SUCCESSFUL BIODYNAMIC GARDENING

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Gardening, as I wish to discuss it, deals with plants and especially with the production of plants for human food. B.D. Gardening employs methods which have been derived from the insight that the plant is but one part of life on earth. It can not be viewed and treated without the consideration of the spheres that surround it, and the connections which plants have with the rest of nature. Since B.D. gardening is based on a science which embraces the whole universe, its practical methods are quite different from those ordinarily taught. To achieve success with these methods the bio-dynamic gardener must gain an understanding of:

1. The plant kingdom in its relationship to the whole of nature.
2. The plant in general, and cultivated plants specifically.
3. The plant in its individuality as related to soil, climate, and origin.
4. The plant and its relationship to the animal kingdom, especially insects.
5. The plant and its relationship to other plants.

The life, which covers our earth, is represented by three stages, not including man: minerals, plants, and animals. The minerals, forming the earth's crust, have been developed over millions of years, never having achieved life in the sense of the plants and the animals. Yet they are extremely essential building materials which nature uses to give substance and form to life, imparting visibility to living things. Minerals make plant growth possible. The entire plant realm can exist only in the presence of minerals. A plant consists of a variety of minerals endowed with life. In nature the first incarnation of life is the plant. Life finds its second incarnation in the world of animals; they have in addition to a mineral basis a life, further developed through feeling and sensation, including the possibility of movement. The plant has no choice about where it grows; it must depend on the wind, animals, or man to move it from place to place, allowing its life to emerge from the seed. The roots are organs which give the plant its anchorage, and take in the minerals, suspended in water. The leaves absorb sunlight and other energies from the outer world which might be associated with it.

On the other hand, animals with their more sensitive life are mobile; they can fly, walk or swim in their search for food. This food is not mineral in nature, as it is in the case of plants, but consists of plants or lower animals, indicating that animals need a material for nourishment that is already alive in order to develop their more sensitive beings.

Of these three natural components — minerals, plants, and animals — plants stand in the center. Towards one side life decreases, towards the other, it increases. The plant requires both sides for its development; minerals to build up the body, animals for their part in reproduction and the role they play in the soil.

The varieties of plants distributed throughout nature are large in number. Yet all plants have several things in common. The green pigment chlorophyl is found in those parts of the plants that are exposed to the sun. Roots can develop in no medium other than one of moist darkness. Light and the absence of light are the two factors therefore which cause the bipolar nature of the plant from the moment it emerges from the seed. And it is this seed which initiates the plant's growth, and through which the plant produces descendants and maintains the species. This, too, applies to all plants.

Although all plants have identical essential needs, one distinction must be made; there are wild or natural and cultivated or domesticated plants. The latter have originated and descended from wild plants but have lost the ability to grow wild and need the cultivation and care of man in order to survive. It was man who directed their growth forces, concentrating them in those parts of the plants which might be used as food. The cabbage, for instance, differs from its ancestor, the hedge-mustard, in so far as all its growing forces are focused in the leaves. While hedge-mustard forms seed in the first year, the cabbage has exhausted its life forces, and the production of its seed must be delayed another year until it is renewed by reentering the cosmic rhythm of the seasons. The cabbage was forced to place all its growing power into the leaves instead of utilizing it in the growth of blossoms. As a result, the leaves were thickened. The carrot is another example. In this case, it is the root, in which most of the growing forces are concentrated. Throughout the centuries, breeding methods have aimed at the sole goal of specializing a plant by enlarging one part of it: seed, fruit, leaf or root, as the case may be. It is through this enlargement,

especially through an increase in the size of the cell, that the original wild fruit, leaf etc. becomes more succulent and tender, ideal for human consumption. To produce this food economically, the plants are grown in monocultures, where cultivation can be kept to a minimum and machinery can be utilized.

In comparison to wild plants, our cultivated plants must be considered as deviations from the normal. In one sense, our crops may be considered sick and deteriorated. They manifest an increased degeneration from year to year, especially those plants which are propagated vegetatively. The most obvious symptom is the increase in virus plant diseases. These diseases evolve from within the plant and represent a decomposition of defective protein. The plant loses its aliveness and tends towards mineralization.

If we realize that our cultivated plants are weak, we can gain an understanding of why they are so easily overcome by disease, insects, and weeds. In nature there is a selective process through which all weak and defective life is eliminated. This is a further reason why a cultivated food plant could scarcely survive without the care of man. Through man's care the plant gains an advantage over its stronger contestants.

Everything healthy in nature exists in a state of balance. Considering the plant as a bipolar organism, a balance must exist between root-system and leaf-growth. By enlarging either side we undoubtedly favour its growth, causing an imbalance of the whole organism. All our efforts, therefore, should be directed towards stimulating the growth of the other pole. In the case of the cabbage, whose leafy side has been enlarged by breeding, help is needed to promote the root growth. At this point, we are led to the soil, the humus, and the organisms which populate and form it, and we think of the bio-dynamic methods which aim at improving the soil.

Today, vegetables in a garden, are members of an artificial community, each neighbour coming from a different part of the world. Most plants in our region are native to southern latitudes and because of their sensitivity to frost they are referred to as tender vegetables. Nowadays, few farmers or gardeners respect the individuality of a plant species, ignoring the plant's origin, history, and the environment in which it used to thrive.

There are two primary factors which affect a plant's individuality and govern its development: climate and soil. The effect of the first, is obvious to everybody. Disregarding its

importance will result in disaster for the plant. A southern plant has no chance against low temperatures. So far, no methods of breeding have found success in making such a plant resistant to the frost. This sensitivity has been inherited for centuries, and points out the necessity of keeping this factor in mind when growing these plants.

The second factor, the soil, is more easily overlooked, because failure to take note of it does not result in immediate death for the plant. Although the cause might not be recognized as such, disregard of the soil certainly does affect the plant to its disadvantage. An example of this, is the appearance of plant diseases brought about by insufficient aeration of the soil. When the relationship of plant and soil remains unclear and disease appears, modern agriculture makes use of fungicides to control the infection.

An understanding of soil and climate and a translation of this into practice, insures, to a great extent, success to the bio-dynamic gardener. It is of great help to know from which country a vegetable derives, and especially what type of soil it prefers. The most ideal way to respect individuality is to create an environment for the plant of climate and soil, most similar to the one in which it thrives naturally. It might be easier now to understand why a bio-dynamic gardener makes different types of compost for different types of plants.

Our next subject certainly concerns everybody, growing plants for any purpose. It deals with the relationship between plants and insects. We need not discuss how all the other animals affect plant growth, because the gardener does not encounter them frequently. Insects, however, inhabit every garden, no matter how small its size. Some scientists estimate the number of insects to be as high as 4 million per acre. This number, of course, includes those insects which live in the soil. Most insects are really very closely connected with the earth, 95% spending at least one stage of their development underground, commonly during winter. In addition to insects, the soil is the home of billions of bacteria, protozoa, mites, nematodes, and earthworms.

Thus the plant, roots as well as leaves, is surrounded by animal life. Which is the way it must be. Without insects for pollination, most plants would be unable to reproduce. Where plant and insect meet, in the blossom, the seed or fruit is formed. There is then a relationship between plants and insects. And

if, in the last decades, so many insects turned destructive, there must be reasons for this to have happened. It is certainly man who has brought about this change. No other being deals so much with plants and animals. By growing plants in monoculture, for example, man has favoured the living conditions of insects by providing an easily found source of their food. The insect has only to eat and reproduce!

Once again, the plant must be viewed as a polar organism if we wish to understand its relationship to insects. Leaves and blossoms grow upwards, into the air, assuming a position in which the sunlight can most fully be utilized. The roots, however, retreat from the sun, directing their growth towards the center of the earth. The plant obeys the two laws of phototropism and geotropism. The surface of the soil, where soil and air meet, is the point of plant neutrality where its two poles separate. Now, both leaves and roots are surrounded by animal life. The plant meets animal life in the air and in the soil. Between these two zones of insect life, there seems to be a natural balance. This means, that insects around the green parts of the plant exist in a certain ratio to the life in the soil. In order for the plant to continue to live it needs both animal spheres, but, in a state of balance.

From observation, it is known that insects are most destructive to plants grown on soil very low in organic matter, and, consequently, low in the number of soil organisms. This means that an imbalance is created between the two poles of animal life associated with the plant, and the lack of life in the soil results in an excess of life on the leafy part of the plant growing above the soil. This excess life, incarnated in insects, since it far exceeds the purposes of pollination, must become destructive. On the whole, therefore, the insect life is rarely found to be related to the blossoms; but lives on the leaves, degraded, one step further removed from the light. The causes of such attacks are obviously not found to lie in the plant, but in the soil, in the life which is or should be part of it.

This, again, explains why the whole of bio-dynamic fertilization practices does not aim simply at replacing plant nutrients, but strives, to foster and increase the life of the soil. This is achieved through the application of compost, a breeding place of soil organisms, and with various sprays which stimulate the soil life.

However, another factor in plant life must be considered which bears on the relationship between plant and insects. Many plants possess odorous substances, the so-called essential oils, which insects find attractive, not only those active in pollination but destructive species as well. The pollinating insects are attracted only as long as the blossoms are in bloom; the blossoms release the fragrance. The degraded insects, inessential and inactive to pollination, respond to the volatile odors generated not by the blossom but by the leaves and fruits. This further connection to the leafy parts of the plants rather than to the blossom indicates a fall from the sun, once more. The opposition of light and darkness or good and evil can easily be recognized if we remember that it is these varieties of insects which pass at least one stage of their development in the soil, revealing their dependence upon darkness. In contrast, bees and butterflies will not complete their metamorphosis away from light.

By careful observation, one will find that insects are more attracted to the plant as its growth declines. This is also the period during which the plant liberates an increased amount of essential oils. This is caused by the decomposition of the lower leaves. In this process the cells break down and expel into the air the odorous oils.

Realizing these facts, two things might be done to counteract the effect of the declining rhythm. The gardener should first try to keep the plants healthy and young, not allowing any part of the plant to die. This becomes a question of preventing plant diseases, a topic previously discussed. The other method is to decrease the attraction of an insect attack for the plant by employing odorous sprays which dominate and thus disguise the plant's own evaporation products. Many biodynamic herbal sprays can be used for this purpose, such as stinging nettle, camomile, vermouth, sage, etc. Fermented cow manure and mustard flour are also effective. There is no doubt that this method of insect repellence works. Most destructive insects are very specialized in their diet and if their favorite food is disguised they are apt to turn to neighbouring weeds or vegetables of the same family.

There are, certainly, many other laws governing the relationship between plant and insect. It takes, however, some time, knowledge and a kind of feeling to be able to understand them.

Next to be dealt with is the science of companion-planting. Much has already been learned about the influence one plant exerts on another plant. Dr. Pfeiffer mentions in his writings several plants which aid each other's growth and therefore should be interplanted. The soil is actually the medium where plants can prove their compatibility. Planting deep- and shallow-rooted plants together is not disturbing, since each derives its nutrients from a different level of the soil. An example is beans and carrots. In this way the soil is used intensively.

In order to avoid going into extensive detail I have to omit bringing into discussion another important factor of plant combinations. This is the factor of the influence that a crop has on the plants that follow it on the same field, the after effects of crop residues and to a lesser extent green manures.

Plants may have an influence on each other through substances excreted by either leaves or roots. Many plants secrete aromatic essential oils, which may have either a stimulating or a retarding effect on the growth of other plants. This phenomenon has been especially investigated in the case of strongly fragrant herbs. It is well-known, for example, that vermouth depresses the growth of practically every plant in its vicinity through the action of a bitter extract, secreted by its leaves and washed into the soil by rain. In most cases, this effect is not as striking, but by close observation one can discover whether a plant is or is not favoured by its companion. This beneficial reaction may even be carried to the point where there is an obvious improvement in the taste and yield of certain vegetables and fruits, which is one reason why herbs are interplanted in our orchard. Some essential oils are more concentrated in the seeds than in the leaves. Mustard oil, the pungent ingredient, present in Cruciferae, (the cabbage family which includes mustard, radishes, and the various cabbage varieties as members) suppresses to the greatest extent the germination of seeds belonging to other families. On the basis of preliminary research, it can be hoped that mustard flour will find use as a practical herbicide.

Since gardening deals also with trees, we should see the tree very clearly in its biodynamic visualization if we wish to care for it correctly. There is a distinction in a tree between the stem, with its branches, and the leaves, with their blossoms. Seen biodynamically, each belongs to a different aspect of nature. Stem and branches are extensions of the soil, while leaves

and blossoms are considered as belonging to the plant kingdom. The identification of tree and soil can be seen most clearly in winter when both are in a state of barren rest accepting the cosmic forces of frost. Consequently, stem and branches are treated like a soil, a medium for the leaves and blossoms to grow on. By spraying stem and branches with a mixture of clay and sand, the biodynamic gardener attempts to make the tree a more integral part of the soil. As every soil needs fertilization, cow-manure is included in the tree-paste for the purpose of furnishing all the vital plant nutrients in a blended and balanced state. This is an old practice, understood and performed long prior to the discovery by conservative science that trees assimilate nutrients through the bark and even via the leaves.

Any additive to the tree paste is beneficial that can fertilize the tree or has the property of influencing the growth and health of the leaves and blossoms. Mustard flour ideally satisfies both conditions. This highly organic substance is valuable because of its high nitrogen content, high concentration of the odorous and volatile mustard oil, and the comparatively large amount of sulfur released in its breakdown.

THE MARKETING OF GOLDEN ACRES FARM BIO-DYNAMIC PRODUCE

WALTER STUBER & C. R. KEEP, JR.

In 1924 Dr. Pfeiffer asked Rudolf Steiner:

".....'How can it happen that the spiritual impulse, and especially the inner schooling, for which you are constantly providing stimulus and guidance bear so little fruit? Why do the people concerned give so little evidence of spiritual experience, in spite of all their efforts? Why, worst of all, is the will for action, for the carrying out of these spiritual impulses, so weak?' ..... Then came the thought-provoking and surprising answer: 'This is a problem of nutrition. Nutrition as it is today does not supply the strength necessary for manifesting the spirit in physical life. A bridge can no longer be built from thinking to will and action. Food plants no longer contain the forces people need for this.'" (From "New Directions in Agriculture," an article by Ehrenfried E. Pfeiffer which appeared in a volume entitled *Rudolf Steiner, Recollections by Some of his Pupils.* Published 1958 by *The Golden Blade,* London, England.)

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