

Production of Crude Drugs

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Crude Drugs (C.D.) are produced through four steps.

1. Selection and collection of medicinal plants.

2. Drying of plants.

3. Grinding of the dried plants.

4. Storage and packing of crude drugs.

Collection of medicinal plants(C.D.)

Medicinal plants (C.D.) materials should be collected during the appropriate season to ensure the best possible quality of both source materials and finished products. The amount of a constituents are usually not constant throughout the life of a plant. The stage at which a plant is collected or harvested is very important for maximizing the yield of the favorite constituents. The differences are sometimes not only quantitative but also qualitative.

General Rules for Collection of Crude Drugs :

1. Roots and rhizomes are collected at the end of the vegetation period, usually in the autumn, and they must be washed free of adhering soil and sand.

2. Leaves are collected at the flowering stage.

3. Flowers are usually collected when fully developed.

4. Fruits and seeds are collected when fully matured.

5. Bark is collected in the spring.

6. Whole plant should be collected during flowering stage.

The choice of promising plant depends upon the following:

1. A plant which have a biological activity.

2. A plant used in folk medicine.

Sources of Medicinal Plants (C. D.)

Medicinal Plants may be collected from both wild and cultivated sources .

A. Wild Source :

Collecting of medicinal plants from wild sources , must be taken into consideration :

- Wrong identification of medicinal plant (C.D.).
- Admixture with similar looking plants.
- Collection from too young or too old or diseased medicinal plants (C.D.).



Advantages of wild sources :

1. More effective in medical applications because it contains biologically active compounds and secondary metabolites in higher propotions.
2. Pure and free from the harmful effects of pesticides and agricultural chemicals.
3. A primary source of medicines, as it provides essential raw materials for extracting medicines and medical preparations.
4. Wild plants are part of traditional medicines and enhance food security and income for local communities.
5. It is a rich source of minerals, vitamins, and essential fatty acids.

B. Cultivated Source :



Advantages of cultivated sources :

1. It ensures a correct of the medicinal plant (C.D.).

2.Drying and storage of the medicinal plants from cultivated sources can be regulated and controlled.

3. Ensuring the purity of the final product because it is free from weeds and other contaminants during cultivation.

4. Under cultivation, production and quality of the medicinal plants (C.D.) can be improved.

Influence of Time of Plants Collection on Drugs Quality

The timing of plant harvesting significantly affects the quality of the medicine, as the bioactive components vary according to seasonal and daily growth stages.

Wrong timing reduces the concentration of active constituents, affecting the overall medicinal effectiveness and therapeutic value of the final herbal drug

A. Camphor tree (*Cinnamomum camphora*)

►Camphor tree cultivated for camphor production. Camphor tree is a large , long-lived , evergreen tree that can reach a height of **50** meters.

►Camphor leaves have many pharmaceutical applications such : treat asthma , coughs , lung congestion, antibacterial and antiviral. Camphor oil is beneficial for cleansing the airways and respiratory tract.

►Camphor is a white, crystalline substance with a strong odor and pungent taste.

►Camphor production begins when the tree is **15** years old, the best camphor production comes from **older trees**.





Camphor tree

Cinnamomum camphora

B. Belladonna (*Atropa belladonna*)

►A perennial herbaceous plant with large leaves and shiny fruits, it is particularly dangerous to children due to its attractive cherry-like appearance and high toxicity.

►Belladonna cultivated for Atropine production.

►Belladonna uses for reducing stomach acid , controlling heart rate , relaxing muscles , atropine used to decrease saliva and other fluid production during surgery.

►The best collected when the plant is **3** years old (young plant).









C. Rhubarb (*Rheum palmatum*)

►It is commonly called Chinese rhubarb or Turkey rhubarb.

►It is a herbaceous perennial , related to Polygonaceae primarily used in traditional medicine, it acts as a laxative to treat constipation and deficiency of the blood.

►Is reported to contain no anthraquinone derivatives in winter but anthranols which, on the arrival of warmer weather, are converted by oxidation into anthraquinones.






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D. Thorn apple (*Datura stramonium*)

►A poisonous annual herb that grows along roadsides , native habitat is western Asia , belongs to family Solanaceae , plant can reach a height of 1.5 meters , leaves are oval , toothed , velvety , flowers are white , fruit are a large capsule (4cm) covered with spines (5mm).

►The medicinal product (atropine and hyoscyamine) is extracted from the leaves and seeds.

►leaves collected in the morning containing a higher proportion of alkaloid than those of collected in the evening .









Thorn apple (*Datura stramonium*)

Preservation of plant material

The plant material must first be preserved so that the active compounds will remain unchanged during transport and storage. The cells of living plants contain not only low molecular-weight compounds and enzymes, but they also have many kinds of barriers that keep these constituents apart. When the plant dies, the barriers are quickly broken down and the enzymes then get to increase various chemical changes in the other cell constituents, e.g. by oxidation or hydrolysis. Preservation aims at limiting these processes as far as possible.

2.Drying

Most common method for preserving plant material is drying. Enzymic processes take place in aqueous solution. Freshly collected plant drugs contain about (55 - 82%) of water. This high percentage of water aids enzymatic and other chemical reactions and growth of moulds and bacteria in them, which bring about many undesirable changes in their constituents. Immediately after collection crude drugs should be dried to stabilize the condition of the drug and to fix their chemical constituents.









Water Content of Some Parts of Living Plant Material

Leaves may contain (60-90%).

Roots and rhizomes (70-85%).

Lowest percentage, often no more than (5-10%) is found in seeds.

Drying is Necessary to :

- keeping quality of the drug.
- Stop enzymatic hydrolysis.
- Inhibits growth of moulds , bacteria and insects.
- Stop chemical reactions and other changes in the drug.

Roles of drying

1. Enzymatic action is enhanced for conversion some constituents from inactive to active state, slow drying at a moderate temperature is necessary used, e.g. ‘vanilla pods’. Freshly vanilla beans do not have any vanillin, whereas the fermentation of the pods causes its production, involving the enzymatic hydrolysis of glycoside.





2. If enzymatic action is not desired, drying should be take place as soon as possible after collection.

3. The drying process is not necessary for the part used in case of the plants that containing (volatile oils) in order not to lose the oils, therefore the plant parts which contain (volatile oils) must be either drying in shade (at room temperature 25°C or store under either frozen or distilled immediately at the time of collection.

4. Rapid drying helps flowers and leaves to retain their color and aromatic drugs their aroma.

5.Leaves and flowers may be dried between (20-40 C°) while barks and roots between (30-65C°).

Medicinal plants can be dried by any of the following two methods :

1. Drying by natural heat.
2. Drying by artificial heat.

Drying by natural heat.

may be done by either in the sun or in the shade, depending on the material to be dried.

- Sun drying is used for those drugs whose constituents are not affected by the direct action of sunlight.
- Shade drying is active for those drugs is desirable and whose constituents are affected on exposure to direct sunlight.

Drying by artificial heat

It is most commonly used method. It involves the use of various mechanical drying devices , like oven.

This method has **2** advantages :

A) It stops enzymatic action more rapidly.

B) Less time consuming

3. Grinding of the dried plants

Is grinding of the plant material to a powder of suitable particle size. It is important that the particles are of as uniform in size as possible. Large particles take a longer time for complete extraction than small ones and large differences in particle size thus slow down the extraction process.


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4 . Storage and packing of crude drugs

Storage of the plant drugs needs knowledge of their physical and chemical properties. All drugs should be preserved in a well closed and filled container.

Drugs containing **glycosides** and **esters** are usually less stable than those containing **alkaloids**.

Drugs with **volatiles oils** deteriorate rather quickly through evaporation, oxidation and polymerization of the substances constituting the essential oil.


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In order to keep crude drugs as long as possible:

1. It is essential to store them in a dry condition in carefully closed containers at low temperature.
2. Advisable to exclude light, because even if it does not affect the active constituents , it almost causes changes in the appearance of the drug, especially loss of color.
3. It is necessary to protect the drug against insect attack.

Thanks for your listening

