



## IO3 - The Total Business Plants Training Material

Module No.

“Methods for harvest treatment”

## Unit 3 General guide lines

- **Summary**

Unit 3 discusses in detail the different parameters regarding harvesting and divides them in three main groups: when, where, how. A lot of parameters, from weather conditions to storage facilities, and the impact of those to the final product are discussed.

- **Learning outcome descriptors**

- **Knowledge, understanding and professional skills**

1. Understand which parameters of the harvesting procedure can affect the final product
2. Plan the different steps of the production in order to keep in line with the needs of the specific plant and final product
3. Recognize the different steps of harvesting and modify their parameters according to the needs of the starting raw material and the 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

## 3. General guide lines

### When to harvest

Reproductive cycle are different taking under consideration the species of interest and the ferocity of the collection. Mint or equinaceae might be three years, for instance, thyme, oregano and melissa from 4 to 5 years, lavenders and rosemary from 8 to 9 years. The harvesting period begins in May and can last up to October. Certain species are gathered 3 or 4 times a season, while others can only be gathered once or twice. The moment for harvesting relies upon the part of the plant we will use (leaves, seeds, blossoms, roots, etc.), and we ought to remember that this is a key factor for getting the quality and richness in active ingredients we are searching for. All the more accurately, the blooming tops are gathered exactly toward the start of blossoming, the leaves usually before the blossoming and is prescribed to do it at a young hour in the day, the fruits are gathered when mature, the roots in harvest time or winter or once the plant has given its fruits (to have the seeds), the bark is taken from young shoots and the grasses are gathered when blossoming begins.

Normally, production begins after one year, yet in the event that we plant in fall, numerous species are ready for a first harvest by the following summer. Depending on conditions, we harvest once, twice or three times each year. Thyme, for instance, if irrigated, can be gathered three times each year; oregano once, melissa, similar to mint, can be gathered three or even four times, the surface parts of equinaceae three times, estragon twice, *Salvia officinalis* three times, *Hypericum perforatum* twice if irrigated, lavender once. The rhythm of harvest ought to dependably keep pace with the rhythm of production or transformation. In this manner, the harvesting capacity of the machinery used (hectares per day) should exactly match the capacity of the equipment used for transforming (tons per fresh plant per day), and the working capacity of the workers available and the collection periods of the species in question.

Medicinal plant materials ought to be gathered during the suitable season or time period to guarantee the highest quality of both source materials and finished products (Table 1.). It must be taken underconsideration that the quantitative concentration of biologically active substances differs with the phase of plant development and improvement. The best time for collection (quality peak season or time of day) ought to be resolved by the quality and amount of biologically active substances instead of the total vegetative yield of the targeted medicinal plant parts. Harvesting ought not to be completed in wet conditions (dew or rain) or in states of high humidity. At whatever point conceivable, harvesting ought to be done in dry, low humidity conditions. In the event that gathering happens in wet conditions, the reaped material ought to be transported quickly to an indoor drying facility to speed up drying in order to keep any conceivable harmful impacts because of expanded moisture levels, which advance microbial fermentation and mildew.

Harvest season	Yield%	
	Fresh mas	Dried mass
Summer	0.25	0.43
Fall	0.16	0.48
Winter	0.20	0.44
Spring	0.21	0.29

*Table 1. Cymbopogon citratus essential oil yield of freshly harvested and dried leaves harvested in different seasons (Maringá, 2012)*

## What to harvest

Once the crop plants develop, first thing to do is to ensure that it is the right species. Phytochemical constituents are not equally dispersed all through the plant; desirable phytochemicals can be found at deferent parts of the plant, for example, buds, bark, leaves, grass, seeds, roots and so forth respectively

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for deferent species. Prior knowledge of the particular part or parts of the plant that the desired phytochemicals are found in high concentrations is significant for choosing the suitable technique and equipment to maximize quality and quantity of the product.

Furthermore, the phases of growth and development of the plant affect the concentration of biologically active substances. In order to guarantee ideal amount of biologically active substances in the medicinal plant product, the harvesting ought to be done at suitable development stage. The medicinal plant product ought to be thrashed out from any under or over developed product, which may downsize the overall quality of the lot. For those species where right phase of collection is not known, collection administrators may look for direction from the responsible person of the completed product manufacturers for such medicinal species for herbal formulations. The harvesting time according to phenological phase of plant species alongside with dates and months for each medicinal plant must be archived.

Collection of health plants is significant, just healthy individuals of wanted plant species ought to be harvested. Plants, which are infested with insects, pests, fungus, bacteria or virus, ought to be avoided (unless the medicinal value of the species comes from such connection as in the case of insect galls, agar wood and specified parts developed due to pathogens) as such infested plant product may degenerate the entire lot. Additionally, throughout gather, care ought to be taken to guarantee that no toxic plants or weeds can blend with the collected harvest. Also damaged and perished plant parts must be rapidly wiped out.

Another parameter for consideration is how to limit the damage to source plant. While collecting the preferred plant parts, for example, leaves, fruits, flowers, seeds etc. there are measures to be taken to limit the damage to the plant from which these parts are being harvested. Cutting the branches to ease collection of its bearings (fruits, leaves, flowers etc.) should not be attempted.

## How to harvest

Precautions must be taken in order to avoid any unwanted mixing of foreign matter with the product of the medicinal plants. There is high probability of soil debris, organic matter like leaves, stems, or timber portions being inadvertently blended with the medicinal plant product at some point of the harvesting and post-harvest management. Collectors have to be vigilant to keep away from such mixing. Cross-infection with different medicinal plant product being harvested or processed concurrently must additionally be avoided. If more than one medicinal plant parts is to be collected, the different plant species or plant materials should be amassed one at a time and transported in separate containers.

Contact with soil ought to be prevented to the quantity feasible with a purpose to limit the microbial load of harvested medicinal plant materials. Cutting devices of harvesters ought to be adjusted in order that the collection of soil particles may be reduced to a minimum. When necessary, massive drop cloths, preferably manufactured from easy muslin, may be used as an interface among the harvested plant life and the soil. If the underground parts (such as the roots) are used, any adhering soil ought to be eliminated from the medicinal plant materials as quickly as they may be harvested. The gathered raw medicinal plant materials should be transported right away in dry, clean conditions. They may be located

in clean baskets, dry sacks, trailers, hoppers or other properly-aerated containers and carried to a vital point for shipping to the processing facility.

Equipment used for digging, cutting, sorting, peeling and any other activity must be suitable for the purpose they are used and should be stored in an uncontaminated, dry facility or area free from birds, rodents, insects and other pests and with no access to farm animals or pets. System must be manufactured from a non-toxic stuff and should be maintained in right running circumstance. It is crucial to ensure that elements of the equipment, which are available in direct touch with the product, are clean and free from any potential contaminant like paint, lubricant and so on. Equipment that is used for cutting, shearing, spilling or peeling ought to be thoroughly cleaned after use to avoid cross contamination with the last residues.

All storage units used at harvest must be kept clean and free from contamination that could be caused by previously harvested medicinal plants and foreign matter. If plastic containers are used, unique attention should be paid to any possible retention of humidity that would lead to the increase of mildew. Whilst containers aren't in use, they should be stored in dry conditions, in an area that is protected from insects, rodents, birds and other pests, and unreachable to farm animals and home animals.

In addition, any mechanical damage or compacting of the raw medicinal plant materials, that can be caused by overfilling or stacking of sacks or bags, that can bring about composting or in any other case diminish quality, have to be prevented. Decomposed medicinal plant materials should be diagnosed and discarded at some point of harvest, post-harvest inspections and processing, so that microbial contamination and loss of product quality will be avoided. Finally, the harvested crop ought to be safeguarded from pests, mice/rodents, farm animals and domestic animals whilst pest manage measures should be documented and the time between the harvesting and the processing of the plant must be very brief, with a purpose to avoid that the product could be damaged in its quality and increase its microbiological content.

Conveyances used for transporting bulk plant materials from the location of production to storage for processing should be cleaned between cargos. Bulk transport, like ship or rail cars, where suitable, must be properly ventilated to deduct humidity from plant materials and to prevent condensation.

## References

1. UNIDO and FAO (2005). Herb, spices and essential oils. Post-harvest operations in developing countries.
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3. WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants.

