INNOVATIVE INTEGRATED TRAINING IN
HEALING PLANTS
BUSINESS

IO3 - The Total Business Plants Training Material

Module No. 1

“Organic cultivation of medicinal plants”

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4. Unit 4 Organic cultivation of MP – the research, the commercial and the conservation points

Summary

Unit 4 discusses the research, commercial, and conservation of MP organic cultivation. The research activities related to MP cultivation are described. Management principles of MP cultivation, harvest and post-harvest processing for commercial uses are presented. Constraints of MP trade and their economic expansion are listed. The future trends and areas for improvement of MP cultivation are given.

- ## Learning outcome descriptors

By the end of the Unit, the trainee should be able to:

- ✓ **Knowledge, understanding and professional skills:**
  1. Describe the principles of introduction of protected and endangered MPs into cultivation.
  2. Summarize the challenges in conservation of medicinal plants.
  3. Recognize the research, commercial and conservation aspects of organic cultivation of MP
- ✓ **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.

4.1 Organic cultivation of MP – current and future research activities

Main trends of investigations on MP are focused on biology, diversity, and population mapping, as well as on breeding, selection, and introduction of wild MP. Additionally, the research in the field of bio-ecology, amelioration and culture technologies for medicinal plants (MP) has an important role in the increase of production of cultivated species.

MP cultivation on scientific bases:

- Assures the necessity of vegetal raw material for the industry of medicines;
- Guarantees a product rich in active compounds and more homogenous, without substitutions and forgeries;
- Allows harvesting to be done at the optimal moment (when the content in active compounds is maximal) followed by drying or processing in fresh state;
- Help acclimatization of new species that do not grow spontaneously in defined region;
- Facilitates protection of the plants, considered monuments of nature, etc.

High productions of raw material rich in active compounds can be obtained only by the application of technologies of differentiated culture, based on the solid knowledge of biology and requirements of plants compared to the factors of vegetation.

The current and future research trends in MP cultivation encompass the following topics:

- Strengthening / establishing local seed production;
- Surveying the distribution of available genetic diversity together with analyses of genetic erosion;
- Investigations throughout the production-consumption chain;
- Identification of improved agronomic and production procedures and application of value-adding strategies
- Analysis of market opportunities;
- Research on nutritional value of the species, and characterization and evaluation work;
- Development of networks;
- Studies to identify MP cultivation policy failures'
- Development of a database on biodiversity conservation;
- Studies of local and foreign ethnobotanical uses, plant toxicity to humans and animals, chemical constituents and pharmacological uses;
- Evaluation of morphological and chemotaxonomic characteristics of MP;
- Evaluation of MP ecotypes for quantitative and qualitative differences in secondary metabolites with regard to growth and development and/or biological activity;
- Evaluation of susceptibility to environmental stress (drought, low temperature, depleted soils, etc.)

The perspectives in expanding research activities on PM are concentrated on:

- Encouraging the collectors to provide specimens to the national herbarium collections.
- Promotion the collaboration between national programs working on the same plants/groups of plants through facilitated collaboration and coordination of target teams.

- The need for the development of harmonized methodologies/protocols (sampling and conservation techniques, etc.) by the national and international research programs.

4.2 Management of MP cultivation, harvest and post-harvest processes for their commercial uses

In cultivation, the management activities encompass the following processes:

- Preparation
- Sowing and transplanting
- Manures and fertilizers
- Irrigation
- Weeding and intercultural operations
- Crop protection

The management of harvest and post-harvest processes include:

- Harvesting
- Primary processing
- Packaging, storage and transportation

All these processes when correctly and efficiently performed create added value, which is substantially important for the MP commercial exploitation as well as the medicinal value of the raw drugs. The added value of the medicinal plants can be accomplished directly (**direct added value**) by getting a better quality of the cultivated or collected plant material or indirectly (**indirect added value**) - through quality assurance during processing of the material to valuable products.

Direct Added Value

The about preservation measures of MP materials often is neglected by respective experts. The dangerous conditions can be minimized by proper cleaning, packing and storage. All the processes listed below generate direct added:

- Proper season collection
- Grading and sorting
- Cleaning
- Packaging
- Storage
- Categorization of MP

Indirect Added value

The indirect added value is evaluated by quality testing for purity and strength of MP. It also includes testing for the physical-chemical standards (moisture, FOM, ash content, extractives, etc.):

- Moisture
- Presence of external matter
- Ash Content
- Extracts
- Pesticides residues
- Microorganisms

4.3 Semi-processing of MP to value-added products

The application of semi-processing processes also results in value-added MP products. The semi-processing techniques are simple and fast for performance and add to the value of the MP material preparations. The resultant products/preparations are offered in the most popular types of formulation: as a powdered substance, tablets, capsules, and extracts.

4.4 Troubles and limitations for MP management

- Lack of information on wild MP and their geographical distribution, and proper utilization;
- Lack of information in the study area on the ways to improve commercial exchange;
- The variation in the local names of one and the same plant or in one and the same country is a restriction in producing helpful information;
- The proper management of MP raw material along the chain from collection to processing requires the cooperation of researchers and technicians of various organizations and institutions;
- The deficiency of research in the development of techniques for propagation and regeneration of MP in their natural habitats.

4.5 Constraints to the development of MP trade

Cultivation of medicinal plants faces a number of problems. Partly, these problems are due to the typically small scale of operation and performance. However, biotechnological, administrative, legislative, social, etc. factors must not be underestimated.

Some key features of the trade with MP, endangered by these problems are connected to the:

- Increasing pressure on the natural resource for the MP that are in greatest demand;
- Constantly increasing market for the MP materials that are used in health and medical products;
- Expanding international trade with MP.
- Improvement of the regulatory basis;
- Lack of detailed and accurate information available.

The major problems include the following areas:

1. Cultivation and harvest:

- Small land holdings of the MP producers (the majority);
- Shortage of labour in some rural areas, especially those at high altitude;
- Long lag periods between MP growing and harvesting;
- Bureaucratic obstacles in obtaining permits for cultivating restricted/endangered species;
- Difficulties in cultivating MP (especially in high altitude areas) due to lack of technology and technical facilities;
- Poor quality and/or lack of planting material;
- Limited knowledge of plant properties;
- Prices are too low to make cultivation attractive.

2. Post-harvest processing

- Continuing and commonly abandoned problems with packaging, storage, transportation and quality control, even in cases of well-developed technologies;
- Gap between research activities with MP and MP producers' experience and needs. The latter usually are not included in the R & D schemes;
- Weak relationship between research institutes and industry;
- Bad practices in harvest and post-harvest treatment;
- Lack of research on development of high-yielding varieties, domestication, product and process development;
- Inefficient processing techniques leading to low yields and poor quality products.

3. Quality control, marketing and trade

- Poor quality control procedures;
- Difficulties in marketing;
- Lack of local markets for primary processed products;
- Lack of access to latest technological and market information;
- Lack of knowledge of their supply capabilities;
- Lack of information and mechanisms for protection of IPR.

4.6 Future trends and areas for improvement of MP cultivation

The listed above problematic elements of the complex procedures of cultivation and processing of MP can be overcome through the application of mitigation measures at several stages and directions. Future measures for overcoming these obstacles can include.

- Establishment of a critical mass of cultivable land in order to guarantee larger consistent supply of MP;
- Reduction of the intermediary numbers/stages involved in the distribution and marketing chain;
- Increase the intermediary role of the producers and collectors.
- Making improvements at post-collection handling, value addition, and product presentation stages;
- Promoting R & D activities on the chemical composition and elimination of the effect from bad practices on the active ingredients of the selected species;

- Development of efficient strategies and corresponding action plans by the country authorities to support improved cultivation, quality controls systems;
- Provision of high-quality planting materials and encouragement of investments in new technologies;
- Performance in-depth global overview of the demand / supply of MP, MP products, and MP drugs in order to clarify market status, to forecast, and to consider more effective solutions;
- Promotion of sustainable cultivation of MP and entering markets at the early stages of the value chain by better supply of manufacturers with unprocessed raw materials;
- Encouragement of sustainable commercial development and industrial processing of preliminarily identified MP products, which would be most amenable to in the supplying entities;
- Value-addition through processing;
- Stimulation the more equitably sharing of the benefits from the expanded interest in MP;
- Improving the MP marketing.

4.7 Constraints for the economic expansion of MP

- Needs of field studies on the cultivation of MP;
- Inadequate knowledge of the export companies and personnel about standards restrictions. This results in low prices for medicinal herbs and drugs;
- Lack of technologies for MP management and supplies;
- Lack of marketing information regarding the international organizations dealing with MP for capturing world market share.

4.8 Suggestions

- Development of strategies for collecting, surveying and identification of MP, their habitats and field studies for their regeneration;
- Development of a state level R&D centers for MP;
- Encouragement of SMEs to supply the local markets with medicinal and aromatic commodities;
- Introduction and cultivation of non-native (exotic) medicinal plants under the different climatic and edaphic conditions of the area.
- Encouragement and financing of research programs on regeneration and management of important MP.

4.9 Ecological perspectives of medicinal plant preservation

Land degradation and forest conservation caused reduction of medicinal plant availability. It is known that turning natural forests into agricultural fields has changed the number of medicinal plant species and their distribution in timber plantations. The inadequate information on ecological productivity, growth forms, life history and conservation of the various species complicates harvesting levels of medicinal plants by medicinal plant gatherers.

In fact, the ecology of the species can help a particular species to survive over-exploitation. Such event is described for some MP living in dormancy in certain seasons, particularly winter, and that becomes more readily available in rainy seasons such as summer and spring.

Another important ecological factor is the difficulty of collecting plants, which are visibly present.

There is also another factor that defines the medicinal plants' existence is ecological processes performed by humans, such as herbage fires.

Anthropogenic factors can decline the native medicinal plant species and must be protected through the collaborative activity of all the stakeholders included since MP possess vital importance for society.

4.9 Cultural practices in medicinal plant conservation

The usage of wild plants, including medicinal plants, is connected to cultural peculiarities of all nations. It is known that wild plants are a major source of edible fruits, leafy vegetables, and traditional herbs. They are especially important for food security and keeping the balance of people's diets.

Wild plants are very important for human survival especially in the time of starvation and they have different functions: to prevent the need for cash expenditure and to ensure a source of income to cash-poor households.

Due to alterations in the usage of land for commercial crops, the plant numbers diminish from their natural environment. In addition, the over-harvesting for marketing purposes and clearance of vegetation for industrial development, made the cultured practices associated with the plants to fail away.

The modern culture and development of modern medicine have also change the alignment and extent of local knowledge and use of medicinal plants in the societies. It has been found that indigenous knowledge is declining in Europe because of technology and modern commercial food. The credibility of the elders has been given through documenting the identification and use of medicinal plants. They are concerned because the youth people are losing the native knowledge that could be utilized to cure diseases. Thus, rapid social change can also affect local knowledge of MP and the interest in their use.

In order to promote conservation, livelihood security, healthcare and local culture, educational documentation of MP and their functions is recommended. The native knowledge has always been looked down upon and being secret. For instance, if someone had knowledge about a special herb able to cure a serious disease, one's grandfather might appear in a dream to tell one who should be given the privileged information about how the herb should be used.

Unlike native medicinal practitioners, scientists are characterized by both cooperation and competition. They performed one another's claims to careful scrutiny by repeating experiments to verify the results of others. This represents a system of quality assurance. The same cannot be said of the native practice.

4.10 References

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