

WHAT IS BIO-DYNAMIC AGRICULTURE?

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The following excerpts are reprinted from the booklet, "What Is Bio-Dynamic Agriculture?" (internal citations omitted), also published in German by Freie Hochschule für Geisteswissenschaft Goetheanum. These chapters present a concise and clear overview of the biodynamic method of agriculture.

BIOLOGICAL FARMING

Many substances and forces have to work together to ensure that even the humblest plant grows and ripens in the manner of its species. *Natural plant communities* develop in areas undisturbed by man. They develop according to the soil and climatic conditions of their locale. Within these living communities many kinds of interrelations exist among the single plant species, and among these and the living world of the soil: Bacteria, fungi, worms and other creatures. Insects, birds and larger and smaller mammals of the area also belong to these communities. It rarely happens that one or more plant or animal species gains the upper hand over others within such a living complex, as can be the case with weeds and [pests] in cultivated ground. The cyclic exchanges of substances and forces between the soil and plants are almost entirely closed systems, and losses by leaching or erosion are minor. The soil fertility that has developed in the course of centuries is stable. *Many-sidedness and well-nigh closed cycles* within an area are characteristics of a stable, natural eco-system.

Cultivated landscapes present a different picture. Here, productive species are grown in pure stands, rarely in mixed-culture. Managed meadows and fields give higher yields but contain a narrower range of species than do natural stands. Or course, managed land supports many times the number of animals, supplies more fodder and produces more manure than does a natural system left to itself. Plow and spade promote the aeration of the soil, and the break down of organic matter is thereby accelerated. The cycles to which substances are subject run their course more quickly and are exposed to more losses. Natural animal habitats shrink in size. These are some of the conditions under which the high yields of food and fodder are achieved on cultivated soils, while the yield from areas left in a state of nature is comparatively small.

However, *"many-sidedness of living communities"* and *"maximally closed systems"* are characteristics to be desired for cultivated areas as well, if these are to remain lastingly fertile and healthy. Specialized vegetable or grain growing with no—or only slight—crop rotations, huge animal herds, and so on, mean, with the present-day demand for high yields, the introduction of large amounts of chemical fertilizers, toxic compounds to control pests, expensive feed concentrates, antibiotics and hormones. Intensification and high yields can be achieved, however, without relying on specialization and the use of objectionable supportive measures. Biological management also represents an intensive use of a given area. Here too, high yields are obtained, but by other means. The biologically managed garden

or farm enterprise relies on a many-sided cropping system. Nitrogen-enriching legumes, other humus-encouraging plants, and the use of intercropping and green manuring, all raise the yields of cereals and row crops. Animal populations are geared to what the land itself can support. Feed is largely produced on the farm, and feeding aims at maintaining health and performance. Care of the land, including the planting of hay crops, manure handling, composting, companion planting in the garden, herb raising, careful soil cultivation, unobjectionable protective measures, chosen on the basis of an integrated plan of plant protection, and many other measures belong to the biologically managed system. *Biological management means reconciling the life-conditions of a healthy, enduring, producing system with economic necessities, and with the skills and interests of the farmer or gardener.* There will always be conflicts between biological and economic goals. If the life of the earth and of future generations is to be provided for, the task must be carried out with an eye to the totality of nature's growth. In bio-dynamic agriculture, the "farm as organism" is the form of organization which does justice to these points of view.

DYNAMICS, OR THE WORKING OF FORCES

Anthroposophy enables us to broaden our knowledge of nature and man. What we explore with our eyes, our hands and other senses in order to arrive at a rational explanation merely results in a science of dead nature. But this is not a really adequate approach to plants and animals. K. J. Schroer, an instructor of Rudolf Steiner during his student days, wrote: "... organization overrides the stream of cause and effect; cause and effect cease to exist purely physically within an organism; they are endowed with a certain character by an indwelling principle of life." The effects of this principle reveal themselves to the attentive observer in the way the plant builds its shape and substance, as well as in its permanent form. The principle is seen in the innumerable metamorphoses of the archetypal motif spread out before us in many species; one finds it in the process of localization, that is, in environmentally provoked changes of single species or of whole plant communities. Growth, nutrition, propagation and characteristic form-building are activities which appear at the life stage in addition to those of the inorganic processes involved. This second principle is called the life or etheric body by anthroposophical spiritual science. It is active in all living organisms. Anthroposophy offers training methods open to everyone which strengthen the human capacity for ideas and lead in the long run to the perception of the working of this etheric world. Those who cannot perceive this etheric body for themselves can nevertheless acquaint themselves with a concept of it derived from supersensible reality. As one becomes familiar with this it throws light on the world of phenomena, makes one's own thinking and observation richer and more many-sided and leads in the end to the attainment of higher perception. At a still higher level a person who does exercises for this purpose comes to a corresponding awareness of human and animal soul life, and lastly, to the spiritual individuality that is active in every human being.

The advice given by Rudolf Steiner in his agricultural lec-

tures thus sprang from an extended insight into what goes on in nature. This insight must of course be pursued into depths considerably beyond what is expressed here. But what was communicated dawned in time on the understanding of those who have concerned themselves with it. There are paths that the practical person and scientist can travel to this understanding. One learns to comprehend how the life of the plants is connected with their environment in the widest sense. On the other hand, one can learn to apply the dynamic effects of small material entities. In the fourth lecture of the agricultural course, Steiner says; "You have now seen what is essential in the discovery of spiritual-scientific methods for Agriculture, as it is for other spheres of life. Nature and the working of the Spirit throughout Nature must be recognised on a large scale, in an all-embracing sphere. Materialistic science has tended more and more to the investigation of minute, restricted spheres." Nowadays indeed, scientific investigation, having gone to the extreme of breaking up living processes into a tremendous number of separate mechanisms, wants to apply separate means to their manipulation. The successes and drawbacks of modern methods of agricultural production are founded on such separation. The results are high yields but also diseases, poison sprays and lessened quality. In contrast to this, the foremost endeavor of the bio-dynamic method is to keep each single measure related to life's overarching wholeness. This is taken account of in the methods of manuring, in cultivating the soil, in the observing of cosmic rhythms, in the interrelationships of farm and environment, and so on.

The bio-dynamic *preparations* have dynamic effects.

These preparations are specially prepared substances which are applied in very small quantities. Research in the last decade furnishes impressive examples of the manifold influences of trace minerals and organically-active compounds on plant growth. The effects are not always as drastic as those for nutrients out of the fertilizer bag. On that account it would not be right to neglect them. The bio-dynamic preparations are, however, different from those naturally occurring, physiologically-active compounds. The preparations are *substances in a condition* which does not occur in the same form in nature. Plant and animal substances, and in one case a mineral, are exposed at certain times of the year to environmental influences. To grasp how and why, it is necessary to enter into the underlying connections in detail. To do that would mean going beyond the scope of this article. However, nothing should be accepted on faith. Experimental results, available in ever-increasing number, must decide the issue. The farmer himself is in a position gradually to grasp even the more subtle effects through actual experience.

Perhaps as a result of ingrained habits, people are generally not sufficiently clear on the fact of how close and many-sided is the relationship of earthly life-processes to the great cosmic expanses. Of course there is no question of this in the case of the growing season and the solar year. We are familiar with the warmth rhythm involved in growing summer and winter grains and perhaps also with the light rhythms of the long- and short-day plants. In addition to the abundance of circadian or one-day rhythms, there are also dozens of known moon or tidal rhythms in the animal and plant kingdoms. There are some that are "built into" the organism as it were, and others more or less

closely related to the momentary extra-terrestrial occurrences. Up until the last few decades traditional farming kept to various *moon rhythms* (synodic, tropical month, etc.) in sowing, planting, fertilizing and pruning vines and trees and so on. To continue these practices out of piety would amount to superstition. We need a more comprehensive and well-founded understanding. In his lectures on agriculture, Rudolf Steiner drew attention to the relation between the watery element in soil and plants and the phases of the moon. And indeed, in the decades since 1924, research into rhythms has discovered a great many moon rhythms occurring chiefly in water-dwelling organisms and in weather events. Experimental findings are also available, based on the behavior of the fluid media. In numerous planting experiments, Maria Thun has singled out from among the great host of overlapping rhythms a number of outstanding relationships. Growth types emphasizing either root, leaf, flower or fruit (seed) development can be distinguished, in the case of a number of cultivated plants, as related to the sidereal (i.e., with reference to the zodiac) moon cycle. However, it is important to see that these results rest upon a procedure that takes totality into account. It is not just a matter of seeding or planting; soil management and further treatments such as those with the preparations are pursued in rhythmical sequence. In a doctoral thesis that appeared recently, Thun's results were confirmed in principle. Taking into account and successfully applying cosmic rhythms, of which there are many, rests upon exact knowledge, penetration and painstaking observation.

Two groups of dynamically effective substances are in use as *preparations*. There are six substances that are added to compost and other farm manures The two preparations *Horn-manure* (also called preparation 500) and *Horn-silica* (preparation 501) are sprayed directly on the soil or on the growing plants. As the names suggest, they are made from animal manure and finely ground quartz, respectively. In the case of the first, the application rate is approximately 200 g per hectare (ca. 2 ½ oz. per acre), which is about 0.1 ppm for the plow layer (1 ppm—1 g per ton). For the quartz, only a few grams per hectare are used. Both preparations are sprayed after being stirred very thoroughly in water for one hour. Wherever possible, *Horn-manure* is applied at the time of cultivating the soil in preparation for making a seed bed. Or else it can be spread in drop form on moderately moist soil in the late afternoon, about the time when the evening damp is beginning to fall. This preparation stimulates soil life. The quartz preparation is sprayed on the green leaf, except for special or more frequent applications, around the time when the part of the plant destined for use is beginning to develop. The morning hours of a sunny day are best for the purpose. A wealth of observations have been made on the effects of these preparations on growth and ripening; exact field experiments have also been made, with some surprisingly high and statistically significant increases in a yield. We can witness the fact that these two preparations belong to the realms of forces which constitute a plant's environment—the earthly (terrestrial), and the cosmic, influences, respectively. . . .

THE FARM ORGANISM

The pursuit of principles of biological and dynamic procedures leads to a thorough shaping and harmonising of all measures—to building the so-called *farm organism*, described in the following passage from the second lecture of Rudolf Steiner's agricultural course: "A farm is true to its essential nature, in the best sense of the word, if it is conceived as a kind of individual entity in itself—a self-contained individuality. Every farm should approximate to this condition. This ideal cannot be absolutely attained, but it should be observed as far as possible. Whatever you need for agricultural production, you should try to possess it within the farm itself (including in the "farm," needless to say, the due amount of cattle). Properly speaking, any manures or the like which you bring into the farm from outside should be regarded rather as a remedy for a sick farm."

Here, a goal is clearly indicated. Where correctly pursued, it has proven itself over the decades. It presents a contrast to the present-day widely adopted procedures in agriculture at large, organized as it is around specialization, considerable dependence on purchased supplies and a minimal work force. The questionable nature of these procedures is beginning to be felt by many farmers in their own operations . . .

The farm organism is properly developed when it is based on the natural conditions of the habitat. In this picture belong the composition of the soils and its parent materials, the surface configuration, the regional and local climate, forests, meadows, fields, ponds and streams in the near and more distant surroundings, and many other factors. The size of the farm dictates the ideal number and kinds of domestic animals. The farmer has to discover what this is. However, each farm also represents a certain human and economic situation. The stage of development reached in breeding, mechanization, and building; the economic and market situation; the needs and desires of consumers; the interests, education and special skills of the farmer and his co-workers are all decisive factors. All of them affect a farm's or market garden's own life and its relationships to the world about it.

The greatest possible degree of self-containment, the development of the right relation of soil-depleting market crops to soil-improving fodder crops, animal raising and so on are all characteristics of bio-dynamic operations. Of course, these must not be confused with those of the old-fashioned self-sufficient farm. A certain amount of concentration in one or another area of production is entirely possible within the bio-dynamic method. Use is made of machines to lighten labor wherever this is indicated. It is important to find the right relation of capital-intensive mechanization to hard and expensive human labor. Self-containment is certainly not a rigid dogma; that would only alienate the farmer from life and bring about socially undesirable conditions. Necessary improvements must be made and obvious deficiencies overcome. The animal raising should be a permanent practice, that is, based as far as possible on raising one's own stock and feed.

Existing farms and gardens prove that where there is crop diversity and good soil management on a farm, in private gardens or in market gardens, the biocides used to combat weeds,

diseases and pests lose the significance that they have in agriculture at large. It is not always easy to do without herbicides, considering today's labor shortage. Farming and gardening skills are essential. Bio-dynamic growers have worked out satisfactory procedures for themselves. But there are also instances of successful bio-dynamic management of such special crops as fruit and grapes without resort to poisons. Soil cultivation, organic fertilization, crop management, painstaking observation and unquestionable supportive measures are all applied.

Rudolf Steiner's advice was actually intended for definite situations. The idea of the necessary self-containment of the farm was suggested in the temperate-humid zone, where from earliest times diversified farming with stock had been the usual practice. A great majority of instances of and wide experience in the development of bio-dynamic farms have arisen in Europe and also in the temperate zones of the other continents. There exists a rich variety of farm types which have developed in the course of several decades. The question is often asked, whether this method is suited to other climatic zones too. The principles of biological and dynamic methods mentioned here in the . . . [previous] sections are generally applicable, but the means of carrying them out vary from place to place. As experience shows, it is more important to have permanent cover and shading in warm, humid areas than to maintain humus by manuring. In warm, dry areas well-ripened compost and protection against over-grazing are important. The bio-dynamic preparations are used just as they are in various climatic zones, without thereby cutting out the possibility of alternative uses. The farm organism is not built on a rigid system of measures that must be taken, but should be adjusted and developed to suit the locale.

What has been said thus far applies to farming as well as to commercial vegetable and fruit raising. Vegetables, berries, stone fruits and flowers are grown in numerous private bio-dynamic gardens around the world. . . . The home garden ought also to be a source of satisfaction and recreation. It keeps the family provided with fresh vegetables and fruits, not to mention a mixed variety of culinary herbs and teas. Blossoming shrubs and ornamentals should not be left out. Variety should be an objective—something which is not always possible in commercial operations. Here too, however, there can be a rotation and one can make use of soil-improving legumes. Care of the soil, mulching and wind protection should be considered. Spraying with the bio-dynamic preparations can be done intensively; composting should be done very carefully. Companion and border planting, the provision of nesting opportunities, the supplying of flowers to attract butterflies, and various other measures offer opportunities to observe nature. The control of diseases and pests is done with non-poisonous remedies and preventive measures. A garden such as described here is an organism in a slightly different sense, although as a rule use is made of brought-in manures or other composting materials.