

# Biodynamic Agriculture

Life

energy.

Biodynamic derived from two Greek words bios means life & dynamic means energy. It refers to a working with the energies which create & maintain life. Father of biodynamic farming is Rudolf Steiner (1861-1925). 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 & to produce food that nourishes, vitalises & helps to develop humanity.

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## Advantages of Biodynamic Agriculture

- ① Environment must be good.
- ② Improvement in soil quality.
- ③ Healthier for the consumer.
- ④ Higher annual yields.

## Disadvantages of Biodynamic Farming

- ① Labour & time demand.
- ② Relatively low yield.
- ③ Knowledge & skill requirements.
- ④ Control difficulties.

## Principles & Guidelines for good agriculture practice (GAP) of medicinal plants including organic farming

Good Agriculture practices (GAP) It is a collection of specific & good methods applying to the agriculture for the production of safe, qualitative, healthy & useful crop, food & medicinal products is called as Good Agricultural practices.

## Principles of Good Agricultural practices

- ① Environmental sustainability
- ② Social Acceptability
- ③ Food Safety & Quality
- ④ Economic viability.

The Guidelines described for GAP are intended to streamline the cultivation of medicinal plants as per the well regulated method & follow a systematic way in cultivation process.

- ① Seeds & propagation material of the seedling materials are to be identified botanically, indicating plant variety & Chemotype & its origin.
  - ⇒ The material should be used 100% traceable.
  - ⇒ The above same rule applies to vegetative material as well.
  - ⇒ Vegetative part used in organic production should be certified.

- ② Cultivation of it requires intensive care & management. Various factors like environment, soil, pests etc play a vital role. The method of cultivation growers should be allow to follow different SOP for cultivation.

- ③ Soil & fertilization of the soil which is used for cultivation should not be contaminated by heavy metals, pesticidal residues & other chemicals. The use of fertilizers & other chemical products should be minimum as possible. Medicinal & aromatic plants should not be grown in soil that is contaminated by sludge.

- ④ Irrigation In irrigation, water should be free from contaminations such as faeces, heavy metals, pesticides, herbicides & other chemical substances. It should be minimized as much as possible & only applied

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as per the needs of plant.

- ⑤ Crop Maintenance It should be adapted to enable good plant growth & must be carried out whenever required. Pesticides & herbicides should be avoided as far as possible. The use of pesticides & herbicides has to be documented.
- ⑥ Harvesting Harvesting should be done when plant are in their best quality & quantity. It should be done in optimum condition as wet soil, rain, high humidity can produce unfavourable effects.
- ⑦ Primary processing It includes <sup>steps</sup> such as washing, drying, freezing etc. Buildings or areas used for processing should be clean & provided protection for the harvested crops from birds, insects & animals. Processing material should be inspected in order to maintain standard.
- ⑧ Packing The product should be packed in clean & dry bags & cases. The label must be clean, permanently fixed & made from non-toxic material. Proper care should be taken in reusable packing so, that they don't cause contamination.
- ⑨ Storage & transport Packaged dried materials & essential oils should be stored in a dry place. Fresh products should be stored b/w 1 to 5°C. Frozen products should be stored below -20°C for long term storage. During transportation,

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aerated vehicles should be used.

- (10) Staff requirements of Personnel working in GAP should be educated & trained. It should have knowledge of personal hygiene & should be free from infectious diseases.
- (11) Documentation of all the steps involves in manufacturing & production must be documented. All the agreements b/w producer & buyers should be fixed in written form. All the starting materials processing steps including location of cultivation have to be documented.
- (12) Quality Assurance of the quality of product must be standardize to monograph. The properties must as per pharmacopoeia. Consultation & feedback should be taken from buyers regarding the quality & properties of products.

## ORGANIC FARMING

It is the production of crops without the use of any synthetic, chemical or inorganic fertilizers. It only use biofertilizers for the production. Organic farming is a method of crop production with an objective not to use pesticides, fertilizers genetically modified organism, antibiotics & growth hormones.

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OBJECTIVES OF ORGANIC FARMING

- ⇒ To protect the environment, decrease soil degradation & erosion, decrease pollution, optimize biological productivity & promote a sound state of health.
- ⇒ To maintain long-term soil fertility by optimizing condition for biological activity with the soil.
- ⇒ To maintain biological diversity within the system.
- ⇒ To recycle materials & resources to the greatest extent possible within the project.
- ⇒ To maintain product quality.

Principles of Organic Farming

- ① Production of high quality nutritious food.
- ② Maintain ecological balance in nature.
- ③ Good Quality of life & reduce poverty.
- ④ Enhance productivity of efficiency.

Importance of organic farming Organic farming provide many benefits like -

- ① Provides Better nutrition Organic food is rich in nutrients. It increase the nutrients of the

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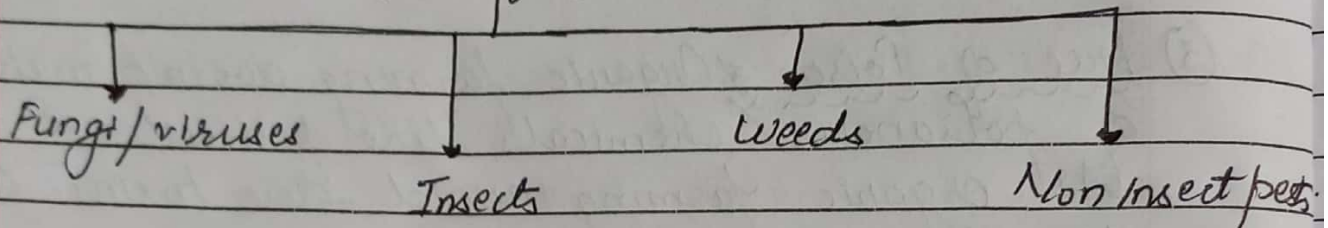
soil which is passed on to the plants & animals.

- (2) Help us to stay healthy Organic foods don't use chemical at any stage of the food growing. Organic farmers use natural farmer techniques which don't harm humans & environment.
- (3) Free of Poison Organic farming doesn't make use of poisonous chemicals like pesticides & weedicides. As organic farming avoid these toxins. It reduces the chances of sickness & diseases.
- (4) Lower prices Organic foods cheaper as they don't use applications of expensive pesticides, insecticides & weedicides.
- (5) Improved Taste Organic food taste better than other food.
- (6) Organic farming method are eco-friendly Organic farming doesn't utilize chemical so the environment including plant life animals & human remains protected.
- (7) Longer shelf-life Organic plants have greater metabolic & structure than conventional crops this enable storage of organic food for a longer time.

## Pest & Pest management in medicinal plants

Pest It is an undesired part or animal body which causes loss of cultivated plants

### Types of pests:



① Fungi/viruses It grows on plants & produces many diseases such as wheat, rose, Aspergillus etc. For example Ascochyta triticea cause formation of greyish white irregular spots which further causes necrosis of leaves.

Viruses Virus are also responsible for diseases occur on plants. Viruses causes twisting in young leaves, growth of entire plants & causes poor fruit & leaf production. For example (TMV) Tobacco mosaic virus affect digitalis, nightshade or solanaceae family.

② Insects Insects such as flies, moth, grasshoppers spiders etc causes loss of cultivation

③ Weeds Any undesirable plant which grow along with crop is called weeds. Weeds interfere in the growth of cultivated plant by consuming most of water of minerals from the



soils. The growth of weed at cultivated plant are will soon acquire whole space at weas and lead to destroy the cultivated plants.

⇒ Weed attract the other pest & insects which may destroy our cultivated plant.

⇒ Quality of weed become poor due to presence of weeds. For example of Corn cockle (*Agrostemma*) seeds causes death of wheat flour when they are present in excessive quantities.

(4) Non-insects of Mammals like rat, mouse, rabbit & monkey causes the loss of cultivation. Crude drugs often contaminated due to faeces. Rodents are responsible for transmitting disease from which they are suffering.

### Methods of Pest control

(1) Mechanical method: It includes simple techniques such as hand picking, burning, using of pest traps (Rats & mouse)

⇒ Destroy the eggs & larva, insects & mammals.

⇒ Kill the insect & animal.

⇒ Construct ware-houses in order to protect crops from animals.

(2) Agricultural Method: It involves various methods such as crop rotation, <sup>inter</sup>cropping, salarisation use of organic pesticides, using pest to fight against pest, maintain crop diversity etc all these methods are used in order to manage pests

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so, that the crop must be safe.

Crop rotation It growing of different crops in field year after year, avoid exhausting of soil fertility & control weeds, pest & diseases.

(3) Biological Method This method involves introducing enemies against pest in order to control the pest. For example, introducing cats to combat (fight) against rat & squirrels.  
⇒ Introducing birds to combat (fight) against insects.

(4) Chemical methods It involves the use of synthetic chemicals that target specific pests. These chemicals are highly toxic to human. If improper use of these chemicals may lead to toxic effects on human & animals.

Herbicides Alaba derivatives, Calcium, Cursetene etc.

Insecticides Parathion, Malathion

Rodenticides Zinc phosphate, Warfarin

Fungicides Chlorophenols & sulphur etc.

## Biopesticides / Bioinsecticides

It is obtained from natural resources like micro-organisms, plants, animal, insects & minerals. For examples, Canola oil & baking soda have <sup>pesticidal</sup> applications are considered biopesticides.

Bio-insecticides Bioinsecticides are organic formulations recommended for the management of insects that feed on crops. They are different from chemical pesticides in several ways. They contain live bacteria that produce toxins which cause poison in the insects & kill them.

### Advantages of pesticides

- ① It is safe to handle & use.
- ② Non-toxic to plants & humans.
- ③ Eco-friendly & don't affect soil fertility.
- ④ Biodegradable & don't leave any toxic residues.
- ⑤ Biopesticides often are effective in very small quantities & often decompose quickly, resulting in lower exposures & largely avoiding the pollution problems caused by conventional pesticides.

### Classification of Biopesticides

- ① Biochemical These are naturally occurring chemical substances which are obtained from insects & animals which have ability to control the pests by non-toxic mechanism. These include substance like insect pheromone. Biochemical pesticides contain

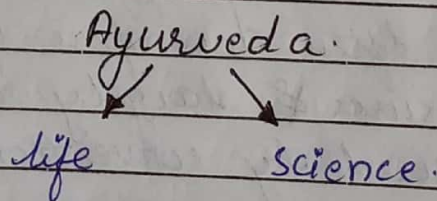
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biomolecule that directly kill the pest.

(2) Microbial Pesticides / Pesticides that contain micro-organisms like bacteria, fungi or viruses which attack specific pest & species. These are some fungi that act as bioherbicides (control weeds). For example Trichoderma (Biofungicides), Phytophthora (Bioherbicides), Bacillus thuringiensis (Bioinsecticides).

(3) Plant pesticides / Plant pesticides are those plants which have pestidal & insectidal properties. They can grow along with cultivated plants to <sup>control</sup> insect and can be used in powdered form or sprayer. For example Neem, Tobacco, Ayania (control pesticides).

[A] Indian Systems of medicine basic principle involved in Ayurveda.



Ayurved is the one of the oldest system of medicine which the word "Ayur" means life & "veda" means science. Literally, ayurveda means science of life. The book Charak samhita was written by Charaka. He was known as father of ayurveda.

Principle of Ayurveda ① Panchamahabhuta According to this theory it believes that the whole universe is made up of 5 elements known as "Mahabhutas" they are Prithvi (Earth), Jala (water), Vayu (Air), Agni (Fire), Akasha (sky). Combination of these 5 elements form 7 basic tissues of the body.

- ① Rasa (Lymph/plasma)
- ② Rakta (Blood)
- ③ Mamsa (Flesh)
- ④ Meda (Fat)
- ⑤ Asti (Bones)
- ⑥ Majja (Marrow)
- ⑦ Shukra (Reproductive organ).

② Tridasha According to this theory, the five basic elements (Panchmahabhuta) exist in human body in three different forms together known as "Tridasha"  
 Vata (Space + Air)  
 Pitta (Fire + Liquid)  
 Kapha (Liquid + Solid)

③ Guna-Rasa Siddhanta These are considered as five pharmacological properties of "Dravya" (Drug substances). They are Rasa (Taste), Guna (Taste) & Virya (Active principle), Vipaka (Digestive products), Prabhava (Pharmacotherapeutic properties).

Diagnosis in Ayurveda ① Observation of Doshas (vata, pitta, kapha).

- ② Observation of skin, eyes, hair, nails & tongue.
- ③ Recording the pulse.

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(4) Investigation of Mala (Urine, stools, sweat).

### Treatment

- (i) Elimination therapy
- (ii) Alleviation therapy.
- (iii) Psychic therapy.
- (iv) Surgery therapy.

### For examples

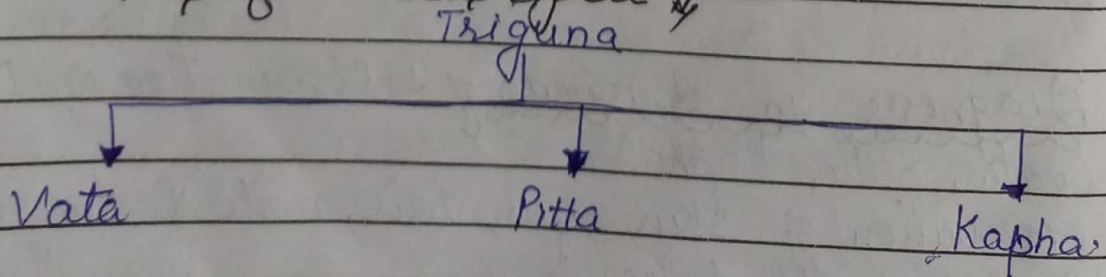
<u>DRUGS</u>	<u>USES</u>
(1) Arjunarishtha	Heart diseases
(2) Khadrarishtha	Skin diseases
(3) Kumaryasava	Liver diseases
(4) Churayanta arka	Fever
(5) Paradi bhasma	Diarrhoea.

### Siddha

This system was practised in south India especially Tamil Nadu. This system is believed to be older than Ayurved.

"AGASTYA" was believed to be the father of Siddha medicine & wrote a book known as "Agastya's Charaku".

### Principle of Siddha system



It is based on these 3 principles vata, pitta which is known as "Triguns".

- ① Vata People with predominant vata are characterise -d by stout, black, cold & inactive personalities. Increased vata develops acidity, obesity, heart attack etc.
- ② Pitta People with predominant pitta are characteris -ed by lean, whitish complexioned hot personalities. Increased pitta shows early greying of hairs, reddish eyes, burning chest, anaemia.
- ③ Kapha People with predominant Kapha are characterised by well built, good complexioned, well behaved personalities. increased Kapha lead to jaundice, Heart attack, high fever, anaemia etc.

Diagnosis of Siddha system During the diagnosis the physician studies eight things, Nadi (Pulse), Dhvani (Speech), Twaka (Tongue) Beham (Body), Neeram (colour), Malam (Faeces) Mutram (urine), vizhi (Eye).

Treatment of Siddha physicians give knowledge of one thousand herbs & their effectiveness in specific composition & formulation commonly medicines are prepared freshly for specific disease. The formulations are prepared using plants, animal, minerals, metals like mercury,

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gold, silver, sulphur, Zinc.

Formulation are used in Siddha System

- ① Kashayam (Decoction)
- ② Churna (Powder)
- ③ Tailam (Medicated oils)
- ④ Bhasma (Calcinated drugs).

Diet in Siddha Siddha system also gives importance to "pathya" (Restriction on diet).

For example of (a) Non Restricted food of wheat, milk, ghee, vegetable, sugar etc.

(b) Restricted food of Chicken, mangoes, coconut, fenugreek, mustard, almonds etc.

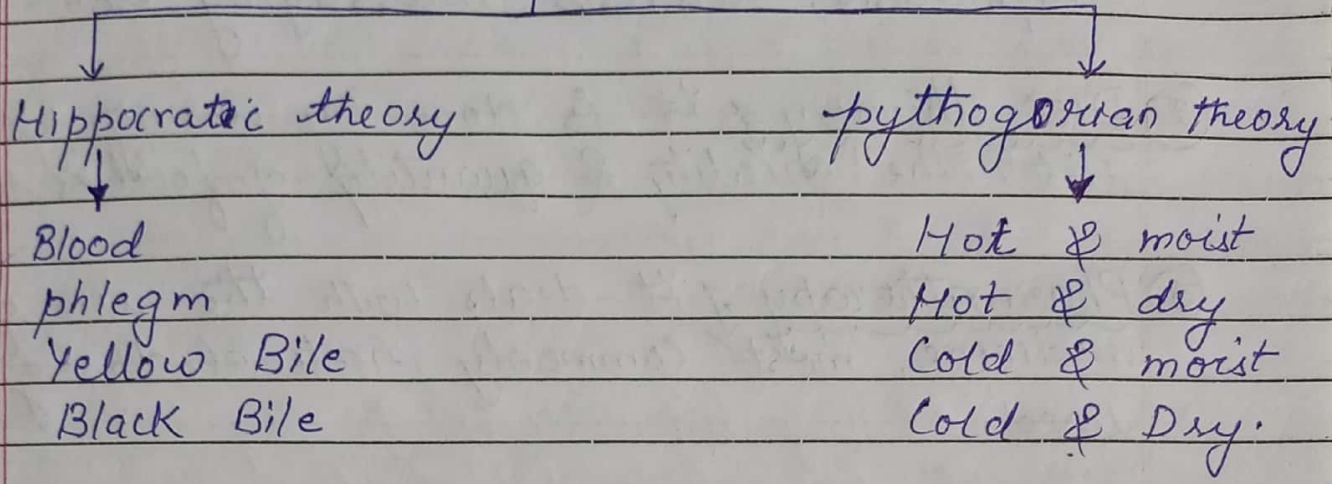
### Unani System of medicine.

Unani system originated in Greece. It was started by a Greek philosopher "Hippocrates". He was the first physician to introduce documentation of medical history. Unani system was later developed by Arabs & became popular as Arab system of medicines.



# Basic principle of unani system

## Principle of unani



- ① Hippocratic theory It is of four humours. mentions, the first products of digestion. They are Blood (Dum), Phlegm (Balgham), yellow Bile (safra), Black Bile (soudha).
- ② Pythagorean theory Pythagorean theory of four proximate qualities includes hot, cold, moist & dry. These four qualities are present in the human body in combination & represent the four basic elements of universe. They are  
 Hot & moist (Air)  
 Hot & dry (Fire)  
 Cold & moist (water)  
 Cold & dry (Earth).

### Diagnosis

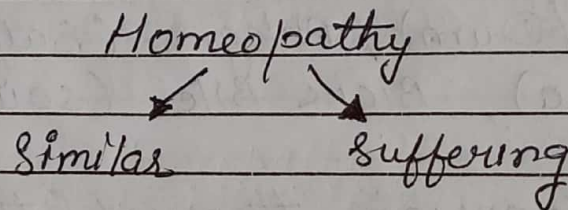
- ① Pulse reading
- ② Examination of sputum, urine & stools.
- ③ Patient counselling.

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## Treatment in Unani System

- ① Regimental therapy It include emetics, purging, diaphoresis, auresis, massaging etc.
- ② Diet therapy It is done by using special diet. The quality & quantity of food is regulated.
- ③ Pharmatherapy It deals with the use of medicine, most commonly natural drugs are used.

## Homeopathy System of medicines



Homeopathy means similar & pathos means suffering hence homeopathy means similar suffering. It means the cause of disease itself can be used as treatment. Homeopathy was introduced by a German physician "Dr. Samuel Hahnemann"

Principle of Homeopathy It is based on seven principles which are as follows

- ① Individualisation
- ② Principle of Similia
- ③ Principle of simplex

- ④ Principle of minimum dose
- ⑤ Law of Dynamisation
- ⑥ Law of proving.
- ⑦ vital force.

① Individualisation of the individual response to the same disease would be different from person to person. Thus medicines used to cure some diseases in different individuals are different.

② Principle of Similia of causes of disease or produce similar symptoms in healthy individuals can be used to cure disease in patients (vaccines).

③ Principle of minimum dose of this rule states that dose of the drug is inversely proportion -1 to its potency.

④ Law of simplex of it means that only single, simple medicinal substances is to be administrated in a given case of time.

⑤ Law of Dynamization of it recognized that the use of substances that cause symptoms similar to an existing disease would acutely aggravate the condition & present other side effects.

⑥ Law of proving of the testing of drug is done on healthy volunteers. If the drug produces similar symptoms in a healthy person as that of

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the disease person. The drug is considered as suitable for treating that disease. For example, Cinchona, Ipeac. etc.

- ⑦ Vital force It is a unique philosophy which accepts the existence of a spirit like energy that drives the living organism both in health & disease.

Diagnosis in Homeopathy Collection of detailed case history & medical history.

Treatment It is used drug in mother tincture, small pills, powders. Preparation of doses involved 3 process, they are trituration, succession & serial dilution.

Disadvantages of Homeopathy

- ① Selection of correct drug is difficult.
- ② It takes long period of times to cure in chronic cases.

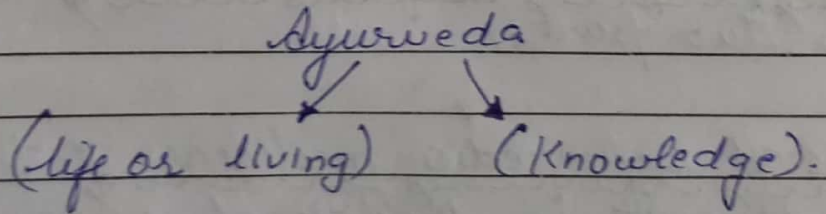
# 1B1 Preparation & standardization of Ayurvedic formulation

Introduction of Ayurvedic dosage forms are prepared from plants etc. Intended for internal or external use for the treatment & prevention of disease in human beings.

Ayurvedic formulation can be categorized into 4 types based on their physical nature of dosage forms.

- ① Solid dosage forms of For example of vatika, Ghrta pills
- ② Semi solid dosage forms of Paka, Lepa, Suleha, Kalka, Ghrita
- ③ Liquid dosage forms of Asava, Aristas (zandu pancharishta), Taila
- ④ Powders of Bhasma, Churna.

## Method of preparation of Ayurvedic formulation



Ayurveda medicine is a system of healing that originated in ancient India. So, ayurveda defined as the "Knowledge of living" or the "science of Longevity".

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Ayurvedic Formulations / ① Different solvent (menstrum) used in preparation of ayurvedic formulation are water, oil, milk, ghee, cow's urine etc.

② The use of sweetening agents, binding agents, colorants, flavouring principles & other adjuvants is also very common in ayurvedic preparation.

③ With an objective of obtaining maximum therapeutic benefits & making the formulation potable, different pharmaceutical process are prescribed in ayurveda.

④ According to drugs & cosmetic act 1940, ayurvedic medicine includes all medicines intended for internal or external use, or in the diagnosis, treatment or prevention of disease or disorder in human beings or animals.

Types of Ayurvedic formulations / It is divided into two parts.

① Classical ayurvedic medicines / These medicines are present in traditional ayurvedic text books such as Charaka samhita, Sushruta samhita. The manufacturing company follows the same formula & prepare medicines. For example / Bhasma, Asava, drishta & Taila etc.

- ② Proprietary ayurvedic medicines / It also called as patent medicine or modern ayurvedic medicines. Their formula, dosage form are decided by the manufacturing company & ingredients used in these preparation are not found in traditional ayurvedic text books. Every company has its own formula & conducts clinical trials, research on the medicine about its efficacy. For example / Capsule, Syrups.

### Aristas & Asarvas

They are also known as preparation contain self generated alcohol (alcoholic preparation). The medication which is prepared by mixing together different kinds of medicinal juice, decoction, jaggery & flowers of dhataki (wood fordra fruticosa) is an earthen vessel buried deep into a heap of grains for flavouring & to initiate fermentation.

#### Preparation of Aristas

Crude drug are coarsely powdered

↓  
Decoction is prepared.

↓  
Filtered

↓  
Mix other ingredients.

↓

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Contents are added to solution of sugar, Honey, or jaggery.

↓  
Boiled, cooled & transferred to wooden vessels or pots.

↓  
Covered with an earthen lid

↓  
Fermentation

↓  
Filtered

↓  
Stored.

Preparation of Asava  
~~Preparation of Asava~~  
Drug (fine powdered)

↓  
Mix with other ingredients

↓  
Added solution of sugar, Jaggery or honey

↓  
Mix well.

↓  
Boiled, cool, transferred to wooden vessels or pots.

↓  
Covered with an earthen lid.

↓  
Fermentation

↓  
Filtered

↓  
Stored.



### Standardization of Aristas & Asava

- ① It should be clear without any froth or foam at the top.
- ② It should not become sour upon standing.
- ③ It should have a characteristic aromatic & alcoholic odour.
- ④ There should be no effervescence produced.

For example of Aristas - Ashokarishita, Dasmularishita, Ashwagandharishita, Arjunarishita

Asava - Arvindasava, Kumaryasava, Vasakasava, Purandaravasa, Chandanasava, Mudhukasava.

### Gutika

These are medicines in the form of tablets (vati) & pills (gutika). They contain single or combinations of herbals, minerals or animal drugs.

### Preparation of Gutika

