The Oklahoma Cooperative Extension Service
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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Pepper Production

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Oklahoma Cooperative Extension Fact Sheets are also available on our website at:
http://osufacts.okstate.edu

Production Requirements

Peppers are a warm-season crop and require about the same growing conditions as tomato and eggplant. Peppers are very sensitive to light frost and cool temperatures, growing poorly when temperatures are in the 40 F to 60 F range. Extreme summer heat in Oklahoma prevents fruit set in most pepper crops. Very little fruit set occurs when temperatures are above 90 F during the day or below 60 F at night. Fruits that do set at temperatures above 85 F usually are small and poorly shaped. Peppers yield best when temperatures range between 65 F and 80 F during fruit set. Some of the small-fruited, pungent peppers are more tolerant to high-temperature fruit set problems than bell type peppers. The expected yield of bell and other fresh market peppers with good management in Oklahoma is 8,000-12,000 lbs. per acre. If put in 30-pound cartons, expect 265 cartons to 400 cartons.

Sites and Soils

A well-drained, sandy loam soil is ideal for pepper production. Other soil types can be used satisfactorily. Site selection is important if early yield is desired. For early production, the site should have a sandy soil and southern exposure, which causes the soil to warm quickly in the spring. The site selected should not have been cropped to pepper, tomato, eggplant or potato during the previous two seasons to avoid diseases.

Types and Varieties

Varietal information—Varieties to consider are given in Extension Fact Sheet HLA 6035 "Commercial Vegetable Varieties for Oklahoma" available on-line at: http://www.oces.okstate.edu/crops. One other good source of information on variety selection is Oklahoma State University's Vegetable Trial Reports MP-164. Annual trial results are available on-line at: http://www.hortla.okstate.edu/research-and-outreach/research/vegetable-trial-reports.

Bell types—Bells are sweet peppers grown primarily for fresh market. Their shape is blocky, with 3 lobes to 4 lobes and thick flesh. Most are green when immature and red when ripe. Some will ripen to yellow or orange; these often are lighter green when immature than varieties that ripen to red. Most require 75 days to 80 days from transplanting to harvest.

Chile types—Chile peppers are pungent and thin fleshed. Chile varieties differ in size and shape from cherries to slender fruits up to 8 inches long. They require about 100 days from transplanting in order to produce mature green fruit and 140 days to red ripe fruit. Ancho/poblano types have relatively large pods. Examples include San Martin and Tiburon. Several smaller fruited, pungent varieties are grown in Oklahoma for the fresh market. Jalapeño and Serrano types are both green fruited. Caloro and Santa Fe Grande are yellow fruited varieties.

Soil pH and Fertilizer

The first step to developing a fertility plan for pepper production is to take a soil sample and have a routine soil analysis done to provide information on soil pH and relative amounts of nitrogen, phosphorus, and potassium in the soil. Instructions for how to take a representative soil sample are available in fact sheet PSS-2207 "How to Get a Good Soil Sample" available at: http://www.oces.okstate.edu/crops. Peppers are fairly tolerant to soil pH as low as 5.5, but like most vegetables, they will perform best at a soil pH range of 6.0 to 6.8. Apply lime if soil pH is too low. Based on OSU soil test results the following amounts of P_2O_5 and K_2O are recommended (Table 1). Fertility recommendations based on your soil test results for specific vegetable crops can also be found on-line by going to www.soiltesting.okstate.edu. Other fertility recommendations are available in Fact Sheet HLA-6036 "Soil Test Interpretations for Vegetable Crops" available on-line at: http://dasnr22.dasnr.okstate.edu/docushare/dsweb/Get/Document-6620/HLA-6036web.pdf.

Table 1. Phosphorous and potassium requirements for pepper.

Phosphorous Requirements (lbs P_2O_5 per acre)					
When test shows	0	10	20	40	>65
Add lbs. P_2O_5	150	125	100	55	0
Potassium Requirements (lbs K_2O per acre)					
When test shows	0	75	125	200	>250
Add lbs. K_2O	200	155	120	50	0

Nitrogen—Apply 50 lbs. per acre pre-plant and incorporate it along with the recommended amounts of P_2O_5 and K_2O. The crop should be sidedressed with 50 lbs. per acre of nitrogen when the plants first begin to fruit. Additional nitrogen may be needed later in the season if nitrogen is lost by leaching from rainfall or over-irrigation. The plants must grow rapidly after being transplanted to prevent blooming and fruit set while they are too small. Setting fruit on small plants stunts crop growth and will reduce overall yield. Stunted plants fail to develop the size needed to produce a good crop of fruit and provide good foliage cover to protect fruit from sunscald. Apply one cup starter solution per plant at time of transplanting to reduce transplant shock and promote rapid early growth. A starter solution can be made using 3 lbs. of 15-30-15 per 50 gallons of water.

Planting and Spacing

Peppers are usually transplanted, but can be direct seeded. Transplanting offers several advantages compared to field seeding: weed control is much easier; fruit set occurs before high summer temperatures develop; a field stand is much easier to obtain using transplants; and seed cost for hybrid varieties is reduced since only 4 ounces of seed are needed to grow plants for one acre compared to 2 pounds for direct field seeding.

Pepper transplants are usually greenhouse grown and require four weeks to six weeks from seeding to transplant size. See Extension Fact Sheet HLA-6020 "Growing Vegetable Transplants" for detailed information on transplant production available on-line at: http://dasnr22.dasnr.okstate.edu/docushare/dsweb/Get/Document-1377/HLA-6020.pdf. Transplants should be healthy, disease-free plants and can be transplanted by machine or hand. Firm the soil around the roots and apply a starter fertilizer solution for quick plant recovery. Peppers are usually transplanted 12 inches to 16 inches apart in rows with 36 inches between row centers. Plant populations for pepper can range between 11,000 to 14,500 plants per acre, depending on the in-row spacing. Research in Oklahoma and Texas suggested that, given equal plant populations, single rows are likely to produce more U.S. No. 1 peppers than double rows. Transplanting must be delayed until the danger of late spring frost is past to avoid frost injury.

Transplanting peppers through black plastic mulch will increase early plant growth and promote earlier production. A premium price must be expected from early production to offset the added production expense of using plastic mulch and the drip irrigation needed under the mulch.

Weed Control

Weed control can be accomplished through shallow mechanical cultivation and hand hoeing. If weed control will be carried out by this method only, it is important to scout for weeds several times per week and to cultivate when weeds are small and easily controlled. Pruning roots with cultivating equipment slows plant development, reduces yield, and promotes blossom end rot. Several preemergence herbicides are available that will control germinating weeds and grasses in transplanted peppers if used properly. Consult the current edition of E-832 "Extension Agents' Handbook of Insect, Plant Disease, and Weed Control" for recommendations.

Insects

Early in the season, cutworms are the most damaging pests of both seeded and transplanted peppers. Seeded peppers are also subject to attack by several species of flea beetles when the cotyledons emerge. Green peach aphids can become numerous at any time, but are probably more prevalent during the summer. Besides the stress created by aphids feeding on plant sap, their honeydew (waste) is deposited on the fruit and leaves. Honeydew is difficult to remove and can render the fruit unmarketable. Its presence on the leaves, if heavy enough, can decrease photosynthesis due to the growth of sooty mold. Hornworms and blister beetles, if present in large numbers, may warrant treatments. Occasionally, loopers will feed on the foliage, exposing the pods to sunscald. Fall and beet armyworms as well as yellow-striped armyworms are possible pod feeders along with the variegated cutworm. Beet armyworm will also feed on the foliage. Corn earworm will feed on the pods and cause the pods to drop or to be unmarketable. For specific insect control measures, see the latest edition of E-832 "Extension Agents' Handbook of Insect, Plant Disease, and Weed Control."

Diseases

Bell peppers are subject to several diseases in Oklahoma. Seeds and seedlings may become infected with damping off fungi. Phytophthora root rot causes rotting of the roots and underground portions of the stems. Infected plants suddenly wilt and die. Most recommended varieties are resistant to tobacco mosaic virus; however, several other viruses can infect peppers. Leaves may become infected by anthracnose fungi, by Cercospora leaf spot fungus, and by the bacterial leaf spot (BLS) bacterium. Copper-resistant strains of the BLS pathogen have been reported in Oklahoma. The use of BLS-resistant cultivars (where available) and drip irrigation will help to reduce BLS damage. Pepper fruits are subject to blossom end rot, sunscald, bacterial spot, bacterial soft rot, and to Alternaria fruit rot (ripe rot). Descriptions of the above diseases and recommended control measures are available in E-832 "Extension Agents' Handbook of Insect, Plant Disease, and Weed Control."

Irrigation

Irrigate peppers with moderate amounts of water, since some roots go 3 feet to 4 feet deep, but also have many shallow roots. Irrigate to maintain uniform soil moisture to promote uniform growth and fruit setting. An irregular moisture supply will increase the occurrence of blossom-end rot on fruit. Long dry periods may cause plants to shed flowers and small fruits. Plants are likely to make a slow recovery after drought injury. Over-irrigation promotes Phytophthora and other root-rotting organisms. Supplemental irrigation should be available to supply up to 1 ½ inches of water every seven days to ten days. Actual needs will vary with soil type, plant size and weather conditions. Primary irrigation systems used in Oklahoma would include overhead and drip irrigation. Overhead systems could include pivot or linear systems, pipe and risers or a side-roll system–all of which would be used to apply water on the suggested seven- to ten-day schedule. Drip irrigation systems are operated on a more frequent basis, often daily or multiple times per day. Refer to OSU Extension Fact Sheet BAE-1511 Drip Irrigation Systems, for additional information available at: http://dasnr22.dasnr.okstate.edu/docushare/dsweb/Get/Document-1443/BAE-1511web2014.pdf.

Harvesting

Green bell peppers should be harvested before any chocolate or red color develops. They should be full grown and feel firm and crisp when squeezed. Fruits are snapped off by hand and carried from the field in buckets or sacks. Pepper plants have brittle branches that break easily during harvest. Use care during harvest to avoid yield reduction due to plant damage. Harvest at regular intervals to maintain production.

Grading and Packing

Grade and remove pods showing sunscald, disease or damage. The size requirement for U.S. No. 1 peppers is a minimum of 2 1/2-inch diameter and 2 1/2-inch length. Marketable peppers should be carefully wiped with a soft cloth to remove soil and dust. Do not wash the fruit to minimize rot after harvest. If peppers are to be sold on the fresh market, growers should pack in the type container desired by their market. Thirty-pound cartons are commonly used containers.

Post-Harvest Holding

Pepper fruit are sensitive to chilling injury, so temperature management is crucial to maintaining quality. Mature green peppers hold best at temperatures between 50 F and 54 F; chilling injury will occur at holding temperatures below 45 F. Holding pepper fruit at the recommended temperatures and at 90 percent to 95 percent relative humidity allows peppers to be stored for up to two weeks.