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From Garden to Table:

All in the Family!
Potatoes, Tomatoes, Peppers and Eggplant

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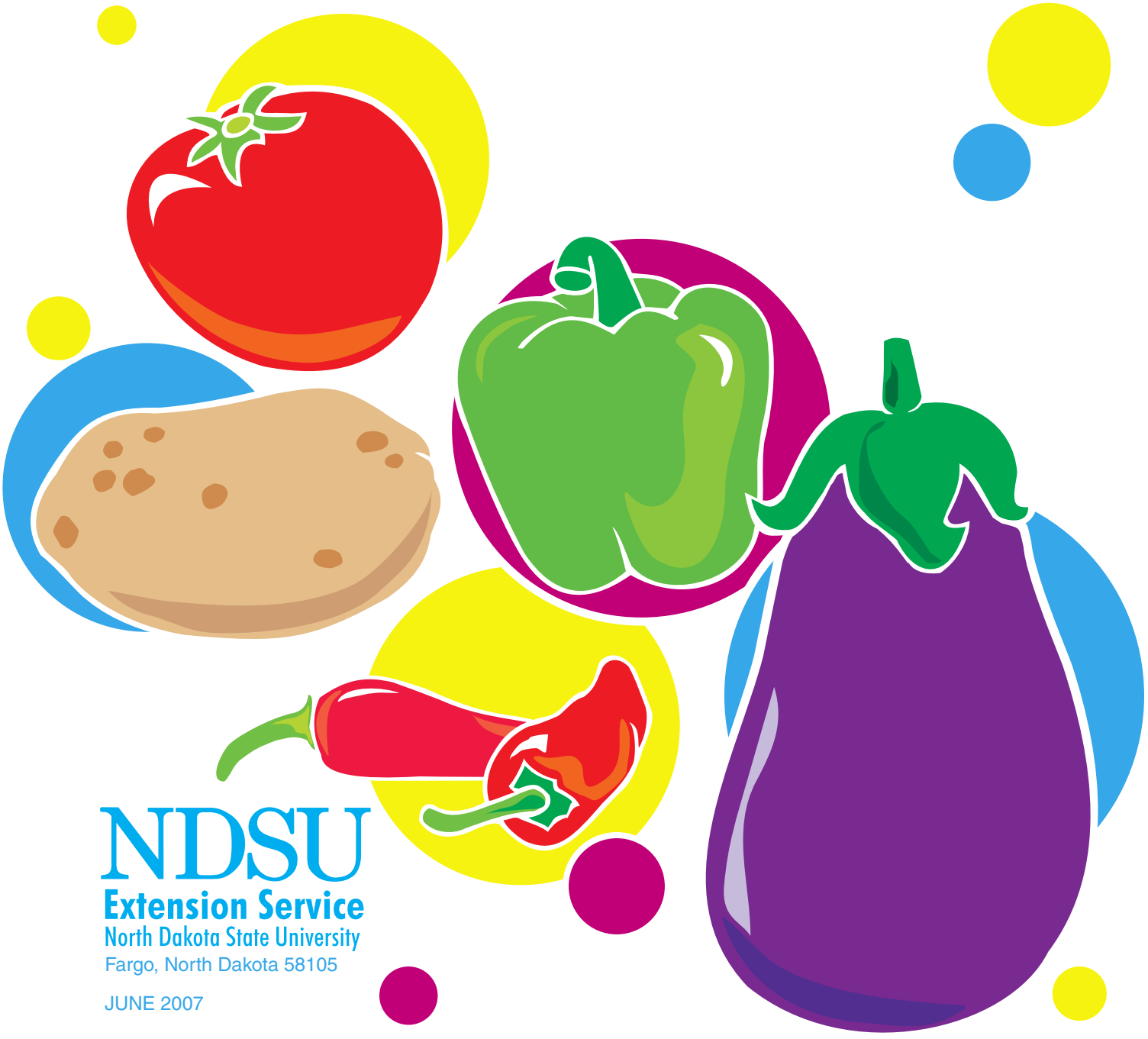

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Welcome to the **Solanaceae family** (potato or nightshade family), which includes the common garden crops listed in the title, but many flowering plants, such as petunia and the tobacco plant *(Nicotiana spp),* as well. Our focus in this publication is to bring these four popular garden vegetables together and provide a little history, basic cultural requirements, a list of some of the popular cultivars and some of our favorite recipes.

Potatoes

The most important species of this family for the global diet is the potato *(Solanum tuberosum).* Ironically, most of the plant (foliage, flowers and fruit) is considered toxic, while the tubers are a generous storehouse of carbohydrates that both plants and humans can use to obtain energy. While all members of this family are frost sensitive, the potato is the only one that can be nipped back by a frost and still produce nice tubers.

Tomatoes

Next on the road to fame has to be the tomato *(Solanum lycopersicum),* originating from the same areas of Central and South America as the potato. According to the U.S. Department of Agriculture, the per-capita consumption of tomatoes is 22 pounds, with more than half being consumed as tomato sauce (pizza!) and as salsa. If Americans are going to grow just one vegetable, it most likely will be a tomato plant or two.

Garden peppers

The garden pepper *(Capsicum frutescens)* is not related to the true pepper *(Piper nigrum),* from which we get the common black pepper on our tables. The very pungent forms, such as the habanero and chili, are competitive with the black pepper in the spice market of the world, and the nonpungent form, the common bell pepper, is most popular in America. Garden peppers offer a wide range of colors, flavors and sizes to fit into any ethnic cuisine.

Eggplant

Eggplant doesn't share as much of the produce spotlight as the previous members of the nightshade family; consequently, growing this vegetable may be a new experience for some gardeners. Known botanically as *Solanum melongena,* it is native to southern India and Sri Lanka. While all of these nightshade members are frost and cold sensitive, eggplant leads the family in this category. Gardeners have escaped injury or serious setback of their tomatoes, peppers and potatoes with ingenious manipulations when frosty temperatures are threatening, but failed with eggplant under the same conditions.

Soil Requirements

The soil requirements for all four nightshade crops are pretty close: well-drained sandy loam, high in organic matter and slightly acid (pH less than 7). While organic matter can come from most peat moss sources, gardeners should not use manure in the case of potatoes because of the possible increased incidence of potato scab.

Garden crops produce best in deep, high quality topsoil that is not compacted; consequently, we strongly recommend turning the soil over every fall after cleanup or in the early spring before planting. Fall tillage is best with a rototiller or spade to a depth of at least 6 to 9 inches. This brings any insect pests to the surface, exposing them to the elements and natural predators. Good soil sanitation – the removal of old garden litter — will go a long way toward enjoying healthy, bountiful crops.

Unfortunately, much of the garden soil in North Dakota is considered “sweet” (alkaline) where the pH exceeds 7, as it often can create problems with diseases and good production of vegetables. We recommend a soil test to determine the pH of the soil, as well as the basic nutrient levels of nitrogen, phosphorus and potassium. Gardeners also should obtain a soluble salt reading (EC — electrical conductivity), and make amendments based on the results.

Fertilizer

Fertilizer additions are best made before planting tomato, pepper and eggplant seedlings and seed pieces or eyes in the case of potatoes. Broadcasting is the easiest for most homeowners, where typical rates would be 2 to 3 pounds of an 8-16-16 or something similar per 100 square feet. Once broadcast evenly over the soil surface, it should be worked in with a tiller, garden rake or spade. With potatoes, a follow-up application usually is made in a band when the plants are about 6 inches tall. The other nightshade crops respond well to applications of a water-soluble (e.g., Miracle-Gro) fertilizer about every two weeks during the growing season.

Early soil warming

In North Dakota and other areas of the upper Midwest, many gardeners will push the season earlier with soil warming before planting takes place. A common practice is to cover the soil with clear or black plastic for about 10 to 14 days prior to setting out tomato, pepper and especially eggplants seedlings. The choice is then up to the gardener to either plant into that plastic by making slits or to remove it completely and plant directly into the prepared soil. Leaving the plastic in place often results in earlier and better crop production, and fewer pest problems.

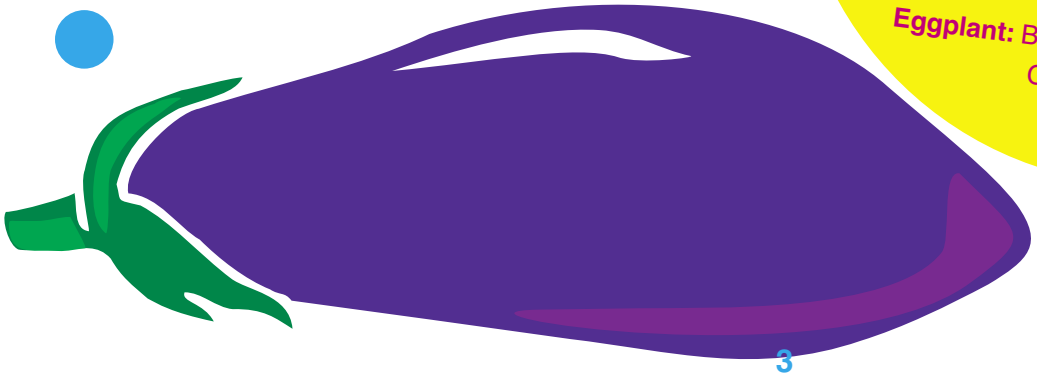
Example Variety Selections

Potatoes: Irish Cobbler, Norland, Potanic, Kennebec, Yukon Gold

Tomatoes: Celebrity, Big Beef, Juliet, Jolly, Early Girl and any All-America Selections (AAS) winners

Peppers: Bell Boy, Blushing Beauty, Chilly Chili, Super Cayenne, Poinsettia

Eggplant: Black Magic, Burpee Hybrid, Classic, Ichiban



Cultivation and Pest Control: Weeds, Insects and Diseases

Due to the normally small space of a typical home garden, gardeners often do not need to use pesticides. If a pest should should appear to be getting a foothold, we suggest organic choices or the least toxic of the inorganic products. Some organic selections are listed in Table 1.

Table 1. Organic Products

Insecticidal Soaps – can be applied up to day of harvest, and especially are useful in controlling soft-bodied insects, such as aphids, leafhoppers, scale and mites.

Fish Fertilizer – modern sources are deodorized usually with a citrus scent. Nutrient content is low, but provides sustained growth. Can be applied to the roots or directly on the foliage.

Hot Pepper Spray – Cayenne pepper extract is the usual active ingredient. It will discourage plant-nibbling pests, such as rabbits, field mice and squirrels. Most formulations come with a sticking agent added so that reapplications can be spaced farther apart.

Fungicide 3 – a product of the Neem tree, it acts as a fungicide, insecticide and miticide.

Yellow Sticky Traps – these yellow cards are coated with a sticky substance that will attract a wide range of insects, such as aphids, fungus gnats, white flies and several species of beetles, to this color.

Disease resistance

Today's hybrid cultivars of tomatoes and peppers have resistance bred into them, so little to no fungicide – organic or otherwise – needs to be used. With tomatoes and peppers, look for some or all of the letter designations behind their cultivar name to determine their particular resistance:

V = Verticillium wilt
F = Fusarium wilt
N = Nematodes
T = Tobacco mosaic virus
A = Alternaria stem canker
St = Stemphylium gray leaf spot

For example, the 1984 AAS winner, Celebrity Hybrid, has VFFNTA after its name in catalogs. This would mean that the plants are resistant to Verticillium wilt, Fusarium wilt races 1 and 2, Nematodes (microscopic eel-type animals), Tobacco mosaic virus and Alternaria stem canker. Some gardeners shun hybrids altogether and go for the heirloom (old-fashioned, nonhybrid) varieties and grow them with great success. For the typical gardener looking for good eating without the hassle of active disease control, the AAS winners and other hybrids are the way to go.

Insects

Unfortunately, potato and eggplant varieties have no such designation, so they must be managed with greater care. For example, potatoes are very attractive to the Colorado potato beetle just about as they emerge from the soil. Consequently, the emerging plants must be sprayed with the appropriate insecticide or the juvenile and adult beetles hand-picked. Other than the Colorado potato beetle, flea beetles, aphids and spider mites can be a problem for both the potato and eggplant crops.

Raised bed gardening

Raised beds will allow for warmer soils in the spring and better drainage than in beds that haven't been raised.

Plastic barriers

Utilizing plastics in your home garden has several advantages. Plastic will provide a physical barrier to weeds and reduce erosion due to wind and water. It also will provide cleaner fruits and increase yield and allow for crop production one to three weeks earlier due to the soil being warmed. A disadvantage of plastic is that desiccation and/or stem injury can occur on the newly placed plants. Hot air can move under the plastic and out of the hole in the plastic where the plant is growing.

Drip irrigation

Utilizing drip irrigation will save water and labor costs, and also have an improved environmental effect due to reduced leaching of fertilizers from the soil. An advantage of drip irrigation over other types is that it does not provide water or fertilizer (in the case of fertigation) to competing weeds. Many states require irrigation systems to have anti-siphoning equipment to stop movement of water containing fertilizer and other chemicals back into the main water supply.

Container gardening

Tomatoes can be grown in containers for people with limited space. The type of tomato for containers is usually the cherry tomatoes, bush varieties or other smaller determinate types. Five- to 10-gallon containers with adequate drainage and pasteurized soil medium would be needed to grow a tomato plant. Remember that the plant's roots may become hot during the day and some type of shading may be warranted for the container portion. When watering, water so that the water will not touch the plant and comes out of the bottom of the container. Watering every day to every other day will be necessary in a containerized plant that is kept outside.

Nonorganically approve insecticides

If the choice is to use nonorganically approved insecticides, begin with the least toxic and *carefully follow label directions.* Problems typically arise not so much from pesticide use, but from its misuse!

Crop rotation

One of the reasons for this publication is to make gardeners aware that crop rotation is a good, organically-approved and sustainable practice. This means that four-year rotations with nonrelated crops and using plants grown from disease-free seeds will help in controlling diseases of all of these crops. Eggplant is particularly vulnerable to Verticillium wilt. It causes severe stunting and interveinal yellowing, wilting and death of the plant. Avoid tomatoes, potatoes, eggplant, okra, raspberries or strawberries in rotation with eggplant. Here is an example of a good rotation: year one, eggplant; year two, spinach; year three, beans; year four, cabbage.

Blossom-set spray

With our short growing season, savy gardeners often will use a "blossom-set" spray to get increased fruit set and harvest. It is a naturally occuring plant hormone known as gibberellic acid (GA) and can be used on a wide variety of vegetable crops listed on the label.

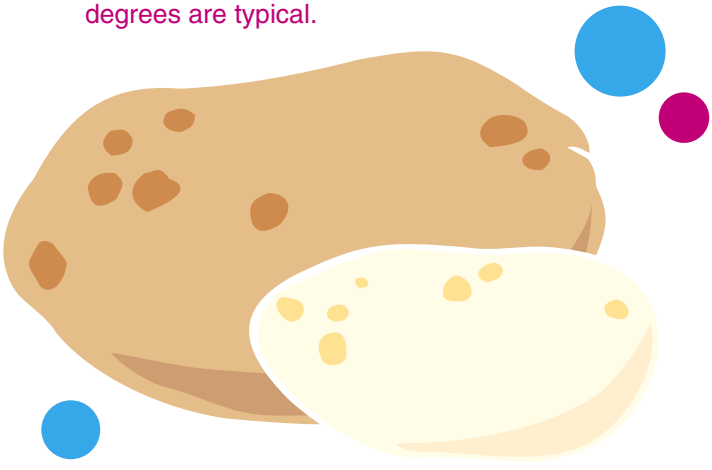
Culture

Potatoes

Potatoes can be planted from either whole or cut seed tubers. Select only certified seed potatoes to minimize disease and to avoid sprout inhibitors, which typically are used on potatoes available in our grocers' produce section. Select cultivars that you like and fit your culinary needs. Seed potatoes are planted at a depth of about 4 to 5 inches, spaced about 12 inches apart and in rows 36 inches apart. Hills can be formed at planting or after the potatoes have emerged. The hill provides protection to the developing tubers from the sun and aids in water management.

Moisture is important for potatoes at all stages of growth, and the developing plants will access moisture primarily from the top 12 inches of soil. When the rainfall is inadequate, irrigation should be applied about every five days and the soil dampened to a depth of about 2 feet. Potatoes typically are fertilized in the home garden at planting using a banded application of a typical blend, such as 15-30-15, about 2 inches to the side and 2 inches below the seed piece. A light application (side-dress) of nitrogen may be appropriate midseason if plants are yellowing. Most pests in the home garden can be addressed without the use of pesticides; however, if late blight is present in the area, a preventative fungicidal program would be appropriate.

Potatoes can be harvested through the growing season as new potatoes or in the fall after the plants have matured. Use new potatoes quickly after digging due to the rapid loss of moisture from the tender skins. For storage, temperatures in the range of 38 to 40 degrees are typical.



Tomatoes

Plant tomatoes at least 2 to 4 inches deeper than the seedling roots. New roots will emerge along the buried stem and result in a sturdy plant that is able to mine more nutrients and water from the soil. Tomatoes can be planted one per square foot (as in Mel Bartholomew's "Square Foot Gardening" book) or conventionally, with adequate spacing between plants in a row. Vine-type (listed in catalogs as Indeterminate) will need more space unless they are staked. Staked tomatoes will result typically in a smaller yield, but higher quality fruit. Bush tomatoes (Determinate) grow to a specific size, bear flowers and fruit, then stop. Where space is a premium, the determinate tomato cultivars may be the way to go. They also lend themselves well to container gardening. Growth can be encouraged through the season with regular fertilizations of a material high in phosphorus. Never use lawn fertilizers for garden crops, especially any members of this nightshade family.

Cultivation around tomato plants should be carried out with care, if at all. The roots are near the surface, and the damage to the roots often will result in a physiological disorder known as Blossom End-Rot (BER) to the developing fruit. Generally, this is noted on just the initially ripening fruits, and while unattractive, if the gardener wants to cut out the affected area, the rest of the tomato certainly is edible. Harvest tomatoes when they have developed a deep red color (or a color that is typical for a particular cultivar) and store them at room temperature if they are not going to be consumed right away. Refrigerating tomatoes ruins the good flavor that typically is characteristic of garden-fresh tomatoes.

Some cultivars of tomatoes to consider that have proven successful in variety trials other than Celebrety are: Big Boy, Big Beef, Health Kick, Luscious, Jolly, Sugary and Juliet – all hybrids with high disease resistance and good productivity.

Peppers

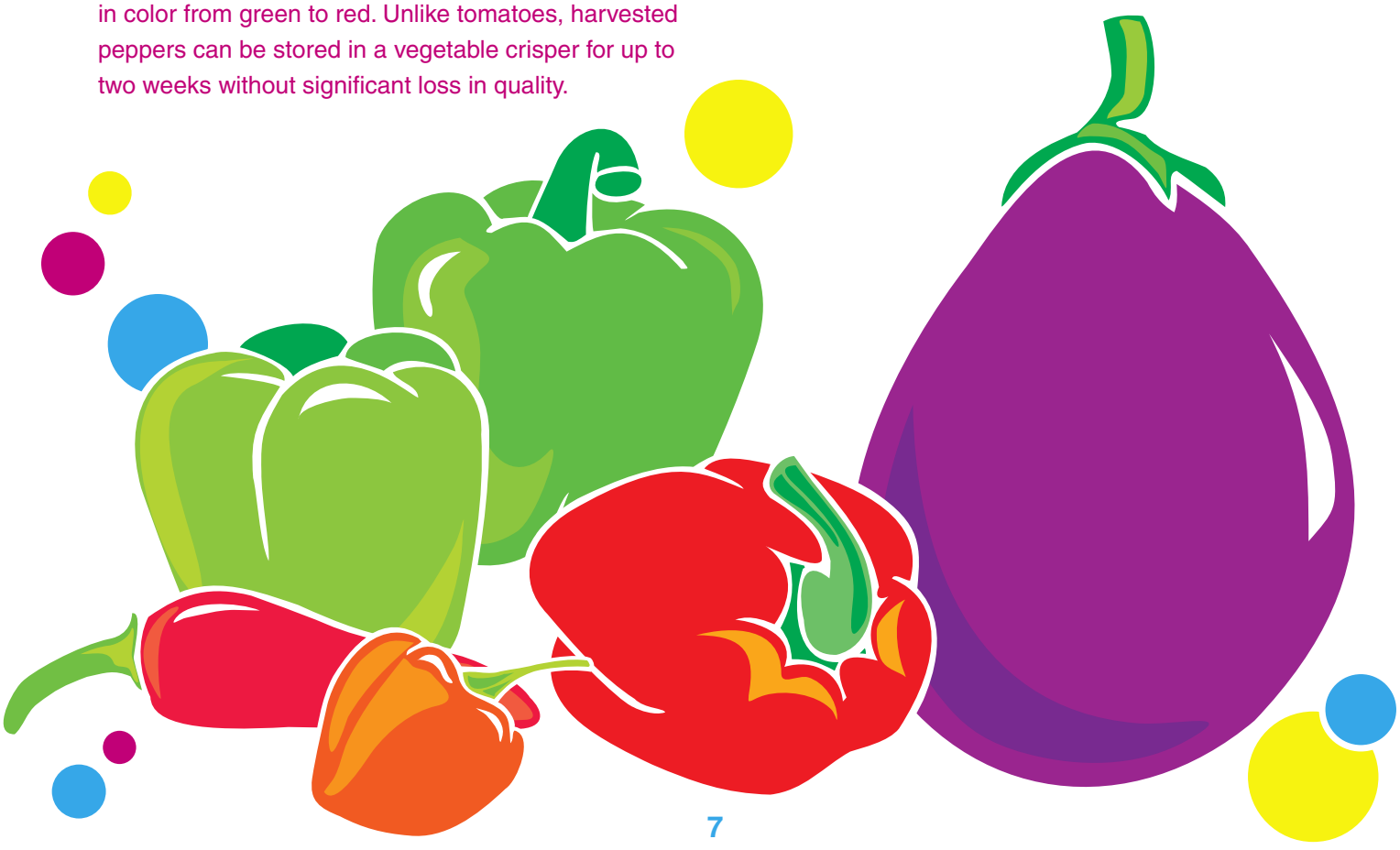
Since pepper plants are more sensitive to temperature fluctuations than tomatoes, setting them out early generally is not a good idea. Hardened-off tomatoes may be tolerant somewhat to chilling temperatures, where peppers are not. They typically grow with less vigor and require higher temperatures than tomato plants. The sweet peppers, also known as “bells,” are most popular with Americans. Hot or chili types are increasingly being planted in our gardens as Americans become more acquainted with more pungent tastes in their food.

Peppers are spaced typically 18 to 24 inches in the row, and as with tomatoes, gardeners need to exercise care when cultivating near the plants. If weeds are a problem in a pepper planting, we highly recommend hand pulling at the earliest stage. Most of the bell (sweet) peppers are harvested green and immature, but when they are full-sized and firm. If the season will allow them to do so, the peppers will ripen and be sweeter and higher in vitamin content, often changing in color from green to red. Unlike tomatoes, harvested peppers can be stored in a vegetable crisper for up to two weeks without significant loss in quality.

Eggplant

Of all the members of the nightshade vegetable family, the eggplant would benefit most from the use of plastic mulch to get the soil temperature up and keep it there. Plants may be planted in staggered double rows on each strip of plastic, spaced 18 inches apart. The fruits of eggplant are edible from the time they are one-third grown until ripe. They remain edible for several weeks after they become fully grown and colored with a shiny skin. Like squash and cucumber, they will continue to bear if they are harvested when of adequate size and color until an autumn frost stops everything.

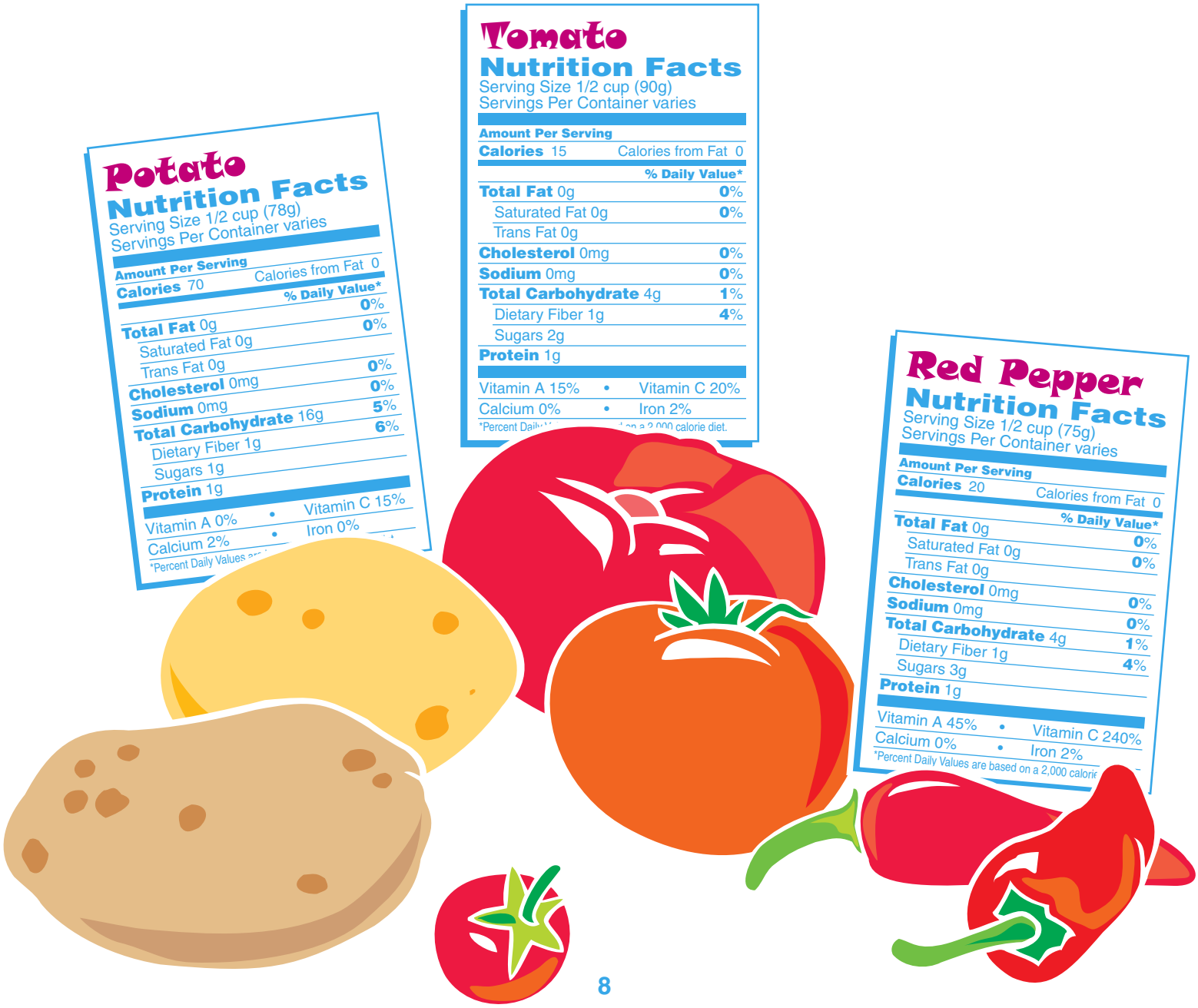
Eggplant trials have been limited, but the following have proven productive: Black Beauty is the standard for comparison, producing large fruits that make them great for creating eggplant “steaks” for grilling. They do require hot summer temperatures and at least 100 days to successfully produce fruits. Nadia and Ichiban are two others that have a greater chance of success with our short growing seasons.



Nutrition and the Nightshade Family

Tomatoes, potatoes, peppers and eggplant add variety, nutrition and color to your diet when used in soups, salads, casseroles and other recipes. Members of the nightshade family provide fiber, vitamins A and C and other nutrients. In their raw state, tomatoes, peppers and eggplant contain less than 20 calories per half-cup serving. Peppers, especially red peppers, are a notable source of vitamin C.

Most members of the nightshade family of produce can be canned or frozen. For more information about canning and freezing (including a publication about preparing and canning salsa), visit the NDSU Extension Service Web site www.ag.ndsu.nodak.edu/food.htm (click on Food Preservation).



Recipes

Featuring the Nightshade Family

Eggplant Nutrition Facts

Serving Size 1/2 cup (41g)
Servings Per Container varies

Amount Per Serving	
Calories 10	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrate 2g	1%
Dietary Fiber 1g	4%
Sugars 1g	
Protein 0g	

Vitamin A 0% • Vitamin C 2%
Calcium 0% • Iron 0%

*Percent D... ...alorie diet.

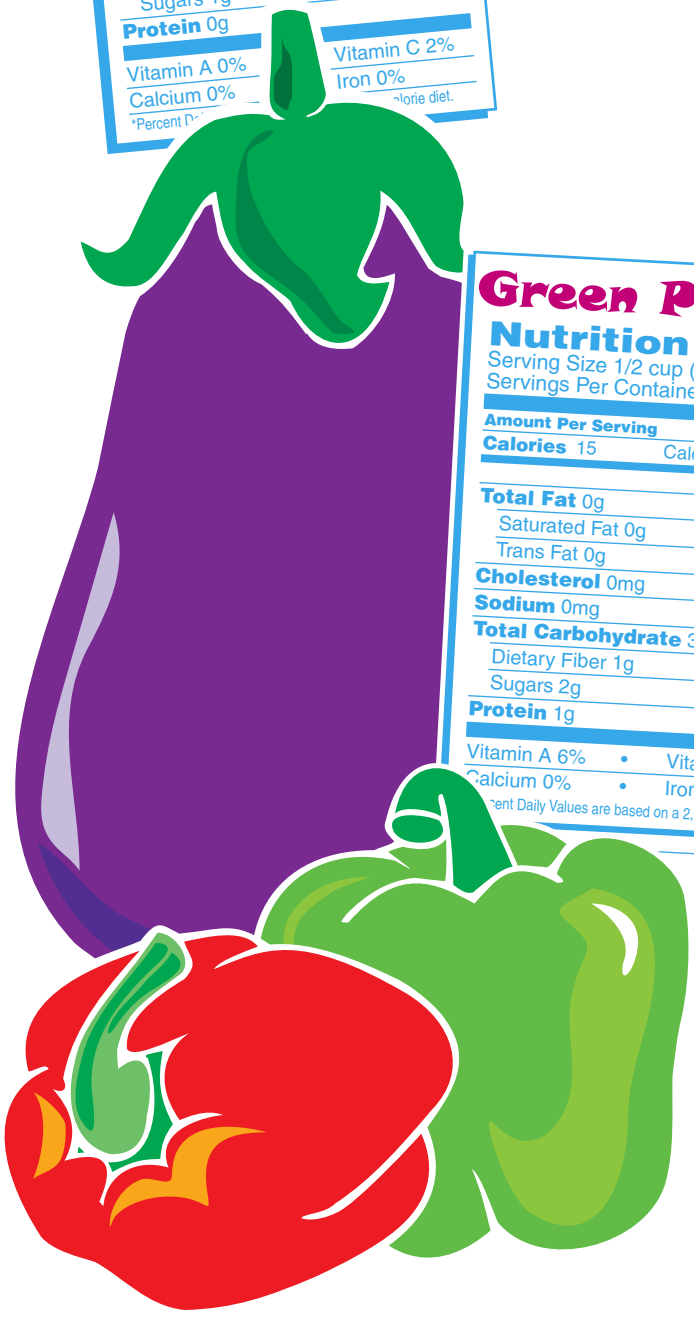
Green Pepper Nutrition Facts

Serving Size 1/2 cup (75g)
Servings Per Container varies

Amount Per Serving	
Calories 15	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrate 3g	1%
Dietary Fiber 1g	4%
Sugars 2g	
Protein 1g	

Vitamin A 6% • Vitamin C 100%
Calcium 0% • Iron 2%

...cent Daily Values are based on a 2,000 calorie diet.



Guide to abbreviations in recipes and nutrition analysis:

tsp. = teaspoon
Tbsp. = tablespoon
g = gram
mg = milligram

Taco-flavored Potatoes

- 4 medium new potatoes
- 2 Tbsp. olive oil
- 2 Tbsp. taco seasoning
- 3 Tbsp. corn meal

Preheat oven to 400 degrees. Wash and scrub potatoes well. Cut the potatoes in half lengthwise and then into quarters and again into eight pieces. Place potatoes in large mixing bowl and toss with the olive oil until potatoes are well-coated. Sprinkle the seasonings and corn meal over potatoes; toss again until coated. Arrange the potatoes on a nonstick baking sheet and bake for approximately 30 minutes until potatoes are golden brown.

Serves five. Per serving: 110 calories, 11 g carbohydrate, 5 g fat, 4 g fiber, 190 mg sodium

Source: USDA Recipe finder: http://recipefinder.nal.usda.gov/
Adapted from Es Facil Campaign; California Health Department – Los Angeles County

Potato Soup

½ c. chopped onion
½ c. chopped celery
6 diced medium-sized potatoes
2 Tbsp. margarine
½ tsp. salt
⅛ tsp. black pepper
1 c. nonfat dry milk
3 c. water
2 Tbsp. flour

Peel and chop the onion. Chop the celery. Peel the potatoes and cut them into small cubes. Melt the margarine in a large saucepan on low heat. Add the onion and celery. Cook for a few minutes. Add the potatoes, salt, pepper and 1½ cups water. Cook for 15 minutes until the potatoes are tender. In a small bowl, stir together the dry milk and flour.

Add 1½ cups water slowly, stirring as you add it. Add the milk mix to the potatoes.

Cook until the soup is heated and slightly thickened. Adjust the seasonings.

Serves six. Per serving: 130 calories, 17 g carbohydrate, 4 g fat, 4 g fiber, 310 mg sodium

Source: USDA Recipe finder: http://recipefinder.nal.usda.gov/ Adapted from Pennsylvania Nutrition Education Network Web site recipes; the Pennsylvania Nutrition Education Program

Chicken Rice Salad

4 c. lettuce
2 c. brown rice, cooked
2 c. chicken breast, skinless roasted
1 cored and diced tomato
1 cored and diced green pepper
1 Tbsp. olive oil
Juice of one lemon
(or about ⅓ c. bottled lemon juice)
2 Tbsp. vinegar, flavored
dash hot pepper sauce (optional)
Italian herb mix and black pepper to taste, (optional)

Toss all ingredients together in a large salad bowl. Use personal taste preferences to determine the amounts of seasonings. Serve immediately. This salad looks great when served on a large plate with a few of the seasonings sprinkled on top.

Serves four. Per serving: 280 calories, 28 g carbohydrate, 7 g fat, 3 g fiber, 65 mg sodium

Source: USDA Recipe finder: http://recipefinder.nal.usda.gov/ Adapted from Cooking Demo II; Food and Health Communications Inc.

Tangy Crisp Vegetable and Pasta Salad

- ½ c. pasta, such as shells, macaroni, etc., uncooked
- ¼ c. vinegar
- 2 Tbsp. sugar
- ½ tsp. garlic powder
- ⅛ tsp. salt
- ⅛ tsp. black pepper
- ½ medium peeled, seeded and coarsely chopped cucumber
- ½ medium thinly sliced carrot
- ½ medium coarsely chopped tomato
- ¼ coarsely chopped green or red pepper
- ½ c. coarsely chopped broccoli florets
- ½ c. thinly sliced radishes
- 2 Tbsp. coarsely chopped green or red onion

Cook pasta according to package directions but do not add salt to cooking water. Drain, rinse with cool water and drain again. Meanwhile, in a small saucepan, combine vinegar , sugar, salt, garlic powder and black pepper. Stir and heat over medium heat until sugar is dissolved, but do not boil. Let cool. Rinse, drain and chop remaining ingredients. Combine in a shallow container, such as an 8-inch by 8-inch pan. Add cooked pasta and vinegar mixture. Mix gently. Cover and refrigerate overnight to allow flavors to blend. Serve cold using a slotted spoon. Cover and refrigerate leftovers within two hours

Serves six. Per serving: 60 calories, 13 g carbohydrate, 0 g fat, 1 g fiber, 60 mg sodium

Source: USDA Recipe finder: http://recipefinder.nal.usda.gov/ Adapted from Fix it Fresh! Recipe Series — Kansas State University Research and Extension

Stuffed Green Pepper

- 4 large washed green peppers
- 1 pound turkey, ground
- 1 c. rice, uncooked
- ½ c. peeled and chopped onion
- 1½ c. tomato sauce, no added salt
- black pepper to taste

Cut around the stem of the green peppers. Remove the seeds and the pulpy part of the peppers. Wash and then cook green peppers in boiling water for five minutes. Drain well. In saucepan, brown turkey. Add rice, onion, ½ cup tomato sauce and black pepper. Stuff each pepper with the mixture and place in casserole dish. Pour the remaining tomato sauce over the green peppers. Cover and bake for 30 minutes at 350 degrees.

Serves four. Per serving: 410 calories, 53 g carbohydrate, 10 g fat, 5 g fiber, 125 mg sodium

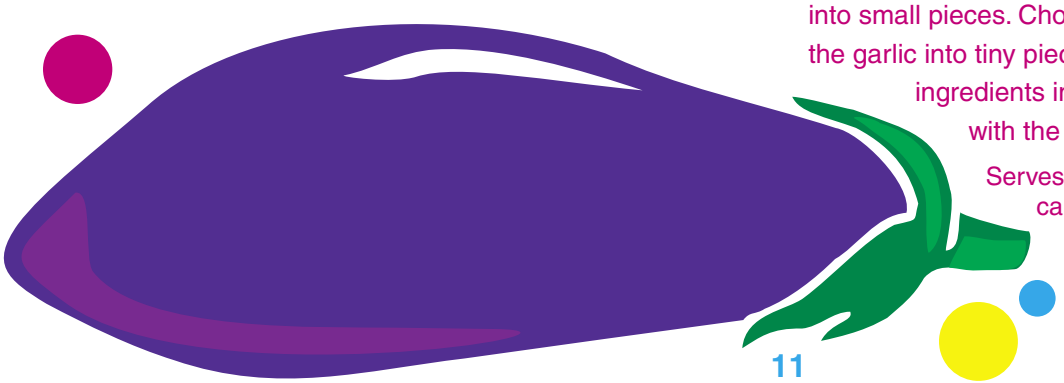
Source: USDA Recipe Finder: http://recipefinder.nal.usda.gov/

Fall Veggie Casserole

- 1 medium eggplant
- 4 tomatoes
- 1 green or red pepper
- 1 onion
- 1 tsp. salt
- ¼ tsp. black pepper
- 3 Tbsp. vegetable oil
- 1 garlic clove
- 2 Tbsp. grated Parmesan cheese

Remove the skin from the eggplant. Cut the eggplant into cubes. Chop the tomatoes into small pieces. Cut the green pepper in half. Remove the seeds and cut it into small pieces. Chop the onion into small pieces. Cut the garlic into tiny pieces. Cook the first eight ingredients in a large skillet until tender. Top with the Parmesan cheese and serve.

Serves eight. Per serving: 90 calories, 9 g carbohydrate, 6 g fat, 3 g fiber, 310 mg sodium



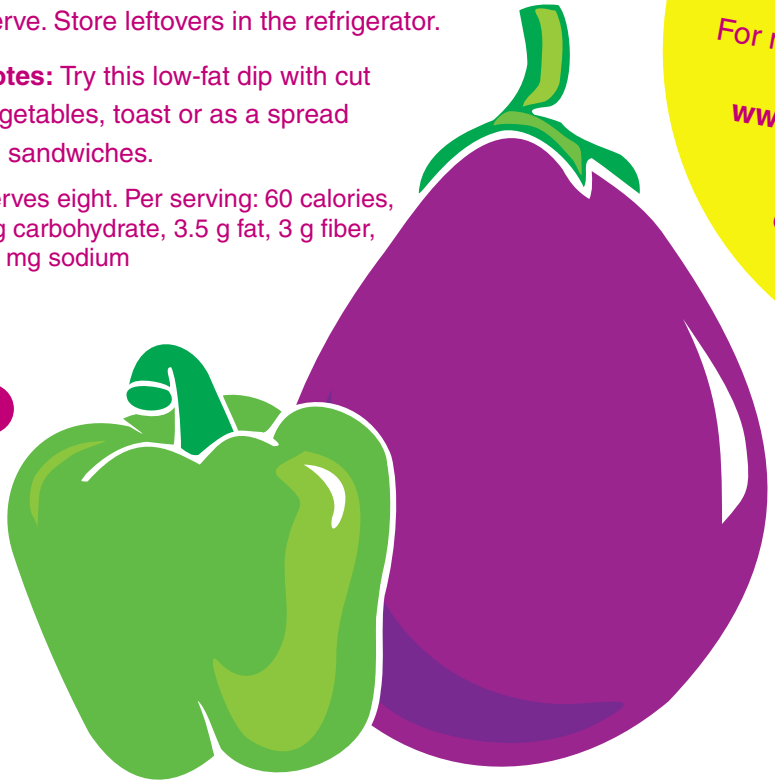
Eggplant and Pepper Dip

1 large eggplant
2 red or green peppers
1 small onion
¼ tsp. garlic powder
2 Tbsp. vegetable oil
1 tsp. oregano
1 tsp. basil
¼ tsp. salt

Use a vegetable peeler to remove the peel from the eggplant. Chop the eggplant into 1-inch cubes. Chop the peppers. Peel and chop the onion. Put all the ingredients in a large bowl. Stir together. Spread the ingredients on a baking tray. Bake at 400 degrees for 45 minutes. While the dip is baking, stir it a few times. When the eggplant is lightly browned and soft, take the dip out of the oven. Let the dip cool for at least 10 minutes. Put the dip the blender. Blend until smooth. Serve. Store leftovers in the refrigerator.

Notes: Try this low-fat dip with cut vegetables, toast or as a spread on sandwiches.

Serves eight. Per serving: 60 calories, 6 g carbohydrate, 3.5 g fat, 3 g fiber, 75 mg sodium



Conclusion

A planting of potatoes, tomatoes, peppers (both mild and pungent) and eggplant can provide the gardener with a diverse selection of fun to grow, nutritionally diverse vegetables. If gardeners are going to plant a vegetable garden, we certainly encourage going beyond the nightshade family, if for no other reason than to have something to incorporate into rotating crops.

More Information

For more information about horticulture, visit **www.ag.ndsu.nodak.edu/horticulture.htm**.

For more information about nutrition, food safety and health, visit **www.ag.ndsu.nodak.edu/food.htm**.

For more information on this and other topics, see **www.ag.ndsu.edu**.

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