing, and feeding areas.

Openings are an important part of wild turkey habitat, and you will need several small and large permanent openings. A range of 25 to 50 percent of the total area to be managed for wild turkeys should be in small to large, permanent, grassy openings. You can easily manage turkeys, even if timber is your main objective. You can leave a streamside management zone (SMZ) when you harvest timber. SMZ's can include hardwoods and/or pines left along creeks and drains to protect water quality and to provide travel paths and mast production for wildlife.

Turkeys often use intensively managed plantations that are thinned and burned as production areas (nesting, brood rearing, feeding). You can burn in pine stands as young as 10 years old. You can do commercial thinning early (13 to 17 years) in the rotation. Salvaged pine beetle (bug) spot areas, log loading decks, skid trails, and roadsides provide openings you can maintain in food plantings.

The eastern wild turkey is a strong scratcher and needs 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 feed maily on a wide variety of plant matter (seeds, leaves, fruits, tubers, forbs, grasses) and insects. In addition to grassy "bugging" areas, summer and winter food plantings that provide desirable foliage, fruit, and seed production are beneficial. During fall and early winter months, turkeys use mast crops of oaks, pines, and several other fruit-producing trees and shrubs (such as dogwoods and huckleberry).

Fruiting trees, shrubs, forbs, grasses, and vines in the diets of the wild turkeys include the following:

Trees and Shrubs

American Beautyberry
Autumn Olive
Barberry
Black Cherry
Black Gum
Black Locust
Crab Apple
Dogwood
Hawthorn
Honey Locust
Mountain Ash
Oaks
Persimmon
Pine
Redbud
Russian Olive
Serviceberry
Sumac
Wild Plum
Yaupon

Forbs and Grasses

Aquatic Sedge
Bahiagrass
Beggarweed
Bluestem
Johnsongrass
Lespedeza
Milk Pea
Orchard Grass
Panic Grass
Partridgeberry
Partridge Pea
Pokeweed
Ragweed
Vetch

Vines

Blackberry
Honeysuckle
Muscadine
Poison Ivy
Virginia Creeper

Field edges that have grown up around wood lines provide important cover for the bobwhite quail.

Bobwhite Quail

Habitat and Food Requirements

The bobwhite quail has an average home range of about 40 acres, but quail might stray from these areas if the habitat doesn't meet certain requirements. Bobwhites are an easy game bird to manage on smaller tracts of land. Population numbers have been declining over the last 30 years, and the decline has increased over the last 10 years.

Bobwhites are an "edge" and early successional stage species and need a mixed pattern of open ground and weedy/grassy habitat and/or open (thinned and burned) timber. The best basal area (cross sectional square footage of trees on a per acre basis) for quail is a range of 40 to 60 square feet per acre. It is difficult to produce quail long term in short rotation pine pulpwood stands.

Harvest cut areas can provide good habitat and hunting for quail for up to 3 to 4 years after harvest, though. With proper management, these areas might provide good numbers of birds for 5 to 6 years. For sawtimber rotations, thinning, prescribed burning, mowing, and disking are beneficial quail management techniques where timber is the key objective.

The bobwhite quail favors patchy farming techniques where you keep 5-acre and smaller patches of different early successional habitats to include an abundance of brushy fence rows, ditch banks, and strips of open timber separating fields. Loss of suitable habitat because of clean farming techniques, loss of small farming operations, and other changes in land-use patterns have limited bobwhite quail populations.

The most critical factors in quail management include providing the right mix (mosaic) of habitat to meet food, bare ground, and cover needs. Quail will not venture far out into a large, open field to feed because of lack of cover. Neither can they scratch out foods in areas of heavy cover, if the seeds are available. You can ease these situations by mixing habitats and by creating transitional zones in the habitat. A transition is a middle habitat between two types of habitat.

The following are suggestions where transitional zones improve quail habitat:

- Build several long fences (preferably wooden, in a criss-crossed pattern) and let them grow up in vegetation. You can enhance this by fertilizing and planting rows of shrub lespedeza, honeysuckle, or muscadine on both sides of the fence row. Leave a buffer strip of 10 to 30 feet on both sides of the fence. You can plant this area to desirable seed-producing plants or perennial grasses that attract insects and can be mowed in late winter. A good substitute for fences would be to push up windrows where cut slash is available.

- Let field edges grow up next to wood lines.
- Build brush piles in large open fields or harvest cut areas, then let a buffer grow up around the brush pile.
- Plant 6 to 10 rows of pines in open fields, bordered by strips of annual reseeding lespedeza or broom sedge.
- Leave 30-foot buffer zones between cultivated crops and trees alongside ditch banks, roadsides, or fence rows.

Bobwhite quail, as do wild turkeys, eat animal and plant matter. Quail chick diets are mainly insects for the first 2 weeks of life. After about 8 weeks, their diets are more like those of adults. Adult quail diets, although supplemented by insects, are seeds, fruits, acorns, forbs, and grasses/green matter. Food plantings that attract insects and produce green stuff and seeds can be beneficial at all times during the year, especially in late summer, when nesting and brood rearing are complete. In the Southeast, free water is not generally considered critical for bobwhite quail habitat. Although quail will drink available water, they can hold enough water from fruits, dew on foliage, and insects to meet their needs.

Numerous wild plants, trees, and shrubs are good food sources for bobwhites. You can produce many of these native plants by seasonal diskings.

The bicolor lespedeza plot in the center of this thinned pine stand provides cover and an important winter food source (seeds).

Trees, shrubs, forbs, and grasses that provide important food and/or cover for bobwhites include the following:

Trees and Shrubs

American Beautyberry
Autumn Olive
Barberry
Black Cherry
Black Gum
Crab Apple
Dogwood
Gallberry
Hawthorn
Huckleberry
Magnolia
Mountain Ash
Mulberry
Oaks
Persimmon
Pine
Privet
Redbud
Russian Olive
Serviceberry
Sumac
Sweet Bay
Wax Myrtle
Wild Plum
Yaupon

Forbs and Grasses

Beggarweed
Butterfly Pea
Bluestem
Common Ragweed
Cranesbill
Croton (Dove Weed)
Goldenrod
Johnsongrass
Lespedeza
Milk Pea
Panic Grass
Partridgeberry
Partridge Pea
Poison Oak
Pokeweed
Vetch

This grain sorghum field was established by disking, broadcasting seeds and fertilizer, and then covering the seeds with a disk drag.

Mourning Dove

Habitat and Food Requirements

Mourning doves are migratory game birds that usually migrate through the Southeast from early fall through winter. Even so, many will nest in the Southeast and have habitat requirements that must be met. Doves need "grit" (small bits of gravel and larger grains of sand) in their diets to help grind food in the gizzard. Doves are often seen on sand and graveled roadsides and in gravel pits. Also, a water source (such as a farm pond) is needed within approximately one mile of the food source. Doves are herbivores and are characterized as seed eaters. They feed primarily on the seeds of forbs, grasses, and small grains. Doves prefer to light in areas where the ground is bare and then walk to the food source. A large machine-harvested field attracts doves because of the clean ground and scattered seeds. Doves seek food by sight, prefer clean ground, and will not scratch or dig in the ground for food.

Doves are federally regulated migratory birds, and you should place extreme care and attention on federal and state regulations regarding dove field management. Consultation with wildlife biologists or enforcement officers might help avoid illegal field situations. Normal and acceptable agricultural practices typically have been considered legal dove shooting areas.

It is important to plant summer grain crops no later than June 15, if you want to attract doves to fields for dove shoots in September. Doves are easily attracted to prepared grain fields of at least 10 acres, and larger fields will attract proportionately greater numbers of birds. Planting techniques should use small seed and grain crops such as browntop millet, grain sorghum, corn, and sunflower. Crop production will be maximized if drilled, but broadcasting seeds, followed by light disking and dragging, will produce acceptable results. Harvests of portions of the field beginning 6 to 8 weeks in advance of expected shooting dates and continuing weekly until the shooting date might help hold doves on the field. Waste grain and bare ground are critical to the doves using the field.

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.

Wood ducks are cavity nesters and readily use man-made boxes. A metal guard will deter predators.

Waterfowl

Habitat and Food Requirements

The mallard and wood duck are two of the most popular species of waterfowl in the Southeast. Both of these ducks are herbivores, are characterized as grazers and seed eaters, and have diverse diets of grasses, forbs, seeds, fruits, acorns, cultivated crops, and aquatic plants. Mallards and wood ducks are further characterized as dabbling ducks or puddle ducks, and feed in shallow water.

Waterfowl are federally regulated, migratory species, and most nest from the northern tier of the United States into Canada. Wood ducks, however, also nest in the Southeast in great numbers, and, unlike most waterfowl (which are ground nesters), use natural tree or man-made cavities. The number of wood ducks can be increased by providing nest boxes around water sources where there are inadequate numbers of natural cavities.

Cover, food, and shallow water are habitat requirements important for waterfowl impoundment management. Farm/beaver ponds and other impoundments of at least 5 acres can be made attractive to waterfowl. Food plantings of corn, Japanese millet, and other small grains planted around the edges and in these impoundments can provide excellent habitat and good hunting. Those trees not producing small acorns and other duck foods can be removed from the pond's edge to allow seed-producing weeds and grasses to flourish. Water levels where beavers are active can be controlled by using the Clemson drain or similar devices.

One of the best techniques used in waterfowl management is the greentree reservoir. This technique involves constructing a levee in a hardwood drain or bottom (with an adequate water source such as a creek, sizeable watershed, or well) that contains oaks and other small, hard mast-producing trees and shrubs. Water levels are controlled via a structure such as a weir or flashboard riser. The timber is flooded in the fall to an average depth of about 18 inches and often attracts good numbers of dabbling ducks, depending on mast crops. Do not continue flooding longer than 4 to 5 months, to prevent timber damage. Landowners and clubs interested in this technique can receive technical and often material assistance regarding location, permits required, and/or cost estimates from the Natural Resource Conservation Service, Cooperative Extension Service, state wildlife agency, Ducks Unlimited, and U.S. Fish and Wildlife Service. Most of these areas are considered wetlands and might require federal and state approvals before development.

Similar techniques can be used with agricultural production areas, pastureland, and with any impoundment that has a water-control structure. These areas can be drained by March 1, and native food production can be promoted by disking and fertilizing the soil, or they can be planted to crops that will tolerate some flooding.

Some wild plants in wet areas or drawndown ponds are beneficial to ducks and might be enhanced by mechanical soil disturbance.

Crops that can tolerate some flooding include the following:

Browntop Millet
Buckwheat
Cattail Millet
Chufa
Corn
Egyptian Wheat
Grain Sorghum
Japanese Millet
Joint Vetch
Rice
Soybeans

Wild plants that might be enhanced by mechanical disturbance:

Aquatic Sedge
Arrowhead
Alligator Weed
Asiatic Dayflower
Barnyard Grass
Bladderwort
Bullrush
Coontail
Duckweed
Maidencane
Pickerel Weed
Pondweed
Saw Grass
Smartweed
Tearthumb
Water Primrose
Watershield

You can seed Japanese millet seed directly onto mud flats around ponds or in wet fields for waterfowl.

Supplemental Forages

Research indicates clearly that no one particular supplemental forage variety can meet all the needs of any one wildlife species on a year-round basis. However, combining different forages in food plantings, including warm and cool season forages, is an excellent way to maximize benefits of food plantings. Selections of adapted varieties should be based on soil and site characteristics, as well as cost and the wildlife species managed. Experiment with different varieties and planting combinations. Initially, plant small areas to serve as test plots before establishing large acreages.

Soil Quality and Fertilization

Wildlife seek and consume foods that are high in nutrient content. Since plants and animals are by-products of soil quality, determining soil quality and correcting problems in fertility and pH are the first steps in food-plot preparation.

To test soil quality, collect soil samples 3 months before planting. Soil testing kits are available from the Extension Service or Natural Resource Conservation Service. One way to sample soils is to collect a handful of topsoil from 3 to 5 locations throughout the plot. Mix the soil in a container and remove a small sample (handful) to go in a small bag. Label the container with name and address and include the plant variety to be planted in the plot (s). Soil test results can give different NPK and lime (pH) rates for particular plant varieties. Contact the agencies listed for information on analysis of samples.

Planting food plots without proper fertilization and liming wastes time and money and, in most cases, is of little value to wildlife. In addition to fertilizing food plantings, fer-

Soil testing, with follow-up treatment, will improve cost effectiveness, production, and use of food plantings. Contact your Extension office or NRCS office for kits and information.

Fertilize food planting based on the soil test recommendations. A small tractor and broadcast spreader will access most remote locations.

Many of the soils in the Southeast are acidic and need liming periodically to allow maximum forage production, quality, and to encourage annual reseeding.

tilizing native vegetation in fallow fields, along roadsides, fence rows, and wooded areas with scattered openings also has benefits. Honeysuckle, for example, is an excellent wild vine to fertilize for deer forage production. If you cannot get a soil test, for most cereal grains, use a good complete fertilizer with equal amounts of nitrogen, phosphorous, and potassium applied at the rate of 200 to 400 pounds per acre. NPK is expressed as a number on the fertilizer sack, such as 15-15-15. Most legumes, however, require only low nitrogen levels, such as 6-24-24.

Liming involves applying agricultural lime (if needed) to bring up soil pH to the proper level to maximize growth, yield, fertilizer efficiency, and palatability of food plantings. For slightly acidic soils, applying 2 to 4 tons per acre is generally required to adjust pH to the proper level. Many clovers need a pH of 6.5 to 7.0 to promote reseeding.

Food Plot Size, Shape, and Placement

Match food plot size to the animal species you are managing. The size of food plots can vary from a few square feet to 20 or more acres. Deer, for example, will best use a 1- to 3-acre plot every 100 acres, and quail will best use a ¼- to ½-acre plot every 15 to 20 acres. Generally, plans should address a percentage of the total area managed and/or controlled to be planted in food plots. Plant at least one percent of the managed area in food plots for deer.

For greatest plant diversity and cover, plant long, narrow plots between two or more types of timber stands. For example, plant a plot between a stand of hardwoods and a stand of pine, between two separate ages of pine stands, or on the edge of a clear cut near the surrounding timber. Planting fruit- and nut-producing trees and shrubs in plots can add diversity and increase wildlife use of these plantings.

Food-planting locations that might not impact timber production very much include wide fire lanes, rights-of-way of gas and power lines, logging roads, old log-loading decks, and small, salvaged spots of timber. You can also overseed permanent roadsides. Do not plant food plots next to public roads, since these plots are too easy to get to. You should control access to plots by gates and fencing placed at least 100 yards inside property boundaries.

Food plantings located near drains, bottomland, or flatwood sites usually are more productive because of soil fertility and topsoil depth. Unless you can reduce soil movement to insignificant levels, don't locate food plots on steep slopes that might erode. Unless waterfowl is the target species, don't plant areas that routinely flood. Available sunlight is a major consideration in food-planting placement. Although some plants and shrubs are shade tolerant, most are not.

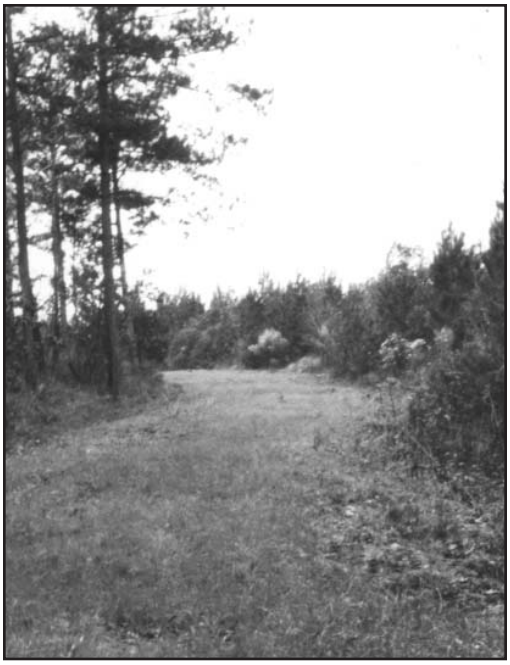
Preparing Food Plots

Some farm equipment is needed to plant and maintain wildlife food plantings. A tractor large enough to pull 5-foot implements is sufficient in most cases. Useful implements include a heavy-duty mower, disk, broadcaster (seeder), and a planter or drill with at least two rows. Although a row planter or drill is not essential, for most plantings it can be useful in making productive grain plots, and you can use it to plant areas that are level with little soil preparation (low till).

A hand seeder is also useful for planting small-seeded crops, such as clovers, or for seeding remote, wet, or steep areas. Direct seeding can be feasible for small seeded plants and might not require disking or other soil preparation. You can use direct seeding (no till) on roadsides, fire lanes, or other areas with freshly disturbed soils. Roadside food-planting management will provide edges, openings, and food for wildlife, as well as help control erosion of roads and ditches. Disk roadsides only along flat stretches and away from ditches. Fertilize and plant in a desirable grass, legume, or seed-producing plant. Cover with wheat straw or other type mulch to help prevent erosion and to hold seeds in place.

Soil-preparation techniques useful for food plots include fallowing and preparing firm seedbeds. Fallowing builds and maintains soil before planting legumes and is done by letting fields or plots lay out several months before planting. You can disk plots before planting time. To prepare firm seedbeds, let disked plots settle before planting. Usually this happens with one good rain and several days of sunshine. Lightly cover seeds by dragging a piece of railroad iron or a piece of chain link fence behind the seeder. Five tires chained together in a V will also cover seeds and help level plots.

It is important to locate food plots well away from public roads and place them (plots) where foods are needed (such as this young pine plantation).



This fire lane ryegrass planting can benefit timber and wildlife. It serves as a wide, green firebreak and a long food plot.

Adding sawtooth oak trees to this wheat plot adds diversity in the form of cover and a late-winter hard-mast component.

One percent of an area planted to year-round deer forages will positively impact the nutritional plane and response of white-tailed deer.

Wildlife Food-Planting Mixtures/Strip Planting

Food plots planted with two or more crops or mixtures provide diverse food and cover and often are used by more wildlife species than a one-crop field. These mixed plots can provide year-round use on smaller acreage. When planted, if one crop does not make, a second or third probably will produce. The better technique used for mixing crops is strip planting. Plant several long strips about 30 to 40 feet wide to alternating crops.

The following plant mixtures work well in a single plot. If you plant them together rather than in strips, there will be some competition.

Mixes	Planting Dates
Deer and Turkey	
Forage Cowpeas, Alyce Clover, Joint Vetch	May 1 to June 15
Arrowleaf, Red Clover, Crimson Clover, Ryegrass, Wheat	Sept. 1 to Nov. 1
Regal or Osceola (moist area), Ladino Clover, Ryegrass, Oats	Sept. 1 to Nov. 1
Bobwhite Quail and Mourning Dove	
Sunflower, Grain Sorghum, Browntop Millet	April 15 to May 15
Egyptian Wheat, Quailhaven Soybeans	April 15 to June 1
All Species	
Corn, Soybeans	April 1 to June 1

The following mixtures contain at least one excellent soil holder, several perennials, annual reseeders, and several good wildlife food plants. They are designed for the least site preparation and are small seeded, so you can distribute them with a hand seeder or a broadcaster and tractor. These are excellent for planting on roadsides, disked fire lanes, or log decks. You should cover plantings with wheat straw and fertilize, if direct seeded, for greatest benefit. Application will be around 60 pounds per acre for the total mix, and the cost will be in the $1 to $1.50 per pound range. Plant large seeded crops first, cut in, then apply small seeded crops (clovers) on top and cover lightly.

These plant mixtures are for minimal site preparation and are small seeded, so you can distribute them with a hand seeder or a broadcaster and tractor.

	Planting Dates
Late-Winter Mix	**February to April**
Orchard Grass, Korean Lespedeza, Kobe Lespedeza, Ladino Clover, Red Clover, Ryegrass, Alyce Clover (optional)	
Late-Spring Mix	**May to June**
Browntop Millet, Buckwheat, Korean Lespedeza, Wildflowers (optional)	
Fall Mix	**September to November**
Orchard Grass, Ladino Clover, Red Clover, Crimson Clover, Ryegrass, Wheat, Nebraska Rye, Meechee Arrowleaf Clover (optional)	

Note: *Consult a wildlife biologist or local seed dealer before buying prepackaged, high-priced seed mixtures. Check bag contents and prices with several vendors. Often a seed dealer can customize seed mixtures at a much lower price while maintaining the same or similar contents as prepackaged mixes.*

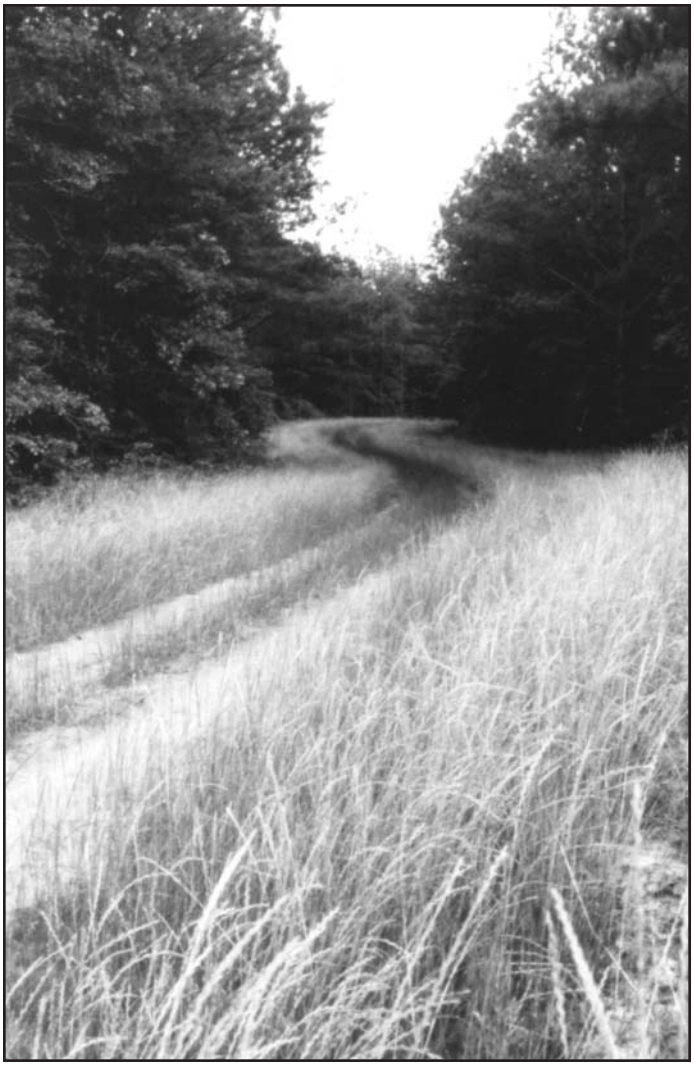
Plant Applications

Cool-season annuals are planted in late summer and early fall to provide forage and seed crops for fall, winter, and spring uses. These often make the best mixtures.

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 allow nitrogen production and intake by plants. Inoculation of legume seeds will increase production of legumes, decrease fertilizer cost, and build soil quality. Mix the packet with a small amount of water or sugar water, then mix thoroughly with the seed just before planting. Avoid fertilizer contact with inoculated seed, if possible.

Perennial plants will continue to sprout each year after establishment. Some fertilizing and liming are required for continual growth. Periodic competition control, such as mowing or disking, is often needed.

Warm-season annuals are planted in early to late spring to provide forage and seed crops for summer and fall uses.



This secondary road is planted to gulf ryegrass for erosion control and wildlife management. Access is controlled with gates.

Alyce clover is one of the better warm-season forages for white-tailed deer.

Cereal grains such as wheat, oats, and rye are often chosen for cool-season plantings.

Quailhaven soybeans and milo are mixed in this planting.

Corn is popular as a planting because a variety of wildlife species use it, and it is highly desirable. It is a good source of carbohydrates but is low in protien.

Egyptian wheat will grow in many locations and in late winter provides good cover and food for bobwhites.

This stand of Japanese millet was planted for waterfowl.

This young 5-year-old stand of sawtooth oaks is starting to produce acorns.

Planting Materials Guide

Alfalfa

Companion plants
None; do not mix with other plants.

Description
A cool-season perennial legume, widely used by deer and turkey in the spring, summer, and fall. Provides nesting habitat, seeds, insects, and foliage for turkeys.

Fertilization
Soil tests are necessary; generally requires 150 pounds of phosphorus and 300 pounds of potassium per acre.

Lime requirements
Apply according to soil test or use amounts necessary to bring soil pH to 7.0.

Management
Mowing is required in early spring and late summer to keep shoots green and tender. Apply 75 pounds of (P) and 150 of (K) per acre annually after the first mowing.

Planting dates
September 1 to October 15.

Planting rates
Alfalfa inoculant required. Drill 15 pounds per acre at 1/4 of an inch, or broadcast 18 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Requires fertile, well-drained soils; not suited to heavy clay or wet soils.

Soil preparation
Disk plot in June and leave plot fallow until planting date; redisk and plant in a firm seedbed.

Varieties
Apollo, Vanguard, and Florida 77.

Austrian Winter Peas

Companion plants
Perennial grasses.

Description
A cool-season annual legume. Provides excellent fall, winter, and early spring foliage for deer and turkeys. Seeds mature from May to June.

Fertilization
A soil test is recommended, or use 250 pounds per acre of 0-14-14.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.0-7.0.

Planting dates
September 1 to November 1.

Planting rates
Vetch inoculant required. Drill 40 pounds per acre at 1/2 of an inch, or broadcast 40 to 60 pounds per acre; cover 1 inch.

Soil adaptation
Better adapted to heavy clay; moderately fertile to fertile soils.

Soil preparation
Plant in a well-disked seedbed.

Bahiagrass

Companion plants
Clovers, winter peas, and annual lespedeza.

Description
A warm-season perennial grass. Used heavily by wild turkeys as a source of insects and choice seeds.

Fertilization
A soil test is recommended, or use 400 pounds per acre of 13-13-13 or 15-15-15.

Lime requirements
Apply according to soil test or to maintain a soil pH of 5.5-6.0.

Management
Mow in early spring and late summer. Apply 150 pounds per acre of 34-0-0 annually after first mowing.

Planting dates
March 1 to June 1; September 1 to November 1.

Planting rates
Drill 15 pounds per acre at 1/4 of an inch, or broadcast 18 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Well adapted to most soils; best stands are obtained in sandy soils.

Soil preparation
Plant in a firm seedbed.

Varieties
Argentine, Paraguay, Pensacola, and Wilmington.

Barley

Companion plants
Ryegrass, clover, and vetch.

Description
A cool-season, annual small grain. Provides choice seeds for game and nongame birds and choice foliage for deer in early stages of growth. Barley is tolerant to cold weather.

Fertilization
Soil tests are recommended, or use 60 pounds of (N), 80 pounds of (P), and 80 pounds of (K)/acre.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 5.5 to 6.5.

Management
(Optimal) Apply 120 to 200 pounds per acre of 34-0-0 in February.

Planting dates
September 1 to November 1.

Planting rates
Drill or broadcast 1.5 bushels or 80 pounds of seeds per acre and cover 1 inch.

Soil adaptation
Adapted to well drained, light textured soils. Does not grow well in poorly drained or heavy clay soils.

Soil preparation
Plant in a well disked seedbed.

Bird's-Foot Trefoil

Companion plants
Ryegrass, clover, and vetch.

Description
A cool-season perennial legume. Mostly planted for quail and turkey. Provides a good source of foliage and insects. Grows to heights of 2 feet.

Fertilization
Soil tests are necessary. Generally, 75 pounds of (P) and 150 pounds of (K) are required.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.5 to 7.0.

Management
Mow in early spring and late summer.

Planting dates
September 1 to October 15.

Planting rates
Inoculation required. Drill or broadcast 12 pounds per acre, and cover seed 1/4 of an inch.

Soil adaptation
Most productive in the mountain and Piedmont regions. Adapted to well-drained soils.

Soil preparation
Disk plot in June and leave fallow until planting date. Redisk and plant seeds in a firm seedbed.

Varieties
Fergus, Empire, and Viking.

Buckwheat

Companion plants
Sunflower, millets, and grain sorghum.

Description
A warm-season annual grain. Used by deer, turkeys, waterfowl, quail, and doves. Hard to establish when deer populations are high.

Fertilization
Soil tests are recommended, or use 200-300 pounds per acre of 13-13-13 or 15-15-15.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.5 to 7.0.

Planting dates
May 1 to June 1.

Planting rates
Drill 30 pounds per acre at 1/4 of an inch, or broadcast 40 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Widely adapted to fertile and infertile soils. Grows best on well-drained sites.

Soil preparation
Plant in a firm seedbed.

Burnett

Companion plants
Clovers.

Description
A warm-season perennial forb planted mainly for quail. This is a small, creeping, seed-producing plant.

Fertilization
A soil test is recommended, or use 150 pounds per acre of 13-13-13 or 15-15-15.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.5 to 7.0.

Planting dates
March 1 to May 1.

Planting rates
Drill 4 pounds per acre at 1/4 of an inch, or broadcast 6 pounds per acre and cover 1/4 of an inch.

Soil adaptation
Requires fertile, well-drained upland soils.

Soil preparation
Plant in a firm seedbed.

Puna Chickory

Companion plants
Oats, Crimson, or Ladino clover

Description
Perennial herb; a member of the lettuce family. Selected for high yields in New Zealand. Planted in the fall, grows slowly until spring, then grows rapidly until it blooms in late summer. May last up to 3 years.

Fertilization
Soil tests are recommended, or use 50 units of nitrogen fertilizer every month.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.5 to 7.0.

Management
When stand declines, reseed in fall and cover lightly.

Planting dates
August 15 to October 31.

Planting rates
Plant 5 to 6 pounds per acre, and cover 1/4 of an inch.

Soil adaptation
Prefers well-drained site with good water-holding capacity.

Soil preparation
Plant in a firm, smooth seedbed prepared by plowing and dragging. Broadcast seed, and cover lightly.

Chufa

Companion plants
Grows best alone.

Description
A warm-season sedge. Chufa produces small, underground, nut-like tubers. These are choice foods for turkey, deer, and ducks, and are even tasty to humans. Chufa is also a delicacy to raccoons and can be severely damaged if plots are small and raccoon populations are high.

Fertilization
Soil tests are recommended, or use 300 pounds per acre of 13-13-13 or 15-15-15.

Lime requirements
Apply according to soil test, or use amounts necessary to bring soil pH to 5.5 to 6.5.

Management
You can often have second-year crops by disking in February to March and reapplying 100 to 150 pounds per acre of 13-13-13 or 15-15-15. Rotate crops to avoid nematode infestations.

Planting dates
April to May.

Planting rates
Plant 30 pounds per acre in 24- to 36-inch rows at 9-inch spacings, or broadcast 50 pounds per acre and cover seeds 1 inch.

Soil adaptation
Grows on well-drained to moderately well-drained soils; can be flooded if duck hunting is desired.

Soil preparation
Plant in a well-disked plot.

Clovers

Note: Clovers are excellent forages that provide high protein levels in winter for deer. Clover can be mixed with other cool-season annuals. The clovers discussed in this publication are best suited for the Southeast. Clover is expensive, ranging from $1.70 per pound to $2.50 per pound. Be careful to check clover prices carefully. Mixes packaged and marketed to produce trophy animals carry high price tags and often can be mixed at local seed dealers for half the cost. Clovers are site specific and perform best when you use lime to correct pH problems.

Alyce Clover

Companion plants
Plant with forage cowpeas and/or joint vetch. Reduce seeding rate to 10 pounds per acre when planting combinations.

Description
A warm-season legume that provides forage in the summer and early fall. Especially important to whitetailed deer; one of the few warm-season forages that holds up well to grazing pressure.

Fertilization
Apply according to soil test, or apply 200 pounds per acre of 0-14-14 after planting is established.

Lime requirements
Apply according to soil test, or apply amounts necessary to bring pH to 6.5-7.0.

Planting dates
May 1 to June 15.

Planting rates
Inoculate seeds. Broadcast 15 to 20 pounds per acre, or drill 16 pounds per acre.

Soil adaptation
Suited to most moderate to well-drained soils, including bottomland sites.

Soil preparation
Disk and plant in a firm seedbed.

Arrowleaf Clover

Companion plants
Ryegrass, barley, oats, wheat, and rye; although these will often outcompete clovers.

Description
A cool-season, reseeding annual legume. Grows to heights of 40 to 50 inches under fertile conditions. Seeds germinate in the fall, and plants grow slow in winter, then grow rapidly in spring. Flowers are white and pink. Seeds mature from late June to early August. Arrowleaf provides excellent foliage that attracts insects for turkeys and produces choice forage for deer, although palatability might be lower than some other clovers.

Fertilization
Apply according to soil test, or apply 300 pounds per acre of 0-20-20.

Lime requirements
Apply according to soil test, or apply amounts necessary to bring soil pH to 6.5 to 7.0 to ensure reseeding.

Management
Reseeding may be enhanced by bushhogging or light disking and fertilizing at the rate of 200 pounds per acre of 0-20-20 in October the following year.

Planting dates
September 1 to November 15.

Planting rates
Arrowleaf inoculant required. Drill 6 pounds per acre at 1/4 of an inch, or broadcast 6 to 8 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Best suited to fertile, well-drained soils. Grows best in sandy loams and light clay soils.

Soil preparation
Disk plot in July and leave fallow until planting date. Redisk and plant seeds in a firm seedbed.

Varieties
Meechee, Yuchi, Amclo, and Chief.

Ball Clover

Companion plants
Grasses.

Description
A rapid growing, cool-season annual legume that grows on sites not suitable to other clovers. Provides foliage and insects for turkeys and forage for deer.

Fertilization
Apply according to soil test, or use 200 pounds per acre of 0-20-20.

Management
Reseeding can be encouraged by mowing or disking and fertilizing at the rate of 300 pounds per acre of 0-20-20 in September.

Lime requirements
Apply according to soil test, or use amounts necessary to bring soil pH to 6.0.

Planting dates
September 1 to November 15.

Planting rates
White clover inoculant required. Drill 3 pounds per acre at 1/4 of an inch, or broadcast 3 to 4 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Adapted to a wide range of soils. Grows in heavy clays, poorly drained soils, and light-textured soils.

Soil preparation
Plant in a well disked plot, or broadcast over a closely mowed grass.

Crimson Clover

Companion plants
Ryegrass, small winter grains, other clovers, and vetch.

Description
A cool-season annual legume. Tolerates acidic soils. Provides insects and foliage for turkeys and forage for deer. Has pink-red blossoms and grows to heights of 3 feet. This is an excellent crop to plant to control erosion and beautify roadsides. Can be used in combination with other clovers, since it initiates growth quicker, but seeds out earlier than most clovers.

Fertilization
A soil test is recommended, or apply 300 pounds per acre of 0-20-20.

Lime requirements
Apply according to soil test, or use amounts necessary to bring soil pH to 6.5 to 7.5.

Management
Reseeding may be enhanced by disking or mowing the following fall. Apply 150 pounds per acre of 0-20-20 after soil disturbance.

Planting dates
September 1 to November 15.

Planting rates
Inoculation required. Drill 15 pounds per acre at 1/4 of an inch, or broadcast 20 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Best adapted to fertile, well-drained soils. Grows in loamy clay and heavy clay soils. Does not grow well in sandy soils.

Soil preparation
Plant in a firm seedbed. Can be planted immediately following summer pea crops with one disking.

Varieties
Autange, Chief, Dixie, and Tibbee.

Red Clover

Companion plants
Red clover grows best alone but can be planted with dallisgrass.

Description
A cool-season legume. Provides insects and foliage for turkeys and forage for deer.

Fertilization
A soil test is recommended. Apply 300 pounds per acre of 0-20-20.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.0 to 6.5.

Management
Mow in October and fertilize at the rate of 200 pounds of 0-20-20 per acre.

Planting dates
September 1 to November 15.

Planting rates
Requires a red clover inoculant. Drill 8 pounds per acre at 1/4 of an inch, or broadcast 810 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Grows best on fertile, well-drained soils. Does not grow well on sandy soils. Prefers a sandy, clay loam.

Soil preparation
Disk plot in July and leave fallow until planting date; redisk and plant in a firm seedbed.

Varieties
Kenland and Redland II.

Subterranean Clover

Companion plants
Warm-season perennials, ryegrass, cool-season winter grains, and vetch.

Description
A cool-season annual legume; very tolerant to shade; can be planted on temporary food plots, such as logging roads, and in strips of thinned timber. Makes excellent plots in short-rotation pine and provides foliage and insects for quail and turkeys and forage for deer.

Fertilization
Soil test recommended, or apply 250 pounds of 0-20-20 per acre.

Lime requirements
Apply according to soil test, or use amounts required to maintain a soil pH of 6.5 to 7.0.

Management
Reseeding can be enhanced by mowing or fall disking and fertilization of 200 pounds per acre of 0-20-20.

Planting dates
September 1 to October 15.

Planting rates
Requires subterranean inoculant. Drill 8 pounds per acre at 1/4 of an inch, or broadcast 15 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Best adapted to well-drained, sand, loam, or clay soils.

Soil preparation
Plant seeds in a well-prepared, firm seedbed.

Varieties
Mount Barker, Woogenellup, Tallarook, Nangech, and Meterora.

Ladino Clover/White Clover

Companion plants
Ryegrass, cool-season annual small grains, and vetch.

Description
A cool-season annual legume. A very popular clover for providing deer forage and foliage and insects for quail and turkey.

Fertilization
Soil tests are recommended, or use 400 pounds per acre of 0-20-20.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.5 to 7.0.

Management
Reseeding can often be enhanced by fall disking or mowing and fertilizing at the rate of 200 pounds per acre of 0-20-20.

Planting dates
September 1 to November 15.

Planting rates
Requires white clover inoculant. Drill 3 pounds per acre at 1/4 of an inch, or broadcast 4 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Very well adapted to fertile, bottomland, and moist soils.

Soil preparation
Plant in a firm seedbed. In wet areas, seeds and fertilizer can be broadcast and lightly disked in.

Varieties
Osceola, Tillman, Regal, Louisiana S1, and California.

White Dutch Clover

Companion Plants
Bahiagrass, dallisgrass, ryegrass, and cool-season annual small grains.

Description
A cool-season perennial legume. Grows well in shaded areas and can be planted on logging roads, decks, and in strips of thinned timber. Provides foliage and insects for quail and turkey and forage for deer.

Fertilization
A soil test is recommended, or apply 300 pounds per acre of 0-20-20.

Lime requirements
Apply according to soil test, or use amounts required to bring soil pH to 6.0 to 7.0.

Management
Reseeding can be enhanced by fall mowing and fertilization of 200 pounds per acre of 0-20-20.

Planting dates
September 1 to November 15.

Planting rates
Requires a white clover inoculant. Drill 4 pounds per acre at 1.4 inches, or broadcast 4 to 6 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Well adapted to fertile, bottomland, wet soils.

Varieties
New Zealand.

Corn

Companion Plants
Soybeans, cowpeas, and winter legumes.

Description
A warm-season annual; a very favored and sought-after crop for wildlife. Corn is high in carbohydrate energy.

Fertilization
A soil test is recommended, or use 300 pounds per acre of 15-15-15 on poor sites and 200 to 250 pounds per acre of 6-12-12 on fertile sites.

Lime requirements
Apply according to soil test, or use amounts required to bring soil pH to 6.5-7.0.

Management
For ducks, if flooding is desired, do not plant with any winter legumes. You can plant Japanese millet and cereal grains nearby for height/diet diversity. For deer, leave standing in patches near the wood's edge. For turkey and quail, allow seeds to fall naturally or knock down by hand or with a mower. For doves, mow in strips to provide scattered seeds and clean ground.

Planting dates
Ideally, April 1 to May 1.

Planting rates
Plant 12 pounds per acre in 36-inch rows, no till-in with legumes, or broadcast 12 to 15 pounds per acre and cover 1 inch.

Soil adaptation
Well-drained loam or light clay soils are best. You may choose moderately drained soils if you want flooding for ducks.

Soil preparation
Plant in a well-prepared seedbed.

Varieties
There are numerous varieties. Those that produce low- growing "ears" are best for wildlife.

Cowpeas

Companion plants
Other warm-season annual peas and browntop millet.

Description
A warm-season annual legume. Browsed by deer and rarely eaten by doves but highly used by turkey and quail.

Fertilization
A soil test is recommended, or use 100 pounds per acre of 0-20-20.

Lime requirements
A soil test is recommended, or use amount required to maintain a soil pH of 5.5 to 7.0.

Planting dates
May 1 to July 1.

Planting rates

Plant 15 pounds per acre in 24- to 36-inch rows, or broadcast 25 pounds per acre and cover 1 inch. Inoculant required.

Soil Adaptation

Adapted to well-drained soils, from sandy loams to heavy soils.

Soil preparation

Plant in a firm seedbed.

Varieties

Thorsby Cream, Tory, Wilcox, and Cat Jang.

Dallisgrass

Description

A long-lived perennial bunch grass; can be planted in spring and fall with other grasses and clovers. Attracts insects, provides foliage and good nesting habitat for turkeys; also good for erosion control.

Fertilization

A soil test is recommended, or use 400 pounds per acre of 13-13-13.

Management

Early spring and late summer mowing with one annual fertilization of 250 pounds per acre of 13-13-13 after the first mowing.

Lime requirements

Apply according to soil test, or 12 tons per acre in absence of test.

Planting dates

February 15 to May 15 or September 1 to October 15.

Planting rates

Broadcast 10 pounds per acre, and cover 1/2 of an inch.

Soil adaptation

Adapted to fertile, moist, well-drained, light- and heavy-clay-textured soils.

Soil preparation

Plant in a well-prepared seedbed.

Egyptian Wheat

Description

Egyptian wheat is actually an annual sorghum that grows up to 8 feet tall. It grows in thick stands, and heads will easily fall to the ground (lodge) at maturity. Makes cover and choice seeds for quail and turkey.

Fertilization

A soil test is recommended, or use 200 pounds per acre of 13-13-13.

Lime requirements

Apply according to soil test, or use amounts required to maintain a soil pH of 5.5 to 6.5.

Planting dates

April 1 to May 15.

Planting rates

Drill 6 pounds per acre at 1/4 of an inch, or broadcast 6 to 10 pounds per acre and cover 1/2 of an inch.

Soil adaptation

Widely adapted to well-drained, light-textured soils.

Soil preparation

Plant in well-disked plots. Best to plant in patches 8 to 12 feet wide and 30 to 50 feet long. Excellent for providing cover in large fields; you can strip plant it alternately with other warm-season grasses.

Elbon Rye

Companion plants

Other cool-season, annual small grains, ryegrass, vetch, and clover.

Description

An annual, cool-season, small grain (similar to wheat). Choice food of doves, ducks, quail, turkeys; browsed heavily by deer in early stages of growth. Rye grows very fast and loses its protein level early. Rye is a cold-tolerant small grain; provides forage for deer in fall and winter, if kept mowed. Rye provides nesting, bugging areas, and seed for quail and turkey; usually dies back in early summer.

Fertilization

A soil test is recommended, or apply 200 pounds of 13-13-13 per acre.

Lime requirements

Apply according to soil test, or use amounts required to maintain a soil pH of 5.5 to 6.5.

Management

Apply 200 pounds of 34-0-0 per acre in February.

Planting dates

September 1 to November 15.

Planting rates

Drill or broadcast 1.5 bushels or 80 pounds of seed per acre and cover 1 inch.

Soil adaptation

Adapted to well-drained, light-textured clay soils. Does not grow well in poorly drained soils.

Soil preparation

Plant in a well-disked seedbed.

Grain Sorghum

Companion plants

Browntop millet, corn, sunflower, and winter legumes.

Description

A very hardy, warm-season annual with tall, medium, and dwarf varieties. Favorite foods of turkeys, quail, doves, and, less often, ducks.

Fertilization

A soil test is recommended, or use 150 to 250 pounds of 13-13-13 per acre.

Lime requirements

Apply according to soil test, or use amounts required to maintain a soil pH of 5.6 to 6.5.

Management Management

If you choose larger varieties, knock down with mower at maturity; often you can make second crops after pruning heads with mower.

Planting dates

April 15 to June 15.

Planting rates
Plant 8 pounds per acre in 24- to 36-inch rows, or broadcast 12 to 15 pounds per acre and cover 1 inch.

Soil adaptation
Bottomland, well-drained, heavy clay to clay loam soils are best. However, moderately-drained soils are acceptable when you want flooding.

Soil preparation
Plant in a well-disked seedbed.

Varieties
Choose non-bird resistant, dwarf varieties such as Kafir, Hegair, Milo, and small game food sorghum.

Lab Lab

Companion plants
Other drought-resistant warm-season legumes; millet, corn, and sorghum.

Description
Very drought tolerant, fast growing, erect, warm-season legume that is weakly perennial and does not readily reseed. Used widely in south Texas. Highly preferred by deer.

Fertilization
Soil tests are recommended, or use 300 pounds per acre of 0-20-20.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.0 to 7.5.

Management
Seedlings are not competitive. Keep seedbed free of weeds, and avoid grazing or browsing for the first month after establishment. Must be reseeded each year. Inoculate before planting.

Planting dates
April 15 to June 15.

Planting rates
Drill 5 to 10 pounds per acre at 1/4 of an inch, or broadcast 10 to 20 pounds per acre and cover 1/2 to 3/4 of an inch.

Soil adaptation
Grows on well-drained, sandy, upland sites. Very drought tolerant; will not tolerate wet soils.

Soil preparation
Plant in a well prepared, firm seedbed.

Lespedezas

Note: *Lespedeza is an excellent crop for the bobwhite quail. You can plant annual lespedezas with other summer grasses, legumes, and grains. Seeds will also germinate and sprout without soil disturbances, especially on areas overseeded after prescribed burning. These are good plantings for seeding roadsides. Sericea lespedeza is widely planted for soil erosion and hay. However, its seeds are not palatable to quail and turkeys. You get better stands of shrub lespedeza by transplanting prepared seedlings from a nursery.*

Annual Lespedeza

Description
Kobe and Korean lespedeza are reseeding annual legumes. Kobe grows about 6 to 10 inches high, and Korean grows about 12 to 18 inches high. Both produce seeds for quail and turkey.

Fertilization
A soil test is recommended, or use 200 to 300 pounds of 0-20-20 per acre.

Lime requirements
Apply according to soil test, or use amounts required to maintain a soil pH of 5.0 to 6.5.

Management
Reseeding can be enhanced by disking and fertilizing with 100 pounds of 0-20-20 per acre.

Planting dates
March 1 (Kobe) to May 1 (Korean)

Planting rates
Broadcast 10 pounds per acre, and cover 1/2 of an inch.

Soil adaptation
Adapted to well drained soils, primarily sandy loams to clay loams.

Soil preparation
Plant in a well-disked seedbed, or direct seed along fire lanes and roadsides.

Shrub Lespedeza

Description
Two types of shrub lespedeza are commonly planted in this region. Bicolor is the number-one planted lespedeza and is a sought-after plant of the bobwhite quail. Bicolor produces choice seeds for quail and turkeys and provides suitable nesting cover. Deer will also heavily browse these plants. The other is Thunbergii. It also provides choice seeds for quail and turkey but supposedly is more deer resistant than other lespedezas. Both of these species are perennial legumes that grow to heights of 5 to 8 feet.

Fertilization
A soil test is recommended, or apply 400 pounds of 0-20-20 per acre in fields (depleted areas), or 250 pounds per acre in woods.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.0.

Management
Shrub lespedeza should be bushhogged and refertilized with 200 pounds of 0-20-20 per acre just before spring green-up.

Method of establishment
Direct seeding or seedling transplants.

Planting dates
November 15 to March 1.

Planting rates
Broadcast 15 pounds per acre, or plant seedlings in rows 2 to 3 feet apart with 18- to 24-inch spacings between plants. A long and narrow plot 4 to 5 rows wide and at least 200 feet long (1,000 to 2,000 plants) is recommended. Plant along fence rows and at edge of woods for transition zones and through thinned

timber of fields to break up touching, single vegetative layer areas.

Soil adaptation
Well-drained sandy loam to clay loam sites.

Soil preparation
If you will seed lespedeza, plant in a well-prepared, firm seedbed. Although not necessary, disking would help hand-planting tremendously. A tractor with three-point hitch planter is essential when planting considerable numbers/plots of bush lespedeza seedlings.

Varieties
Bicolor Strain 101; Thunbergii Amquail and Attaway.

Browntop Millet

Companion plants
Winter legumes, grain sorghum, and sunflower.

Description
A summer annual grass that grows up to 3 feet high and matures in 60 days. Seeds are choice foods of quail, turkeys, doves, waterfowl, and non-game birds.

Fertilization
A soil test is recommended, or use 300 pounds of 6-12-12 per acre. Additional use of nitrogen may cause less seed production and more grass production, which is not desirable, unless planted for hay.

Lime requirements
Apply according to soil test, or use amounts required to maintain a soil pH of 5.5 to 7.0.

Planting dates
For doves, plant 80 days before the season. For ducks, plant in late July to early August and flood several weeks before desired hunting date.

Planting rates
Drill 8 pounds per acre at 1/4 of an inch, or broadcast 10 pounds per acre and cover 1/2 of an inch; can be planted in 2 to 3-foot rows at 8 pounds per acre.

Soil adaptation
Well adapted to all upland soils and well-drained bottomland soils.

Soil preparation
Plant in a well disked seedbed.

Dove Proso Millet

Companion plants
Grows best alone.

Description
A warm-season annual grass that grows up to 6 feet high. Seeds mature in 80 days; choice seeds of doves, quail, and turkeys.

Fertilization
A soil test is recommended, or use 300 pounds of 6-12-12 per acre.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 5.5 to 6.5.

Planting dates
May 15 to June 15.

Planting rates
Drill 15 pounds per acre at 1/4 of an inch, or broadcast 15 to 20 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Adapted to well-drained fertile soils.

Soil preparation
Plant in a well-disked seedbed.

Foxtail Millet

Companion plants
Usually outcompetes other grasses.

Description
A warm-season annual grass that varies in height according to variety. Seeds mature in 90 days; choice seeds of doves, quail, and turkeys.

Fertilization
A soil test is recommended, or apply 300 pounds per acre of 6-12-12.

Lime requirements
Apply according to soil test, or use amounts required to maintain a soil pH of 5.5 to 6.5.

Planting dates
May 15 to June 1.

Planting rates
Drill 15 pounds per acre at 1/4 of an inch, or broadcast 15 to 20 pounds per acre and cover 1/2 of an inch.

Soil adaptation
Adapted to well-drained upland soils.

Soil preparation
Plant in a well-disked seedbed.

Varieties
Common, German, and Hungarian.

Japanese Millet

Companion Plants
Grows best alone.

Description
A warm-season, annual reseeding grass that grows up to 2 to 4 feet tall. Seeds mature in 50 to 60 days. Japanese millet is the most popular planting used for ducks. This plant can withstand shallow flooding during growth. It produces choice seeds for ducks, doves, quail, and turkeys and provides forage for deer.

Fertilization
Apply 200 pounds per acre of 13-13-13. Fertilization is not required when direct seeding on mud flats.

Lime requirements
Use amounts required to maintain a soil pH of 6.0.

Management
Flood 2 weeks before duck season. It is prone to lay over and sprout if flooded for extended periods.

Planting dates
As near August 1 as possible for waterfowl.

Planting rates
Broadcast 20 pounds per acre, and cover 1/4 of an inch.

Soil adaptation
Grows best on wet soils.

Soil preparation
Plant in a well-disked seedbed, or direct seed onto mud flats.

Oats

Companion plants
Ryegrass, clover, vetch.

Description
A cool-season annual small grain that is a choice food of doves, ducks, quail, turkeys, and browsed by deer in early stages of growth. Oats are not as cold hardy as are wheat, barley, and rye.

Fertilization
A soil test is recommended, or use 200 pounds per acre of 13-13-13.

Lime requirements
Apply according to soil test, or use amounts required to maintain a soil pH of 5.5 to 6.5.

Management
Apply an additional 200 pounds per acre of 34-0-0 in February.

Planting dates
September 1 to November 1.

Planting rates
Broadcast or drill 1.5 bushels or 80 pounds of seed per acre, and cover 1 inch.

Soil adaptation
Adapted to well-drained, light-textured soils.

Soil preparation
Plant in a well-disked seedbed.

Partridge Pea

Description
A reseeding, warm-season annual legume with small fern-like leaves, yellow flowers, and short pods containing black seeds. Grows naturally along roadsides, fence rows, ditch banks, and fallow fields. Seeds are a staple of the bobwhite quail.

Fertilization
Not required on fertile sites; infertile sites require 200 pounds per acre of 0-20-20.

Management
Partridge pea needs to be disked in February every third year to ensure proper reseeding.

Planting dates
February 1 to March 15.

Planting rates
Drill or broadcast 15 pounds of scarified seed per acre.

Soil adaptation
Grows naturally on all soils in this region.

Soil preparation
Can be planted on closely mowed grasses and lightly disked in, or can be planted in a well-disked seedbed.

Rape

Companion plants
Wheat, rye, turnips.

Description
An erect, warm-season perennial that resembles turnips. Highly preferred by deer.

Fertilization
Soil tests are recommended, or use 50 to 75 pounds per acre of 10-10-10.

Lime requirements
Apply according to soil tests, or use amounts necessary to maintain a soil pH of 6.5 to 7.0.

Planting dates
August 1 to September 15.

Planting rates
Plant 8 to 10 pounds per acre and cover 1/4 of an inch.

Soil adaptation
Well suited for damp soils.

Soil preparation
Plant in a firm seedbed. A good plant for no-till seed combinations.

Varieties
Dwarf essex

Ryegrass

Companion plants
All cool-season small grains, clover, and vetch.

Description
A cool-season annual grass heavily browsed by deer; provides forage and insect habitat for turkeys and quail.

Fertilization
A soil test is recommended, or apply 250 pounds per acre of 13-13-13.

Management
In December, apply 150 pounds per acre of 34-0-0.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.0.

Planting dates
September 1 to November 1

Planting rates
Drill or broadcast 20 to 30 pounds of seed per acre and cover 1 inch.

Soil adaptation
Adapted to all textured, well-drained soils, except sandy soils.

Soil preparation
Plant in a well-disked seedbed.

Varieties
Gulf Coast, Marshall (cold tolerant), and Jackson (rust resistant).

Sawtooth Oak

Description

An oak introduced from Asia that can produce mast crops of acorns in 5 to 6 years. It has long, shallow, lobed leaves like Chestnut Oak and produces acorns about 5/8 of an inch to 1 1/4 inches long. Deer, turkeys, and squirrels are attracted to these acorns. Sawtooth oak is in the white oak group.

Fertilization

Not recommended until second year. At that time, apply 4 to 6 ounces of 15-15-15 per tree in a circular fashion around the tree.

Lime requirements

While research is still being conducted on exact rates, a pH of 5.5 to 6.0 is desirable for other white oaks.

Management

After the second year, continue to fertilize with 4 to 6 ounces of 13-13-13 until mast crops appear. Control weed competition by mowing or disking. Thinning is required when limbs start to touch.

Planting date

January.

Planting rates

Obtain 1 year old seedlings. Plant in a 10 by 8 foot spacing, with trees 8 feet apart and rows 10 feet apart.

Soil adaptation

Adapted to fertile, well-drained sites and can withstand flooding in the dormant season. Sawtooth oaks are difficult to establish on many Southeastern sites.

Soil preparation

Plant in an area that can be mowed.

Soybeans

Companion plants

Corn.

Description

A warm-season annual legume. Provides food and cover for rabbits, turkeys, quail, doves, and ducks. Browsed heavily by deer in early stages of growth.

Fertilization

A soil test is recommended, or use 300 pounds per acre of 0-20-20.

Management

If planted for waterfowl, remember that non-reseeding variety seeds will spoil in 30 days after flooding. Also, waterfowl do not use the protein in soybeans efficiently, even though they readily eat them. Plant large plots in areas with high deer densities, or plots will be overgrazed quickly.

Lime requirements

Apply according to soil test, or use amounts required to maintain a soil pH of 5.8 to 7.0.

Planting dates

May 1 to June 1.

Planting rates

Plant 30 pounds per acre in 24- to 36-inch rows, or drill 30 pounds per acre at 10-inch row spacing, or broadcast 50 pounds per acre and cover 1/2 of an inch; inoculant required.

Soil adaptation

Adapted to well-drained, medium-textured soils such as sandy loams and clay loams.

Soil preparation

Plant in a well-disked, firm seedbed.

Varieties

There are hundreds of varieties; reseeding varieties, such as Bobwhite and Quailhaven, are being studied at the SCS Plant Materials Center in Coffeeville. Select "forage-type" varieties for best performance.

Sunflower

Companion plants

Browntop millet, grain sorghum.

Description

A warm-season annual that is a highly favored food source for mourning doves. Seeds are also used by turkeys, quail, and non-game birds. Plant the dwarf varieties where possible.

Fertilization

A soil test is recommended, or use 300 pounds per acre of 13-13-13.

Lime requirements

Apply according to soil test, or apply amounts necessary to maintain a soil pH of 5.5 to 6.5.

Management

Mow several strips randomly through plot to clean the ground, and scatter the seeds; should be done at least 14 days before dove season.

Planting dates

April 15 to June 15. If planted for doves, plant before May 15 to ensure seed maturity for dove shoots in September.

Planting rates

Drill or broadcast 10 to 15 pounds per acre at 1/4 to 1/2 of an inch. For best results, plant 15 pounds of seed per acre in 36-inch rows.

Soil adaptation

Best adapted to fertile, well-drained soils.

Soil preparation

Plant in a well-disked seedbed.

Vetch

Companion plants

Cool-season small grains, ryegrass, clover.

Description

A cool-season annual legume. Grows rapidly in late winter and early spring. Provides choice seeds and foliage for turkey and bobwhite quail; browsed heavily by deer.

Fertilization

A soil test is recommended, or use 300 pounds per acre of 0-20-20.

Lime requirements

Apply according to soil test, or use amounts required to maintain a pH of 5.5 to 6.5.

Management

To enhance reseeding, disk plot every third year in February, and apply 100 pounds per acre of 0-20-20.

Planting dates
September 1 to November 1.

Planting rates
Drill 20 pounds per acre at 1/4 of an inch, or broadcast 25 to30 pounds per acre and cover 1/2 of an inch; inoculant required.

Soil adaptation
Adapted to well-drained, medium textured soils.

Soil preparation
Plant in a well-disked seedbed.

Varieties
Hairy vetch, the most hardy and widely planted; smooth vetch, same as hairy, without hairs on stem; grandiflora, the best reseeder of the three and can be encouraged naturally by winter diskings.

Joint Vetch (Deer Vetch)

Companion plants
Warm-season perennial grasses.

Description
A warm-season annual, reseeding legume. Provides excellent forage for deer and succulent foliage and seeds for dove, quail, and turkeys. Will grow on wet sites and can be flooded 18 to 24 inches for ducks.

Fertilization
A soil test is recommended, or use 300 pounds per acre of 0-10-20.

Lime requiements
Apply according to soil test, or apply amounts necessary to maintain a soil pH of 5.5 to 6.5.

Management
You can enhance reseeding by spring disking; reapply 300 pounds per acre of 0-10-20.

Planting dates
March 1 to June 1.

Planting rates
Broadcast 8 to 10 pounds per acre and cover 1/2 of an inch; inoculation required.

Soil adaptation
Adapted to moist, and wet, light textured soils. Do not plant in sandy soils.

Soil preparation
Plant in a well-disked, firm seedbed.

Wheat

Companion plants
Ryegrass, clover, vetches.

Description
A cool-season, annual small grain, widely planted; highly favored by ducks, doves, quail, and turkey as a source of seed; also, heavily browsed by deer in early stages of growth.

Fertilization
A soil test is recommended, or use 200 pounds per acre of 13-13-13.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 5.5 to 6.5.

Management
Apply an additional 200 pounds per acre of 34-0-0 in February.

Planting dates
September 1 to November 1.

Planting rates
Broadcast 80 pounds (1.5 bushels) per acre and cover 1 inch.

Soil adaptation
Adapted to well-drained, lightly textured soils; does not grow well in poorly drained soils or heavy clays.

Soil preparation
Plant in a well-disked seedbed.

Wild Winter Peas

Companion plants
Bahiagrass and dallisgrass.

Description
A cool-season, annual reseeding legume. Grows up to 3 feet high and makes rapid growth in spring. Seeds mature in June. These peas are also known as rough winter peas, singletary peas, and caley peas. These peas are choice food of quail and turkeys and heavily used by deer.

Fertilization
A soil test is recommended, or use 300 pounds per acre of 0-20-20.

Lime requirements
Apply according to soil test, or use amounts necessary to maintain a soil pH of 6.0 to 7.0.

Management
You can enhance reseeding by early fall disking and reapplication of fertilizer at the rate of 200 pounds per acre of 0-20-20.

Planting dates
September 1 to November 15.

Planting rate
Broadcast 30 pounds per acre, and cover 1 inch. Must use scarified seed. Vetch inoculant required.

Soil adaptation
Better adapted to heavy clay, fertile to moderately fertile soils.

Soil preparation
Plant in a well-disked seedbed.

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Revised by **Dr. Ben West**, Assistant Extension Professor, Wildlife & Fisheries. Originally adapted by Dean Stewart from *Wildlife Food Planting Guide for PCA Recreation Users* by David McArthur, Wildlife Manager, Tennessee Packaging. Photographs courtesy of Dean Stewart, former Extension Associate; Dr. Richard Kaminiski, Professor of Wildlife; and Dr. Harry A. Jacobson, Professor of Wildlife, Mississippi State University.

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Wildlife Food Plot Planting Guide For the Southeast

Crop	Forage Class[A]	Varieties	Planting Dates	Planting Rate (lbs./acre)[B] Drill	Broadcast	Inoculant[C]	Wildlife
Alyceclover	L/A		May 1 – June 15	15	20	EL	Deer
Aeschynomene (American Jointvetch, Deervetch)	L/A	Lee, Glenn	March 15 – June 15	15	20	EL	Deer-Dove-Quail
Alfalfa	L/P	Alfagraze, Amerigraze 401 & 702, Ameristand, Bulldog 505	Sept. 1 – Oct. 15	15	20	A	Deer-Quail-Turkey-Rabbit
Austrian Winter Peas	L/A	Granger, Fenn, Melrose	Sept. 1 – Nov. 1	30	40	C	Deer-Turkey
Benne or Sesame	F/A	(90- to 120-day maturity)	April 1 – June 30	5	10		Dove-Quail
Birdsfoot Trefoil	L/P	AU Dewey, Fergus (best in a mix with grasses or other legumes)	Sept. 1 – Oct. 15	6	10	K	Deer-Quail-Turkey-Rabbit
Brassicas	F/A	Available varieties of Rape, Kale, Turnip, Canola	Sept. 1 – Oct. 15	5	10		Deer-Rabbit-Turkey
Buckwheat	F/A	Japanese, Silverhull, CommonGray, Mancan, Manor, Royal, Tokyo	May 1 – June 1	40	60		Deer-Dove-Duck-Quail-Turkey
Burnett, Small	F/P	Delar	March 1 – May 1	5	10		Deer-Quail
Chicory	F/P	Choice, Puna, Puna II, Brow Tyne, Six Point, Oasis	Sept. 1 – Oct. 15	2	4		Deer-Rabbit-Turkey
Chufa	G/A	Turkey Gold, Wingmaster	April 1 – June 1	25	40		Deer-Turkey-Duck
Clover, Arrowleaf	L/A	Meeche, Yuchi, Amclo, Apache	Sept. 1 – Oct. 15	10	15	O	Deer-Turkey-Rabbit
Clover, Ball	L/A		Sept. 1 – Oct. 15	2	3	B	Deer-Turkey
Clover, Berseem	L/A	Bigbee, Tibbee	Sept. 1 – Oct. 1	10	20	R	Deer-Turkey
Clover, Crimson	L/A	Chief, Autauga, Dixie, Tibbee, Auburn, Talladega	Sept. 1 – Oct. 15	20	30	R	Deer-Turkey-Rabbit
Clover, Ladino (White)[D]	L/P	Osceola, Regal, Louisiana-S1, Patriot, Durana, Regalgraze	Sept. 1 – Oct. 15	4	5	B	Deer-Quail-Turkey-Rabbit
Clover, Red	L/P	Kenland, Redland Max, Redland Graze, Redland III, Bulldog, Kenstar	Sept. 1 – Oct. 15	8	12	B	Deer-Quail-Turkey-Rabbit
Clover, Subterranean	L/A	Woogenellup, Mt. Barker, Daliak, Clare, Nuba, Nungarin	Aug. 15 – Oct. 15	15	20	WR	Deer-Quail-Turkey-Rabbit
Corn[E]	G/A	Commercial varieties Dwarf Tropical	March 15 – June 1	12	15		Deer-Dove-Duck-Quail-Turkey
Cowpeas	L/A	Iron Clay, Red Ripper, Combine	May 1 – July 1	15	45	EL	Deer-Quail-Turkey
Egyptian Wheat	G/A		April 1 – June 1	5	15		Dove-Quail-Turkey
Grain Sorghum[E]	G/A	Kafir, Hegair, Dwarf Milo, Commercial varieties (90-to 115-day maturity, depending on variety)	April 15 – June 15	10	15		Dove-Duck-Quail-Turkey
Lab Lab	L/A	Rongai, Highworth, Rio Verde	April 1 – June 1	5	10	EL	Deer-Rabbit
Lespedeza, Annual	L/A	Common, Kobe, Korean	March 1 – April 1	20	30	EL	Quail-Turkey
Lespedeza, Shrub[F]	L/P	Amquail Thunbergii, Attaway, Bicolor 101	March 1 – April 1	6	12	EL	Quail
Millet, Browntop	G/A	Commercial varieties (60- to 65-day maturity)	May 1 – August 1	15	25		Dove-Duck-Quail-Turkey
Millet, Proso	G/A	Dove Proso, White Proso (75-day maturity)	May 1 – June 30	15	30		Dove-Duck-Quail-Turkey
Millet, Foxtail	G/A	Common, German, Hungarian (90-day maturity)	May 1 – July 1	15	25		Dove-Quail-Turkey
Millet, Japanese	G/A	Common, Chiwapa, Golden Millet (80- to 120-day maturity, depending on variety)	May 1 – August 1	12	25		Dove-Duck-Quail-Turkey
Oats	G/A	Arkansas 604 & 833, Buck Forage, Buck Magnet Chapman, Coker, Dallas, Florida 501, Harrison Horizon 314, Rogers, TAM 606	Aug. 15 – Oct. 15	90	120		Deer-Dove-Quail-Turkey-Rabbit
Partridge Peas	L/A	Lark Selection, Showy, Commanche	Feb. 1 – May 1	6	10	EL	Quail
Rye	G/A	Elbon, Wrens Abruzzi, Wondergraze, Vitagraze Wintergrazer 70, Maton, Bates	Aug. 15 – Oct. 15	90	120		Deer-Dove-Quail-Turkey
Ryegrass[G]	G/A	Commercial varieties, Gulf, Tetraploid, Marshall Passerel Plus	Sept. 1 – Nov. 1	20	30		Deer-Quail-Turkey-Rabbit
Soybeans[E]	L/A	Commercial varieties, Tyrone, Hutchinson	April 15 – June 1	30	60	S	Deer-Dove-Duck-Quail-Turkey
Soybeans, Wildlife	L/A	Quail Haven, Laredo	April 15 – June 15	10	25	S	Deer-Quail-Turkey-Rabbit
Sunflower[E]	F/A	Commercial Black Oil Hybrids, Peredovick (120-day maturity)	April 1 – May 15	4	15		Dove
Triticale	G/A	Tamcale 5019, Beagle 82, Trical 102 & 336	Aug. 15 – Oct. 15	90	120		Deer-Turkey
Vetch	L/A	Bigflower; Hairy-Madison, Auburn, Americus, Oregon, Lana; Common-AU Olympic, Willamette	Sept.1 – Oct. 15	20	30	C	Deer-Dove-Quail-Turkey-Rabbit
Wheat	G/A	Commercial forage varieties, Longhorn, Lockett, GA Gore, Saluda	Aug. 15 – Oct. 15	90	120		Deer-Dove-Quail-Turkey-Rabbit

The information given here is for educational purposes only. References to commercial products or trade names are made with the understanding that no discrimination is intended against other products that may also be suitable.

[A] Forage classes: A = Annual; F = Forb; G = Grass; L = Legume; P = Perennial

[B] All of the above planting rates assume a complete stand for each species. If you plan to mix species, reduce planting rates (such as when broadcasting a 50/50 mixture of wheat and oats, use 60 lbs of each for a total of 120 lbs)

[C] Purchase either preinoculated legume seed or inoculate with the appropriate inoculant before planting.

[D] This seeding rate is based on preinoculated seed coated with clay/lime. Use 2 (drill) or 3 (broadcast) pounds of uncoated seed.

[E] Broadcasting seed is not recommended for these plantings. Drilling seed in rows improves forage and seed production.

[F] Potentially invasive non-native species; may require mechanical and herbicidal control in some situations.

[G] Potentially invasive non-native species; may require mechanical and herbicidal control in some situations. Most appropriate for shady, acidic, or wet sites where other forages perform poorly.

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Purdue University
Forestry and Natural Resources

Food Plots for White-Tailed Deer

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The establishment and maintenance of food plots can be a component of any wildlife management plan. When used in conjunction with other habitat management techniques, food plots are useful for attracting wildlife. However, landowners may have unrealistic expectations about the utility and function of food plots. Food plots are not a replacement for habitat management. They can enhance your property for wildlife by increasing the numbers that frequent your property at different times of the year. Food plots can also be a supplemental food source during harsh weather conditions when they are a part of a comprehensive wildlife management plan.

Much of the current literature regarding the use and necessity of food plots originates from the southeastern United States. Soil fertility and water abundance in the southeast are relatively poor compared to those found in Indiana. Research confirms that the presence and condition of many wildlife species are correlated to soil fertility (Bolen and Robinson 1999:234-240). Soil fertility is an indicator of food quality and quantity. Food supplementation can be important for managing wildlife in the Southeast; however, in the Midwest, wildlife populations are not as dependent upon supplemental food plots, although they will use supplements if available. Productive glaciated soils found in the Midwest support a bounty of food for white-tailed deer and other wildlife in areas with a mixture of agricultural crops, woodlots, and old fields.

Myths of Food Plots

Establishing food plots can be a costly endeavor. Therefore, it is important to understand what food plots can do, for example:

- They can potentially attract more deer to an area.
- They increase the chance of seeing one or more mature deer that have large racks.
- Food plots potentially concentrate deer during the hunting season, especially if the food plot is planted to a green fall or winter crop such as winter wheat or rye.
- They provide a supplemental food source for deer that might be important during harsh winters or when hard mast failures occur. This is true for corn in particular, but also for winter wheat and sometimes grain sorghum.
- Food plots increase the likelihood of seeing other wildlife.
- They potentially increase the populations of smaller, less mobile wildlife, provided their other habitat requirements are met within their home range.

Research has not proven that food plots appreciably increase antler growth of any particular free-ranging buck or the overall condition of any free-ranging deer.

Deer Nutrition

Many landowners establish food plots specifically to attract deer to their property. Before offering supplemental food for deer, be aware of their nutritional requirements and factors that affect them throughout the season.

Deer are generally classified as browsers, i.e., they eat primarily young twigs, buds, and leaves of trees and shrubs. However, deer eat a wide variety of items including grasses, sedges, fruits, nuts, mushrooms, and forbs (broadleaf herbaceous plants) (Jacobson 1994). Their consumption of these foods varies seasonally and depends upon plant availability and nutrient requirements of deer at a given time.

White-tailed deer are ruminants. They have a compound stomach (like that of a cow) consisting of a reticulum, rumen, omasum, and abomasum. Unlike animals with a single stomach (such as pigs), deer are able to digest plant materials that contain cellulose, such as woody twigs, grass stems, and the skins of some berries. Microbes in the rumen and reticulum are able to break down cellulose into volatile fatty acids which can be used for energy (Verme and Ullrey 1984). Although not definitively determined, deer have specific nutritional and energetic requirements that

include water, carbohydrates, nitrogen, minerals, water-soluble vitamins, fat-soluble vitamins, and indigestible fiber (Brown 1994). The relative amounts of these that are required depend on age, sex, level of activity, and environment (northern climates vs. southern climates, for example) (Verme and Ullrey 1984). Any plant or combination of plants that provides the required levels of these dietary components is sufficient for proper deer growth and development. Providing dietary levels in excess of maximum required amounts will not be of any additional nutritional benefit to deer.

Factors that Influence Nutritional Requirements in Deer

Bucks have higher nutritional demands during antler development. Hardened antlers are made up primarily of three components: 45 percent protein, 22 percent calcium, and 11 percent phosphorus (Brown 1994). A diet consisting of 13 to 16 percent protein is optimum for antler development. The daily percent dry weight calcium and phosphorus requirements for optimal antler development is unclear. Research findings vary from 0.09 to 0.64 percent calcium and 0.14 to 0.56 percent phosphorus (Brown 1994). This variability probably reflects the ability of deer to store minerals in their skeletons and transfer them to the antlers (Brown 1994), rather than regional differences in daily requirements of these minerals.

Just as antler development is a resource drain on bucks, pregnancy and lactation is a resource drain for does. Milk of white-tailed deer averages about 36 percent protein dry weight (Brown 1994). Thus, the optimal daily protein intake for lactating does approximates that of growing fawns (Verme and Ullrey 1984) and may be as high as 22 to 24 percent dry weight. The calcium and phosphorus requirements for lactating does are approximately equal to those of bucks during antler growth (Brown 1994).

Age can also influence nutritional demands in deer. Fawns require a relatively high amount of protein, up to 22 percent of the diet (Brown 1994). Dry-matter basis calcium and phosphorus requirements are about 0.45 and 0.28 percent, respectively (Ullrey et al. 1973).

These daily and seasonal dietary requirements for does, bucks, and fawns can be met by a mixture of grains, high-quality green forage, fruits and nuts, and woody plant materials found throughout the Indiana landscape. If your property or neighboring properties lacks one or more of these food types, then you may provide the missing elements. For example, planting a green browse food plot is attractive to deer in areas dominated by woodlots and row crops. Likewise, grains are attractive to deer in landscapes where grass pastures are the dominant agricultural practice. Generally, four main dietary components should be available to deer throughout its home range.

- High-quality green forage (hay field, winter wheat, clover, etc.).
- Grain, available in winter (corn, soybeans, sorghum, etc.). Waste grain in fields can meet this requirement if it is above the snow and not fall plowed.
- Soft (persimmon, apples, dogwood, etc.) and hard mast (acorns, etc.).
- Woody browse (oaks, serviceberry, chokeberry, shrub dogwood, hazelnut, hawthorn, sumac, crabapple, etc.).

If any of these components are missing in your existing habitat and are not available within about a half mile, then that component should be added to your property.

Mineral Licks

In Indiana, white-tailed deer can obtain all of their dietary requirements with the exception of sodium (Na) in most habitats. White-tailed deer and other herbivores require sodium for regulation of fluid volume and blood pressure, maintenance of osmotic balances and buffer systems, and conduction of nerve impulses. Sodium is not readily available in the plant materials that they consume since most plants do not require sodium. Therefore, deer actively seek sources of sodium. This salt drive is highest in deer during the spring and summer (Weeks and Kirkpatrick 1976). The amount of water and potassium in the diet impacts the ability of deer to retain sufficient sodium for metabolic needs. During the spring, many plants deer consume contain exceptionally high levels of water and potassium, causing a temporary sodium imbalance that results in development of the salt drive (Weeks and Kirkpatrick 1976). Research has shown that antler mineralization in white-tailed deer reaches its peak during the late summer when the sodium drive in bucks is strong. Therefore, it is reasonable to assume that providing supplemental sodium during this time can be beneficial to deer.

Deer in Indiana seldom move more than about one mile for salt (Wiles and Weeks 1986). Thus, providing a supplemental source of sodium (salt blocks) likely will not alter deer distribution to a great extent; however, it may attract deer from the local area (about 2 to 3 miles) to a specific site.

Care should be taken if you hunt on the property and are considering any type of mineral management. Salt and mineral blocks are considered to be bait by the Indiana Department of Natural Resources. By law,

bait is a product that is transported into a hunting area and placed there for animal consumption. An area is considered to be baited for 10 days after the removal of the bait and any affected soil. It is illegal to use bait to take deer and other wildlife. However, activities considered to be normal agricultural production are not classified as baiting. For more information regarding baiting regulations, contact your IDNR Conservation Officer at your county sheriff's office.

Food Plot Design and Establishment

Food plots for deer are intended to attract deer to an area to feed. Unlike other smaller, less mobile wildlife, they are not dependent upon them for winter cover, nesting cover, or brood cover. Therefore, food plots specifically for deer should be planted at typical forage-production rates in large blocks. Just like any agricultural crop, seedbed preparation and correct fertilization is essential for the successful establishment of any food plot for deer.

The specific design of your food plot depends upon the goal for its use. Do you want to supply a supplemental source of winter food? Do you want to attract deer during the hunting season? Do you wish to provide benefits to other wildlife species? Your IDNR District Wildlife Biologist (www.state.in.us/dnr/fishwild/huntguide1/wbiolo.htm) can help you determine the type, size, shape, and location of a food plot(s) to meet your objectives. In some cases, you may be eligible for cost-share assistance to establish a food plot. See FNR-87 for information about available wildlife cost-share and technical assistance programs.

If planting in areas dominated by tall fescue, problems with successful food plot establishment are common unless there is appropriate seedbed preparation. For areas dominated by fescue sod, first remove the excess vegetation in late summer by mowing, burning, or haying. During September and October when the fescue is actively growing (60-70^{o} F) and is 8 to 12 inches tall, apply a glyphosate (i.e., RoundUp®) herbicide at the labeled rate, combined with 17 lbs. of ammonium sulfate and 1 quart of methylated seed oil (MSO) per acre. The following spring, when grasses and other plants are 6 to 12 inches tall (usually mid- to late-April), spray another application of the formulation listed above. Note that the MSO is unnecessary for herbicides such as RoundUp Ultra® that contain a surfactant. If light to moderate residue remains, no-till drilling is an option. Frequently, some disking is necessary to break up existing fescue residue. Disk 7 to 14 days after herbicide application for best results.

Table 1. Approximate lengths (ft) required for food plots of different widths and areas. These are provided only as a guide to help you design a food plot to fit your needs. Example: A field 100 ft. by 870 ft. is 2 acres.

Width (feet)	Field Size (acres)		
	1	2	3
30	1450	2900	7250
60	725	1450	3625
100	435	870	2175
150	290	580	1450
200	218	435	1090

Size, Shape, and Location

Food plots for deer should be at least 1-acre blocks. For areas with high deer densities, grain food plots should be planted in blocks of 5 acres or larger rather than small, linear-shaped plots to withstand continuous browsing pressure. Corn and soybeans are suitable for larger food plots. Legume food plots should range 1 to 3 acres, depending on deer density. See Table 1 for approximate dimensions for fields of various sizes.

Whenever possible, food plots should be located adjacent to wildlife travel lanes. Establishing winter food plots adjacent to cover is not as important for deer as it is for other, less mobile wildlife. However, if the intent of the food plot is to attract deer for hunting opportunities, then it should be adjacent to some type of woody or brushy cover for hunter concealment. Establishment of a snow trap on the windward (NW) side of the food plot can be important for areas in northern Indiana that receive significant annual snowfall (Figure 1). Accumulation of snow in a food plot can make it less useful to deer. If food plots cannot be established adjacent to cover, plant corridors of cover between food plots. Corridors should be at least 50 feet in width and include at least three rows of shrubs and two rows of trees.

Typically, one food plot per 40 acres of farmland or forestland is a minimum, but they should not exceed approximately 5 percent of the total acreage. The surrounding habitat will dictate the type and amount of food plots on a given property. For example, deer will readily utilize waste grain from harvested fields. Establishing a grain food plot in this situation will not add much additional nutritional benefit for deer. However, establishing practices that provide a food or cover requirement that is absent on your property or the general area will be of greater benefit to deer. If a grain source is freely available, a permanent field border

adjacent to the grain field or a perennial green-browse food plot located on another part of the property may be alternatives.

Plant Selection

The next step is to determine the selection of plants for your food plot (see Table 2). This will depend upon the purpose of the food plot, soil type, whether you live in the northern or southern part of the state, and the types, amounts, and arrangement of food and cover on your property.

Many specialty mixes are available on the market today. Some of these have high concentrations of proteins, minerals, and vitamins, and/or are not native to this region or country. Many of these are also very expensive when compared to different varieties of comparable species mixes available from local seed vendors. With proper fertilization and soil pH, most locally available seed mixes meet or exceed the nutritional needs of deer (see Table 3). When deciding on the types of mixes offered from mail order catalogs or your local seed store, consider the daily nutritional requirements of deer relative to the nutrient levels the seed mix contains, the geographic source of the seed, and cost.

Research efforts in the Midwest have not demonstrated a consistent increase in weight or antler development for free-ranging deer that were given a high-protein supplemental food source. You have to decide if potential dietary gains offered by some specialty mixes justifies the increased cost.

Some plant mixes for deer and other wildlife contain species with very high amounts of protein, calcium, phosphorus, and other minerals and vitamins. Excess nutrients above the optimal requirements of deer do not offer any additional benefits.

Plants such as soybeans, millets, wheat, rye, and buckwheat provide an excellent source of food for deer. However, they tend to lodge (bend over) then rot, making them an unreliable food source in late winter or early spring. You can plant mixtures of these species with plants that do not readily lodge such as corn and grain sorghum. While grazing of food plots is generally not recommended, you should note that grain sorghum can be poisonous to livestock after frost or drought.

It is essential that the plants you include in a food plot match the growing conditions (climate, soil fertility, drainage, and pH) of your property and provide the missing nutritional requirements deer cannot get easily from existing habitat. See Table 2 for a list of species, soil requirements, and planting rates. Your county Extension educator or IDNR District Wildlife Biologist can help you match food plot species to your growing conditions.

Additional Benefits of Food Plots

The recommendations for food plots found in this publication are for white-tailed deer. The list of practices below will enhance a food plot for other wildlife species.

Reduced seeding rates. Planting rates of food plots for deer are approximately equal to those for production agriculture. However, reducing the seeding rates allows for the growth of forbs within the food plot that can enhance its value to other wildlife species. Not only will the annual plants be a food source for many species of birds and mammals, but the resulting habitat will provide nesting cover and insect foraging habitat that will benefit ground nesting bird species like bobwhite quail, ring-necked pheasant, and some songbirds.

Frequency of planting. Rather than replanting the same annual food plot every year, you may allow food plots to stand 3 to 4 years prior to replanting. If you have 3 to 4 food plots, replant each one in a different year, two every other year, etc. This will result in a mosaic of food plots of various structure and species composition. The older food plots will provide cover and insect habitat for many wildlife species while the plots that are replanted will provide the high-quality forage for deer.

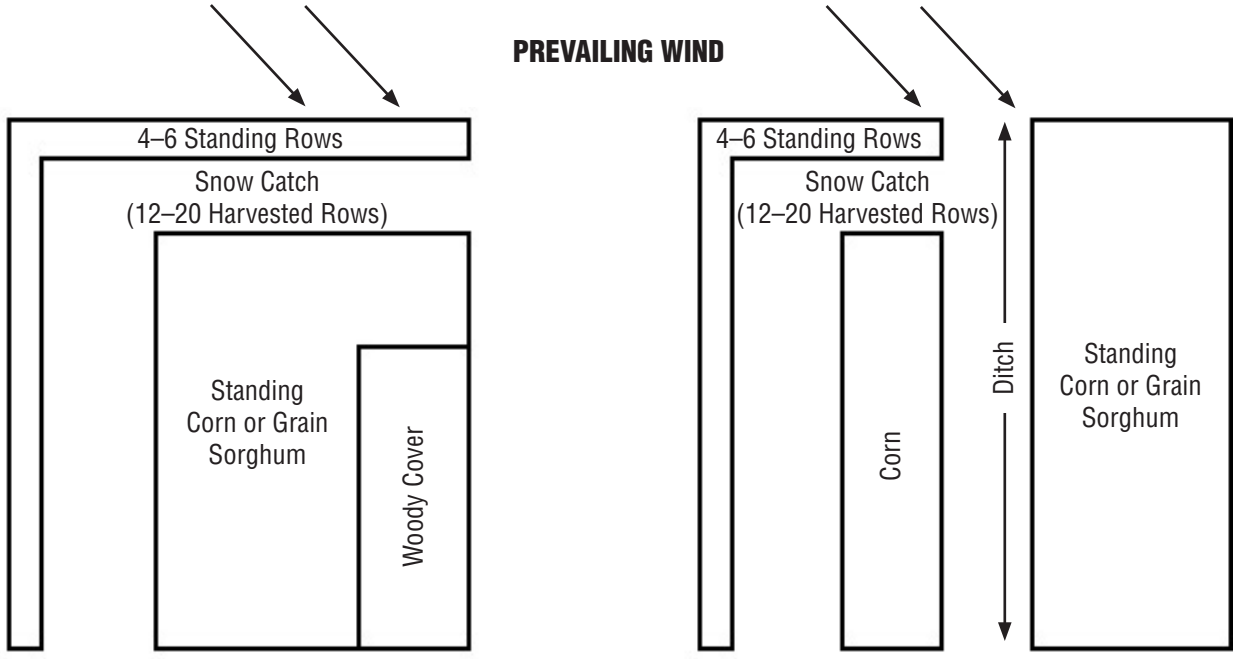
Plot size. While deer are able to utilize food plots planted in large (> 1 acre) blocks, smaller and less mobile wildlife tend to concentrate their use around the edge near cover. Consider planting food plots in small, linear strips about $^1/_2$ acre in size. Most of the food plot will be available for wildlife.

Winter cover. Establish food plots downwind from woody or brushy cover (see Figure 1). Small wildlife species can minimize their exposure to the elements and predation.

Brush piles. If alternative sources of cover are lacking, construct brush piles adjacent to food plots. A minimum of one brush pile per $^1/_2$-acre planting should be located around each food plot.

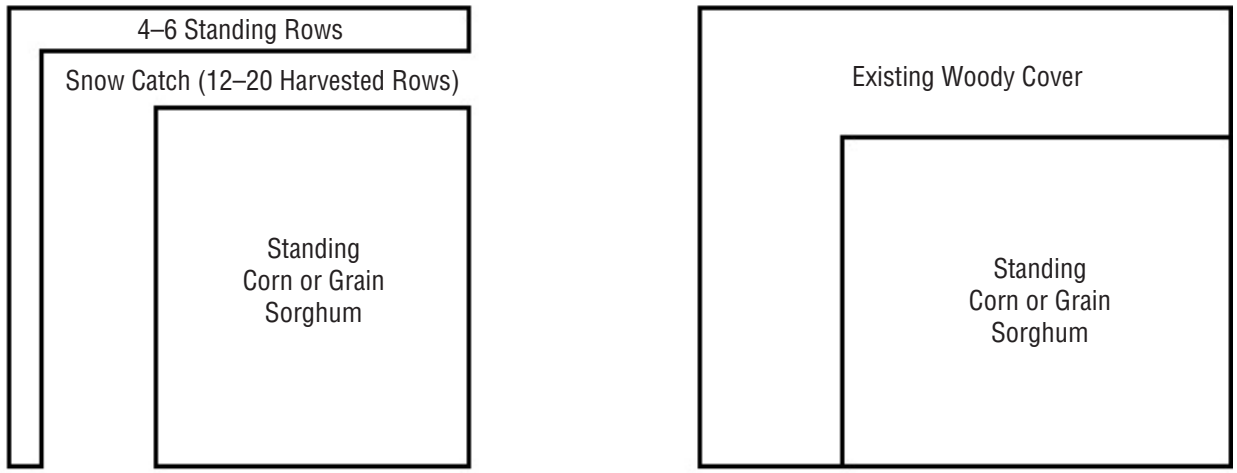
Species diversity. Food plots for deer typically contain only 1 to 2 plant types. Other species of wildlife can benefit from plantings with more diversity (see Tables 2 and 4). However, food plots containing a mixture of four or more species are usually not compatible and are therefore not very productive. Consider planting small food plots ($^1/_2$ acre) containing different combinations of two species.

Figure 1. Examples of annual food plot design. (Adapted from USDA-NRCS 1999.) Note, establishment of a snow trap on the windward (NW) side of the food plot can be important only for areas that receive signifigant annual snowfall.



A. Plot design to protect existing winter cover. Size: 1–5 acres.

B. Plot design to enhance drainage ditch or other area. Size: 1–5 acres.



C. Plot design to function alone. Size: 1–5 acres.

D. Plot design to take advantage of existing woody cover. Size: 1–5 acres.

Table 2. Food plot soil requirements and planting rates.
(Some information adapted from USDA-NRCS 2000 and Johnson et al. 1991)

Species	Drainage[1]	Soil Fertility[2]	Soil pH	Normal Seeding Planting Rates[3] (lbs. per acre)	Mixed Species Planting Rates[4] (lbs. per acre)	Wildlife Species Benefited
Winter Food Plots						
Corn	MWD	M-H	6.0-6.5	20-25[5]	4-15	Deer, quail, wild turkey, pheasant, squirrels
Grain Sorghum (milo)	MWD	M-H	6.5-7.0	8-105	4-12	Deer, quail, wild turkey, pheasant, dove, songbirds
Wheat	SPD	M	6.0-6.5	120	10-25	Deer, quail, wild turkey, pheasant, dove, songbirds
Hunting Season Food Plots						
Rye	SPD	L-M	5.8-6.2	112	10-25	Deer, quail, wild turkey, pheasant
Wheat	SPD	M	6.0-6.5	120	10-25	Deer, quail, wild turkey, pheasant, dove, songbirds
Green Forage Food Plots (Annual)						
Spring Oats	MWD	M	6.0-6.5	96	10-40	Deer, quail, wild turkey, pheasant, songbirds
Sunflowers	MWD	L-M	6.0-7.0	10-20	2-12	Deer, quail, wild turkey, pheasant, dove, songbirds
Cowpeas	SPD	L-M	5.8-6.5	30-60	5-20	Deer, quail, wild turkey, pheasant, dove
Soybeans	SPD	M	6.2-6.8	45-60	8-45	Deer, quail, wild turkey, pheasant
Buckwheat	WD	L-M	5.0-7.0	40	8-20	Deer, quail, wild turkey, pheasant, songbirds
Green Browse Food Plots (Perennial)[6]						
Alfalfa	WD	H	6.6-7.2	12-15	6	Deer, quail, wild turkey, pheasant, rabbits, songbirds
Alsike Clover	PD	M	6.0-6.5	6-10	2	Deer, quail, wild turkey, pheasant, rabbits, songbirds
Ladino Clover	PD	H	6.0-6.5	2-4	1	Deer, quail, wild turkey, pheasant, rabbits, songbirds
Red Clover	SPD	M	6.2-6.8	8-10	5	Deer, quail, wild turkey, pheasant, rabbits, songbirds

[1] PD = Poorly Drained, SPD = Somewhat Poorly Drained, MWD = Moderately Well Drained, WD = Well Drained
[2] L = Low, M = Moderate, H = High
[3] Planting rates for typical agricultural production. Rates will vary depending upon method of planting (drill versus broadcast)
[4] Planting rates for mixing species in a single food plot. Rates will vary depending upon method of planting (drill versus broadcast)
[5] Approximately 25,000 to 26,000 seeds per acre
[6] These are usually mixed with a thin stand of cool-season grass or inter-seeded into an existing stand of cool-season grass

Table 3. Recommended planting dates and selected nutritional values for parts of annual and perennial food plot plants (% dry weight). Note, values are not averages of published information and should only be used as approximate guides. Nutritional information adapted from Preston 2001, Berglund 1998, Banks and Stewart 1998, and National Research Council 2001.

Species	Approximate Planting Dates	Crude Protein (%)	Calcium (%)	Phosphorus (%)	Sodium (%)
Corn (whole, grain)	April 15 - May 15	19	0.02	0.30	0.02
Grain Sorghum (grain)	May 15 - June 15	11	0.04	0.28	0.01
White Proso Millet (grain)	May 1 - July 1	12	0.05	0.30	[1]
German/Pearl Millet (grain)	May 1 - July 1	18	0.54	0.35	[1]
Spring Oats (grain)	Mar. 1 - Apr. 15 or Aug. 1 - Sept. 1	13	0.05	0.41	0.03
Sunflowers (oil seeds, whole)	May 1 - June 1	19	0.71	0.51	0.01
Cowpeas (whole)	May 1 - June 1	23	0.10	0.42	0.01[2]
Soybeans (whole)	May 1 - June 1	40	0.27	0.64	0.01
Partridge Pea (whole)	March 1 - June 1	17	1.312	0.17	0.01[2]
Buckwheat (grain)	May 1 - June 1	12	0.11	0.36	[1]
Rye (silage)	Sept. 15 - Oct. 30	16	0.43	0.42	0.05
Wheat (fresh, pasture)	Sept. 15 - Oct. 30	20	0.35	0.36	0.06
Alfalfa (fresh)	Mar. 1 - May 1 or Aug. 1 - Sept. 1	19	1.35	0.27	0.01[2]
Ladino Clover (fresh)	Jan. 1 - May 1 or Aug. 1 - Sept. 1	25	1.27	0.38	0.01[2]
Red Clover (fresh)	Jan. 1 - May 1 or Aug. 1 - Sept. 1	18	1.70	0.30	0.01[2]

[1] No data
[2] Value for forage legumes, pasture from National Research Council (2001)

Table 4. Soil requirements and planting rates of selected plants suitable for food plots that benefit wildlife other than white-tailed deer. (Some information adapted from USDA-NRCS 2000 and Johnson et al. 1991)

Species	Drainage[1]	Soil Fertility[2]	Soil pH	Single Species[3] (lbs. per acre)	Multiple Species[4] (lbs. per acre)	Wildlife Species Benefited
Partridge Pea	MWD	L-M	6.0-6.5	10	2	Quail, wild turkey, pheasant
White Proso Millet	MWD	L-M	6.0-7.0	12	4	Quail, wild turkey, pheasant, dove, songbirds
German/Pearl Millet	MWD	L-M	6.0-7.0	8	2	Quail, wild turkey, pheasant, dove, songbirds

[1] PD = Poorly Drained, SPD = Somewhat Poorly Drained, MWD = Moderately Well Drained, WD = Well Drained
[2] L = Low, M = Moderate, H = High
[3] Planting rates for typical agricultural production. Rates will vary depending upon method of planting (drill versus broadcast)
[4] Planting rates for mixing species in a single food plot. Rates will vary depending upon method of planting (drill versus broadcast)

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