

*The Herb Society of America's
Essential Guide to*
HORSERADISH



2011 Herb of the Year

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INTRODUCTION

A hot herb full of surprises!

On first glance horseradish may seem to be a lackluster plant with not much to recommend it. However, appearances can be deceiving and as a wise man once said, “it is not what is on the outside, but what is on the inside that counts.” Those who endeavor to learn more about horseradish might be surprised to find that this holds true for the 2011 Herb of the Year. My hope for this edition of *The Herb Society of America’s Essential Guide to Horseradish* is that the reader will discover why the seemingly lackluster horseradish plant is worth a second look.

Janeen Wright/Educator

Knowledge

HISTORY & ORIGIN

Horseradish originated in the southern part of Russia and the eastern part of the Ukraine (17). The herb has been cultivated for centuries because of its culinary and medicinal benefits. In the past it has been used medicinally to treat everything from back aches to the common cold. Ancient Greeks and Romans cultivated this herb for medicinal uses such as back pain and menstrual cramps (19). During the Middle Ages (c. 1000-1300) horseradish began to be incorporated into the Passover Seder as one of the marmor, or bitter herbs, to be used by the Jewish people. In 1542, the use of horseradish as a condiment was mentioned by Leonhart Fuchs in his herbal entitled *De Historia Stirpium comentarii insignes* or *Notable Commentaries on the History of Plants*. By the 1600s the Europeans were using this herb to spice up their roast beef as well as other culinary items. During this time the herb

was still widely used medicinally. In the mid-1800s, immigrants living in northeastern Illinois planted horseradish with the intention of selling the roots on the commercial market. The Sass family was instrumental in developing the horseradish industry in Illinois (17).

In 1869, John Henry Heinz made horseradish sauce from one of his mother's recipes with the intention of selling it. He bottled the sauce in clear glass to show off its quality—a concept that was unheard of at the time. The product was one of the first condiments sold in the United States.

The commercial horseradish industry in the Midwest began to grow during the nineteenth century. Today a large portion of horseradish is still grown in the areas surrounding Collinsville, Illinois. The town of Collinsville refers to itself as “the horseradish capital of the world.” They hold an annual festival complete with

food, exhibits and competitions. Horseradish is also grown in other areas of the United States such as Pennsylvania, Oregon, Washington, Wisconsin and California. Canada and Europe also cultivate the herb to sell commercially (18). The 2007 Census of Agriculture reports that 3,692 acres in The United States were devoted to growing horseradish for processing and the fresh market (1).

DESCRIPTION

Horseradish is an herbaceous perennial that is hardy to Zone 5, although it is grown as an annual in many areas. The plant grows in clumps with leaves that radiate out from the main taproot. It can attain heights anywhere from 2 ft (61 cm) to 3 ft (91.7 cm) or taller when flowering.

The shape and length of the leaves may vary as the plant

grows to maturity. The bases of the leaves on the individual cultivars can be heart-shaped, tapering or somewhere in between. Leaf margins may be smooth (entire), wavy (sinuate) or lobed, while the leaf surface can have a rugose, or crinkled, appearance.

In late spring to early summer the white flowers appear in terminate racemes. They have four petals, a characteristic which

is shared by other members of the Brassicaceae family. The fruits are spherical-shaped compartments that hold four to six seeds apiece (17). The main taproot, which has branching side shoots, has a skin color that ranges from off-white to light tan. The inside of the taproot also ranges from white to light tan. The main roots can reach lengths of more than a foot. The entire root system is capable of extending several feet into the ground depending upon the age of the plant.





ETYMOLOGY

The common name horseradish may be a derivation of the German term *meerrettich*, which means “more radish” or “stronger radish.” The English may have confused the term *meer* with that of *mare* or *mähre*, thinking that the name referred to a horse. In southern Germany and Austria the regional term *kren* refers to horseradish.

TAXONOMY

The currently accepted taxonomic name for horseradish is *Armoracia rusticana* P.G.

Gaertn., B. Mey. & Scherb..

Horseradish is a member of the Brassicaceae (Cruciferae) family with other crucifers such as the cabbage (*Brassica oleracea*) and the radish (*Raphanus sativus*). The Brassicaceae family is a large one, containing approximately 3,700 species and 330 genera. A number of plants in this family are characterized by a pungent odor which is attributed to a set of [glucosinolate](#) compounds, or “mustard oils.” Scientists hypothesize that *A. rusticana* may be an [interspecific hybrid](#) of the only other two species in the genus, *A. lacustris* (A. Gray) Al-Shehbaz & V.M. Bates and *A. sisymbroides* D.C. Cajander (17).

A quest to pinpoint the exact historical origin and meaning of the genus name *Armoracia* can also be frustrating. One theory is that the term came from *Armorica*, which is an ancient name for a peninsula in Brittany, France, where horseradish has been known to grow wild (15). *Aremoricus*, which means “maritime” or “near the sea” may have also been a contributing factor to the botanical name, because horseradish was often found growing near the seashore. The generally accepted meaning for *Armoracia* and the one that most closely fits horseradish is “wild radish.” *Rusticana* means “of the country,” “rustic” or “rural.”(17)

CULTIVATION

Horseradish is easy to cultivate; even when neglected it will often continue to thrive. The disadvantage is that these same characteristics make it nearly impossible to eliminate. Careful consideration should be given to placement in the garden.

SOIL: A well drained, loose, garden loam or sandy, alluvial soils allow for the healthy development of horseradish roots. Prior to planting horseradish be sure to work the soil deeply for the best results; a depth of ten to twelve inches or deeper is recommended. Heavy soils filled with clay and rocks or a thin layer of soil can restrict root development and result in a poor harvest. Art Tucker, co-author of *The Encyclopedia of Herbs*, recommends that the soil have a pH of 6.0 to 6.5 (17). An application of manure preliminary to planting can enhance soil fertility.

CLIMATE: Horseradish is a hardy to Zone 5, and it grows well in cooler temperatures. It also grows well in hotter climates such as Zones 8 and 9, but it may require afternoon shade.

PROPAGATION: The following technique for taking root cuttings works well for the gardener who is only concerned with propagating one or two plants.

Begin by finding a 6-10" long section of root that includes at least one bud and has a circumference of 1/4" to 1." It is important to plant the root in the same way it came out of the ground, so be sure to mark the top with a straight cut and the bottom with an angle cut. Next, remove any branching roots that may exist.

Established plants can also be propagated by crown division. Lift a clump of horseradish from the ground and shake gently to remove excess dirt. Cut the crown into sections that include the upper leaves of the plant and at least one crown bud. Replant the sections in the desired location. Seeds can be planted, but they are not always reliable.

PLANTING: Choose a sunny location and prepare for planting by turning compost or manure into a loose, friable soil. Allow the freshly turned soil to sit for a day or two before placing the roots in the ground.

Planting Horseradish in Containers

“At the grocery store, I chose a firm horseradish root. I cut it into 2” pieces. When cutting, I cut the bottom of the root at a 45-degree angle and cut straight across on the top of the root so that I wouldn’t mix up which end went up. I placed these pieces vertically in the pot, angled part down, about three inches apart, in a pot filled with commercial potting soil. I then covered the entire surface with 1” of commercial potting soil and 1” of mulch.

I placed the pot in a semi-shady (morning sun and afternoon shade) location and watered the pot with root stimulator. I kept the potting medium moist but not wet.”

~Beth DiGioia, Unit Chair, North Texas Unit

“I experimented with horseradish this summer in hot Dallas, TX. On a whim I planted it in a pot in the heat of the summer. I chose an eastern exposure since the Texas sun can be brutal. I used a good potting soil and basically stuck the root vertically in the middle of the pot. Two times I dug down to check to see if anything was happening. The second time I discovered the root had swelled to 3 times its original size, now had a yellowish cast on the cut end and was loving the sun, good soil and water that I was giving it. At this point our temperatures rose to more than 100 degrees for 18 days. I watered the root almost daily and very quickly had sprouts. I began to water with ice cubes to cool the root and give slow melting water as the humidity and temperatures were not letting up. Horseradish is a perennial in our Zone 7. When my plant leafed out, cabbageworms found it and had a good snack, Interestingly enough, because horseradish was chosen as Herb of the Year I have been introduced to growing it...Hands on experience is the only way a gardener can learn and teach....that’s what it’s all about, for use and delight! I have truly been delighted by my little root!”

~ Mary Nell Jackson, North Texas Unit

Growing Horseradish in Warm Climates

“Horseradish grows beautifully here in Arizona as long as the soil is well amended with compost to a good depth and it is given frequent watering through the summer, also with a little shade from mid-day through the afternoon. Without sufficient water or with too much direct sun in the afternoon, the leaves will turn crispy, but it will develop new foliage and continue to grow if water and/or shade are provided in quick response. All conditions adequately met, it is probably wise to control its spread as in other areas!”

~ Kirti Mathura, Member at Large

Planting holes should be eight to ten inches and the roots should be placed in them at a slight angle. The top (straight cut) of the root should be even with the rim of the hole and pointing upwards. Fill the hole and mound three to five inches of soil over the root. Leave adequate space between the planting holes to allow the plant to grow to maturity.

Containers can be used for horseradish if they are large enough for good root development and have adequate drainage. Use a potting mix that has been supplemented with compost. Pay close attention to watering since containers can dry out quickly.

WATER: Once established, horseradish grows well in a soil that is kept slightly moist. During, the hot, dry months

“To a worm in a horseradish; the whole



of summer it may require supplemental watering as drought can result in roots that taste sour or bitter. Soil type also plays a role in the frequency of watering. Avoid locations where the soil is constantly wet or soggy.

LIGHT: Full sun helps this plant to thrive but it will also do well with a slight amount of shade. In hot climates afternoon shade is advisable.

REMOVAL: Try to get the entire root when removing horseradish from an area because root sections sprout easily. Avoid rototilling areas where horseradish has been planted.

HARVESTING & STORAGE

Harvesting should occur once cooler temperatures have hit an area, preferably after the first hard frost has killed off most of the top growth. If the roots

cannot be taken before the ground freezes, they can be left to overwinter and then dig up in the spring before the plant is actively growing. To prepare for harvesting, loosen the soil around the roots to minimize breakage of the side shoots. Use a shovel to deeply undercut the root system and lift the plant out of the ground, taking care to not leave any remnants of the root behind lest volunteer plants rear their ugly heads the next season. Once the main root is removed from the ground, take off the side shoots. Small, thin roots can be saved for planting the next year. If the plant is being grown as a perennial, return it to the ground immediately after root collection; divide the plant every two to three years to keep it actively growing. The addition of compost is also helpful when overwintering the plants (3).

Store the roots in a cool, dark location to avoid spoilage and

world is a horseradish.” ~Yiddish proverb



discoloration. They can be buried in a layer of moist sand (17) or placed in ventilated plastic bags in the refrigerator. Whole roots can be stored for up to three months using these methods. Outdoor trenches, pits and root cellars can also be used for storage.

PLANTING & HARVESTING COMMERCIALY

Manual labor is still used to plant and harvest a large amount of the horseradish used today. Larger farms sometimes use converted transplanters or other equipment. Since horseradish roots have polarity, care is taken to place the roots in the right direction at 30-degree angles in shallow furrows about 18 to 24 inches apart (17). They are then covered with soil.

As the season progresses the practice of “lifting” or “suckering” is used by some growers to turn out quality roots for marketing. Lifting is the process of raising the crown of the plant one to two inches. This is accomplished by gently grasping the base of the crown and giving it a short jerk or

using a U-shaped hook to lift the crown from underneath the soil (18). Lifting encourages growth at the distal end of the root or the section that is the furthest away from the crown. This method produces well-formed roots but it lowers the yield for harvesting (17). Suckering is the process where the shoots of the crown are thinned out to improve its appearance.

Once the crown freezes, the roots are ready for harvesting, usually in late October or November. Generally, large farming operations mow down the tops and then use converted potato diggers or other equipment to undercut the roots and remove the plant from the soil. Smaller operations harvest the plants by hand. Soil and debris are removed from the newly harvested roots and they are sorted into different grades depending on length, diameter and overall root quality.

Roots that go to market must be free of blemishes or spots, retain a good white color and be as long and straight as possible—preferably at least 6-10 inches with a minimum diameter of .75 inches (3). They should be

free of side shoots. The roots are then cleaned and packaged in ventilated plastic bags for transport to grocery stores or they might be sent on to a processing facility. For export, horseradish roots are often dehydrated (17).

COMMON CULTIVARS

Several named and unnamed horseradish cultivars are available for use in the home garden and for commercial production. Each one varies in its resistance to disease and harvesting yields. Leaf textures range from smooth to crinkled. Many of the common cultivars can be classified into three types according to the shape of the leaves where they attach to the petiole. Some of the common cultivars and their classifications are listed below.

Type I: (heart-shaped base)

Armoracia rusticana ‘Big Top

Western’ –smooth leaves

A. rusticana ‘Bohemian’ –smooth leaves

A. rusticana ‘Sass’ –smooth leaves

Type II: (intermediate)

A. rusticana ‘Swiss’ –smooth leaves

Type III: (tapered base)

A. rusticana ‘Maliner Kren’

Sometimes referred to as “common,” crinkled leaves

Other varieties

A. rusticana ‘Variegata’

Green leaves splashed with white, ornamental

A. rusticana ‘Wildroot’

‘Wildroot’ has a strong, hot, spicy flavor.

A. rusticana ‘Czechoslovakian’

Newer commercial variety with a milder taste than other cultivars.



PESTS & DISEASES

Horseradish can tolerate some pest damage to its leaves without affecting yield and root quality.

Flea beetles, caterpillars, false cinch bugs and diamondback larvae have all been known to defoliate horseradish. Growers are often more concerned with insects that cause root damage.

One of these pests is the imported crucifer weevil (*Baris lepidii*).

Adult weevils lay eggs that overwinter in horseradish fields and result in larvae that bore into the roots.

Crop rotation, control of wild horseradish, and the use of clean root sets can help to control this pest.

The beet leafhopper (*Circulifer tenellus*), indirectly causes harm because it is the vector for the brittle root virus, a pathogen called *Spiroplasma citri*. Curled yellow leaves, sometimes known as curly top, show up within weeks after the plant is infected and daytime wilting can occur

(8). As the disease progresses it moves underground, resulting in brittle, discolored roots that produce lower yields. One control method for this disease is to avoid using infected root stock.

Armoracia rusticana is susceptible to many pathogens, some more harmful than others. The turnip mosaic virus (TuMV) is transported by aphids and infected root stock.

Characteristics of this virus are mottled, streaked, or spotted leaves. The fungus *Albugo candida* also causes discoloration of the leaves as well as streaking on the leaf stalks (8). The root may suffer damage directly or indirectly as a result of damage to the top growth. Using clean root stock and crop rotation are key methods of control for *Albugo candida*.

Root discoloration can be caused by the fungus *Verticillium dahliae*. This pathogen is difficult to eradicate because microsclerotia, tiny dark masses



of cells in which the fungus overwinters, can be harbored in the soil for several years (8). Horseradish is also susceptible to other foliar diseases such as bacterial leaf spot and *Cercospora*.

NUTRITION

The U.S. Food and Drug administration granted GRAS (Generally Recognized As Safe) status to horseradish for use as a condiment, seasoning and spice. Minerals such as phosphorous, calcium, magnesium and potassium are found in this herb. Freshly grated roots are fat-free and low in calories as well as being rich in Vitamins C and A. Author Carol Ann Rinzler, in the book *The New Complete Book of Herbs, Spices and Condiments*, states, “One ounce of horseradish provides 38% of all the Vitamin C that a healthy adult needs for the day.”(12) Cooking horseradish strips it of its nutritional value so it is best used fresh. The National Heart, Lung and Blood Institute advocates using horseradish as part of a healthy, balanced diet (7).

CHEMICAL CONTENTS

As a rule, mustard oils are usually bound in the **vacuoles** of the plant cells with sugars as either **sinigrin (allyl glucosinolate)** or **gluconasturtin (beta-phenylethyl glucosinolate)**; they are separated from a membrane-bound enzyme called the **myrosinase** (17). The barrier that separates the plant vacuoles from the myrosinase is broken down when the skin of the horseradish root is ruptured, making way for **hydrolysis** of the sugar bonds by the **myrosinase**, which frees the **isothiocyanates**, or mustard oils (17). This chemical reaction is responsible for the eye-watering, heat-producing properties of *A. rusticana*. The reaction only occurs if the skin is ruptured, and its effects are short-lived. An ether extract of a ground root yields 76 to 80 percent **allyl isothiocyanate** and 16 to 18 percent **beta-phenylethyl isothiocyanate**. The essential oil of horseradish is toxic and should be treated with extreme caution (20).

Growing Horseradish in the Ozarks

Jim Long

When I moved to the Ozarks 30 years ago, horseradish was one of the first 20 herbs I planted in a raised bed at the edge of my garden. During the third winter of the plants' growth, I decided to dig and process some roots.

My grandmother had always told me the job she hated most as a little girl was when her mother ground horseradish in the fall of the year. She said they always had to do the job outdoors because of the fumes and her eyes and nose would burn for hours, so I was curious about the process.

I dug into my big clump of horseradish with my potato fork and out came some several foot-long, contorted, wrist-diameter roots. I was surprised at how gnarled and twisted they were. My grandmother had told me all I needed to do was scrub the roots free of soil, peel, cut up and grind them. But my horseradish had grown around the rocks in my soil, so the process wasn't going to be so easy.

My garden soil, before I began amending it, was just red clay with lots of rocks—rocks from the size of grapes to grapefruits. The horseradish had simply grown around several of the smaller rocks, so I had to first scrub, then peel, then cut the roots into pieces to extract the stones.

Grandma had used a hand-cranked meat grinder, but I chose a food processor. I simply added a bit of vinegar to a handful of cut up roots and within seconds, I had ground horseradish. Doing it so quickly, and covered in a food processor, the fumes weren't a problem and I soon had several pint jars for the freezer. (Leave out the vinegar if you want a stronger, hotter horseradish.)

Growing Horseradish in the Ozarks, cont.

Over the years I've made a better soil bed for my horseradish, with richer soil and free of most rocks. I add some compost every year along with a hearty application of bone meal, then divide the roots about every second year, replanting some and harvesting the rest.

I occasionally gather a few larger leaves in summer and wrap one or two around pork steak with some mustard, salt and pepper and bake it. I read a few years ago that there were cautions in using horseradish leaves, but in looking on the Web, I find no cautions listed. I've enjoyed the mild horseradish flavor in the baked pork.

Harlequin beetles are the only pest I have on my horseradish and those can usually be picked off by hand. If not a mixture of water, cooking oil and baking soda, added to a sprayer with more water, will usually get them.

I like the more pungent flavor of my own ground horseradish and take out a small jar from the freezer whenever I need a new supply.

Jim Long writes for *The Herb Companion* and *Heirloom Gardening* magazines. He is a business member of The Herb Society of America. His garden blog chronicles his weekly garden adventures: jimlongsgarden.blogspot.com and his herb books can be seen on his Web site: www.LongCreekHerbs.com.



Use

MEDICINAL USE

Long before horseradish gained popularity as a culinary herb, it was being used medicinally.

Early physicians and healers would recommend horseradish for everything from a sore throat to digestive upset. During the Middle Ages the leaves and roots were used for treating asthma, arthritis, cancer and toothaches (15). **Rubifacient** and **diuretic** properties were ascribed to horseradish.

When the ground root was made into a **poultice** and applied to the skin it would cause heat and irritation, which lends credence to the idea that it could stimulate the circulatory system. The leaves were also made into poultices and applied to the chest to help with colds and congestion. **Tonics** were used as an **expectorant** for coughs, sore throats and hoarseness. Once the plant became established in North America, Native Americans utilized it for toothaches and menstrual

cramps.

Horseradish still plays a role in the medical field today.

The enzyme horseradish **peroxidase** (HRP) is a useful tool for detecting **antibodies** in the molecular biology field.

Research is being conducted on the herb to explore the possibility that the compounds it holds may help prevent cancer. Large doses of horseradish may irritate the stomach lining and induce vomiting.



Medical Disclaimer

It is the policy of The Herb Society of America not to advise or recommend herbs for medicinal or health use. This information is intended for educational purposes only and should not be considered as a recommendation or an endorsement of any particular medical or health treatment.

CULINARY USE

Preparing fresh horseradish for culinary use is a simple process, and the resulting product is well worth the effort. Rupturing the skin of the root can irritate the nose and eyes and cause difficulty with breathing; consequently, prepare the roots in a well ventilated room or outdoors.

When using a food processor to grind the roots, stand back from the unit before opening the lid.

To process horseradish roots, start by thoroughly washing them to remove dirt and debris and then dry them afterwards. Using a small knife, remove any soft spots or problem areas then peel the skin off of the root.

Next, grate or chop the roots by hand or with the aid of a

food processor. Once grated, horseradish loses its palatability and color over time, so avoid waste by grating only as much of the root as is needed for a meal. The extra can be stored in the refrigerator for use at a later time. Wrap it loosely in a plastic bag with slits cut in it for ventilation. Vinegar and salt can be mixed with the grated roots to help preserve their flavor and color or longer periods of time; combine $\frac{1}{8}$ to $\frac{1}{2}$ cup of white, wine, rice or cider vinegar for every 1 cup of fresh horseradish (2). The USDA recommends storing horseradish in the refrigerator or freezer to avoid food poisoning. The root is not the only edible part of *A. rusticana*; small leaves that are less than two inches long can be added to soups and salads.

Horseradish loses its punch when it is exposed to the heat of cooking; in most cases it is best used fresh or added to a warm dish prior to serving. Fresh is preferable, but using commercially processed products is also acceptable for many recipes— use four teaspoons or prepared horseradish for every tablespoon of freshly grated horseradish (2). Recipes that call for vinegar or lemon juice may need adjustment.

Horseradish can be paired with other items to make simple sauces or spice blends. Combine it with cream or mayonnaise for a delectable salad dressing, or add in some vinegar and salt for use on roast beef or prime rib. A cocktail sauce for seafood can be made from a blend of horseradish, ketchup, tomatoes and lemon juice. Horseradish mixed with whipped cream produces a wonderful sauce to be used with ham and beef dishes (15).

Try this herb with cheese, mustard, relish, eggs, beef, chicken, fish, shellfish, broccoli, tomatoes, beets, potatoes, squash and apples. A few herbs that pair nicely with horseradish are bay, mint, chives and garlic. Finally, it has been suggested by E. Schreiber in *Uncommon Fruits and Vegetables: a Common Sense Guide* to “throw out the rules and add a little bit of horseradish to everything!”

Growing Horseradish at Festival Hill

I haven't had great success here with horseradish. It seems to grow for a while and then fizzles out. I experimented this spring with growing it in various areas and under varying conditions. Only one of six plants that I planted has survived and thrived. It is planted in an area that I thought would be the least successful - full sun.

All the others were planted where they would receive some shade during the day and they were in the ground. The successful one is in our pharmacy garden where there is no shade and all the beds are raised and on drip irrigation - suffice it to say that we don't work there in the summer except first thing in the morning. I think that in order to have good success here one needs to plant in full sun, a rich, well-drained, loose soil, and provide adequate, routine watering.

Raised beds and containers may give success if it isn't achieved in planting in the ground. I would doubt that horseradish would become invasive here and have never heard of it happening.

~ Henry Flowers, Pioneer Unit



RECIPES

Dressings and Sauces

Horseradish Dill Cream

Used with permission from EatingWell.com

Yield: 1 cup

Preparation: 10 minutes

Total Time: 10 minutes

Ingredients

1/2 cup reduced-fat sour cream

1/2 cup low-fat plain yogurt

1 tablespoon chopped fresh dill

1 tablespoon prepared horseradish

1/4 teaspoon salt

Preparation

Combine sour cream, yogurt, dill, horseradish and salt in a small bowl.

Herb and Horseradish Dressing

Used with permission from EatingWell.com

Yield: 1/2 cup

Preparation: 10 minutes

Total Time: 10 minutes

Ingredients

1/2 cup crème fraîche®, or reduced-fat sour cream (see ingredient note below)

1/3 cup finely chopped mixed fresh herbs, including chives, dill and flat-leaf parsley

2 tablespoons prepared horseradish

1/8 teaspoon salt

Freshly ground pepper, to taste

Preparation

1. Whisk crème fraîche® (or sour cream), herbs, horseradish, salt and pepper in a small bowl until combined.

Make-Ahead Tip: Cover and refrigerate for up to 1 week.

Ingredient note: Crème fraîche® is a tangy, thick, rich, cultured cream commonly used in French cooking. Find it in the dairy section of large supermarkets, usually near specialty cheeses. Sour cream can be used as a substitute, or you can make your own lower-fat version by combining equal portions of reduced-fat sour cream and nonfat plain yogurt.





Classic Cocktail Sauce

Used with permission from horseradish.org

- 1 jar (10 ounces) chili sauce
- 2-3 teaspoons prepared horseradish, to taste
- Juice of ½ lemon
- 1 teaspoon Worcestershire sauce

Preparation:

Combine all ingredients and refrigerate until ready to use. Serve with chilled, cooked shrimp.

Mix-ins – Add to the above recipe for a fresh, new taste.

Southwest Cocktail Sauce

- Add – 1 teaspoon cumin
- Juice of ½ lime (omit lemon juice)
- 1 teaspoon chopped, fresh cilantro

Asian Cocktail Sauce

- Add – 1 teaspoon soy sauce
- ½ teaspoon sesame seeds
- 1 teaspoon grated fresh ginger root

Buffalo Cocktail Sauce

- Add – ½ teaspoon hot sauce
- 1/3 cup crumbled blue cheese
- Freshly ground black pepper

Main dishes

Horseradish-Crusted Beef Tenderloin

Used with permission from EatingWell.com

Yield: 8 servings

Preparation: 15 minutes

Total time: 1 hour and 10 minutes

Ingredients

2 tablespoons prepared horseradish

1 tablespoon extra-virgin olive oil

1 teaspoon Dijon mustard

2 pounds trimmed beef tenderloin, preferably center-cut (see note)

1 teaspoon kosher salt

2 teaspoons freshly ground pepper

Creamy horseradish sauce (recipe follows)

Preparation

1. Preheat oven to 400°F.

2. Combine horseradish, oil and mustard in a small bowl. Rub tenderloin with salt and pepper; coat with the horseradish mixture. Tie with kitchen string in 3 places. Transfer to a small roasting pan.

3. Roast until a thermometer inserted into the thickest part of the tenderloin registers 140°F for medium-rare, (about 35 to 45 minutes). Transfer to a cutting board and let rest for 5 minutes. Remove the string. Slice and serve with Creamy Horseradish Sauce.

Equipment: Kitchen string

EatingWell

Note: You'll need 2 pounds of trimmed tenderloin for this recipe. Ask your butcher to remove the extra fat, silver skin and the chain (a lumpy, fat-covered piece of meat that runs along the tenderloin). If you buy untrimmed tenderloin, start with about 2 1/2 pounds, then use a sharp knife to trim the silver skin, fat and chain.

Cont. from Horseradish Crusted Beef Tenderloin

Creamy Horseradish Sauce

Yield: 1 1/2 cups

Preparation: 5 minutes

Total Time: 5 minutes

Ingredients

1 1/4 cups reduced-fat sour cream

1/3 cup prepared horseradish

1 teaspoon kosher salt

1 teaspoon freshly ground pepper

Preparation

1. Combine sour cream, horseradish, salt and pepper in a medium bowl. Chill until ready to serve.

Potato-Horseradish-Crusted MahiMahi

Used with permission from Eating Well.com

Yield: 4 servings

Preparation: 25 minutes

Total Time: 25 minutes

Ingredients

1 cup precooked shredded
potatoes, (see note)

1 shallot, finely
chopped



- 1 tablespoon prepared horseradish
- 1 teaspoon Dijon mustard
- ½ teaspoon garlic salt
- ¼ teaspoon freshly ground pepper
- 1 ¼ pounds mahi-mahi, skin removed, cut into 4 portions
- 4 teaspoons reduced-fat mayonnaise
- 1 tablespoon canola oil
- 1 lemon, quartered

Preparation

1. Combine potatoes, shallot, horseradish, mustard, garlic salt and pepper in a medium bowl. Spread each portion of fish with one teaspoon mayonnaise, then top with one-fourth of the potato mixture, pressing the mixture onto the fish.

2. Heat oil in a large nonstick skillet over medium-high heat. Carefully place the fish in the pan potato-side down and cook until crispy and browned, 4 to 5 minutes. Gently turn the fish over, reduce the heat to medium and continue cooking until the fish flakes easily with a fork, 4 to 5 minutes more. Serve with lemon wedges.

Note: Look for pre-cooked shredded potatoes in the refrigerated section of the produce department—near other fresh prepared vegetables.

Side Dishes

Harvest Mashed Potatoes

Barbara Brouse, Colonial Triangle of Virginia Unit

Ingredients:

- 4 large red potatoes (about 2 pounds)
 - 2 medium sweet potatoes (about 1 ½ pounds)
 - ¼ cup butter
 - ½ cup milk
 - ¼ cup sour cream
 - ¼ cup grated Parmesan cheese
- Harvest Mashed Potatoes (continued from previous page)*

1 tablespoon horseradish

¼ teaspoon salt

¼ teaspoon pepper

¼ teaspoon cinnamon

1/8 teaspoon freshly grated nutmeg

Peel potatoes and cut into 1-inch pieces. Cook until tender (about 15 minutes) in a large pan of boiling salted water. Drain and place in a large bowl.

Preparation:

Add all remaining ingredients. Mash with potato masher until smooth. These are not whipped potatoes—they will have a texture (lumpy) to them. If you prefer them whipped, add a little more milk and butter and whip with electric mixer. If you prefer a smoother texture, add a little more milk. Top with additional butter if desired.

Reprinted from *The Herb Society of America's Essential Guide to Cooking with Herbs*.

Potato Salad with Horseradish

Lorraine Kiefer, South Jersey Unit

Ingredients:

5 pounds red potatoes

2 cups mayonnaise

2 cups sour cream

¼ cup white wine vinegar

¼ cup sugar

¼ cup freshly grated horseradish

3 tablespoon chopped fresh parsley

2 tablespoon fresh dill

Preparation: Scrub potatoes and cut into bite-sized pieces. Boil in salted water until tender. Drain and toss with remaining ingredients while still warm, but not hot.

Black Olive Black Beans and Rice

Used with permission from horseradish.org

Yield: 4 Servings

Ingredients:

1 onion, chopped
2 tablespoon olive oil
1 cup black olives
2 tablespoon horseradish
1 teaspoon black pepper
1 teaspoon oregano
1 can black beans
3 cups cooked rice

Preparation:

Heat olive oil in a nonstick wok until it bubbles around a wooden spoon. Add onions. Stir until brown. Add black olives and horseradish. Heat. Add black beans and remaining seasonings. Heat. Stir in rice. Serve as a main entrée with oranges and with a salad or as a side dish.

Apple-Cabbage Horsey Slaw

Used with permission from horseradish.org

Yield: 8 Servings

Ingredients:

3 cups unpared red or green apples, cored and coarsely chopped
4 ½ cups shredded green cabbage
1 cup sour cream
2 tablespoon lemon juice
2 tablespoon horseradish
1 tablespoon sugar
Salt and pepper to taste

Apple-Cabbage Horsey Slaw (continued from previous page)

Preparations:

In large bowl, lightly toss all ingredients until well blended. Refrigerate at least one hour before serving.

Appetizer

Juliet's Cheese Log

Joyce Brobst, Pennsylvania Heartland Unit

Ingredients:

8 oz. cream cheese

¼ cup grated parmesan cheese

1 tablespoon prepared horseradish

1/3 cup chopped Spanish olives

4-5 dried beef slices

Preparation:

In a medium bowl, thoroughly blend cream cheese, Parmesan cheese and horseradish. Gently stir in the chopped olives. Shape the mixture into a log. Roll the cheese log in the dried beef slices until the outside is covered. Wrap in waxed paper and aluminum foil and chill.

Serve thinly sliced on assorted crackers. Also makes a good filling for cream cheese sandwiches.

Reprinted from *The Herb Society of America's Essential Guide to Cooking With Herbs*.



Kid-friendly Fare

The “Ultimate” Grilled Ham & Cheese

Used with permission from horseradish.org

Yield: 2 servings

Ingredients

4 slices specialty bread - such as sourdough, cracked wheat, seven-grain, rye, etc.

1-3 tablespoon butter

4 slices of ham

2 thin slices of cheese

2 teaspoon horseradish
mustard

Preparation:

Melt 1 tablespoon butter in a skillet on medium heat. When butter starts sizzling a little, place 2 slices of bread in skillet. Layer on each slice of bread in this order: 1 slice ham, 1 slice cheese, 1 teaspoon horseradish, mustard, another slice of ham, slice of bread. Turn heat down and grill until bread is crunchy and golden brown. Divide the remaining tbsp. butter on top of sandwiches, flip over and continue grilling until cheese is melted and ham is heated thru.

Secret Ingredient Jell-O Salad

Used with permission from horseradish.org

Yield: 8-12 servings

Ingredients:

2 8-ounce packages raspberry-flavored Jell-O

1 bag frozen raspberries or 1 pound fresh raspberries

Secret Ingredient Jello Salad (continued from previous page)

- 1 8-ounce container cream cheese
- 1 tablespoon horseradish (more or less to suit your taste)
- 1/3 cup mayonnaise or salad dressing

Instructions:

Prepare 1 package raspberry Jell-O per package directions. Pour into 9 x 13" Pyrex® dish. Add raspberries. Refrigerate until set up. Bring cream cheese to room temperature. Mix in horseradish and mayonnaise or salad dressing until smooth. Spread evenly over chilled Jell-O. Refrigerate again to let filling set up. Prepare second box of Jell-O per package directions. Pour carefully over filling layer (hold a soup spoon turned over and let the liquid Jell-O pour gently over the back of the spoon onto the set-up filling. It doesn't disturb the texture that way.) Refrigerate until set. Cut into squares and serve.

"We haven't grown a lot of horseradish in the NHG to date. We had a variegated cultivar earlier, but over time, it lost its variegation, and then petered out. I know that horseradish can get rampant in the garden, but we have not had that experience. The clump we had in the entrance garden never got bigger than the original planting. The plants got bigger themselves, but they never spread. This was not a particularly wet or dry spot, so I'm not sure what conditions are needed "exactly" for it to go buck-wild in the garden. We also recently planted it in the Culinary Garden, but in a rather dry spot, so again, it never got rampant. In fact, it didn't do very well (never grew much). So, I think there is definitely some wiggle room in growing it....When we had a healthy clump, it got attacked (to the point of being unsightly) by harlequin bugs every year during the summer. It was a harlequin magnet. The upside is that horseradish is generally used for its root and not its leaves; the downside is that, if you don't want to spray/treat for the bugs, you're left with a pretty ugly looking specimen."

~Christine Moore, National Herb Garden

“Several years ago I planted horseradish in my herb garden in Baton Rouge. The plant leaves were huge and robust. It was soon apparent that horseradish, if in a happy spot, could be a bully in the garden. Still, the texture was coarse and I found it an interesting addition to the garden. I used some of the big leaves in flower arrangements. I wondered about the quality of the root. I knew that in the warm Gulf South climate the quality might be poor. Sure enough, when I harvested it the root smelled of horseradish but was so gnarled and tough it could hardly be cut. The tissue was stringy. Not a texture you wished for in your mouth. The next year, there were multiple horseradish roots that appeared in my garden. It seemed that some of that tough root had been left behind after harvest and was multiplying. The AgCenter had warned about that, so I spent a fair bit of time eliminating the plants. It was difficult since the root seemed to curve and twist its way to China.

Another experience I had with horseradish was in the Horticulture Department at LSU. Dr. David Picha was the post harvest physiologist. He was working with the Illinois horseradish growers on ways to store their crop following harvest. In his lab, there were shelves that housed huge horseradish roots with different post-harvest treatments. I cannot remember all the treatments, but one group was shrink wrapped and another group had been dipped in paraffin, similar to what is done with rutabagas. I do not know the outcome of the work, but it seemed to me the roots dipped in paraffin were preserved the best. Those paraffin coated roots sat there for months and didn't change.”

~Gloria McClure, HSA Member at Large

POSSIBLE FUTURE USES

In 2008, researchers reported that they had developed a fire alarm for the deaf and hard of hearing by harnessing the strong smell of horseradish. Allyl isothiocyanate, the volatile oil which gives horseradish its strong smell, was extracted from the plant and used inside of the fire alarm. When the alarm was triggered, it sprayed the oil into the air instead of sounding an audible alarm. In case studies 13 out of 14 subjects woke up in less than two minutes, supporting the theory that the fire alarm would be effective (21). In 2010, the alarm was introduced to the commercial

market with a large price tag of \$540 (or £350). The product was received with mixed reviews (21).

Researchers from Pennsylvania State University announced in 1995 that according to their studies, using horseradish may help purify wastewater and tainted soils. Their method involved applying a mixture of finely chopped horseradish and hydrogen peroxide to contaminated areas. They were backed up in this claim by M.I.T. researchers who had conducted similar tests (7). In 2007, Penn State reported that research tests using horseradish components to eliminate odor caused by swine manure had been effectual (4).



Delight



FUN

The well-loved comic strip “Blondie” often depicted Dagwood Bumstead holding towering sandwiches full of bread, lunchmeats, cheese, vegetables and other unknown ingredients. Horseradish was also one of his favorite additions to his sandwiches. One of the strips shows Dagwood yelling to Blondie, “My kingdom for some horseradish!”

The old game show *Hollywood Squares* would bring on famous people to answer questions for the contestants. Comedian George Gobel brought some laughs to the show when he was asked, “Back in the old days, when Great Grandpa put horseradish on his head, what was he trying to do?” George responded “Get it in his mouth.” Al Weider earned a place in *The Guinness Book of World Records* when he tossed a horseradish root 80.5 feet (7).

MYTHS & FOLKLORE

The myths and folklore about horseradish contain a

grain of truth or they may be blatantly untrue. They are often linked with beliefs about the herb’s medicinal properties. For example, the notion that eating horseradish can cure the common cold has led to the unsubstantiated advice to use it as an expectorant for coughs. Likewise, the theory of spreading horseradish on the forehead to cure headaches has led to the myth that it can be used in the place of aspirin.

Medieval people believed that the plant was a cure-all for anything that ailed a person and that it had the added benefit of being an aphrodisiac. Greek mythology claims that the temple priestess known as the Delphic Oracle told Apollo that “horseradish was worth its weight in gold.”

Gardening myths have also been handed down through the years, some have grains of truth in them, such as the saying, “harvest horseradish in the months that have an “r” in their names.” Moon gardeners believe that the roots have a better flavor if they are dug when the moon is full.



Wasabi cultivated in a widened stream bed



Moringa leaves for sale at the market

HORSERADISH SUBSTITUTES

Wasabi (*Wasabi japonica* (Miq.) Matsum) and the horseradish tree (*Moringa oleifera* Lam.) are other plants with tastes similar to that of horseradish. Wasabi, sometimes called Japanese horseradish, can be found growing wild in Japan and Siberia (15). The plant is cultivated in springs or widened stream beds and it has leaves that resemble those of nasturtiums. Advocates of wasabi claim that it is superior to horseradish because of its pungent, hot flavor; others argue that horseradish has more heat.

Wasabi is often used as a substitute for horseradish, but strangely, horseradish is often dyed green and used as a cheaper imitation of wasabi. The roots of these herbs differ in that wasabi has green roots while horseradish has white roots.

The roots of *M. oleifera*, more commonly known as horseradish tree or oil of ben tree, can be ground up and substituted for horseradish, although their flavor is not quite as pungent. This plant is native to Arabia and India (15). It grows well in tropical and subtropical areas (Zones 9 and 10) and it can soar to heights of up to 30 feet (10m).

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GLOSSARY

allyl isothiocyanate-An organosulfur compound. Colorless oil responsible for the pungent taste of mustard, horseradish, and wasabi.

antibodies - A group of different proteins in a body which have an immune response that is triggered to neutralize antigens in the body.

beta-phenylethyl isothiocyanate-A promising cancer chemopreventive agent.

diuretic- A substance which increases the flow of urine.

expectorant- An agent or drug used to cause or induce the expulsion of phlegm from the lungs.

gluconasturtin (beta-phenylethyl glucosinolate)- A glucosinolate with the chemical name phenethylglucosinolate. It is one of the most widely distributed glucosinolates in the crucifers, mainly in the roots.

glucosinolate- A class of organic compounds that contain sulfur and nitrogen.

hydrolysis- A chemical reaction of a compound with water.

interspecific hybrid- Offspring of parents that differ in genetically determined traits. The parents may be of two different species, genera, or (rarely) families.

isothiocyanates- A family of compounds derived from horseradish, radishes, onions and mustards; source of the hotness of those plants and preparations.

Glossary continued on the next page

Glossary continued

myrosinase- Defense-related enzymes, in plants such as mustard, that hydrolyze glycosides thus releasing potentially toxic substances.

peroxidase- An antioxidant enzyme in the body.

poultice- A soft mass of a substance (eg: leaves, bark, etc) usually heated or boiled and applied topically.

rubifacient- An agent which reddens the skin, dilates the blood vessels and increases blood supply locally.

sinigrin (allyl glucosinolate)- Sinigrin is a glucosinolate that belongs to the family of glucosides found in some plants of the Brassicaceae (Cruciferae) family.

tonic- A medicine that strengthens and invigorates.

vacuole- A specialized part of a plant cell that contains water, waste materials and other substances.

WEBSITES

Eating Well

EatingWell Home Page <http://www.eatingwell.com/>

EatingWell Health, http://www.eatingwell.com/healthy_cooking

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The Herb Society of America



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The Herb Society of America is dedicated to promoting the knowledge use and delight of herbs through educational programs, research and sharing the knowledge of its members with the community.

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Promoting the use and delight of herbs.

Providing opportunities for education about herbs.

Providing opportunities for networking and the exchange of information and experiences.

Promoting a respect for our global environment and the preservation of herbs.

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