

## Lab 1

### **Medicinal and Aromatic Plants**

#### **Medicinal Plants**

Medicinal plants can be defined as the plants that possess therapeutic properties or exert beneficial pharmacological effect on the human or animal body. Or any plant species that contains secondary metabolites that can be used for therapeutic purposes. They refer to seeds, berries, roots, leaves, bark or flowers or any extracts from plants that contain active substances used for medicinal purposes such as black seeds, chia seeds, ginger, mint.... etc.

#### **Aromatic Plants**

Aromatic plants are those that contain aromatic compounds – basically essential oils that are volatile at room temperature. These essential oils are odorous, volatile, hydrophobic and highly concentrated compounds. They can be obtained from any parts of the plant contains these compounds including flowers, buds, seeds, leaves, twigs, bark, wood, fruits and roots such as mint, lavender, lemon grass.... etc.

Medicinal and aromatic plants are known to be used by 80% of global population for their medicinal therapeutic effects. There are about 250,000 higher plant species on earth, people around the world use between 50,000 to 80,000 flowering plants for medicinal purpose.

Only in the USA 118 amongst 150 prescription drugs are based on natural sources, including plants 74%, fungi 18%, bacteria 5%, and vertebrate species such as snakes and frogs 3%.

Generally, plants make many chemical compounds for biological functions, including defense against insects, fungi and herbivorous mammals. Over 12,000 active compounds are known to science which work on the human body in exactly the same way as pharmaceutical drugs, hence they can be beneficial and have harmful effect as well similar to conventional drugs.

However, since a single plant may contain many substances, the effects of taking a plant as medicine can be complex.

## **Why Study Medicinal Plants?**

- Many of modern medicines are produced indirectly from medicinal plants, for example aspirin.
- Plants are directly used as medicines by a majority of cultures around the world, for example Chinese medicine and Indian medicine.
- Many food crops have medicinal effects, for example garlic.
- Studying medicinal plants helps to understand plant toxicity and protect human and animals from natural poisons.

## **The Concept of Medicinal and Aromatic Plants**

1. Medicinal Herbs have curative powers and are used in making medicines because of their healing properties as a result of containing active ingredients.
2. Herbal material is not only the whole plant itself but also its gums, fixed oils, essential oils, resins, extracts, etc.
3. Active ingredients are the substances responsible for pharmacological action.
4. Aromatic Plant, medicinal plants, are those which their active ingredients are composed wholly or partly by core.
5. Condiment or spice are used for their organoleptic characteristics, which gives food and drink certain aromas, colors and flavors that make them more appetizing, tasty and pleasing to smell, view and taste.
6. Honey Plants those that attract bees and those that collect nectar and pollen. They contain active ingredients which are medicinal.
7. Tincture plants (dyes) contains substances that are used to dye material and fiber both vegetal and animal (wool, leather, cotton) for clothes.
8. Essential oils are a mixture of volatile organic compounds extracted by physical means of plant materials, for example: flowers, herbs, wood, fruits and roots.

## **Cultivation of Medicinal Plants**

- Cultivation of medicinal plants requires intensive care and management.
- The conditions and duration of cultivation required vary depending on the quality of medicinal plant material required. In addition to the method of propagation.

- The principles of good plant husbandry including appropriate rotation of plants selected according to environmental suitability should be followed, and tillage should be adapted to plant growth and other requirements.

### **Site Selection**

1. The medicinal plant materials derived from the same species show significant differences in quality, physical appearance or variations in their constituents; when cultivated at different sites owing to (due to) the influence of soil, climate and other factors.
2. The biosynthesis of which may be affected extrinsic environmental conditions; including ecological and geographical variables.
3. Risks of contamination as a result of pollution of the soil, air or water by hazardous chemicals should be avoided.
4. The impact of past land uses on the cultivation site, including the planting of previous crops and any applications of plant protection products, should be evaluated.

### **Ecological Environment and Social Impact**

1. The quality and growth of medicinal plants can be affected by other plants, other living organisms and by human activities.
2. The introduction of non-indigenous medicinal plant species into cultivation may have a detrimental impact on the biological and ecological balance of the region.
3. The social impact of cultivation on local communities should be examined to ensure that negative impacts on local livelihood are avoided.
4. If large scale medicinal plant cultivation is or has been established, care should be taken that local communities benefit directly from.

### **Climate**

Climate conditions, for example, length of day, rainfall (water supply) and field temperature, significantly influence the physical, chemical and biological qualities of medicinal plants.

The duration of sunlight, average rainfall, average temperature, including day-time and night-time temperature differences also influence the physiological and biochemical activities of plants.

## **Temperature**

Major component affects both the growth/development and metabolism of the plant, each plant is specialized to adapt to its native environment but most are able to exist in wide temperature ranges, e.g., tropical and sub-tropical plants in temperate regions.

Temperature also affects plant chemical reaction rates e.g., *Datura stramonium* have lower alkaloids in cloudy/rainy weather (winter). In addition, volatile oils are produced more readily in warmer weather, yet very hot days lead to a physical loss of oil.

## **Rainfall**

Annual rainfall, distribution, humidity may influence the production of glandular hairs, and effect on the production of volatile oils, continuous rainfall may cause loss/leaching of water-soluble substances (glycosides, tannins, flavonoids and some volatile oils) through leaves and roots.

## **Day Length**

Amount and intensity of light needed differ from herb to another, they affect the amount of glycosides, alkaloids and volatile oils produced, e.g., peppermint in long day give menthone, menthol and menthofuran traces while in short day give menthofuran as main component. Other spp. Produce more constituents at night e.g., *Nicotiana tabaccum* plants grown in glass houses have less phenol and terpenoid in the leaves.

## **Soil**

1. The soil should contain appropriate amounts of nutrients, organic matter and other elements to ensure optimal medicinal plant growth and quality.

2. Optimal soil conditions, including soil type, drainage, moisture retention, fertility and PH, will be dictated by selected medicinal plant species and target medicinal plant part.
3. The use of fertilizers is often indispensable in order to obtain large yields of medicinal plants. It is, however, necessary to ensure that correct types and quantities of fertilizers are used through agricultural research.
4. Human extra must not be used as fertilizer owing to the potential presence of infectious microorganisms or parasites.

### **Irrigation and drainage**

1. Irrigation and drainage should be controlled and carried out in accordance with the needs of the individual medicinal plant species during its various stages of growth.
2. Care should be exercised to ensure that the plants under cultivation are neither over- or under-watered.
3. In the choice of irrigation, as a general rule, the health impact of the different types of irrigation (various forms of surface, sub-surface or overhead irrigation), particularly on the risks of increased vector-borne disease transmission, must be taken in to account