CHAPTER XV.

MICHIGAN MINT FARM.

Very few people know that the largest Mint farm in the world is owned and operated by an unassuming Michigan man named A. M. Todd, says Special Crops. His career is interesting. Born on a farm near St. Joseph, Mich., he early developed an idea that money was to be made in the growing of Peppermint. At that time the Mint oil industry was small and in a state of crudeness in America, for Europe was supposed to be the stronghold of the industry. To Europe went. Mr. Todd to see about it. He returned filled with plans and enthusiasm.

SOME DETAILS OF THE BUSINESS.

The details are long, but the main facts can be briefly told. Eventually, while still a very young man, Mr. Todd purchased 1,400 acres of wild, swampy land in Allegan County, Mich. The purchase price was $25,000. He proceeded to hire a force of men to clear and ditch the new mint farm. That was 20 or more years ago.

Now, let us take a look at that farm as it is today. First we come to the main farm, called Campania, and comprising just 1,640 acres. Here are huge barns, comfortable houses for employer and employees, warehouses, ice houses, windmills, library, club rooms and bathrooms for use of employes; 17 miles of wide, deep, open drainage ditches; stills for distilling Peppermint oil; roadways, telephones and all the system and comfort of a little village founded and maintained by one thoughtful man.

Not far away is a second farm, recently purchased where somewhat similar improvements are now going on. This farm is named Mentha, and consists of 2,000 acres.

Then, farther north, a third farm completes the Todd domain. This place contains 7,000 acres and is known as Sylvania Range. The three farms, with a total acreage of 10,640 acres, are under one management and they form together the largest Mint farm in all the world. Starting with $100.00 capital, Mr. Todd's plant today is worth several hundred thousand dollars.

DISTILLER AS WELL AS GROWER

But Mr. Todd is more than a Mint grower. With his distilleries he turns the crop into crude Peppermint oil; with his refineries he turns the crude oil into the refined products that find a ready market in the form of menthol, or as a flavoring essence for drinks, confectionery and chewing gum, or for use in medicine. Furthermore, he has been shrewd enough to figure out a method of utilizing, profitably, the by-products of the business, Mint hay. In other words, after the oil is extracted from a mass of Mint plants in a distillery vat, the resulting cake of leaves and stems is dried and fed to cattle. And, oddly enough, the animals greatly relish it and thrive upon it.

RAISES SHORTHORNS ON MINT HAY.

During the summer Mr. Todd has 500 Shorthorns grazing on his 7000-acre range, where they require no human attention during the season when his men are busy planting, cultivating and harvesting the first crop. Later, these same Shorthorns are driven, from pasture to the big Campania barns, where the men care for them and feed them Mint hay from Mr. Todd's distilleries at a season when such workmen have little else to do. In this way the by-product is utilized and the regular force of men is kept employed all the year around.

The growing of Mint is simple, yet there are some peculiar features about it. For instance, the land is so shaky at some seasons of the year that horses can not work on it unless they wear special, broad wooden shoes.

This Mint soil, indeed, is something like the muck found in typical celery fields, being black, damp and loose. But it is less firm and more damp than the celery land at Kalamazoo.

SETTING NEW MINT FIELDS.

The Mint root is perennial. Once in two or three years, however, the fields are renewed to improve the crop. When setting a new field the land is plowed and harrowed in the usual way. It is then marked out in shallow furrows into which the sets are evenly dropped by skilled planters who cover each dropped root by shoveling dirt over it with the foot. The rows are about $2^1/_2$ feet apart and the planting is done in early

spring. The sets are obtained by digging up and separating the runners and roots from old plants.

The planted rows soon send up shoots above ground and the new plants rapidly run or spread, necessitating hoeing and cultivating only until late July, at which time the field should be densely covered with a rank growth of waving green plants that forbid further cultural work.

HARVESTING THE MINT.

In August or September the field is mowed, raked and bunched; in fact, handled quite similarly to a clover hay field. After allowing the plants to dry a short time, the crop is loaded onto hay wagons and carted to the stills, where the essential oil is extracted by means of a system of steam distillation.

The second year's crop is obtained by the simple method of plowing under the plants in the fall. The roots send up new shoots next season, while weeds are temporarily discouraged. No cultivation is attempted the second year, altho the hand pulling of weeds may sometimes prove desirable.

We think the growing of Mint should not be attempted except on a large scale. We have had many queries touching the plant and manner of cultivation that we have taken this means to answer them. In boyhood days we were well acquainted with this industry in all its branches and can not advise the average Ginseng grower to undertake its culture for the reason that there is not money enough in it to be profitable on small areas of land.

CHAPTER XVI.

MISCELLANEOUS INFORMATION.

Remember, unless thoroughly dried roots, herbs, leaves, barks, flowers and seeds are apt to heat or mold which greatly lessens their value. If badly molded they are of little value.

The best time to collect barks is in the spring (When the sap is up) as it will peel easier at that time. Some barks must be rossed, that is, remove the outer or rough woody part. In this class are such barks as white pine, wild cherry, etc.

Leaves and herbs should only be gathered when the plant is mature-grown. In curing they should be kept from the sun as too rapid curing tends to draw the natural color and this should be preserved as much as possible.

Flowers should be gathered in the “height of bloom,” for best results. They require considerable attention to preserve as they are apt to turn dark or mold.

The time to gather seeds is when they are ripe. This can easily be determined by the leaves on the plant, vine or shrub which produced the seeds. Generally speaking, seeds are not ripe until early fall, altho some are.

There has been a heavy demand for years for wild cherry bark, sassafras bark, black haw bark, prickly ash bark, slippery elm bark, cotton root bark as well as scullcap plants, (herbs) lobelia herb, golden thread herb and red clover tops.

There has been a cash market for years for the following roots: Blood, senega, golden seal, poke, pink, wild ginger, star, lady slipper, black, mandrake, blue flag and queen's delight.

If you have a few pounds of Ginseng or Golden Seal, pack carefully in a light box and ship by express. If less than four pounds, you can send by mail-postage is only one cent an ounce. A four-pound package by mail can be sent anywhere in America for 64 cents. Expressage, unless short distances, is apt to be more.

In shipping roots, herbs, leaves, seeds, etc., where the value is only a few cents per pound it is best to collect 56 pounds or more before making a shipment. In fact, 100 pounds by freight costs no more than 10, 20, 50 or any amount less than 100 as 100 pounds is the smallest charge. Some of the biggest liars in America seem to be connected with the “seng” growing business. They probably have seed or plants to sell. Be careful in buying—there are many rascals in the business.

There is always a cash market for Ginseng and Golden Seal. In the large cities like New York, Chicago, St. Louis, Minneapolis, Montreal, Cincinnati, etc., are dealers who make a special business of buying these roots. In hundreds of smaller cities and towns druggists, merchants, raw fur dealers, etc., buy them also. The roots, barks, leaves, etc., of less value are also bought pretty generally by the above dealers, but if you are unable to find a market for them it will pay you to send 10 cents for copy of Hunter-Trader-Trapper, Columbus, Ohio, which contains a large number of root buyers' advertisements as well as several who want bark, leaves, seeds, flowers, herbs, etc.

Since 1858 Ginseng has increased in value one thousand four hundred per cent., but Golden Seal has increased in value in the same time two thousand four hundred pet cent.

Ginseng and Golden Seal should be packed tightly—light but strong boxes and shipped by express. The less valuable roots can be shipped in burlap sacks, boxes, barrels, etc., by freight.

The various roots, barks, leaves, plants, etc., as described in this book are found thruout America. Of course there is no state where all grow wild, but there are many sections where several do. After reading this book carefully you will no doubt be able to distinguish those of value.

Plants are of three classes—annuals, biennials, perennials. Annuals grow from seed to maturity in one year and die; biennials do not flower or produce seed the first year, but do the second and die; perennials are plants which live more than two years. Ginseng plants are perennial.

Roots, leaves, barks, etc., should be spread out thin in some dry, shady place. A barn floor or loft in some shed is a good place, providing it is light and “airy,” altho the direct sunlight should not shine upon the articles being “cured.” Watch while curing and turn or stir each day.

Prices given for roots, plants, leaves, etc., were those paid by dealers during 1907 unless otherwise specified These prices, of course, were paid in the leading markets for fair sized lots. If you have only a few pounds or sold at some local market the price received was probably much less. The demand for the various articles varies and, of course, this influences prices—when an article is in demand prices are best.

After studying the "habitat and range" of the various plants as published together with the illustrations, there should be no difficulty in determining the various plants. By "habitat" is meant the natural abode, character of soil, etc., in which the plant thrives best and is found growing wild. To illustrate: Seneca Snakeroot—habitat and range—rocky woods and hillsides are its favorite haunts. It is found in such places from New Brunswick, Canada and Western New England States to Minnesota and the Canadian Rocky Mountains, and south along the Allegheny Mountains to North Carolina and Missouri.

From this it will be seen that it is useless to look for this plant in the Southern States, on the plains or in old cultivated fields, for such places are not its natural home.

CHAPTER XVII.

GOLDEN SEAL CULTIVATION.

BOTANICAL NAME: Hydrastis Canadensis.

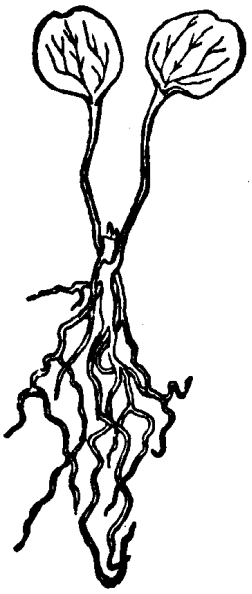
It has been proven beyond all doubt that Golden Seat will not grow in the open field. That being the case we have two general lines of cultivation open for us to follow. One is to use natural shade, which comprises forest shade and also orchard and vine shading, and, in fact, any kind of shading where plants, shrubs, vines or trees are used to make the shade. The other method is by purely artificial means and using materials for the shade proper that do not draw either moisture or fertility from the soil. This consists of wood, metal and in some cases, vegetable fiber. The only reason Golden Seal will not grow in the open field is that the plant needs and must have shade of some kind. Were it not for the lack of shade, seal would grow in any of our fields where our common grains will grow.

When we follow nature closely we are less liable to be troubled with disease such as blight and other fungi. In the cultivations of this crop, we must bear in mind that nature in this case is very slow and if we follow nature we must expect also to go slow. I think, perhaps, it would be best to first consider the natural way of growing seal. Wild seal propagates in two ways, principally by the formation of new plants on the long slim fiber roots some distance away from the parent plant. The rhizome of the seal plant sends out, according to the vigor of the individual plant, from a half dozen up to as high as one hundred or more fiber roots, all nearly of one size and all very long and slim holding their full size to near the extreme end. Some of these roots are two feet in length and I have seen them over three feet.

When the root becomes fairly matured small plants start on the long slim roots and after two or three seasons, when this new plant gets well started, the root on which it formed will perish away somewhere between it and the parent plant, thus forming a separate and distinct plant.

The other method of increase by the wild plant is by seed. The seed ripens the last of July or fore part of August and when first changing in color from the green into a bright scarlet, and later turning to crimson,

and if not disturbed or shaken from the plant, often dries and then turns to a very dark brown. If the seed remains dry for any length of time, it kills it outright. If by chance the seed falls soon after ripe and is soon covered by leaves so it will not dry out, it will grow the following spring. From close and long observation, I am inclined to think very few seeds ever grow in the wild state. Birds do scatter a few and they are more liable to grow for the reason that they are taken from the parent plant before drying and stripped of the pulp surrounding them. They are more liable to find their way when dropped among the leaves and litter to a place where they will not dry up. This plant is purely a bedding plant and often is found as a thick compact mass of plants. It sometimes happens that they get so thick and crowded that rot sets in, usually where the roots are thickest. This starting in the center of a large old root rarely extends to the extreme ends and in that manner often makes several separate pieces of root with the center, and also the buds gone, but after a season or two, new buds will form on these pieces and thus practically new separate plants are formed. A plant from seed the first season in the forest is very small and does not have the proper seal leaf until the second year. The accompanying cut shows an average wild seedling the first season, both root and top.



If the grower decides to select the forest for his garden, he should first remove all fiber root, of trees and large plants that come in the bed. He should also be very careful to select the location of each bed so as it will be well shaded during the middle of the day. The large trees will throw their fiber roots into this mellow prepared bed and by the end of the second summer the gardener will find his beds crowded with them and the seal plants from that time on will make very slow growth, unless he again clears all these fiber roots out. To do this he will have to take up a few hundred first and heal them in some soft mellow soil where they will remain in good condition for some time without attention. Then clear out the roots and mellow up the plat of ground where he dug them and get it ready to plant again. Then, as fast as he digs up other roots, set or plant them at once in the prepared bed. In this manner he can dig and reset his plant and not harm them by drying or exposing them to sun and wind. By transplanting them after two years, they will again make a good growth and by the end of the fourth summer will be ready to harvest, That is, if

good, fair plants were used to start with.

Golden Seal Garden.

A much larger growth, however, can be secured by growing this plant in good garden soil under artificial shade. It has been supposed that virgin soil must be used; this is not the case. Any good soil that will grow a fair crop of garden vegetables is all right for Golden Seal. Select well drained, mellow, friable soil and if not rich, give it a heavy coat of stable manure, and work it all one summer by spading or ploughing and harrowing once a week. This will mix the manure and also sprout and get rid of weed seeds. By the first of September, your garden will be ready to plant In preparing for planting, I advise that the ground be laid off into beds of a suitable width to accommodate whatever shading you use. I also find the plants to thrive better if the beds are raised somewhat above the level. We level the ground and then draw a line where we want the edge of the bed, and with round-pointed shovel throw out about eight inches of soil from the paths, placing this soil on the beds. I do not use the edge boards as they cost considerable and really are not needed.

In planting, we first determine how long we want the bed to stand before harvesting or resetting. Also much depends on the plants we have on hand. If we are planting good, strong plants and intend to dig them after three seasons' growth, we plant six by eight inches. Usually the rows eight inches apart and the plants six inches apart. If we desire them to remain four years, then we plant eight by eight inches, and if the bed is to remain more than four years undisturbed, they should be planted at least eight by ten inches. The reason for this is, that as this is a bedding plant and increases by adding new stalks from the rhizome and, also by new plants forming on the fiber roots, it, in time, becomes so thick that it would kill itself out if allowed to get too crowded. When it gets so thick that the entire ground is covered and the soil all taken up

with little roots, it must be lifted. If not, the tops will decay close to the ground from lack of air and the roots themselves are very apt to decay. The crown or bud, in planting, should be placed about two inches under the surface and if the roots have many long, fibrous roots, we always, with a sharp knife, cut them off about two inches from the rhizome. This helps in arranging the roots and spreading them out in planting, and also makes the plant fully as vigorous. The little ends, where cut, will usually throw out each two tiny plants soon after being put in the ground.

Golden Seal is one of the few plants that can safely be planted any time of the year, when the ground is not frozen so it cannot be worked. During May and June is the time that most diggers of this wild root begin to collect it for planting. It is in blossom in this state in May. Some of the collectors of this root still leave the top on when they are collecting for planting in the garden, but this should not be done as the wilted top draws hard on the disturbed root. Take the top off as soon as dug and then if planted soon the roots will get hold and in about three weeks another top will appear and often this second top will bear seed that same season. The gardener has several sources of supply to select from when buying his plants for starting a garden. First, because as yet the most abundant, comes the wild root as gathered by the root collectors. Then plants grown from seed in gardens, but in this connection the practice of planting yearling roots from seed is not to be advised, as they are too small to stand it. Two year old, grown in garden, is an ideal plant for transplanting. Another good plant comes from cutting up older garden plants and still another choice is the small plants started from layering pieces of fiber roots. We will describe each of this separately.

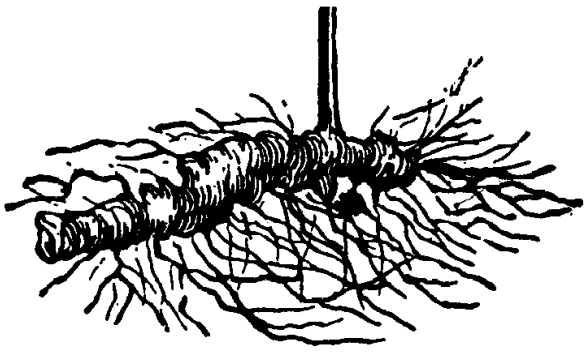


Figure 1.

Fig. 1 is from a photograph of a wild root but shows rather more fibers than the average wild root as received from the collector. It is a good root for planting and is about the size that you should expect when buying wild roots from a digger for your planting. Of course, some will be larger and some smaller but this is a fair average. Such roots as this should remain about four years after planting. They will bear to be planted about six by eight inches. If the

ground is very rich and the plants do extra well, it may happen that at the end of the third summer after planting, that the roots will have fully occupied the ground and the tops also occupy all the overhead room. If this should be the case, you should harvest them, as another season's growth in, that crowded condition will surely invite decay and that will mean a heavy loss to the grower. Last fall (1913) the writer harvested a plot of this class of roots that had been planted three years and dried them and at market prices of dry root ($4.50). the roots brought some over $12,000.00 to the acre.

Figure 1.

The next choice at the present time would be two-year roots from seed. See Fig. 2. This is not a two-year from the forest or from a forest garden for, as a rule, such would not reach the size represented in this picture from a photo, which was three-fourths natural size. The coming plant will be these two-year-olds from gardens. At present there are not enough of them to supply the demand and, of course, the price is high. As soon as the cultivation of Golden Seal is well established these will be, in my I mind, what will be sought for by the planters. I have not grown any of these two-year-olds to maturity but have seen them where they had been transplanted as two-year-olds and then grown three years and it is my opinion they are fully equal to the transplanted wild roots and probably will average to make a larger growth but at the present time the price of cultivated two year-olds is nearly twice that of good wild roots. With that difference, I think, it more profitable to buy the wild root for planting. As wild roots become fewer and the cultivated more plenty, the price will be changed and possibly reversed.

Two Year Old Root.

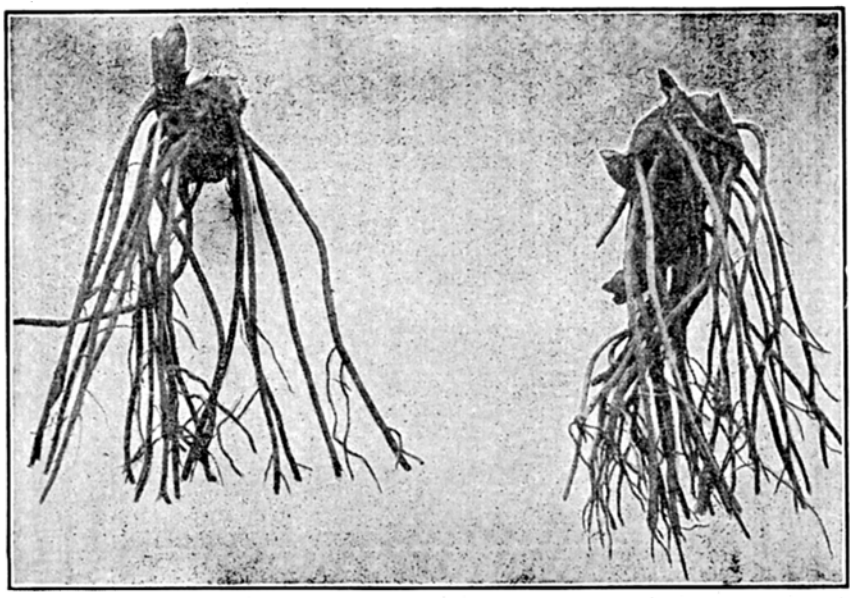


Figure 3.

Another grade of roots for planting is shown in Fig 3. These plants are divisions of large plants. The reset wild plants make better root to divide than the strictly cultivated plants, as the rhizome is larger in proportion to the fiber roots. The plants represented in Fig. 3 were taken from mature roots by cutting into lengths of about one-half inch of the rhizome and the cutting was so planned as to give each piece a bud. Parts of the root where a bud could not be given may be dried for market or if plants are greatly to be desired these may be planted and they will form buds but will be about one year behind those that had good strong buds. While most of them will form buds and come up the first season, they will not be as strong and growthy as the others. To make this class of plants one need not wait for maturity of root but may dig up a plot that has had but one season's growth and they will be able to make at least two plants from one on an average. This class of plants are stronger than either of the two first named, but considering their value to dry and sell as dry root, they are really more costly than the others. However, I am planting these in preference to any others, when I can get them.

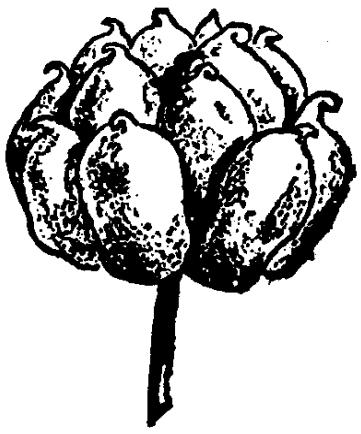
Still another class of plants for the gardener to consider are those represented in Fig. 4. The four little plants shown in the photo at Fig. 4 were produced by layering pieces of fiber roots in soft loam with a little gray sand added, but are identical with the little plants formed on the fiber roots of mature plants and in harvesting a crop of four-year-olds for drying, enough of these would be found to reset the plot. If the gardener is anxious to increase his garden he can, from one mature

Figure 4.

plant, cut from one hundred to five hundred of these pieces and by layering get from fifty to seventy-five per cent of them to form buds. The two upper ones in the cut have had one season's growth and another year they will grow rapidly. The two lower ones were cut from the parent plant ten weeks before the picture was taken and at the' time of layering showed no indications of forming a bud. At that time, out of two thousand pieces layered in November and placed in a warm cellar as an experiment, about two hundred had formed buds. It is, at this writing, about three weeks since we counted the two hundred that had formed buds, and today we find forty-five more. This process will continue for nearly a year but nearly all will form buds sooner or later. This class of plants grow slow the first year but after they are established, make good, thrifty stock. This is the favorite manner of increase of this plant in its wild state.

CARING FOR THE SEED.

Golden Seal Seed is more difficult to handle than most seeds the gardener is accustomed to and the ordinary farmer or city man is doomed to failure unless he carefully posts himself, First, get it firmly fixed in the mind that at no time should this seed be allowed to get dry clear through. The seed ripens in July or August, according to the locality where it grows. The seed head contains from ten to thirty small shiny black seeds and is similar to a common red raspberry. As it begins to turn from green to red the color is scarlet and as it begins to verge on crimson is the best time to gather.



As soon as gathered, separate the seeds from the pulp. This may be done by placing the berries in a sieve, the meshes of which will not allow the

seeds to pass through and then rub and crush with the hand; then with a copious supply of water wash out all the juice and pulp possible. By persistent rubbing and washing most of the juice and pulp can be eliminated; then layer the seeds with at least twice their bulk of fine sifted loam and let stand a month, when the seed will be ready to plant. Another method of getting rid of the pulp is to run the berries through an Enterprise meat chopper, being careful to use such attachments as will not crush very many seeds. Then wash and treat as above.

Figure 6.

This seed grows the spring following the harvest and should always be planted in the fall. If the attempt is made to carry it over until warm weather comes in spring, it is almost sure to sprout and spoil. It can be kept over, however, by placing it layered in the loam in boxes with perforated tops and bottoms and burying the box in the garden, where it will be kept cold and even freeze. Fig. 5 shows the seed or upper leaf on the stalk and also the seed berry.

HARVESTING, DRYING AND MARKETING.

The digging of Golden Seal should not be undertaken when the soil is very dry, especially if soil is heavy, as many of the fiber roots will break off and be lost. The gardener should also wait until the leaves and tops have died down, as that is the time when they weigh the heaviest and are the strongest in medicinal properties. If the tops have been killed with frost, wait two weeks to let them harden and mature, as they were killed before this process was completed. A spading fork is, a good thing. to dig with; shake off what dirt you can as soon as dug as it comes off better then.

In washing, great care should be taken to get them clean. An old splint basket or large sieve with a good stream of water running into it is all right. Very large roots will have to be broken apart in order to get the dirt clinging to the rhizome among the thick sprangles of fiber roots. This breaking and dividing does not hurt their market value as it does in the case of Ginseng.

If there are small roots to be saved for replanting, this should be done as soon as the roots are dug and the little fellows carefully healed in the garden or moist loam in boxes. The drying is very simple. Spread thin on floor of a warm room or place on screens over moderate heat. Be sure that the larger parts of the root are perfectly dry before putting away, as it will cause the whole to mould if these are still damp. The drying should be done in the shade.

Figure 6.

This root needs no sorting or other preparations for market after it is dry. Select a clean, light box to pack it in, line the box with paper, put in a few inches of roots and fibers, just as they grew, and then press down firmly. I do this by setting box on the floor and using my feet, placing my whole weight on them. This breaks many of the fiber roots but it does no harm.

Wild roots are worth the most because they have the least fiber in proportion to the weight of rhizome. In other words, the rhizome is the strongest part of the root and the price is based on the proportion of that part of the root as compared with the fiber roots.

GENERAL REMARKS.

That the general reader may get an idea of the difference in growth of the cultivated root and the wild, we give two illustrations, life size.

Fig. 6 is a yearling, cultivated from seed, and has had one season's growth. Fig. 7 is precisely the same age but is a wild, or forest grown, plant. Note the difference in the leaf; the wild seedling has not as yet developed the true seal leaf and has only the two little round baby leaves, while the garden plant has two distinct seal leaves.

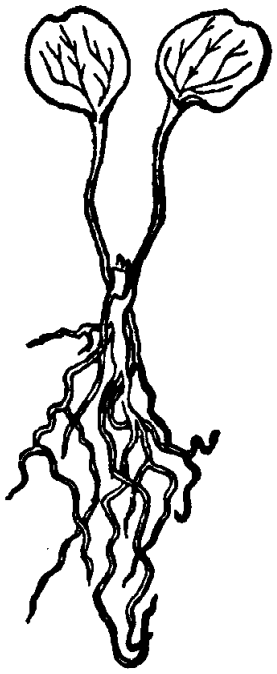


Figure 7.

This marked difference in growth will follow throughout the life of the plant unless great care is taken to keep the roots of the trees and larger forest plants from robbing the seal of moisture and fertility. To give some idea as to what can be done we have known cultivated seal roots to reach fourteen, sixteen, and in one case, eighteen ounces, dry weight, and this in only six years, from the wild plant and in a country where seal does not grow wild. The above large grow th occurred on the Pacific Coast. The largest we have seen grown in the north was one pound, green weight, at five years.

The seal grower, however, should be cautioned against high fertilizing, as it is liable to cause disease. Acid Phosphate should not be used, as we have known several cases where it caused the immediate death of the plants. Neither should raw manure be used. Well rotted stable manure is the best fertilizer we know of and is also best mulch. It is not necessary to use mulch but in many cases it is advisable as it conserves moisture and keeps back many small weeds. Our own gardens of seal we cultivate the top about one and one-half inches deep and keep it very fine and mellow all summer. This acts as a mulch and keeps the soil always moist and the plants growing. Care should be used in mulching seed beds as too heavy a mulch will cause a vacant spot in your beds the next summer. One inch of saw dust or buckwheat hulls is the limit and one and one-half inches of well rotted manure. Leaves, unless well rotted, should never be used on seed beds unless taken off early in the spring.

Golden Seal is unlike Ginseng, in that the market for it is based on its real value. From this plant are extracted the alkaloids, Hydrastinine and also Berberine, two preparations used by every physician in the country. Besides there is a large export demand. The growing of this plant must be resorted to if the drug trade is to be supplied with these alkaloids, and it is opening a very large and, profitable field.

The cultivated root, when it attains age, becomes an irregular shaped chunked root or mass of roots. The first season after planting it usually throws up but one stalk but during the summer one or more new buds

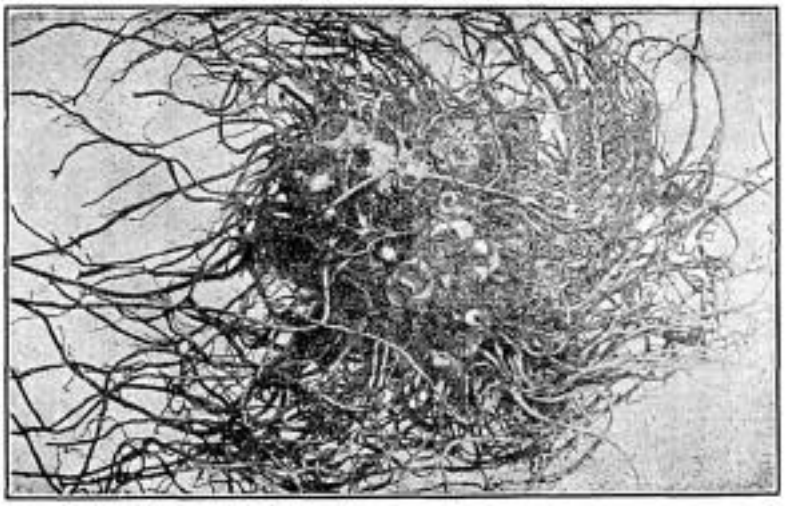


Figure 8.

will start from other parts of the rhizome and the second summer two to four stalks will appear and this process continues until we find an old plant with as high as twenty stalks and as the root enlarges where each stalk comes out, we have a very irregular mass not at all resembling the one straight, little, wild root planted. Fig. 8 is a medium-sized root of this sort, weighing, green, six ounces.

This far no disease has attacked the seal plant, and if growers do not manure it too highly, we are not looking for any, but we should all remember that for ages and ages, this plant has been pinched for food and has been taught to rough it. Slow growth in nature means stability and if we reverse the conditions and force the plant by coddling and high feeding, we are liable to undermine the constitution, no matter how rugged.

In shading this plant, the general instructions given for Ginseng will suffice and I should add here that the more sun you give it, up to the point of burning, the larger root growth you will get and not only that but also the larger per cent of Hydrastinine, or Hydrastine, as it is usually spelled. The U. S. Official Pharmacopia calls for this roof to analyze two and five-tenths per cent of Hydrastine. The wild root, dug in the fall, will exceed this by four or fivetenths of one per cent, sometimes reaching three per cent of Hydrastine. Spring dug root, although wild, will barely reach the standard. Cultivated root, fall dug, rhizome and fibers as they grew, will exceed the standard, but the fiber roots alone will not come up to the standard. This root loses somewhat of its medicinal value if kept any great length of time, after it is dried. The rhizome, or root proper, and also the fiber roots, are the parts used in medicine. Of late years the tops of this plant have come into use and now command about the same price that the roots did twenty years ago, which is around twenty cents per pound.

Since 1894 the price has advanced from about twenty cents per pound until in 1911 the price reached $4.50 and for extra quality, a little above that. In 1912, owing to the high price of the year before more than usual was marketed and the price dropped for a time but recovered to $4.50 or better in 1913.

To properly plant and shade one acre, with good plants and good substantial lumber shade, cost at present a little over $2,000.00 This will vary some in different localities, as the price of roots and lumber and labor will vary, but will come close to this, estimate. The returns from one acre, at four years from planting, will average $10,000.00 or better and at five years would reach an average of at least $15,000.00 and in many cases will go far beyond this and, of course, with the careless and slipshod grower will fall far short of it.

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I learned when a boy, by actual experience, that Golden Seal and Ginseng will not grow in open cultivated fields or gardens, I tried it faithfully. The soil must be virgin, or made practically so by the application of actual “new land” in such quantities that to prepare an acre for the proper growth of these plants would be almost impossible. And to furnish and keep in repair artificial shade for, say, an acre, would cost quite a little fortune. Of course one may cultivate a few hundred or few thousand in artificially prepared beds and shaded by artificial means, but to raise these plants successfully in anything like large quantities we must let nature herself prepare the beds and the shade.

When we follow nature closely we will not be troubled with diseases, such as blight and fungus. I know this by actual experience dear, and therefore dear to me.

Plants propagate themselves naturally by seedage, root suckers, and by root formation upon the tips of pendulous boughs coming in contact with the ground. Man propagates them artificially in various ways, as by layering, cuttings, grafting or budding, in all of which he must follow nature. The Golden Seal plant is readily propagated by any of the three following methods: (1) by seed; (2) by division of the large roots; (3) by suckers, or by small plants which form on the large fibrous roots.

The seed berries should be gathered as soon as ripe, and mashed into a

pulp, and left alone a day or two in a vessel, then washed out carefully and the seed stored in boxes of sandy loam on layers of rock moss, the moss turned bottom side up and the seed scattered thickly over it, then cover with about one-half inch of sandy loam, then place another layer of moss and seed, until you have four or five layers in a box. The box may be of any convenient size. The bottom of the box should be perforated with auger holes to secure good drainage. If water be allowed to stand upon the seeds they will not germinate, neither will they germinate if they become dry. The seeds should be kept moist but not wet. They may be sown in the fall, but, I think the better way, by far, is to keep your box of seeds in a cellar where they will not freeze until the latter part of winter or very early spring. If your seeds have been properly stratified and properly kept you will find by the middle of January that each little black seed has burst open and is wearing a beautiful shining golden vest. In fact, it is beginning to germinate, and the sooner it is put into the seed-bed the better. If left too long in the box you will find, to your displeasure, a mass of tangled golden thread-like rootlets and leaflets, a total loss.

To prepare a seed-bed, simply rake off the forest leaves from a spot of ground where the soil is rich and loamy, then with your rake make a shallow bed, scatter the seeds over it, broadcast, being careful not to sow them too thick. Firm the earth upon them with the back of the hoe or tramp them with the feet. This bed should not be near a large tree of any kind, and should be protected from the sun, es pecially from noon to 3 P.M.

The Golden Seal seedling has two round seed leaves upon long stems during the first season of its growth. These seed leaves do not resemble the leaves of tile Golden Seal plant. The second and usually the third years the plant has one leaf. These seedlings may. be set in rows in beds for cultivation in the early spring of the second or third year. This plant grows very slowly from seed for the first two or three years, after which the growth is more satisfactory.

By the second method, i. e., by division of the large roots, simply cut the roots up into pieces about one-fourth inch long and stratify in the same way as recommended for seeds, and by spring each piece will have developed a bud, and will be ready to transplant into beds for cultivation.

This is a very satisfactory and a very successful method of propagating

this plant. The plants grow off strong and robust from the start and soon become seed bearing.

By the third method we simply let nature do the work. If the plants are growing in rich, loose, loamy soil, so the fibrous roots may easily run in every direction, the whole bed will soon be thickly set with plants. These may be taken up and transplanted or may be allowed to grow and develop where they are.

This is the method by which I propagate nearly all of my plants. It is a natural way and the easiest of the three ways to practice.

As to the proper soil and location for a Golden Seal garden I would recommend a northern or northeastern exposure. The soil should be well drained and capable of a thrifty growth of deciduous trees. It should contain an ample supply of humus made of leaf mold. It will then be naturally loose and adapted to the growth of Golden Seal. Cut out all undergrowth and leave for shade trees that will grow into value. I am growing locust trees for posts in my Golden Seal garden. I do not think fruit trees of any kind suitable for this purpose.

In preparing the ground for planting simply dig a trench with a mattock where you intend to set a row. This loosens up the soil and makes the setting easy. Set the plants in this row four to six inches apart. For convenience I make the rows up and down the hill. In setting spread the fibrous roots out each way from the large main root and cover with loose soil about one to two inches deep, firming the soil around the plant with the hands. Be very careful not to put the fibrous roots in a wad down in a hole. They do not grow that way. Plants may be set any time through the summer, spring or fall, if the weather be not too dry. The tops will sometimes die down, in which case the root will generally send up a new top in a few days. If it does not it will form a bud and prepare for growth the next spring. The root seldom if ever dies from transplanting. I know of no plant that is surer to grow when transplanted that Golden Seal. I make the rows one foot to fifteen inches apart. It does not matter as it will soon fill the spaces with sucker plants any way.

The cultivation of Golden Seal is very simple. If you have a deep, loose soil filled with the necessary humus your work will be to rid the plot of weeds, and each fall add to the fall of forest leaves a mulch of rotten leaves.

Do not set the plants deeper than they grew in a natural state, say about 1/2 to 3/4 inch. Spread the fibrous roots out in all directions and cover with leaf mold or some fine, loamy new soil. Water if the ground be at all dry. Then mulch with old forest leaves that have begun to decay. Let the mulch be about three or four inches deep and held on by a few light brush. The wind would blow the leaves away if not thus held in place. Be careful, however, not to press the leaves down with weights.

Golden Seal Plants.

Remove the brush in the early spring, but let the leaves remain. The plants will come up thru them all right. This plants grows best in a soil made tip entirely of decayed vegetation, such as old leaf beds and where old logs have rotted and fallen back to earth. If weeds or grass begin to grow in your beds pull them up before they get a start. Be careful to do this. Do not hoe or dig up the soil any way. The fibrous roots spread out in all directions just under the mulch. To dig this up would very much injure the plants.

I think the plants should be set in rows about one foot apart, and the plants three or four inches apart in the rows. This would require about 1,000 plants to set one square rod. My Golden Seal garden is in a grove of young locust trees that are rapidly growing into posts and cash. The leaves drop down upon my Golden Seal and mulch it sufficiently. The locust belongs to the Leguminous family of plants, so while the leaves furnish the necessary shade they drink in the nitrogen from the atmosphere and deposit great stores of it in the soil. This makes the soil porous and loose and gives the plant a very healthy dark green appearance.

We have only to follow the natural manner of the growth of the Golden Seal to be successful in its culture. Select a piece of sloping land, so as to be well drained, on the north or northeast side of the hill—virgin soil if possible. Let the soil be rich and loamy, full of leaf mold and covered with rotting leaves and vegetation. This is the sort of soil that Golden Seal grows in, naturally.

It is hard to fix up a piece of ground, artificially, as nature prepares it,

for a wild plant to grow in. So select a piece if possible that nature has prepared for you. Do not clear your land. Only cut away the larger timber. Leave the smaller stuff to grow and shade your plants. There is no shade that will equal a natural one for Ginseng or Golden Seal.

Now, take a garden line and stretch it up and down the hill the distance you want your bed to be wide. Mark the place for the row along the line with a mattock, and dig up the soil to loosen it, so as to set the plants, or, rather, plant the roots easily. With a garden dibble, or some other like tool make a place for each plant. Set the plants 4 to 6 inches apart in the row. The crown of the plant or bud should be set about I inch beneath the surface.

Firm the earth around the plant carefully. This is an important point and should be observed in setting any plant.

More plants are lost each year by carelessly leaving the earth loose over and around the roots than from any other cause. Do not leave a trench in the row. This may start a wash. Let the rows be about I foot apart. If land is no item to you, the rows may be further apart. They will, if properly cared for, in a few years, by sending up sprouts from the roots, fill up the end completely.

When you have finished setting your bed, cover it with a good mulch of rotten leaves from the forest and throw upon them some brush to keep the wind from blowing them away. By spring the leaves will settle down compactly and you will be pleased to see your plants grow luxuriously. October and November are the best months of the year in which to set Golden Seal plants. They are, also, the months in which it should be dug for the market. It may be set in the spring if the plants are near by. The roots will always grow if not allowed to dry before transplanting.

If your bed does not supply you with plants fast enough by suckering, you may propagate plants by cutting the roots into pieces about one-fourth inch long, leaving as many fibrous roots on each piece as possible. These cuttings should be made in September or October and placed in boxes of sand over winter. The boxes should be kept in a cellar where they will not freeze. By spring these pieces will have developed a bud and be ready for transplanting, which should be done just as early as the frost leaves the ground so it can be worked.

All the culture needed by this plant is to mulch the beds with forest

leaves each fall and keep it clear of grass and field weeds. Wild weeds do not seem to injure it.

Golden Seal transplants easily and responds readily to proper cultivation. There is no witchcraft in it. The seeds ripen in a large red berry in July to germinate, if planted at once, the next spring. The fibrous roots, if stratified in sand loam in the autumn, will produce fine plants. Any good, fresh, loamy soil, that is partially shaded will produce a good Golden Seal.

You want soil that is in good tilth, full of humus and life, and free from grasses and weeds. It will stand a great deal more sunlight than Ginseng. It will also produce a crop of marketable roots much quicker than Ginseng. There is no danger of an over supplied market, as the whims of a nation changing, or of a boycott of a jealous people. I have my little patch of Golden Seal that I am watching and with which I am experimenting.

I want to say right here that you do not need a large capital to begin the culture of these plants that are today being exploited by different parties for cultivation. just get a little plot of virgin soil, say six yards long by one yard wide and divide it into two equal lots. Then secure from the woods or from some one who has stock to sell about 100 plants of each, then cultivate or care for your apron garden and increase your plantation from your beds as you increase in wisdom and in the knowledge of the culture of these plants.

The Bible says “Despise not the day of small things.” Do not, for your own sake, invest a lot of money in a “Seng” or Seal plantation or take stock in any exploiter's scheme to get rich quick by the culture of these plants. Some one has written a book entitled “Farming by Inches.” It is a good book and should be in every gardener's library. Now, if there be any crops that will pay a big dividend on the investment farmed by inches, “Seng” and Seal are the crops.

CHAPTER XVIII.

GOLDEN SEAL, HISTORY, ETC.

The increasing use of Golden Seal in medicine has resulted in a wide demand for information about the plant, its identification, geographical distribution, the conditions under which it grows, methods of collecting and preparing the rhizomes, relations of supply and demand, and the possibilities of its cultivation. This paper with the exception of the part relating to cultivation wa s prepared (under the direction of Dr. Rodney H. True, Physiologist in Charge of Drug and Medicinal Plant Investigations) by Miss Alice Hinckel, Assistant in Drug and Medicinal Plant Investigations; and Mr. G. Fred Klugh, Scientific Assistant in the same office, in charge of Cultural Experiments in the Testing Gardens, furnished the part treating of the cultivation of this plant. In the preparation of this paper, which was undertaken to meet the demand for information relative to Golden Seal, now fast disappearing from our forests, many facts have been obtained from Lloyd's Drugs and Medicines of North America.

LYSTER H. DEWEY, Acting Botanist.

OFFICE OF BOTANICAL INVESTIGATIONS AND EXPERIMENTS,
WASHINGTON, D. C., Sept. 7, 1904.

HISTORY.

As in the case of many other native medicinal plants, the early settlers learned of the virtues of Golden Seal thru the American Indians, who used the root as a medicine and the yellow juice as a stain for their faces and a dye for their clothing.

The Indians regarded Golden Seal as a specific for sore and inflamed eyes and it was a very popular remedy with pioneers of Ohio and Kentucky for this affection, as also for sore mouth, the root being chewed for the relief of the last named trouble.

Barton in his “Collection for an Essay towards a Materia Medica of the United States,” 1804, speaks of the use of a spiritual infusion of the root of Golden Seal as a tonic bitters in the western part of Pennsylvania and the employment of an infusion of the root in cold water as a wash for inflammation of the eyes.

According to Dr. C. S. Rafinesque, in his Medical Flora in 1829, the Indians also employed the juice or infusion for many “external complaints, as a topic tonic” and that “some Indians employ it as a diuretic stimulant and escharotic, using the powder for blistering and the infusion for the dropsy.”

He states further that “internally it is used as a bitter tonic, in infusion or tincture, in disorders of the stomach, the liver,” etc.

It was not until the demand was created for Golden Seal by the eclectic school of practitioners, about 1747 (actually 1847), that it became an article of commerce, and in 1860 the root was made official in the Pharmacopoeia of the United States, which place it has held to the present time.

HABITAT AND RANGE

Golden Seal occurs in patches in high open woods where there is plenty of leaf mold, and usually on hillsides or bluffs affording nature drainage, but it is not found in very moist or swampy situations, in prairie land, or in sterile soil. It is native from southern New York to Minnesota and western Ontario, south to Georgia and Missouri, ascending to an altitude of 2,500 feet in Virginia. It is now becoming scarce thruout its range. Not all of this region, however, produced Golden Seal in. abundance. Ohio, Indiana, Kentucky and West Virginia have been the greatest Golden Seal producing states, while in some localities in southern Illinois, southern Missouri, northern Arkansas, and central and western Tennessee the plant, tho common, could not be said to be sufficiently plentiful to furnish any large amount of the root. In other portions of its range it is sparingly distributed.

COMMON NAMES.

Many common names have been applied to this plant in different localities, most of them bearing some reference to the characteristic yellow color of the root, such as yellow root, yellow puccoon, orange-root, yellow paint, yellow Indian paint, golden root, Indian dye, curcuma, wild curcuma, wild tumeric, Indian tumeric, jaundice root and yellow eye; other names are eyebalm, eye-root and ground raspberry. Yellow root, a popular name for it, is misleading, as it has been applied to other plants also, namely, to gold thread, false bittersweet, twinleaf and the

yellow-wood. The name Golden Seal, derived from its yellow color and seal-like scars on the root, has been, however, generally adopted.

DESCRIPTION OF THE PLANT.

It is a perennial plant and the thick yellow rootstock sends up an erect, hairy stem about a foot in height, around the base of which are two or three yellowish scales. The stems, as they emerge from the ground, are bent over, the tops still remaining underground, and sometimes the stems show some distance above the surface before the tops are brought out from the soil. The yellow color of the roots and scales extends partly up the stem so far as it is covered by soil, while the portion of the stem above the ground has a purplish color. Golden seal has only two leaves (rarely three), the stem bearing these seeming to fork at the top, one branch supporting a large leaf and the other a smaller one and a flower. Occasionally there is a third leaf, much smaller than the other two and stemless.

The leaves are prominently veined on the lower surface, and are palmately 5 to 9 lobed, the lobes broad, acute, sharply and unequally toothed. The leaves are only partially developed at flowering time and are very much wrinkled, but they continue to expand until they are from 6 to 8 inches in diameter, becoming thinner in texture and smoother. The upper leaf subtends or encloses the flower bud.

Early in spring, about April or May, the flower appears, but few ever see it as it lasts only five or six days. It is greenish-white, less than half an inch in diameter, and has no petals, but instead three small petal-like sepals, which fall away as soon as the flower expands, leaving only the stamens-as many as 40 or 50—in the center of which are about a dozen pistils, which finally develop into a round, fleshy, berrylike head. The fruit ripens in July or August, turning a bright red and resembling a large raspberry, whence the common name ground raspberry, is derived. Each fruit contains from 10 to 20 small, black, shining, hard seeds.

If the season has been moist, the plant sometimes persists to the beginning of winter, but if it has been a dry season it dies soon after the fruit is ripe, so that by the end of September no trace of the plant remains above the ground. In a patch of Golden Seal there are always many sterile stems, simple and erect, bearing a solitary leaf at the apex but no flower.

Mr. Homer Bowers, of Montgomery county, Ind., who propagated Golden Seal from the seed for the purpose of studying its germination and growth, states that the plant grown from naturally sown seed often escapes observation during the first year of its existence owing to the fact that in this entire period nothing but two round seed leaves are produced and at this stage the plant does not look materially different from other young seedings. During its second year from seed one basel leaf is sent up, followed in the third year by another smaller leaf and the flower.

DESCRIPTION OF THE RHIZOME, OR ROOTSTOCK.

The rhizome (roostock) and rootlets of Golden Seal, or hydrastis, as it is also known in the drug trade, are the parts employed in medicine. The full-grown rhizome, when fresh, is of a bright yellow color, both internally and externally, about $1^1/_2$ to $2^1/_2$ inches in length, and from one-fourth to three-fourths of an inch in thickness. Fibrous yellow rootlets are produced from the sides of the rhizome. The fresh rhizome contains a large amount of yellow juice, and gives off a rank, nauseating odor. When dry the rhizome measures from one to two inches in length and from oneeighth to one-third of an inch in diameter.

It is crooked, knotty, wrinkled, of a dull brown color outside, and breaks with a clean, short, resinous fracture, showing a lemon-yellow color if the root is not old. If the dried root is kept for a long time it will be greenish-yellow or brown internally, and becomes inferior in quality. On the upper surface of the rhizome are several depressions, left by former annual stems, which resemble the imprint of a seal; hence the name Golden Seal.

The fibrous rootlets become very wiry and brittle in drying, break off readily and leaving only small protuberances, so that the root as found in commerce is sometimes almost bare. The dried rhizome has also a peculiar, somewhat narcotic, disagreeable odor, but not so pronounced as in the fresh material; an exceedingly bitter taste; and a persistent acridity which causes an abundant flow of saliva when the rhizome is chewed.

COLLECTION AND PREPARATION OF THE ROOT.

The root should be collected in autumn after the plants have matured. Spring-dug root shrinks far more in drying and always commands a lower price than the fall-dug root. After the roots are removed from the earth they should be carefully freed from soil and all foreign particles. They should then be sorted and small, undeveloped roots and broken pieces may be laid aside for replanting. After the roots have been cleaned and sorted they are ready to be dried or cured.

Great care and judgment are necessary in drying the roots. It is absolutely necessary that they should be perfectly dry before packing and storing, as the presence of moisture induces the development of molds and mildews, and of course renders them worthless. The roots are dried by the exposure to the air, being spread out in thin layers on drying frames or upon a large, clean, dry floor. They should be turned several times during the day, repeating this day after day until the roots are thoroughly dried. If dried out of doors they should be placed under cover upon indication of rain and at night so that they may not be injured by dew. After the roots are thoroughly dried they may be packed as tightly as possible in dry sacks or barrels and they are then ready for shipment.

DIMINUTION OF SUPPLY.

Altho, perhaps, in some secluded localities Golden Seal may still be found rather abundantly, the supply is rapidly diminishing and there is a growing scarcity of the plant thruout its range. With the advance of civilization and increase in population came a growing demand for many of our native medicinal plants and a corresponding decrease in the sources of supply. As the rich forest lands of the Ohio valley and elsewhere were required for the needs of the early settlers they were cleared of timber and cultivated, and the Golden Seal, deprived of the shelter and protection necessary to its existence, gradually disappeared, as it will not thrive on land that is cultivated.

Where it was not destroyed in this manner the root diggers, diligently plying their vocation, did their share toward exterminating this useful little plant, which they collected regardless of the season, either before the plants had made much growth in the spring or before the seeds had matured and been disseminated, thus destroying all means of propagation. The demand for the root appears to be increasing, and the

time seems to be not far distant when this plant will have become practically exterminated, so far as the drug supply is concerned.

The cultivation of golden seal seems now to have become a necessity in order to meet the demand and save the plant from extinction. Prior to 1900 there seemed to be no one, so far as the Department of Agriculture could ascertain, who had ever attempted the cultivation of golden seal for the market. From that time on, many inquiries were directed to the Department by persons who were quick to note the upward tendency of prices for golden seal and there are now several growers in different parts of the country who have undertaken the cultivation of golden seal on a commercial scale.

CULTIVATION.

The United States Department of Agriculture has been carrying on experiments in the cultivation of Golden Seal on a small scale at Washington, D. C., since the spring of 1899, in the hope that methods might be worked out according to which this valuable wild drug plant could be grown on a commercial scale. In these experiments the aim has been to imitate the natural conditions of growth as closely as possible. The results that have thus far b een obtained, while not as complete in some respects as would be desirable, seem to justify the conclusion that Golden Seal can be successfully cultivated. The methods of operation described apply to the conditions at Washington, and the treatment may need to be somewhat modified under other conditions of soil and climate.

NECESSARY SOIL CONDITIONS.

The soil conditions should imitate as closely as possible those seen in thrifty deciduous forest. The soil should contain an ample supply of humus, well worked into the ground, to secure the lightness and moisture-retaining property of forest soils. The best form of humus is probably leaf mold, but good results may be obtained by mulching in the autumn or early winter with leaves, straw, stable manure, or similar materials.

After the soil has been prepared and planted, it is well to add a mulch in the fall as a partial protection to the roots during the winter, and the decay of this material adds to the value of the soil by the time the plants appear in the spring. The forest conditions are thus imitated by the annual addition of vegetable matter to the soil, which by its gradual

decay accumulates an increasing depth of a soil rich in materials adapted to the feeding of the plants and to the preservation of proper physical conditions.

The growth of the weeds is also hindered to a considerable extent. If sufficient attention is given to the presence of this mulch, the nature of the underlying soil is of less importance than otherwise. In the case of clay the thorough incorporation of a large amount of decayed vegetable matter tends to give lightness to the otherwise heavy soil, facilitating aeration and drainage. Since the roots of the Golden Seal do not grow well in a wet soil, thorough drainage is necessary. A lighter, sandy soil is improved by the addition of humus, since its capacity to hold moisture is thereby increased and the degree of fertility is improved.

The looser the soil, the easier it is to remove the roots in digging without breaking or injuring them. Before planting, the soil should be thoroughly prepared to a depth of at least 6 or 8 inches, so as to secure good aeration and drainage. The good tilth thus secured will be in a degree preserved by the continued addition of the mulch. A further advantage of a careful preparation is seen in a decrease in the amount of cultivation required later.

ARTIFICIAL SHADE.

Since the Golden Seal grows naturally in the woods, it must be protected from the full light of the sun by artificial shade. That used in connection with the experiments of the Department was made of ordinary pine plastering lath, nailed to a suitable frame elevated on posts. The posts were of cedar 81 feet long, set 21 feet in the ground in rows 11 feet apart, and 16 feet distance from each other in the rows. Supports 2 by 4 inches were set on cedar blocks 2 feet long -sunk below the soil surface in the middle of the 16-foot spaces. Pine pieces 2 by 4 inches were nailed edgewise to the tops of the posts and supports. The posts were notched to receive the 2 by 4-inch sticks. Pieces 2 by 4 inches were nailed across these at intervals of 4 feet. The laths were nailed to these, leaving spaces about an inch wide.

This shade has been found to be satisfactory, as it is high enough above the ground to allow such work as is necessary in preparing and cultivating the land. If the lathing is extended 2 or 3 feet beyond the posts on the sunny sides, injury from the sun's rays at the edges of the area will be prevented. The sides may be protected by portable board

walls about 2 feet high set around the edges. Protection from injury by winds when the tops are large may be thus secured. Too much dampness should be guarded against in the use of the board sides, since conditions might be developed favorable to the damping off fungus and to aphides during the hot, rainy periods.

Trees may be used for shade, but this is in some ways to be regarded as unsatisfactory. When the shade produced is of the right density, the use of the moisture and raw food materials of the soil by the trees is an undesirable feature.

ATTENTION REQUIRED.

The cultivation of Golden Seat is simple. Having secured a deep, loose soil, rich in humus, renewed annually by the application of a new mulch, the removal of weeds is the chief care. The soil, if properly prepared, will tend to maintain itself in good condition. The manner of treatment is very similar to that required by Ginseng, which is also a plant of moist woods. If the ground is thoroughly prepared, beds are not absolutely necessary. The plants may be grown in rows 1 foot apart and 6 inches apart in the rows. Beds may be thought by some to be more convenient, enabling the grower to remove the weeds and collect the seed more readily. If beds are used, they may be made from 4 to 8 feet wide, running the entire length of the shade, with walks from 18 inches to 2 feet wide between. Boards 6 or 8 inches wide are set up around the sides of the beds, being held in place by stakes driven on each side of the board in the center and at the ends. These beds are filled with prepared soil, and the plants are set 8 inches apart each way.

METHODS OF PROPAGATION.

There are three possible ways of propagating the plant: (1) by seed; (2) by division of the rhizomes; (3) by means of small plants formed on the stronger fibrous roots. Thus far no success has been attained in growing Golden Seal from the seed. The second and third methods have given better results.

EXPERIMENTS WITH SEEDS.

Seeds just after ripening were planted in sandy soil mixed with well rotted stable manure and mulched lightly with manure. Other lots were kept over winter in a dry condition and planted in the spring in potting

soil in a greenhouse. No seedlings have appeared, but a long rest period may be demanded and the seed may yet germinate.

EXPERIMENTS WITH DIVIDED RHIZOMES.

In the spring of 1902, 40 plants were secured and planted under a shade of temporary character, but the season was too far advanced to permit of much growth during that year. In 1903, proper shade was supplied, all other conditions were better, and the plants made a good growth. The crop was dug about the middle of November 1903; the roots were weighed and divided. They were again planted and in May, 1904, there were found to be 150 strong plants and a few smaller ones as a result of this division, an increase of 275 per cent.

This method of propagation seems to be the most important and the other two of second importance. The processes are simple and no skill is needed. The plant dies down in late summer and the stem decays, leaving a scar in its place on the rhizome. Two or more buds are formed on the sides of the rhizome and these accumulate energy for growth the following spring. If the root is cut in as many pieces as there are buds, giving each plant a portion of the rhizome, some fibrous roots, and one or more buds, the number of the plants can be doubled. The roots are planted and mulched and the process is complete. The rains pack the soil around the roots and they are ready to grow when spring comes. The process may be repeated every year and the number of roots increased indefinitely.

The stronger fibrous roots of the larger plants dug in the autumn of 1903 were formed. from a few inches to a foot from the rhizome. Some were about half an inch long, but the majority of them were smaller. The larger ones need no special treatment and may be planted with the main crop. The smaller ones should be planted in boxes or beds of well prepared soil, at a distance of about 3 inches apart, mulched with a thin coating of leaf mold or similar material, and grown in shade until large enough to transplant to the shelter with the larger plants. They will probably require at least three years to reach their full development.

If they could be left undisturbed in the beds where they are formed they would receive nourishment from the older rhizomes and perhaps grow faster, but it is probably best to divide the older roots every year where propagation alone is desired, planting the smaller roots and the plants made by division of the rhizomes. The larger roots are marketed to more

advantage than the smaller ones, so it is best to have the surplus consist of the larger roots. The frequent working of the soil allowed by this treatment will keep it in better condition than if left undisturbed for a longer period.

YIELD OF ROOTS.

The yield from the small plant grown by the Department was 4 pounds of green roots to an eighth of a square rod of soil, or 5,120 pounds per acre. This, when dried, would give about 1,500 pounds of marketable roots. The conditions were not very good, the shade being too close to the plants and the plants being set too far apart. The yield will probably be larger with the shade now in use. The 150 roots obtained by dividing the above crop now occupy less than one-fourth of a square rod and are set in rows one foot apart and 6 inches apart in the rows.

TIME NECESSARY TO MATURE CROP.

The number of years necessary to produce the largest crop has not been definitely determined, but the roots begin to decay after the fourth year and the central and largest part of the root decays at the oldest scar, leaving two or more plants in place of the old one. No advantage can be gained by growing the plants more than three years and probably very little by growing them more than two years. For propagation alone, one year will give good results, while for maintaining a constant area and producing a crop, two or three years, depending upon the growth made, will give a good crop of large, marketable roots.

MARKET CONDITIONS.

Golden Seal is a root the price of which has fluctuated widely, because of the alternate oversupply and scarcity, manipulation of the market, lack of demand, or other influences. High prices will cause the diggers to gather the root in abundance, thus overstocking the market, which the next season results in lower prices, at which diggers refuse to collect the root, thus again causing a shortage in the supply. Lack of demand usually brings about a shrinkage in price, even tho the supply is light, while an active demand will cause prices to advance in spite of a plentiful supply.

The arrival of spring dug root has a weakening effect on the market, altho the fall dug root is always preferred. For the past few years,

however, high prices have been steadily maintained and there appears to be but one cause for this and that is, as already pointed out, that the forests no longer yield unlimited quantities of this valuable root, as in former years, and the scant supply that can be had is inadequate to meet the constantly increasing demand.

According to the market reports contained in the Oil, Paint and Drug Reporter, the year 1904 opened with a quotation of 74 to 75 cents, will soon advance (in one week early in February) from 76 cents to 95 cents. A still further advance occurred about the end of February, when the price went up from $1.00 to $1.25 per pound. In March the market was almost destitute of supplies, but lack of interest brought the price down to $1.10. In May the price again advanced to $1.25 and it was stated that the local supplies were being held by a small number of dealers, altho it was believed that together they held not more than 1,000 pounds. About June 1st the arrival of spring dug roots cause a the market to sag, prices ranging from $1.10 to $1.18 during that month and in July from 90 cents to $1.10.

In August the lowest price was $1.15 and the highest $1.50, no discrimination being made between the fall dug and the spring dug roots. From September 1st to October 15th, 1904, the price of Golden Seal varied but little, $1.35 being the lowest and $1.40 the highest quotation. No supplies worth mentioning can be obtained in the West; the stock in New York is short and the demand, especially for export, is increasing. It is impossible to ascertain the exact annual consumption of Golden Seal root, but the estimates furnished by reliable dealers place these figures at from 200,000 to 300,000 pounds annually, about one-tenth of which is probably used for export.

It will be observed that the price of this article is very sensitive to market conditions and it seems probable that the point of overproduction would be easily reached if a large number of Golden Seal growers were to meet with success in growing large areas of this drug.

By ALICE HENKEL, Assistant, and G. FRED FLUME,
Scientific Assistant, Drug and Medicinal Plant Investigations.

U. S. Department of Agriculture.

CHAPTER XIX.

GROWERS LETTERS.

Considerable has been said the past few years concerning Hydrastis (Golden Seal) and I do not wish to enter on a long article describing this plant, but will make the facts brief and narrate some of my experiences with the plant under cultivation.

The scientific name is Hydrastis Canadensis, the common name Golden Seal, yellow root, puccoon root, Indian tumeric, etc., according to the section in which it is found. It is a perennial plant with an annual stem same as Ginseng, and appears above ground in the spring at the same time and manner. The stalk coming thru the ground bent and leaves folded. It has from one to three palmately five to nine lobed leaves, uneven and sharply toothed.

The fruit or seed grows from the base of one of these leaves. Flower is first whitish green producing the fruit red and resembling a strawberry, maturing last of July and the first of August.

The berry contains from fifteen to twenty small oval black shiney seeds. Only a portion of the stalks ever bear seed. From the middle to the last of September the stalks die down and when winter comes on the hydrastis bed appears the same as a Ginseng bed.

The root stalk or rhizome is thick, rough covered with rounded indentations or eyes, dark yellow in color and having many long threadlike bright yellow fibres branching in all directions. It has one and sometimes as many as four buds which will produce the next season's stalks. Besides these there are many latent buds and little plantlets on the runners of fibrous roots.

The root and all of its fibres is the part used in medicine I presume it will be difficult to fix a date when this plant was first used in medicine. But it is known that the Indians used it in healing diseases and in preparing stains and paints when first observed by the white man. Dr. Rafinesque first makes mention of it in a medical work in 1828 and the eclectic physicians adopted it in their practice in 1847. The Pharmacopoeia of the U. S. in 1860 made Hydrastis an official drug and described the manufacture of different preparations.

It has since gained in favor and in extent of application until at present it is almost the specific in the treatment of certain catarrhal conditions. Thousands of pounds being used by the physicians in different parts of the world variously estimated from 200,000 to 300,000 pounds annually, more extensively, as you see, than Ginseng.

The price has advanced as given by the Drug Reporter, from 1894 of 18 to 23 cents a pound, to 1903, of 52 to 75 cents a pound, since 1903 to 1906 it has advanced to $1.10 to $1.30 a pound. The figures representing the highest and lowest quotations of those years. The price of the plant has advanced first because investigation has proven the value of the plant as a drug in the healing art increasing its consumption, second the consumption of and destruction of its habitat is limiting its supply. It is used in all countries, but not found in all countries in its wild state. The United States supplies the majority of the root.

Golden Seal in an Upland Grove.

Its cultivation is very promising and profitable because only very few have entered the industry yet, the wild supply is becoming exhausted, the drug trade demands it and its consumption depends upon a sound demand.

There is a promising opportunity in this industry and when I am speaking I am not offering inducements to get the rich quick individual, but to the careful, painstaking. plodding individual who is willing to give at least some- labor for a handsome compensation. I have been one of the pioneers to begin the investigation and cultivation of this plant, and shall tell some of my experience in handling the plants.

I procured four years ago several pounds of green Hydrastis root from a digger and set them out in three different patches. One in the open garden, one in an enclosure shaded in the garden, and one bed in a

grove. I had the beds made the same as instructions had been given me for making beds for Ginseng. Ground loose and mellow, I selected only roots with buds formed, and set an inch under ground and six inches apart.

This was in June. All the plants came up and all made a good growth except those in the open, the leaves on these remained small and pinched about two to three inches from the ground. In digging them I found that they had thrown out a number of fibrous roots. In the fall I procured and set several thousand roots in the woods.

The next fall I set many more, but this time I cut the roots into three or four pieces and planted. All came the next summer, some not appearing above ground until June. I have had no success in planting seeds, so do not use this means of raising the plants. The method I use now is to cut the roots across so a latent bud will be on one piece, all small pieces broken and the fibers for some of these grow a plant.

After preparing the beds loose I lay little trenches across and drop the pieces in these every two or three inches apart, then cover about an inch with loose dirt, then leaves and mulch. The best time I have found to plant is in September, the earlier the better, for the buds then form before freezing up and are ready to come in the spring early.

They grow larger and thriftier if well rotted manure is in the ground and this does not interfere with the quality of the root. The largest roots I have seen grew in a hog lot supplied with hog manure. In three or four years I dig the roots, using a manure fork, the largest ones I wash and dry; the smaller ones and pieces I use for planting.

I am arranging a barrel shaped affair closed at the ends and covered around with wire to wash the roots. The method is to put a rod thru wifh handles on ends and rest on grooves on posts immersed half way of barrel in running water and revolve. In this way I believe the roots can be washed readily by splashing and falling in the water, and tons of the roots easily handled and washed clean with little help.

I have dried them by spreading on racks to dry in the sun. In bright sun it requires two or three days. As they wilt, I place on paper in order to save the fibres that break off. When making a business of growing these roots and having good, fresh roots in considerable quantity, a better price can be commanded by dealing direct with the drug mill. A great

many of the roots when dug will weigh one ounce or more and the roots lose in weight about the same as drying Ginseng.

DR. L. C. INGRAM, Wabasba County, Minn.

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There has never been a time in the history of this country when the cultivation of certain medicinal plants, as Golden Seal, Ginseng, Seneca and others appealed so much to those interested in such things as the present.

Many of these plants have hitherto been found growing wild in our woods and fields, and along our road sides and waste places, and have usually been gathered in an immature state and out of season, washed and cured in a slovenly manner and bartered at country stores for coffee and calico and other commodities. In this way the drugs and drug trade of the country have been supplied. I think it is very evident to the casual observer that this manner of supply is nearing its close finally and forever.

The merchant who handles the stock may not know as yet the great and growing scarcity of almost all our medicinal plants. But the digger who has stood at the first end of the drug trade, in touch with the natural supply, knows that the fountains are dried tip, in great measure, -and that the streams of the trade must necessarily soon cease to flow or be supplied by artificial means. In most cases medicinal plants grow naturally in the best soils, the sandy, loamy, moist north bill sides, the rich, black coves at the heads of our small streams and in the rich alluvial bottoms along our larger creeks and small rivers. They will not grow in wet lands or on south hill sides. This should be remembered by the would-be culturist and the natural whims of the plant attended to, else failure and disappointment are sure.

What I have said is peculiarly the case with Golden Seal, the yellow root of our locality, the ground raspberry of another, the yellow puccoon of another and probably bearing other local names in other localities. The natural habitat of Golden Seal has been cleared up for farming or grazing purposes, while the keen eyed “sanger” has ferreted out every nook and corner adapted to the growth of this plant and then ruthlessly dug it, little and big, old and young, until today it is a very scarce article.

The Indians regarded Golden Seal as a sure remedy for sore and inflamed eyes, sore mouths, old sores, wounds, etc., and first taught the whites its use as a remedy.

The pioneers used it as teas, washes and salves years before it became known to the medical fraternity. It did not become an article of commerce in any way until about the year 1847, and then it was so plentiful and so little used that the trade was supplied at 3 cents per pound for the dried root. I dug it myself, when a boy, as late as 1868, and received 5 cents per pound for the dried root, in trade, at a country store. I found it plentiful in patches in open woods where the ground was rich and favored the growth of paw paw, dogwood, walnut, elm, sugar maple, etc. It grew best in land well drained and full of leaf mold. Remember this, ye planters.

Well, the demand has rapidly increased, and the supply, from the causes afore mentioned, has more rapidly decreased, until the price has risen from 3 cents to $1.50 per pound. Golden Seal was originally found growing in favorable localities from Southern New York west to Minnesota, thence south to Arkansas and east to Georgia and the hill regions of the Carolinas. Ohio, Indiana, West Virginia and Eastern Kentucky have been by far the greatest Golden Seal producing sections.

Golden Seal is a perennial plant, the gnarly, knotty root of which is the part used in medicine. These knotty roots send out in every direction many long, slender, bright yellow, fibrous roots. Each root in spring early sends up one to six hairy stems six inches to fifteen or twenty inches in height, each stem supporting at the top one, or if a seed yielding plant, two large leaves, in shape somewhat resembling the leaf of the sugar maple, but thicker and more leathery. At the base of each stem are two or three scale like leaves starting from the root, around the stem and extending to the surface of the ground. These scales are yellow while the leaf stems are somewhat purplish in color, The seed bearing stocks fork near the top of the plant, each stem supporting a leaf, the smaller leaf enclosing a flower bud at the base and at the top of the leaf stem. The plants that are not of seed bearing age and size do not fork and have but one leaf. The flowers are greenish, about an inch in diameter and open, here, about the first of May. Then continue open about five days when the petals fall and the development of the seed berry begins.

This berry ripens in July. When ripe it is red in color and resembles a large raspberry and contains about 20 to 30 small, round, black, shiny, hard seeds. These seeds, if stratified at once and kept in moist, sandy loam, will begin to open by the first of February, each seed showing a beautiful, bright, shiny, golden bud. The seeds should be planted very early. When it comes up, the young plant has two leaves and does not develop any further leaf or stem growth during the first summer. The first two leaves do not look at all like those that follow. So, be careful or you will destroy your plants for weeds.

Lemon Grove Seal Garden.

Plants may be readily propagated by cutting up the roots into pieces, say 1/4-inch long and placing these root cuttings in boxes of loamy sand in the autumn. By spring each root cutting will have developed a fine bud and be ready for transplanting, which should be done as early as possible. The plant also propagates itself by sending up suckers from the fibrous roots.

As to culture, I would say, follow nature. Do not plow and hoe and rake and make a bed as for onions. just simply select a piece of virgin soil, if possible, and make rows, say one foot apart and set the plants about three or four inches apart in the rows. All the culture needful is to pull out the weeds, and, if the trees in the patch be not sufficient to furnish a good leaf mulch in the fall, attend to this by mulching with a good coat of forest leaves.

My Golden Seal garden is in a locust grove that is rapidly growing into posts, so, you see, I am getting two very profitable crops off the same land at the same time. The plants should grow in a bed of this kind until it becomes full of roots, which will require three to five years. It is all the better if they are allowed to grow longer. The whole patch should be dug in the fall when the tops die down. The large roots should be carefully washed and cleansed of all foreign roots and fibers and dried on clean cloths in the shade, when it is ready for market and should be shipped in clean, new bags to some reliable dealer in the larger cities. There are plenty of them and I would advise that you write to several of them, telling them just what you have before you ship.

I know from actual experience that good money may be made by the right party in the culture of Golden Seal. If a young man would start a garden of medicinal plants and attend to it at odd times, studying the nature of the plants and carefully save all seeds and add them to his stock, in a few years he would have a garden with a large sum of money. I have estimated an acre of Golden Seal at full maturity and as thick on the ground as it should be grown to be worth $4,840, or one dollar per square yard. It will not take a very great while to fill an acre with plants. Besides, if the land is planted in locust trees it is yielding two crops of wonderful value at the same time.

One young man from Virginia says: “I have a piece of new ground just cleared up which I think would be just the thing, and then I could set out short stem red cherries to shade and cover the ground. Please let me hear from you at once.” Well, if this piece of ground is on the right side of the hill, that is, the north or northeast or west slope, and is rich, loose and loamy, full of leaf mold and naturally well drained, it is all right for Golden Seal, but would it suit cherries? Cherries might do very well for shade, but I would prefer catalpa or locust or some other quick growing timber tree to any sort of fruit tree.

One reason is that in gathering the fruit and in caring for the trees 1 think the Golden Seal would be trampled upon and injured, also the ground would be trampled and compacted and thus rendered unsuitable for this plant. The ground in which Golden Seal grows should be kept in its “new state” as much as possible. However, my Virginia friend may succeed well with his cherries and Seal. He must keep up the primitive condition of the soil and keep out weeds and grass.

Another question, “How long will it take it to mature?” As to its

“maturity,” it may be dug, cleansed, dried and marketed at any time and in any stage of its growth. But I think that a setting of Golden Seal should be dug in the fall three or four years after planting; the large roots washed and cleansed and made ready for market, while the smaller roots should be used for resetting the bed. You will have enough small roots to set a patch ten or twelve times the size of the one you dig, as each root set will in three or four years produce ten to fifteen good plants besides yielding a lot of seed.

“How much will it cost to plant one-eighth of an acre?” One-eighth of an acre contains twenty square rods, and to set one square rod, in rows eighteen inches apart would take 363 plants, and twenty square rods would take 20 times 363 plants, or 7,260 plants, which at $10.00 per thousand, would cost $72.60. But I would advise the beginner to “make haste slowly” in trying new things. A thing may be all right and very profitable if we understand it and give it proper culture, while it is very easy to make sad failure by over doing a good thing. So let the beginner procure a thousand or so plants and start his garden on a small scale, and increase his plantation from his own seed bed as his knowledge of the plant and its culture increases. A very large garden may be set in a few years from 1,000 plants.

“Should the seed be sown broadcast?” To be successful with the seed requires great patience and pains. I make a large flat brush heap and burn it off in the fall. I then dig up the ground to the depth of three or four inches and place boards edgewise around this bed, letting them down into the ground two or three inches. These boards are to keep out mice and to prevent washing. I then sow the seeds in little trenches made with a hoe handle about six inches apart and pretty thick in the trenches and smooth over and tramp solid.

Then sow a few handfuls of bone dust mulched with forest leaves and cover with brush to keep the leaves from blowing away. You are done now until spring. In the early spring, after freezing weather is over, carefully remove the brush and the mulch of leaves. Remember this must be done early as the plant wants to come up early. Watch for your young plants and carefully pull up every weed as soon as it shows itself. Mulch again in the fall and remove as before the next spring. Keep down weeds as before, and by fall you will have a fine lot of No. 1 two-year-old plants, which may be transplanted to the garden at once or early the next spring.

I should have stated that Golden Seal seed should not be allowed to dry after gathering. They should be placed in layers of sand in a box and kept moist until planting time. They begin to germinate very early, and if you delay planting until spring you are nearly sure to lose them.

As to the “profits,” I want it distinctly understood that I do not think that every one who starts a bed or patch of Golden Seal will be a millionaire in a few years. But I do think, and in fact I know, that considering the land in cultivation, the time and expense of its culture, it is one of the most profitable crops that can be grown in this latitude.

LEE S. DICK, Wayne County, W. Va.

CHAPTER XX.

GOLDEN SEAL -GOVERNMENT DESCRIPTION, ETC.

The following is from a bulletin issued by the U. S. Department of Agriculture—Bureau of Plant Industry—and edited by Alice Henkel:

Hydrastis Canadensis L.

DRUG NAME—HYDRASTIS.

OTHER COMMON NAMES—Yellowroot, yellow puccoon, orange-root, yellow Indian-paint, turmeric-root, Indian turmeric, Ohio curcuma, ground raspberry, eye-root, eye-balm, yellow-eye, jaundice-root, Indian-dye.

HABITAT AND RANGE—This native forest plant occurs in patches in high, open woods, and usually on hill sides or bluffs affording natural drainage, from southern New York to Minnesota and western Ontario, south to Georgia and Missouri.

Golden Seal (Hydrastis Canadensis) Flowering Plant and Fruit.

Golden Seal is now becoming scarce thruout its range. Ohio, Indiana, Kentucky and West Virginia have been the greatest Golden Seal producing states.

DESCRIPTION OF PLANT—Golden Seal is a perennial plant belonging to the same family as the buttercup, namely the crowfoot family (Ranunculaceae.) It has a thick yellow rootstock, which sends up an erect hairy stem about 1 foot in height, surrounded at the base by 2 or 3 yellowish scales. The yellow color of the roots and scales extends up

the stem so far as it is covered by soil, while the portion of the stem above ground has a purplish color. The stem, which has only two leaves, seems to fork at the top, one branch bearing a large leaf and the other a smaller one and a flower.

A third leaf, which is much smaller than the other two and stemless, is occasionally produced. The leaves are palmately 5 to 9 lobed, the lobes broad, acute, sharply and unequally toothed; they are prominently veined on the lower surface and at flowering time, when they are very much wrinkled, they are only partially developed, but they continue to expand until they are from 6 to 8 inches in diameter becoming thinner in texture and smoother. The upper leaf subtends or encloses the flower bud. The greenish white flower appears about April or May, but it is of short duration, lasting only five or six days. It is less than half an inch in diameter, and, instead of petals, has three small petal-like sepals, which fall away as son as the flower expands, leaving only the numerous stamens (as many as 40 or 50), in the center of which are about a dozen pistils, which finally develop into a round fleshy, berrylike head which ripens in July or August. The fruit when ripe turns a bright red and resembles a large raspberry, whence the common name "ground-raspberry" is derived. It contains from 10 to 20 small black, shining, hard seeds.

Golden Seal Rootstock.

DESCRIPTION OF ROOTSTOCK—The fresh rootstock of Golden Seal, which has a rank, nauseating odor, is bright yellow, both internally and externally, with fibrous yellow rootlets produced from the sides. It is from $1^1/_2$ to $2^1/_2$ inches in length, from $^1/_4$ to $^3/_4$ of an inch in thickness, and contains a large amount of yellow juice.

In the dried state the rootstock is crooked, knotty and wrinkled, from 1. to 2 inches in length, and from one-eighth to one-third of an inch in

diameter. It is a dull brown color on the outside and breaks with a clean, short, resinous fracture, showing a lemon-yellow color inside. After the rootstock has been kept for some time it will become greenish yellow or brown internally and its quality impaired. The cup-like depressions or stem scars on the upper surface of the rootstock resemble the imprint of a seal, whence the most popular name of the plant, golden seal, is derived. The rootstock as found in commerce is, almost bare, the fibrous rootlets, which in drying become very wiry and brittle, breaking off readily and leaving only small protuberances.

The odor of the dried rootstock, while not so pronounced as in the fresh material, is peculiar, narcotic and disagreeable. The taste is exceedingly bitter, and when the rootstock is chewed there is a persistent acridity, which causes an abundant flow of saliva.

COLLECTION, PRICES AND USES.—The root should be collected in autumn after the seeds have ripened, freed from soil, and carefully dried. After a dry season Golden Seal dies down soon after -the fruit is mature, so that it often happens that by the end of September not a trace of the plant remains above ground; but if the season has been moist, the plant sometimes persists to the beginning of winter. The price of Golden Seal ranges from $1 to $1.50 a pound.

Golden Seal, which is official in the United States Pharmacopoeia, is a useful drug in digestive disorders and in certain catarrhal affections of the mucous membranes, in the latter instance being administered both internally and locally.

CULTIVATION.—Once so abundant in certain parts of the country, especially in the Ohio Valley, Golden Seal is now becoming scarce thruout its range, and in consequence of the increased demand for the root, both at home and abroad, its cultivation must sooner or later be more generally undertaken in order to satisfy the needs of medicine.

In some parts of the country the cultivation of Golden Seal is already under way.

The first thing to be considered in growing this plant is to furnish it, as nearly as possible, the conditions to which it has been accustomed in its native forest home. This calls for a well-drained soil, rich in humus, and partially shaded. Golden Seal stands transplanting well, and the easiest way to propagate it is to bring the plants in from the forest and

transplant them to a properly prepared location, or to collect the rootstocks and to cut them into as many pieces as there are buds, planting these pieces in a deep, loose, well-prepared soil, and mulching, adding new mulch each year to renew the humus. With such a soil the cultivation of Golden Seal is simple and it will be necessary chiefly to keep down the weeds.

The plants may be grown in rows 1 foot apart and 6 inches apart in the row, or they may be grown in beds 4 to 8 feet wide, with walks between. Artificial shade will be necessary and this is supplied by the erection of lath sheds. The time required to obtain a marketable crop is from two to three years.