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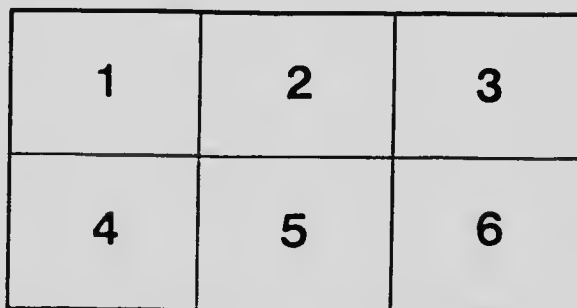
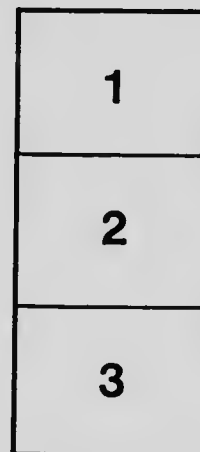
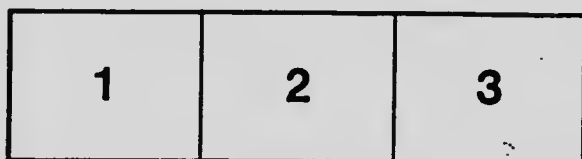
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W. T. MACOUN,
Horticulturist.

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GINSENG CULTURE.

BY W. T. MACOUN,
Horticulturist, Central Experimental Farm, Ottawa.

For nearly two hundred years there has been a trade in ginseng between America and China, but during the last half century, the price obtained for the root has gone up so rapidly that Ginseng is now worth more than seven times as much as it was fifty years ago. This increased price is partly due to a growing popularity among the Chinese for American Ginseng, and partly because the wild root has become more difficult to get. The high prices obtained for ginseng soon encouraged the cultivation of this plant and like many new industries the immense profits in growing ginseng were heralded on every hand before these profits were actually made. While good prices have been obtained for much of the cultivated root, the largest profits have so far come from the sale of seeds and plants to those who wished to experiment.

The American Ginseng (*Aralia quinquefolia*), is a native of Canada and the United States. It is closely related to the Chinese Ginseng (*Aralia Ginseng*) and belongs to the *Aralia* family. The ginseng is also nearly related to the Wild Sarsaparilla (*Aralia nudicaulis*) but is a much smaller plant, growing only from 12 to 13 inches high, although often reaching 24 inches under cultivation. Instead of the flower stalk coming from near the ground like the wild sarsaparilla, it grows from the base of three compound leaves, all attached to the main stem by their petioles or leaf stems at the same point, each leaf being divided into five leaflets. There is another plant even more closely related to the ginseng, namely, the Ground Nut (*Aralia trifolia*) which is often mistaken for ginseng. It resembles the latter very much in the leaves, but it usually has three leaflets to a leaf instead of five. The flowers of the ground nut are white; those of the ginseng, greenish. The flowers of both are in clusters or umbels. The fruit of the ginseng is scarlet when ripe; that of the ground nut is greenish. The fruit of both is in clusters. The root or tuber of ginseng is long; that of the ground nut is almost round. The ground nut is a smaller plant than ginseng.

Ginseng is now very rare in the wild state in Canada, but was formerly common in the Provinces of Ontario and Quebec in hardwood forests on rich land.

The ginseng root has long been used by the Chinese, who value it very highly. It is thought by them to have remarkable properties, such as the power to ward off all kinds of sickness. It is quite probable that it has certain medicinal properties known to the Chinese. It is usually made into a tea and is also used by the wealthy for flavouring food. Those ginseng roots with several prongs, giving them somewhat the form of human beings, are particularly prized and higher prices are paid for such roots. The ginseng so far as is known in America has not great value as a medicinal plant, though it has a slightly stimulating effect and is a specific for hiccough. The

Chinese prefer the ginseng grown in China, but have been quite willing so far to pay good prices for the American root.

Ginseng is usually propagated from seeds and each plant after three years of age will produce from fifty to one hundred or more seeds. Seeds of ginseng were sold for a cent or even two cents apiece when the interest in ginseng was at its highest, but they can be obtained for less now. One of the first drawbacks to the culture of ginseng is the time required, about eighteen months, for the seed to germinate. Thus, seed ripened in the autumn does not germinate until a year from the following spring. As the seed is precious it is not sown as soon as it is ripe, for, lying dormant in the ground as it would do during the next summer, it is liable to be injured in some way. It should not be let become dry. The best plan is to stratify the seed as soon as it is ripe, leaving the pulp on. A mixture of sand, loamy soil, and leaf mould is rubbed very fine, so fine that it may be sifted out when desired and leave the seeds. A box with a lid is useful for the storing of the seeds. After putting in about one inch of the prepared soil scatter the seeds thinly on top. Put in half an inch more soil, and so on until all the seeds are in. The box is now closed and buried four or five inches deep in well-drained soil where water will not lie at any time. The seed is left buried for a year. It is taken up the autumn after being buried and sown at once in a bed specially prepared for it, about four feet wide being a convenient size. It should be inclosed by six inch boards for greater protection. The seed bed should be made of soil with a large amount of vegetable matter or leaf mould in it, of such a character that it will not bake, and free of sticks and stones which might interfere with the development of the roots. The seed is sown about one inch deep, two inches apart, in rows about three inches apart. After seeding, the bed should be mulched for winter with about two inches of decayed leaves. Early in spring remove most of the leaves, the finer parts being left for a mulch on the surface of the soil, through which the young plants will soon make their appearance. Ginseng grows naturally in shady places and will not succeed in the open, hence shade should be given; the beds in the spring. Sometimes an open space in the woods is found suitable for a seed bed, but the most satisfactory plan is to use laths. Frames are made the width of a lath and about six feet in length, the laths being nailed about an inch apart. Where a large plantation is made the frames are raised about six feet high so that the grower may walk upright beneath. The sides of the enclosure should also be protected with these frames to prevent the entrance of sunlight. If only a few plants are grown the frames may be raised about eighteen inches above the bed. During the summer the bed should be kept free of weeds, as plants may be transplanted at any age, though the best growers now transplant the seedlings the autumn of the first year after the leaves fall. The permanent bed is made much the same as the seed bed, but is usually wider and there should be at least a foot of good soil. This should be thoroughly worked over before the seedlings are transplanted. The young plants should be taken up with great care so as not to injure the roots, and re-planted in the permanent bed about eight inches apart each way. The wider the plants are apart the less danger there is from disease. The plants should be deep enough so that the crown will be about two inches below the surface of the soil. The bed is now mulched for winter as in the case of the seed bed. During succeeding years the ground is kept free of weeds and the surface stirred to encourage as rapid growth as possible. The plants begin fruiting when three years old and the seed may be used to start new plantations. The roots are large enough for export when four to five years old and should average about two ounces each in weight. The roots are carefully dug, cleaned and dried before shipping. Gradual drying in warm air makes a better root than quick drying in hot air; they are sometimes dried in the sun. Drying takes from two to eight weeks, depending on the system. A good method of drying is to place a box with wire shelves above a stove when the warm air passing upwards dries the roots very well. Meanwhile the fibres are rubbed off. The roots lose two-thirds of their weight in drying.

Several troublesome diseases have handicapped and discouraged ginseng growers during recent years, that causing the greatest injury being the *Alternaria*, which

affects both leaves and stems. Sometimes this is so bad that the leaves are quite destroyed, the seeds do not ripen, and the roots do not make the growth they should. There is also a soft rot of the root. Damping off of the seedlings sometimes causes considerable loss. The *Alternaria* can be controlled by thorough spraying with Bordeaux mixture, beginning early in the season.

Nematode worms have also caused considerable injury to the roots in some places, and no good remedy has been found so far for these.

There may be fair, and even good, profits in the future for the patient and thorough ginseng grower, but for the majority of people it is feared that the long wait necessary before the roots are large enough to be sold may lead to carelessness, when time and money will be lost. Furthermore, although ginseng is at present sold at good prices, from \$3 to \$7 a pound having been obtained for the root in recent years, the future market is uncertain, depending as it does on the whim of Chinamen who may at any time decide that American grown ginseng has no value in curing disease and may only accept that grown in China and Korea.

MUSHROOM CULTURE.

BY W. T. MACOUN,
Horticulturist, Central Experimental Farm, Ottawa.

There has been a growing interest in mushroom culture during recent years, partly due to the high prices obtained for them and partly because of the large profits said to be made from growing them. The following information should prove useful to any one desiring to grow mushrooms:—

It is of the greatest importance to have good spawn. If the spawn or mycelium is dead there will be no mushrooms, no matter how carefully the bed is looked after. Therefore, mushroom spawn should be obtained from reliable sources.

Spawn is the mycelium of the mushroom and may be compared to the vegetative flowering plants, while the mushrooms themselves correspond to the flowers. Spawns in which spawn is bought are merely the carriers of the mycelium which, under proper conditions are given, continues its growth and eventually produces mushrooms. The mycelium is produced from spores which fall from the mature mushrooms and germinate. The spawn-bearing bricks which are purchased are composed of horse and cow manure and sometimes a little loam. The compost is moulded into the form of bricks and while still moist they are inoculated with mycelium. This grows and permeates the bricks, which, when filled with the mycelium, are dried and stored ready for sale. If the bricks are not kept dry until they are needed for spawning the mycelium is liable to be injured, and, as the older the bricks are the more likelihood there is of their being subjected to unfavourable conditions, fresh spawn should be used. The pure culture spawn differs from the other in that the mycelium is first grown from the tissue of young mushrooms or from the spores in sterilized compost, by which method the best varieties and strains may be grown pure.

The manure for the bed should be partly rotted horse manure; cow manure is not so good. This is usually obtained from livery stables and should be mixed with straw bedding for best results, although mushrooms will grow in manure when mixed with sawdust or shavings which have been used as bedding. It is piled in a place sheltered from rain and kept from burning by turning several times at intervals of four to seven days until the first violent heat is over, by which time it is thoroughly mixed and of comparatively uniform consistency and has lost its rank smell. This will take three weeks or a little less. To heat well, the pile should be at least four feet deep, or

more if the weather is cold. If the manure is very dry, enough water may be added to make it moist, but not wet. The bed may be made in a cellar under a house, beneath greenhouse benches, or in any fairly dark place where the temperature in the room does not go much about 60° F. or under 50° F. From 55° F. to 58° F. is a good range. A lower temperature for a few days will delay the appearance of mushrooms, but may not otherwise prove harmful. Mushrooms do best where there is good ventilation, providing moisture and temperature can be controlled. When the manure is put in, it is tramped down solid, and this can best be accomplished by sitting on about three inches at a time and pounding down well until there is a depth of fifteen inches, although less will do where the temperature is near 60° F. all the time. When the manure is put in, it should be of such a consistency and moistness that it will not crumble in the hand if squeezed yet is not so moist that water will come out. The temperature of the bed should soon rise about 100° F. and after it has reached its maximum and has fallen to between 70° F. and 80° F. the bed is ready for spawning. Good results are obtained if the bed is spawned at 65° F. The spawn should be broken into pieces as large as a butternut or small egg, or larger, and the pieces inserted every eight to ten inches or even farther apart and from one to two inches deep in the manure, lifting it up when putting in the spawn, after which the manure should be pressed firmly against the spawn and the whole bed made firm. From five to eight days after spawning, according to how fast the temperature is going down, from two to three inches, or even less, of good loamy soil is spread on top of the manure. If there is a tendency to dryness, a light covering of hay or straw may be put over the manure until it is time to put on the soil, after which the straw is removed. The mycelium should begin to run in about two weeks, or less if it is good, and sometimes the soil is not put on until it is seen as a white, cobweb-like growth extending in different directions from the pieces of spawn. If it can be avoided, the bed should not be watered at all, as watering, especially shortly after spawning, often causes injury. It is best to keep the floor and walls damp, the moisture given off from these furnishing the soil with enough. If the room is very dry, lightly watering the bed with tepid water may be done very occasionally, but there is danger of rotting the mycelium from watering. A covering of hay over the bed will help to keep in the moisture until the mushrooms come. The growing of mushrooms during the summer months is not satisfactory, as maggots are very troublesome and difficult to control. If the bed is prepared in the fall the mushrooms should appear in seven or eight weeks and the bed continues bearing for from two to three months, but results with mushroom are very uncertain. The amateur sometimes obtains a good crop, and other times there is failure, although apparently the same treatment is given.

MELON CULTURE.

BY W. T. MACOUN.

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Both muskmelons and watermelons are very popular in Canada, but in some parts of the country, owing to the short season, special methods of culture must be adopted to have them ripen during the warm weather, when they are most in demand.

More attention has been given to the culture of muskmelons in Canada than to watermelons, although the latter are grown extensively in the warmer districts. The name cantaloupe is now applied to all muskmelons alike by some people, but the true cantaloupes are muskmelons of the type of the rough hard-skinned melons grown in Southern Europe and the Southern States but seldom met with in Canada. Being a native of Persia and other parts of Asia, where there is great heat in the growing season, the muskmelon to do well must be kept in a high temperature from the time

the seed is sown until the melons are ripe. If the seeds are sown in cold soil they are likely to rot. If the young plants are not well protected when started early in the hotbed they will be chilled and checked in their growth or killed, and if there are cool nights and the plants are exposed when they are in bloom, melons will not set. Furthermore, the slightest frost will kill the vines. Having these facts in mind, one can intelligently begin the culture of melons.

As the early melons are the most profitable the methods of obtaining them are described before giving general directions for growing them in the open. The melon growers in the vicinity of Montreal have given more attention to the production of large, high class early melons than anywhere else in Canada and as the excellent results which they have obtained show what can be done where the season is comparatively short, as it is over a large part of Canada, the first system of culture recommended is based largely on their methods.

The seed is sown in a greenhouse or hotbeds during the month of March or first days of April, either in pots or in rows about six inches apart and about half an inch deep in the soil. As soon as the plants appear above ground, ventilation is given the beds during the daytime, but they are closed at night. As soon as the plants begin to show the first rough leaf, they are pricked out into four inch pots, or sometimes five inch pots are used, setting two plants in the pot. At times it is desirable to transplant from a four inch pot to a five or six inch pot if the plants have been started very early. Plants may also be started in pieces of sod or strawberry boxes. A piece of sod about four inches square is a satisfactory size, three or four seeds being planted in each piece. These sods are sunk in the soil in the hotbeds.

Some growers prefer sowing the seed direct in the frame where the vine is to remain. Warm, well-drained soil should be chosen for the melon plantation, as it is important to have as high a soil temperature as possible after the heat of the manure has been expended. The soil for melons is preferably rather light, but having a good supply of available plant food in it from a liberal application of barnyard manure which has been ploughed under. Trenches are opened in this soil two to two and a half feet in width and eighteen inches in depth, early in May, or the work may be done the previous autumn when, the soil being exposed to the frost during the winter, becomes broken up. These trenches are dug in rows about twelve feet apart and as long as space will allow. Into these trenches is put actively fermenting horse manure, filling them to within four inches of the surface of the ground. The soil is now thrown back up of the manure making the surface in the centre of the trench a little higher provide for settling. There should at the same time be a slight slope towards the south. There should be about eight or nine inches of soil, or at least six inches, over the manure. Movable frames are used for putting over the trench. The usual length of each frame is about twelve feet. They are six feet wide and planned to take four hotbed sash each 6 by 3 feet. A path of about four feet is left at each end of the frames for working about them. After the glass has been over the trench for a day or two, the soil will be warm enough to take the seed or young plants, and it is at this time that the utmost care should be taken to prevent the plants getting chilled and a warm day should be chosen for transplanting. As the young melon plants have not a large root system and have few fibres to hold the soil to them, it should be disturbed as little as possible. It is desirable to water well before turning the plants out of the pots or boxes. Three hills of two, or at the most three, plants to a hill are now made about four feet apart in the frames, pressing the surrounding soil well about the plants, but at the same time not breaking the ball of soil attached to the roots. If in strawberry boxes, there may be four plants to the box when setting out. These all should be left until the plants are established when the weakest plant should be cut off. The plants should now be shaded to help prevent their wilting. The frames should be protected early in the season at night with matting or boards to keep the bed as warm as possible. From now on the chief attention should be given to ventilating and watering. On cold days very little ventilation can be given for fear of chilling the plants, but as the season advances and the weather becomes warmer

more and more ventilation is given. Only practice can give the grower the knowledge of how and when to ventilate to get the best results. Usually ventilation is given in the morning and the frames closed at night. Water should be applied when needed, in a fine spray, the chill being taken off it before using. From time to time it may be found desirable to thoroughly syringe the leaves with a good force of water to clean off red spider. The surface soil should be kept loose and free of weeds. Cultivation should be shallow.

The pinching back or pruning of the vines is practised by the best growers. Pinching is given when the plants are transplanted from the pots to the frame, the tip of the central shoot being removed. After the vines have made about one and a half or two feet of growth the shoots are again pinched off. This causes the production of laterals and makes it easier to distribute the vines in the frames. These laterals also bear melons and thus the largest possible number of melons are produced in the smallest space. As the melons set, the ends of the laterals on which they are growing are pinched off to about two nodes or joints beyond the melon. This method also economizes space. Melons set well even when the vines are not pruned. If the vines have been started early, they flower, melons set, reach a good size and are often nearly mature before the frames are removed. After the vines have filled the frames, the latter are raised a little off the ground to allow the vines to extend outside. When there is no further danger of cool nights the sash are left off but the frames are often left on for a few days in case there should be an unexpected cool spell before the plants become hardened, when the glass can be put back temporarily. While muskmelons require high temperature to do well, they should at the same time have plenty of water. In their native country the melons are grown near streams where there is abundant moisture. Where the land is naturally wet in Canada it is usually too cold for melons, hence they are grown on the warm, well drained soils which often become dry in the summer and the successful melon grower is prepared to irrigate when necessary.

When one does not wish to go to the expense of using hotbed sash for forcing the melons they can be advanced considerably by using small lights about a foot square. A frame is made of pieces of twelve-inch boards and the glass is laid on top, or it may be made to slide in a groove so as to ventilate readily. Holes are dug about eighteen inches deep and two feet square and nearly filled with manure as already described. Over these are put the small frames, sinking them six inches in the soil and manure so that they will afford greater protection to the plants. Seed or plants may be put in these. They are left over the plants as long as possible, but, as they have to be removed comparatively early in the season, cool nights afterwards may injure the crop.

In the warmest parts of Canada, where the season is longest, the general practice is to grow muskmelons in the open, either without starting them in the greenhouse or hotbed or else merely starting the plants inside and planting them in the open when quite small. Grown in this way, they require as warm, well drained soil as when forced. If the soil has been well manured no special preparation is made where the seed is sown, but as a rule a liberal quantity of manure is mixed with the soil. A hole is made about eight inches deep and about two feet square into which is thrown about half a bushel of compost made of short manure thoroughly mixed with the soil in the hole. The manure should be short, as if long it will dry out more readily. There should be enough of this compost to make it about level with the surface of the ground. Over this is put about two inches of good loamy soil which raises the hill that much above the surrounding level. The hills are made from six to seven feet apart. A dozen or more of seeds are now planted about the centre of each hill, pressing them in with the finger to about the depth of one inch, after which the soil is pressed down with the hand to firm it and to aid in bringing the moisture to the seed. A few days after the seed is sown, and just as or before the plants break through the ground, poisoned bran in the proportion of one pound Paris green to fifty pounds bran should be sprinkled over the hill. This is to kill the cutworms, which are very destructive to plants. When danger of cutworms is

over, the plants should be thinned out, leaving only the three strongest. The ground is now kept thoroughly cultivated to conserve moisture and to destroy weeds. The vines may be moved from time to time when young to start them in the direction which will cover the ground best with the least crowding. When the vines are crowded the melons do not set well. To obtain the most uniform and best melons, pieces of boards or stones should be placed under each to keep it off the ground. The melons should also be turned gradually, not exposing a part which has been underneath at once to the sun, but turning part way at a time.

Muskmelons are ripe when they break easily from the vine. When shipping them long distances, growers sometimes pick them a day or two before they have reached this stage, but unless one has had considerable experience it is best to leave them until they are ripe, as if picked much too soon they will not mature properly.

Watermelons.—The watermelon is a native of Africa, hence it also requires great heat to grow it well. As watermelons are obtained from the United States early in the season at comparatively low prices, there is not the same inducement to force them in Canada, though they can be forced if desired. For field culture about the same methods are adopted as for muskmelons. The hills for watermelons should be farther apart than for muskmelons, from seven to nine feet being a fair distance. It is much more difficult to tell when a watermelon is ripe than it is a muskmelon; in fact, there is no satisfactory method for telling, though after one has harvested many melons one can get fairly expert. Some indications of ripeness are the cracking of the flesh under slight pressure, the drying up of the tendril nearest the melon, a clear sound when the melon is clumped as opposed to a dull sound when green. These indications, which are by no means accurate, together with the general appearance of the melon, help to decide on what melons to harvest.

Insects.—In addition to cutworms already mentioned, the melons are often injured by the striped cucumber beetle. To overcome this the leaves should be kept covered with Paris green mixed with land plaster or lime in the proportion of one pound of the former to fifty pounds of the latter. Applications should be made every two days. Poisoned Bordeaux mixture made in the proportion of four pounds bluestone, four ounces Paris green, four pounds lime, and forty gallons of water is also a good remedy for this insect, and also for the flea beetle, a very small, black hopping insect which often does much injury.

Grasshoppers are sometimes troublesome, eating pieces out of the melons and disfiguring them. The poisoned bran scattered on the ground where they can get at it, as recommended for cutworms, will kill them.

Diseases.—There are several diseases which affect muskmelons, among these being the mildew or blight, the alternaria, and the bacterial wilt. The two former can be checked by thorough application of Bordeaux mixture beginning early in July while the plants are still healthy looking, and continuing at intervals of from ten days to two weeks throughout the season. There is no good remedy known for the wilt.

