Production and Preparation of Horseradish
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Climatic Adaptation

Horseradish is adapted for growing in the north-temperate sections of the United States, but it is not suited for planting in the South, except possibly in the high altitudes. It can be grown on almost any good soil but does best on a deep rich, moist loam which is well supplied with organic matter. Horseradish is also being grown successfully on certain of the peat soils of the North. A shallow, poor soil with hard subsoil is not adapted for the growing of horseradish as this type of soil produces short, prongy roots which give a high percentage of waste during preparation for use.

The commercial production of horseradish is at present more or less confined to a few specific localities. The largest acreage is found around St. Louis, Mo., although considerable horseradish is grown in Michigan, Ohio, Pennsylvania, northern New Jersey, Connecticut, Massachusetts, and Washington. In the section around St. Louis, horseradish is grown on both river-bottom and hill land; certain of the clay soils of the St. Louis district are known for the quality and high pungency of horseradish they produce.

Fertilizers

Both stable manure and commercial fertilizers are used in the production of horseradish. Some growers plow under 12 to 20 tons of manure per acre in the fall, plowing the land deep, even to the extent of bringing up some of the subsoil. Other growers apply the manure with the crop grown the preceding season. Manure should not be applied in the spring of the year that the horseradish is planted, as this causes an excessive growth of tops and irregular branching roots. Horseradish roots tend to go deep; therefore, the manure and commercial fertilizer should both be worked into the soil to a depth of 10 inches or more. Commercial fertilizers recommended for horseradish, where manure has been used, contain 3 or 4 percent of nitrogen, 8 to 10 percent of phosphoric acid, and 8 to 10 percent of potash. The fertilizer should be applied at the rate of about 1 ton to the acre, and in New Jersey the best yields have been procured where the fertilizer is applied broadcast and plowed under rather than on the surface after plowing. Where no manure is available soil-improvement crops should be used in rotation with horseradish.

Varieties

There is very little choice in the matter of varieties of horseradish. However, care should be taken to obtain good, healthy planting stock of a strain that is giving good results in the territory.
where it is being grown. In 1899 the United States Department of Agriculture imported from Bohemia a very promising variety known as Maliner Kren. Considerable difficulty has been experienced in getting the cuttings of this variety from overseas in good condition, but a few seedsmen and nursery firms are now propagating this variety and offering planting stock for sale.

![Horseradish sets or root cuttings. Note the sloping cut at the lower end of each cutting.](image)

**Planting Stock**

Horseradish is grown from root crowns and root cuttings, as it does not form seed, at least not in this country. Most of the commercial acreage is planted from sets or root cuttings (fig. 1) rather than from the crowns. The usual custom is to save the planting sets during the fall and winter while preparing the crop for the market. In trimming the roots for the market all small or slender roots from the thickness of a lead pencil up to the thickness of a man's little finger that are 8 to 12 inches in length are saved. These are cut off square at the top and sloping at the bottom, in order
to leave no doubt in the minds of the planters as to which is the lower end of the cutting. The sets are then tied in small bundles and stored until spring either in outdoor pits or in barrels of slightly moistened sand in a cold cellar. Considerable difficulty is often experienced in keeping the sets over winter, and the utmost care must be taken to prevent their becoming heated or badly dried out; too much moisture, however, will cause the sets to decay.

Soil Preparation and Planting

The land for horseradish is plowed as deeply as possible and as early in the spring as it is in condition to work. The soil is harrowed until it is in good working condition and is then allowed to settle for several days before the sets are planted. The field is then marked into rows 30 inches apart and 3 to 5 inches deep. Before being planted the field is divided into sections with an equal number of rows in each section, and each of these sections is planted with the tops of the cutting pointing in the same direction. Later, during cultivation, the cultivators are run in the same direction that the cuttings are planted, in order to avoid tearing up the crowns with the cultivator teeth.

The planter usually takes an armful or a basketful of the sets, dropping them 2 feet apart in the rows and always with the crown or top of the sets all in one direction, the alternating section of land being planted with the crown in the opposite direction. As the sets are dropped, a little soil is drawn over the lower end of the set with the foot and tramped firmly. Following the planters a cultivator is used to cover the remainder of the set and level the soil. About 8,700 sets will be required for planting an acre with the above-mentioned spacing.

Cultivation

The cultivation of horseradish is similar to that of other truck crops and is done with weeders during the early stages of growth and later with ordinary one-row or two-row cultivators, but always in the direction in which the sets are planted. Late in the season the tops become so large as practically to close the spaces between the rows; cultivation is then discontinued.

Lifting and Stripping the Sets

In order to produce good horseradish for the market, it is necessary to remove all side roots, leaving only those at the bottom of the set. As a rule, the roots are "lifted" twice during the season, the first lifting being done when the largest leaves are about 8 to 10 inches in length. In lifting the roots the soil is first carefully removed, care being taken not to disturb the roots at the lower end of the set. The crown end of the set is then raised, and all but the best sprout or crown of leaves is removed. Any small roots that have started from the top or the sides of the set are rubbed off, leaving only those at the bottom. The set is then returned to its normal position and the soil replaced. About 6 weeks later the sets are again lifted, the side roots rubbed off, and the sets returned to their position.
By this method a root free from side roots and comparatively smooth is produced. Woolen gloves are often used to protect the hands in rubbing off the small roots.

**Diseases and Insects**

Horseradish is subject to attack by certain diseases and insects that are more or less serious where precautionary and control measures are not followed. The horseradish rots are the most serious diseases affecting the crop; one form attacks the root from the inside, leaving only the outside walls, and the other causes decay of the outer skin. Losses from disease occur mainly in storage pits but may also occur in the field. The source of the disease is often traceable to the storage pits where the seed roots were kept. One method of avoiding the transmission of the disease to the field is to make a clean cut with a sharp knife through the lower end of each cutting, discarding those that show discoloration. Dipping the cuttings before planting in a 1:1,000 solution of bichloride of mercury (corrosive sublimate) for a period of 15 minutes will also assist in eliminating disease. To make a solution of this strength, dissolve 1 ounce of bichloride of mercury, which is extremely poisonous, in 8 gallons of water, using a stoneware jar or wooden tub or barrel for the purpose.

In the Northwest, horseradish is sometimes severely affected by the curlytop disease, which is transmitted by leafhoppers.

The most common insect enemy of the crop is the horseradish flea beetle. This insect often appears just when the sprout is breaking through the ground and while it is still small, and it is extremely difficult to control. For information relative to the control of this and other insect pests of horseradish apply to your State agricultural experiment station or to the United States Department of Agriculture, Washington 25, D. C.

**Harvesting**

Horseradish makes its greatest growth during late summer and early fall, and for this reason harvesting is usually delayed until October or early November. Where beets, carrots, and similar root crops are grown, they are generally harvested and stored before the horseradish crop. Three or four days before the harvesting of horseradish roots is begun the tops are removed as near to the ground as convenient. A heavy two-horse plow that will turn a furrow about 15 inches in width is used for plowing out the roots. A furrow is run alongside the first row to be harvested, in the opposite direction from that of cultivation, or against the slope of the roots. The second furrow in the same direction will turn out the roots, and with 30-inch rows each alternate furrow will include a row of roots that are turned over with the furrow. The roots are separated from the soil, thrown in piles as each row is loosened, and then gathered in baskets or some other type of container and removed to storage or placed in pits.
Storage

Horseradish may be stored in cool cellars, in barns, or in outdoor pits, but cold storage is being used extensively. Roots that are to be kept for summer marketing are either placed immediately in cold...
storage or pitted during the winter and then placed in cold storage in the spring. The usual method is to store the roots in trenches or pits. A well-drained place is selected and the soil plowed out to a depth of 8 to 10 inches and not over 6 feet across. This trench is then lined with a layer of clean, dry straw. The roots are piled in the trench and covered with 6 inches of clean straw. As the weather becomes cold, about 6 inches of soil is thrown over the straw before the ground freezes. As the weather becomes colder, additional soil is put on, to protect the roots from freezing. Roots that are stored in barns must be protected by being covered with straw or some other material. Those stored in cellars, while not subject to freezing, must be kept well ventilated and as cool as possible. Horseradish roots should not be kept exposed to the light, as they will turn green.

Marketing

Cleaning the roots of soil and packing them for market may be done at any time during the winter when weather conditions permit. The roots are taken out of the pit or storage, brought into the packing shed, and first trimmed of all lateral roots. Any of the laterals that are reasonably straight, of sufficient size, and 8 to 12 inches in length are selected and tied in bundles and again stored for planting stock. The main roots (fig. 2), or “sticks”, as they are commonly called, are neatly trimmed around the crown and lower end, and all small rootlets or stubs are carefully removed. They are then washed and packed in barrels holding 100 pounds net each. Both burlap-covered and double-headed barrels are used for shipping the roots to the market. United States standards for horseradish have been issued and copies may be obtained by writing to the Production and Marketing Administration, United States Department of Agriculture, Washington 25, D. C.

Yields and Prices

Yields vary considerably, both with the season and with the locality, and growers report them as ranging from 3,000 to 6,000 pounds of marketable roots to the acre. Prices also vary considerably from year to year, sometimes going as low as $6 or as high as $15 a barrel, but No. 1 roots usually sell for about $10 or $11 a barrel.

Preparation for Use

Horseradish is prepared for table use by first peeling or scraping the roots and removing all defects, then grating the root directly into white-wine vinegar or distilled vinegar of 4½— to 5-percent strength. Cider vinegar should not be used, as it causes the grated horseradish to turn dark within a comparatively short time. The horseradish should be bottled as soon as possible after being grated and then tightly corked. It will keep for a few weeks but does not lend itself to storage for any length of time on the grocer’s shelf. Horseradish may also be dried, then ground to a powder and put up in bottles in dry form. By this method it will keep much longer, but it does not make as fine a product as when grated fresh and mixed with white-wine or distilled vinegar.