

Thesis.

GARDEN PLANS.

Ethel Cowles.



## References.

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|---|----------------|
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The importance of abundant fruit and vegetables in the diet cannot be overestimated. The diet of the city dweller is more liable to be deficient in these than that of the farmer, because the question of cost influences him more than it does the farmer. However if enough thought be taken in placing and caring for them, the amount of fruit and vegetables that can be grown on an ordinary city lot will make cost a minor question and possibly be a source of revenue.

The first plan presented here is of a city lot somewhat larger than the ordinary city lot. A statement of the preparation of the soil, care and planting necessary for orchard fruits, bush fruits, and vegetables will be followed by the application to the lot in question.

The second plan is of a small garden actually grown in a city lot.

For growing fruit trees a gentle slope is best because it provides for good air and water drainage. The air drainage is essential because the constant flow of air lessens the liability to frost and to winter injury and prevents spores of fungous disease from settling. The water drainage is as important because on poorly drained land the trees grow slowly and often have crooked and twisted trunks.

A wide range of soils may be used for orchard. Everything from a sandy loam to a fairly heavy clay loam can be used. However certain kinds of fruit do better on some soils than others do. Fletcher says "In general the pome fruits; apples, pears, quinces, prefer a heavier soil than the stone fruits; plums, peaches, cherries and apricots. Apples do especially well on clay loam, pears on heavy clay loam; plums and cherries on a medium loam, peaches and apricots on light sandy loam, quinces



on heavy, deep, and moist loam."

If the soil is lacking in deepness or moisture-holding capacity, it should be in clover or alfalfa or some other deep-rooted crop for some time before the trees are set out. These roots penetrate deeply thus loosening up the soil and providing organic matter. If the land is not as rich as desired stable manure, applied preferably a long enough time before to be well worked in, can be used. Chemical fertilizers are sometimes used. If the land is rich and has been well worked, the trees may be set out without resorting to clover or alfalfa.

When the land is in a good condition it should be well plowed and rolled and the trees set out. In setting, the holes should be large enough to spread the roots out well. The trees must be set sufficiently far apart so that when grown they will not shade each other.

After the trees are set the soil should be cultivated for the first few years in order to send the roots deep into the soil, so they will be less liable to injury and will get the food and moisture needed, as well as to form a mulch to conserve the soil moisture. Crops best suited to young trees are potatoes, beets, carrots, beans, tomatoes, melons, corn and all low hoed crops. All sown crops are to be avoided, and grass is still worse, because it is impossible to mellow the ground by repeated cultivation. It will probably not pay to grow any crop between trees set as close as 20 ft., after the second year, because of the injury to the trees and the labor involved. After they come into bearing fruit trees should be cultivated up to the middle of July and sometimes even up to September, depending on the season. A catch crop to catch the moisture, act as a mulch and provide humus, can be sowed after the last cultivation. Plow



under early in the spring and cultivate often during the season. Tillage should generally be stopped early enough to allow the tree to stop growing and harden the wood for winter.

Pruning should begin with the nursery tree and should be done a little each year. The best time is in the spring just before growth starts. Each year the tree should be looked over and the surplus shoots removed.

Insects and disease must be taken into consideration in growing fruit. Spraying is the most general method of combating both. Those insects that eat the leaves are usually combated by spraying their feeding ground with some arsenical spray. For the fungi the Bordeaux mixture is most generally resorted to. To be effective the sprays must be used early enough, often enough, and in sufficient quantity.

#### The bush fruits.

Most bush fruits grow wild in cool mountainous places, hence a cool northern exposure is best for them. They may be grown on a variety of soils, the essential thing being that the land shall not be wet and heavy, but shall be deep and porous. Strong clay loam and sandy loam give the best results. Land that has been well worked for some time previous to planting is best, hence it is better not to set out on sod land. The plants do not root so readily and are more likely to suffer from drought. The soil at the time of planting should be "moist, friable, and thoroughly pulverized as deep as possible, so that the roots shall find firm, moist, well-fined feeding ground."

Stable manure is most often used as fertilizer and gives satisfactory results. It should be applied in the fall or early winter and should be well worked in in the spring, or it will not



be available until late summer, thus causing a heavy growth late in the season, which is to be avoided. Wood ashes are good used with this.

Fall and spring planting are both practised. The fall planting has the advantage that the ground is in good condition and one need not hurry in planting. But bushes planted in the fall must be mulched with coarse manure or earth to protect them during the winter. With spring planting the expense and trouble of mulching is avoided and the ground is placed in condition to be easily worked during the summer. Considering everything, spring planting is best and is most used.

The plants are usually set in rows six to eight feet apart and two to six feet apart in the rows. Some prefer them set in hills five to seven feet each way. This makes it easier to cultivate and also makes a finer grade of fruit.

The first year after planting some hoed crop, as potatoes or corn, may be planted between the rows. After that it is better not to plant anything, but cultivation should be thorough. If cultivated well early in the spring the ground will be fine and mellow and easy to keep so. If planted in rows some hoeing will have to be done around the plants. Most growers cease tillage about the middle of August so that growth will cease and the plants become hardened for winter.

As regards mulching versus tillage, the general opinion is that the most practicable mulch is "that formed by a layer of mellow and frequently stirred soil at the surface of the ground." In either case the object is to conserve the soil moisture. Mulching material is hard to get, expensive for very large tracts of ground, and causes the roots to run near the surface, so if once begun it must be kept up or the plants are liable to be



injured. On rich soils with plenty of moisture, continued cultivation may cause too free a growth of canes. In this case cultivation should cease after the second year and mulching must be resorted to. One author advises seeding to clover which would be cut about the time the fruit begins to ripen, and left on the ground.

With the brambles, pruning is based on the fact that the fruit is borne on shoots of one-year-old wood. Each year the old canes should be removed soon after bearing has ceased, as they are soft and easier to cut than they would be in the spring, and insects and fungus spores are thus disposed of. The new canes should be pinched back to eighteen inches to two feet. In the spring these canes should be pruned, cutting off the laterals to encourage the growth of fruit-bearing shoots. They are pruned back to eighteen inches to three and one half feet, according to the variety. With red raspberries especially, the suckers should be cut back in the spring. The summer pruning is usually omitted for them.

Currants are borne on wood older than two years, so the pruning consists of removing the surplus new wood and maintaining the wood between two and five years old. If manured too heavily, they will develop the wood at the expense of the fruit in spite of pruning.

Gooseberries are usually borne on wood older than one year, though it is variable, sometimes being borne on one year old wood. The wood begins to fail after bearing two or three years, so "guard the vigorous young wood, allowing it to replace that which is older before the latter has a chance to fail."

The length of duration of plantation of brambles depends upon the care and cultivation given it. With black raspberries



it is usually best to harvest only about four crops, the first one being only a partial one, though the plants will bear much longer than this. Blackberries last from five to ten years; dewberries about the same; currants eight to ten years; gooseberries ten to twelve years, though plantations have been profitable after twenty or twenty-five years if well kept up.

To destroy the old plantations of brambles is somewhat of a task. Directly after fruiting the canes should be removed and burned and the ground plowed. Frequent cultivation and re-plowing the ground before winter will usually finish the work.

For strawberries the soil should be rich and moist, especially the latter, for they are heavy feeders. The soil should be well drained then filled with well rotted manure. Strawberries should not be set on recently plowed sod land as a grub that destroys the roots is liable to be present. The plants are set early in fall or spring. If in the fall there will be a partial crop in the spring, but if set in the spring the blossoms should be picked off so that the strength will go to the plants.

During the first season the entire surface should be kept cultivated for the dust mulch. Cultivation must be shallow, however as the plants are shallow rooted. Cease tillage after the middle of August. After the ground is frozen mulch with straw or manure. If done before the ground is frozen, the plants will start too early in the spring. One setting will bear from three to five good crops, depending on the treatment, but it is best to fruit it only once.

Grapes need a sunny and well drained site. They will grow well on many soils, but prefer a warm porous soil rather than a cold heavy one. The light poor upland is better than a soil rich in nitrogen. On heavy soils grapes are apt to lack flavor



and productiveness. Before starting a vineyard the ground should be made mellow with deep plowing. It is best to have the rows, north and south, as the foliage thus shades the stems and roots. However, ease of tillage and the prevention of soil from washing on hilly ground are more important than shading the roots.

The vines should be cut back starting all the canes new from the main trunk every one or two years. One should leave about forty buds upon each vine each pruning and these should be as near the main trunk as possible.

#### Vegetables.

The best soil for garden is a sandy loam with sandy or gravelly subsoil. The best site is a gently rolling slope with general eastern or southern exposure. Very few gardens are on a "best" soil and site. But by drainage, manuring, and cultivation the productiveness of almost any land may be increased so that the original soil and site are not all-important.

Garden crops require a better soil than field crops because the seeds are small and the roots of the plants do not go deep into the ground, hence the plant-food must be close to the surface in an available form, and the soil should be deeply and finely worked in order to hold the moisture.

The garden should be planned so as to use horse tools as much as possible, hence it is preferably oblong in shape, the rows running the long way. The crops should be grouped according to their season of maturing, the perennials, as asparagus and rhubarb, being in the same row or in adjoining rows; the early crops as lettuce and radishes being near together; as also the late root crops; salsify, parsnip.



The annual root crops need a deep rich soil with plenty of moisture. Too much nitrogen induces a too heavy growth of top and long branching roots, which are to be avoided. In heavy rich land the soil should be lightened without increasing the nitrogen. Hence stable manure is better than leguminous green manuring. The manure should be well rotted and worked in.

For perennial root crops - asparagus, horseradish, and rhubarb, the necessity for the ground being well prepared is even greater than for other garden crops, because of their permanency.

For asparagus the ground should be deeply plowed and heavily manured in the fall before planting. Early in the spring the manure should be plowed under and the ground well fined. During the first two years it should be cultivated often. After frost the tops are cut and burned and soil only to the depth of two or three inches above the roots is left on. The reason for this is that the frost may loosen the soil and the rains improve it. The roots will not be hurt.

For horseradish a first class garden soil is best, provided it has not been freshly manured, as the grubs destroy the roots. Rhubarb needs a rich moist soil. It is set either in the fall or spring, is cultivated during the summer and manured in the fall to prevent deep freezing and encourage an early start in the spring.

The Irish potato needs plenty of moisture. To this end early planting and frequent surface tillage are practised. The soil must be rich and if manure is applied it must be well rotted and worked in, because fresh manure favors scabby potatoes and is liable to contain grubs.

Experiments have shown that increased weight of the seed potato increased the yield, one piece weighing 3 oz. giving better



results than two weighing 1-1/2 oz.; and that the weight of the potato is more important than the number of eyes, though each piece should contain at least one good eye.

After planting, the ground should be harrowed frequently until the young plants appear. They should be cultivated until the plants are fully grown and the vines have begun to spread.

The sweet potato is tropical in its requirements, being started in the hot-bed. The best soils are those that vary from sandy loam to very sandy soil.

The best onion soil is rich, well drained, and retains moisture well. It should be quite rich with barnyard manure but it should contain no coarse litter. With all garden crops, but especially onions, it is always cheaper to keep the weeds down than to cut them after they have taken plant-food from the soil.

The best crops of peas are secured on a moderately poor soil. On rich soil they tend to vine too heavily. They can be sown early and are usually sown later for a succession.

Beans are frost tender and must not be planted until danger of frost is past - "When the oak leaves reach the size of squirrel's ears." If the seed is sown too early it decays. Rapid growth is necessary especially for string beans, so the ground should be rich and moist.

Vine crops need a warm sandy soil as they are frost tender. They are grown in hills and are cultivated as long as the vines permit. Squash and pumpkin, the latter especially, are often grown in corn-fields.

Cabbages are usually started in hotbed and set out when the second or third leaves have appeared. A rich soil and frequent cultivation to conserve the moisture are necessary to the best growth.



Cabbages require a large amount of lime so should not be grown on the same ground oftener than one year in three unless special applications of lime are made. They are rank shallow feeders, so should follow and be followed by a deep-rooted crop.

The tomato requires a warm soil and plenty of sunlight. It is started in hotbed and requires a long warm season for growth. In cold wet seasons the fruit sets poorly. Commercial fertilizers are sometimes used and wood ashes also give good results. The requirements of the egg plant are about the same as the tomato, a well drained soil being very important.

Sweet corn and popcorn require the same general conditions and treatment as field corn. For sweet corn early maturity is desired. Plant in a warm soil and be sure the seed is fresh and vigorous.

Of the salad crops, lettuce and the cresses are hardy and can be planted early. Celery is more exacting. It requires a moist rich soil. If irrigation is not used rich bottom-land is best. Transplanting should be done early enough so that the plants will be well established before the hot dry weather sets in.

Rotation of crops is as necessary in the garden as in the field. "The correct theory of rotation proposes while making immediate use of the plant-food already in the soil, at the same time to prepare the soil for producing the other crops that are to follow." In general, follow a deep rooted crop by a shallow rooted one, alternating constantly. Follow a slow growing crop with a quick growing one and vice versa. Root crops should not follow crops of similar nature nor should vines follow vines.

#### Plan Number One.

The lot to be improved is shown in Fig. I.

It is a 60-foot lot, five hundred feet deep. The house,



barn, yard and chicken yard occupy 160 feet of the depth, leaving 320 feet to be used for fruit trees and bushes, vegetables and horse feed, as the last 20 ft. (J) is swampy and cannot be cultivated.

The slope is slightly to the north and decidedly to the west, about nine inches per hundred feet. To the east across the street the incline continues about 250 feet when the top of the hill

Fig. I

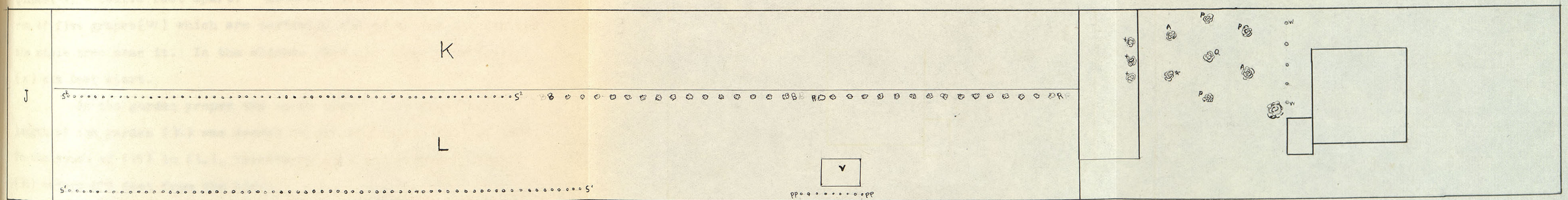
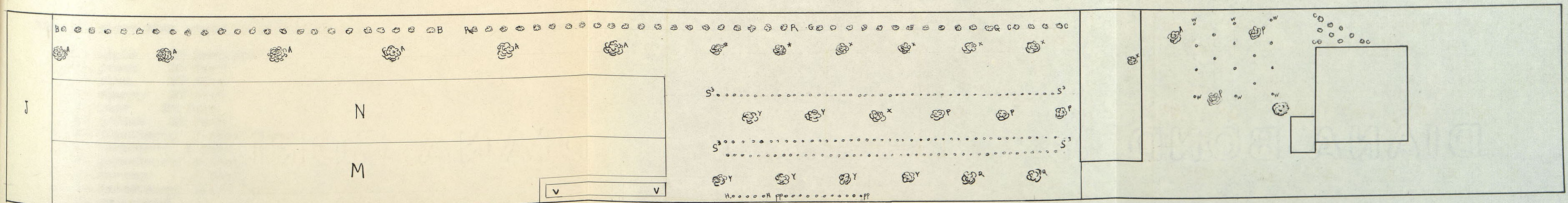
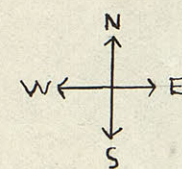


Fig. II





barn, yard and chicken yard occupy 160 feet of the depth, leaving 320 feet to be used for fruit trees and bushes, vegetables and horse feed, as the last 20 ft. (J) is swampy and cannot be cultivated.

The slope is slightly to the north and decidedly to the west, about nine inches per hundred feet. To the east across the street the incline continues about 250 feet when the top of the hill is reached.

In the yard between the house and the chicken yard are seven trees - three peach, (P) two apple (A), one pear (★) and one quince (Q) - twelve feet apart. Between these and the house is a row of five grapes (W) which are partially shaded by the kitchen and the maple tree near it. In the chicken yard are three plum trees (X) six feet apart.

In the garden proper the north twenty five feet the entire length of the garden (K) was seeded to alfalfa in the fall of 1906. To the south of (K) in (L), blackberry (B) and raspberry bushes (R) extend 170 feet from the barn.

Seventy feet from the garden gate is a row of 12 rhubarb (PP) plants. North of this is the asparagus bed (V). Seventy feet below the rhubarb, strawberries (S') were set out, spring 1907.

Fig. II. shows what could be done with it.

- A - apple 35 feet apart
- P - peach 20 feet
- X - plum 20 feet
- Y - cherry 20 feet
- ★ - pear 20 feet
- Q - quince 20 feet
- B - blackberry 5 feet apart.
- R - raspberry 5 feet
- G - gooseberry 5 feet
- C - currant 5 feet
- S - strawberry 1-1/9 feet
- V - asparagus
- H - horseradish
- W - grapes 7 feet
- PP - rhubarb 3 feet
- M - clover
- N - garden ground.



The following calender will show how and when it could be done.

Fall 1907. Grapes (W) Fig. I. and four trees cut out.

Ground there and for currants (C) Fig. II, north of the house, well manured with stable manure.

Spring 1908. The above ground well plowed and worked and used for early garden followed by tomatoes.

(V), Fig. II. to be set to asparagus.

Strawberries (S<sup>1</sup>), Fig. I, plowed up.

Strawberries (S<sup>2</sup>), Fig. I, set out.

Blackberries (B) and

Raspberries (R), Fig. I, cut and plowed up just after fruiting.

(L) used for garden supplies and corn.

Alfalfa (K) made into hay.

Horseradish (H) set out.

Fall 1908. (M), Fig. II, seeded to clover.

Alfalfa (K), Fig. I, plowed up.

Spring 1909. Asparagus (V), Fig. I, to be plowed up after season's crop is off.

(N) used for garden and corn.

Grapes (W), and Currants (C), Fig. II, set out.

Spring 1910. Strawberries (S<sup>2</sup>), Fig. I, plowed up.

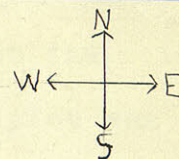
Strawberries (S<sup>3</sup>), Fig. II, set out.

#### Plan Number Two.

A plot of ground 18 X 9 feet was used for this garden. It had previously been used as a garden. The soil is a sandy loam rather rich, a good garden ground. It was spaded 10 inches deep and was well broken up. About 30 lbs. of well-rotted stable manure



# Plan No. Two



Lettuce	Peas
Cress	Beans
Spinach	Beets
Onions	Sets
Radish	Salsify
Tomato	Parsnips
Cabbage	Carrots
	Potatoes



was well worked in. All the work was done by hand and except the spading it was all done by one person. The long way of the plot was north and south; for this reason and also that the plants might get the full benefit of the sun, the rows were planted north and south, 14 inches apart. The gardener had only a general knowledge of gardening and had not "read up" much, but on March 25" and 26" everything except cabbage and tomato were planted.

The root crops were planted together, the peas and beans together and at the west side so as not to shade the other plants. The early crops, lettuce, cress, spinach, radishes, and onions, were planted near together so that the ground could be used for something else later.

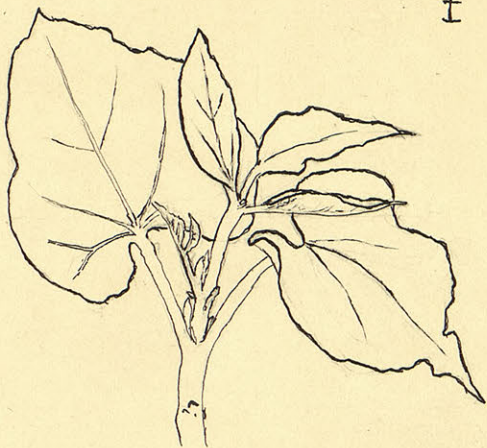
The peppergrass(XII) and radishes (VII) came up in abundance a week from planting, the former being planted 1 inch deep the latter 1/2 inch deep. The cress was large enough to eat in 30 days and at the end of ten weeks was running to seed. The radishes were large enough for the table in 34 days after planting, though not in abundance until a week later.

The lettuce (XI) was planted 1 inch deep - too deep and came up - that that did - in 12 days, and has been slow in growing only by the eighth or ninth week being large enough for table. Ten weeks after planting the leaves are a good 6 inches long.

The spinach (IV) was planted 1 inch deep and came up in abundance in 9 days. It was large enough to use 49 days after planting. Ten weeks after planting the leaves are 9 inches long.

Some of the onion sets were an inch in diameter others were 1/2 inch in diameter. None of them had sprouted when placed in the ground. They came up in 15 days, the larger sets a little sooner than the others. The larger sets grew faster and were ready for the table sooner than the smaller ones - six weeks from planting. The





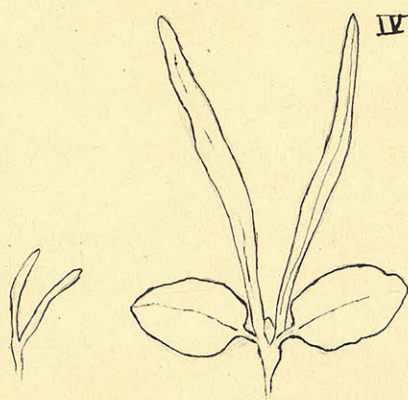
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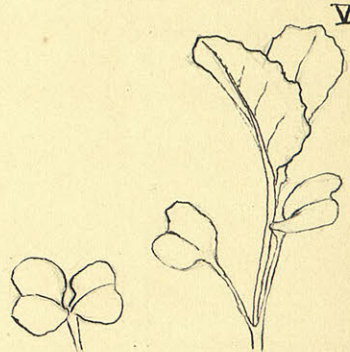
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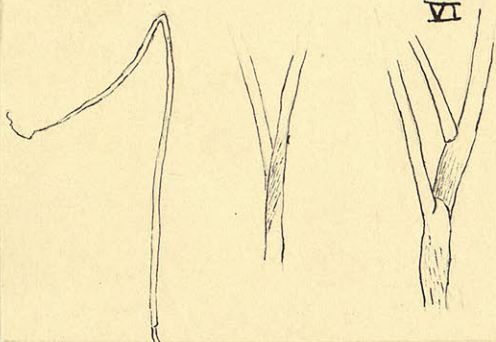
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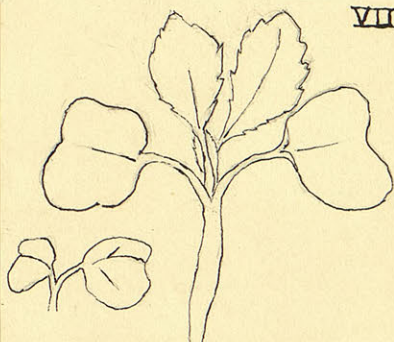
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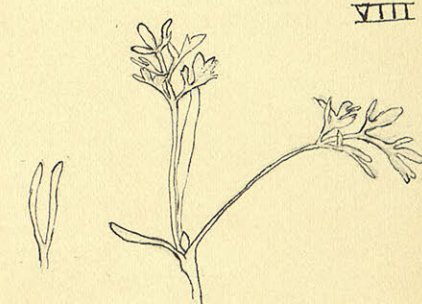
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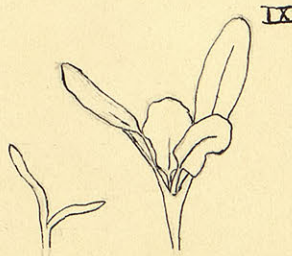
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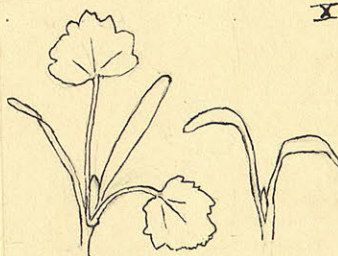
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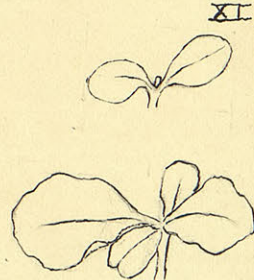
VIII



IX



X



XI



XII



XIII



XIV



onion seeds (VI) were planted  $1\frac{1}{2}$  inch deep and came up in 22 days. They were thinned eight weeks after planting.

The beans (I) were first planted three inches deep. A few came up in twelve days. The others were sown too deeply for on digging them up it was found that many had sprouted but had not been able to reach the surface. Those that came up were killed by one of the heavy frosts, although they were covered. The next planting was soaked in warm water for  $1\frac{1}{2}$  hour before being put in the ground. Scarcely one came up. Some had sprouted but seemed to mold, probably because there was not moisture enough in the soil to aid the hasty start. The third time the beans were planted dry after a rain and very shallow. A good showing came up in eight days which after six weeks are growing nicely.

The peas (XIV) were planted 3 inches deep and came up eleven days later. The first blossoms were 55 days after planting. Ten weeks after planting the pods are  $2\frac{1}{2}$  inches long though not filled out yet.

The beets (IX), salsify (II), and carrot (VII), were planted 1 inch deep. The beets came up plentifully in 11 days. Ten weeks after planting the leaves are 10 inches long, the roots  $\frac{7}{8}$  inches in diameter. They are being thinned the thinnings being used for greens.

The salsify came up in 15 days and at the end of ten weeks is 12 inches high, the roots are 4 inches long and  $\frac{5}{16}$  inch in diameter.

The parsnips (X) were planted  $1\frac{1}{2}$  inches deep and came up very thinly in 28 days. The largest is at the end of ten weeks from planting  $4\frac{1}{2}$  inches long, the roots  $3\frac{1}{4}$  inches long.

The carrots came up in 16 days and are now  $5\frac{1}{2}$  inches long, the roots  $4\frac{1}{2}$  inches long.



The cabbage (V) and tomato (III) were planted April 22" and came up in eight days. They were set out five weeks after planting, when the first pair of leaves were well developed.

The potatoes (XIII) were planted 6 inches deep and came up in 35 days. They were nipped by the frost twice but far enough apart so they were not killed, only the growth being retarded.

The season has been the most unfavorable for all green things of any for a long time. During the unfavorable weather the plants were covered with paper or sacking every night and sometimes during the day. They merely held their own but on the warmer days one could almost see them grow. The ground has been kept mellow and free from weeds, being hoed on an average once in every 1-1/2 weeks.

The covering and uncovering of the plants was the greatest care and this in an ordinary year would not be necessary.

The drawings are of the first leaves as the plants came out of the ground, and then later after the true leaves had started. All of them except the second drawing of the bean are life size, it being half size.

The work has been interesting and instructive and has more than repaid for the time and work expended even without considering the material returns.