



a plant which has been correctly identified for which medicinal/drug gardens are often established for the authenticity of plants. Another practice of identification is to compare the drug sample with a published description/literature of the drug and with the authentic drug samples.

Quality means the intrinsic value of the drug, i.e. the amount of active principles present in the plant parts used a drugs. These active constituents may be carbohydrate, tannins, alkaloids, volatile constituents, lipids, oleoresins, steroids, etc. Since high grade of quality is of primary importance, efforts should be made to obtain and maintain this high quality. The necessary measures to be adopted to maintain this quality have already been discussed under the head 'Preparation of Plant Drugs for Commercial Market'.

The various evaluation processes of drugs are as follows-

- (i) The Organoleptic Evaluation of Drugs
- (ii) The Microscopic Evaluation of Drugs
- (iii) The Biological Evaluation of Drugs
- (iv) The Chemical Evaluation of Drugs
- (v) The Physical Evaluation of Drugs

The Organoleptic Evaluation of Drugs :

Organoleptic refers to evaluation by means of organs of sense and includes the macroscopic characteristics or appearance of the drugs like (a) shape and size, (b) colour and marking, (c) fracture and internal colour and (d) odour and taste.

- (a) **Shape and Size :** The shape and size are the important macroscopic characteristics of the drugs. The shapes of the underground parts may be conical, fusiform, terete, cylindrical, etc. It may be simple or branched or may be curved and twisted. In case of leaves, the shape of the blade with the apex, margin and base is considered. The sizes are given as to length and diameter which are expressed in mm or in cm.
- (b) **Colour and Marking :** Colour is important external characteristic. The external marking may be furrows, wrinkles, nodules, projection, scar, etc. In case of barks, this characteristic includes lenticels, lichens with their apothecia, corky ridges, warts, fissures, adhering mosses, etc.
- (c) **Fracture and Internal Colour :** The fracture of the woody portion is important than non-woody portion. The term used for describing fracture are complete, incomplete, short, fibrous, brittle, tough, weak, etc. The fracture of barks may vary from short and weak to tough and fibrous. For woods, the fracture is usually tough and fibrous.
- (d) **Odour and Taste :** The odour of the drug may be distinct or indistinct depending upon the amount of volatile constituents present in the drug plants. In describing the odour the terms like aromatic, balsamic, sweet, spicy, camphoraceous, etc. are used.





Taste is a particular sensation excited by the substance when they are brought in contact with the tongue. The first taste is usually noted by the soluble constituents of the material. Depending on the taste, the substances are classified as (i) Those possessing a true taste like acid, saline, saccharine, alkaline and bitter, (ii) Those possessing no taste and hence referred to as tasteless or insipid, (iii) Those possessing a characteristic odour which gives a name to the so-called taste and (iv) Those imparting distinctive sensation to the tongue. These sensations may or may not be associated with the true taste. They are mucilaginous, oily, pungent, unpleasant, irritating, nauseous those tending to excite vomiting, etc.

The Microscopic Evaluation of Drugs :

The microscopic evaluation of drugs involves (i) microscopic evaluation of plant parts and (ii) microchemistry.

(i) **Microscopic evaluation of plant parts :** The microscope is essential in the study of adulterants in powdered plant and other powdered natural origin used as drugs. It is also essential in the identification of pure powdered drug. The organoleptic evaluation/study deals almost exclusively with the microscopic appearance of the drug in sectional view and powdered form. The histological studies are made from very thin sections (T.S. or L.S.), properly mounted in suitable stains or mounting media. For powdered drugs, microscopic study is very important as they possess very few macroscopic characters like colour, odour and taste. In the powdered drug, the cells are mostly broken except the lignified walled cells but the contents like starches, calcium oxalate crystals, aleurone, etc are scattered in the powder and become very evident in the mounted specimen.

Microscopic study is also used for quantitative microanalysis of adulterated powders. This is done by counting the specific histological feature in a known quantity of unknown powder and comparing the count with that obtained from known standard sample.

(ii) **Micro-chemistry :** It is a study of drug constituents by the application of chemical method to small quantities of drug in powdered form or to histological section of the drug. Initially, small quantity of drug is extracted with the help of solvent. After extraction, the extracted constituent is crystallized. Then the crystalline substance is identified and the melting point is determined. The confirmation tests for the chemical constituents is done by various chemical methods.

The Biological Evaluation of Drugs :

The pharmacological activity of certain drugs may be applied for their evaluation and standardization. Since this can be done by applying the drug on living beings, such type of assay is known as 'bioassay'. The following methods are employed in the biological evaluation of drugs-

- (i) Bacteria like *Salmonella typhosa*, *Micrococcus pyogenes*, etc are used to tests the phenolic contents and aseptic value of certain drugs.





- (ii) Bacteria like *Lactobacillus arabinosus*, *L. casei*, yeasts, and other microorganisms are employed for the assay of vitamins and antibiotic drugs. Rats are also used for vitamin study.
- (iii) Guinea pigs are used to test toxicity and antigenicity of certain biological products.
- (iv) Rabbits are used for testing ophthalmic products.
- (v) Humans are finally used for noting the activity of drugs.

The Chemical Evaluation of Drugs :

Chemical tests are also employed to identify crude drugs. In many drugs, the chemical assay represents the only method of determining the official potency. Micro-chemical tests on crude drugs can also be considered as a method for chemical evaluation. Since, micro-chemical tests require the use of microscope, it has been discussed under microscopic evaluation of drugs.

The Physical Evaluation of Drugs :

The application of physical constants in the identification of drugs are very rarely been done. The physical constant like specific gravity, optical rotation, refractive index, solubility, melting point, water content, elasticity of some fibres, reactions with filtered ultraviolet light, etc may sometimes be applied in the identification of drugs. Many alkaloids show distinctive colours under UV light, whereas many other drugs show a marked intensity of colours or a characteristic colour under this light.

Application of a number of physical constants is extensively employed to the active principles like alkaloids, glycoside, tannins, lipids, resins, enzymes, hormones, proteins, essential or volatile oils, fixed oils, etc.

