

H. M. Ramp

Woody Plants Of New England Used As Food By Birds And Mammals

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WILDLIFE management has taken its place as one of the newer techniques in the conservation of our natural resources. In wildlife management, one of the most important factors is the control of food and cover. However, before satisfactory progress can be made in this direction, we must know what plants will be suitable during critical periods and how these can be established and maintained at reasonable cost. Woody plants which, generally speaking, are long-lived, do not require cultivation and provide much of the food and cover for both forest and farm-loving game species promise to be most useful in developing our wildlife management.

The choice of a plant or group of plants to be used in a given situation must, of course, depend on a number of factors.

One of the first considerations is the type and ultimate size of the plant. It must fit either in a dominant or an understory position into the vegetation at present growing or soon apt to be growing on the site where it is to be established. It must not soon outgrow the space available and overtop something more useful or interfere with some other more valuable use of the land, such as the growing of agricultural crops.

The plant must be hardy in the region under consideration. Most plants can be moved south of their range, but few can suc-

cessfully be moved north of it. A safe guide in this direction is to use plants native to the locality where a planting is being made.

Growth rate has many implications. It determines whether a plant will soon outstrip competing vegetation such as grass and be able to take its "place in the sun." In group plantings some of the individuals must not outgrow and eliminate the others. With forest species growth rate largely determines the care necessary to establish a new crop and bring it through to a stage where it can care for itself so far as being overtopped is concerned. Also, rate of growth is, in general, correlated with length of life, the fast-growing species usually being short-lived.

Connected rather closely with growth rate but still apart are vigor and resistance to injury. While vigor is tied up with nursery treatment to a certain extent, some plant species are able to thrive under any reasonable conditions while others are difficult to bring through with the most favorable treatment. In the field, vigor determines to a large degree the ability of a plant to compete with its neighbors and grow without cultivation. Many pests, such as the stem rust of certain barberries, can necessitate the exclusion of a species from a given region. Also, in some cases, pests may damage a given plant so that it cannot exist without protective measures.

Some plants have definite soil type requirements outside of which they cannot succeed. However, this is not to be taken too literally. Rubel (1935) in discussing the compensation of various factors has shown that lime in a clay soil brings about coagulation effecting a coarser state; sandy soil compensates for humidity; in dry regions sand means a moist habitat and many plants indifferent to soil in their optimum range become indicators of one factor or another at the borders. Also, a species may succeed perfectly well with a given climate and soil when not limited in space but not be able to compete with new invaders. Wilde (1933) found that, within a given soil type, depth to the water table greatly influenced the climax vegetation.

Each species has a definite stage in which it can exist in the natural ecological succession. No natural unit of vegetation is static and one of the requisites for successful planting is the selection of species which fit in the stage represented. It would be as foolish to plant the ground hemlock, *Taxus canadensis*, in an open field as it would be to put staghorn sumac, *Rhus typhina*, under a stand of old trees.

"Tolerance" is the forestry term applied to the ability of a plant to grow under an overwood. This ability is based upon a combination of several factors, including soil moisture, available nutrients, the history of the individual plant, and probably its mycorrhizal equipment (Gast, 1930). It is plain, therefore, that "tolerance" is not merely the ability to endure shade. In general, it can be said that plants

with dense foliage are more tolerant than those with a thin type.

The characteristics of a plant in respect to its fruit and fruit production are, of course, of paramount importance.

While summer foods are not often a limiting factor, a plant with fruit available above deep snow may often mean the difference between starvation and life for a bird or mammal in the northern states. On the other hand, it should not be assumed that only the plants on which fruits persist are valuable. R. T. King (1936) stated that one of the most critical periods in the nutrition of the ruffed grouse comes in early spring when the male is drumming, the female is producing her clutch of eggs and there are few nutritious foods available. In this connection the value is obvious of some of the hawthorns, the fruits of which lie over winter under the snow and come out firm and bright in the spring.

Fruits which rot or go to pieces are usually a loss unless the seeds are available as food. The ruffed grouse and the squirrels will pick a rotten apple to pieces to get the seeds, but the food value is, of course, only a small part of what it was when the pulp could be taken too.

A plant which begins bearing a few years after planting is, naturally, much more valuable for wildlife management purposes than one such as the oak, which takes 30 years or more to begin fruiting.

The regularity of fruit crops is of paramount importance in all the food species except those which supply browse or bark. White pine seed is taken by the ruffed grouse in New England,

but the years in which the seed is abundant enough to be taken are so far apart that records of its use are scarce. At the other extreme the hybrid apple, *Malus Soularidi*, produces a heavy crop of fruit nearly every year.

Many species bear such light fruit crops that their use as food is practically negligible.

Dates of fruit maturity indicate several things in respect to wildlife use. In general, early maturing fruits disappear first, and those ripening late are the most valuable to animals during the critical months of winter and spring. However, in some species maturity seems to be correlated with the formation of the abscission layer which causes the fruit to fall, and, as with some of the hawthorns, a species from a more southern range may hold its fruit better than one native to the region. Too late ripening with correspondingly low sugar content and poor keeping qualities obviously may rule out a species for use under given conditions.

Little is known of the nutritional needs of wild birds and mammals or of the nutritional value of most plants showing promise of use as food by these animals. It can be said though that, as a class, nuts have a high fat content, little water, a rather large protein portion and medium to large amounts of carbohydrate. Fleshy fruits of woody plants have a high water content, small amounts of protein, little fat and a high percentage of carbohydrate. The small amount of work done on buds of such species as yellow birch and poplar indicate that these have low protein and fat contents and medium amounts of carbohydrate. Chemi-

ical analysis must necessarily be supplemented by feeding experiments to determine the actual utilization value of the foods by the different wildlife species in order to get a true picture. Also, one of the greatest values of the various fruits may easily prove to be their vitamin content.

Many of the plants producing wildlife foods are also fine ornamentals although they are little appreciated as such. As Halligan (1935) said, "If the common sumacs were some rare, imported species from a distant land that could be grown only with painstaking care, 'what a work we should make about their beauty!' But, thriving about us on every hand, along the roadside or in the fence rows, we see them only as worthless native brush."

Other things being equal, a plant which is easily propagated is, of course, much more useful in wildlife food production than one difficult to handle in this direction.

Many of the plants which produce wildlife food are valuable for other purposes. The oaks, black cherry and hickory are only a few of these which produce valuable timber. Others, such as the blueberry and bramble fruits, provide important human foods. Many others furnish the best of wildlife cover.

The native flora of New England includes quite a variety of outstanding woody wildlife food plants. Food habits studies have shown these to make up a large part of the fall and winter foods of our game animals. There is no question as to their adaptability to the region and, in many cases, they can be had for only a little protection or a little care.

Native Trees

Apple, Malus spp.

If all the animals using the apple were known, it would probably rank as the most universal wildlife food of the Northeast. It is used as fruit by the bobwhite, pheasant, many non-game birds, the black bear, red and gray foxes, muskrat, opossum, raccoon, skunk, snowshoe hare, and gray squirrel, and as both fruit and browse by the white-tailed deer, cottontail rabbit and ruffed grouse.

Seedling trees are easily grown from stratified seed, but, of course, are largely hybrids. Grafting of several types is successful and offers one of the best means of establishing the better species on abandoned farm lands where wild seedlings are plentiful. The plants require fertile, permeable soils, doing best on loams or loams overlying clays. The best locations are in rolling country on gradual slopes or high tablelands where air drainage is good.

Among the small crab apple types, *Malus arnoldiana*, a cross between the Japanese crab, *Malus floribunda*, and the Siberian crab, *Malus baccata*, gives promise of being a good wildlife food species. Its fruits are only about 1/2" in diameter. It is a heavy bearer, seldom failing to produce a crop, and the fruits are eagerly taken by songbirds. The fruit persists well, sometimes remaining on the tree into April.

Representing the larger type of apple, the first generation hybrid between the native prairie crab, *Malus ioensis*, and the common apple, *Malus pumila*, is especially outstanding. The fruits are about 2" across. For volume of production, this tree seems to have any

other apple beaten by far. A good-sized tree will often cover the ground almost completely to the limits of its crown. Eight trees studied during a period of 4 years showed no failures and only one light crop, while there were six medium and eleven heavy ones. The fruit is bitter and is used as a substitute for quinces.

Beech, Fagus americana

In point of numbers of wildlife species using the plant as food, beech ranks at the top among northeastern tree species. It is used either as browse or fruit by some of the ducks, the ruffed grouse, pheasants, beaver, black bear, cottontail, deer, red and gray foxes, opossum, raccoon, gray squirrel and several species of non-game birds. The nuts are important in northern New England, but are scarcely found in the feeding records from Massachusetts southward. The tree is only fair as a timber species, but maintaining a few large-crowned individuals in game management areas is certainly well worth while.

The birches, Betula spp.

The species of birches are usually not separated in food habits research, but the bulk of the material is made up of the browse from yellow birch, *Betula lutea*, and black birch, *Betula lenta*. These two are taken by the ruffed grouse, beaver, cottontail, deer and moose, and probably by other species. Chemical analysis indicates that the buds of yellow birch are surprisingly nutritious. The birches are common timber trees of the northern New England forests, and favoring a few individuals per acre furnishes abundant browse for the ruffed grouse.

Black cherry, Prunus serotina

This valuable timber tree is commonly found throughout the hemlock-white pine-northern hardwood region, especially in the southern part. It is very susceptible to tent caterpillar attacks and so is not wanted in commercial orcharding sections. However, where this is not a factor, the heavy fruit production of this species and the large number of animals using it make it extremely valuable. The cherries are used as food by at least 29 species of non-game birds, the bobwhite, ruffed grouse, pheasant, red fox, raccoon and gray squirrel. In addition, the browse is used by the ruffed grouse, cottontail, beaver and deer. The dried fruits and seeds are taken by grouse as late as March.

Hawthorns, Crataegus, spp.

This very variable genus of shrubs or small trees thrives on almost any soil, but, of course, does best in rich, loamy, somewhat moist situations. The fruits are one of the most important foods of the ruffed grouse in the Northeast and are also taken by the bobwhite, some of the ducks, pheasant, some 30 species of songbirds, the cottontail, deer and gray squirrel. Deer in Massachusetts refused the browse (Hosley & Ziebarth, 1935), but the cottontail accepts it. Some of the most promising species are *Crataegus bellula*, the fruit of which lies over winter on the ground and is still bright and firm in March, *C. blanda*, the fruit of which persists on the tree until April, and *C. Canbyi*, *C. crugalli*, *C. triumphalis* and *C. viridis* which are heavy bearers with fruit persisting into April. *C. Engelmanni*, *C. erecta*, *C. Fon-*

tanisiana and *C. Lavellei* do not persist after mid-March. *C. phaenopyrum*, the Washington thorn, is a very desirable species for central and southern New England.

The oaks, Quercus, spp.

The oaks are one of the most important genera for wildlife food production. The browse is taken by many species and the acorns make a meal which is highly nutritious and easily obtained. The fruits are produced in abundant crops usually at intervals of several years. The various species are used as food by the bobwhite, some of the ducks, ruffed grouse, pheasant, some 50 species of non-game birds (Van Dersal, 1936), beaver, black bear, cottontail, deer, gray and red foxes, opossum, raccoon, snowshoe hare, and gray squirrel.

Native or Naturalized Shrubs

Only a few of the shrubs used as food by birds and mammals in New England can be covered in a sketchy manner in a short paper. This group of plants has several special values. In general, the shrubs reach fruit-bearing age more quickly than the trees; many furnish good cover; they can be used in many locations where trees cannot be tolerated, and they do not grow out of reach of most animals as quickly as the trees.

Northern bayberry, Myrica carolinensis

This thick-forming species does well on sands and dry, sterile soils and is a favorite for seaside plantings. The fruit ripens in September and persists until April. It is known to be eaten by 35 non-game birds, the bobwhite, ruffed grouse and pheasant. It is an important ruffed grouse food in Connecticut.

Bittersweet, Calastrus scandens

This ornamental climber is a species of the better soils. The plants are dioecious, but the pistillate ones usually have enough staminate flowers for fertilization. The fruits ripen in October and persist, in some cases at least, until March. The plant is used as food by 6 non-game bird species, the bobwhite, ruffed grouse, pheasant, cottontail and deer. The quantities represented in stomach analysis are small, due perhaps to the scarcity of the plant. The oriental species, *Celastrus articulata*, is more robust in growth than the native and seems to fruit more heavily.

Blueberries, Vaccinium spp.

The blueberries are one of our most valuable shrub groups from the standpoint of wildlife and human food. They grow on a wide variety of acid soils coming in on old fields abandoned 15 years or more, persisting as straggling thin bushes under pine or hardwoods and taking on a new lease of life on cutover lands. Unless spring frosts prevent, crops are produced every year. The fruit or browse is known to be used by 82 non-game birds, the bobwhite, some of the ducks, the ruffed grouse, pheasant, black bear, cottontail, deer, red and gray foxes, moose, opossum, skunk, gray squirrel and probably by others. The fruit is used in Massachusetts at least as late as December.

Panicled dogwood, Cornus paniculata

This thicket-forming plant is a common roadside and hedge-grow species doing well on a wide variety of the drier soils. Fruit crops are often heavy, but

vary widely in dates of falling. This is an important food of the ruffed grouse in the Northeast and is taken by 18 non-game birds and the pheasant. The browse and bark are taken by the cottontail. The plant is valuable game cover.

Wild grapes, Vitis spp.

Every grouse hunter knows the possibilities of a wild grape tangle as a place from which to flush a ruffed grouse in the hunting season. Fruit crops are heavy and occur nearly every year. Although the berries ripen in the fall, they sometimes dry on the vines and also remain usable on the ground through winter. Pheasants have been observed to dig through 8 inches of snow to get the fruits in February. They are taken also by some 80 species of non-game birds, the bobwhite, some ducks, the pheasant, black bear, red and gray foxes, opossum, raccoon and gray squirrel. The browse is taken by the cottontail and deer. The plant makes a good cover tangle.

Red-berried nightshade, Solanum Dulcamara

This exotic has been so widely planted in North America that it is thoroughly naturalized. It is a half-woody climber most common in swamps, but occurring also on uplands. The fruits are borne regularly in fairly heavy crops. The fruit is an important pheasant food and is also eaten by the ruffed grouse, bobwhite, a few songbirds, the opossum and skunk. The browse is taken by the cottontail. The fruits are poisonous to humans, or the plant would be a good ornamental.

Virginia creeper, Parthenocissus quinquefolia

This high-climbing vine grows in any common soil except dry sand. It is a common species of hedgerows and woodland borders apparently requiring full light for fruiting. Included among the species using this plant are the bobwhite, ruffed grouse, pheasant, deer, raccoon and red fox. While the fruits persist well into the winter in Michigan, they usually fall with the hard frosts in New England. The plant is a very attractive ornamental with brilliant fall leaf coloration.

In conclusion, emphasis should be placed on the fact that the behaviour of both animals and plants is a local thing to be studied as such. The white-tailed

deer browses heavily on witch hobble, *Viburnum alnifolium*, in the Adirondacks (Pearce, 1937) but rejects it in Massachusetts (Hosley & Ziebarth, 1935). A given plant may hold its fruit well in one section and lose it in another. The safest rule seems to be to begin with known quantities in the form of the local plants which produce food when it is most needed and try out others experimentally before making large-scale plantings. One of the most productive management practices is the release of food plants from overtopping vegetation. This exposure to full light produces astonishing results at very low cost. The practice is one of the best means of combining silvicultural practice with wildlife management.

It was impossible to cite directly all the dozens of references bearing on this paper. For a more detailed bibliography see "Woody plants used by Wildlife in the Northeastern United States" by N. W. Hosley, Doctorate thesis, University of Michigan, pp. 1-409, 1938.

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