THE VEGETABLE GARDEN

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CROP ROTATION AND MIXED CULTURES

In forest, meadow and every wild plant association, there is a colorful mixture of plants, which, in accordance with soil type and local climatic conditions, are able to live together and mutually complement each other. We often speak of "natural plant association." The substances resulting from the decomposition of plants, the excretions of animals and all rotting organic matter, care for the formation of natural humus, which is held fast by the plant roots and utilized by them. In many regions plants associate in such a varied manner, that blossoms, green leaves and fruits hang beside one another up to the time of killing frosts.

A secret life hides itself in the underground rootstocks, bulbs and tubers of perennial plants, in the slumbering eyes of trees and shrubs. It lies there ready to push forward again with the increasing warmth of Spring and manifest itself anew in growing and blossoming.

Conditions are quite different in cultivated land, in field and garden. Here, in the course of *one* period of growth, plants are cultivated which often do not even ripen completely, except for the grains and certain fruits.They are supposed to develop the greatest possible leaf mass, as cabbage and spinach, for example, or to form large roots, like the turnip. Thus the plants make great and often truly one-sided demands on the soil. Cultivation of the soil and fertilizing are therefore necessary, the first to aerate and open up the soil, the second to supply nutritive substances and maintain a balance. Plants must alternate with one another in a succession which uses the ground without robbing it, and lets it rest again at intervals, so that it is not made one-sidedly poor in nutritive content. This means that we must use a crop rotation such as follows. In horticulture plants are classified according to their requirements and their more or less one-sided utilization of the food substances in the soil. They may thus be divided into *heavy feeders, light feeders* and *soil conserving and improving plants.*

HEAVY FEEDERS—All plants which need a heavy fertilizing with stable manure are heavy feeders. They can also utilize applications of liquid manure. Entirely fresh, untreated manure or liquid manure are not used, however, even for them. The heavy feeders are planted immediately after fertilizing. Those most familiar are all the cabbage varieties, cauliflower in particular, all leafy vegetables such as chard, head lettuce, kale, mustard, endive and spinach, as well as celery and celeriac, leeks, peppers, eggplant, cucumbers, squash, melons, pumpkins and corn.

Rhubarb and tomatoes are also decidedly heavy feeders, but are not included in the crop rotation because rhubarb is perennial and tomatoes are the one annual which likes to grow in the same place year after year. Even the stay-at-home tomato, however, sometimes needs a change after four or five years. They don't require a long journey; shifting to another part of the same garden area usually suffices. Berry bushes and strawberries likewise require a rich, but not a fresh manure, but are benefited by alternate applications of treated manure and compost, or by application of a mixture of the two. The results, in terms of flavor and fragrance of the fruit amply repay the gardener for this added labor.

SOIL CONSERVING AND IMPROVING CROPS—The heavy feeders can be followed by legumes. These include pole and bush beans, peas, edible-podded peas, broad beans, shell beans, black-eye peas, lima and soy beans and peanuts. Such plants bring about the recovery and improvement of soil which has been depleted by the heavy feeders. By means of their deep-growing roots legumes open up lower soil levels and bring to the surface again nutritive substances which may have been washed down (lime, for instance). The roots of many annual legumes reach to a depth of 2 feet; perennial types go even deeper, alfalfa and sainfoin reaching a depth of 6½ feet in a deep soil. By means of the nodule bacteria on their roots all the legumes capture the air's free nitrogen. In this way they provide for necessary nutritive materials and produce supplementary fertilizer. In a run-down soil, we should always plant them directly after the heavy feeders. In a live humus soil they can come later, in which case a light compost fertilizing benefits them.

LIGHT FEEDERS—It would really be more appropriate to call these "compost lovers." They cannot stand heavy fertilizing with manure, which will cause a rank, coarse growth. Instead they should be fertilized with well-fermented compost. We are dealing here with bulbs and all root vegetables, such as beets, carrots, radishes, salsify, parsnip, chicory, turnips, corn salad, kohlrabi, onions, leaf lettuce, etc. They stand to best advantage when grown after heavy feeders, but they can also be grown in third place in the rotation. To this group also belong annual and perennial herbs. With their aromatic quality they help to conserve the soil and "enliven" with their blossoms the vegetable garden, which flowers relatively little.

There are still some plants to be mentioned which, because of the peculiar character of their growth, their scent, root formation and soil demands, have a beneficial effect on the garden, being often useful as border plantings or as a hedge around the garden to break the wind. Although they make strong demands on the soil, they are biologically useful plants. Among these are corn, sunflowers, rhubarb, asparagus, tomatoes and globe or Jerusalem artichoke. Corn should always be planted in two or more rows to insure pollination, never in a single row. Tomatoes may be part of the border or in their special bed. Sunflowers attract the birds which then help us to control insect pests. The artichokes make good border plants, likewise rhubarb and asparagus, both the latter being perennial and requiring a permanent location. As border plants for the whole garden some of the taller growing herbs are excellent, especially if allowed to bloom freely as a feast for the bees. These could include any of the following,—sage, southernwood, wormwood, yarrow, rue, hyssop (especially near grapes), lavender, lemon balm, lovage, angelica, tansy, bergamot, catnip, costmary, stinging nettle and horehound. All these perennials or biennials can be located where one does not need to plow. Rosemary and rose geranium belong in this group too, but must be treated as annuals in the northern part of the United States.

Mixed border plantings within the garden can well be made of the lower growing herbs such as the perennials thyme, winter savory, tarragon, santolina, burnet, chives and garlic (good near roses) ; or the annuals summer savory, parsley, chamomile, chervil, dill, marjoram, basil (not near rue), borage (good among the strawberries), cress, and nasturtium. If you grow potatoes, plant a *few* horseradish among them. Fennel is an

herb which seems to disturb many other plants, especially bush beans and tomatoes. All the mints spread so wildly that they need a corner to themselves, possibly a damp and somewhat shady spot. Tarragon, parsley, lovage, angelica and chervil will tolerate some shade too, but most of the herbs need full sun.

If you can spare the space in your vegetable garden, by all means plant a few flowers as well as herbs. Modern specialization is not good for gardens. The instinctive wisdom of those monks who made the beautiful old medieval gardens brought vegetables, flowers, herbs, shrubs and trees into one thriving unit. Garden flax has an excellent soil loosening effect through its fine root structure. Carrots are especially grateful for such a soil. Besides flax, soy beans and lupines leave behind them the finest, most friable soil. Buckwheat and caraway are good cover crops to improve heavy, poor soil. Caraway germinates better if sowed with a legume.

It is not a matter of indifference in what associations plants are grown. We need only think how the shallow-rooting and deep-rooting plants supplement one another through the differentiation in their root systems. The legumes, for example, promote root growth in their neighborhood through the aeration of the soil resulting from their own deep-growing roots. It has been observed that beets and kohlrabi grow very badly near pole beans, if planted too late and consequently shaded by the beans. Between cabbages they thrive, even in a cramped and shaded position. Another unfavorable combination is tomatoes and kohlrabi. The one planted last generally suffers. While we value sunflowers in a border, along a path or in a meadow, it is not good to plant them near potatoes. We risk having stunted vines and small potatoes, especially if the sunflowers are luxuriant.

Among mutually beneficial combinations are cabbage and beans, beets and onions, celeriac and leeks, cucumbers and corn. Beans are not harmful planted near celeriac and leeks except if planted too thickly between them, when all three are generally stunted. Other beneficial associations are carrots and peas, cucumbers and beans, kohlrabi and beets, early potatoes and corn, early potatoes and beans, tomatoes and parsley, bush beans and celeriac, turnips and peas, bush beans and celery, cucumbers and peas, onions and early lettuce (if soil is good). There is still much to be investigated in this field of plant symbiosis and

the home gardener is urged to observe and note down his observations in this connection.

The value of companion cropping now becomes clear. Above the soil as well as under it, neighboring plants supplement one another. For example, the upward striving, two-dimensional leek finds enough room near the bushy celeriac or celery plant. Both are potassium lovers and therefore like well-rotted pig manure. The intercropping of various plants is conditioned by their similarity in soil demands and difference in rate of development. Lettuce and kohlrabi, for instance, develop rapidly and can cover the soil until plants which mature later can do this. After the inter-crop is harvested the more slowly maturing plants remain with plenty of room for their development.

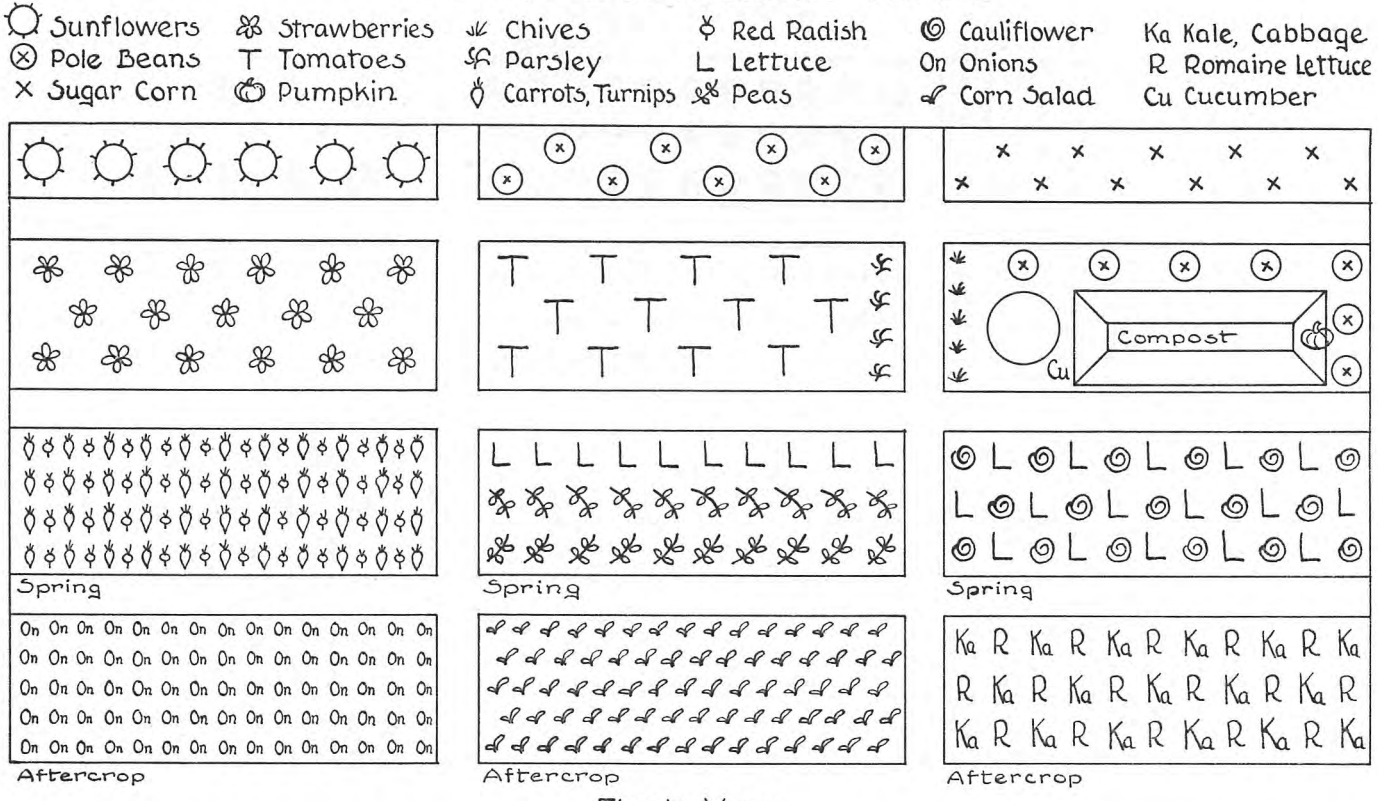
Such a permanent ground cover from mixed cultures helps not only to prevent crusting and drying out of the soil, but to hold the weeds in check. Besides it has a marked influence on the quality, flavor and keeping quality of the vegetables thus grown. Tests have shown too, that nutritive value goes hand in hand with flavor and quality.

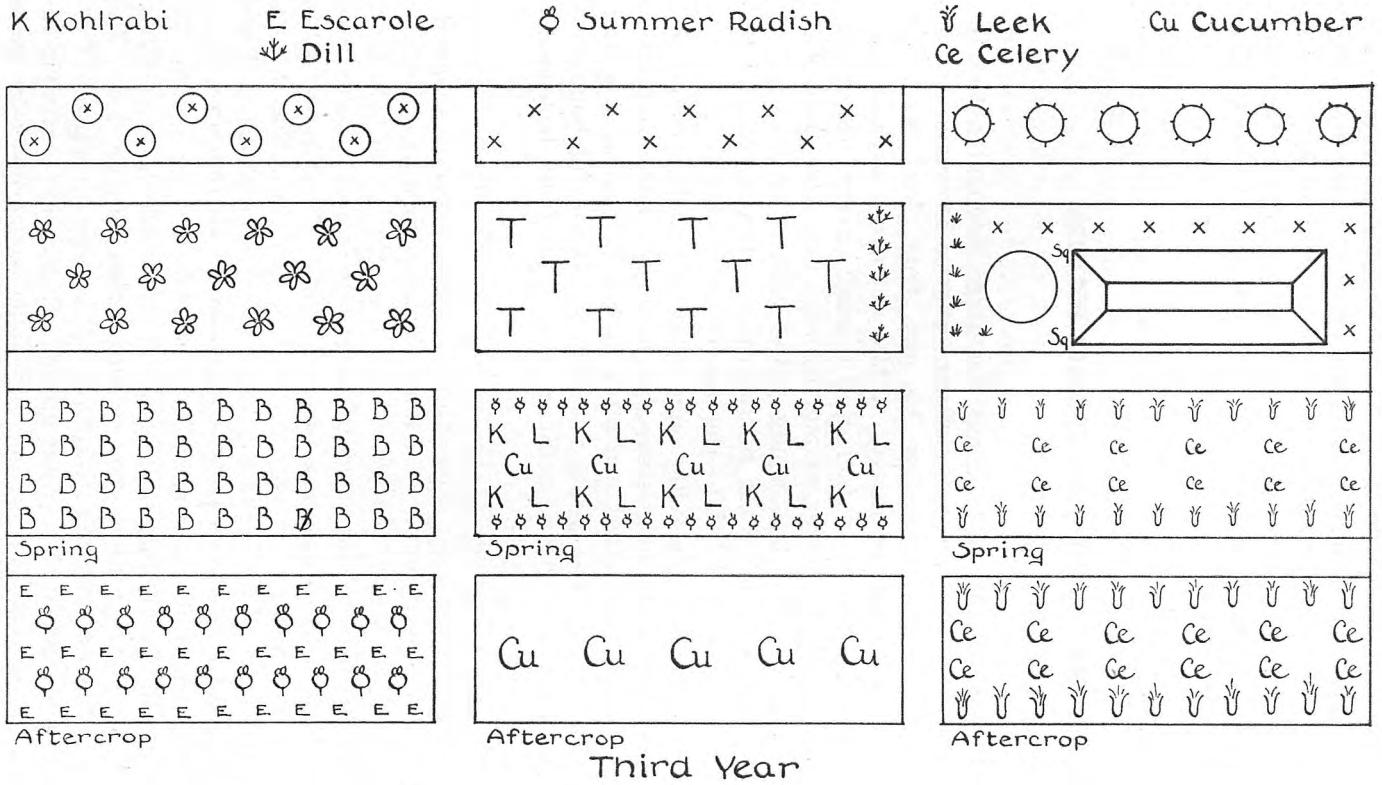
The following simple experiment is a test of companion planting. Make three small plantings of radishes. Border one with garden cress, the second with chervil, and leave the third with no companion plant. You will be able to detect marked differences in the flavor of the radishes. Those grown with chervil are sharp, those with cress are very tasty, those grown alone have less flavor.

The accompanying plans show one way of working out a three year crop rotation in the vegetable garden by using small beds. In the narrower border bed at the top is a rotation of sunflowers, corn and pole beans. The next row of three beds below remains mostly the same each year with strawberry and tomato plantings and the compost pile with its barrel for liquid manure. The two lower rows in each plan show two arrangements of the same three beds, first the early spring planting, later the crop which follows on the same spot.

Such a three year crop rotation may be planned just as well with most of the garden in rows instead of beds. The important point is to have a definite plan and to keep it as a record so that heavy feeders are not planted again on the same spot for three years. Likewise the soil improvers need to be moved each year to a new location, and the compost lovers as well.

PLANTING PLANS OF A SECTION OF THE INTENSIVE GARDEN FOR THREE SUCCESSIVE YEARS




K Kohlrabi
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Third Year

This rotation of the three kinds of vegetable crops and the right companion plantings combined with the usual bio-dynamic practices of treating manure and compost and of spraying soil and foliage, will help greatly to avoid diseases and pests, to build up the soil equally over the whole garden area and to insure healthy plants and good food.

BEES BELONG IN THE BIO-DYNAMIC PICTURE

STERLING W. EDWARDS

Producing your own honey definitely belongs in the Bio-Dynamic picture. The self-sufficient grower of vegetable foodstuffs also wants to produce his own fruit, fowl, beef, pork, grains and, of course, honey. While not every organic situation today is capable of including a small apiary, nevertheless hundreds of B.D. gardeners and farmers over the country can easily take on some beekeeping. And when they do, they can, if they will, cast off what many people regard as a very pernicious and harmful habit—the use of white sugar.

Now a small apiary like ours requires a little management, some careful attention at times, but is never a burden and, save for the swarming period, can often be left for weeks at a time. Yet the rewards are large, not only in wonderful honey, but the service of the bees as pollinators for your fruit, berries and grains is immeasurable.

Up here in our mountains we look out of bedroom windows down into the carpenter shop chimney; from carpenter shop windows we can see down into the honey house with stacks of drawn comb hive bodies on the floor. All bee activity on this place centers in this building, and keeping bees is just another step along the road to full living for our family. Having two large gardens is another. It may as well be said now that having once lived out of an organic garden, everything that is offered us from the typical fertilized garden—of which there are many in these mountains—seems to have no taste and no quality, for growing things organically has a very subtle effect on a person. All things must taste as good as those from your garden. You want to have everything about you of organic structure, of organic temperament. You want all your friends to be organic enthusiasts too. And you become very much concerned over those