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Time for Fall Vegetables

Fall is an excellent extension of the vegetable garden season and a vital period for intensive gardening methods. Many cool-season and some warm-season vegetables attain their peak quality when grown and harvested as late crops. When planning for the fall garden, gardeners should consider the space needed, soil preparation, rotations and varieties desired. Seeds that were purchased for spring planting can be used for the fall garden provided they were stored in a cool location and kept dry.

The main challenge with fall vegetable production of cool season vegetables is seeding or transplanting a crop when the weather is hot. The latter makes getting good establishment and vigorous early growth more challenging. When seeding in late summer for a fall crop, moisture is often an issue. Water should be applied immediately after seeding or transplanting. Plant the seeds slightly deeper than you would normally plant them in spring to improve moisture availability for germination and root growth.

Cool-season vegetables will thrive in the cooler nights of late summer and fall and are not sensitive to frost. Since it is difficult to get uniform seed germination and seedling emergence in the high soil temperatures common in late summer, consider transplanting hardy crops such as broccoli, cabbage, cauliflower, and Chinese cabbage in early to mid-August for fall harvest. These crops should be four to six weeks old when transplanted into the garden. Transplanting in late afternoon or early evening will reduce transplant shock.

Greens (collards, kale, mustards and turnips) and lettuce are also well adapted to fall garden conditions. Greens can be seeded through August and harvested approximately 50 days from seeding. Turnips can be planted to produce greens or roots, depending on the variety. Both lettuce and spinach grow well in the fall and an ideal time for seeding is the first week of September (Labor Day weekend). Spinach often overwinters successfully and produces abundantly in April.

Many warm-season vegetables can be grown successfully in late summer and fall, including fall tomatoes, snap beans and squash (summer and winter). Snap beans can be seeded in early to mid-August in most areas of Missouri. Bush beans grow best at temperatures from 75 to 85 degrees but will drop flowers if temperatures exceed 90 degrees. They mature in approximately 60 days and make an excellent fall crop.

Since the last planting date for tomatoes, peppers, pumpkins, squash and cucumbers has passed, review the plants you already have and determine if they might benefit from additional or more regular watering, an additional application of nitrogen, or treatment with a fungicide or insecticide for pest control. Remember that most warm-season vegetables are tender and must be harvested before frost. Any tomatoes left on the vine when frost is predicted can be harvested green for green tomatoes, or, if they have started to turn, can be stored in a paper bag or wrapped in newsprint to ripen inside at 70 degrees F. Pumpkins and winter squash are sensitive to cool temperatures,

but the fruit is often harvested after the first frost.

For information on planting dates recommended for vegetable crops see the MU Guide Vegetable Planting Calendar: <http://extension.missouri.edu/explore/agguides/hort/g06201.htm>.

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In This Issue

Time for Fall Vegetables
Page 57

Fall Fertilization of Home Lawns
Page 58

Recovering Turf Density in Shaded Areas
Page 59

Clinic Update: July Samples at the Diagnostic Clinic
Page 61

Long-Term Apple Scab Resistance Remains Elusive, Purdue Expert says
Page 61

September Gardening Calendar
Page 64

Fall Fertilization of Home Lawns

Home lawns in most years usually struggle through the perils of summer – high heat, humidity, drought and insect problems. Our cool-season grasses like Kentucky bluegrass, tall fescue and perennial ryegrass have not had a typical year in that we only had a few days with heat indexes above 100 F. Our night temperatures during several weeks in July dipped into the fifties. Several other weeks had nighttime temperatures in the sixties and now we may end up with one of the coolest July's on record. Rainfall has been very timely in most parts of the state so drought has not been an issue at this time. So while we usually look forward to cooler nighttime temperatures and additional rain in September, they are already here. As one looks around, everything looks great and green as we go into August and it already feels like September. But do not be deceived by all this and forget we still have most of August and September remaining and heat and drought can still be part of the picture. However, it is also not too early to start thinking about fall chores to improve even more on what we already have. It's time to think about aeration and fall fertilization.

Aeration is a practice of pulling soil plugs to open the soil surface for better nutrient and water movement as well. It is a practice that also helps to reduce compaction and thatch by spreading soil plugs on the surface. Soil plugs are crumbled and fall freely into aeration holes as well as spreading some soil into the thatch layer where soil microbes can feed on thatch debris. Aeration is a practice that can be done in both spring and fall.

Aeration is the very best way to begin a fall fertilization program. Applications of fertilizer after aeration will move nutrients immediately into the root-zone of your lawn. This practice has shown excellent results in the density and color of cool-season turfgrasses on their way to recovery from summer stresses.

Aeration equipment can be found at local rental stores or garden centers as well. A machine that pulls a ½" diameter plug three to four inches deep on four inch centers will do an excellent job. Machines that force hollow tines into the soil are better than pull-type drums with tines. Not all machines will meet these specifications, however any amount of aeration is better than no aeration to kick-off fall fertilization.

Fall fertilization should always start with a soil test to determine what the needs of the soil are, if any. Soil test results will also give you the soil pH and any information about lime requirements. Soil pH is also important as it affects nutrient availability to the plant. A soil pH between 6.0 and 7.0 is acceptable. A soil pH around 6.4 to 6.8 is optimum. MU guide # G6954, "Soil Testing for Lawns" gives information on how to take and submit soil samples to the University of Missouri Soil Testing Labs.

Homeowners have a wide variety of fertilizers available to them for fall fertilization. Many organic fertilizers, such as Milorganite, Sustane and Ringer are available and will provide an excellent source of slow released nitrogen. Organic fertilizers do require soil microbes to release nutrients, therefore as soil temperatures decrease by late Fall, performance of these fertilizers may drop off.

More inorganic types of fertilizers are available to homeowners and can be somewhat confusing. Many products have much higher amounts of nitrogen and most are soluble forms (quick release) of fertilizers. Quick release forms of fertilizers are there and gone after about two weeks. You will get a quick flush of green growth, then a quick tapering off of color and growth. Find fertilizers with a good balance of N-P-K (nitrogen/phosphorus/potassium) with a ratio somewhere around 3-1-2. Also look at the ingredient label on the bag and find a product with 30 to 70% slow-release nitrogen. This way your

fertilizer is released over a longer period of time requiring fewer applications and allowing the plants to more efficiently utilize plant nutrients.

Fertilizer rates for fall fertilization give best results if 2.5 to 3.0 lbs of nitrogen can be applied per 1,000 square feet. Amounts should be divided over two or three applications throughout the fall. Possible combinations would include a pound of nitrogen per 1,000 square feet in early September after aeration and/or de-thatching followed by 1.5 pounds of nitrogen per 1,000 square feet in late October. A second alternative would include a pound of nitrogen per 1,000 square feet applied in early September, October and November. Most fertilizers are complete fertilizers including phosphorus and potassium; therefore requirements for those nutrients should be based on soil test results. Soil test results indicating high to very high amounts of phosphorus and potassium may require applications of fertilizers with nitrogen alone.

Winterizing fertilizers are usually recommended as the final application of the fall. Good winter fertilizers will have higher and equal amounts of nitrogen and potassium (first and third numbers of the fertilizer components). However, there are conflicting comments about applications of potassium for hardening off plants before winter dormancy. Plants harden off by reducing the amount of water in plant cells, therefore reducing the threat of winter freezing. It is a practice of higher importance for warm-season (bermuda and zoysia) grasses as opposed to cool-season grasses.

Any additional questions on aeration and fall fertilization can be directed to the MU Turfgrass Research Center @ (573) 442-4893.

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Recovering Turf Density in Shaded Areas

Recovering Turf Density in Shaded Areas

Trees and shade create a naturally pleasing environment in the landscape. However, it is difficult to grow grass under trees because not only the quantity but also the quality of the light changes in the shade. In full sun, light is in the “near red” range of wavelengths; in the shade it shifts to the “far red,” which is less effective in photosynthesis. In addition, dense canopies, particularly those of conifers, filter out the blue component of sunlight, which is critical for plant growth. The result of these changes is a reduction in photosynthesis and its products, including carbohydrates needed for plant growth.

Leaves, leaf cuticles and stems of plants are thinner in shade. Shoot density decreases as well. Plant tissues are succulent and there is an increase in susceptibility to environmental stresses and disease. Transpired moisture from trees and grass, and moisture from dew forming under trees, take longer to dissipate, and the additional moisture may contribute to an increased potential in turf diseases.

Shady conditions in combination with other plant stresses contribute to the difficulty of growing grasses under trees. For example, tree roots compete with turf for water and nutrients, and this competition can further weaken turf growing in shade. Allelopathic effects, such as the inhibitory effect of silver maple upon Kentucky bluegrass, are important between certain species of plants. Excessive organic matter from leaf litter will also inhibit grass. One or more of these factors make it particularly difficult to grow grass under sweet gum, maple and unpruned pin oak. On the other hand, grass is easier to grow under locust and poplar trees.

Success with growing grass in shade can be increased if the tree canopy is thinned and branches from the lower third of the tree are selectively removed. Also, trees can sometimes be removed

without disrupting the harmony and function of the landscape.

Select and use grasses that have improved shade tolerance (Table 1). Most of the fine fescues (hard, sheep, spreading, slender creeping and Chewing’s) have very good shade tolerance. Tall fescue has good shade tolerance, while Kentucky bluegrass is the least shade tolerant of the cool-season grasses. However, selected varieties of Kentucky bluegrass do have moderate tolerance to shade – Glade, Nuglade, Challenger, Midnight, Nassau. Bermudagrass, zoysiagrass and buffalograss should not be used in shady locations. In areas where shade-tolerant grasses fail, consider shade-tolerant groundcovers or mulched beds instead of grass.

Pruning trees to improve light penetration

Pruning trees with dense canopies, such as maples, will allow additional light to pass through to the turfgrass sward. Prune lower branches to a height of six feet. On large trees, branches should be removed all the way back to the trunk or a main leader so that the area under the canopy is clear. Thinning shrubs in the landscape will improve air circulation and lower humidity. Before planting grasses, remove shallow tree feeder roots that compete with the turf for nutrients and water.

Lawn management under trees

- Avoid excessive nitrogen fertilization, which promotes shoot growth at the expense of roots, lowers carbohydrates, and promotes soft, succulent tissue that is more susceptible to disease. Shade-tolerant grasses such as the fine fescues should receive no more than 2 pounds of nitrogen per 1,000 square feet per year. Apply fertilizer in shady areas in the fall just as leaves begin to drop. Rake and remove leaves before they accumulate to the

point of covering grass. Leave can be mowed and mulched into the lawn canopy as they start to fall. However, as leaf drop accelerates and mulching becomes difficult, remove or blow leaves off of lawn. If fall fertilization was missed, fertilize in late winter or early spring, about a month before trees begin to leaf.

- Mow turf at 3 to 4 inches to allow maximum interception of reduced light by the thin turfgrass sward. Avoid scalping turf. Decline of turf in shade often begins after a single episode of scalping.
- Irrigate only enough to avoid droughty soil conditions in shady locations during summer months. When moisture is needed, water infrequently and deeply. Avoid frequent irrigation that will lead to increased humidity and disease. Irrigate in the early morning to allow maximum time for drying. Do not water in the evening; turf may remain wet and ambient humidity may remain high throughout the night, thus increasing the chance of disease. Above all, do not overwater turf in shade. Dry conditions are always preferable to wet conditions for fescues growing in shade.
- Limit traffic. Core aerify compacted areas that receive heavy traffic.
- Avoid using herbicides in shady areas if weed problems do not exist. Many weeds, especially crabgrass, will not grow in shade.

In Missouri, the hard, sheep, and Chewing’s fescues are usually preferred over the other fine fescues when using a monoculture in shady locations.

Continued on page 60

Turf-type tall fescues may also provide an acceptable turf in moderate shade caused by trees.

Another shade-tolerant grass is rough stalk bluegrass. This grass does well in cool, wet conditions found in some shady locations. It performs well in the spring and fall but will die in the summer if moisture is lacking. Rough stalk bluegrass should not be used in lawns where only one or two large trees cause thinning of turf. It is a spreading grass and may escape, causing unattractive patches in sunny areas. This grass should be used in lawns only where several trees exist and other grasses have been tried without success.

Recommended seed mixtures for shade

Light to moderately shady, dry areas

- 30 percent to 50 percent Kentucky bluegrass plus 50 percent to 70 percent fine fescue (blend two or three varieties of each species and mix). Use 3 to 4 pounds of seed per 1,000 square feet.

or

- 100 percent turf-type tall fescue (blend two or three varieties). Use 5 to 7 pounds of seed per 1,000 square feet.

Moderately shaded, dry areas

- 100 percent fine fescue (blend two or three varieties within a species or mix two or three species). Use 3 to 5 pounds of seed per 1,000 square feet.

or

- 100 percent turf-type tall fescue (blend two or three varieties). Use 5 to 7 pounds of seed per 1,000 square feet.

or

- 70 percent turf-type tall fescue (blend two or three varieties) plus 5 percent Kentucky bluegrass (blend two or three varieties – use rough stalk

Table 1. Species and cultivars for shaded areas

Environment	Common name	Species	Selected cultivars
Light to moderate shade, dry	Hard fescue	<i>Festuca longifolia</i>	Aurora, Biljart, Discovery, Ecostar, Osprey, Reliant, Reliant II, Scaldis, Spartan, Waldina, Tournament
	Sheep fescue	<i>Festuca ovina</i>	Bighorn, Azay
	Spreading (strong creeping fescue)	<i>Festuca rubra</i> spp. <i>rubra</i>	Flyer, Flyer II, Fortress, Ensylva, Pennlawn, Rondo, Ruby, Shademaster II
	Slender creeping fescue	<i>Festuca rubra</i> spp. <i>trichophylla</i>	Dawson
	Chewing's fescue	<i>Festuca rubra</i> spp. <i>commutata</i>	Agram, Atlanta, Banner, Banner II, Brittany, Highlight, Jamestown, Jamestown II, Koket, Shadow, Shadow II, Tiffany, Victory, Victory II, Waldorf
Turf-type tall fescue	<i>Festuca arundinacea</i>	Adventure, Arid, Bonanza, Essential, Falcon, Falcon IV, Finelawn Petite, Hounddog, Hounddog V, Jaguar, Jaguar III, Jamboree, Rebel, Jr., Trident	
Light shade, dry	Kentucky bluegrass*	<i>Poa Pratensis</i>	Absolute, Adelphi, Allure, America, Bristol, Challenger, Chateau, Coventry, Enmundi, Estate, Georgetown, Glade, Huntsville, Midnight, Nassau, Nugget, Nuglade
Light shade, wet	Perennial ryegrass	<i>Lolium perenne</i>	All star, Birdie II, Citation II, Cowboy, Elka, Fiesta II, Gator, Manhattan II, Palmer, Palmer III, Pennant, Pennant II, Regal, Repell
Light to moderate shade, wet	Rough stalk bluegrass	<i>Poa trivialis</i>	Colt, Laser, Laser II, Saber, Saber II

*Note: This list is not comprehensive, and seed of listed cultivars may be unavailable in some localities. *Some Kentucky bluegrass cultivars will adapt to moderate shade.*

bluegrass in wet areas) plus 25 percent fine fescue (blend two or three varieties). Use 5 to 7 pounds of seed per 1,000 square feet.

Shady, wet areas

- 50 percent to 70 percent or more rough stalk bluegrass plus 30 percent to 50 percent perennial ryegrass (a blend of two or more varieties). Use 3

to 4 pounds of seed per 1,000 square feet.

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Clinic Update: July Samples at the Diagnostic Clinic

July is a busy month in the plant diagnostic clinic. What follows is a summary of some of the notable samples we have had over the past month.

A number of our samples have been from woody ornamentals. Several Colorado blue spruce samples were submitted with purple needles and needle drop towards the interior of the tree. We were able to confirm *Stigmina* needlecast from these samples. See <http://www.ipm.iastate.edu/ipm/hortnews/2008/2-6/Stigmina.html> for more information on *Stigmina* needlecast. We have also received many ornamental pear samples, some have had fire blight while others have had general decline symptoms. Samples with the decline symptoms had red to purple pigmentation in the foliage as well as sparse foliage, dieback and poor spring bloom. We have been able to find *Armillaria* root rot with several of these trees, one sample from a particularly poorly draining site was also serologically positive for *Phytophthora*. A declining river birch sample also had a root rot consistent with *Armillaria*. See <http://wihort.uwex.edu/gardenfacts/XHT1120.pdf> for more information on *Armillaria* root rot. Several shingle oak samples

had skeletonizing insect damage that in some cases has caused the entire canopy to turn brown. Our samples and photos have come from west central Missouri. See <http://mdc.mo.gov/news/out/1997/out0808.html#4> for more information on oak leaf skeletonizer. Other oak samples have been submitted with jumping oak gall, lacebug injury, *Botryosphaeria* twig canker. We have continued to get Scotch pine with *Diplodia* tip blight. We have received additional ash samples with anthracnose. A couple magnolia samples have been submitted with Magnolia scale, extensive sooty mold growth was also present on the infested trees. A euonymus sample had oystershell scale. We have had apple samples with black rot and apple scab. Silver maple leaf samples had tars pot and eriophyid leaf galls.

We have received a large volume of tomato samples all season. Recently, we had several tomato samples with *Fusarium* wilt. These samples were generally heirloom varieties without resistance to the disease and had dark streaks in the lower stems. See <http://ohioline.osu.edu/hyg-fact/3000/3122.html> for more information. Additional tomato samples had leaf mold and a *Pythium* root rot. A pepper sample

had blossom end rot and eggplant had a bacterial soft rot. A green bean sample had common bacterial blight and a *Cercospora* leaf spot. Watermelon samples had a *Rhizoctonia* stem rot, bacterial leaf spot, and anthracnose. A cantaloupe sample had a *Fusarium* crown and root rot. Elderberry had a bacterial leaf spot.

Our samples from other ornamentals have been more limited this month. A vinca sample was submitted with a *Phoma* dieback, a declining zoysia lawn had a chinch bug infestation and several fescue samples had *Rhizoctonia* brown patch.

We appreciate your sample submissions. Your submissions help us to create better updates in the newsletter as well as allow us to provide you with a diagnosis and management information to control the plant problems you encounter in the landscape. Please see your county extension office or our website for more information on sample submission.

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Long-Term Apple Scab Resistance Remains Elusive, Purdue Expert Says

WEST LAFAYETTE, Ind. - There are hundreds of choices when picking a crabapple tree from the nursery, but a Purdue University expert says only a handful are resistant to a widespread fungus or other serious diseases.

After reviewing 33 years of data, Janna Beckerman, a Purdue assistant professor of botany and plant pathology, found that only five of 287 crabapple varieties had durable resistance to a serious disease of crabapple trees. The results of her study were published

in the June issue of the journal *HortScience*.

Beckerman said data on crabapple trees and apple scab had only been done on a year-by-year basis until now. Looking over a prolonged period gives researchers a better idea of which trees have historically maintained or lost apple scab resistance.

"Whenever new plants are released, they are often touted as disease-resistant, but they have only been tested for a few years," Beckerman said. "That isn't enough time. From this data, you

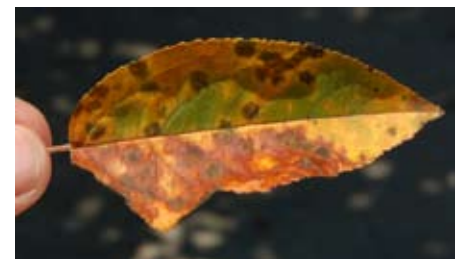


Figure 1. Apple Scab on leaf.

could see that varieties that did well for the first few years after planting often developed scab within 10 years."

Continued on page 62

Long-Term Apple Scab Resistance Remains Elusive, Purdue Expert Says

continued from page 61

The *Venturia inaequalis* fungus produces black scab-like lesions on the fruit and leaves. Crabapple trees with scab tend to defoliate, or lose all their leaves, in early summer, a condition that can weaken and eventually kill the trees.

“When a tree loses all of its leaves, it will try to produce more leaves, using the energy reserves it needs to get through the winter,” Beckerman said. “Over time, this repeated defoliation weakens the tree. A tree that is defoliated is under stress and can be susceptible to opportunistic insects and other diseases. The apple scab won’t kill the tree, but the chronic weakening will.”

The data, collected from observations at the Secrest Arboretum in Wooster, Ohio, showed that only 29 varieties of crabapple trees had resistance to scabbing for at least 10 years. Only 15 varieties lasted the entire 33 years, but 10 of those had problems with fire blight and other diseases.

The five that showed resistance to scabbing and other serious diseases were: Beverly, Sargentii, Jackii, White Angel and Silver Moon. A promising new variety, Adirondack, showed resistance for 12 years, but it was not considered enough time to count in the study.

Another major finding was that scab has infected the Japanese flowering crabapple, *Malus floribunda*. This variety was considered scab resistant in the early 1900s and provided the resistance gene bred into other crabapple trees to protect them from scabbing.

But a trace of scab was found in *Malus floribunda* in 1997, and by 2003, the trees were defoliating, Beckerman said.

“You can actually see the pathogen evolving by looking at the data over time,” Beckerman said. “Finding scab on this crabapple suggests that all commercial apple varieties with this resistant gene are at risk of scab.”

Beckerman said even susceptible crabapples can be protected with about three well-timed fungicide treatments per year. Certified arborists have access to proper chemicals that the average homeowner wouldn’t be able to obtain.

Beckerman said using information on scab resistance could minimize the need for those fungicides, though.

“What tree owners are doing is putting in an investment that could

live in their yards for 100 years,” Beckerman said. “A few minutes of research and choosing the right tree can pay out dividends over the course of decades.”



Figure 2. Janna Beckerman examines a Ralph Shay crabapple tree that is infected with apple scab. The fungus shows up as brown lesions on the leaves and fruit of crabapple trees, causing early defoliation. (Credit: Purdue Agricultural Communication photo/Tom Campbell)

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September Gardening Calendar

Ornamentals

- **Weeks 1-4:** Continue planting evergreens now.
- **Weeks 1-3:** Cuttings of annuals can be taken now to provide vigorous plants for overwintering.
- **Weeks 1-3:** Herbs such as parsley, rosemary, chives, thyme and marjoram can be dug from the garden and placed in pots now for growing indoors this winter.
- **Weeks 2-4:** Except tulips, spring bulbs may be planted as soon as they are available. Tulips should be kept in a cool, dark place and planted in late October.
- **Weeks 2-3:** Begin readying houseplants for winter indoors. Prune back rampant growth and protruding roots. Check for pests and treat if necessary. Houseplants should be brought indoors at least one month before the heat is normally turned on.
- **Weeks 3-4:** Perennials, especially spring bloomers, can be divided now. Enrich the soil with peat moss or compost before replanting.
- **Weeks 3-4:** Divide peonies now. Replant in a sunny site and avoid planting deeply.
- **Weeks 3-4:** Lift gladiolus when their leaves yellow. Cure in an airy place until dry before husking.
- **Week 3:** Poinsettias can be forced into bloom for Christmas if they are moved indoors now to a sunny windowsill. Each night, they must be kept in a cool, dark place where there is no light for 14 hours. This must continue until proper color is achieved in 6-10 weeks.

Lawns

- **Weeks 1-4:** Cool season lawns are best fertilized in fall. Make up to 3 applications between now and December. Do not exceed rates recommended by fertilizer manufacturer.
- **Weeks 1-4:** If soils become dry, established lawns should be watered thoroughly to a depth of 4-6 inches.
- **Weeks 1-4:** Begin fall seeding or sodding of cool season grasses. Seedbeds should be raked, dethatched or core-aerified, fertilized and seeded. Keep newly planted lawn areas moist, but not wet.
- **Weeks 2-4:** Lawns may be topdressed with compost or milorganite now. This is best done after aerifying.
- **Weeks 3-4:** It is not uncommon to see puffballs in lawn areas at this time.
- **Weeks 3-4:** Newly seeded lawns should not be cut until they are at least 2 or 3 inches tall.

Vegetables

- **Weeks 1-2:** Egyptian (top-setting) onions can be divided and replanted now.
- **Weeks 1-2:** Sowing seeds of radish, lettuce, spinach and other greens in a cold frame will prolong fall harvests.
- **Weeks 2-4:** Keep broccoli picked regularly to encourage additional production of side shoots.
- **Week 2-3:** Pinch out the top of Brussels sprout plants to plump out the developing sprouts.
- **Weeks 2-3:** Harvest herbs now to freeze or dry for winter use.
- **Weeks 2-4:** Tie leaves around cauliflower heads when they are about the size of a golf ball.

Fruits

- **Week 1:** Pick pears before they are fully mature. Store in a cool, dark basement to ripen.
- **Weeks 3-4:** Bury or discard any spoiled fallen fruits.
- **Week 4:** Paw paws ripen in the woods now.
- **Week 4:** Check all along peach tree trunks to just below soil line for gummy masses caused by borers. Probe holes with thin wire to puncture borers.

Miscellaneous

- **Weeks 1-4:** Autumn is a good time to add manure, compost or leaf mold to garden soils for increasing organic matter content.
- **Weeks 2-3:** Monitor plants for spider mite activity. Reduce their numbers by hosing off with a forceful spray of water.