

Relevance of Biodynamic Farming Approaches in Sustainable Agriculture

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ABSTRACT

Biodynamic farming is a comprehensive agricultural approach that weaves together ecological, spiritual, and ethical dimensions. Developed by Rudolf Steiner around the early 1900s, detailing interactions between soil, plants, animals, and people. Major parts that make up biodynamic farming include composting, crop rotation, organic methods of farming, and the use of special preparations made through fermented herbs and minerals for increased soil fertility and biodiversity. A fundamental principle of biodynamics is to see the farm as its very own ecosystem and adapt techniques to every regional characteristic of the country. Thus, while supporting social well-being and ecological wellness, harvested products would be of good quality. Crop and soil vivacity can be optimized according to nature's rhythms: diel, lunar, and solar, among others, by biodynamic farmers. These methods contribute toward enhancing quality soil, and biodiversity, and augment resistance to pests and diseases. The increasing need for sustainable farming practices has led to increased biodynamic farming as a viable approach for enhancing food systems, mitigating climate change, and bolstering community resilience.

INTRODUCTION

Conventional agriculture faces change posing a formidable threat to our significant economic and planet and the well-being of future generations environmental obstacles, with climate (Sarma *et al.*, 2024). The transition to



biodynamic agriculture has been spurred by inefficiencies in industrial organic operations. Organic farming's primary focus has shifted from addressing social and environmental issues to taking globalization into account. By contrast, the integrity of the landscape, human health, food quality, and ecology are given priority in biodynamic farming. It stands for an ethical, ecological, and all-encompassing approach to gardening, farming, and nutrition. This approach is founded on the theories of Dr. Rudolf Steiner, who in 1924 presented a novel approach to integrating scientific understanding of nature with a spiritual perspective to farmers through his lectures. Since then, several farmers and academics have worked to advance biodynamics. It grows today in tens of thousands of orchards, farms, vineyards, ranches, and gardens worldwide. Anywhere food is produced, the principles of biodynamics can be tailored to fit different scales, climates, and cultural situations. Every biodynamic garden or farm is a complete, integrated living being. Numerous interconnected components comprise this organism, including people, fields, forests, plants, animals, soils, compost, and the essence of the location. Farmers in India have traditionally used the ancient Hindu "panchanga" calendar, which is based on solar cycles. They blend this age-old process with the biodynamic planting and harvesting calendar and scientifically proven techniques like "cow pit-pat" and "soil shampoo." This method combines traditional wisdom with cutting-edge scientific understanding.

In order to support the health and vitality of the whole, biodynamic farmers and gardeners strive to cultivate and balance these elements through dynamic and comprehensive management. In order to create and evolve their farm as a distinctive individuality, biodynamic practitioners also make an effort to listen to the ground and perceive whatever may wish to emerge through it. Biodynamic

farming produces a rich, dynamic soil that is in touch with cosmic rhythms and full of rejuvenated natural energies. The fundamental tenet of this strategy is the human intelligence and consciousness that tends to the land. This deep insight is the result of close observation and a deep, loving relationship with the land and its creatures.

Features of Biodynamic Farming

- 1. Holistic approach:** One that integrates all the different aspects such as plants, animals, soil, and people as a self-sustaining system.
- 2. Application of Biodynamic Preparations:** To improve fertility of the soil, as well as growth of plants, specific natural preparations of herbs, minerals, and manure are applied.
- 3. Diversification and rotation of crops:** Cultivation techniques and rotations are part of cropping systems, hence helping protect the soil's health and resist pests.
- 4. Composting Methods:** These mainly highlight the significance of composting through enhancing soil quality and effectively recycling nutrients.
- 5. Cosmological Rhythms:** Farm according to the rhythms of the moon and space, based on beliefs that space rhythms affect plant health and growth.
- 6. Community and Locality:** Demonstrates a close proximity to the immediate communities and encourages environmentally friendly and sustainable activities.
- 7. Animal Integration:** Incorporates cattle in the farming system to enhance nutrient cycling through the utilization of manure and to support biodiversity.

Biodiversity with Biodynamics

High-biodiversity, topographically rich natural habitats inspire biodynamic farms and gardens. Annual and perennial vegetables, herbs, flowers, berries, fruits, nuts, grains, pasture, feed, native plants, and pollinator hedgerows are all planted to increase plant diversity and improve, in general, the health and resilience of the farming system. This diversity of domestic animals also should be included on the farm because they all contribute different things to the soil, and their manure will be of different qualities. With some staple crops and one or two animal species-like earthworms or honeybees-this diversity of plants and animals can emerge incrementally and then multiply as the farm ecosystem develops.

Planting Calendar

The technique considers the influence that astrological signs and moon phases have on the growth within plants and soils. This includes evaluating what the plant type is; if it is a root, leaf, flower, or fruit, as well as when to plant, cultivate, or harvest specific crops based on the moon's phase and sign it is in. It has even been referred to as an "astrological" feature of biodynamic methods.

Basic principles of biodynamic farming are as follows:

1. Relation between matter and energy:

Beyond simple chemical reactions, life depends on the interaction of matter and energy. Like in plants that grow with soil and water supplemented by light and warmth, it is through the interaction of substance and energy that produces such a harmonious system. Because both matter and energy are important for our existence, we need to make sure that we eat the right foods that give the body's needs. Only in well-balanced soils can we find these essential nutrients and energy content in the

form of growth hormones, enzymes, and trace minerals.

- Holistic Management:** According to this holistic approach, the sum of all the factors-soil, plants, animals, and also humans-engage in and contribute to the benefit of the farm as a whole. The farmers work for enhancing such relationships through encouraging an equilibrium that reduces the dependence on external inputs. This approach develops habits that strengthen the integrity of ecosystems, as observation and understanding of natural processes are emphasized. We can collect insects, weed seeds, or animal remains and burn them at a time corresponding to the planetary placement to control pests, weeds, or an imbalanced insect population. The ash left over can be used to create a homeopathic cure by diluting it with water and spraying it on the ground. It's a biodynamic strategy that can very well replace chemical pesticides.
- Soil Health:** Healthy soil is crucial for productive farming. Biodynamic practices prioritize soil health through:
 - Organic Compost:** Farmers create compost using plant residues, animal manures, and other organic materials, which enhances soil fertility.
 - Cover Crops:** Growing cover crops during off-seasons helps prevent erosion, suppress weeds, and fix nitrogen in the soil.
 - Crop Rotation:** Rotating different crops helps prevent nutrient depletion and disrupts pest and disease cycles, promoting soil vitality.
- Biodiversity:** Biodynamic farms thrive on diversity. This principle includes:
 - Variety of Crops:** Growing a range of crops increases resilience against pests and

diseases and enhances soil health through diverse root structures and nutrient requirements.

- **Integrated Livestock:** Incorporating animals into the farming system helps maintain ecological balance. Livestock can contribute manure for compost, help with pest control, and support the cycle of nutrients.
- **Wildlife Habitat:** Maintaining natural habitats around fields encourages beneficial insects and pollinators, supporting a vibrant ecosystem.
- This diversity fosters a more resilient agricultural system that can adapt to environmental changes.

5. Cosmic Influences: Because they are unable to select their food sources or manage their exposure to light, plants are extremely sensitive to environmental factors and seasonal variations. It is simple to understand how the moon's gravitational pull could have an impact on soil water, plant sap, and the extra sunlight reflected during a full moon. After all, the moon's gravitational pull can alter Earth's tides. There are numerous natural factors at work, the moon being just one.

In an effort to comprehend how these celestial forces impact the growth and development of plants and animals, biodynamic gardeners and farmers pay special attention to the rhythms and cycles of the earth, sun, moon, stars, and planets. It recognizes the impact of cosmic energies on farming methods. This comprises:

- **Lunar Phases:** Farmers may plant, cultivate, or harvest according to the moon's phases, believing that different phases affect moisture levels and plant growth.
- **Zodiac Signs:** The position of the moon in relation to zodiac signs is also considered.

Each sign is thought to influence different plant parts (roots, leaves, flowers, fruits), guiding farmers on optimal planting times.

6. Animal Integration: Animals play a vital role in biodynamic farming systems:

- **Nutrient Cycling:** Livestock contribute manure that is essential for composting and improving soil fertility.
- **Pest and Weed Control:** Chickens, for example, can help manage insect populations, while larger animals can graze on cover crops, naturally controlling weeds.
- **Diversity and Resilience:** Integrating animals increases biodiversity, contributing to a more resilient ecosystem.

7. Sustainability: Biodynamic farming promotes sustainability through:

- **Closed-Loop Systems:** Farms aim to produce their own inputs (such as compost and animal feed) and minimize reliance on external resources, thereby reducing environmental impact.
- **Organic Practices:** By avoiding synthetic fertilizers and pesticides, biodynamic farming maintains ecological balance and soil health.
- **Community Engagement:** Many biodynamic farms emphasize local economies and community involvement, fostering a sustainable approach to food production.

8. Recycling: Composting is very important in biodynamic agriculture and stands as an example of the principle of recycling in agroecology. Biodynamics maintain that waste material should be at a minimum amount; materials that otherwise would seem as waste are channeled throughout the

farm for initiating an essential energy exchange that allows the farm to regenerate itself. Biodynamic compost is prepared with protein-rich materials like animal manure and fresh green leaves, in combination with carbon-rich material such as paddy straw, wood chips, and dried leaves; it recycles the organic wastes from the animals with these processes stabilizing the nitrogen in the soils and enriching the humus of the soils, which are vital to farm health. It is the various preparations utilized during biodynamic practices that play a crucial role in composting—some of which specifically promote the formation of humus and prevent fungal diseases within crops.

Preparation of Inputs

For more than 65 years, certain biodynamic techniques have been applied, and numerous farmers and gardeners can personally speak to their efficacy. Additional experimental research has added to the corpus of empirical knowledge about these techniques. Two types of specifically fermented foodstuffs, referred to as preparations, comprise the practices. The first group consists of six herbal compounds, designated 502 through 507, that are added sparingly to composts and manures—collectively, compost preparations—in modest amounts. The original creators of the preparations gave these random numbers. The sprays with the numbers 500 and 501 make up the second group. Additionally, while not classified among the main eight preparations, a ninth preparation, sometimes called 508, is created by boiling the horsetail plant and is used in excessively wet years to help prevent fungal diseases (agritech.tnau.ac.in).

1. BD 500 Cow horn manure: The process of creating horn manure involves putting cow dung inside a cow horn for the winter. This enhances the soil's life and the way that plants and soil interact (Spaccini *et al.*,

2012). It is essentially cow dung that has been fermented, and it is extremely important for improving soil fertility and revitalizing degraded areas. It is unearthed in February or March, when the ground is actively absorbing and cosmic influences are especially powerful during winter, after being buried between September and November. In order to prepare BD 500, feed high-quality cattle diet for two days prior to removing the dung; use high-quality green fodder and reduce the amount of artificial feed that is high in protein. Next, excavate a burial trench that is eighteen inches deep and free of earthworms, strong root systems, or flooding. This is because the BD 500 is influenced by the condition of the soil. Gather cow horns (be sure to clean off any paint) and relatively hard fresh manure. Owing to the warmer environment in India, fill the horns with dung in October or November rather than September. Then, set them in the pit, base down, one inch apart, and encircled by a 50% compost and soil mixture. Everything should be covered with dirt and left underground for four to six months. If the soil isn't rich enough, add compost. Maintain the burial pit at 20°C, moist, shady, and earthworm- and weed-free. Dig up one horn to assess the fermentation after four months. If the dung has turned into a smooth, dark humus with an earthy aroma, it is ready for usage and storage. If not, bury it for a longer time.

2. BD 501 Cow horn silica: This preparation requires high quality, well-formed, and clear finely ground quartz crystals. As with BD 500, the crystals are implanted underground but this time during summer months ideally April or May, while the plan is to collect the same from the earth in September when the exhalation by the Earth reaches its peak. You will be equipped to crush the silica quartz, using a

pounding rod, mortar and pestle, or hammer and grind the crushed silica quartz into a fine powder between two glass plates-the larger one being a 12-inch square, 9 mm thick plate mounted in a wooden frame and the other a 4-inch square mounted in a wooden block with a handle. As quartz dust is risky for inhalation with its development of silicosis, masks must be worn during the crushing and depositing process. The crushed quartz should then be moistened into a stiff paste and filled into cow horns. The hollowed cow horns should be placed in a soil trench-one inch apart with the bottom facing downwards-and covered with a mixture of 50% compost and soil from the end of March or April till September.

3. BD 502 Yarrow (*Achillea millifolium*):

This preparation consists of yarrow flowers, along with the urinary bladder of a stag, whose cosmic effects are enhanced by the antlers of the stag. The smell of the bladder of the stag is akin to that of yarrow; the cosmic energies from the stag, with an amplification through its antlers, concentrate around the bladder. Prepare this mixture under the planetary influence of Venus. Squeeze the fresh bladder with air and let it air dry before folding up flat. Just before using the bladder, wet it so that it becomes pliable, cut it open along its length, and insert a funnel into the bladder to fill it with yarrow flowers until the bladder is packed. Steep the flowers in an infusion of plant extract, sew up the opening with cotton thread, and let the finished preparation in a closed basket to prevent rodents and other pests from getting at it.

4. BD 503 Chamomile (*Matricaria chamomilla*):

This medicine is prepared with flowers of chamomile mixed with cow intestine. To prepare, pick the flowers when

the petals fall flat and preferably in mid-morning around 10 am. The choice of the perfect chamomile flower should have two rows of petals that hide the middle cone. Collect the flowers in a tray because if kept heaped together, they generate heat. Dry the flowers on drying trays for maximum effect. The cow or bull intestine, used for this preparation, need not be washed. Cut into sections of 15 cm, the undigested material can be removed by passing a finger along the length as one milks a cow. At each end of every intestine, a cotton string holds it in place and to the open end a funnel is attached to fill it with dried flowers. In this manner, neither packed too tightly nor too loosely, the intestines are filled. Finally, the filled intestines are bundled together and set in a mud pot, surrounded by fertile soil.

5. BD 504 Himalayan stinging nettle (*Urtica parviflora*):

To prepare this mixture, dried leaves are firmly placed inside terracotta pipes or mud pots and well-pressed and the lid closely covered. Place the pot under the influence of Mars. In case the leaves become too dry, they can be wetted with the juice of the leaves before placing them in the vases. Leaves will have to be collected in May and in September, and thus this preparation is to be taken up in September after one year.

6. BD 505 Himalayan oak bark (*Quercus glauca*):

This preparation involves mixing oak tree bark with the skull of a domestic animal. First, oak bark is crushed, and any domestic animal's skull can be used due to the shared calcium properties between the two. This relationship is important because both calcium formation in the bark and skull development occur early within the course of the embryo development. Tightly packed crushed bark is packed into the cranial cavity of the skull that is sealed with

a snug piece of bone. The skull must be submerged in an aqueous medium inhabited by weeds and plant debris infected with local crop diseases, as this stimulates plant resistance and is Homeopathic-friendly. Place the skull in a location that allows for good water exchange, such as a rain drain or swamp. The preparation will emit an offensive odor when it is finally removed, which will abate as the piece dries in a dark, dry location. Some fungus may be present, so it should be turned periodically to control this. The burial is in September; the preparation is suspended in March.

7. **BD 506 Dandelion (*Taraxicum officinalis*):** This material preparation involves stuffing dandelion flowers into bovine mesentery. Initially, unwashed mesentery from a cow is used; the excess fat may be trimmed away. The delicate flowers are put inside the mesentery and the mesentery is wrapped into a parcel that is tied up with jute thread. This parcel is put into a well-mixed mixture of soil and compost in a pot. The mesentery may or may not be visible when the preparation is lifted. The burial takes place in September with the preparation lifted in March.
8. **BD 507 Valerian (*Valeriana officinalis*):** Preparation of Valerian flower juice Grind the clipped flowers in mortar and pestle to prepare a paste. Mix 1 part of the prepared paste with 4 parts of water and keep the mixture in a cool place. One gram of the mixture should be applied on every 5 cubic meters of compost, and in liquid manures or cow pat pits, 10 ml of the mixture at a 5% concentration should be diluted in 2 to 5 liters of water.
9. **BD 508 (*Equisetum arvense*):** Horsetail herb is rich in silica, may be prepared as a tea for controlling fungal growth in early seasons. This should also be sprayed when

the full moon has begun and Saturn opposition. One kg of horsetail or Casuarina in 10 liters of water should be brought to the boil for 2 hours and then allowed to steep for 2 days.

Constrains

A few of the challenges faced by biodynamic farming include greater starting expenses because it requires specialized procedures and organic materials. For small-scale farmers in particular, restricted access to certified biodynamic ingredients can provide difficulties. Additionally, conventional farmers might be discouraged from switching due to the difficulty of following biodynamic principles. Crop yields can also be impacted by weather variability and climate change, and planning may become more difficult due to reliance on lunar cycles and cosmic rhythms. Ultimately, market potential may be limited by a lack of consumer understanding and demand for biodynamic products, which makes it more difficult for farmers to defend their investment in these sustainable practices.

Future prospects

This could be promising for the future of biodynamic farming since the desire of consumers to sustain the organic farming practices is on the increase. Biodynamic products are in great demand due to increasing awareness of health benefits and environmental challenges that open up new business potential, and technological advancements may retain the principles of biodynamic farming but improve farming processes and efficiency. Government support for and incentives in sustainable agriculture may also make many farmers to adopt biodynamic practices. Research studies on the health of the soil and ecological balance may further strengthen the case for biodynamic farming practice, hence increasing adoption from the side of the farmers as well as

consumers. In all aspects; biodynamic farming will thrive in an ever more environmentally sensitive market.

CONCLUSION

In general, biodynamic farming is a holistic practice of farming that emphasizes much on sustainability and soil health with ecological balance. Crucial bonds between the land, crops, and community are encouraged through the combination of organic practices with cosmic and spiritual ideals. Even while there are still existing challenges such as higher costs and market awareness, high development prospects exist due to the increase in demand for sustainable food sources. With more farmers adopting biodynamic farming practices, we would expect increased resilience and biodiversity in ecosystems and a greater movement of consumers toward eco-friendly habits, ultimately improving the health of the world as well as the food chain.

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