

Pepper

1. Q. Why do my pepper plants often bloom but fail to set fruit?

A. Peppers, like tomatoes, are sensitive to temperature. Most peppers will drop their blooms when daytime temperatures get much above 90 degrees F. in combination with night temperatures above 75 degrees F. They will also drop their blooms in the early spring if temperatures remain cool for extended periods. Hot peppers, such as jalapenos, withstand hot weather fairly well and can often produce fruit through the summer in most areas. Optimum temperatures fall between 70 degrees and 80 degrees F. for bell-type peppers and between 70 degrees and 85 degrees F. for hot varieties.

2. Q. If I remove the first few blooms on a pepper plant, will my overall production be increased?

A. Maybe. Occasionally, if a bell pepper plant sets the first bloom that flowers, the plant will be stunted as it matures that fruit. This is likely to happen if the plant is growing under marginal conditions which might include low fertility or perhaps low moisture. With the first bloom removed, the plant will grow larger before setting fruit which often does result in higher total yields. However, if the plant is grown under satisfactory cultural conditions removing the first bloom should not affect subsequent yield.

3. Q. If you plant hot peppers beside sweet peppers, will the sweet pepper plant produce hot fruit?

A. Absolutely not. Pepper flowers are self-pollinated, although occasionally cross-pollinate. However, the result of this crossing will appear only if seed is saved from this year's crop and planted next year. It will not result in off-flavor or differences in fruit characteristics of this year's crop.

4. Q. Can I cut back my spring planted pepper plants in late summer or early fall for increased production later?

A. Yes, although this is not a recommended practice. In the northern parts of the state spring-planted pepper plants can often be carried through to first killing frost without pruning. However, in southern parts, judiciously pruning the pepper plants and applying additional fertilizer as a sidedress application can prolong pepper production until the first killing frost. Pruning should not be severe in southern parts of the state as excess foliage removal can often result in burn, stunting or death of the plants.

5. Q. Is there any difference in taste or nutritive value between green peppers and those that mature and turn red?

A. Peppers that are allowed to mature and ripen entirely, from green to yellow to red, are higher in vitamin content, especially vitamin A. There is little difference in taste although there is a considerable difference in texture caused by the ripening process.

6. Q. How can you tell when jalapeno peppers are mature?

A. Jalapeno peppers are edible and flavorful at all stages of their growth. However, a connoisseur of jalapeno peppers can distinguish a definite flavor difference between a fully mature jalapeno and one harvested early. A fully mature jalapeno pepper, regardless of size, generally exhibits small cracks around the shoulders of the fruit. Often a darkened area on the fruit indicates maturity and the initial stages of a color change in the fruit.

7. Q. Can I save seed from this year's pepper crop for planting in my next garden?

A. Yes. Peppers are self-pollinated and consequently will breed if seed is saved from this year's garden for planting in next year's garden. Although an occasional cross-pollination will occur, this is generally not a problem. Do not save seed from hybrid pepper plants as these will not breed true and will result in plants exhibiting characteristics different than the desired hybrid.

8. Q. The foliage on my pepper plants developed spots or lesions and the leaves have dropped off.

A. This could be a combination of three foliage diseases: Alternaria leaf spot, Cercospora leaf spot and bacterial leaf spot. In most cases, two or more of these occur simultaneously on the foliage. They can be controlled with foliar

sprays using a combination of chlorothalanoil and Kocide or any other copper fungicide. Begin at the first sign of the disease and continue at 1- to 2- week intervals during the critical disease periods.

9. Q. The foliage and fruit of my pepper plants are distorted and small. The leaves have a mosaic pattern.

A. This could be one of five viruses that attack peppers in Texas. The best control is to buy healthy plants and to follow approved cultural practices and a good insecticide program. The viruses are transmitted by aphids. For this reason, it is important to control insects. Also, when a plant becomes infected with one of the viruses, remove the plant.

10. Q. After the recent rainfall, my plants wilted and died soon. The inner stems of the plants were dark.

A. This is Phytophthora stem rot. It is a soilborne fungus that attacks peppers. It is particularly severe in areas where water stands around the plant. Plant on a raised bed for optimal drainage.

11. Q. After a summer rain, my pepper plants died rapidly. I found a white growth at the base of the plant. Intermingled with this growth were small, round, bead-like structures the size of a pinhead.

A. This is southern blight, caused by a soilborne fungus. Crop rotation and deep burial of organic material will help control it. Do not allow leaves to collect around the base of the plant because the fungus will feed on them and later develop on the peppers.

12. Q. There are small wiggly trails all over the leaves of my pepper plants. What are these?

A. These trails are caused by leaf miners. Heavy infestations can defoliate plants and reduce yields. Control this pest by treating with diazinon or a recommended insecticide. Two or three applications at 5-7 day intervals may be necessary to achieve control. Use as directed on the label.

13. Q. We have just moved to this area and enjoy the Mexican food. What makes Mexican food so hot? Is it the pepper they add?

A. The cooks add pepper alright but not the black stuff you shake from a can - they add green peppers, *Capsicum annum*. These peppers contain a chemical named capsaicin. When you eat these "green bullets from hell" there's a cellular response that releases neurotransmitters. These are proteins that mimic chemically the sensation of burning or pain. They go to the end plate of our sensory nerves and create the sensation of pain. The body's response is to remove the chemical irritant by increasing heart rate to increase metabolism, by increasing salivation and increasing sweating. Your nose runs and the gastrointestinal tract goes to work in high gear to remove the irritant. You sweat to cool yourself.

The body's strong reaction to capsaicin is why many people claim chili has medicinal properties. A paper by a New Mexico biologist noted that the death rate from heart disease in the state was about half the national rate. She also said the rate of heart disease among Hispanics and Indians was low. Presumed reason? They all eat lots of chile pepper and that reduces blood fat levels. Hot peppers are said to protect against blood clots that could cause thromboembolism.

So why do folks eat this hot food? When people eat hot chili the brain secretes endorphins, the opiate-like substances that block pain. Endorphins are produced when runners "hit the wall" and get their second wind. Who needs to jog and watch their diet? Just eat peppers and keep on burning!

14. Q. Can good pickled jalapenos be made from garden grown jalapeno peppers?

A. Yes, if you have a good recipe. Here is THE BEST:

Using fresh TAM Mild Jalapeno peppers, blanch peppers for 3 minutes in boiling water. To prevent collapsing, puncture each pepper. Add the following ingredients to a pint jar packed with the blanched peppers before cooling occurs.

- 1/4 medium-sized garlic clove
- 1/4 teaspoon of onion flakes
- 1 small or medium bay leaf
- 1/8 teaspoon of ground oregano
- 1/8 teaspoon of thyme leaf (not seed)
- 1/8 teaspoon of marjoram

1 tablespoon of vegetable oil (olive, refined sesame, corn)

Cover with boiling brine solution prepared as follows:

Mix together:

3 tablespoons sugar

9 tablespoons salt

2 pints water

2 pints vinegar (5 percent)

Close the containers and process 10 minutes in boiling water, then cool.

Note: Jalapenos must be hot when brine solution is added. The addition of carrot slices adds color to the product.

15 Q: We have 2 bell pepper plants, in containers, that have until recently been very healthy and produced several beautiful peppers. Within the last week or two the peppers have developed small round tannish spots on the some of the fruit. The fruit were not fully developed, but we harvested then in order to save the fruit, if possible. In cleaning the fruit, the only damage is the small spot or two on the bottom of the peppers. I thought perhaps it was sunscald, but these plants have plenty of leaves. Could they be getting too much sun and would moving them to a shadier location help?

A: Tan or translucent spots on developing pepper fruit is DEFINITELY sunscald. All the young pepper has to be exposed to is a few minutes of direct sun during the hottest part of the day and that does it. Remember the last time you burned your body parts the first sun exposure of the spring?! The same situation! If you can see the pepper on the plant SO CAN THE SUN and it is not protected. A bacterial spot would be black so you can rule that out. You did right by removing the fruit; such removal may stimulate more foliage growth and subsequently more fruit protection.

16. Q. Do you have any information on the hot pepper used in Mexican dishes?

A. Is the Pope Catholic? Does a bear eat in the woods? OF COURSE, I have information on the pepper which made Mexican food famous! Peppers are hot, trendy items. Look at a recent crop of mail-order gift catalogs. Inside you can order pure silk chili pepper ties, sterling silver red or green chili pepper tie tacks; t-shirts, shorts, cotton caps blazing with red peppers or the red chili pepper string of Christmas lights. These gifts indicate the popularity of peppers. If you can't grow peppers, the least you can do is wear one to show your support. The National Garden Bureau declares 1993, 'The Year of the Pepper' to encourage more folks to grow this New World native. With basic information, anyone in North America should be able to successfully grow pepper plants in pots or in the garden. Grow a hot or a sweet pepper for the flavor and satisfaction of saying "I grew it myself."

HISTORY

The pepper, native to the tropics of Central and South America, has probably been cultivated for thousands of years. Archaeologists exploring prehistoric caves in Peru have found the remains of pepper seeds.

South America, Spain, England and the Caribbean all played roles in the introduction of the pepper to North America. Columbus explored the seas in search of a better trade route to the Indies. Dangerous, lengthy overland journeys made spices an expensive commodity for Europeans. When Columbus reached the Caribbean, he tasted a vegetable being grown by the Indians. Its sharp taste reminded him of the familiar black pepper from the East Indies and so he called this vegetable "pepper," as we do to this day. However, Columbus was incorrect as the newly found vegetable was not the pepper of "salt and pepper" (*Piper nigrum*) but an entirely different genus, *Capsicum*.

He brought peppers back to Spain where they were considered an appealing alternative to the more traditional spice. The instant popularity of the vegetable is apparent from the comment of Peter Martyr, writing in 1493 that "...in the New World can be found plants hotter than pepper of Caucasus." (He was referring to *Piper nigrum*.) From Spain the cultivation of the pepper soon spread to the rest of the continent and England. History does not tell us whether peppers reached North America via Europe or the Caribbean.

The first of the English immigrants to the colonies brought the seed of precious vegetables with them to plant in the New World. By the middle of the 18th century, North Americans could import many varieties of flowers and vegetables from England. John Randolph (1727-1784) of Williams-burg, Virginia wrote a treatise on vegetables grown in the New World colonies. In the essays, he referred to "*Capsicum*...it should be gathered before the pods grow hard for pickles." Research conducted by the National Garden Bureau found that records kept at Mount Vernon indicate George Washington grew a "cayan" pepper.

NOMENCLATURE

While conducting research for this column an obvious nomenclature conflict became apparent. Some folks used 'chili'

and others used 'chile' to describe a pepper. We reached several conclusions. Namely, that Chile is a country in South America. Seed companies use chili to designate a 'hot' ½ pepper, and chile is generally an ingredient in ethnic foods. So if you purchase green 'chili' pepper seed, and grow the plants, you will harvest 'chile' peppers for 'Chile rellenos'! Peppers are part of the Solanaceae or Nightshade family which contains over 2000 species of ornamental, medicinal and poisonous plants. This makes the pepper a close cousin to tomato, potato, tobacco, eggplant and petunia.

CLASSIFICATION

There are over 20 species of pepper but only one is commonly known to North American gardeners, *Capsicum annuum*. This species contains the pepper varieties widely cultivated in North America. Although Hortus lists five groups within the *C. annuum* species, we will refer to peppers as one of two kinds--sweet or hot.

SWEET PEPPERS

Bell--This pepper is mostly blocky in shape with three or four lobes on the bottom of the pepper. For years, gardeners could choose only one color of bell, a green that matured to red, Through modern breeding efforts e can now grow bell peppers that mature to an artist's palette of colors including red, yellow, orange, lavender, purple and chocolate. The bell peppers have a crisp, thick flesh and are suitable for eating fresh, or stuffing and baking.

Paprika--When dried and ground, this thin-walled pepper becomes the flavorful condiment paprika.

Pimiento--This heart-shaped pepper measures 3 1/2 by 4 1/2 inches. Fruits have very thick flesh. Strips of this fully mature, bright red, mild tasting pepper are found in stuffed greenolives.

Sweet Banana, Sweet Hungarian, Cubanelle--All of these are also referred to as sweet frying or pickling peppers. The shape is long, narrow tapering down to one, two or three lobes. These are thinner-walled than bells and Cubanelle has the thinnest walls of the three. They are usually picked when immature as a light yellow or green. Because they have less water content than bells, they are excellent choices for frying. 'Sweet Banana' is a variety that has withstood the test of time--it was a 1941 All- America Selections Winner. 'Gypsy,' a 1981 AAS Winner is early to mature--only 62 days and performs very well in containers as well as in regular gardens.

Sweet Cherry--Here is a pepper that looks like its name in that it is globe or cherry-shaped and about 1 1/2 inches across. This pepper is harvested when mature green to deep red and is generally used in processing as pickled.

HOT PEPPERS

Cayenne--This pepper is slim and tapered, ranging in length from 3 1/2 to 8 inches. Cayennes are often dried. The hybrid 'Super Cayenne' is a 1990 All American Selections Winner. It is very productive, early to mature and hot, hot, hot.

Red Chili--The small cone-shape peppers of this type are 1 to 3 inches long and have medium thick flesh. They are often used dried and ground in chili powder. 'Super Chili,' a 1988 AAS Winner is the first hybrid chili. The compact plants were bred for increased yields.

Green Chili--These are the long (7 to 8 inch) green, two celled mildly pungent Anaheim type peppers that are so flavorful in chile rellenos. They turn red at maturity but are nearly always harvested, green, roasted and peeled. They're the kind you'll find in the canned goods section of supermarkets labeled "Green Chile Peppers."

Hungarian Yellow Wax (also called Hot Banana)--This pepper is pungent but still one of the more mild "hots." It is 5 to 6 inches long and picked when an immature greenish yellow color but matures to orangish red. This type is good for pickling or canning.

Jalapeno--Jalapenos are the popular peppers used in many Mexican entrees. They are 2 1/2 to 3 1/2 inches long and have a thick-walled pungent flesh. They may be harvested when immature green or mature red and are good for pickling or canning. There are many varieties of jalapeno peppers with varying degrees of pungency. It has been said that more than 200,000 pounds of jalapeno seed is planted in Mexico annually.

Red Cherry--This hot pepper is only 1 1/2 inches across and shaped like a cherry. It may be used fresh or pickled, primarily pickled.

Red Hot Peppers--There are other *Capsicum annuum* in the Longum Group that add distinct flavor to their native regional cuisines. These vary in plant and fruit size and shape. Smaller plants are attractive in patio containers and hanging baskets. These scorchers such as Chili Tepine, Chile Peguin, Tabasco, and Thai, mature red and zest-up foods. Many additional kinds are available. Small hot yellow peppers like Cascabella and Santa Fe Grande are used primarily for canning and pickling. There is the hot Serrano type that is popular in the Southwest. There is Habanero, said to be 50 times hotter than Jalapeno peppers.

PLANTING

Choose a sunny area of the garden as peppers need full sun to blossom and set fruit. Growth in full sun will result in a

more productive plant. Select a spot protected from the wind as pepper plants have shallow, easily disturbed roots and brittle branches. A strong wind may break stems or completely uproot the plants.

The plant will perform best in well drained soil with adequate nutrition for plant growth. To insure adequate nutrition use fertilizers or work in well-rotted compost when preparing the garden soil in the spring.

A pepper plant does not take up a lot of garden space, at least when compared to vines like watermelon or pumpkin. Depending on the variety, most pepper plants will measure 2 to 3 feet tall. A half dozen plants should provide a family with a summer long crop of peppers. Gardeners with limited space can even grow peppers in containers. A large patio container will support one of the compact varieties such as 'Gypsy.'

SOWING SEED

Many gardeners start seeds indoors early, then transplant to their garden, but seeds can be planted directly into prepared garden soil in long season areas. Sow pepper seed outdoors once the soil temperature has warmed to 75 degrees F. Place seed 1/4 to 1/4 inch deep, cover with finely textured soil and water gently but thoroughly. Peppers need moist conditions to germinate and are hungry for water during the seedling stage and throughout the growing season.

HOW TO SELECT BEDDING PLANTS

No time to sow and grow from seed? Head to the local nursery or garden center. You will find pepper plants that are just the right size for transplanting into the garden. Look for healthy plants that are green with strong foliage. Yellowed leaves, spindly stems or sparse foliage indicate the plant is not thriving and probably will not perform well in your garden.

TRANSPLANTING

The same procedure and care are recommended for planting bedding plants or peppers home grown from seed. Wait until the weather has warmed to a daytime temperature of 65 to 70 degrees F. and nighttime temperature above 55 degrees F. To help warm the soil, black plastic may be placed on the ground. Slits can be made in the plastic to accommodate the plants.

Space plants about 2 feet apart. This distance will vary slightly depending on the variety. Rows should be spaced at least 2 feet apart. This will allow enough air circulation for the plants, permit easy cultivation and harvest. A time release fertilizer can be added to the soil now according to directions on the package. This fertilizer releases nutrients into the soil for about 120 days.

GROWING ON

Peppers should grow rapidly given warm day and night temperatures. During this period of rapid growth be sure to provide adequate water and nutrients. Water the soil before plant foliage begins to droop or show signs of wilting. Take care to watch plants and look for any insect problems. Most locations in North America can grow any type of hot or bell pepper without any major problem.

If you notice blossoms dropping of your pepper plant, temperature may be the reason. The pepper is a warm season vegetable. It grows and produces fruit when the soil and air temperatures are warm. The temperature range for fruit set is quite narrow. When nighttime temperatures fall below 60 degrees F. or above 75 degrees F., blossoms are likely to drop and fruit will not set. Daytime temperatures above 90 degrees F. will also inhibit fruit set, but fruits will again begin to form when cooler daytime temperatures appear.

INSECT PESTS

Gardeners may find that pests cause occasional problems. Early detection can prevent damage; inspect plants frequently for telltale signs of insects; presence. Large insects can often be removed from the plant. Any damaged leaves or stems should be removed and destroyed. Insects often make their homes among garden debris, quickly moving on to healthy plants. Remove debris from pruning or weeding once the yard chore is finished. If increasing insect populations appear, contact a garden center or a county Extension agent for information about insecticides to reduce insect populations.

Aphids are a major source of pepper problems. They are very small insects (under 1/10 inch) found clustered on the undersides of leaves and on new growth. As they feed they suck plant juices; leaves become yellowed and distorted. They can spread all viruses, particularly Cucumber Mosaic Virus.

Thrips are another likely source of pepper problems. These small flying insects congregate by the undreds. Thrips are active insects, wounding plants to suck sap like aphids. Thrips damage leaves which generally curl upward into a "boat-shape." These insects can infect peppers with Tomato Spotted Wilt Virus (TSWV).

DISEASES

While there are many viruses that can harm peppers, the following are the most prevalent in North America.

Tobacco Mosaic Virus--Leaves become yellow and a mosaic pattern can be seen on them. Eventually plants become stunted and fruit discolored. Because TMV can be found in tobacco, refrain from smoking near the plants. Do not handle plants after smoking tobacco. Many pepper varieties have resistance or tolerance to Tobacco Mosaic Virus. Wilt diseases--These are caused by the fungi *Verticilium* and *Fusarium* present in the soil. The initial symptoms are wilting, upward curling of leaves, and yellowing. Eventually the stems and roots of the plant are affected. *Verticilium* wilt is more common in the western and northern parts of North America. *Fusarium* wilt is more likely to occur under conditions of wet soil and high temperatures.

Phytophthora root rot is caused by organisms found in heavy, poorly drained soils. These diseases are best prevented by good water management and crop rotation.

Cucumber Mosaic Virus--Plants are severely stunted with light green, leathery foliage. Leaves and fruit may develop yellow spots and rings. This virus is worldwide and can infect many food crops and weeds. Aphids can transmit CMV from weeds to vegetables and back to weeds.

Viruses and wilts are not very common in gardens. If a pepper plant appears to have the symptoms of a wilt or virus, the only action to take is to remove and destroy the plant.

There is no cure for a wilt or virus. Plants can be burned or put through a garbage disposal, if small, but do not allow the plant to be put into a community or home compost pile where the virus or wilt could infect other plants.

HARVEST

Peppers may be harvested and enjoyed when immature or mature. There is not a "best" time to harvest, let personal taste preference be the guide. Remember that sweet peppers become sweeter as they mature and hot peppers come hotter.

To harvest, do not pull or tear a pepper from a plant. Peppers have shallow root systems and it doesn't take too forceful a pull to dislodge the entire plant from the ground. Fruits of many varieties will easily snap off at the stem. With some varieties you will need to use a sharp knife or scissors to cut the fruit stem from the plant. Harvesting regularly will encourage the plant to keep blossoming and setting fruit, especially early in the growing season. If the temperature just drops below 32 degrees F. for a short time, covering the pepper plants will protect them from damage. At the end of the growing season such as September in Minneapolis, if there is a threat of killing frost, pick all fruit regardless of the size. This is the last harvest for the plants.

COOKING WITH HOT PEPPERS

A cautionary note on preparing HOT peppers for storage or cooking. The "heat" in hot peppers is an oil called capsaicin that is contained in the placenta (membranes that join the seed to the fruit). This oil will easily get on hands and fingers during the cutting and cleaning process.

If you then rub your eyes, nose or mouth, the oils will be transferred to these areas with a distinctly painful burning. Wear plastic gloves while cutting the hot peppers to prevent any of the oil from covering your hands. Wash hands after preparing is finished. Do not rub your eyes!

Should you forget to use caution and end up with burning hands, gel from the leaf stem of an aloe vera plant offers immediate relief when applied to hands or other burning areas. Use the gel carefully. A 10 percent solution of chlorox will also neutralize.

The temperature of a 'hot' pepper can be controlled by using or excluding the seed and placenta of the pepper when cooking. If you wish a dish to be 'hot' include the hot pepper parts. If you want less heat, use the flesh only and dispose of the placenta and seeds.

STORAGE

Peppers may be stored fresh, frozen, dried or pickled. Peppers will continue to ripen after being picked. Store peppers at room temperature if you wish them to ripen. The ripening process will be slowed if the peppers are stored under cool conditions. If whole fresh peppers are placed in plastic wrap and stored in the refrigerator, they should keep for at least a week.

Peppers are among the easiest of vegetables to freeze. Most peppers such as sweet bell or jalapeno need not be cooked or blanched prior to freezing. Simply wash, slice open and remove seeds. They may be cut into strips, chopped or diced and placed in a freezer container. Once thawed the peppers will be soft but well-suited for use in soups, stews or cooked vegetable dishes.

Mature peppers may also be dried for long term storage. Make a Mexican ristras, a long string of dried chili peppers that can be hung on the wall for easy accessibility as well as a colorful decoration. Use fresh chili peppers leaving the stems on. Make a small slit on each side of the pepper just below the stem. Insert a needle and thread through these

slits and string the peppers together. Hang in a warm dry place. Use them in appropriate recipes or as a decoration. To dry "hot" peppers such as jalapeno, use waxed dental floss because the capsaicin oil dissolves thread.

NUTRITION

Peppers are the right food for people seeking a healthy, nutritious diet. Low in calories, high in Vitamins A and C, peppers are also high in a very important mineral--potassium. One cup of raw sweet green peppers contains 22 calories. For comparison a cup of cucumber is 16, cottage cheese is 223 and whole orange is about 41 calories.

A red sweet or hot pepper contains about ten times more vitamin A and double the amount of Vitamin C than an immature green pepper. A 100 gram serving of red hot peppers eaten raw contains 369 milligrams of Vitamin C. The same serving size of sweet raw green pepper contains 128 milligrams, about one third less.

Whether green or red a pepper contains more Vitamin C than a whole orange which contains only about 50 milligrams. For potassium rich foods, an average banana contains 370 milligrams and a cup of green sweet pepper has 213 mg raw and 149 mg if boiled before being eaten.