



## IO3 - The Total Business Plants Training Material

### Module No. 2

#### “Methods for harvest treatment”

## 1. Unit 5. Storage and packaging

### • Summary

Unit 5 discusses the storage and packaging conditions of raw material and final product and the impact that they may have to the quality and quantity of the final product. It also explains the right method to label the final product.

### • Learning outcome descriptors

#### • Knowledge, understanding and professional skills

1. Specify the main factors that should be taken into consideration for storage and packaging
2. Summarize the requirements for complete labeling
3. Choose the appropriate method for storage and packaging for specific final product

#### • General and transferable skills:

1. Plan a research task
2. Work independently or with a minimal guidance where appropriate
3. Work in team with minimal guidance where appropriate
4. Show good written and oral communication skills
5. Demonstrate computer literacy
6. Perform online (computer) search to develop information technology skills in order to retrieve information from a variety of sources

## 5. Storage and packaging

Processed plant materials have to be packaged rapidly in order not to allow deterioration of the product and protect the product from pest attacks and other sources of infection. Non-stop in-process quality control measures must be taken to remove substandard materials, contaminants and foreign matter prior to and in the course of the final stages of packaging. Processed plant materials need to be packaged in clean, dry boxes, sacks, bags or different packing containers accordingly to standard operating approaches and national and/or regional regulations of the manufacturer and the end-user countries. Materials used for packaging have to be non-polluting, clean, dry and in undamaged circumstance and have to conform to the quality requirements for the plant substances concerned. Fragile plant substances need to be packaged in stiff packing containers. Reusable packaging material like jute sacks and mesh bags ought to be disinfected and thoroughly dried prior to reuse, as a way to avoid infection by previous contents.

### Storage

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While storing herbal plant attention must be paid to the following points:

1. Raw material storage.
2. Storage material properties in which the plant material is kept.
3. Proper labeling.

Proper storage of raw herbs after collecting fresh from field should be authenticated first. The personnel should have sufficient training in appropriate fields such as pharmaceutical technology, taxonomy botany, phytochemistry, pharmacognosy, hygiene, microbiology. As soon as the herbal material arrives at the processing facility, it should be immediately unloaded and unpacked, while measures should be taken to avoid contact with soil. It should not be exposed directly to the sun. It should be protected from rain and microbiological infection.

Unprocessed drug part such as stem, bark, root, leaves may be contaminated by soil, therefore the dust particle must be removed by high pressure air blower after it passed through clean water once and if require twice. Washing dry herbal material with water is generally not acceptable. When it is necessary to clean them, an air duster or air shower should be employed.

Unprocessed drug if contains volatile oil should be kept in shed. Passing over and over through high pressure air blower must be avoided as it could lead to decrease of percentage of volatile oil. The method of drying herb depends on the active ingredient, for example essential oil and the type of the plant part collected e.g. root, leaf and flower. Drying by direct exposure to sunlight is possible, but without ground contact. Sterilization of raw drug is possible by treating it with ethylene oxide to remove microbes.

Raw herb should have the following information:

1. The botanical name of the plant used according to the binomial system (genus, species, variety and authority) it may also be proper to add the vernacular name and the therapeutic use in the country or region of the origin of the plant.
2. Details of the source of the plant e.g. region from where it is gathered whether it is cultivated or collected from wild, method of cultivation, dates and condition of harvesting, collection procedures, use of pesticides if any then type and quantity of pesticides.
3. Which part of the plants used, for dried plant material, the drying system should be specified.

For each of the processed and cleaned herbs the following information should be given: herb name, arrival date, supplier name, collection's site and time, batch number, stored part (root, stem, bark, leaf, flowers, rhizomes, etc.), inspection status and expire date.

## Testing raw herbal material

Storing and preservation are in significant importance for future use of herb in formulation. The assessment of quality, safety and efficiency of formulation in different disease are depending upon storing and preservation condition of herb. When collecting a plant product several factors such as the

collection site, collection time, plant growth stage and other environmental factors can affect the chemical composition of the final formulation. Testing of raw material ought to be done according to regulations. If the herbal material for processing is not in accordance with its quality specification, rejected herbs are stored separately and disposed accordingly.

## Store house

The storage area should be well organized and tidy. Particular attention should be paid to cleanliness and good maintenance. Different plant materials should be stored in different areas. In order to keep the stored material safe and to reduce the risk of pest infestation, its storage time, in unpackaged form, should be reduced to a minimum. Incoming fresh herbal material should be processed, unless specified otherwise, straight away. If the circumstances allow it, they should be stored between 2°C and 8°C, whereas frozen materials should be stored below –18°C. Direct exposure to light, air or microbial organisms that effect on the active component of herb which leads to lower the therapeutic efficacy of drug must be avoided; but if the herb are stored in bulk to minimize the risk of mildew formation or fermentation it is recommended to store them in aerated rooms or container using natural or mechanical aeration and ventilation. Raw drug may be stored under conditions that block contamination and deterioration. There must be adequate space for in-house quality control testing. Approved and discarded herb should be stored with proper arrangement. All herbs should be washed clean, dry (unless a different procedure is required) and placed in order with controlled temperature, humidity in closed room. Temperature should be kept in between 8°C to 25°C.

## Storage material

The drug storage methods are to be followed with maximum care as the potency of unprocessed drug has to be retained until we use it in the formulation. Herbal material even when saved in fiber drums, bags or boxes should be stored off the ground and suitably spaced to permit cleaning and inspection. Storage of plants and their products may require special conditions of humidity, temperature and protection from light. Adequate safety measures should be taken when sampling, weighing, analyzing and processing plants so as to facilitate cleaning and avoid contamination from previous batches..

Materials for specialized packing and storage of raw material:

- Stem, heartwood, bark - Gunny bags and woven sacks
- Creepers, leaves – low density plastic woven bags, high strength HMHD bags and high strength polyethylene bags
- Fruits and roots - High strength HMHD bags, low density plastic woven bags, wooden boxes.
- Flower, anthers, stigma, petals, seed - Corrugated box with polypropylene woven sacks, HDPE containers, Fiber board's liner.
- Herbal extracts and compounds - Air tight HDPE containers, corrugated box with polyethylene woven sacks and fiber board's drums with polyethylene bags.

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Different categories of medicinal and aromatic plants, for example fresh herb, dry herb, volatile oil, must be stored separately.

## References

1. UNIDO and FAO (2005). Herb, spices and essential oils. Post-harvest operations in developing countries.
2. Atram Seema Ulhas (2015). Storage, Packaging and Labeling Concept with Perspective of Raw Herbs and their Formulation. UJAHM 2015, 03 (04): Page 42-46.