

# 5 Great Reasons to Plant



PHOTO BY BILL MARCHEL

# Tree Orchards

By David A. Osborn and Dr. Karl V. Miller

Managing habitat for deer is one of the cornerstones of Quality Deer Management. Today, habitat managers use prescribed fire, tree cutting, herbicides, and cultivation to create a mosaic of different plant species, different stages of plant succession, and a complementary distribution of food and cover. However, the idea of helping Mother Nature to better provide resources for deer and to attract deer for hunting is not new. Long before the first Europeans arrived here in about 1500 AD, Native Americans used fire and tree girdling to manage forests near their villages for many purposes. High-quality browse plants growing in man-made forest openings were purposely maintained to attract game animals, including whitetails. Fields were cleared for growing vegetables, and native fruit and nut trees were released from competition to improve their crops for Man and wildlife. After Europeans introduced exotic tree crops – including apples, European plums, peaches, pears, and others – orchards of those trees became common where local climates suited them. Native Americans understood that planting and maintaining tree orchards, for themselves and for game animals was an investment for the future, well worth their effort and patience.

Although some QDMA members have been planting tree orchards for many years, we believe fruit and nut orchards are underutilized for attracting, feeding, and holding deer. At the 2009 QDMA National Convention in Louisville, Kentucky, Karl gave a presentation on the value of hard and soft mast to deer. Immediately afterwards, David presented on selection, planting and care of fruit and nut tree orchards. Based on questions we received from the audience, it was obvious many people recognized the importance of mast to deer and the potential value of tree orchards in deer management. If you were unable to attend the convention, or believe planting fruit and nut trees isn't worth the required work and cost, we encourage you to continue reading this article. We want to share the five most important reasons we plant orchards for deer, and why you should too.

## 1 TO INFLUENCE DEER MOVEMENTS SO YOU CAN ATTRACT AND HUNT DEER

We've seen no reports on the effects of tree orchards on deer movements. However, deer movement ecology is a direct reflection of habitat composition, herd dynamics, and predator-hunter avoidance. No matter where you live (even Texas), acreage used by deer is large compared to the average size of private landholdings. The smaller and more irregularly shaped a property, the more likely deer will use multiple properties. Therefore, if you want to maintain management control over deer on your land, you have two options – either increase size of the property through land acquisition or a QDM Cooperative, or manipulate deer movements through behavior modification. Research suggests 2,500 to more than 10,000 acres are needed to have reasonable management control over all deer sex and age classes. Most QDMA members hunt properties less than 500 acres in size.

If you can't increase the acreage under your control, your best option is to change deer behavior to minimize the amount of time each deer spends off your property. Unless you have a high-fence, you can't keep a deer from sometimes crossing boundary lines. However, by providing all essential habitat components with proper distribution and interspersed, you might influence where it spends most of its time – what is referred to as its "core area." A study of adult buck movements in southern Texas conducted by Dr. Mickey Hellickson reported bucks spent 50 percent of their time in a relatively small core area: 2½-year-olds (356 acres), 3½- and 4½-year-olds (180 acres), 5½- and 6½-year-olds (210 acres), and 7½-years and older (151 acres). (See the article "Solving the Mystery of Buck Movements" in the June/July 2010 issue of *Quality Whitetails* for details.) As food resources increased during a spring with abundant rain, core areas of bucks decreased in size. This likely happened because bucks met their nutritional needs in a smaller area, not needing to cover more ground.

If you choose to change deer movements on your land, conduct a thoughtful inventory of your deer habitat and identify any components that might be missing or limited. Then, make plans to correct those deficiencies. Even if your property is relatively large, you can increase its value to deer by dividing it into smaller units (maybe 80 to 300 acres each) and providing all essential habitat components within each unit. Planting supplemental fruit and nut orchards might help hold deer on your property when mast producing trees, shrubs, and vines are in low supply or when their crops only are available during a short period.

We suspect the effect of orchards on deer movements is similar to that of food plots and baiting. Most research suggests, unless established

just outside a deer's annual home range (maybe within 150 yards), food plots and bait sites don't cause deer to expand their home range size. However, when located inside their annual home range, food plots, bait, and agricultural crops often cause deer to shift their core areas toward the food or to alternate among multiple small core areas to better take advantage of multiple food resources. Deer sometimes will decrease size of their core areas around an attractive and reliable food source. Because we can't know the boundaries of a deer's core area without tracking equipment, it's a good idea to plant orchards for hunting near the center of your property. That way, you just might shift a buck's core area toward you and away from your neighbor.

Research suggests once deer develop the habit of regularly visiting a localized food source, they might continue to visit it for up to two years after all food is removed. Because tree orchards are semi-permanent features of a property (more so than food plots and bait sites), it seems reasonable that a strong habit of visitation might become established and maintained across many generations of deer. During each new generation, does teach their fawns to visit. Those fawns pass the habit on to their fawns, etc. As Mickey Hellickson demonstrated, deer develop increasingly

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### Production Potential for Popular Deer Trees

	Spacing	Trees/acre	Food/tree (lbs)*	Food/acre (lbs)*
<b>Apple</b>	20 x 30	73	250	18,250
<b>Chestnut</b>	30 x 30	48	125	6,000
<b>Honey locust</b>	30 x 30	48	100	4,800
<b>Jujube</b>	20 x 30	73	180	13,140
<b>Mulberry</b>	30 x 30	48	25	1,200
<b>Pear</b>	25 x 25	87	250	21,750
<b>Persimmon</b>	20 x 20	109	50	5,450
<b>Plum (domestic)</b>	20 x 20	109	75	8,175
<b>Sawtooth oak</b>	30 x 30	48	50	2,400

\*Wet weights (fruit are not dried before being weighed).

stable home ranges as they mature. Young deer tend to be wanderers, but you might encourage them to stay on your property by using tree orchard fruits and nuts as attractants. In many states, hunting over bait is illegal. Tree orchards are legal everywhere, serve the same function and provide aesthetic appeal in addition to attraction and supplemental nutrition.

When compared to food plots, deer orchards provide a more practical approach for attracting deer to your “hidden honey holes,” and they are perfect for providing multiple stand sites across a small property. Hunters often plant small attraction food plots in out-of-the-way places for the sole purpose of drawing deer in close for a killing shot, particularly during archery season. However, sometimes it seems these small plots are more trouble than they’re worth. Because they’re off the beaten path, it’s difficult to access them with a tractor for annual maintenance. Also, their small size limits your crop choices because many deer forage plants can’t tolerate heavy browsing, which is common when small food plots are surrounded by deer escape cover. Small, well-placed tree orchards provide the same attraction as a small food plot, require less frequent tractor visits by you, and heavy use by deer won’t limit their continued productivity (as with food plots). Yes, you could search for and hunt over naturally occurring mast trees, but you have no control over their distribution relative to your deer stands, property lines, and other features. By planting tree orchards you determine when and where deer will spend much of their time.

When planning your tree orchards, give careful consideration to the same details that are important when establishing food plots. Environmental conditions at the site must match the grow-

ing demands of the trees. Some trees tolerate heavy and poorly drained soils, but others don’t. Some trees bloom late enough to never have their crops killed by frost, others must be planted where the risk of frost-damage is minimized. Some trees are self-fertile; others require that a suitable pollinator be planted close enough for pollen exchange. Fruit and nut trees require at least six hours of sun each day to be most productive, and most perform best in full sunlight, so consider their estimated size at maturity, and plan your orchards accordingly.

## 2 TO SUPPLEMENT THE SEASONAL SUPPLY AND DISTRIBUTION OF HARD AND SOFT MAST

Mast is a highly preferred and important food source for deer from spring through winter. Unfortunately, many fruit- and nut-producing plants have rather narrow habitat requirements, and this affects seasonal abundance and distribution of mast for deer. Some sun-loving plants, like pokeweed and blackberry, favor clearcuts and “old fields,” becoming less abundant and productive as trees encroach on their growing site. When a site enters mid-succession, pioneer trees like black cherry and persimmon and woody vines like grapes are old enough and have adequate sunlight to make a real fruit contribution to deer diets. In mature forests, persimmon fruit production declines, but shade-tolerant understory plants like beautyberry, blueberry, flowering dogwood, fringetree, hawthorn, and viburnums; and dominant and codominate trees like blackgum and oaks are important mast producers. In a perfect world, our hunting lands would contain an ideal mix of plants to provide deer with adequate cover, high-quality green browse, and abundant mast during all months of the year.

### About This Article

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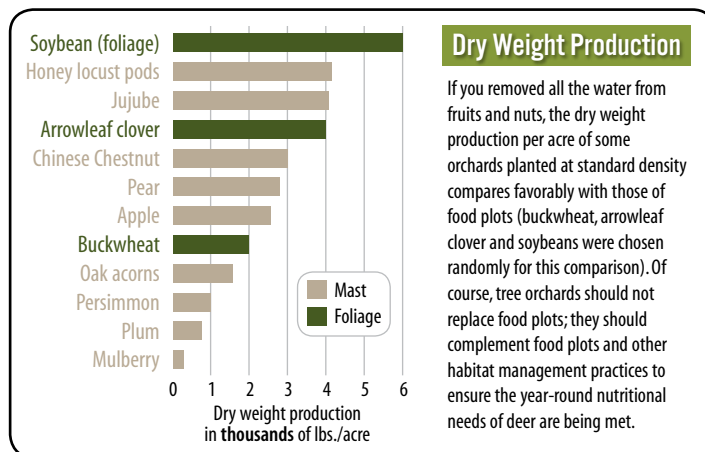
In the real world, properties are mostly managed on a larger acreage scale for the sake of efficiency. Large tracts of similar trees lack diversity needed for sustainable production of hard and soft mast. For example, when many acres are devoted to pine timber production, clear-cuts provide fruit for deer in summer, but a scarcity of mature oaks provide few or no acorns in the fall and winter. When too many acres are devoted to mature hardwoods, fewer spring and summer fruits are available for deer. In areas dominated by oaks, acorns are the most important deer food from September to March during good crop years. During poor crop years, or when deer are too abundant, all acorns have been eaten by December, and deer have little high-energy food to attract or nourish them until spring green-up.

The effect of inconsistent acorn production among years by oaks can be minimized by managing forests for multiple oak species. An even-aged oak forest in North Carolina with five oak species produced one to 800 pounds of sound acorns per acre during a 12-year study. When considering northern habitats and poor quality winter browse, deer need about half a pound

of acorns per 100 pounds of body weight per day to survive for 90 days. When given unlimited access to acorns, the same deer would eat about 1.5 pounds of acorns per 100 pounds per day. In poor mast years, without supplementation, deer must eat whatever lower-quality foods are available and hope their body fat reserves carry them until spring.

Habitat managers can provide deer with an almost year-round abundance of fruits and nuts by encouraging naturally growing plants and supplementing them with cultivated tree orchards. If mature or nearly mature oaks are naturally available on your land, manage the best crop trees by reducing competition for sun, water, and soil nutrients with adjacent, but less desirable trees. Search an aerial photo of your property for any gaps in the forest canopy where sun-loving fruiting plants

like pokeweed, blackberry and raspberry might have become established. When possible, maintain these forest openings in old-field succession by preventing canopy closure and favoring plants that fruit early in life to those that don't fruit, or those that fruit at a relatively older age. Inventory all of the naturally occurring fruit and nut producing plants on the property, organizing them according to date when their mast will be available to deer during an average crop year. Identify dates when mast is missing, or limited, and develop a list of available orchard trees that ripen their fruit or nuts on those dates. Because fruit and nut tree breeders have used world-wide genetic variation to develop varieties with a wide range of fruiting characteristics, like date of ripening (early to late) and persistence of fruit on the tree (drops when ripe to hangs when overripe), we now have the ability to



### Dry Weight Production

If you removed all the water from fruits and nuts, the dry weight production per acre of some orchards planted at standard density compares favorably with those of food plots (buckwheat, arrowleaf clover and soybeans were chosen randomly for this comparison). Of course, tree orchards should not replace food plots; they should complement food plots and other habitat management practices to ensure the year-round nutritional needs of deer are being met.

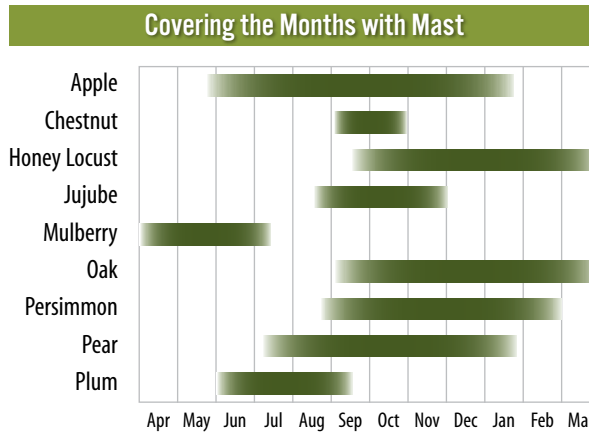
grow mast for deer outside of the range of dates for naturally occurring trees.

Consider planting early season apples and crabapples, jujubes, mulberries, and pears to attract and hold deer from May to August. Because deer hunting season is closed during these months in most states, you can plant orchards of early season trees with maximum mast production in mind, without regard for deer stand placement. We suggest you plant late-spring and summer orchards where you can watch visiting deer from a distance. An attractive orchard is a great tool for off-season scouting. There's no harm in planting an orchard that ripens its fruit in late-spring or summer near your property boundary, as long as it won't pull deer toward a busy roadway. Mid-season (September to mid-October) apples and crabapples, chestnuts,

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honey locusts, jujubes, pears, persimmons, plums and sawtooth oaks are good choices for archery hunting. Some fruit trees like jujube ripen and drop their fruits over an extended period, rather than all at once. This tree characteristic requires deer to make frequent visits, reinforcing the behavior and increasing your chances of hunting success. Mid-season ripening fruits and nuts provide powerful attraction during that period when large agricultural crop fields have

been harvested, but most oaks have not yet begun dropping their acorns. Select late-season apples, honey locust, jujubes, pears, oaks, and persimmons to attract and feed deer from mid-October to late winter. Although most orchard trees drop their fruit and nuts by early January, some apples and crabapples, some pears, and some oak acorns remain in good condition for several weeks after they drop. Therefore, the true period of deer use might greatly exceed the published ripening dates. For example, in Georgia, Goldrush apple ripens its fruit in early November, but we have picked and eaten viable apples in early January. Similarly, where trees are protected from deer, we have gathered viable crabapples and pears from the ground in early January for fresh eating and for making pies. Honey locust pods are most palatable to deer in September and October before the energy-rich pulp ferments. However, when other foods are limited, deer continue



to eat a few honey locust pods until spring green-up.

For archery hunting, and to minimize orchard diseases, we suggest you plant small groups of trees, maybe two to six, at your favorite honey holes. For each orchard, include trees with staggered drop dates to broaden their dates of use, or plant different orchards for early, mid-, and late-season use. If you don't have a large enough opening to plant multiple trees at standard spacing, you might consider plant-

ing two to four similar trees (apple varieties, for example) in a group, 18- to 24-inches apart. If each tree has similar vigor, when mature they will all share a common canopy. That is, four trees in the space of a single tree. This planting technique facilitates cross pollination, broadens the period of ripening and drop, and makes the most efficient use of small openings. When space is not a concern, comply with standard spacing recommendations for maximum fruit production.

### 3 TO PROVIDE DEER WITH DIETARY ENERGY WHEN THEY MOST NEED IT

Many deer habitat managers think of crude protein when considering forage quality: the higher the protein, the higher the quality. Yes, protein deficiencies will negatively affect deer health, particularly if they occur during spring and summer. However,

from late spring through winter, digestible energy is the most limiting nutrient in plants, not dietary protein. Low energy plants and plant parts (below about 1 megacalorie/pound) are difficult for deer to digest, often staying in the rumen for 14 to 19 hours. In contrast, high-energy foods like fruits and nuts take much less time to digest. When available, mast buffers the negative effects of poor forage quality, helping deer to meet nutritional needs.



The tracks in the snow under this late-dropping Honeycrisp apple tell the story of year-round nutrition provided by a well-planned orchard.

During summer and fall, deer must have access to high-energy foods or they will enter winter with inadequate fat reserves. Just as squirrels bury acorns in fall to provide easy food for when times get hard, deer store high-energy foods like acorns and fruits in their own bodies in the form of fat. Their body fat is burned as energy when the energy in plants becomes limited, when does are nursing fawns, and when a rutting buck's thoughts are on breeding instead of eating. When faced with a serious energy deficit because of low-quality diet and high energy demands, deer must burn dietary protein and muscle as a source of energy. With enough high-energy foods in summer and fall and plenty of fat in storage going into winter, surviving until spring green-up is just a matter of selecting the most energy-rich foods available, reducing activity, and otherwise conserving energy. When deer enter spring in poor condition, any further restriction of energy and protein (as in a year with late green-up) delays nutritional

recovery and might negatively affect body weight, reproduction, and antler growth. It is critically important that does enter the period of late gestation and lactation with adequate fat reserves, because at that time energy costs exceed the amount of energy provided by the diet. When a doe is nursing fawns, she needs an abundance of nutritious high-energy and high-protein foods to produce plenty of high-quality milk. After she weans her fawns, she

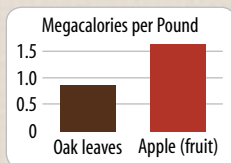
needs a high level of nutrition to rebuild her own body condition.

When deer have access to highly digestible energy in the form of succulent green forage, fruits and nuts they usually also acquire adequate protein, minerals and vitamins by default. Phosphorus, sodium (salt), and sometimes calcium are the exception because they can be naturally limited in soils. Fleshy fruits and acorns are low in protein and phosphorus when compared to nutritious green plants and some fungi. However, few nutritional studies have given fruits and nuts credit for the quality of their protein or the phosphorus contained within their seeds. When considering the specific amino acid composition of protein, fruits like apples and pears are high in lysine and nuts are high in arginine. Lysine and arginine are two of the most limited essential amino acids (10 in total) in the diets of grazing and browsing animals. Plants accumulate soil phosphorus and store 60 to 80 percent of it in nuts,

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## THE IMPORTANCE OF DIGESTIBLE ENERGY

From late spring through winter, digestible energy is the most limiting component of plants, not dietary protein. Low energy plants and plant parts (below about 1 Mcal/lb.) require more



time for deer to digest than higher-energy foods like fruit and nuts. When high-quality foods are scarce, a deer's rumen fills up with low-quality browse, which sits for 14 to 19 hours before it moves to the next stomach

compartment, blocking intake of additional food. If they can buffer their diet with high energy fruits and nuts, digestion is more rapid. This allows them to eat more frequently

and to obtain more energy. When high-energy foods are not available, deer must burn body fat or protein. When available, mast buffers the negative effects of poor forage quality, helping deer meet nutritional needs.

seeds, and grains as phytic acid. Phytic acid is the mineral nutrient store that growing seedlings use for nourishment after they germinate. When deer (or people) eat sorghum or wheat seed heads, bean and pea seed pods, fleshy fruits containing mature seeds, or tree nuts, they are eating phytic acid. People can't digest phytic acid, but a deer's rumen microbes convert it into useable phosphorus. Again, the primary essential nutrient a deer receives when eating fruit and nuts is energy in the form of sugars, starch, and fat; but a bit of protein and phosphorus is in there, too.

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The take home message in regards to the nutritional value of tree orchards to deer can be summarized as follows: Some forces that drive the nutritional quality of a deer's diet are out of our control and we must learn to accept them. These include rainfall patterns, acorn failures, habitat characteristics on adjacent properties, and distribution of naturally occurring plants. Other forces are completely within our control, if we take the time and effort to intervene – wise forest management, wise deer population management, and strategic distribution of food and cover

resources. By carefully selecting cultivated varieties of fruit and nut trees to supplement natural mast production on your land, you can provide deer with a conveniently packaged and highly concentrated source of energy from late spring through winter. This is particularly important if a property is mostly closed-canopy forest (lacking plant diversity) and during years of naturally occurring mast failures.

Do your homework! Manage your forests by thinning, herbicides, and prescribed fire. Maintain some forest openings in early succession. Plant food plots to provide high protein forages. And last, but not least, plant fruit and nut orchards for the deer.

#### 4 TO MAXIMIZE COST EFFICIENCY OF HABITAT MANAGEMENT

When considering the rising cost of fuel, seed, lime, and fertilizer, deer food plots can be very expensive. Even when perennial forage plants like clover and alfalfa are planted, there is a yearly cost associated with food plot maintenance, including mowing, spraying, and fertilization. In contrast, with tree orchards, most of the costs occur at the time of planting (trees, lime, fertilizer) and for the next couple of years (watering, weed control, fertilizer). Even then, inputs are directed at a smaller acreage (just around the tree) when compared to a food plot. After establishment, occasional weed control around the tree, light fertilization, and pruning are all that's required.

#### 5 TO PROVIDE SECONDARY REWARDS THAT ARE DIFFICULT TO QUANTIFY

Tree orchards provide many rewards in addition to their value to deer. Although we primarily plant and manage orchards for deer, we also enjoy the other wildlife that orchards attract, birds for example. Yes, even turkeys! Have you ever seen an apple or pear tree filled with turkeys as they pick and eat the immature fruits?

When considering nongame birds, much has been written about the plight of neotropical migratory song birds. Too much forest fragmentation and excessive deer browsing is known to negatively affect bird species that have very specific feeding or nesting requirements. However, as Will Ricks' QDMA-funded research has shown (see "Fringe Benefits" in *Quality Whitetails*, April/May 2010), habitat man-



Once established, aside from light annual work such as pruning, tree orchards require relatively little maintenance compared to food plots – and their benefits will likely last for multiple generations of habitat managers.

agement activities directed at deer also can be beneficial to sensitive bird communities. In specific reference to tree orchards, The Audubon Society Guide for attracting birds (2006) includes a section titled, “Reviving neglected apple trees.” Furthermore, it states, “Crabapples, hawthorns, and other fruit and nut trees are also an important source for bird food.” When planning your deer habitat modifications, you should protect some black cherry (eaten by 47 bird species), red mulberry (eaten by 44 bird species), and serviceberry (eaten by 36 bird species). If you do, both birds and deer will benefit.

Don’t underestimate the pleasure you’ll feel when you see a fruit tree you grew covered in beautiful flowers, or when you eat its first ripe fruit of the season. For us, this experience is much like seeing a hunting dog that you nurtured from a puppy finally perform as it was bred and trained to do. Luckily, well-managed orchards are productive enough that deer (and birds) won’t go hungry even when you steal some of their crops for your own use.

Another nice thing about tree orchards is their persistence over time. Food plots come and go with changes in the availability of farming equipment, people to help with planting, and changing

budgets. In contrast, once you’ve properly established a tree orchard, with a little scheduled maintenance; you’ve got something that your children, grandchildren, and maybe even great grandchildren will enjoy. If you ever must sell your hunting land, tree orchards are an enticement for potential buyers, much like established food plots, stocked fish ponds, or a deer cooler. Hopefully, you will retain the land for many years to share with family and friends. If so, don’t take the view from your deer stand for granted. The well-managed forest, perfectly shaped food plots, and ever-reliable tree orchards aren’t there because of the will of Mother Nature. Instead, they are testaments to years of someone’s planning, sweat, blood, and hard work; not unlike the subsistence forests created and maintained by early Native Americans.

We strongly believe tree orchards are an underutilized deer habitat management tool. They will help keep deer on your property and direct them to you during hunting season. They will increase plant diversity, structure, and distribution providing important mast when dietary energy is most limited. They will increase the enjoyment you, your friends, and your family receive from your property because of many secondary rewards, not directly related to deer hunting. We hope the view from your deer stand includes fruit and nut orchard trees. If so, enjoy a chestnut, apple, or pear as a midmorning snack; and keep a watchful eye out for furred and feathered visitors.



**About the Authors:** David Osborn is the wildlife research coordinator at the Warnell School of Forestry and Natural Resources at the University of Georgia. He is also a board member for the North American Fruit Explorers group ([www.NAFEX.org](http://www.NAFEX.org)).

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This article is part of a series by the authors covering management of specific trees, including articles on pears, persimmons, crabapples, jujubes, and one on increasing hard mast production in oaks. For questions about this or any article in the series, write to David at [osborn@warnell.uga.edu](mailto:osborn@warnell.uga.edu).