

# Garden Plan II: Layout

**Your garden layout will be influenced by how much space and time you have, and by the type of cultivating equipment you plan to use.**

And don't underestimate aesthetic appeal - you must feel good about your garden to want to spend time in it!

## Traditional rows

Row gardening consists of planting narrow rows of vegetables separated by wide paths. This is still the most popular layout for gardeners with lots of space. Row gardens are easy to plan and easy to plant. A large cultivator can be used to quickly turn the soil in spring. During the summer, paths will require cultivation to manage weeds and this is often done with a combination of rototiller and hoe. It is generally suggested that rows run north and south to take best advantage of available sunlight. East and west orientation can also be used, especially where sloped land is at risk of erosion. With east and west row orientation, tall crops should be planted on the north side of the garden.



*Carrots are an example of a crop traditionally planted in rows.*  
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The main disadvantage to row gardening is that crop area is taken up by the space between rows, which means lower yields per unit area. Planting staggered double rows instead of single rows is one way to increase efficiency. Use Table 1 at the end of this factsheet as a guide for plant spacing in a row garden.

## Intensive gardening methods

The purpose of an intensively grown garden is to harvest the most produce possible from a given space. The practice of intensive gardening is not just for those with limited garden space; rather, an intensive garden concentrates work efforts to create an ideal plant environment, giving better yields with less labor.

Although its benefits are many, the intensive garden may not be for everyone. Some people enjoy the sight of long, straight rows in their gardens. Others prefer machine cultivation over hand weeding. Because of fewer pathways and closely spaced plants in an intensive garden, the weeding that must be done is usually done by hand or with hand tools. Still other gardeners like to get their gardens planted quickly and have harvests come in all at once. The intensive ideal is to have something growing in every part of the garden at all times during the growing season which means staggered planting and more time management.

A good intensive garden requires early, thorough planning to make the best use of time and space in the garden. Interrelationships among plants must be considered before planting, including nutrient needs, shade tolerance, above- and below-ground growth



patterns, and preferred growing season. However, using the techniques described below, anyone can develop a high-yielding intensive garden.

### The raised bed

The raised bed or growing bed is the basic unit of an intensive garden. A system of beds allows the gardener to concentrate soil preparation in small areas, resulting in effective use of soil amendments and creating an ideal environment for vegetable growth. Beds are generally 90 to 120 cm (3-4') wide (depending on the gardener's reach) and as long as desired. The gardener works from either side of the bed, reducing the incidence of compaction between plants caused by walking on the soil. Beds should run east and west for best sun access. Tall crops should be planted in beds on the north side of the garden.

Soil preparation is the key to successful intensive gardening. To grow so close together, plants must have adequate nutrients and water. Fertility management and irrigation will help, but there is no substitute for deep, fertile soil high in organic matter. Humus-rich soil will hold extra nutrients, and existing elements that are "locked up" in the soil are released by the actions of earthworms, microorganisms, and acids present in a life-filled soil, making them available for plant use.



*Temporary raised beds and composted sheep manure were used to improve drainage and soil texture on this heavy clay soil. © R. Campbell, Dalhousie.*

If your soil is not deep, double-dig the beds for best results. Remove the top 30 cm (12") of soil from the bed. Insert a spade or spading fork into the next 25 to 30 cm (10-12") of soil, and wiggle the handle back and forth to break up compacted layers. Do this every 15 to 20 cm (6-8") in the bed. Mix the topsoil with a

generous amount of compost or manure, and return the mixture to the bed. It should be somewhat fluffy and may be raised slightly. To create a true raised bed, take topsoil from the neighboring pathways and mix it in as well.

This is a lot of work! Try it in one or two beds for some of your most valuable plants; if you like the results, you can proceed to other beds when you have time. One nice thing about raised bed gardening is that it breaks work into units. Instead of gazing desperately at a garden full of weeds, thinking you'll never have time to clean it up, you can look at each bed and say, "I can do that in half an hour today!" Other chores are accomplished with the same ease. Raised bed gardening also provides design opportunities such as creating a pattern of raised beds through the garden.

By their nature, raised beds are a form of wide-bed gardening, a technique in which seeds and transplants are planted in wide bands of several rows or broadcast in a wide strip. In general, the goal is to space plants at equal distances from each other on all sides, so that leaves will touch at maturity. This saves space, and the close plantings reduce moisture loss from surrounding soil.



*Temporary raised beds and composted sheep manure were used to improve drainage and soil texture on this heavy clay soil. © R. Campbell, Dalhousie.*

### Vertical gardening

The use of trellises, nets, strings, cages, or poles to support growing plants constitutes vertical gardening. This technique is especially suited, but not limited, to gardeners with a small garden space. Vining and sprawling plants, such as cucumbers, tomatoes, melons, and pole beans, are obvious

candidates for this type of gardening. Some plants entwine themselves onto the support, while others may need to be tied. Remember that a vertical planting will cast a shadow, so beware of shading sun-loving crops, or else take advantage of the shade by planting shade-tolerant crops near the vertical ones.

Plants grown vertically take up much less space on the ground, and although the yield per plant may be (but is not always) lower, the yield per square meter (square foot) of garden space is much greater. Because vertically growing plants are more exposed, they dry out faster and may need to be watered more frequently than if they were allowed to spread over the ground. This fast drying is also an advantage to those plants susceptible to fungus diseases. A higher rate of fertilization may be needed, and soil should be deep and well-drained to allow roots to extend vertically rather than compete with others at a shallow level.



*A simple arched trellis adds extra space and makes an attractive entrance to this community garden.*  
© Lana Bos, Dalhousie.



*A structure like this pergola can add vertical space to the garden, but require time and money to construct.*  
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## Interplanting

Growing two or more types of vegetables in the same place at the same time is known as interplanting. Proper planning is essential to obtain high production and increased quality of the crops planted. This technique has been practiced for thousands of years and is gaining widespread support in this country. For example, carrots and radish are commonly planted together in the same row. The fast growing radish acts as a nurse crop, and they are harvested long before the carrots reach maturity.

To successfully plan an interplanted garden, the following factors must be taken into account for each plant: length of the plant's growth period; its growth pattern (tall, short, below or above ground); possible negative effects on other plants (such as the allelopathic effects of sunflowers and Jerusalem artichokes on nearby plants); preferred season; and light, nutrient, and moisture requirements. Interplanting can be accomplished by alternating rows within a bed (plant a row of peppers next to a row of onions), by mixing plants within a row, or by distributing various species throughout the bed. For the beginner, alternating rows may be the easiest to manage at first.

Long-season (slow to mature) and short-season (quick to mature) plants like carrots and radishes, respectively, can be planted at the same time. The radishes are harvested before they begin to crowd the carrots. An example of combining growth patterns is planting smaller plants close to larger plants (e.g. radishes at the base of beans or broccoli). Shade tolerant species, like lettuce, spinach, and celery, may be planted in the shadow of taller crops. Heavy feeders, such as cabbage family crops, should be interplanted with less gluttonous plants.

Interplanting can help keep insect and disease problems under control. Pests are usually fairly crop-specific: that is, they prefer vegetables of one type or family. Mixing families of plants helps to break up large expanses of the pest-preferred crop, helping to contain early pest damage within a small area, thus giving the gardener a little more time to deal with the problem. One disadvantage is that when it does come time to spray for pests, it's hard to be sure that all plants are protected.

### Intensive garden plant spacing

Individual plants are closely spaced in a raised bed or interplanted garden. Also, an equidistant spacing pattern calls for plants to be the same distance from each other within the bed: that is, plant so that the center of one plant is the same distance from plants on all sides of it. In beds of more than two rows, this means that the rows should be staggered so that plants in every other row are between the plants in adjacent rows.

The distance recommended for plants within the row on a seed packet is the distance from the centre of one plant to the centre of the next. This results in an efficient use of space and leaves less area to weed and mulch. The close spacing tends to create a nearly solid leaf canopy, acting as a living mulch, decreasing water loss, and keeping down weed problems. However, plants should not be crowded to the point that disease problems arise or competition causes stunting.



*The use of pots or hanging baskets is simple way to optimize the use of a small garden space.*  
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### Succession and relay planting

Succession planting is an excellent way to make the most of an intensive garden. To obtain a succession of crops, plant something new in spots vacated by spent plants. Corn after peas is a type of succession. Planting a spring, summer, and fall garden is another form of succession planting. Cool-season crops (broccoli, lettuce, pea) are followed by warm-season crops (bean, tomato, pepper), and where possible, these may be followed by more cool-season plants or even a winter cover crop.

Relaying is another common practice, consisting of overlapping plantings of one type of crop. The new planting is made before the old one is removed. For instance, sweet corn may be planted at two-week

intervals for a continuous harvest. This requires some care, though, because crops planted very early are likely to get a slower start because of low temperatures. In the case of corn, it can be disastrous to have two cultivars pollinating at the same time, as the quality of the kernels may be affected. Give early planted corn extra time to get started, for best results. Another way to achieve the same result is to plant, at once, various cultivars of the same vegetable; for example, you can plant an early-season, a mid-season, and a late-season corn at the same time and have a lengthy harvest.

Starting seeds indoors for transplanting is an important aspect of intensive gardening. To get the most from the garden plot, a new crop should be ready to take the place of the crop being removed. Several weeks may be gained by having 15 cm (6") transplants (4 to 6 leaf stage for cole crops) ready to go into vacated areas. Remember to recondition the soil for the new plants.



*To make the most of succession planting, a new crop of transplants should be ready to take the place of the crop being removed.* © Desiree Jans, Dalhousie

### Planning the intensive garden

Good gardening practices, such as watering, fertilizing, crop rotation, composting, and sanitation, are especially important in an intensive garden. An intensive garden requires more-detailed planning, but the time saved in working the garden and the increased yields make it well worthwhile. Start your planning with Table 2 as a guide to plant spacing and remember to check the factsheet on 'Crop rotation and companion planting' on this web site to see which plants make good neighbors. Have fun!



*In this garden rocks have been used to create a simple raised bed for tomatoes.*  
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**TABLE 1. TRADITIONAL ROW GARDEN SPACING GUIDE**

Crop	Planting distance in row		Planting distance between rows	
	cm	inch	cm	inch
Asparagus	45	<b>18</b>	<b>90-150</b>	<b>36-59</b>
Beans, bush	5-7.5	2-3	60-75	24-30
Beans, Lima	7.5-10	3-4	60-90	24-36
Beans, pole	10-30	4-12	90-120	36-48
Beans, wax	<b>5</b>	2	60-90	24-36
Beets	5-7.5	2-3	30-60	12-24
Broccoli	38-60	15-24	60-90	24-36
Brussels sprouts	45-60	18-24	75-90	30-36
Cabbage	38-45	15-18	75-90	30-36
Cabbage, Chinese	30-60	12-24	45-60	18-24
Cantaloupe	30-90	12-36	150-230	59-90
Carrot	2.5-5	1-2	38-75	15-30
Cauliflower	35-60	14-24	69-90	27-36
Chard, Swiss	15-30	6-12	45-75	18-30
Collards	45-60	18-24	60-90	24-36
Cucumbers	30-45	12-18	120-180	48-70
Eggplant	45-60	18-24	75-105	30-41
Endive	23-30	9-12	45-75	18-30
Kale	25-45	10-18	45-90	18-36
Kohlrabi	10-15	4-6	30-90	12-36
Leeks	7.5-15	3-6	30-75	12-30
Lettuce, Bib	15-25	6-10	35-60	14-24
Lettuce, leaf	10-15	4-6	30-45	12-18
Mustard	7.5-10	3-4	45-75	18-30
Onion (sets)	5-10	2-4	30-60	12-24
Parsnip	20-25	8-10	45-60	18-24
Peas, garden	2.5-7.5	1-3	30-75	12-30
Peppers	45-60	18-24	75-90	30-36
Potato	25-45	10-18	60-90	24-36
Pumpkin	120-210	48-82	180-240	70-94
Rutabaga	7.5-15	3-6	38-75	15-30
Spinach	7.5-15	3-6	38-75	15-30
Squash, summer	60-90	24-36	90-150	36-59
Squash, winter	90-210	36-82	90-300	36-118
Sweet corn	25-30	10-12	60-90	24-36
Tomato	45-90	18-36	90	36
Turnip	5-7.5	2-3	30-60	12-24
Watermelon	180-240	70-94	210-300	83-118



<b>TABLE 2. INTENSIVE GARDEN SPACING GUIDE</b>		
<b>Crop</b>	cm	inch
Asparagus	38-45	<b>15-18</b>
Beans, bush	10-15	4-6
Beans, Lima	10-15	4-6
Beans, pole	15-30	6-12
Beets	5-10	2-4
Broccoli	30-45	12-18
Brussels sprouts	38-45	15-18
Cabbage	38-45	15-18
Cabbage, Chinese	25-30	10-12
Carrot	5-7.5	2-3
Cauliflower	38-45	15-18
Chard, Swiss	15-23	6-9
Collards	30-38	12-15
Cucumbers	30-45	12-18
Eggplant	45-60	18-24
Endive	38-45	15-18
Kale	38-45	15-18
Kohlrabi	15-25	6-10
Leeks	7.5-15	3-6
Lettuce head	25-30	10-12
Lettuce, leaf	10-15	4-6
Melons	45-60	18-24
Mustard	15-23	6-9
Onion	5-10	2-4
Parsnip	20-25	8-10
Peas	5-10	2-4
Peppers	30-38	12-15
Potatoes	25-30	10-12
Pumpkins	60-90	24-36
Rutabaga	10-15	4-6
Spinach	10-15	4-6
Squash, summer	45-60	18-24
Squash, winter	60-90	24-36
Sweet corn	38-45	15-18
Tomatoes	45-60	18-24
Turnip	10-15	4-6

**Note:** To determine spacing for interplanting, add the centimeter (or inch) for the two crops to be planted together, and divide the sum by 2. For example, if radishes are planted next to beans, add 5 cm + 10 cm = 15 cm, then divide 15 cm by 2 = 7.5 cm. The radishes should be planted 7.5 cm (3") from the beans.



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# Activity 1

## **Draw a plan of your garden layout.**

Use graph paper marked to the appropriate scale and draw the outline of your garden. Mark which direction is north. Add permanent features like pathways, trees, bushes and long-lived perennials.

Using information from 'Garden Plan I: What to grow and how much', make a list of the vegetables you want to grow and how many of each you will need. Next, figure out how much space each vegetable crop will take up. Lastly, note each crop's nutrient requirements (heavy, moderate, or light).

Arrange the vegetables on your graph paper, trying to group those with similar nutrient requirements. Make sure tall crops are not shading others. Keep in mind how you might rotate your crops from year to year.

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# Activity 2

## **Make garden signs.**

Garden signs might be used to designate individual mini-gardens within a community garden or to identify specific vegetables within a bed. Either way, they are a fun addition to the vegetable garden!

Garden signs can be very simple. For small signs, start with any non-toxic material that is resistant to weather: small cedar shingles, strips of plastic cut from milk containers, or even old utensils. Use a permanent marker to write vegetable names and stick them into the soil.

Fancier signs can be made out of wood or large rocks. Use water-proof paints or, if gluing pictures onto wood, cover your creation with polyurethane.



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# Activity 3

## **Build a trellis or teepee**

To build a trellis, you will need two upright poles about 8 feet long and sharpened to a point at one end. (A 2x4 ripped lengthwise will yield a good pair of 2x2 uprights.) Drive the uprights into the ground 5 to 10 feet apart, leaving about 6 feet above ground. Use an iron bar to make a starter hole, especially in heavy soils. A crossbar sits on the uprights. Weave the crossbar through alternate holes in the top edge of 6 foot tall nylon or plastic netting. Place the crossbar on top of the uprights and screw into place. Anchor the bottom of the netting into the soil using garden stakes (1 inch square by 12 inches long) with a slight notch cut into the edge. For tomatoes and pole beans, use untreated garden twine instead of netting. Tie the twine to the crossbar and anchor to a garden stake.

To build a teepee, gather 3 to 6 poles 10 to 12 feet long and sharpen to a point at one end. Sink the poles one to two feet into the ground. Pull the poles into a tight bundle at the top and use strong twine to lash them together. For additional support, run some more twine around the poles in a criss-cross pattern or attach netting. Plant seeds of climbing plants on the outside of the poles. You might also like to leave one section between the poles unplanted. This creates a doorway into the teepee and a great place for kids (or grownups) to hideout!

