

EARLY AMERICAN "ROOT" CROPS

by

Charles Leach



THE NATIONAL COLONIAL FARM

RESEARCH REPORT NO. 9

The Accokeek Foundation, Inc.



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INTRODUCTION

Root crops have never played a major role in American agriculture. The varieties grown in the United States today are of largely European stock, and most seeds are also produced in Europe. Unlike many people in the European nations, for whom roots are important staples, Americans have traditionally excluded roots from their diets whenever possible. Roots have been used as vegetables in this Country only so long as no suitable substitute, more to the epicurean fancy, was available. Because more desirable vegetables were often not available to settlers, root crops were grown to some extent in Colonial America. One historian claims that the roots were the first vegetables to have major consequence in the colonial world.¹ For a brief period of American history, therefore, root crops could be considered as important to our agriculture.

This term, "root crops," refers to the fact that an edible, swollen segment of vegetable matter, is produced by these plants beneath the surface of the ground. While this part may, in fact, be a root, it may also be a stem or some other botanically distinct part of the plant growing below the ground. The swollen segments expand to store carbohydrates as food for future plant growth. Root crops come from diverse

families of plants. The group includes such mundane species as turnips and beets, as well as such exotic sounding ones as taro and manioc.

Because root crops come from such diverse plant groupings, they require varied growing conditions, and are used for sundry purposes. Discussing all of these plants in one brief report would not be logical. Therefore, the roots to be considered in this report are ones called root crops and raised as such by colonial Americans. They are embraced by eight genera, namely those which include the beet, carrot, Jerusalem artichoke, parsnip, white and sweet potato, radish, and turnip. People in Colonial America grew roots from seeds imported from Europe, especially Great Britain. These roots have their wild origin in Europe or Asia, except for the potatoes and the Jerusalem artichoke, and had been cultivated there for centuries. The potatoes, the so-called "Irish" and the sweet potato, were both originally from South America and were first imported to Europe and then transplanted to American soil. Neither is a true "root." Potatoes have underground stems, referred to as "tubers" which form the vegetable. Jerusalem artichokes, which are neither artichokes nor grown in Jerusalem, originated in North America.

Other vegetables which are roots, including those of the onion family and which have been important to American agriculture, will not be considered in this study. First, because they were not generally considered roots in the eighteenth and nineteenth century literature, and second, because of their unique use in flavoring foods. By the same reasoning, however, cabbages could be considered "roots" because they were allied to roots in literature as well as in common use and storage. They are closely related botanically to turnips, and were often fed to cattle together with root crops. But they will not be considered in this report because they are more akin to the leafy vegetables which grow their edible parts above ground.

Having briefly outlined the coverage of this report, the importance of root crops to colonial American agriculture again needs to be addressed. Roots were considered only as a substitute for more desirable vegetables, and when those latter species became available, root vegetables were shunned. One writer has suggested that root vegetables have been neglected here because of the emphasis in the west on grains, legumes, and animal products as the only real foods; thus, relegating root vegetables to a lowly status, fit only for the economically disadvantaged.² Whether or not this

philosophical argument is true (some authorities have noted that only the wealthy ate potatoes when they were first introduced to Europe), root vegetables have a high nutritional value which has been little exploited throughout American history.³ The period of American agriculture in which root crops were most important was from the eighteenth century when they were used in crop rotations, until the mid-nineteenth century when silage for cattle first appeared.

When the colonists first arrived on the shores of the American continent, they brought with them the agricultural traditions of Europe; one of which was the kitchen garden where the farm wife planted root crops for table use. One historian has noted that these first gardens contained nearly the same crops as those found in England, the Low Countries, France and Spain.⁴ Another scholar wrote that every house had its half acre kitchen garden, which was the first ground to receive attention in the spring with manuring and plowing.⁵ Ann Leighton suggested that root cellars, which many households did not have, held more importance to colonial families than ice houses and were given constant attention to be kept filled.⁶ Despite these protestations of historical value, root crops took a

back seat to leafy vegetables and the all-important herbs in these colonial kitchen gardens.

During the latter half of the seventeenth century, farmers in England began to take note of the turnip and to utilize it as an important component crop in field rotation systems. Previously, at least one year of rotational system on a European farm was devoted to fallow to permit the land a time to recoup. Turnips were introduced as an alternative to this practice of having the ground lie fallow. The invention of the seed drill by Jethro Tull promoted the utilization of turnips in a rotational scheme because it enabled the crop to be planted in rows. The reason turnips came to be favored was that the leaves of the plant would extend horizontally across the rows, preventing weeds from emerging. Fallow ground was expected to lie barren, free from weeds as well as crops, and turnips provided that weed-free environment.

The use of root crops in the rotational process was also considered to be more beneficial to the land than most other crops, leaving the soil better prepared for the next crop.⁷ This latter effect may be due in large measure to the great amount of manure used in planting root crops rather than to any special quality inherent in the turnip.

The "Norfolk System" of crop rotation, as the method became to be known, was preached by agriculturalists in the United States after 1750, but it failed to stir farmers to adapt the root crops into a field economy.⁸ Many farmers were afraid that the roots would consume too much labor. If that was not a potential problem, some farmers believed they did not have enough manure to grow the roots. Manuals recommended a mixture of 15 to 20 loads of well-rotted manure per acre.⁹ But, for example, most farmers in Southeastern Pennsylvania had so few cattle they could not have manured more than one acre.¹⁰

It was later discovered that turnips made good winter feed for stock, providing a fattening agent during a critical period.¹¹ Once this use for root crops came to the fore, stock owners made much greater efforts to raise these vegetables and to discern which, if any, of the several species made the best stock feed.

These newly found uses for root crops had only a very brief effect on American farmers. In fact, the history of root vegetables as an important farm product covered a period of less than a century's duration for the ordinary farm.

These vegetables were first brought and planted by the earliest European settlers to the New World.

Parsnips, carrots, and turnips were brought to Virginia in 1622 and were grown easily there.¹² After 1630, on orders from the Massachusetts Bay Company, that colony began growing cabbages, turnips,¹³ and radishes. The first agricultural report from the colony of Pennsylvania in 1685 noted that cabbages, turnips, carrots, and potatoes, among other crops were grown by early Pennsylvania colonists.¹⁴ These roots grew unexpectedly well, particularly in the New England colonies. By the middle of the eighteenth century, the garden cultures of many rural colonial households north of the Carolinas produced enough quantities that surpluses were brought to the bigger coastal cities for sale, or shipment to the south and abroad.¹⁵

Still, while root crops, as traditional garden plants became well established by 1750, The Pennsylvania Mercury in 1786 proclaimed that even though every family grew carrots for their own table use, few grew carrots in the field for stock. The reason for this reality, said the Mercury, was that it had been only a few years since such a practice was established in Europe.¹⁶ Other root crops were similarly ignored as field crops. After 1850, cultivation of root crops on any large scale was rejected everywhere except in New England. Corn and other grains proved to be more profitable elsewhere, and

many of the root crops did not fare well enough in the hot climate south of New York to be viable as commercial produce.¹⁷ The New England States, however, became large exporters of root crops, particularly potatoes. James Bonner reported that the principal winter vegetable stocked by merchants in Georgia up through 1840 was the Irish potato, which had been shipped in from New England.¹⁸

Potatoes were used for livestock feed in all parts of the eastern seaboard. Following a potato blight in 1840's which tended to substantially reduce the size of the crop and to raise the price, farmers began to look to other crops for winter feeding. In consonance with the advice given them in many of the farm journals, which followed the findings of the European growers as to the nutritional value of roots for cattle, these farmers began to turn in large numbers to the other root crops to accomplish the purpose of winter feed.¹⁹ The interest in root crops was short lived. The process of making winter livestock fodder in a silo was discovered by Manly Miles in 1875. The use of root crops for stock feeding after the adoption of the silo plummeted.²⁰ Corn silage is much cheaper to produce as well as being easier than the high degree of handwork involved in preparing roots for feed.

Since colonial times, American use of root crops (not counting potatoes) at the table has also fallen. Aside from potatoes, which have increased in popularity over the years, only carrots have retained some favor with Americans.²¹ To illustrate the change in attitude toward root crops for the table, in 1816, professional families spent only four percent of their food budget on all vegetables, including roots (but excluding potatoes). Roots absorbed about one percent of the total food bill. Carrots and turnips received interest at that period with beets running a close third. By 1926, a similar family would spend ten percent of its food budget on vegetables (again excluding potatoes), but only 0.8 percent on roots. Carrots were the clear favorite in this time, with turnips and beets both accounting for a scant 0.1 percent of the budget.²² Although vegetables in total have accounted for an increasing share of the average American's table fare, the ability to store green vegetables over the winter lessened the American's dependence, which was never great, on root vegetables.

ORIGIN AND BOTANICAL RELATIONSHIPS

Roots and tubers were gathered by pre-agricultural people in western Asia. Roots were domesticated by the earliest of farmers, who grew them interspersed with grain. The root vegetables probably appeared in grain fields first as weeds. Although first seen as useful adjuncts to other crops, their use fell in importance until they were used merely as condiments and flavoring²³ once grain agriculture became well established.

The root vegetables described in this report belong to six different families. Their origins are largely Mediterranean, Southern European, or Near Eastern, although both South America and North America as well as China have made significant contributions. The scientific names of these plants as well as their suspected origination and introduction to cultivation are described below:

Chenopodiaceae:

Beta vulgaris - Common Beet:

The common beet originated in Southern Europe. Beta vulgaris, var. maritima has been denoted as the earliest representation of this species. New varieties were developed in Germany. When first grown, only the

leaves were desired. Beta vulgaris, var. cicla, Swiss chard was the variety which developed. Beets were not important as roots until after 1675. . Two varieties developed in Germany. The one, known as Mangel-Warzel, sometimes called simply Mangels or Mangolds, means "root of scarcity" in translation, indicating that this root would grow even when other plants failed. This plant was commonly used as cattle feed.

The other beet of note was the sugar beet. The sweetness of the beet had been known since 1500. In 1747, a German chemist, Andrew Marggrof, demonstrated that the sucrose could be extracted from the root. He used both the "white mangold" and the "red mangold" in his experiments. Marggrof's student, Franz Kark Achard carried the work forward. Frederick William III, King of Prussia, provided funds for Achard, who erected the first sugar beet factory in Cunern, Silesia, and also developed the "White Silesian" beet, the ancestor of the all present day sugar beets.²⁴ Napoleon, needing sugar for his armies, added even more impetus and money to the development of the sugar beet industry.

Beets, whether mangel-warzels or sugar beets, were generally permitted to grow to enormous sizes in European gardens. Beets for the table, which began to become a more popular use in America after 1700, were

planted early and pulled when still very young.²⁵ Beets are biennials that are planted as annuals. They would bear flowers and fruit in their second year, if permitted to grow that long.

Compositae:

Helianthus tuberosus - Jerusalem Artichoke:

This plant is a member of the sunflower group. It is a native of North America and was cultivated by American Indians. It is a perennial, and once established is reputed to be very tenacious. Examples of this plant can be found today in the eastern United States along roadsides and abandoned lands. The part which is consumed is a tuber, and like potatoes, one plants the tubers instead of the seed in order to raise the crop.²⁶ The Jerusalem artichoke is neither from Jerusalem nor an artichoke. The name is a corruption of the Italian or French words written "girasole." It is said that French explorers in Canada discovered the plant and brought it back to the European continent where it was an instant success, particularly with royalty.²⁷ It is still eaten today more in Europe than in America.

Convolvulacae:

Ipomoea batatus - Sweet Potato:

Batatas is the Indian name for this tuber, a native of tropical, South America. It was introduced to Europe in the sixteenth century along with a number of other new foods from the Americas. This name became confused and applied to all potatoes - potato being a corruption of the Indian name. It thrives in a hot and moist climate. For that reason primarily, it never gained much of a foothold in Europe. The dispersal of the sweet potato from its source in Central and South American lowlands is an interesting one, for it traveled around the world during the sixteenth century. It was introduced to China, Japan, Africa, Polynesia, Hawaii, and Austronesia. It remains a popular vegetable in all tropical climates. It is difficult to store, and for that reason is not grown in many areas where it has to be pulled long before it is to be eaten.

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Cruciferae:

This family includes a large number of vegetables used by mankind today. Two root groups - the turnip and the radish - are identified within it. The rutabaga and the horseradish are subgroupings.

Amoracia lapathifolia - Horseradish:

Radish is from the Latin name radix meaning root. The horseradish is only a distant relative to the radish (discussed below), but they both have roots which grow hotter to the taste as they increase in size. The horseradish is a native of Southeastern Europe. It was used as a medicine in sixteenth century Germany. It was grown in American colonial gardens and has since established itself as a wild plant on the North American continent. The horseradish is a perennial.²⁹ It is propagated solely by cuttings, since what has become the domestic variety does not produce fertile seeds.³⁰

Brassica rapa - Turnip:

The Brassica genus contains a large number of domestic plant species, including cabbage, Brassica oleracea, and both broccoli and cauliflower, B. oleracea var. botrytis. The rutabaga (described below) is thought to be a cross between cabbage and turnip. The turnip has 20 chromosomes, while the rutabaga has 38. Turnips have been grown in domestic gardens since antiquity. Both the Greeks and Romans cherished the turnip and it was used since prehistoric times in Central Asia. The turnip, like the beet is a biennial.³¹ They are believed to be native to Russia, particularly Siberia and Scandinavia. They thrive in a

cool marine climate,³² but high rainfall reduces
growth.³³

Brassica napobrassica - Rutabaga:

The name comes from the Swedish word "rotabagge."
It is commonly referred to as Swede or Swede turnip in
England and Canada. It was often called these names as
well as "turnip rooted cabbage" in America. It is
sensitive to hot weather, but requires a longer growing
season than the turnip. It was first described by
Cooper Bartin, a Swiss botanist in 1620. As noted
above, it is believed to be a cross between turnip and
cabbage, and it is assumed that this cross happened
accidentally in a Swedish or Swiss domestic vegetable
garden.³⁴

Raphanus sativus - Radish:

This plant is native to China, although it appears
to have been introduced to middle Asia in prehistoric
times. Egyptians, Greeks, and Romans all enjoyed
radishes. They were brought to the Americas prior to
1500 by the Spaniards.³⁵ The plant is an annual, and
has been shown to be tolerant to a great variety of
environments.³⁶

Solanaceae:

This family includes many useful as well as some quite harmful plants. It includes white potatoes, tomatoes, and deadly nightshade. Because the potato's leaves bear an obvious resemblance to the latter plant, it was not at first accepted easily or utilized readily in Europe.

Solanum tuberosum - White or Irish Potato:

This potato, like the sweet potato, is native to South America, but not to the tropics. Its origin is in alpine meadows, lying some 13,000 feet above sea level in the Andes Mountains of Peru, Bolivia and Chile. The Inca Indians had become heavily dependent on this crop at the time of the arrival of the Spaniards. The Indians stored potatoes in a freeze-dried form. Potatoes frozen at night would be stamped on the following day to drive the moisture out. This process was repeated until the potato was desiccated. It was then called a "chuno" by the Indians. The vegetable can be kept indefinitely in this form.³⁷

The way potatoes arrived in Europe is not clear. Drake may have brought some in the late sixteenth century from the West Indies to Ireland. He stopped first, apparently at Virginia, which for a time gave

rise to the belief that the origin of the plant was in Virginia.³⁸ Though not accepted as a viable vegetable at first in Europe, it later was given the status of an aphrodisiac. This latter accord was connected to the ever present confusion between the sweet and the white or Irish potato. The sweet potato had previously been granted the billet of a stimulant.

It is interesting to note how the white potato came to have the label "Irish." It was thus called by Europeans and Americans alike, long before it became a dominant food in Ireland. But the reason it was given that name can only be guessed. During the eighteenth century, potatoes were promoted throughout Europe and some governments in central and eastern Europe required farmers to plant the crop. These regulations developed after it was discovered that the crop could survive war (because the edible parts were buried, out of reach of fire and wanton destruction). The use of potatoes as a staple was carried to Ireland, where by the start of the nineteenth century, the potato had become the major food. Presumably, it was this fact which contributed to the plant becoming known as "Irish." It was also the position potatoes held in Ireland that contributed to the horror of the potato blight (since identified as a

fungus, Phytophthora infestans), in that country, and which destroyed the Irish agriculture in the middle of the 1840's.³⁹

Umbelliferae:

Daucus carota - Carrot:

The carrot has been grown since ancient times, and is thought to be a native of Afghanistan, although a wild species, Daucus maxinca is known near the Mediterranean.⁴⁰ However, it is only recently that the plant has been grown for its root as a vegetable. The Greeks used the carrot as a stomach tonic. Prior to that, it had been used by Egyptians for its beautiful flowers and lacy leaves. Carrots have become wild in North America, the seed having escaped from domestic gardens, and it is commonly known as Queen Anne's lace. By the thirteenth century, carrots began to be raised in France as food. Carrots were believed to be delicate plants, not easily grown in extreme hot or cold temperatures and needing sandy soil.⁴¹

Pastinaca salivus - Parsnip:

The parsnip, in addition to being related to the carrot, closely resembles the root except for its lack of orange pigment. Parsnips are believed to be from the

Mediterranean area. They were grown as roots by both the Greeks and the Romans. Parsnips were a common staple throughout Europe by the middle of the sixteenth century, and were brought to America by the first settlers. The sweet flavor of the parsnip which makes it most enjoyable, is derived only after it has been affected by several frosts. Early gardeners learned to leave their parsnips in the ground until long after the cold weather had set in.

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GENERAL CONSIDERATIONS

One of the major reasons root crops have been shunned by many gardeners is that they need a great deal of manual labor in planting, harvesting, and preparation for consumption. However, root vegetables need little tending once planted until it comes time to harvest. For each of the roots, extensive preparation of the soil was favored by eighteenth century European farmers as well as by informed colonial growers. One authority recommended tilling and harrowing, then retilling and reharrowing in a perpendicular direction, manuring,¹ hoeing, and finally digging a trench to sow the seed. A French clergyman, admitting that soil preparation was arduous, still estimated that for beets, a man who had grown accustomed to it could plant from 1,800 to 2,000 roots per day, and recommended that the resultant feed for stock was well worth the trouble.² Harvesting required pulling or grubbing each root with a spade or digging fork. Furthermore, if the root was to be fed to stock, it needed to be cut into small pieces. The same clergyman calculated that within one hour's time, a man³ could cut enough beets to feed twelve oxen for one day. Such an expenditure of time might be nothing for a gentleman farmer who likely had leisure time, but to a

colonial or early national farmer, who was labor deficient, such a time-consuming task might seem out of the question.

Though farmers were advised that root crops needed little attention during the growing season, some hoeing was suggested prior to the development of the plant's leaves. Once out, the leaves would then act to shelter the ground and prevent the further growth of weeds. Farmers were cautioned, however, not to hoe too deep, as disturbance of the soil near the growing root would cause the root to fork, giving it an undesirable appearance.

Although turnips were introduced as a fallow crop in England in the middle of the seventeenth century, their use as such was not widespread until after the invention of the seed drill in the eighteenth century.⁵ Jethro Tull, one of the drill's inventors noted that turnips sown by hand and hand hoed were extraordinarily expensive to produce. Tull recommended drilling wheat between rows of turnips, or alternately, drilling turnips between rows of wheat. He also promoted the use of the horse-drawn cultivator.⁶ Despite Tull's advice, European root crops remained strictly garden vegetables until the eighteenth century. Carrots were not con-

sidered field crops and were not fed to stock until late in that century. Moreover, although beets had been used to feed both animals and humans since the first century, their use as a field crop did not occur until early in the nineteenth century.⁷

In the European kitchen or vegetable garden, all root crops were sown together among other vegetables and herbs. This system used the ground to the greatest extent and was made possible because plants matured, from a culinary standpoint at different times. One gardener recommended that herbs should be removed from the garden first, followed by radishes, carrots, turnips, and leaving parsnips until winter.⁸

In colonial kitchen gardens, root crops tended to fare best in the northern colonies. Even southern Pennsylvania was considered to have summers that were too hot and dry for root crops which had come from the cool marine climate of western Europe.⁹ This is a curious phenomenon, for as was noted previously, many of these crops had originated in the warmer and drier environment of the Mediterranean Ocean. One must assume that varieties had been selected unconsciously over the centuries for the cool and moist weather.

From the records, potatoes, or something called

potatoes, were among the earliest crops planted in the American colonies. They are mentioned several times as having been tried as a crop.¹⁰ These could have been either white or sweet potatoes, or even another vegetable, since there was much confusion as to the exact nature of potatoes.¹¹ What is clear is that none was grown on any large scale until some Scottish-Irish settlers "introduced" the Irish (white) potato to New Hampshire in the period between 1718 and 1720. From there, this "new" crop spread across all of New England until by 1745, New England became a major exporter of potatoes.¹² The growing of potatoes as a cash crop even became popular in New York, New Jersey, and Pennsylvania, where certain soils and micro climates led to high production.¹³ Originally, there was only one variety of potato; but shortly after 1740, two new varieties were introduced, which were considered good "table" potatoes. Late in the eighteenth century, the potato also gained wide acceptance as a fodder crop. Unlike other root vegetables, potatoes were never restricted to the kitchen garden. In fact, after the middle of the eighteenth century, Americans learned how to plant potatoes with a plow instead of in holes dug individually with a spade. By the early nineteenth

century, at least one Pennsylvania county could boast of 4,000 acres having been planted to potatoes.¹⁵ Yields for the potato were high, given the right environmental circumstances, reaching 200-250 bushels per acre, even when no special care was given them in planting or during the season.¹⁶ It seems that potato growing was not undertaken on a wide scale south of the Mason-Dixon line.

The sweet potato was early tried in many parts of the American colonies as well. However, it could not be grown with any success in New England. As opposed to the white species, the sweet potato was better adapted to the Southern colonies, where it quickly found a permanent home.¹⁷ Although the sweet potato was nearly the only root crop grown in the South, its cultivation was not extensive even there.¹⁸ Perhaps one reason is that it is difficult to store. In the eighteenth century, these tubers were "cured" by placing them in a pit lined with corn stalks. The potatoes were placed on the corn stalks, covered with either rice straw or additional corn stalks, topped with earth which had a hole left in it to provide ventilation.¹⁹ The process was expected to draw off moisture so the potato would not rot, while at the same time keeping the tuber from

shriveling from lack of water content. Even with curing process, the sweet potatoes often would not last through the winter.²⁰

As the news of the "Norfolk system" of crop rotation, which had been tried extensively near Norfolk, England, reached American farmers in the mid to late eighteenth century, some began a trial of it, and many self proclaimed agricultural authorities advised the adoption of the system.²¹ Claims had been made that England's ability to raise cattle had increased three-²²fold simply through the use of turnips as winter food. Bordley, for example, advocated growing potatoes and/or turnips between rows of corn.

Growing root crops among other cash crops appears to have become an acceptable practice among many American farmers early in the nineteenth century, but not during the colonial period. The turnip became known as especially valuable for this purpose, since it could be planted late in July or early in August when the grain crops need little attention. Indeed, the turnip was considered a poor root to plant in the spring, since summer turnips tasted bad, were considered too soft, and were hard to keep.²⁴ On the other hand, turnips planted in late summer would be ready for harvest in late

September or October. Turnips were hard to keep even when pulled in the fall and usually if not consumed by the early part of January, would turn soft.²⁵ If a family desired a turnip-like vegetable later in winter or spring, the Swede turnip or rutabaga was usually used to finish out the season.

Rutabagas required longer periods of development, needing to be sown in late spring for fall harvesting. One nineteenth century Pennsylvania farmer recommended sowing the Swedes after a crop of early peas.²⁶ Interestingly, it appears that any farmer who attempted the growing of roots as field crops became wholly committed to the idea of the use of roots and convinced that they were indispensable for winter feeding of stock. But the advice of the experts fell on the deaf ears of many colonial countrymen. In James Lemon's analysis of early Pennsylvania farmers, he noted that farmers tended to follow short term market demands rather than respond to practices which might be best for enhancement of the land, or which might lead to quality farm produce in the long run. In Pennsylvania, since wheat prices and demand were both high, farmers grew grain in response. Tobacco and wheat held the same positions in the Tidewater colonies. Except in New

England and parts of New Jersey and Pennsylvania, root crops required an emphasis on stock, with the crop being used as feed, if commercial success was the anticipated outcome. With little market control and since there was frequently a low demand for meat, farmers could not afford to raise root crops on a large scale. Thus, many Tidewater farmers did not have the need or opportunity to raise roots in large quantities. Alternately, they did not have the necessary manure from the stock to fertilize their fields.²⁷

Only in New England, where it had become obvious that growing either the English grains or corn (maize) would be difficult, did roots, particularly potatoes, assume a major importance. New England farmers did not have large quantities of animal manure either, but they used seaweed and other materials close at hand for fertilizer.²⁸

In the decade starting with 1840, a potato blight devastated much of the crop in New England, New York, New Jersey, Pennsylvania, and elsewhere. This was the same disease, now identified as the late blight fungus, Phytophthora infestans, which attacked the plant in Ireland and caused the widespread famine there.²⁹ The potato disease had struck many times previously, but

each time it had been possible to overcome the problem by returning to the seeds of the plant and sowing these in place of the pieces of tuber (seed potatoes) which were commonly used. The blight had been normally blamed on a "running out" of the vitality of the potato plant, thus making it more susceptible to disease through a continual planting of tubers. In the 1840's however, reversion to seed appeared to have little effect on the intensity of the blight. This was to cause a major upheaval in traditional thinking about potato varieties and planting practices. Much work was begun, starting in the 1850's to find and/or create new potato varieties resistant to blight.³⁰

The lack of potatoes, however, between 1840 and 1860, sent American stockmen along the East Coast in search of alternatives to potatoes for their stock feed, upon which they had become increasingly dependent since the late eighteenth century. The search led to a new spate of adherents to alternate root crops for winter cattle feed. Each kind of root had its advocates. Some believed that the carrot was the most loved by stock, especially horses. Others felt that beets were the most profitable for "milk cows." Still others advised that the turnip was the root par-excellance for the

fattening of stock and the production of butter. Although turnips could cause milk to have a strange taste, this problem could be avoided by boiling the turnips prior to feeding them.³¹ Each of the roots had its backers who claimed it was the most widely grown of all the species in America.

How much land was given to roots seems to have been highly individual and dependent upon the needs of the farm, including the number of stock and the eating preference of the family. The 1863 report of the Department of Agriculture did recommend that each farmer set aside from four to five acres for roots.³² Farmers considered the roots for home use primarily, although high quantities could be raised on a single acre of ground and with fairly intensive cultivation, an acre could be made to yield upwards of 1,000 bushels of carrots.³³

Each of the roots required slightly different planting times, harvesting points, and preservation methods, although the root cellar or burial heap is central to all root storage. After being pulled, root crops go through three periods prior to their use in feed or in the kitchen. The first is the curing time, in which both heat from the field and heat of

respiration need to be dissipated. This requires ventilation. Holding the crop after curing, necessitates maintaining it in a resting stage - succulent but not ready to sprout. Darkness, temperatures that are cool but well above freezing, and relative dryness, are the major factors in this process. Finally, if the vegetable is cold, it must be warmed before consumed.³⁴ It was the root cellar, field pit, or the least effective manner, piles of vegetables with dirt coverings, which were used to accomplish both the curing and holding periods.

The method of harvesting and storing sweet potatoes has already been mentioned. Advice to farmers indicates that beets were taken up by digging, and cutting the tops three weeks before the first frost, then stored in a dry cellar, buried up to the neck in dry sand. Some authorities recommended that they could be stored like carrots with no sand in a dry cellar, but sand was more commonly advocated.³⁵

Carrots, we are told, should remain in the ground until hardened by the cold. Parsnips were expected to be left until several frosts had passed. Both of these vegetables were said to shrink more in curing than did other root crops. They were normally stored without

sand in closed and only moderately dry cellars.³⁶
Turnips and rutabagas on the other hand, needed a high
degree of ventilation for proper storage.³⁷ Irish
potatoes were susceptible to rot, particularly if the
crop had been hit by the late blight. One method
suggested to avoid this problem was to pack potatoes in
charcoal.³⁸

If the root crops were not wanted until spring,
they could be stored out-of-doors. For this process,
they were pulled, their leaves cut off, and the
vegetable dried for two to three days in the sun. Then,
with straw as a bed, they were laid in pits or in a
conical pile, covered with additional straw, and finally
with six to eight inches of earth. Pits were more
suitable for keeping freezing temperatures from the
vegetables than were above ground piles. No more than
10 bushels to a pile were stored in this manner for fear
of over heating during the curing process.³⁹

The planting times and conditions which were
recommended varied from fall (for a spring harvest), to
late summer and from heavy clay to light and gravelly
soils. Most root crops are biennials. The reason they
store food in an underground, tuberous segment, is that
in this manner they can last through the winter with

sufficient latent energy to start growth anew the following spring. Normally, root crops are sown by seed, and their growth is interrupted by pulling the plant prior to its reaching the maturity of its second year. Some must naturally be left in order to produce seed for continued planting. Irish potatoes were sown normally by burying whole or parts of the tuber. Sweet potatoes were grown by cuttings of older vines. Jerusalem artichokes are perennials. Gardeners were not so much worried about when to sow or even what part of the plant to sow, but how to keep it from taking over the garden.

Beets were sown early - as early as the ground could be worked. Some authorities even recommended planting the seed in the previous fall.⁴¹ A light and sandy soil, heavily fertilized, was acclaimed the best by most writers.⁴² Beet seeds are covered with a hard shell and need to be steeped at least two days, and up to four days to encourage prompt germination. Table beets were taken up while the root was still young, but beets fed to stock were left in the ground until they grew quite large. This sometimes interfered with the rotation of crops. One Delaware County, Pennsylvania farmer for instance, complained that his beets didn't ripen soon enough to enable him to follow them with a

crop of wheat or grass without diverting his attention
from other mid-summer chores.⁴³

As has been noted, parsnips were best (sweetest) when left in the ground until several frosts had passed, but carrots were found to be susceptible to both extreme heat and cold.⁴⁴ The climate of the middle colonies was found to be best for carrots. They needed a very sandy earth, and no dung could be applied after planting as manure would cause the root to fork.⁴⁵ One gardener discovered by accident that carrots grown in gravelly soil with no attention, withstood drought better and tasted sweeter than those grown in the rich garden soil.⁴⁶

Radishes were frequently planted among other roots. Radishes were more often eaten just as they were pulled rather than being stored for winter use. Since they become hotter the longer they remain in the soil, they were usually pulled after about six weeks. Radishes sown during the heat of summer needed protection from the sun. A north wall was commonly cited as useful for summer radishes. The radish was found to be tolerant of many soil environments.⁵⁰

Turnips sown in the spring were described as having a strong taste, and more hard and yellow than were to be desired of a white and tender table

vegetable.⁵¹ Turnips, therefore, were sown in late July or early August, and pulled in early fall in order to give the best product for both man and beast. Cows fed on the improper tasting spring sown turnip would also give milk that tasted poorly. Turnips were heavily manured, but not as heavily as beets. They also did not yield the nutritional value that beets did. The practice of late sowing turned out to have an additional advantage in that they could be sown where other crops had already failed. In the late colonial period, they were also frequently grown on the edge of corn fields. Later, this practice extended to sowing in-between rows of cash crops.⁵² Swede turnips or rutabaga, were sown in June. Both crops required a heavier, high clay content soil than did the other roots.⁵³

There were many insects, fungi, and other pests which attacked root crops, but, except for the Irish potato, these do not seem to have been severe enough to have caused any concern on the part of the farmer. Rinsing plants with solutions of soap or scattering of soot was considered a sufficient antidote in most cases.⁵⁴ Plants of the family Cruciterae, including turnips and radishes, were susceptible to a slime mold known as club-root. The sweet potato is frequently affected by a dry rot that attacks the stored tubers,

Rhizopus stolonifer. The Irish potato, aside from the often noted late blight, (Phytophthora infestans) is also plagued by early blight (Alternaria solani), scale (Streptomyces scabies), and the Colorado potato beetle, (Leptinotarsa decemlineata). Other pests, which appear to have been of minor concern include: flies, Anthomyia betae (beets); Athalia spinarum (turnips), and Psila rosae (carrots), a carrot soft rot, Erwinia caratorora,⁵⁵ and a turnip aphid, Aphis brassicae.

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VARIETIES OF ROOTS IN AMERICA

When roots were first grown in the gardens of Colonial America, there were very few varieties. There were several reasons for this situation. In the first place, plant breeding was unknown to farmers, husbandmen, and gardeners of the time. Selection was practiced, but that selection was based on achieving produce which most closely resembled what the society had been used to, not for finding new, perhaps more desirable traits. Concerns were often expressed about the deterioration of species by a reversion to the wild or by a growing of plants of the same genus too close to each other.¹ In addition, most of the root crops are biennials, but they are harvested as if they were annuals. Therefore, many plants never reached the maturity to produce seed, and consequently, never had the opportunity to cross with other species or variety. Further, the crops were probably vast genetical mixtures, with little true variation. Even in 1925, one plant botanist found in breeding the "monarch" beet that it did not reproduce itself well. Only 70% of the offspring were monarchs. The remainder were other well-recognized varieties.² Finally, and perhaps most importantly, diseases and pests did not then and do not

today pose a great problem, and there was a consequent lack of incentive to find new varieties. Despite the lack of attention to varieties, some variation can be recognized.

Beets:

The two general kinds of beets recognized in England and America in the eighteenth century have been noted: the common or sugar beet, and the mangel-warzel. The former was used as a table variety and was not originally known for its sugar production. The latter was grown largely in Germany and related countries, and was used primarily for cattle. The latter beet grew to extraordinary size compared with the table beet. In fact, the mangel-warzel differed so much from the table beet, that some botanists believed it should be a different species and given the name Beta altissiaria.⁴

The sugar beet was white and the mangel-warzel red. In some locales, they were known as the white mangold and the red mangold, respectively. In fact, beets ranged widely in color, from red to white, as well as in size and shape. The work of Franz Karl Achard in the late eighteenth century resulted in the development of the White Silesian beet, which is now recognized as the parent of all currently grown sugar beets in the

world.⁵ The relationship of present-day varieties to colonial ones is difficult to trace, however, white Silesian and French yellow were reported as varieties in 1857. In 1832, the Shakers of South Union, Kentucky, who were heavily involved in the production of vegetable seed for sale, recorded planting blood beets, turnip beets, and yellow sugar beets. Whether any of these hold any relationship to the beets named above is not known. Burpee in 1899 offered a Blood Turnip Beet, a Long, Smooth Blood-Red Beet, five yellow beets, the White Silesian and five other varieties.⁶ Jefferson's garden book lists red, scarlet, and white beets in addition to mangel-warzel, for Monticello. Cobbett listed a yellow, white and red beet, but explained that the red one was the true beet, while the others were degenerate.⁷

Carrots:

In 1855 four varieties were recognized: Early Horn, Red Altringham, Long Orange, and White Belgian. The Early Horn had a deep red color, small size, and was considered the best flavor. The Red Altringham was cultivated as a field crop. It also was a deep red and somewhat small variety. It was believed to have a tendency to not breed true. The Long Orange was long,

often growing it was claimed, to a length of two feet. It was orange to orange-red in color. Finally, the White Belgians were promoted as the largest, resembled a mangel-warzel in shape and color, and were of recent introduction. A large red and large orange carrot were said to be grown in Europe but not in the United States.⁸ Cobbett maintained that the market of a good carrot was its deep red color. Pale ones, he claimed, were degenerate, and yellow ones were reverting to a wild carrot.⁹ In this century, reports indicate that the yellow carrot is believed to be the most primitive variety, and the one from which white and orange ones sprang. It is believed that the Long Orange was brought to the American colonies after 1620. Horn carrots were originally developed in the Netherlands, and it is believed that a variety known as Early Horn also came to this Country in the beginning of the seventeenth century.¹⁰ Jefferson lists Early, Large, Orange and Yellow varieties in his garden.¹¹

Parsnips:

Parsnip varieties are scarcely mentioned in the literature prior to 1900. Jefferson apparently did not grow them. Burpee mentions only two: Improved Gurnsey and Long Smooth (also called Hollow Crown).¹²

Irish Potatoes:

There were several varieties extant in the United States in the eighteenth century. Fletcher describes the potatoes available in the first half of that century as singularly unappetizing, being "small, knotty (and) bright yellow." He mentions a variety known as Bilboa as being introduced to Pennsylvania from New England. He cites Charles Varlo as having enumerated five varieties in 1785: Red Russetting (round, red); White Russetting (round, white); Irish White Smooth; Early Wife; and Mercer, a variety developed in Mercer County, Pennsylvania.¹³ Russell lists four varieties for Essex County, Massachusetts in 1840. These were: English White (a round sort); Biscuits (round and rough skinned); LaPlata (a long red which may have been a Sweet Potato), and Mercer (early maturing and heavy in texture).¹⁴ Fletcher states that David Landreth, who established the first American seed house circa 1784, also introduced the first truly white potato in 1811, a variety called "white."¹⁵ Jefferson mentions four varieties - Indian (probably sweet), Irish, Long and Round.¹⁶

Since white potatoes were not widely distributed until the mid-eighteenth century in the colonies, and since after the potato blight of the 1840's, varieties

changed drastically, Jefferson's list may have been fairly typical of those grown in the Tidewater area for home consumption. Today's varieties bear no resemblance to those grown prior to 1840. The new breeds were started by experiments on the farm of the Reverend Chauncey Goodrich of Utica, New York, who obtained some seed from Chili through the United States emissary. From this he grew the Rough Purple Chili, and then later selected one he called Garnet Chili from the former's offspring. However, Albert Breese of Vermont, in the 1860's, developed a variety which was to turn interest in the United States from Garnet Chili stock. Breese's new variety was called Early Rose. The Early Rose became the breeding stock for all later developments of the American potato in the nineteenth century.¹⁷ Earlier varieties fell out of favor once the newer and more disease resistant varieties became generally available, and none of the earlier varieties is grown in the United States today.

Sweet Potatoes:

Owing to the confusion between sweet and Irish potatoes, poor records were kept on varieties of sweet potatoes. Many farmers believed the sweet was in fact, a variety of Irish potato. Only two varietal names are

mentioned for eighteenth century sweet potatoes - namely Spanish and Maryland.¹⁸ These may, in fact, have been names indicating the supposed origin of the potato, rather than any recognition of varietal differences.

Radishes:

Three varieties of radish were described by Lawrence in 1726 - horseradish, annual radish, and black radish. The horseradish is now known as a different genus from the common radish. The annual radish was said to be best used in salads. The black radish, however, Lawrence believed to be of little worth.¹⁹ Randolph's Treatise describes three varieties known as, Scarlet (salmon); London, and Short-topped;²⁰ while Jefferson's long list includes, Black, Common, English, Scarlet, Summer, Violet, and White.²¹

Turnips:

Turnips were thought, in the seventeenth and early eighteenth centuries, to consist of three main varieties - Turnips, Swedes, and Kohl rabi (turnip rooted cabbage). These are, of course, three species, and not simply three varieties of one specie. For the common turnip, two varieties, one white (considered most delicate), and one yellow (described as robust), were also listed.²² A yellow and white variety of rutabagas

was mentioned in 1855, but it was noted that here, the yellow variety was much preferred and the white had gone out of use, not being worthy of cultivation. In addition, the yellow variety could be divided into green topped and purple topped. In the mid-nineteenth century, purple topped was denoted as the newest variety, and because of its introduction, the green topped variety had received less care in the selection of seed.²³

Cobbett mentioned two varieties of the common turnip, which should receive, he believed, particular attention. These were the early white and flat yellow.²⁴ Randolph's Treatise mentions white and purple rooted turnips.²⁵ Jefferson lists nine turnips in addition to the Swedish, namely, Early; Early Dutch; English forward; Fraser's new; Hanover; Long French; Rose, and Summer. Burpee, in 1899, described four varieties of rutabaga, including Large White; Purple top; Yellow; Improved Strap-leaved, and Imperial Hardy. Burpee's turnips, twelve in all, include - Early; White; Flat; Dutch; two white; Globes; Yellow Aberdeen; two red topped,²⁶ and a purple topped.

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