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Scab Resistant Apple Cultivars Revisited

Several scab resistant apple cultivars are currently available for planting, including Liberty, Pixie Crunch, Crimson Gold, Crimson Topaz, Freedom, Galarina, Querina, Enterprise, and Goldrush. Although each of these cultivars has immunity or resistance to apple scab, they have additional positive and negative attributes. Thus, it is important to match the cultivar with the characteristics you desire when selecting trees for planting. Because Missouri temperatures often reach 100°F in August, early ripening disease resistant cultivars are excluded. Also, some of following cultivars have not yet been evaluated in Missouri and they may have unidentified limitations to fruit production.

Liberty is a one of the older cultivars, released in 1978, that has broad resistance to apple scab, fire blight, cedar apple rust, and powdery mildew. Like all scab resistant cultivars, it is susceptible to other diseases and insect pests may infest leaves and fruits. However, Liberty is a standard scab resistant cultivar recommended for planting in Missouri. It has red fruit with a yellow background color that generally ripens around September 10 in central Missouri.

Pixie Crunch was developed by the cooperative breeding program of Purdue, Rutgers, and Illinois (PRI). These trees have a spreading growth habit with some bare wood on its leggy branches. Pixie Crunch is immune to apple scab, moderately susceptible to fire blight, and susceptible to downy mildew and cedar-apple rust. This red apple ripens about the same time as Liberty and the fruit tends to be small, but it has a crisp texture.

Crimson Gold and Crimson Topaz ripen around mid September. Crimson Gold is scab resistant, but it may be susceptible to other diseases. The fruit is a reddish- orange color with a yellow background and has a sweet/acidic flavor. Crimson Topaz has similar fruit color with striping. Trees of this cultivar have an upright growth habit, bear fruit on spurs, and are resistant to apple scab, but only moderately resistant to mildew and fire blight.

Freedom was the second scab-resistant cultivar released by the New York State Agricultural Experiment Station breeding program. However, trees are only moderately resistant to fire blight which is a limiting factor to apple production in Missouri. The fruit has a spicy flavor, is an orangish-red color, and the peel has prominent lenticels. In wet growing seasons, the fruit surface is rough with some black rot infections at lenticels.

Galarina was introduced from France and later evaluated and released by the Quebec apple breeding program. It has high tolerance to scab, but its susceptibility to other diseases has not been evaluated in Missouri. This cultivar has a sweet flavor and looks much like Gala, with medium to small reddish orange fruit color. Fruit is harvested in mid to late September.

Florina (also known as Querina) is another scab resistant cultivar that originated in France. It also has moderate resistance to blight and mildew, but is susceptible to cedar apple rust. Although its parentage includes Jonathan, its flavor has been described as mild and buttery. The dark red, medium-sized fruit ripens in October.

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Scab Resistant Apple Cultivars Revisited

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Enterprise is an older, but reliable cultivar that ripens in October. It is immune to scab, resistant to fire blight and cedar apple rust, and is moderately resistant to mildew. The fruit is tart and is medium to large with red color, but the peel tends to be tough.

Like Enterprise, Goldrush originated from the PRI breeding program. It is immune to apple scab, resistant to powdery mildew, moderately resistant to fire blight, but susceptible to cedar apple rust. It has medium to large yellow fruit with sweet/acidic flavor that tends to mellow when cold-stored. The fruit ripens in October after Enterprise.

Most of these scab resistant cultivars are available from nurseries on rootstocks that that produce relative large to very large trees such as M.26, M.7, and MM.111. However, M.26 is very susceptible to fire blight and therefore this rootstock is not recommended for planting in Missouri.

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Success with House Plants

The end of the outdoor growing season does not necessarily mean an end to the enjoyment of working with plants. Many avid gardeners turn their attention to nurturing plants they have growing in their homes at this time of the year. The winter months are an ideal time to start or add to one's collection of house plants since many retail outlets offer attractive prices on them during the "off season" for outdoor gardening.

A fact of life, however, is there are no house plants in nature. All plants in nature grow out-of-doors and have basic needs for light, water, temperature, air and plant nutrients. Correct levels of each of these environmental factors needed for growth varies according to species. Horticulturalists have selected certain species of plants that are able to withstand the austere, low-light conditions characteristic of indoor settings and named them "house plants". Alluding to their ability to withstand adversity, someone once mused that house plants are simply "plants that die more slowly than others". In spite of that pessimistic forecast, there are several environmental factors that can be manipulated to help prolong the life of a house plant to the greatest extent possible.

Light. Light is life to green plants and is the single most important factor to consider when providing an optimum indoor plant environment. Plants use the energy from light and, along with carbon dioxide and water, manufacture food and release oxygen. In most cases the growth or longevity of a house plant is directly proportional to the amount of light it receives. When considering light (natural or artificial) for the purpose of plant growth three parameters must be taken into account: 1) quantity, 2) quality and 3) duration. Quantity refers to the amount of light available for plant growth. Most of us still use the old English system and refer to light intensity in term of foot candles (f.c.). Natural light intensity in the home varies according to the number of windows the room contains, the exposure of those windows (north, south, east or west) and the presence of curtains or other materials that tend to block light. Light intensity in a typical living room can range from as little as 10 f.c. to as much as 1000 f.c. depending on the afore-mentioned factors and the location at which the reading is taken. Suffice to say, in most cases light is the limiting factor for the growth of house plants and care must be taken to select plant species that are able to tolerate the amount of light present or to supplement natural light with artificial light. It is much easier and less expensive to match a plant that requires the same light conditions of your home than to alter the light to suit a certain species of plant.

Light quality refers to the wavelength or color of light. Photosynthesis is energized by light in the blue and red color wavelengths. Therefore, artificial light sources emitting those two colors of light would be most effective in promoting plant growth. Incandescent lamps emit an abundant amount of red light but very little blue. Fluorescent lamps can be found that emit abundant amounts of blue and red (e.g. plant lights) but they are not available in lamps with large wattages and high light output. Additionally, light from fluorescent lamps cannot be reflected effectively and the fixtures must be placed relatively close to plants if they are to be effective. The latter takes away from enjoying the beauty provided by having plants indoors.

Light duration refers to the amount of time the plant is exposed to light. Basically, the amount of plant growth is directly proportional to the amount of light energy received by the plant. Inadequate light quantity can be compensated for to a certain extent by increasing the duration of the light. Since we cannot control sunrise and sunset the duration of light exposure can only be manipulated though the use of artificial lighting.

Water. More house plants are killed from overwatering than for any other reason. That said, a very

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common question asked by house plant owners is, "How often should I water my plants?" The answer to this question is very difficult and varies from situation to situation. Light, temperature and relative humidity all affect the rate of water use by house plants. Higher amounts of light, warm temperatures and low relative humidity will dictate a need for more frequent watering than the opposite. The frequency also will vary according to the size/age of the plant and the size/type of contain in which it is growing. Containers that "breathe" (e.g. clay) will require more frequent watering than those that do not. The roots of most potted plants are in the bottom two-thirds of the pot and it is this area that should feel dry to the touch before watering, not the surface of the growing medium. If water is needed, apply it until excess water drains from the bottom of the container. This will help to leach excess fertilizer residue out of the growing medium and give assurance the bottom two-thirds of the container has received water. Most people use some sort of saucer or "carpet saver" to collect the excess water that drains from the pot. This excess water should be discarded soon after it is collected to prevent the growing medium from which it drained from remaining overly moist by taking up the water by "wick" action. Any potable water is considered safe and satisfactory for house plant use unless it has been soften by a contact process water softener. The latter imparts a high degree of salinity to irrigation water which can damage roots and harm growing medium structure.

Air. Plants derive carbon dioxide used for photosynthesis from the air. However, it is the amount of water vapor in the air that has a greater affect on house plants than the amount of carbon dioxide. One of the biggest changes house plants must adapt to from the outside world is the extremely low relative humidity characteristic of most indoor settings. Many house plants are native to tropical rainforests where the relative humidity is quite high. In contrast, the relative humidity in the average home during the winter months of the year is actually lower than that of the Sahara Desert. Relative humidity affects the rate at which plants loose water (transpire). The lower the relative humidity, the greater the rate of water loss by a plant will be. One way the humidity around house plants can be increased is to install a humidifier in the home. This can be done by attaching one to the heating system of a house or by purchasing a free-standing humidifying unit. A second way to increase the humidity around house plants is to place them their pots on trays filled with pebbles and water.

Temperature. Since temperatures fluctuate in nature, most house plants are able to tolerate modest fluctuations in temperature. Many of the species favored for indoor use grow best at nighttime temperatures in the range of 65-68° F and daytime temperatures approximately 10-15 degrees warmer. Any effort on our part to reduce fuel costs by turning down our thermostat a few degrees (e.g. from 72 to 68) probably will result in healthier house plants as well. Plants growing in above-optimal temperatures (especially at night) tend to become spindly in appearance due to increased rates of respiration. Care must be taken to make certain plants are not located in front of heating (cooling) ducts for the air discharged from these ducts is well above (below) the optimal temperature and injury or death are quite possible. Additionally, although locating a house plant in a sunny, south-facing window might increase the amount of light it receives, such a location can get quite hot for the plant which has no means of cooling itself as due animals.

Fertilization. House plants need mineral fertilizers in order to grow just as outdoor plants do. A water-soluble fertilizer containing nitrogen, phosphorus and potassium is preferred over slow-release types since the latter tends can be erratic in the release of its nutrients depending on temperature and state of hydration. Most fertilizers formulated for house plants are water soluble and complete (meaning they contain nitrogen, phosphorus and potassium) . Since growing conditions in a home are much less ideal then out-of-doors, house plants need less fertilizer than do outdoor plants. As a general rule, fertilize house plants only during the months of spring, summer and fall, since the reduced light and temperatures of winter results in reduced growth. Always read and follow label directions when applying fertilizer. Some fertilizers are formulated to be applied at a very dilute concentration each time plants are watered; others are applied in a more concentrated solution at intervals of two weeks or longer. When applying fertilizer always apply sufficient solution so that water drains from the bottom of the pot. This will help to prevent the accumulation of salts in the pot and possible root damage.

Having plants in the home is a good way for gardeners to counter the doldrums of winter as they await another growing season. With a bit of effort and reasonable care, house plants will remain welcome additions to the home for many years.

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Snow Molds: Many Types but Little Worry for Lawns

Believe it or not, turf disease can occur even when old man winter sends the snow flying. The snow molds, coming in hues of gray, speckled, and pink, actively infect turfgrasses at very low temperatures. As the name implies, these pathogens inflict damage when a nice comfy layer of snow covers the turf surface and provides a nice wet microenvironment for the fungus to thrive. The term for these type of organisms is psychrophilic, which doesn't mean they are scared of anything, but instead denotes them as cold-loving organisms. For most areas in Missouri, the winters are not harsh enough for home lawn owners to be scared of the snow molds. In some years though, managers of high amenity turfgrasses can have problems with snow mold damage.

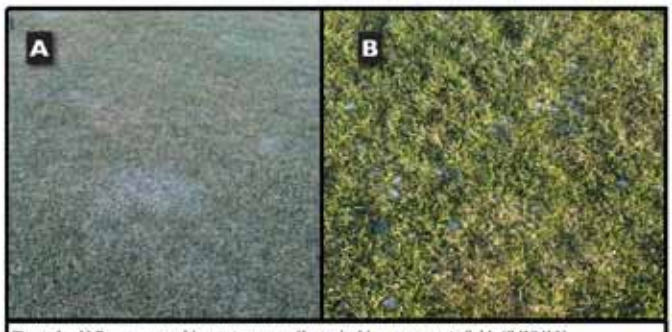

Figure 1: A) Gray snow mold symptoms on a Kentucky bluegrass sports field. (2/18/11)
B) Tufts of conspicuous mycelium apparent in a cottony snow mold outbreak. (2/18/11)

Gray Snow Mold & Cottony Snow Mold

Gray snow mold/Typhula blight and cottony snow mold/Coprinus snow mold were observed in the late winter of 2010 on several higher cut Kentucky bluegrass and mix bluegrass/fescue lawns and sports fields. Gray snow mold appears as light yellow, or straw colored patches from 1 inch to 3 feet in diameter (Fig. 1A). Cottony snow mold was being observed as conspicuous tufts of mycelium 2-4 inches in diameter (Fig. 1B). Of the areas seen last winter, only the turf leaves were affected, meaning regrowth from crowns and stolons healed these areas quickly when the temperatures rose.

Speckled Snow Mold

Plant symptoms are very similar to gray snow mold, but fortunately we leave this type of snow mold for our neighbors in the Great North of Wisconsin, Minnesota, Michigan, and Canada to deal with.

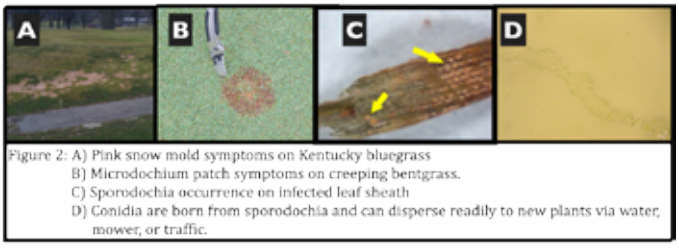

Figure 2: A) Pink snow mold symptoms on Kentucky bluegrass
B) Microdochium patch symptoms on creeping bentgrass.
C) Sporodochia occurrence on infected leaf sheath
D) Conidia are born from sporodochia and can disperse readily to new plants via water, mower, or traffic.

Pink Snow Mold/Microdochium Patch

Of the varying types, pink snow mold is much more prevalent in Missouri, with gray or cottony snow molds occurring in unique winters (like 2010-11) with more extended snow cover. Pink snow mold is the phase of the disease that occurs under snow cover, but the disease can also be very active in cool, wet weather in the spring when it is referred to as Microdochium patch. These two disease phases, caused by the fungus Microdochium nivale, are often more severe than other snow molds because the pathogen often infects the crowns of the plant making regrowth difficult.

The disease can occur and damage nearly all cool-season grass species, but is most severe on Poa annua and creeping bentgrass putting greens. Pink snow mold symptoms often occur as patches that can be 4-8 inches in diameter or larger. Microdochium patch symptoms are more often observed as smaller reddish-brown spots or patches that may resemble Pythium streaking due to the dispersal of conidia by traffic or water. In conducive environments, pink-salmon colored sporodochia (which produce the conidia) can be observed on leaf sheaths (see Figure 2).

Snow Mold Control

For turf maintained at heights over one inch, it is important in the fall to mow as long as the grass is actively growing to avoid a matted turf and a conducive microenvironment. Nitrogen applications too late in the fall have been shown to increase disease severity, but this should not be a deterrent to fall fertilization for home lawns. Fall fertilization is very important to cool-season turf, and should already be completed. In areas affected by snow mold, resume spring maintenance as soon as possible and lightly rake affected turf areas to break apart the matted layer and allow turf drying.

Chemical control is unnecessary on home lawns in Missouri, with the possible exception of pure Kentucky bluegrass stands in the far northern reaches of the state. Conversely, chemical control may be necessary in lower mown, high amenity areas that have a history of the disease, such as sports fields (Kentucky bluegrass baseball infields in particular) or golf putting greens. In these cases, preventive fall fungicide applications are needed with a specific target of pink snow mold, with possible re-application necessary in curative situations or during periods of snowmelt. Timing of application should be as close to anticipated snowfall as possible to shorten the time that the fungicide needs to persist through the season. For our relatively low pressure climate, thiophanate-methyl and the dicarboximides (vinclozolin or iprodione) mixed with chlorothalonil have been shown as a good economical solution for gray and pink snow mold treatment. If the site has not had prior history of snow mold though, I would suggest saving your resources and applying curatively if the need arises.

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January Gardening Calendar

Houseplants

- **Weeks 1-4:** To clean heavily encrusted clay pots, scrub them with a steel wool pad after they have soaked overnight in a solution consisting of one gallon of water, and one cup each of white vinegar and household bleach.
- **Weeks 1-4:** Some plants are sensitive to the fluorine and chlorine in tap water. Water containers should stand overnight to allow these gases to dissipate before using on plants.
- **Weeks 1-4:** Wash the dust off of houseplant leaves on a regular basis. This allows the leaves to gather light more efficiently and will result in better growth.
- **Weeks 1-4:** Set the pots of humidity-loving houseplants on trays filled with pebbles and water. Pots should sit on the pebbles, not in the water.
- **Weeks 1-4:** Allow tap water to warm to room temperature before using on houseplants.
- **Weeks 1-4:** Fluffy, white mealy bugs on houseplants are easily killed by touching them with a cotton swab soaked in rubbing alcohol.
- **Weeks 1-4:** Insecticidal soap sprays can be safely applied to most houseplants for the control of many insect pests.
- **Weeks 1-2:** Quarantine new gift plants to be sure they do not harbor any insect pests.
- **Weeks 2-4:** Amaryllis aftercare: Remove spent flower after blooming. Set the plant in a bright sunny window to allow the leaves to fully develop. Keep the soil evenly moist, not soggy. Fertilize occasionally with a general purpose houseplant formulation.

Ornamentals

- **Weeks 1-4:** Gently brush off heavy snows from tree and shrub branches.
- **Weeks 1-4:** Limbs damaged by ice or snow should be pruned off promptly to prevent bark from tearing.
- **Weeks 1-4:** Check stored summer bulbs such as dahlias, cannas and gladioli to be sure they are not rotting or drying out.
- **Weeks 1-4:** To reduce injury, allow ice to melt naturally from plants. Attempting to remove ice may damage plants further.
- **Weeks 1-4:** Use sand, bird seed, sawdust or vermiculite to gain traction on icy paths. Avoid salt or ice melters as these may injure plants.
- **Weeks 1-4:** Make an inventory of the plants in your home landscape. Note their location and past performance. Plan changes on paper now.
- **Weeks 2-4:** Sow pansy seeds indoors now.

Miscellaneous

- **Weeks 1-4:** Avoid foot traffic on frozen lawns as this may injure turf grasses.
- **Weeks 1-4:** Make a resolution to keep records of your garden this year.
- **Weeks 1-4:** Store wood ashes in sealed, fireproof containers. Apply a dusting around lilacs, baby's breath, asters, lilies and roses in spring. Do not apply to acid-loving plants. Excess ashes may be composted.
- **Weeks 1-4:** Check all fruit trees for evidence of rodent injury to bark. Use baits or traps where necessary.
- **Weeks 1-4:** Cakes of suet hung in trees will attract insect-hunting woodpeckers to your garden.
- **Weeks 1-4:** Brightly colored paints applied to the handles of tools will make them easier to locate in the garden.
- **Weeks 1-2:** Seed and nursery catalogs arrive. While reviewing garden catalogs, look for plants with improved insect, disease and drought-tolerance.
- **Weeks 1-2:** Old Christmas trees can be recycled outdoors as a feeding station for birds. String garlands of peanuts, popcorn, cranberries, fruits and suet through their boughs.
- **Week 1:** Christmas tree boughs can be used to mulch garden perennials.
- **Week 1:** If you didn't get your bulbs planted before the ground froze, plant them immediately in individual peat pots and place the pots in flats. Set them outside where it is cold and bury the bulbs under thick blankets of leaves. Transplant them into the garden any time weather permits.
- **Weeks 2-4:** Try sprouting a test sample of left over seeds before ordering new seeds for spring. (Roll up 10 seeds in a damp paper towel. Keep moist and warm. Check for germination in a week. If fewer than half sprout, order fresh seed.)
- **Week 4:** Swap seeds and plant information with your gardening friends.

Gardening Calendar supplied by the staff of the William T. Kemper Center for Home Gardening located at the Missouri Botanical Garden in St. Louis, Missouri. (www.GardeningHelp.org)