

Crop Rotation

Teaming up with the art and science of fertilizing and tilling the ground, crop rotation has been one of the three pillars of horti-and agriculture for thousands of years. There is a good reason for this:

In a natural biotope a variety of plants join to form an intricate and complex community always striving to build up and harmonize a given location. They complement each other in that task, dealing with the various conditions of soil type, humus level, acidity or alkalinity, climate and animal life. They take and give and, as the condition changes, some will disappear in order to make room for other specialists.

This we have to acknowledge: plants make a demand as well as contribute according to their individual nature. Thus the dandelion will attract silica from the surrounding, the oak calcium, the stinging nettle will handle the iron processes. This gift of theirs they pass on to the soil, to their neighboring plants. These processes are most often extremely subtle, as we know through the research of especially the last 50, 60, 70 years. They are on the level of homeopathic medicines where dilutions of 1: 1 Million or more are initiating, guiding and determining basic life processes with the aid of trace elements, hormones and enzymes.

This harmony or rather, striving toward harmony in nature, has been thwarted to some extent by the two factors: 1) the breeding of our cultivated plants and

2) the intentional limiting of a host of plants growing in one field, on one bed in favor of one cultivar

The cultivated plant has been torn out of its original harmony by enlarging one of its organs and changing its texture, color, juiciness and flavor. A comparison of the wild carrot or wild lettuce with their cultivated grandchildren, nephews and nieces will tell a vivid story. As holds true in all realms of life, in all of evolution: something is gained at the cost of losing something else.

In the case of the cultivated plant, the gain in size and palatability is generally at the cost of robustness, vitality. It is more susceptible to stress and detrimental influences like lack of humus, severity of weather conditions, careless handling by the gardener/farmer and the whole range of predators, parasites.

By intentionally growing only one cultivar in a growing season, we thwart the harmonizing interaction the soil receives from having different plant families-- strong and light feeders, deep and shallow rooters, high or low nitrogen lovers ---balancing out , complementing and furthering healing processes.

It is no secret any more that growing monocultures in one location year after year undermines and eventually destroys the soils .The same holds true for the health of the plant.

Out of a natural instinct the farmer of older times gave his field a rest after two or three years of growing crop monocultures and had a 'fallow' year, a year of letting all the 'weeds', those wonderful harmonizers of the soil, take over and revive and rejuvenate it, heal it of its subtle deficiencies.

Establishing a rotation of crops means stretching over a period of years what nature does simultaneously. What criteria do we apply to this challenging task?

Seven aspects can be found that help one to approach (but only approach!) the magnificent wisdom out of which nature is created and 'functions'. (Other people might find 8 or ten reasons, the Anthroposophist is, of course, called upon to find 7). We must consider the plant's:

- 1) demand for nitrogen
- 2) demand for humus
- 3) depth of root system
- 4) family
- 5) effects on the soil condition
- 6) control of weeds
- 7) organ for which we grow it (root, leaf/stem, flower, seed or fruit)

1) By observing the needs of the different crops in relation to the type and amount of fertilizer that is best for them, we can generally differentiate between the heavy and the light feeders. Not only the way they thrive and develop but also their nutritive value and storage quality depend on paying heed to their needs. Although there are variations within the family, one can basically say that the **brassicas, the lettuces, spinach, Swiss chard, the tomatoes, potatoes, squash, pumpkins, cucumbers, celery, leeks, and**

peppers are heavy feeders, demanding a good humus level and a considerable amount of nitrogen supply.

The **flowers** go to the other extreme of the heavy feeders by appreciating just a bit of mature kitchen-compost or a mild gift of phosphorus-rich bird droppings (guano). It is amazing to see some of the most beautiful flower beds growing in clay that has been mixed with gravel and sand in order to reduce the vegetative growth but benefiting the flowering process.

The root vegetables like **beets, radishes, and carrots** thrive best in terms of fine quality on land that hasn't received but old, mild compost. The legumes with their nitrogen-fixing ability need the least in terms of nitrogen but are grateful for a good amount of humus.

2) The individual differences, however, need to be observed: whereas the **tomato** loves a good amount of 'driving power' in the form of nitrogen, the **cauliflower** doesn't smell too good in the pot if you give it the same amount, but nevertheless relies on a rich old humus supply that balances out the extremes of wet and dry weather spells.

3) When you grow **peas, beans, wheat, lettuce**,--just to name a few-- their roots will not go very deep into the ground. You want to give the soil and the following cultures the benefit of having a deep-rooting plant loosen up the underground and free some of the nutrients in greater depth. Most of your **clovers** will do that, but also **rye, carrots** (especially if the soil isn't too rich) or **lupines**.

4) We all know it: monocultures, grown year after year in the same location, are the cause for a number of problems: the soils gets impoverished, out of harmony and so does the plant, thereby attracting a host of 'helpers' in the task of eliminating the sick patient. Nematodes, bacteria, rusts, insects, all come to do that job. This, of course, results in a serious battle fighting off these beings. The farm, the garden becomes a field of death rather than a 'nursing' environment.

5) Observing the soil condition after harvesting a crop, we can observe vast differences in density, in the resulting crumbly structure. The cultures that need to be hoed or hilled (**peas, potatoes, beets**) and the ones densely shading the ground (**lettuce, brussel endives, Swiss Chard, squash**) usually leave a softer soil than, for example, the **grains. Potatoes** are outstanding in this respect and known to leave a beautifully crumbly soil.

6) Intermediary cover crops of plants that form a dense carpet choking out a number of undesired guests like **thistles, quack grass** and the like are readily put to service by the farmer or gardener after a harvest in summer and before planting a fall crop. The side effect is an enrichment of root mass, nitrogen or just a beautiful crumbly soil structure. **Buckwheat, phacelia, sunflowers, legumes and clovers** all serve well for that purpose. I don't like to use **mustard, rape or oil radish** too much because they, like many of the regular cultures (**brassicas, radishes**) belong to the family of crucifers; and we normally have enough of those for the soil to deal with.

7) Working with the Stella Natura Calendar, you certainly will consider the four organs of the plant in your crop rotation plan but if that's all you will look at, it won't be enough. The other enumerated and to a small degree elaborated factors will have to be involved if a long-term fertility and health of the soil is to be achieved.

No, no! Don't tear your hair or despair!

In over thirty years of biodynamic gardening I have **never** been able to achieve a 'perfect' crop rotation in my gardens. Maybe it isn't possible at all. Perhaps that's aiming for the stars. But isn't that part of what Biodynamics is all about?

Especially our failures do teach us that farming and gardening is an art, not only a science. Whereas the scientist is always on the path of new discoveries, the artist, alas, can never achieve perfection. *C'est la vie!*

Gunther Hauk