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Dynamic use of Cow Pat Pit, Biodynamic Preparations and Peppering in Organic Farming

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Working with the energies that produce and maintain life is referred to as biodynamic farming. It is a type of organic farming using farming inputs made from herbs, minerals, and raw materials processed in complex ways, and then applied to the soil and crops in minute doses. However, what distinguishes biodynamic farming from organic farming is that biodynamic farming makes use of an astrological calendar to determine the most auspicious times for planting, cultivating, and harvesting. It collaborates with the energy of the Sun, Moon, constellations, and planets to produce and sustain life. The ideas of biodynamic agriculture include substance and energy, soil, organic matter, humus, cow manure, cosmic forces, biodynamic preparations, crop rotation, peppering, farm organisms, and the control of weeds, pests, and disease. The main objective of this paper is to review and briefly highlight biodynamic cow pat pit (CPP), different types of biodynamic preparations, biodynamic peppering, and how they are related to the cosmic cycles. Biodynamic Cow Pat Pit (CPP) is a biodynamic preparation that uses cow manure to boost the humus-forming

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processes of the soil and encourage soil activity. On the other hand, biodynamic preparations are numbered from 500 to 508 and are straightforward, all-natural homeopathic remedies prepared from yarrow, chamomile, horn silica, and other plants. And lastly, biodynamic peppering deals with an unbalanced insect problem, animal pests, or weed problem. So, overall biodynamic agriculture uses the natural resources and energy available upon itself to create and maintain life. It somehow increases the nutritional quality of the food, improves seed vitality, fewer weeds, pests, and disease infestation, and produces living soil and healthy plants for sustainable agriculture.

Keywords: Biodynamic farming; cow pat pit; peppering; BD preparation.

1. INTRODUCTION

The term biodynamic is taken from the Greek word “bios” meaning “life” and “dynamics” meaning “energy”. Hence biodynamic farming refers to “working with the energies which create and maintain life” [1]. The Father of biodynamic farming is Rudolf Steiner. BD farming is characterized by two primary features. First, by applying specific farming inputs—made from various herbal, mineral, and raw materials—in low amounts to the soil and crops after complex processing. Second, by observing natural rhythms that go beyond the most conspicuous influences of the sun, weather, and season, such as lunar, planetary, and stellar constellations [2]. In contrast to organic farming, biodynamic farming uses an astronomical calendar to determine the most favourable periods for planting, producing, and harvesting crops. Biodynamic farms also strive to become self-sufficient in animal feeds, compost, and manure [3]. Biodynamic farming has increased the mean yield of potatoes by 10.4% and 10.9%, carrots by 17.2% and 24%, cabbage by 14.3% and 28.3% and French beans by 24.5 and 22.5% under irrigated and rainfed conditions respectively [4]. Early twentieth-century Europeans began using biodynamic agriculture (BDA) as a methodical alternative to the spread of high-input industrial agriculture [5]. In the past 20 years, biodynamic farming has gained scientific attention as an alternate strategy for sustainable production. One of the oldest ideas is biodynamic farming, which has its origins in Rudolf Steiner's lectures at Schloss Koberwitz (1924). The biodynamic farming system has developed over time, and as agricultural issues multiply, so do the number of biodynamic farms and enterprises. To address these problems, biodynamic farming may be helpful to preserve biodiversity, and promoting sustainability [6]. BD agricultural practises are found to be more energy efficient, and Eric Lichtfouse views these qualities as being of growing importance in the face of climate change, energy shortage, and population expansion.

2. EFFECTS OF BIODYNAMIC FARMING

Biodynamic farming deals with interrelationships between soil, humans, plants and animals. Various studies conducted on biodynamic farming concluded that biodynamic farming increases the nutritional content of food. Biodynamically grown crops are known to contain more vitamins, minerals and antioxidants than conventionally grown crops. Also, it can be noted that biodynamic farming aims to regenerate natural resources such as soil, seeds and water. It focuses more on building strong and healthy soil, full of nutrients, by using different types of biodynamic preparations, use of composting, and various other farm practices such as crop rotations. Moreover, biodynamic farming highlights the use of natural and organic fertilizers and pesticides rather than the use of synthetic ones. By doing so, the water pollution by fertilizers and pesticides will be minimized resulting in more diverse organisms, a balanced ecosystem and healthy soil and plants. All these interrelationships between soil, humans, plants and animals result in more increased yields and higher pest resistance.

3. FEATURES OF BIODYNAMIC FARMING

Biodynamic farming uses organic and sustainable practices to build healthy soil and promote the growth of healthy plants. This includes the use of compost, cover crops, and crop rotation to maintain soil fertility, as well as the avoidance of synthetic fertilizers and pesticides. Biodynamic farmers use a series of preparations made from natural materials, such as cow manure, silica, and yarrow, to enhance soil fertility and stimulate plant growth. These preparations are typically applied in small amounts and at specific times in the lunar cycle. Biodynamic farming emphasizes the importance of biodiversity and the interconnectedness of all living things. Biodynamic farmers aim to create a diverse and balanced ecosystem on their farms, including a variety of plant and animal species. It is designed to work with, rather than against, the

natural rhythms of the earth and the seasons. Biodynamic farmers pay attention to the position of the sun, moon, and stars in planting and harvesting crops, and use a planting calendar based on the lunar cycle. Biodynamic farmers often integrate animals into their farming systems, such as using cows to provide manure for compost or chickens to help control pests. This helps to promote soil health and biodiversity. It is one of the first sustainable Agricultural movements; produces living soil and healthy plants as a result of coordinated work of earthly and cosmic energies.

4. BENEFITS OF BIODYNAMIC FARMING

Biodynamic farming uses organic and sustainable practices to build healthy soil, including the use of cover crops, crop rotation, and compost. This can lead to improved soil fertility, water retention, and overall soil health. Biodynamic farmers aim to create a diverse and balanced ecosystem on their farms, including a variety of plant and animal species. This can help to support beneficial insects and other wildlife and may also lead to increased crop yields and pest resistance. Biodynamic farming minimizes the use of synthetic fertilizers and pesticides, which can reduce chemical runoff and pollution in the environment. Some studies suggest that biodynamically grown crops may have higher levels of certain nutrients, such as antioxidants and vitamins, than conventionally grown crops. It produces fruits and vegetables of the highest quality, with flavourful and nutrient-dense foods. Biodynamically grown crops are often noted for their exceptional taste and quality, due in part to the healthy soil and natural farming practices used. Biodynamic farming is designed to work with, rather than against, the natural rhythms of the earth and the seasons. This can lead to increased resilience in the face of weather events, pests, and other challenges. Biodynamic farming is a sustainable and ethical farming practice that supports the health and well-being of the soil, plants, animals, and humans involved.

5. PRINCIPLES OF BIODYNAMIC FARMING

Biodynamic agriculture works on various principles such as substance and energy, soil, organic matter, humus, cow manure, cosmic forces, biodynamic preparations, crop rotation, peppering, farm organisms, weeds, pests, and disease management. The main objective of this paper is to review and briefly highlight biodynamic cow pat pit (CPP), different types of biodynamic preparations, biodynamic peppering, and how they are related to the cosmic cycles.

5.1 Cow Pat Pit CPP

Biodynamic Cow Pat Pit (CPP) is a biodynamic preparation that uses cow manure to boost the humus-forming processes of the soil and encourage soil activity. It creates a natural nutrient input on the farm. Moreover, it accelerates the conversion of organic matter in compost and helps to initiate manure fermentation. It is a natural breeder of effective micro-organisms and bio-fertilizers. It helps reduce the effects of radioactive fallout on land where it was applied. It is simple to make, inclusive and low-cost. It assimilates local traditions and practices.

5.1.1 Cow pat pit raw materials

1. Cow manure
2. Biodynamic preparations 502-507
3. Ground basalt
4. Ground grains
5. Eggshells.

5.1.2 Preparation of CPP

1. Make a pit (90 cm x 60 cm x 30 cm) lined with bricks but with no bottom liner and no cement.
2. Mix 60 kg fresh cow dung with 200 gm crushed, powdered eggshells, and 200 gm basalt dust (or blue granite dust or bore well soil).
3. Mix thoroughly to obtain a smooth paste.
4. Fill the mixture in to pit up to 12 cm height.
5. Pat it gently to get an even spread and flat surface.
6. Also wet the bricks periodically
7. Dig 5 holes in the paste and put one teaspoon full (3 g each) of preparation BD 502 to BD 506 in each hole.
8. BD Preparation 507 is mixed with water, half is poured in one hole, and half is sprinkled over the entire surface.
9. Cover the surface with a wet gunny bag.
10. After four weeks, aerate the dung by turning it with the help of a fork.
11. Smooth out again and cover.
12. Thereafter turn every week.
13. CPP compost will be ready in 12 weeks.
14. Store in a mud pot covered with a damp cloth and do not let the cloth gets dry.
15. Place in a shaded space away from the sun and rain

5.1.3 Uses of CPP

1. As Spray: combine BD 500 or 501 with 100 g CPP per acre.
2. As Foliar spray: 5 kg/acre applied every 7–15 days from the start of the crop till the stage of fruit/pod production.
3. As Soil inoculant: 2 kg/acre of compost-and-inoculant-mixed soil.
4. As paste: Fruit tree stems are covered in paste.
5. As inoculant: instead of 502 to 507, a biodynamic compost inoculant.
6. As compost: 500gm-2kg per acre
7. It also heals grafting wounds.
8. Use for seed, root and stem dipping before planting.

According to a study by Radha and Rao [7], actinomycetes were found in CPP as a result of the addition of calcium during production. The bacterial isolates from CPP were also tested for ammonia, IAA, HCN and siderophore-producing activities. In another study conducted by Perumal et al. [8], it was reported plant growth hormones such as Indole Acetic Acid IAA (28.6 mg/kg), kinetin (7.6 mg/kg) and gibberellic acid (23.6 mg/kg) in CPP. For this reason, CPP stimulates plant growth by providing nutrients and plant hormones and protects the plant's root zone against fungal diseases with bacteria and actinomycetes producing HCN and siderophores. The highest gram-positive and negative bacteria (184 ± 14 × 105 cfu/g), (225 ± 9 × 105 cfu/g) were isolated from CPP, respectively. The increase in bacteria might be due to inoculation of BD502-507 during CPP preparation [9].

5.2 Biodynamic Preparations

Biodynamic preparations are simple straight forward, all-natural homoeopathic remedies prepared from yarrow, chamomile, horn silica, and other plants, Biodynamic preparations increase the impacts of the planets, silica, and lime on the soil and plants, as well as the rate of decomposition and potential life energies in compost piles. For direct application to the soil or plants, Dr. Steiner provided two preparations (numbered 500 and 501), and six preparations for composting (numbered 502 to 507). BD 502 to 507 are known as compost preparations because they are added to manures and composts in small amounts. There is a ninth preparation, BD 508, which is prepared by boiling the horsetail plant and is only used in years that are unusually rainy to avoid fungal infections. A few BD preparations are used in minute quantities but show remarkable effects on plant growth, yield and quality. The BD-500, BD-501, and BD-502-507 are used to increase soil fertility, regulate biotic and abiotic stress, and produce compost. These BD preparations are produced with cow dung and other herbal plants and fermented for a specific period [9].

5.2.1 BD 500 (cow horn manure)

Cow Horn Manure, often known as "500," is made by stuffing quality cow manure into cow horns and burying it for the winter. It is buried in September/October, and it is raised in February/March. Basically, it is fermented cow manure. It serves as the foundation for both soil rejuvenation and fertility. BD 500 is to be applied when the dew is falling (the earth breathes in) i.e., late afternoon or evening (just before sunset) i.e., descending Moon. It can be sprayed 4 times a year – during the beginning and after rains, i.e., Feb-May-Nov-Dec. It should be used within 1 year of making and should be stored in a dark and cool temperature of not more than 25 °C. It encourages root growth, stimulates/increases soil microbial activity, and controls lime and nitrogen levels. It also helps to release trace elements and Increases germination.

5.2.2 BD 501 (cow horn silica)

The original Cow Horn Silica, BD 501, the biodynamic atmospheric spray was created from a clear quartz crystal that had been broken up and let to soak in cow horns all summer. It is buried in the spring (April/May) and lifted in the fall (September). The best time to use BD 501 is when the earth is breathing out and the cosmic light energy is at its peak (summer). It can be sprayed over the plants using a low-pressure sprayer (Knapsack 80-100 psi). It should be sprayed into the air to fall as a gentle mist over the plants. But generally, spray twice during the planting cycle; at the beginning and again just before harvest. It can be kept for up to three years in a glass jar with a loose-fitting lid and kept outside in direct sunshine. Cow Horn silica (501) controls leaf growth promotes flavour and storage quality, as well as photosynthesis and fruit ripening. Additionally, it enhances the sugar formation process, which increases carbon sequestration.

5.2.3 BD 502 (yarrow)

This is created from yarrow flowers and a stag's bladder. The yarrow flowers are stuffed inside the urinary bladder of a stag and are buried from September to march.

5.2.4 BD 503 (chamomile)

This is composed of the flowers of the Chamomile plant combined with the cow intestine. The chamomile flowers are stuffed inside the intestine of a cow and are buried from October to Feb/March.

5.2.5 BD 504 (Himalayan stinging nettle)

BD 504 is made by stuffing the dried leaves of Himalayan stinging nettle in a mud pot surrounded by peat in all directions and buried for a year.

5.2.6 BD 505 (Himalayan oak bark)

BD 505 is made from Himalayan oak bark and the skull of any domesticated animal. The oak bark is chopped up into different pieces and stuffed inside the skull of the domesticated animal. It is surrounded by peat in all directions and buried from September to March.

5.2.7 BD 506 (dandelion)

BD 506 is made from dandelion flowers and cow's mesentery. Since the flower is extremely sensitive to light, it is inserted in the cow's delicate mesentery. Make sure any superfluous fat is removed. Avoid washing the mesentery. The dried flowers should be placed in the mesentery, wrapped in a packet, and fastened with jute thread. Put the packet in a pot with a healthy amount of soil and compost. The mesentery might or might not be visible as you elevate the preparation. It is usually buried from September to March.

5.2.8 BD 507 (Valerian)

The juice of valerian flowers is used for this preparation. Using a mortar and pestle, pulverize the trimmed flowers to create a paste. In a bottle, a ratio of one to four is used to mix this mixture with water. Make sure to store things in a cool location. For every five cubic meters of compost, use 1 gram of each (502–506) and 10 ml of 507 diluted in 2–5 litres of water at a 5% concentration. Both liquid manures and cow pat pits might use these additions.

5.2.9 BD 508 *(Equisetum arvense)*

Because of its high silica content, it can be used as a tea to combat fungus in the early growing season. Similar to BD 50, it should be sprayed at full moon (2-4 days beforehand) and when the moon is in opposition to Saturn. BD 508 can be applied by diluting the tincture with water: 50 g tincture to 10 litres water. In the early phases of growth, BD 508 can be sprayed onto the soil or over the plants.

According to Trivedi et al., [10], the use of the biodynamic preparation BD 501 and botanical neem oil increased yield characteristics and yield to their highest possible levels while also reducing the occurrence of black gram disease under an organic production system. Pfeiffer [11] reported that spray of biodynamic manure BD 501 increases photosynthesis and as such complements the activity of the preparation BD 500, which works mostly in the root zone of the plant. It also strengthens the plants against some fungus attacks. Jayasree and George [12] reported that the application of two biodynamic preparations (BD 500 and BD 501) in chili by adopting a biodynamic calendar resulted in better fruit quality of chili. The concept of biodynamic manure (BD 501) was originally given by Rudolf Steiner [13] who showed that due to the application of BD 500, significant internal changes do take place in the manure during overwintering in the soil. The principal changes are a significant drop in pH, an increase in aerobic status and the production of nitrate. He added that BD 500 and BD 501 applications activate humus and natural manure content.

Another similar case is Compost made using biodynamic principles works well to improve soil quality and provides crops with nutrients right away. Green and dried leaves can be used to create a biodynamic compost heap. Dry leaves (carbonaceous material) and green leaves (nitrogenous material) are alternately stacked in layers that are 15 to 25 cm thick and measure 5 by 2 by 1.5 meters. Rock phosphate (P), loose lime (Ca), wood ash (K), and other materials can be used to enhance the compost with various nutrients as needed. The breakdown and degradation of the material are greatly influenced by the composition of air, moisture, and heat. A set of B.D. 502–507 is included, and the heap is plastered with dung and clay mixtures [14].

The basic biodynamic field spray formulations are as follows. Cow horns are buried in rich soil and filled with fresh cow excrement from lactating cows. In order to incubate entirely during the winter, horns are buried in the lowering moon during the autumn (October to November). It is removed once more in March or April during the

Table 1. Biodynamic preparations

Preparation	Herb/material	Planet	Time of burial to lifting	Result
502	Yarrow flower *Achillea millifolium*	Venus	Hang up in the March to get cosmic influences. Bury from September to March in a mud pot with earth inside.	Permits plants to attract trace elements in extremely dilute quantities for best nutrition
503	Chamomile flower *Matricuria chamomilla*	Mercury	Bury in October and let it remain in the soil till Feb/March.	Stabilizes Nitrogen (N) within the compost and increases soil life so as to stimulate plant growth
504	Stinging Nettle *Urtica parviflora*	Mars	Harvest leaves in May and September Lift the preparation in September after a year	Stimulates soil health, by providing plants with the individual nutrition components needed, 'enlivens' the earth (soil).
505	Oak Bark *Quercus glauca*	Moon	The preparation is placed in September and lifted in March.	Provides healing forces (or qualities) to combat harmful plant diseases.
506	Dandelion flower *Taraxicum officinalis*	Jupiter	Place in September and lift in March.	Stimulates relation between Si and K so that the Si can attract cosmic forces to the soil
507	Valerian flower *Valeriana officinalis*	Saturn	----	Stimulates compost so that Phosphorus component is properly used by the soil.

descending season and used or stored in earthen pots in a cold, dark location. For spraying, 13.5 litres of water and 25g of BD-500 are combined in a plastic bucket by creating a vortex for an hour in the evening. The solution is then applied using a natural brush or a tree twig. When the field is being prepared and the moon is descending, BD-500 is sprayed [14].

5.3 Peppering in Biodynamic Farming

A non-chemical technique called "BD peppering" is used to get rid of undesired plants that are hard to get rid of with conventional methods. BD peppering is collecting insects, weed seeds, or dead animal skins and burning them at the right time according to planetary positions and can help solve an unbalanced insect, animal pest, or weed problem. The ash can then be made into a homeopathic remedy and sprayed on the land. This works well as a biodynamic substitute for chemical sprays. Consideration of moon and constellation positions is an important aspect of enhancing the potency of BD peppers. When Rudolf Steiner began the Biodynamic Agriculture movement in 1924 while presenting Agriculture lectures, he developed the technique known as Biodynamic peppering (BD peppering). The peppering technique can be applied to weedy plants, insects, and animals.

5.3.1 Peppering by weeds

5.3.1.1 Procedure to Make the BD Pepper

1. Collect the reproductive organ of the plant. For instance, nut grass plant is taken. The plant's nut is collected throughout the month. To ensure that the only material left is the plant's reproductive organ, all other organic matter and soil in and around the nut should be removed. When the BD pepper is prepared and used, thorough weeding of the area three weeks before the full moon is advised. Collect at least two tablespoons' worth of nuts.
2. Getting the ash - while the plant's living components are released into the

atmosphere, the nitrogen, sulphur, hydrogen, and carbon are separated from the seeds or tubers during the reproductive part of the plant's burning process. The nuts (for nut grass) should be placed in a cast iron pot with a lid and burned over a hot fire to produce the ash. It typically takes two hours to boil the nuts until they become black and then powder the nuts using a mortar and pestle.

3. The day of the full moon is required for the ashing operation.
4. The ash is homeopathically potentized in water. After potentizing, the BD pepper liquid should be finished in a dark bottle with a dropper on top. Ideal homeopathic potency is 7-8 times.
5. The quantity of nuts, after ashed and potentized, will produce enough BD pepper to cover a fairly big area for numerous applications and be stored out of the light in a cold environment without electricity exposure.

5.3.1.2 Application of BD Pepper

- Put 7 droplets of the BD pepper into a bucket of water for an area under 500 m^2, then use a brush or switch (long dried grass) to flick out droplets lightly over the whole area where the weed is growing. If we have a larger area, we can also use a backpack sprayer. We use a 20-liter sprayer to cover about 4000 m^2 and still use 7 drops of the pepper.
- Apply on a full moon day.
- Depending on our soil management methods we may need to apply it monthly over a few years. It has been found that consistent biodynamic/organic management of soil around 4 applications at 4 succeeding full moons is sufficient to greatly reduce the plants' reproduction.
- It is important to be aware of seasonal factors as there will be times of the year when the weed we want to remove grows much more than other times. When we undertake certain farming or gardening activities, for example, as soon as we cultivate, we are more likely to raise weed seeds to the surface they are more likely to germinate. These seasonal and practice times will need closer attention in applying the BD pepper to ensure it does stop reproducing, so make should your BD pepper application leads up to and include these times.

5.3.1.3 Planetary Aspects in Accordance with BD Peppering

- When the sun and Venus are both in Scorpio at the same time, burn the animal's skin. The occurrence of this is not yearly.
- Making the pepper on a constellation day that corresponds to a fire sign on the full moon day will increase its potency. The pepper should be created on the full moon day. This occurs when the moon is aligned with Aries, Leo, or Sagittarius, with Leo and Sagittarius being the best for all cannabis varieties.
- It is best to light the BD pepper on a full moon day.

Hugh Lovell's book Quantum Agriculture, a fantastic resource for biodynamics, is where the table below is taken from. When deciding which full moon day to employ for producing the weed pepper, the table that follows provides constellation relationships to various plant group.

Using BD soil preps on a moon in opposition to Saturn day each month is the best way to use them to speed up soil transformation while performing a BD peppering technique.

5.3.1.4 Giving Back to the Soil

With the help of BD peppers, the soil in any locations where we may be cultivating loses the ability to support weed growth. In this situation, it is quite beneficial to offer a variety of extra strategies to develop soil life, organic matter, and the proper balance of minerals, nutrients, bacteria, fungi, and the numerous life forms that inhabit wholesome soil. A little more management is required but can modify the soil to suit the needs of pasture and agriculture. The following suggestions are provided:

a. A monthly application of biodynamic soil activator is made on a day when the moon is in opposition to Saturn. The best day of the month to use this BD preparation, which mixes a number of BD preparations into a single brew, is today.
b. Intensively cultivated areas should have green manure cropping to keep weeds at bay.
c. Weed transformation:
   - Weeds are picked up before they can be sown and made into a strong weed tea using BD compost.

- removing weeds from the soil and slashing them before they seeded
- putting weeds through a heated composting process and returning the compost to the soil.

5.3.2 Peppering by insects

By collecting the insect, burning it, and reintroducing it to the soil, peppering effectively keeps a particular pest out of the treated region.

5.3.2.1 Preparation of BD Pepper by Insects

The pests are burnt to ash after capturing it. The ash is then sprinkled on top like pepper around the damaged region. The timing depends on the kind of pest and the planetary factors that control their reproduction:

1. Animals – when the planet Venus is in the constellation of Scorpio.
2. Winged insects – when the Sun is in Gemini, and the Moon is in a water sign.
3. Hard-shelled insects – when the Sun is in Taurus and the Moon is in Taurus.
4. Snails and slugs – when the Sun is in Cancer and the Moon is in a water sign.
5. Weed seeds – at full Moon or moon is in Leo.

5.3.2.2 Some Points to be Noted during Peppering are

1. Grab the pest first. A large number of little insects may be required if we want to get rid of small insects. The ripe and viable seeds are necessary for dealing with weeds.
2. Keep it chilled (in the fridge) until it is time to burn it.
3. Place in a tin and totally burn on a very hot fire until it turns to grey ash. Around the damaged region, scatter the ashes like pepper. The ash can be combined with fine sand, wood ash, or made into a homeopathic remedy that can be sprayed outside.
4. put out over three days in a row.
5. Use during a full moon (associated with fertility).
6. Avoid Mercury's retrograde periods.
7. Use each stage of an insect's life cycle (egg, pupae and adult).
8. Apply again every six months or once a year.

Kirchoff [15] Prior to carrying out this work, they performed preliminary experiments to test the effect of Biodynamic seed peppers on the seed germination of okra seeds (*Abelmoschus esculentus L. Moench*). These experiments yielded negative results after three generations of treatments. Negative outcomes were also obtained in a New Zealand study that examined the effects of a biodynamic pepper made from the burned skin of the brushtail possum (*Trichosurus vulpecula* Kerr). Similar negative outcomes were attained by Bachi-Kunz when he used a BD pepper to eradicate the Red Flower Beetle (*Tribolium castaneum Herbst*). The effects of the peppers on seed germination were also investigated. Biodynamic agricultural practices were used throughout these trials. In the field experiments, various preparations of the peppers were spread annually on the experimental fields, while no treatment was applied to the control fields.

6. BIODYNAMIC LUNAR CALENDAR

The biodynamic sowing and planting calendar is produced each year by the authors Maria and Mathias Thun. It is based on more than forty years of ongoing research into the influences of the moon, planets, and constellations on plant growth. It is available from the biodynamic Agricultural Association.

Table 2. Constellation relationships to various plant group

Constellation	Sign	Planet group
Aries	Fire	Canola, wild raspberries, wild radishes
Taurus	Earth	Farmers friends, wild carrot, queen Anne’s lace
Cancer	Water	Buttercups, convolvulus, creeping and climbing weeds
Leo	Fire	A great variety of weeds
Virgo	Earth	Thistles, morning glory
Libra	Air	Daisy family, quick weed
Scorpio	Water	Solariums, nightshades
Sagittarius	Fire	Fat hen, couch grass
Aquarius	Air	Shepherds purse
Pisces	Water	Grasses, wild oats, bent grass, chick weed

7. WORKING WITH COSMIC CYCLES

Every living thing on Earth is created and kept alive by rhythms, which are frequently governed by cosmic cycles. These cosmological patterns are also taken into account by biodynamic agriculture. By noticing and using these rhythms in tasks like sowing, transplanting, cultivating, and harvesting, one may understand how cosmic cycles affect the practical use of biodynamic agriculture.

8. LUNAR EFFECTS

The Moon reflects light and pulls the Earth in its gravitational field. According to Steiner, this lunar effect has an impact on plant growth. The gravitational force changes during the period of the Moon's 28-day cycle due to its relatively elliptical orbit. When the Moon moves farther away from Earth, the Earth feels less of its pull, which in turn improves root growth. Ocean tides are also caused by this force.

- Two days before the new Moon is the ideal time to plant flowers, fruit, and vegetable seeds since the following seven days will have better light and gravity conditions.
- Over the course of the following seven nights, the Moon gets bigger as it gets closer to a full Moon. Young shoots grow and the roots rest as more light and gravitational attraction are directed toward stimulating the growth of the foliage.
- The growth of the foliage is slowed down for seven days after the full Moon by a reduction in light, but roots can grow because of the gravitational force. It is now an excellent time to transplant seedlings since it improves the conditions for the roots to grow.
- As the lunar cycle comes to an end, the light continues to get softer as the gravitational pull gets stronger, allowing foliage and roots to rest in preparation for the next Moon of the coming lunar cycle.

In this calendar, we describe some of the basic rhythms that can be used in Biodynamic Farming.

8.1 The Ascending Period

The ascending period is when the moon moves into the northern hemisphere. During this period, the energy flow from the Earth's centre to the cosmic perimeter is given more attention during the ascending phase. The strength of a plant's sap flow relates to this event, which is seen in spring tides and can be used by gardeners. It affects activities ABOVE the soil. During this period Spraying of BD501 is done in the morning. Also, Sowing of Seeds, harvesting of fruits/ seeds/flowers/hay and pruning cuttings for Grafting are done in the Ascending period.

Table 3. Basic rhythms that can be used in biodynamic farming

Sl. No.	Basic rhythms
1.	Ascending days (Moon)
2.	Descending days (Moon)
3.	Nodes
4.	Apogee
5.	Perigee
6.	Full Moon
7.	New Moon
8.	Moon opposite Saturn
9.	The Constellations

8.2 The Descending Period

The descending period is when the moon moves into the southern hemisphere. During this period, the energy flow is towards the earth’s centre. Now, these forces are shifted to apply more force in the plant's lower reaches (everything in the soil). It affects activities BELOW the soil. During this period**,** cultivation of Soil; application, planting and digging of BD500 (evening); Making and spreading of Compost/CPP/Liquid Manure; transplanting and Pruning and harvesting of root crops are done.

8.3 Perigee (Poornima)

At perigee, when the moon is closest to earth, plants are more vulnerable to fungal diseases because of high moisture in the atmosphere.

8.4 Apogee

An ideal time to plant tuber crops is when the moon is the farthest away.

8.5 Rahu

Agricultural activities are not recommended when the lunar node is in an ascending lunar phase.

8.6 Ketu

Agricultural operations are not recommended when the lunar node is in the descending phase of the moon.

9. BENEFICIAL PERIODS

9.1 Full Moon

It is a time of high humidity and high-water content in sap and occurs 48 hours before the full moon. During this period utilize the advantages of the moon. Activities include planting seeds and applying liquid manure, CPP, or plant nutrients. It is the optimal time for fungus, insect, pest, and weed control.

9.2 Moon Opposite Saturn

Calcium-Silicon forces are perfectly balanced for 48 hours before Moon Opposite Saturn. Activities that can be done during this period include transplanting and sowing. To enhance the flavour and maintain the freshness of fruits and vegetables, use BD501 and aerial sprays. Also, it improves plant resistance against fungus.

10. STRESS PERIODS

1. New Moon: the 48 hours before the full moon is a period of great stress.
2. The moon blocks the beneficial influence of the sun. Avoid ALL Agricultural Activities.
3. Nodes: +- 6 hours. Nodes are like mini eclipses & again periods of great stress. Avoid ALL agricultural activity.
4. Apogee & Perigee: Avoid seed sowing for 12 hours on either side. It has been discovered that planting potatoes at Apogee is advantageous.

11. BIODYNAMIC CERTIFICATION

The Demeter biodynamic certification system established in 1924 was the first certification and labelling system for organic production [16]. Demeter certification is awarded to farms and handlers who meet or exceed the minimum standards set by Demeter International. To achieve Demeter certification, a farm must adhere to the following requirements, including: Agronomic guidelines, greenhouse management, structural components, livestock guidelines, and post-harvest handling and processing procedures [17]. In India, the Demeter Certification Office (DCO) of the Biodynamic Association of India is the authority of the certification.

12. CONCLUSION

Biodynamic agriculture as stated by Rudolf Steiner is an alternate form of modern organic agriculture. This review of biodynamic agriculture after reviewing many articles, and research, it has been concluded that there is not enough evidence to prove biodynamic agriculture as a productive method. A study conducted by Radha and Rao [7] concluded that there is a presence of actinomycetes in CPP due to the addition of calcium during the preparation. CPP stimulates plant growth by providing nutrients, and plant hormones and protects the plants' root zone against fungal diseases with bacteria and actinomycetes producing HCN and siderophores. It is found that the increase in bacteria might be due to inoculation of BD 502-507 during CPP preparation. Another study by Jayasree and George [12] reported that application of two biodynamic preparations (BD 500 and BD 501) in chilli by adopting a biodynamic calendar resulted in better fruit quality of chilli. Trivedi *et al*,2013 revealed BD 501 and botanical neem oil resulted not only in the maximum increase in yield attributes and yield but also significantly reduced the disease incidence of black gram under an organic production system. In 2016 a study conducted by Kirchoff on BD peppering to test the effects of biodynamic seed peppers on seed germination of okra seeds yielded negative results after three generation of treatments. Similar negative results were obtained by Bachi-Kunz using a BD pepper to control the Red Flower Beetle. After a thorough study of all the above cases, it can be concluded that biodynamic agriculture and its different preparations provide different kinds of benefits to the environment, to the soil, to humans, etc. It is basically a form of sustainable agriculture. But further studies, research and awareness could be conducted to broaden our knowledge in this field to develop more practical innovative activities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Rai N, Yadav DS. Advances in vegetable production. Research Book Centre: New Delhi. 2005:89-114.
2. Dengel L. Biodynamic farming: A complex farming approach with superior results; 2007.
3. Sharma AK. A handbook of organic farming. Agrobios: India. 2001:25-29.
4. Selvaraj BR, Anita B. Production and marketing of horticulture products in the

Nilgiris: A case study. Horticulture Research Station TNAU; 2006.
5. Brock C, Geier U, Greiner R, Olbrich-Majer M, Fritz J. Research in biodynamic food and farming–a review. Open Agriculture. 2019;4(1):743–757.
6. Beluhova-Uzunova R, Atanasov D. Biodynamic agriculture-old traditions and modern practices; 2019.
7. Radha TK, Rao DLN. Plant growth promoting bacteria from cow dung based biodynamic preparations. Indian Journal of Microbiology. 2014;54(4):413–8.
8. Perumal KV, Varadarajan S, Murugappa A.. Production of plant growth hormones and subtilin from organic biodynamic manures organic farming - Advantages and disadvantages for soils, water quality and sustainability. (In) 18th World Congress of Soil Science, July, 9-15, 2006 held at Philipadaia, USA. 2006;162:4.
9. Ram RA, Singha Atul, Kumar A. Microbial characterization of Cow pat pit and biodynamic preparations used in biodynamic agriculture. International Journal of Agricultural Sciences. 2018;(2): 42 -46
10. Trivedi A, Sharma SK, Hussain T, Sharma SK, Gupta PK. Application of biodynamic preparation, bio control agent and botanicals for organic management of virus and leaf spots of black gram (*Vignamungo* L. Hepper). Academia Journal of Agricultural Research. 2013;1(4):060-064.
11. Pfeiffer E. Using the biodynamic compost preparation and sprays in garden. Biodynamic Farming and Gardening Association, Kimberton. 1984:66.
12. Jayasree P, George A. Dobiodynamic practices influence yield quality and economics of cultivation of chilli (*Capsicum annuum* L.) J. Trop. Agric. 2006;44(1-2):68-70.
13. Steiner R. Spiritual foundations for the renewal of agriculture: A course of lecture. Biodynamic Farming and Gardening Association, Kimberton. 1996:310.
14. Ram RA, Pathak RK. Successful conversion of conventional to organic/ biodynamic farming: A case study. 2003:11.
15. Kirchoff BK. An experimental test of a biodynamic method of weed suppression: The biodynamic seed peppers. Organic Farming. 2016;2(1):17-20.
16. Paul Kristiansen, Charles Mansfield. "Overview of organic agriculture. In Paul Kristiansen, Acram Taji, and John Reganold, Organic Agriculture: A global perspective, Collingwood, AU: CSIRO Publishing; 2006.
17. Magali Delmas, Vered Doctori-Blass, Kara Shuster. "Ceago vinegarden: How green is your wine?: Environmental differentiation strategy through Eco-labels". Case Study, Donald Bren School of Environmental Science and Management, University of California, Santa Barbara; 9.

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