Biodynamics

Biodynamics, derived from two Greek words, ***bios*** (life) and ***dynamos*** (energy),

"Biodynamics refers to a 'working with the energies which create and maintain life"

It is a method of farming that aims to treat the farm as a living system which interacts with the environment, to build healthy living soil, and to produce food that nourishes, vitalises and helps to develop humanity.

The bio-dynamic idea of the farm as an 'organism' or living entity

What is biodynamic Agriculture

defining.....

- **Biodynamics derived from two Greek words, bios-life and dynamos-energy .Thus it refers to working with the energies which create and maintain life.**
- **It is a system of organic agriculture which recognizes the biological and chemical values of soil and treats farm as living system to build healthy living soil.**
- **It started in India in early 90s when Peter Proctor was asked to come to India by Sri T.G.K. Menon in 1993**

Principles and guidelines for Good Agriculture Practice (GAP) of medicinal plants:

The guidelines described for GAP are intended to streamline the cultivation of medicinal plants as per the well regulated methods and follow a systematic way in cultivation process as it is important for the production of good quality plant material.

The various stages of processing which are included in good agricultural practice (GAP) are described as follows.

1) Seeds and cm utilization material

The seeding materials are to be identified botanically, indicating plant variety, cultivar, chemo type and its origin.

Note:

Biodynamic agriculture: It is also known as organic farming technique.

- The material used should be 100% traceable.
- The above same rule applies to vegetative material as well.
- The parent material of vegetative part used in organic production should be certified and authentically organic.

2. Cultivation:

- Depending on the method of cultivation (conventional or organic) growers should be allowed to follow different standards operating procedures (SOP) for cultivation.
- Care should be taken to avoid environmental disturbances.
- The principles of good crop husbandry must be followed including appropriate rotation of crops.

3) Soil and fertilization:

Medicinal and aromatic plants should not be grown in soils that are contaminated by sludge.

The soil should also not be contaminated by heavy metals, pesticidal residues and other unnatural chemicals.

The use of fertilizers and other chemical products should be as minimum as possible and in accordance with the demands of the plant.

4) Irrigation:

Irrigation should be minimized as much as possible and only applied as per the needs of the plant.

Irrigation water should be free from contaminants such as faeces, heavy metals, pesticides, herbicides and other hazardous substances.

5) Crop maintenance

- Tillage (preparation of land for growing crops) should be adapted to enable good plant growth and must be carried out whenever required.
- Pesticides and herbicides should be avoided as far as possible.
- The use of pesticides and herbicides has to be documented.

6) Harvesting:

•Harvesting should be done when the plants are in their best quality and quantity.

Harvesting should be done in optimum conditions as wet soil, dew. rain, high humidity can produce unfavourable effects.

7) Primary processing

- It includes steps such as washing, drying, freezing etc,
- Buildings used for processing should be clean, aerated & provide protection for the harvested crop from birds, insects, rodents and animals.
- Processing equipment must be cleaned and regularly serviced.
- All the processed material should be inspected and substandard products must be discarded.

8) Packaging:

The product should be packed in clean, dry preferably new sacs, bags or cases.

The label must be clear, permanently fixed and made from non toxic material.

Re-usable packaging materials should be well cleaned and dried before use, care should be taken that they do not cause contamination.

9) Storage and transport

·Packaged dried materials and essential oils should be stored in a dry, well aerated building in which temp. fluctuations are controlled and good aeration is provided.

·Fresh products should be stored between 1 to 5^0C, while frozen products should be stored below -18^oC or below -20^0C for long term storage.

·Essential oils should be stored as per the chemical storage standards.

·During transportation, sufficiently aerated vehicles should be used.

·National regulations on transport have to be followed.

10) Staff requirements

- Personnel involved in the good agricultural practice (GAP) should receive adequate training and education related to the nature of the work being carried out.
- The staffs who work with the plant material must have a high degree of personal hygiene.
- Staff with infectious diseases should not be allowed into the rooms in which they can come into contact with plant material.

11) Documentation

- All the propagation material and steps in the production process must be documented.
- All the starting materials, processing steps including location of cultivation have to be documented.
- All agreements between producer and buyer should be fixed in a written form.

12) Quality assurance

- In order to ensure a good quality of the produced crude drug, it is extremely advisable to educate all personnel dealing with the crop at various stages.
- Consultation and feedback should be taken from buyers of medicinal and aromatic plants regarding the quality & other properties of plant material and an agreement have to be made.

Effeteness and Features of Biodynamic farming

Effect

1. To increase the vitality of food.
2. Regenerate natural resources such as the soil, seeds and water.
3. Better efficiency of production relative to the amount of energy used.
4. To create a personal relationship with the world in which we live.
5. Greater earthworm populations and biomass than conventional farms.
6. Most of all, to be of service to the Earth and its beings by aiding nature where it is weak due to constant use

Advantage of Biodynamic Farming

1. Production of top quality fruits and vegetables, with strong flavours and high levels of nutrients.
2. Yields always above the average level.
3. No chemical reduce for grain, fruit and vegetables.
4. Little trouble with livestock and plant diseases.
5. No spreading of insect pests, and no great economic damage due to their presence.
6. The important criterion is to sustain the fertility of a farm that lasts for future.

Practical application of Biodynamic

1. Walk around your land each day, with all its aspects.
2. Establish environmental control.
3. Introduce soil-protecting crop rotations and cover crops.
4. Improve soil cultivation practices.
5. Introduce green manuring, carefully plowed or dug under.
6. Use mulching wherever possible.

7. Made compost and treat with BD preparations, do not waste any organic materials collect everything.
8. Use the BD preparations 500 and 501 as necessary, at the appropriate times, on the land and growing plants.
9. Use other preparations such as the Cowpat Pit, Panchagavya, or natural liquid fertilizers (equisetum tea, fermented nettle manure) as needed.

Organic Farming

Farming system to grow crops with avoiding or excluding the synthetic fertilizers, herbicides and pesticides is called **Organic Farming**

Organic farming in India

- Organic cultivation not new in India
- The term organic farming was first used by lord northbourne in the book of look of the land
- Organic agriculture in India started long back 1900 by Sir Albert Howard a British agronomist, in local village of the north India.
- Organic farming first coined by north Bourne in 1946.
- The state of Sikkim and Uttaranchal declared organic state.
- Race less use of this chemical material not alert the ecosystem but it claim with death to many lives every year due to their hazardous nature.

Types of organic farming

- **Pure organic farming :** It includes use of organic manures and biopesticides with complete avoidance of inorganic chemicals and pesticides.
- **Integrated Farming :** It involves Integrated Nutrient Management (INM) and Integrated Pest Management (IPM).
- **Integrated Farming Systems :** In this type, local resources are effectively recycled by involving other components such as poultry, fish pond, mushroom, goat rearing etc. apart from crop components. It is a low input organic farming.

Basic Steps of Organic Farming

Organic farming approach involves following five principles:

1. Conversion of land from conventional management to organic management
2. Management of the entire surrounding system to ensure biodiversity and sustainability of the system
3. Crop production with the use of alternative sources of nutrients such as crop rotation, residue management, organic manures and biological inputs.
4. Management of weeds and pests by better management practices, physical and cultural means and by biological control system
5. Maintenance of live stock in tandem with organic concept and make them an integral part of the entire system

Principles of organic farming

Health

Care

Principles of Organic Farming

Ecology

Fairness

Four principles

1. Principle of health

- ✓ Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.
- ✓ Healthy soils produce healthy crops that foster the health of animals and people.
- ✓ Health is the wholeness and integrity of living systems.

2. Principle of ecology

- ✓ Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.
- ✓ This principle roots organic agriculture within living ecological systems.

3. Principle of fairness

- ✓ Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.
- ✓ Fairness is characterized by equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings

4. Principle of care

- ✓ Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.
- ✓ This principle states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture.

Advantages of organic farming:-

1. Animals lead happier lives
2. Soil structure is good
3. Less harmful to environment
4. More birds and insect
5. No chemicals used

Disadvantages of organic farming:-

1. More expensive
2. More labour needed
3. Smaller yield
4. More blemishes on crop

Difference between conventional farming and organic farming

Conventional Farming	Organic Farming
• It is based on economical orientation.	• It is based on ecological orientation.
• Supplementing nutrients through chemical fertilizers	• Cycle of nutrients within the farms; predominantly farm produced materials
• Weed control by herbicide	• Weed control by crop rotation and cultural practices
• Pest control by pesticide	• Pest control based on non-polluting substances
• Livestock rarely combined	• Livestock for production and health
• Low input: output ratio with pollution	• Optimum input: output ratio with No pollution
• Using up soil fertility often resulting in erosion and soil loss	• Maximum conservation of soils, water quality and wild life

Why organic farming is necessary?

- Sustainable and eco-friendly technology.
- It improves quality, shelf and nutritive value of the farm produce.
- It encourages sustainable livelihood of the producers as well as safeguards consumers health.
- It improves the physical, chemical and biological health of the soil.
- Promotes healthy use of the natural resources and minimizes all forms of the pollution.
- It enhances and sustains biological diversity within the system.

What is a pest ?

- A pest is any living organism which competes with human, domestic animals or desirable plants for food or water.

- At the same time they spread diseases to mankind and harms the environment.

Pest and pest management in medicinal plants

Pest is an undesired animal or plant which cause: loss of cultivated plants, The different types of pests infecting medicinal plants are as follows.

Types of pests

Fungi/Viruses

Insects

Weeds

Non Insect Pest.

a) Fungi and Virus

Examples: Ascochyta atropae causes necrosis of leaf. Cercospora atropae produces leaf spot disease.

b) Insects

Insects such as flea beetle, flies, moth, cutworms, grass hoppers, spiders, termites, etc, also produces significant loss of cultivated plants.

c) Weeds

A weed is an undesired plant, it can produce losses more than any other pests or diseases. They cause depletion and shortage of nutrients, water, light, space to the cultivated plants. They also increase the cost of labour and equipment and reduce the quality of cultivated plant.

Example of weeds are Parthenium, Ragweed, Medican tea, Varnish tree, etc.

d) Non insect Pests

They are further sub classified as follows.

Vertebrates: Animals like monkeys, rats, rabbits, squirrels, birds, pigs etc.

Invertebrates: Animals like crabs snails, mites, nematodes, etc.

Note:

Fungi and viruses: They also include various other microorganism which infect the growing medicinal plant and cause loss of quality as well as quantity.

Methods of pest control

i. Mechanical

ii. Agricultural

iii. Biological

iv. Chemical

i. Mechanical method

It includes simple techniques like hand picking, pruming, burning, using of pest traps, collection and destruction of eggs, larvae and insects. Construction of concrete ware houses to protect from rodents and animals. Rats and mouse traps are also used.

ii. Agricultural method

It includes various methods such as crop rotation, inter cropping, integrated weed management methods, solarisation, etc.

Production of pest and insect resistant plants through genetic engineering technique is another approach.

iii. Biological method

This method involves combating of pests with other living organisms such as employment of cats to combat rats and squirrels, employment of birds to combat insects.

Some chemical substances produced by female insects such as sex attractants, which can be used to lure male insects and prevent reproduction.

iv. Chemical control

Pests are controlled using chemical pesticides which include insecticides, fungicides, herbicides, rodenticides. However these chemical substances are highly toxic to human beings. Improper use of these chemical pesticides may lead to toxic effects on human and animals.

Examples:

Rodenticides: Arsenic trioxide.

Insecticides: Malathion, Parathion, Methoxychlor.

Miticides: Tetradifon, Chlorobenzolate.

Fungicides: Chlorophenols, Quaternary ammonium compounds, etc.

Herbicides: 2,4 dichloro phenoxy acetic acid, Calcium arsenate,

Biopesticides/ bioinsecticides for pest management

These are pesticides obtained from natural sources like microorganisms, plants,animals,nsects & certain minerals.

Advantages of bio pesticide over chemical pesticides

- They are non toxic to plants as well as humans.
- They are biodegradable & do not leave any toxic residues
- They are less expensive and can be grown along with the cultivated medicinal plants.
- They are eco friendly and do not affect soil fertility.
- They are safe to handle and use.

Types of biopesticide

Microbial

Biochemical

Plant pesticides

Microbial pesticides:

They consist of microorganisms, microbial pesticides can control different kinds of pests and are relatively specific for its target pests. It is reported that some fungi are used to control weeds and insects.

Biochemical pesticides

These are naturally occurring chemical substances which are obtained from insects and animals which have the ability to control the pests by non toxic mechanism. These include substances like insect sex pheromones.

Plant pesticides

Various plants are reported to poses pesticidal and insecticidal properties. They can be grown along with cultivated plants to combat insects and can be used in powdered form or the constituents can be extracted from them and used to spray on the crops.

Examples: Neem, Tobacco, Pyrethrum, Derris, Ryania.

Note:

Biopesticides/ Bioinsecticides: They include all the plants or substances which are derived from such plants that have the ability to kill or resist the various pests and protect the cultivating medicinal plant.