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GOOD AGRICULTURAL PRACTICES FOR MEDICINAL PLANTS

National Medicinal Plants Board
Department of AYUSH,
Ministry of Health and Family Welfare
Govt. of India

World Health Organization
In collaboration with
WHO country office for India,
New Delhi

Good Agricultural Practices for Medicinal Plants

National Medicinal Plant Board
Department of AYUSH
Ministry of Health and Family Welfare,
Government of India

In collaboration with

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FOREWORD

We in India have a rich heritage of plant based healthcare systems like Ayurveda, Unani and Siddha with a very high degree of societal acceptance. Forests, however, continue to be the main source of the raw material used in the manufacturer of Ayurveda, Siddha and Unani medicines. Concerned with the unsustainable collection from the wild resulting in a large number of species entering the red data book, the Department of AYUSH, through the schemes of the National Medicinal Plants Board (NMPB), has launched major initiatives to promote cultivation of medicinal plants and thereby integrate medicinal plants into the farming systems.

One of the major challenges facing growth and outreach of the traditional/herbal medicinal products is their quality, safety and efficacy. This inter-alia is dependent on the quality of the raw material used in the manufacture of the finished product.

The National Medicinal Plants Board (NMPB), Department of AYUSH has prepared India specific Good Agriculture Practices (GAPs) on the pattern of Good Agriculture and Field Collection Practices (GACPs) developed by the World Health Organisation (WHO) for medicinal plants.

I am confident that these guidelines, once disseminated and adopted, will go a long way in improving the quality of the products that we manufacture and export and thereby help improve the trade of Indian medicinal and herbal products. This will also help improve the health of the people and thereby increase acceptance of Indian Systems of Medicine world over.

(S. Jalaja)

Dated: October 22, 2009

World Health Organization
Country Office for India

FOREWORD

There is a global upsurge in the use of traditional and complementary systems of medicine. The increasing demand for natural herbal products creates a need not only for conserving medicinal plants in-situ, but also for their cultivation outside the forest areas.

The World Health Organisation (WHO) has developed Good Agriculture and Collection Practices in 2003. A number of countries have adapted them and formulated their own guidelines in order to improve and standardize the quality of raw materials used by traditional medicine practitioners and the herbal industry.

I am pleased to note that the National Medicinal Plants Board of the Department of AYUSH, Ministry of Health & Family Welfare, Government of India, has developed India-specific Good Agriculture Practices for Medicinal Plants in collaboration with the WHO Country Office for India.

I would like to compliment the Department of AYUSH and National Medicinal Plants Board for this important initiative.

Dr. S.J. Habayeb
WHO Representative to India

बी० एस० सजवाण, आई०एफ०एस०
मुख्य कार्यकारी अधिकारी
B.S. SAJWAN, I.F.S.
Chief Executive Officer

भारत सरकार
स्वास्थ्य और परिवार कल्याण मंत्रालय
आयुष विभाग
राष्ट्रीय औषधीय पादप बोर्ड
Government of India
Ministry of Health & Family Welfare
Department of AYUSH
National Medicinal Plants Board

ACKNOWLEDGEMENT

The quality of drugs and nutraceuticals of Ayurvedic, Siddha and Unani systems of medicine, inter-alia, depends on the quality of the raw-material that goes into the manufacture of such products. The World Health Organizations (WHO) has developed Good Agricultural and Collection Practices (GACP) for medicinal plants. The present guidelines draw upon the WHO guidelines and have been adapted to suit the Indian conditions.

The National Medicinal Plants Board expresses its gratitude for the financial assistance provided by the World Health Organizations for the development and publication of these guidelines.

Special thanks are due to WHO-India Office, Ministries of Environment and Forest, Agriculture, Commerce, Science and Technology, Council of Scientific and Industrial Research, Indian Council of Agricultural Research, Indian Council of Forestry Research & Education, Indian Council of Medical Research, Central Council for Research in Ayurveda and Siddha, Central Council for Research in Unani Medicine, Agriculture and Processed Food Products Export Development Authority (APEDA), Indian Institute of Forest Management, and other experts who participated in the meeting of the expert committees and provided their valuable inputs on the draft text, which went through several stages of refinements and improvements.

NMPB acknowledges the most valuable contribution by Dr. Satyabrata Maiti, Director, Directorate of Medicinal and Aromatic Plants, Anand, Gujrat, who prepared the original text of the guidelines and, thereafter, incorporated all the suggestions and comments received from the various experts, organizations and individuals. Without the untiring and willing support of Dr. Maiti, it would not have been possible to bring out the document in its present form.

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Finally, NMPB would like to place on record its appreciation of the work done by the team consisting of Mr. T.U. Haqqi, Dr. O.P. Mishra, Mr. Parhlad Rai, Dr. S. Bhandarkar, Dr. N. Padmakumar, Dr. Varsha Gupta and Dr. Kavita Tyagi in the National Medicinal Plants Board.

(B.S. Sajwan)
Chief Executive Officer
National Medicinal Plants Board

CONTENTS

ABBREVIATIONS

AICRP	:	All India Coordinated Research Project
APEDA	:	Agricultural and Processed Food Products Export Development Authority
ASU	:	Ayurveda, Siddha and Unani
AYUSH	:	Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy
FAO	:	Food and Agricultural Organization
GAP	:	Good Agricultural Practices
GMP	:	Good Manufacturing Practices
ISM&H	:	Indian Systems of Medicine and Homoeopathy

GOOD AGRICULTURAL PRACTICES

1. Background- Need for Good Agricultural Practices

1.1 India has a rich tradition of plant based health care systems contained in its classical texts like Charak Samhita (1) and Sushruta Samhita (2)**.** In recognition of the diversity of health care practices, the Government of India have recognized Ayurveda, Yoga & Naturopathy, Siddha, Unani and Homoeopathy as the alternative systems of medicine under the National Health Policy.

1.2 Department of Ayurveda, Yoga and Naturopathy, Siddha, Unani and Homoeopathy (AYUSH) in the Ministry of Health and Family Welfare has the responsibility for quality assurance and standardization of the production processes of Ayurveda, Siddha and Unani(ASU) medicines and disseminate the guidelines for production of raw material used in ASU medicines.

1.3 To ensure and enhance the quality of ASU medicines, the Government of India have notified Good Manufacturing Practices under Schedule 'T' of the Drugs and Cosmetics Act 1940. These guidelines on Good Agricultural Practices (GAP) seek to lay down standards for production of raw material that goes in to the making of the ASU medicines and standardize the production processes from farm to factory.

1.4 The Good Agriculture Practices described in this document have been adapted from the WHO guideline on Good Agricultural & Collection Practices (GACP) to suit policy framework on environment and health in India(3).

2. Definition of Good Agricultural Practices; (4,5)

2.1 A good agricultural practice in the context of medicinal plants is a cultivation programme designed to ensure optimal yield in terms of both quality and quantity of any crop intended for health purposes.

3. Scope

3.1. This document is designed to play a facilitator role and shall be recommended to all stake holders.

3.2 In the current form, these GAPs are essentially meant for and applicable to commercial scale of farming.

4. Soil and climatic conditions

4.1 The grower should identify the best possible environment where the plant can express its full potential in terms of both quality and quantity during its entire growth period (germination, growth and maturity). Meteorological data collated for preceding three years should be taken into account while judging the suitability of the site.

4.2 The selected site should qualify in terms of overall soil health for the purpose of cultivation of medicinal plant species. The following should be avoided;

4.2.1 Sites designated with high-degree stress factors (salinity, acidity and toxicity), water logging conditions, industrial wastes and affluent.

4.2.2 Sites in proximity to grave yards, crematoria or having a traceable history of such usage.

4.3. A well drained fertile soil with optimum level of water holding capacity and productivity status should be used for medicinal plants cultivation.

4.4. In soils with low fertility levels use of soil amendments as per the specific site and requirement of species are to be followed. The latest soil test report on physico-chemical parameters and nutrient profile should be obtained to decide the nature and quantity of soil amendments required.

4.5 The site must be in proximity to a reliable source of irrigation water.

4.6 The quality of irrigation water should have been adequately understood and classified in the context of both soil type and the target crop in terms of total salt concentration, Sodium absorption ratio, Bicarbonate and Boron concentration etc.

4.7 When the end-product is required to conform to standards of residual contaminants, the irrigation water must be analyzed for heavy metals and residual pesticides also.

4.8 When shade-loving crop is planned for, availability of shade across the field should be ascertained. Provision for artificial shading should be examined in the light of crop economics.

5. Seeds and propagation material

5.1 The seed/planting material should be accompanied with the following information:-

- Name as per pharmacopoeial nomenclature and trade name
- Botanical name
- Cultivar/ Selection / Phenotype/ Chemotype/ Genotype
- Projected quality of crop in terms of physico-chemical analysis/ marker based analysis – on the basis of earlier data/ reports

5.2 Marker based analytical projection for the end-product is mandatory requirement when the crop is meant for phyto-pharmaceutical industries.

5.3 When the planting material is obtained from wild resources as it happens during initial crop cycles, efforts should be made to establish its correct identity.

5.4 Precautions

5.4.1 Seed

- The seeds chosen for cultivation purposes must be physically free from pests, diseases, foreign and inert matter.
- The seed should be fresh and must have originated from recent harvests and in the accompanying document; the supplier should mention the date of harvest.
- The seed which is collected from wild sources must invariably be from recently collected lots and only mature seed should be collected.
- Prescribed seed treatment protocols if any, for the target species, must be completed well in advance so as to match the planting season.
- The process for seedling production under nursery conditions should be initiated as per the recommended agronomic practices for the target species and carried out reasonably well before the actual schedule of field transplantation. Only healthy seedlings should be transplanted.

5.4.2 Stem cutting

- When the grower takes the responsibility of root induction in stem cuttings under nursery conditions for eventual transplantation into the field, the source of cuttings should be well authenticated for both botanical identity and quality of vegetative propagules.
- The stem cuttings collected for root induction should be of uniform dimensions in terms of length and diameter and should be in tune with the requirements laid down for the target species. Only healthy stem cutting giving desired rooting should be used.

5.4.3. Root cutting

The propagation materials in form of 'ready-to-transplant saplings' or root cuttings should be of uniform size and maturity, both in terms of aerial and underground parts, and must be free from any disease and infection.

6. Crop management for cultivation

6.1 Field preparation

The soil should be brought to the desired tilth to facilitate favourable environment for growing seed and seedling. The field operation performed should provide better rhizospheric environment, soil porosity and texture, and keep it free from weeds for initial 20-30 days.

6.2 Sowing and transplanting

6.2.1 The recommended rate of seedlings per unit of land area should be adhered to. The placement of seeds should take place at the appropriate depth in the moist zone of the soil.

6.2.2 In cases where saplings are transplanted the spacing norms in terms of row-to-row and plant-to-plant distance should governed by the needs of target crop as envisaged in the agronomic protocol for target species.

6.2.3 The seedling at optimum stage of transplanting should be uprooted and transplanted immediately thereafter.

6.2.4 Replenishment of plant populations to compensate mortality losses should be carried out within a reasonable timeframe and in consideration of the gestation period of the target crop.

6.3 Manures and fertilizers

6.3.1 Use of organic manure is preferred for growing medicinal plants . However, mineral nutrition through inorganic source may be opted for in consideration of the nutritional needs of the target crop vis-à-vis the soil characteristics.

6.3.2 Use of compost, vermi-compost, poultry manure, green leafy manure is desirable. Similarly, use of microbial fertilizers for distinct purposes like, nitrogen fixing or for phosphate solubilizing is desirable.

6.3.3 The use of sludge, city waste, night soil and any other manure with known or assumed toxicities must be avoided.

6.3.4 Specialized nutritional care for distinct purposes such as root production or enhancement of leafy bio-mass etc should be opted for in the light of recommended agronomic practices for target species.

6.4 Irrigation

6.4.1 Total water requirement of the crop should be estimated in the light of available agronomic protocol. Accordingly, the irrigation cycles should be planned for and implemented to ensure optimal plant growth.

6.4.2 Water harvesting and water conservation methods should be followed wherever possible.