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Module-10

Other forms of Organic Management



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1. Biodynamic Agriculture
 - a. Turning in plant materials such as green crops and straw.
 - b. Not using chemical fertilizers and pesticides.
 - c. Avoiding soil compaction by machinery or animals, particularly in wet weather.
 - d. Keeping soil covered by pasture, crops or mulch not destroying the soil structure by poor farming practices such as excessive use of rotary hoe or cultivation in unsuitable weather (too wet or too dry).
 - e. Fallowing the land by planting deep-rooting permanent pasture species or using green crops.
 - f. Use of preparations BD-500 and BD-501.
 - g. Compost made with preparations BD-502 – BD-507.
 - h. Liquid manure made with preparations BD-502 – BD-507
 - i. Cowpat pit manure made with preparations BD-502 – BD-507



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Biodynamic formulation-500 (BD-500)

As per the established norms of biodynamic process while cow-dung is full of astral and ethereal powers; the cow-horn shell has the potential to absorb astral powers. In this formulation the inherent potential of these two components is harvested in making a biologically active formulation.

- Method of preparation
- Method of application

Biodynamic formulation 501 (BD-501)

- In this formulation fine powder of quartz silica is filled in empty cow-horn shells and kept buried in soil for six months during hot summer season. Opposed to BD-500, the silica filled horns are buried during March-April (Chaitra Navratra) and taken out during Oct.-Nov (Kwar Navratra).



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- BD-501 is used as foliar spray and is known to be promoting photosynthetic activity of the plants, resulting into better growth of the plants and better quality of grains and fruits.
- 1gm BD-501 is sufficient for one acre. Mix 1gm BD-501 in 13 lit of water and mix by whirling for one hour. Apply this suspension in the field as fine mist spray.
- BD-501 should be applied in early morning hours when there is mild breeze. BD-501 is to be applied first at 3-4 leaf stage followed by two more application at an interval of 30 days.
- BD-501 also acts as prophylactic agent and helps in prevention of many fungal diseases such mildews and blights.



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Other biodynamic preparation Besides 500 and 501 there are seven other biodynamic preparations having numbers from 502 to 508, but as their method of preparations are difficult, they are not very popular in India and are not being used in large scale. Their methods of preparation in brief are as follows:

BD-502 – Moistened yarrow (*Achillea millefolium*) blossom gathered in spring, are packed into the bladder of deer stag or hart. The bladder is hung into the sun over the summer and buried into good soil over the winter. The contents, dug up in the spring, will aid the compost to regulate potassium and sulphur processes.

BD-503 – Chamomile blossoms (*Matricaria chamomilla*) gathered in the summer are moistened with chamomile tea and stuffed into the small intestine of a freshly butchered cow, made into little links of sausages and buried into good humus soil in the fall. The burial place should be close to melt water flow of snow after the winter. This preparation helps regulate the calcium processes of compost.



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- BD-504 – Stinging nettle (*Urtica dioica*) is buried in the soil for one full year, enclosed in a mantle of peat moss. It aids in humification of the compost.
- BD-505 – Scrapings of the outer rind of Oak bark (*Quercus robur*) are placed in the skull cavity of a domestic animal such as sheep or goat and buried in fall in ground that has water percolations through it (such as below leaking drain pipe). The contents are used in the spring. This preparation works on calcium processes and contributes to making plants disease resistant.
- BD-506 – Dried flowers of Dandelion (*Taraxacum officinale*) gathered in spring are moistened and folded into the mesentery (membrane that holds intestines) of a cow. This is buried in soil until the spring. It helps to regulate the silica processes in relation to the potassium processes.
- BD-507 – Extract the juice of Valerian (*Valeriana officinalis*) flowers by squeezing. The juice is diluted in rain water and sprayed on the compost pile. This preparation regulates the phosphorus processes in the compost.



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2. Cow-pat Pit (CPP)

- Prepare a brick lined pit measuring 90 x 60 cm and 30 cm deep without any lining in the bottom. Mix 60 kg fresh cow dung with 200gm crushed and powdered egg shells and 300 gm basalt dust (or blue granite dust or bore well soil).
- Mix thoroughly to obtain smooth paste. Fill the mixture in to pit up to 12 cm height. Dig 5 holes in the paste and put one teaspoon full (3 gm each) of preparation 502 to 506 in each hole. Preparation 507 is mixed with water and half is poured in one hole and half sprinkled over the entire surface. Cover the surface with wet gunny bag.
- After four weeks, aerate the dung by turning it with the help of a fork. Smooth out again and cover. Thereafter turn every week. CPP compost will be ready in 12 weeks time.



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- CPP can be used in various ways depending upon the requirement and crop/plants. Use 100 gm CPP/acre, mix with BD 500 or 501 and use as spray.
- CPP can be used as soil inoculant (@ 2 kg/acre) mixed with composts. CPP can also be used as foliar spray (@ 5kg/acre) right from the beginning of crop to up to fruit/pod formation stage with an interval of 7 to 15 days.
- CPP can also be used as paste on stem of fruit trees. CPP can also be used as inoculant to biodynamic composts in place of 502 to 507.



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3. Rishi Krishi

- Drawn from Vedas, the Rishi Krishi method of natural farming has been mastered by farmers of Maharashtra and Madhya Pradesh.
- In this method, all on-farm sources of nutrients including composts, cattle dung manure, green leaf manure and crop biomass for mulching are exploited to their best potential with continuous soil enrichment through the use of Rishi Krishi formulation known as “Amritpani” and virgin soil. 15 kg of virgin rhizosperic soil collected from beneath of Banyan tree (*Ficus bengalensis*) is spread over one acre and the soil is enriched with 200 lit Amritpani.



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- It is prepared by mixing 250 g ghee into 10 kg of cow dung followed by 500 g honey and diluted with 200 lit of water.
- This formulation is utilized for seed treatment (beej sanskar), enrichment of soil (bhumi sanskar) and foliar spray on plants (padap sanskar).
- For soil treatment it need to be applied through irrigation water as fertigation. The system has been demonstrated on a wide range of crops i.e. fruits, vegetables, cereals, pulses, oilseeds, sugarcane and cotton



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4. Panchgavya Krishi

- Panchgavya is a special bioenhancer prepared from five products obtained from cow; dung, urine, milk, curd and ghee.
- Dr Natrajan, a Medical practitioner and scientist from Tamilnadu Agricultural University, has further refined the formulation suiting to the requirement of various horticultural and agricultural crops. Ingredients and methods of preparation of Panchgavya and enriched Panchgavya (Dashgavya) has already been described in preceding pages. The cost of production of panchgavya is about RS. 25-35 per lit.
- Panchgavya contains many useful microorganisms such as fungi, bacteria, actinomycetes and various micronutrients. The formulation act as tonic to enrich the soil, induce plant vigour with quality production. Strength of various microorganisms detected in panchgavya are as follows:



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- i. Total fungi 38,800/ml
 - ii. Total bacteria 1,880,000/ml
 - iii. Lactobacillus 2,260,000/ml
 - iv. Total anaerobes 10,000/ml
 - v. Acid formers 360/ml
 - vi. Methanogens 250/ml
- Physico-chemical studies have revealed that panchgavya possess almost all macro and micronutrients and growth hormones (IAA, GA) required for plant growth.
 - Predominance of fermentative microorganisms such as yeasts and Lactobacillus helps improve the soil biological activity and promote the growth of other microorganisms. For foliar spray 3-4% panchgavya solution is quite effective.



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Four to five sprays ensure optimum growth and productivity:

(a) two sprays before flowering at 15 days interval, (b) two sprays during flowering and pod setting at 10 days interval and (c) one spray during fruit/pod maturation.

- Application of panchgavya has been found to be very effective in many horticultural crops such as mango, guava, acid lime, banana, spice turmeric, flower-jasmine, medicinal plants like Coleus, Ashwagandha, vegetable like cucumber, spinach, okra, radish and grain crops such as maize, green gram and sunflower.
- Panchgavya has also been found to be reducing nematode problem in terms of gall index and soil nematode population
- As due to application of panchgavya a thin oily film is formed on the leaves and stem, it reduces evaporation losses and ensures better utilization of applied water.



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5. Natural farming

- Natural farming emphasizes on efficient use of on-farm biological resources and enrichment of soil with the use of Jivamruta to ensure high soil biological activity.
- Use of Bijamruta for seed/ planting material treatment and Jivamruta for soil treatment and foliar spray are important components.
- The use of both these ingredients have been incorporated in the package described above.
- Jivamruta has been found to be rich in various beneficial microorganisms.
- As per the studies conducted by Bio Centre Bangalore the Jivamruta contains following microorganisms:



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- Azospirillum 2 x 10⁶.
- PSM 2 x 10⁶
- Pseudomonas 2 x 10²
- Trichoderma 2 x 10⁶
- Yeasts and moulds 2 x 10⁷
- 200 lits of jivamruta is needed for one application in one acre. It can be applied through irrigation water by flow, by drip or sprinkler or even by drenching of mulches spread over the field or under the tree basin.



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6. Natueco Farming

- The Natueco farming system follows the principles of ecosystem networking of nature. It is beyond the broader concepts of organic or natural farming in both philosophy and practice
- It offers an alternative to the commercial and heavily chemical techniques of modern farming. Instead, the emphasis is on the simple harvest of sunlight through the critical application of scientific examination, experiments, and methods that are rooted in the neighborhood resources.
- It depends on developing a thorough understanding of plant physiology, geometry of growth, fertility, and biochemistry. This can be simply achieved through:



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Understanding Natueco Farming Science

- It has a new vision of infinite resource potentials in Nature and sunlight and promises plenty for all through harvesting all available resources by increasing the human activity.
- This depends on critical understanding of greening and recycling of biomass within the neighborhood to enrich the structure and fertility of soil in a calculated way.
- It promises record assured yields in a mathematic precision by understanding plant's geometry, cycles of growth and canopy (leaf area) management with little or no external inputs and ensuring optimum harvesting of sunlight.



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Natueco Farming Step by Step:

- Natueco Farming emphasizes 'Neighborhood Resource Enrichment' by 'Additive Regeneration' rather than through dependence on external, commercial inputs. The three relevant aspects of Natueco Farming are:
 - a) Soil - Enrichment of soil by recycling of the biomass by establishing a proper energy chain.
 - b) Roots - Development and maintenance of white feeder root zones for efficient absorption of nutrients.
 - c) Canopy - Harvesting the sun through proper canopy management for efficient photosynthesis.



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Basic Principals of Natueco farming

- Harvesting the sun
- Five Stages in plant life
- Medium for root zone
- Plants manufacture their own food
- Plant Biochemistry
- A family's requirement can be met in just 1000 m²
- Limited water supply

Implementing Natueco Principle with Prayog Parivar Methodology

- a) Soil Management
- b) Harvesting the Sun
 - ✓ What is canopy index number.
 - ✓ Maximize Sun Harvesting
- c) Recycling Process
- d) Energy Pool and Energy Chain



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7. Homa Farming

- Homa farming has its origin from Vedas and is based on the principle that “you heal the atmosphere and the healed atmosphere will heal you” The practitioners and propagators of homa farming call it a "revealed science".
- It is an entirely spiritual practice that dates from the Vedic period. The basic aspect of homa farming is the chanting of Sanskrit mantras (Agnihotra puja) at specific times in the day before a holy fire. The timing is extremely important.
- While there is no specific agricultural practice associated with homa farming, the farm and household it is practiced in, is energised and "awakened". The ash that results from the puja is used to energise composts, plants, animals, etc.
- Homa Organic Farming is holistic healing for agriculture and can be used in conjunction with any good organic farming system. It is obviously extremely inexpensive and simple to undertake but requires discipline and regularity.



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Impregnation of Seeds and Bulbs

Before planting/sowing, seeds and bulbs are treated i.e., impregnated with a mixture of Agnihotra ash and cow urine. It is recommended to prepare a mixture of cow urine and water in a ratio of 50:50, to which up to 4 tablespoons of Agnihotra ash per 5 liters of solution are added and stirred. Seeds and bulbs should soak in this solution for 30-40 minutes. This strengthens the germinating plant and makes it more resistant to pests.

Fertilizers

In addition, plants can be fertilized with a mixture of Agnihotra ash, stinging nettles, and water. This special liquid fertilizer strengthens plants. The stinging nettles are fermented i.e. decomposed in the water for 7-14 days, depending on weather conditions and the amount of nettles needed. This mixture should then be diluted to a solution with a ratio of 1:9. In other words, 1 part stinging nettle solution is mixed with 9 parts water and filtered with a fine screen (sieve) into a spraying container or watering can.



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Plant Nutrient Solution

To make an Agnihotra plant nutrient solution, up to 4 tablespoons of Agnihotra ash and up to 4 tablespoons of pulverized, dried cow dung are stirred in approximately 5 liters of water and then applied to plants. This may be repeated every 14 days, depending on how much it is needed.

Gloria Biosol an effective homa biofertilizer

Gloria Biosol is a very effective bio-fertilizer which can be produced simply in Homa atmosphere. Biosol liquid can be used for foliar application to nourish plants and soil.

Materials required to make the Biosol are:

- Fresh cow dung.
- Vermicompost.
- Cow urine.
- Agnihotra ash .
- Water



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- Materials are mixed in a large tank (200, 500 or 1000 litre). One copper Shree Yantra disc is placed in the tank. The tank is then sealed and kept for 20 to 30 days.
- After digestion is complete, the slurry can be removed. Biosol is used diluted with Agnihotra ash water solution in the ratio of 1:10.
- For one hectare of agricultural area, 200 liters of Biosol in solution are required. Biosol in solution can be sprayed on any type of crop at an interval of fifteen days.
- The application of the Biosol solution should be made before sunrise or after sunset. If we preserve Biosol liquid in air tight cans it will last longer, say about six months.
- Left over solid Biosol which is having maximum macro nutrients should be mixed with any type of organic manure at a ratio of 1:5.



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8. EM – Technology in organic farming

What is EM EM or Effective Microorganisms is a consortium culture of different effective microbes commonly occurring in nature.

- Most important among them are : N₂fixers, P-solubilizers, photosynthetic microorganisms, lactic acid bacteria, yeasts, plant growth promoting rhizobacteria and various fungi and actinomycetes.
- In this consortium, each microorganism has its own beneficial role in nutrient cycling, plant protection and soil health and fertility enrichment.



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Benefits of EM use

- Improve seed germination, seedling emergence, growth of plants, flowering, fruiting and ripening of grains and fruits.
- Improves photosynthetic potential. Increase tolerance in plants against pest attack. Improves physico-chemical and biological properties of soil.
- Help in control of soil borne pathogens. Interdependent biological activity of different EM organisms creates a congenial environment for growth and spread of soil's flora and fauna.
- They also promote the growth and colonization of VAM, which further help in plant growth promotion. Help in quick degradation of organic matter. With the use of EM the requirement of compost can be reduced or dispensed with. Just recycling of crop residue with EM can give similar results as with good compost.
- This saves lot of labour and space required for compost preparation. Improves soil biota and makes the soil soft and porous



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How to use EM Application of EM in agriculture involves four steps as follows:

- Procurement of primary EM- available in market
- Preparation of secondary EM – to be carried out by the farmer
- Appropriate dilution of the secondary EM solution
- Application to plants, soil and organic matter as spray.

Preparation of secondary EM solution

Depending upon the requirement and its end use, various EM formulations have been developed. Even among one formulation depending upon the place and climatic conditions some variations have been incorporated and recommended by promoting institutes and agencies.



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1. EM-1 formulation- This formulation is used for seed treatment, soil enrichment and for spray in field after the emergence of seedlings
1. Dissolve 5 kg jaggary (chemical free) in about 100 lit of water
2. Add 5 lit of EM
3. Mix thoroughly and pour into a plastic carboy. Seal the carboy and allow to ferment for 7 days
4. Dilute this solution in a ratio of 1:1000 and spray over soil or crop residue. For seed treatment soak the seeds in this diluted solution.
2. EM-5 for control of insects and pests –
1. Dissolve 100gm of jaggary in 600 ml of water
2. Add 100 ml each of natural vinegar, wine or brandy and EM
3. Mix thoroughly and transfer the contents in a plastic bottle or carboy and seal the container.



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3. Fermented Plant Extract (FPE)

In this formulation fresh green weeds are fermented with EM to obtain a fermented plant extract.

- Grind 2.3 kg of fresh green weeds to a coarse paste. Dilute with 14 lit of water.
- Dissolve 42 gm of jaggary in some water and mix with weed suspension. Add 420 ml of EM.
- Transfer the contents to a plastic drum and with the help of a thick plastic sheet cover the drum and tie with a rope.
- The drum should be filled up to the top, leaving very little space for air. Fermentation and gas formation process will start slowly.
- Mix the contents at repeated intervals. Finished FPE having a pH of 3.5 with pleasing smell will be ready in 5-10 days time.
- Filter the solution through a cloth and collect the filtrate. For spraying on soil dilute the FPE in a ratio of 1 : 1000 with fresh water. For spraying on crops dilute FPE in a ratio of 1 : 500.



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4. EM-Bokashi – Bokashi is a type of compost prepared by fermentation of waste organic matter with the help of EM. Bokashi is mainly used for improving the fertility status of soil and for enhancing the degradation of crop residue.
- Collect sufficient quantity of different organic matter (such as rice bran, fish meal, animal waste etc) equivalent to 150 lit drum volume.
 - Mix 150gm of jaggary and 50 ml of EM in 15 lit of water. Mix this solution with organic waste thoroughly in such a way that entire contents get uniformly moistened..
 - Transfer the contents in a plastic bag and seal the bag. To ensure the anaerobic conditions put this bag into another polythene bag and seal .
 - Allow the contents to ferment for 3-4 days in a cool shade place. Bokashi will be ready after 4 days. This can be used immediately. In plastic air tight bags Bokashi can be stored up to 6 months.



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Application of EM formulations

1. At the time of land preparation – Dilute 5-10 lit of simple EM solution in 50-100 lit of water and sprinkle/spray over 0.1 ha of land, when soil is wet a day before sowing.
2. For seed treatment – Soak seeds for 5-6 hrs in 1 : 100 fold diluted EM solution and sow immediately.
3. As foliar/ soil spray – After seedling emergence, 1 : 1000 diluted EM solution or FPE should be sprayed at the rate of 500 lit per ha, 4-5 times at an interval of 7-10 days. In fast growing crops such as vegetables, spraying should be done twice a week. In transplanted crops 1 : 500 diluted FPE can be sprayed after 5 days of transplanting @ 750-1000 lit per ha.
4. For soil enrichment – For every 0.1 ha mix 100-150 kg Bokashi with crop residue and mix with soil just before sowing. Simple EM solution @ 5-10 lit can also be used as spray over this residue-Bokashi mix. Spraying the soil with 5-10 lit of FPE mixed in 500-1000 lit of water per ha also add to the fertility of the soil.