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An assortment of acorns—a common hard mast in Ohio Forests

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# Enhancing Food (Mast) Production for Woodland Wildlife in Ohio

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The term ‘mast’ was probably first used to describe a food source for domestic livestock. Webster defines mast as “fruits, seeds, or nuts (such as berries, pine seeds, or acorns) of trees or shrubs that serve as food for wildlife or domestic animals and typically

accumulate on the ground” (Merriam-Webster, n.d.). When foresters and wildlife biologists use the term, they are referring to the woody plant (trees, shrubs, or vines) fruit used by wildlife for food. All woody plants produce some type of fruit. The type of fruit varies greatly, but for many forest wildlife species, mast is an important source of food. In fact, the diets of squirrels and many other wildlife species consist almost entirely of mast throughout the year.

## Hard and Soft Mast

Mast is often categorized as either soft or hard. Hard mast consists of hard-shelled seeds that have a relatively long shelf life and are typically high in fat, carbohydrates, and protein. These characteristics make them a food source that is high in energy content and available well into the winter months. For many Ohio wildlife species, hard mast is a key food source for survival during the winter months when other sources of nutrition are



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most limited. Examples of hard mast include acorns, hazelnuts, hickory nuts, beechnuts, and walnuts. Table 1 lists Ohio hard mast producers and the wildlife that consume them.

Soft mast is fleshy, perishable fruit that is often high in sugar, vitamins, and carbohydrates. It is usually not available in great quantities in winter months. During drought years, soft mast may be a crucial source of moisture for some wildlife and their young. Soft mast may also be a crucial energy source for some wildlife species during migration. Examples of soft mast include black cherries, persimmons, pawpaws, plums, and blackberries. See Table 2 for a more comprehensive list of soft-mast producers in Ohio.

## The Key Is Diversity

All species of trees, shrubs, and vines produce some type of fruit, and most of these fruits are consumed by wildlife. However, many tree species do not consistently produce abundant mast crops. For instance, some oaks only produce good seed crops at intervals of five or more years, while other species such as maple are more frequent mast producers. While the winged “helicopter” fruits found on maples are not a favorite wildlife food, they are eaten by a variety of wildlife when other mast is not available. Additionally, some fruit is readily consumed by wildlife or is highly perishable. These fruits may only be available for a very short period of time. Serviceberry fruit, for example, is so highly preferred by songbirds that it is often gone within days of ripening.

Diversity of mast can also affect wildlife in your woodlot in other ways. For example, small mammal predation of songbird nests increases in years of bad acorn crops if little or no other mast is available to eat. Having a variety of mast helps to ensure that food is available from season to season and from year to year.

Acorns from trees in the red oak group (red, black, scarlet, and pin oak) are more bitter than those in the white oak group (white, bur, chinkapin, and chestnut oaks). As a result, acorns from the white oak group are preferred by most wildlife species over those in the red oak group, and they are often quickly consumed in the fall months. Red oak acorns have a much longer shelf life, which makes them available for consumption during late winter when other food sources are scarce. They also provide food in years when few white oak acorns are produced.

Encouraging the growth of a wide variety of tree, shrub, and woody vine species is one of the best ways to make sure there is always food available for wildlife on your property.

## Enhancing Mast Production

### Planting

The most obvious way to increase the variety of trees, shrubs, and vines on your property is to plant them. Planting is often a long-term proposition for many tree species (oaks may take more than 25 years to produce acorns), but shrubs can produce mast within a few years. Since many plants are difficult to establish under shaded conditions, planting is usually most effective in open areas or on the edges of existing forestland.

Ohio’s wildlife species are well adapted to utilizing mast from native plants as a food source, and there are hundreds of native trees, shrubs, and vines from which to choose. Each native plant species is well adapted to a limited range of soil and climatic conditions, but a variety of species are available for nearly any



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### Ripe American plum fruits – a large soft mast in Ohio forests

site condition found in Ohio. It is important to understand the conditions on your site and to select species that are well adapted to that site. Take the oaks for example—pin oak and swamp white oak thrive in soils that remain saturated for much of the growing season, while other oaks such as black oak and chestnut oak grow quite well under very dry conditions.

Non-native plants have evolved under different growing conditions and some are not successful in Ohio. On the other hand, there are numerous examples of non-native plants, such as multiflora rose, autumn olive, and honeysuckle, which have become overly aggressive and have displaced many of Ohio’s native mast producers. Planting non-native species can actually have a long-term effect of reducing the diversity of mast-producing plants on your property. This reduction in diversity will lead to a decline in the wildlife that use the area. Native tree and shrub seedlings are available through most county Soil and Water Conservation Districts and numerous private nurseries in the region.

### Mowing or Cutting

Shrubs (mostly soft-mast producers) and brambles can be maintained by cutting or mowing at approximately five-year intervals along woodland borders. Many of these species are prolific sprouters and will regrow rapidly following mowing or cutting.

### Crop Tree Release

Mast production in your forest can be enhanced by providing additional growing space for existing mast-producing trees that are crowded by neighboring trees. This is an excellent way to increase soft and hard mast production in a relatively short period of time. Overly crowded trees grow slowly and often do not produce an abundance of flowers or fruit. Removing neighboring trees allows mast producers to expand their crowns, which provides additional energy and a larger surface for mast production. See Ohio State University Extension fact sheet F-50, Crop Tree Management: A New Tool to Help You Achieve Your Woodland Goals ([ohioline.osu.edu/factsheet/f-50](http://ohioline.osu.edu/factsheet/f-50)) for information on how to increase the production potential of mast producers in your woods.

**Table 1. Recommended Hard-Mast Producers for Ohio\***

Plant Species	Form or Habit	Natural Site Conditions	Season of Availability	Wildlife that Consume **	Comments
beech, American	tree	medium	fall, winter	GB, SB, SH, MH, LC, WF	Older beech often form cavities for nesting wildlife
birch	tree	moist	fall, winter	GB, SB	Upland gamebirds, finches sparrows, and chipmunks
hazelnuts	shrub	medium	fall, winter	GB, SH, MH, LH, WF	Produces best along woodland edges or in openings
hickory, pignut	tree	medium	fall, winter	GB, SH, MH, LH, WF	Hickories make up 10-25% of squirrel diets
hickory, mockernut	tree	medium to dry	fall	GB, SH, MH, LH, WF	Preferred by squirrels
hickory, shagbark	tree	medium to dry	fall, winter	GB, SH, MH, LH, WF	Loose bark provides cover for bats and other wildlife
hickory, shellbark	tree	moist	fall, winter	GB, SH, MH, LH, WF	Produces the largest nut of any native hickory
oak, black	tree	dry	fall, winter	GB, SB, LH, MH, SH	Red oak group—blue jays eat and disperse acorns
oak, but	tree	wet to medium	fall	GB, LH, MH, SH	Largest of the acorns in the white oak group
oak, chestnut	tree	dry	fall	GB, LH, MH, SH	White oak group
oak, chinkapin	tree	medium	fall	GB, SB, LH, MH, SH	Small sweet acorns; generally found on soils derived from limestone
oak, northern red	tree	medium	fall, winter	GB, SB, LH, MH, SH, M	Red oak group; bitter acorns, eaten in absence of white oak acorns
oak, pin	tree	wet	fall, winter	GB, SB, LH, MH, SH, MC, WF	Red oak group; very valuable for WF
oak, scarlet	tree	dry	fall, winter	GB, SB, LH, MH, SH, MC	Red oak group
oak, swamp white	tree	wet	fall, winter	LH, MH, SH, MC, WF	White oak group
oak, white	tree	medium to dry	fall, winter	GB, SB, LH, MH, SH, MC	White oak group; one of the most highly preferred acorns
pine	tree	mostly medium to dry	fall, winter	GB, SB, SH	Pine seed is eaten by squirrels and a number of bird species
walnut, black	tree	moist	fall, winter	SB, MH	Woodpeckers and squirrels are some of few animals equipped to break open nuts
hophornbeam, eastern (ironwood)	small tree	partial shade	fall, winter	GB, SB, MH	Buds and catkins (male flowers) also valuable for wildlife including the ruffed grouse
hornbeam, American (musclewood)	small tree	partial shade	fall, winter	GB, SB, MH	Buds and catkins also valuable for wildlife

\*The information contained within this table was derived in part from (Malmborg & Wilson, 1988; Martin et al., 2011; Wilson, 1993).

\*\* GB—gamebirds: grouse, turkey, quail; SB—songbirds: neotropical migrants (e.g. warblers, finches), residents (e.g. blue jays, chickadees); LH—large herbivore: white-tailed deer; MH—medium herbivore: rabbit, squirrel, chipmunk; SH—small herbivore: mice, voles; LC—large carnivore: black bear, coyote, bobcat; MC—medium carnivore: red and gray fox, raccoon, opossum; WF—waterfowl, usually wood ducks

**Table 2. Recommended Soft-Mast Producers for Ohio\***

Plant Species	Form or Habit	Natural Site Conditions	Season of Availability	Wildlife that Consume**	Comments
blackgum	tree	medium to dry	fall	WF, GB, SB, MH, LC, MC	Deer also preferentially browse on the twigs
blackberry	bramble or briar	various	summer	GB, SB, SH, MH, MC	Also makes great cover for rabbits and other smaller mammals
black cherry	tree	medium	summer, fall	SB, LH, SH, LC, MC	Considerable fruit production
blueberry species	shrub	wet to dry	summer	GB, SB, MH, LH, LC, MC	Does well on acid soil sites; some varieties grow in wetlands and others on dry ridgetops
crabapple	small tree	various	fall	GB, SB, LH, MH	Toringo crabapple has become locally invasive
dogwood, flowering	small tree	varies by species	summer, fall	GB, SB, LH, MH, SH, LC, MC	Ohio's most common dogwood; consumed by at least 36 species of birds
dogwood, other	shrub	wet to moist	summer	GB, SB, LH, MH, SH, LC, MC	Most are excellent for wetland areas
elderberry	shrub	moist	summer	GB, SB, MH	Often found in wet areas
grape	vine	various	summer	GB, SB, MH, LH, SH, MC, LC	Provides excellent nesting habitat
greenbriar	vine	dry	fall	GB, SB	Excellent browse for deer
hawthorn	small tree	often invades old pastures and fields	fall	GB, SB	Cedar waxwings prefer these berries
hackberry	tree	moist bottomlands	fall, winter	GB, SB, MH, LH, MC	Important food during winter, especially for mockingbirds, robins, waxwings
mulberry	tree	various	summer	SB, MC	Preferred food in early summer
pawpaw	small tree	medium to moist	summer, fall	SH, MH, LH, MC	Produces the largest fruit of any native plant
persimmon	tree	medium	fall	SB, MH, LH, MC	Large fruit resembles an apricot; ripen after first frost
plum	shrub	medium to moist	summer	LH, SH, LC, MC	Thickets provide good cover for songbirds
poison ivy	vine	medium, wet	summer	GB, SB, MH, SH	Fruit is consumed by several wildlife species
raspberry	bramble or birar	various	summer	GB, SB, LH, MH, SH, LC, MC	Also provides cover for many wildlife species
rose	bramble or briar	varies by species	summer	GB, SB, SH, LC, MC	Multi-flora rose is non-native and invasive; plant only native rose species, e.g. Carolina or swamp rose
serviceberry	small tree	various	summer	GB, SB, SH, MC, LC	Downy and Allegheny serviceberry occur in Ohio
surmac	small tree	medium, dry	fall, winter	GB, SB, SH, MH	Often found in fence rows and woodland edges

Plant Species	Form or Habit	Natural Site Conditions	Season of Availability	Wildlife that Consume**	Comments
viburnum	shrub	varies by species	summer	GB, SB, MH	Several species including blackhaw and maple-leaf viburnum are excellent mast producers
Virginia creeper	vine	various	summer	GB, SB, SH, LH, MC	Fruit similar to grape

\*The information contained within this table was derived in part from (Malmborg & Wilson, 1988; Martin et al., 2011; Willson, 1993).

\*\*GB—gamebird: grouse, turkey, quail; SB—songbird: neotropical migrants (warblers, finches, etc.), residents (bluejays, chickadees); LH—large herbivore: white-tailed deer; MH—medium herbivore: rabbit, squirrel, chipmunk; SH—small herbivore: mice, voles; LC—large carnivore: black bear, coyote; MC—medium carnivore: red and gray fox, raccoon, opossum; WF—waterfowl, usually wood ducks

## A Few Key Recommendations

**Inventory your woods to determine the number and diversity of mast producers.** This will help you to set realistic wildlife management goals for your property. After setting goals, you can work with a forester or wildlife biologist to determine which mast producers can be enhanced to help you accomplish your goals.

**Maintain a diversity of hard-mast producers. Manage for oaks from both the white and red oak groups.** Improve mast production by maintaining dominant and codominant trees with healthy crowns. Neighboring trees may be removed to increase oak crown vigor. Additionally, maintain other species of hard-mast producers (i.e., hickory, beech) to buffer against years when acorn production is down.

**Maintain mast producers that also provide other wildlife benefits.** Insects are important diet items for certain wildlife species, especially migrating and breeding songbirds. Oaks, especially white oak, cherries, and plum, host more caterpillars than other trees (Parker 2010). For more information on selecting trees and shrubs for beneficial insects, see OSU Extension fact sheets HYG-5815, Native Trees: Creating Living Landscapes for Birds, Butterflies, Bees, and Other Beneficials ([ohioline.osu.edu/factsheet/hyg-5815](http://ohioline.osu.edu/factsheet/hyg-5815)); and HYG-5813, Native Trees and Shrubs: Creating Living Landscapes for Birds, Butterflies, Bees, and Other Beneficials ([ohioline.osu.edu/factsheet/hyg-5813](http://ohioline.osu.edu/factsheet/hyg-5813)).

**Select for soft-mast producers in key areas.** Many wildlife species incorporate hard and soft mast into their diets. Selectively maintain soft mast-producing shrubs in wildlife openings, rights-of-way, and along woodland edges. A goal may be to mow or cut approximately one-fifth of shrubby areas along woodland edges each year. This results in a range of ages of shrubby mast producers to help ensure consistent production of soft mast from year to year.

**Maintain approximately two to three fruit-producing vines per acre on trees that are otherwise of little value for mast or timber production.** Virginia creeper, poison ivy, and grapevines are common woodland vines that provide valuable soft mast to wildlife. Grapevines are often damaging to woodland trees. They can rob trees of needed sunlight and make them more susceptible to damage from ice. However, they also provide excellent soft mast and cover for many species of wildlife. Consider retaining grape vines in trees that do not meet other management goals.

**Plant a variety of native mast-producing shrubs and trees in areas where natural regeneration of these species is not likely to occur.** Maintenance of newly planted seedlings by mowing and/or herbicide applications is usually needed to ensure acceptable levels of survival in the first few years after planting. In areas with high deer populations it also may be necessary to use tree shelters or other forms of protection while establishing plantings.

**Control non-native invasive plants, such as, autumn olive, multiflora rose, tree-of-heaven, and honeysuckle, as they often out-compete native mast producers.** Total elimination of non-native plants is often not attainable, but it is often possible to reduce them to a more acceptable level. Fact sheets on the identification and control of non-native invasive plants can be found at Ohio Woodlands Stewards Program ([woodlandstewards.osu.edu](http://woodlandstewards.osu.edu)).

**Consult with your ODNR Service Forester, ODNR Wildlife Management Consultants, or your Ohio State University Agriculture and Natural Resources Extension Educator for specific recommendations for your property.** These natural resources professionals have experience and access to information that will help enhance the production of mast for wildlife on your property.

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