AncientHerbals®
GUIDLINE
on
GOOD COLLECTION and PRODUCTION PRACTICE
for Wild Crafted Herbals

(inline with IFOAM and FairWild principals)

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This initiation was chartered by HAM Ltd.Co to facilitate the quality and supply of raw materials to ensure sufficient production and stable markets for botanical ingredients and products. It also has the goal of providing protection for wild plant communities and biodiversity improvement. This document was completed as a joint effort to develop quality control standards for the manufacture of herbal supplements and botanical medicines, as needed to ensure availability of products having a high degree of safety and effectiveness.

I would like to express my gratitude to professionals and scientist that earlier address these topics. Actually, the origin of the concept and topic introduced in this document can be found in previously published several documents related to wild collection and good agricultural practice. Many documents that have been valuable in the process of preparing and reviewing this standard includes ISO 9001:2000; WHO GACP 2000 (guidelines on good agricultural and collection practices for medicinal plants); US OFPA 1990 (Organic Food Production Act), EEC No 834/2007, 889/2008; 1235/2008; SQF 2000(Safe Quality Food), ISO14001 (environment standard) as well as Good Agricultural and Collection Practice (GACP) of AHPA-AHP (American Herbal product Association American Herbal Pharmacopeia), European Herbal Practitioner Association and USA National Nutrition Association documents,, ASTA standards (American Space Trade Association), International Standards for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP), Germany's Federal Agency for Nature Conservation, WWF Germany, and TRAFFIC, as well as the International Union for the Conservation of Nature, Medicinal Plant Group paperwork, etc.

Preface
Any organization that involved in harvesting, production, marketing and trade of consumer goods should know their obligations and from time to time must provide guidance on issues that will ensure that those goods are produced to high standards. Nowadays the herbal products, particularly infusions, spices, dietary supplements, drugs and cosmetics are widely available in the all of the world and it need to be ensure that they are in complement to the consumer needs and satisfaction, especially when those products are intended for used as aids in promoting health. Wild botanical ingredients for these products come from all over the world and regardless of these trade variables the collection practice has product quality, cultural, social, economic and environmental implications. The emergence of the idea that good collection practice (GCP) needs to be clearly described and documented is a fairly recent development, even for conventional agricultural crops. Working with FAO since 2001 and be involved in Biodinamic since 1984 and actively participating in IFOAM since 2005 I understand the importance of wild collection practice and processing and began to consider the process to support the development

of an international approach to policies on WCP (wild collection practice). Its trough that there is huge work has been done by many international organization and association the result of demonstrated by establishment of FairWild association, and there is some documents developed by FAO, IFOAM and some professional association but hitherto there is no prescribed Wild Collection Practice gridline established by the government of Armenia that will support and contribute the rural people in this country or for foreign farms that export their crops to Armenia. Similarly, the interest in publishing meaningful and well-designed good collection practice (GCP) guidelines has only recently come into focus.

This idea was shred with all supporting organizations mentioned above and with Consumer Rights Protection Association of Armenia, SHEN NGO and Ecoglobe LLC and we believe that the time is right to distribute the ideas contained here in order to address the related but separate issues of good practice in collecting herbal raw materials. As the international trade company and voice of the herbal ingredient harvesters, herbal products industry and consumer right protector in Armenia, the HAM Ltd.Co is actively engaged in the development of standards of identity, purity, and analysis for botanicals, and in the critical review of traditional and scientific data regarding their efficacy and safety.
HAM Ltd.Co has a shared mission to promote responsible use of and commerce in herbal products. No other organizations are so uniquely positioned to develop and provide the guidelines contained in this document. Even though organizations in other countries have developed good agricultural and collection practice guidelines in the last several years, the HAM have identified the need for a document that considers the specific nature of doing business in Armenia.

Introduction
This ArmenianTea Good Collection and Production Practice (GCPP) document provides guidance to collectors and processors of herbs that are used in consumer products. Its goals are to ensure that the herbal raw materials used in these products are accurately identified and are not adulterated with contaminants that may present a public health risk, and are in full conformity with all of the quality characteristics for which they are represented. In many countries, standards of identity, quality, and purity for herbal ingredients used in food and medicines are mandatory standards. In Armenia, standards are established by producers, either to their own specifications or to those set by an authoritative body, such as the Armenian Standardization Committee.
The ArmenianTea GCPP has relevance to herbal raw materials in all herbal products, including foods, dietary supplements, drugs, cosmetics, etc. This GCPP is intended to have applications to all herbal raw material production, whether the herbs are wild crafted or harvested by FairWild or organic methods. While this document may be useful in any country, it is limited to rules in Armenia when it addresses regulatory issues. This guidance serves as a template that growers and harvesters can adapt to their own businesses and is designed to have relevance for both small and large producers. By establishing standard operating procedures that follow the practices presented here, firms at every level in the supply chain will better ensure the production of good quality herbal raw materials.
This document does not serve as a substitute for the empirical knowledge that has been passed down from preceding generations involved in the cultivation, and especially wildcrafting, of medicinal plants. Readers are encouraged to give due consideration to long-established practices in growing and harvesting herbs that also based on traditional, ethno-folk practices in a more nature close approach. The experience that has already been gained in understanding the optimal harvest seasons according to the moon and sun phases, wild collection by using the folk songs for harvesting each herbal ingredients continues to be applicable today. Many traditional techniques such as cleaning, processing, disinfection via herbal fumigation, storekeeping and

handling are still relevant. Today's herbal products industry can benefit through awareness of these and other traditional techniques. Though modern harvests protocols can be emphasize seasonal variations in constituent profiles, many of the older practices have been found to correlate with contemporary standards.
This document is presented as a HAM Ltd.Co Wild Collection and Production guideline and standard and can be a draft for discussion and review with colleagues and professionals. Comments on this document, especially by farmers and collectors who use the draft in their facilities and operations, will be welcome and should be submitted to HAM Ltd.Co at the email or physical address listed on the cover. Revisions may be made to this GCPP as additional insights are gained through this review process.
Finally, while this document is complete in itself, the HAM Ltd.Co have already identified the need to develop a companion to this work, by providing worksheets and checklists that will assist farmers and collectors in implementing the guidance provided here. Readers of this document who have ideas to contribute to this future project are invited to contact the HAM ltd.Co office.

Disclaimers
This standard is for HAM Ltd.Co use only and the information presented here is suggested for other interested organizations for guidance purposes only. Producers of herbal ingredients and of finished consumer products that contain herbs are responsible for knowing, understanding, and conforming to all international and national laws and regulations that are relevant to their businesses, and for implementing practices that may go beyond those described here, as needed. This document does not serve as a substitute for collector's need to be knowledgeable about the plants which they produce. In addition, it does not address all of the needs of those who are producing crops that comply with organic agriculture or other specifically defined agricultural doctrines. In preparing this document, every effort was made to identify current practices that might affect the quality and cleanliness of herbal ingredients. These guidelines may be revised periodically as new information and technology develops.

Good Collection and Production Practice

General principles

Collectors of wild herbal raw materials that are produced for use as ingredients in herbal products for human consumption must make every reasonable effort to ensure that all such ingredients are fit for their intended use.

Several specific principles are essential in such efforts.

• *Identification*. Wild harvested plant populations and all plant materials must be accurately identified. Usually, identification of genus and species will be sufficient to meet this demand, but any material offered as a particular subspecies, variety, or other lesser division of a species must in fact be that exact taxon.

• *Quality Assurance*. Herbal raw materials must meet all specifications represented by accompanying certificates, by reference to standards or official compendia, and by written agreements between buyers and sellers.

• *Cleanliness*. Wild collectors of plants used in consumer products must take necessary steps in harvesting and post-harvest practices to ensure that their herbs are not contaminated with unacceptable levels of substances that may cause harm.

• *Environmental stewardship*.

• Wild herb natural multiplayer's (collectors of seed that broadcasted in the identified wild forest or roots that replanted for natural multiplication in the wild identified areas without any cultivation and further anthropogenic elements) should take steps to protect and improve the stability and quality of the topsoil that is essential to their farms' longevity. Multipliers should be used the seeds of widely growth plants resourcefully and in a manner that protects the immediate anthropogenic factor into the environment. To the degree possible, multipliers should maintain and enhance the biodiversity of the native area.

• Wild plant harvesters must minimize damage to the specific populations in which they harvest and take appropriate steps to ensure survival of local plant communities. They must also protect the wildlife habitats from which they extract plant materials and recognize that many wild plants provide sources of food for wildlife.

• *Cultural complimentarily*. Wild herbal harvesters must be trained on rehabilitated technology of harvesting following the moon and sun phases by using the ancient knowledge of traditional songs and folk for plant harvest.

•*Optimal harvest conditions*. For many plants that are used in consumer products, there are optimal times and conditions for planting and harvest to ensure that quality standards are met.

•*Legal conformity*. Wild harvesters must be aware of and in conformity with national and regional laws that govern their practices.

Producers must take such factors into account when planning their raw material harvesting and production.

1. Good Collection Practice

Many of the plants that are used in consumer products are produced by collectors who gather these products from woods, fields, seashores, and other habitats. Local customs from one country to another impose varying degrees of oversight and management of collectors. The wild species must be collected by organized groups of harvesters or individuals that are trained. Regardless of whether collectors operate individually or under some degree of supervision, good collection practice is essential for providing accurately identified and good quality botanical raw material from wild-harvest sources and for protecting the species from unsustainable harvest. The focus of this section is on assisting harvesters who gather raw material from native plant populations at the point of wild-collection. Guidance is provided on issues ranging from proper permits to plant identity, and outlines of some long established harvest practices are also included. Note that good practice for post-harvest handling, for personnel, and for record-keeping and retention samples are addressed in separate sections of this GCPP. Each of these issues must also be addressed by collectors of wild-harvested herbs to comply with good collection practice.

1.1 Permits and permission to collect

Whether wild harvest occurs on public or private property, the harvester must conform to rules established by federal, state and local governments, and by land managers and owners. The following actions should be completed in advance of harvest on public lands or entering private property.

1.1.1. Public property.

1.1.1.1. If harvesting in a National Forest or National Grasslands, or on land controlled by the Local Administration, contact the appropriate office to obtain a permit, if required, before harvesting.

1.1.1.2. If harvesting on state-owned public lands, contact the appropriate office before harvesting. Obtain a state harvest license if such a license is required for the harvest crop.

1.1.1.3. Follow all rules that apply to permitted harvests on public lands, including limits and seasonal requirements, if any; established restraints on harvests in camping areas and near trails and roadsides; requests for submission of harvest data; fee payment; and any other rules.

1.1.1.4. Carry all required permits and licenses while collecting.

1.1.2. Private property.

1.1.2.1. Obtain permission from the owner or owner's agent to enter and to harvest on any private property on which collection occurs.

1.1.2.2. Obtain permission in writing when regional or local laws have established such a requirement.

1.1.2.3. Comply with any agreements that have been made with the owner or agent of private property on which collection occurs.

1.1.2.4. Carry a copy of applicable permissions when collecting.

1.2 Site selection

While it is obvious that collectors should select harvest sites where the target plant can be readily found, it is just as important that sites be evaluated to ensure that the collected materials are likely to be of good quality and free of contamination from pollution and other negative environmental influences.

Choice of collection site can impact marketability of the collected material.

Adherence to the following steps will assist in making good decisions on site selection and in addressing buyers' requests for harvest information.

Calculate the natural resource balance and availability to be able to established environmentally friendly long-term harvesting practice.

1.2.1. Species habitat. Be aware of the normal habitat for the species and choose collection sites to target healthy stands of plants growing in their normal range.
1.2.2. Site history.
1.2.2.1. Obtain information about prior use of the site, if any. Consider especially:
1.2.2.1.1. If the site has been recently under cultivation, determine what, if any, fertilizers and pesticides were used.
1.2.2.1.2. On local or federal property, determine whether any recent chemical applications have been made to control insects or invasive species, or for other management purposes.
1.2.2.1.3. Consider soil tests prior to harvest on locations that have been the site of significant human activity, such as abandoned home sites, dumps or landfills, quarries, etc.
1.2.2.2. Determine whether water sources at or near the site are potential sources of pollution (e.g., downstream from industrial facilities, mine tailings, parking lots, golf courses, underground storage tanks, etc.).
1.2.2.3. Be aware of any buried utilities that are present at the site.
1.2.2.4. Consider the information compiled in evaluating a site history, and refrain from harvesting if there is any history that indicates that the site may harbor environmental hazards.
1.2.3. Proximity to features of concern.
1.2.3.1. Do not harvest in close proximity to roads or to railroad rights-of way.
1.2.3.2. Do not harvest under above-ground power lines if the buyer has specified a concern about such locations.

1.3 Collection equipment
Equipment used in harvesting of wild-harvested crops (including mechanical equipment, buckets and other containers, tarps, hand tools, brooms and brushes, etc.) must be suitable for its purpose, properly maintained, and clean. The following factors are relevant to collection equipment:
1.3.1 Materials. Use only equipment that is made of non-toxic and noncorrosive materials. Avoid the use of equipment made of wood or other materials that cannot be easily and thoroughly cleaned.
1.3.2 Maintenance. Examine all equipment used in collection operations and maintain in proper working order; repair as necessary.
1.3.3 Cleanliness. Maintain all collection equipment in clean condition. Pay particular attention to ensuring that those parts of equipment that come in direct contact with the crop during collection are clean and free of potential contaminants (e.g., chipping paint, lubricants, etc.).
1.3.4 Absence of cross-contamination. Remove remnants of any prior harvest from harvest equipment to prevent cross-contamination.
1.3.5 Dedicated storage containers. Do not use collection containers for storing or containing non-plant materials, such as tools or chemicals.
1.3.6 Training. Ensure that all personnel are properly trained in the use of the collection equipment, especially mechanized equipment, and that equipment is operated in a manner that ensures the safety of the operators and avoids or minimizes damage to the collected material.

1.4 Identification
Wild plant harvesters must have sufficient training and experience to ensure that all harvested plants are correctly identified, and they must limit their harvest to plants that they can positively identify. The necessary knowledge can be obtained from other experienced harvesters, in a classroom setting, or with information provided from authoritative references, such as a local flora. Also, buying agents who purchase collected materials are often a good source of information on identification of plants and plant materials. While this document is not a substitute for training on plant identification, the following practices will assist collectors to accurately identify harvested wild materials. Whenever necessary, engage the services of a

qualified botanist or taxonomist who has the requisite skills for providing positive identification of the harvested species.

1.4.1. Training and experience. Obtain sufficient training from knowledgeable experts and/or sufficient experience from actual practice to ensure that all collected plant material is accurately identified to species, and to subspecies and/or variety if applicable.

1.4.2. Use of local floras. Collect a sample of the flowering plant and use a local or regional flora to identify the plant by determining that it conforms to its key characteristics.

1.4.3. Use of voucher specimens. Collect a sample of a flowering plant and ensure positive identification by comparison with one or more voucher specimens that have been accurately identified by a qualified expert, and which can be found at herbaria located at local colleges or public gardens. Consider preparation of the sample as a new voucher specimen to keep a record of harvest.

1.4.4. Consideration of plant's life-phase. Positive identification to species of many, if not most plants can only be determined by floral or fruit structures, which may not be present at the time of collection. If collecting plants in a life-phase in which flowers and fruit are not present, ensure positive identification by one of the following:

1.4.4.1. Determine positive identification from a flowering sample collected from the harvest population in a prior season, and conduct harvest in the previously identified population.

1.4.4.2. Determine positive identification from plant parts other than flowers or fruit, if the harvested species bears non-floral or non-fruit characteristics that can be used to make such identification with absolute certainty.

1.4.5. Substitutes and adulterants. Be aware of any local species that are known to be readily confused with the target species, and take additional care to exclude these from the harvest.16

1.4.6. Positive identification. Any time that the identity of the collected material cannot be determined with absolute certainty, submit a sample to a knowledgeable expert for confirming identification.

1.5 Sustainable harvest

Harvesters of wild plants must apply collection practices that address not only their need to gain economic benefits from the sale of wild-harvested plants, but that also make sure that each of the collected species survives. In addition to preserving plant populations, harvest practices must also minimize damage to the local habitat.

This document can not serve as a substitute for the experience gained by years of harvesting wild plants, or for the training that can be provided by a qualified and experienced collector. Collectors should be knowledgeable about each of the plants they harvest and should use collection practices that are appropriate to each species and collection area. To make sure that harvests minimize damage while enhancing the health of the collected species, collectors should follow any of the below-listed practices that are applicable.

1.5.1. Endangered species. Do not collect plants that are listed as endangered under the Armenian Endangered Species Act (Red Book) or that are not allowed to be harvested under state regulations due to concerns about over-harvest. Exception only for those endangered plants that are naturally multiplied based on the special permission provided by the local, regional or state authorities.

1.5.2. Abundance. Collect only from abundant stands of the harvest species. Avoid harvesting from stands where the plant is sparse or that are outside of the species' normal range. Refrain from harvesting in the same location as earlier harvests until the population is sufficiently reestablished.

1.5.3. Maintaining population stability.

1.5.3.1. When harvesting reproductive plant parts that must be collected prior to seed maturation (e.g., flowers, fruit) do not take all of those plant parts from any plant population, but leave

enough so that each population will be able to produce an adequate amount of seeds to sustain the population.
1.5.3.2. When harvesting other plant parts that do not remove the entire plant (e.g., leaves, seeds), leave enough of these in each plant population so that it will regenerate and prosper.
1.5.3.3. When harvesting leaves from trees or woody plants, refrain from excessive defoliation of any individual plant.
1.5.3.4. For harvests of barks from trees or shrubs:
1.5.3.4.1. Do not "girdle" trees by removing the bark all the way around the tree, unless the tree has been or is to be removed for other purposes, e.g., for timber harvest, or is otherwise to be destroyed. Use the special "trained" practice of appropriate pruning if necessary.
1.5.3.4.2. Whenever possible and acceptable for meeting quality standards, harvest bark from branches of the tree rather than from its trunk.
1.5.3.4.3. Whenever possible and applicable to the particular species, prune trees and shrubs in a manner that encourages bark-producing growth, for example, by coppicing, which involves periodic cutting to encourage growth of suckers.
1.5.3.4.4. As necessary and appropriate, use a dressing that will protect the exposed portion of the tree from invasion of pathogens, rodents, or insects that may cause further damage to the plant.
1.5.3.5. For harvests that involve taking the entire plant (e.g., roots):
1.5.3.5.1. Limit harvest in any population to leave a portion sufficient for regeneration of that population.
1.5.3.5.2. Harvest by thinning plants instead of collecting all of the plants along the margins or in one particular part of a colony.
1.5.3.5.3. Harvest only after the fruit has ripened and the seed has been released if the species is seed propagated.
1.5.3.5.4. When harvesting roots of perennials:
1.5.3.5.4.1. Leave some plants from each life stage (seedling, juvenile, mature).
1.5.3.5.4.2. Collect only plants that are mature enough to have produced viable seed.
1.5.3.5.4.3. For species that can regenerate from portions of roots or root crowns, leave a portion of the root in the ground or replant whole or divided crowns, as appropriate.
1.5.4. Propagation and regeneration.
1.5.4.1. Propagation by seed. Plant seeds of collected species that reproduce sexually in a suitable environment.
1.5.4.2. Asexual propagation. Plant whole or divided root crowns, as appropriate, or prepare other asexual propagation material and plant in a suitable environment.
1.5.4.3. Pruning. Consider pruning of trees and woody plants to enhance leaf and flower (and therefore fruit and seed) production.
1.5.5. Habitat stewardship.
1.5.5.1. Minimize habitat disruption. Avoid trampling of surrounding plants and use appropriate equipment for harvest. Take care to repair any unavoidable impacts (for example, by filling holes after digging roots).
1.5.5.2. Be aware of land-use and zoning activities in collection areas and provide input to community leaders to protect these habitats. Keep report of any signs of trespassing, property damage or habitat loss in collection areas.

1.6 Timing and handling of harvest
Harvest season and harvest time are important factors in the collection of good quality wild plant material. In general and ideally, for majority of plants the above-ground parts of plants should be collected after midday when the dew has evaporated, and in dry weather (though these time-of-day and weather restrictions are not relevant to barks). This is only general and in nature that actual seasons and life cycles for collecting any particular plant material may vary. Review

harvest research that has been conducted to evaluate the optimal harvest times for some wild harvested plant materials in trade. Also, always take into account any harvest season specifications that have been set by the material's buyer. Note that this discussion of timing of harvest must be considered in the context of the prior section on sustainable harvest. For example, while leaves and roots of annual plants should be collected prior to flowering to ensure good quality, this must be done in a manner that ensures that adequate seed production will follow collection in each harvested plant population in which harvest occurs. Equally important to quality are the actual handling practices used at the time of and immediately following harvest. For example, dirt and other foreign matter (e.g., other plant parts, insects, bird nests, spider webs, lichens or fungi on barks, etc.) should be removed from harvested material simultaneous with collection, whenever feasible. Some guidance on more specific harvest handling factors is also included in this section.

1.6.1. Leaves. In general please collect leaves from herbaceous plants before the plant flowers, unless otherwise specified. Collect tree leaves anytime during the growing season according to the particular species part harvesting ArmenianTea manual, except that leaves from some deciduous species must be harvested in a particular season to maximize desired constituents. Limit the proportion of discolored leaves in any leaf harvest to meet established specifications, if any. Handle leaf material that is rich in essential oils carefully to prevent bruising of the leaves that could result in essential oil degradation.

1.6.2. Flowers. In general, harvest flowers (or if specified, flowering tops) when they have just opened or shortly enough afterwards to avoid any faded or brown blossoms. If harvest specifications require flower buds, collect these before the buds open. Encourage departure of insects from harvested flowers by shaking the material and by allowing it to sit for some time. Handle flowers carefully to prevent degradation, as these are generally more delicate than other plant materials. Handle flower material that is rich in essential oils carefully to prevent bruising that could result in essential oil degradation.

1.6.3. Fruits. Harvest fruits when they are mature and ripe, unless specifications require collection of immature fruit. Only collect non damaged and non-bruise fruits and handle the collected fruit in a manner than prevents bruising after harvest. If collection is done by shaking fruits from trees, collect onto a clean tarp to prevent direct contact with soil.

1.6.4. Seeds. In general, harvest seeds when they are mass ripened or when they, or the fruit in which they are contained, are fully ripe.

1.6.5. Roots. Dig the roots of annual plants when the plants are well developed, but generally before flowering. Harvest roots of perennials late in the late fall or early in the spring. Collect biennial roots in either the fall of the first year or spring of the second year. Handle root material that is rich in essential oils carefully to prevent bruising of the epidermis, where the oils typically reside, which could result in essential oil degradation.

1.6.6. Barks. Harvest barks in the early spring, prior to any new growth, or in the late fall or winter.

1.6.7. Saps and pitches. Collect tree saps and other exudates late in the winter or early in the spring. Leave a protective layer of sap or pitch to provide protection for the tree against infiltration by insects and pathogens.

1.6.8. Whole plants. When collecting whole herbaceous plants, or the entire aerial parts of herbaceous plants, harvest prior to any visual decline in any of the plant parts. This is typically at the stage at which flowers are emerging. The best time to harvest is phonological stage of mass flowering.

2. Post Harvest Handling and Processing

After an herb is harvested, whether as an agricultural product on a farm or as a wildcrafted material in a non-cultivated setting, the care with which the material is handled has a considerable impact on product quality. Immediate post-harvest practices must stabilize the

harvest to prevent degradation of the fresh material, which is particularly vulnerable due to the naturally-occurring moisture content of plants. Later steps, such as washing, dehydrating, cutting, refrigerating or freezing, natural fumigation, packaging, and storing, must also be properly undertaken so that product quality is preserved throughout the chain of custody, from the field to the point of manufacture.
In this section, several post-harvest handling issues are addressed. As has been stated elsewhere, these matters are relevant to good collection practice. Also, note that good practice related to personnel, a record-keeping and retention sample is addressed in separate sections of this GCPP. Each of these issues must also be addressed in post-harvest operations to comply with good collection practice.

2.1 Handling during and immediately after harvest
At the time of actual harvest and immediately following harvest, the herbal crop must be handled, stored, and consolidated in a manner that ensures that the collected material does not degrade in transit. Threats to product quality include, among others, cross contamination from other crops and materials, insect or other infestation, product compaction, exposure to the elements, and temperature build-up and overheating. The following practices are relevant to the handling operations.
2.1.1. Containers. Place all harvested materials in suitable containers. Harvest containers must be clean and must not have been used for storing non harvest materials, such as tools or farm chemicals.
2.1.2. Avoidance of compaction. Do not fill or stack sacks or other harvest containers to levels that will result in compacting of harvested materials.
2.1.3. Protection from external sources of contamination. Protect the harvested material from contact with birds, rodents, insects, and other animals, and from exposure to the elements that can adversely affect the harvested material, such as excessive direct sunlight, rainfall, etc.
2.1.4. Timing. Minimize the transit time from the point of harvest to the location used for consolidation and cleaning.
2.1.5. Temperature and moisture control. Ensure that both the temperature and moisture of the harvested material is controlled throughout post-harvest handling as needed to prevent degradation. This can best be accomplished by minimizing transit time and by providing adequate air circulation, though use of refrigeration, packing in dry ice, or other cooling steps may also be considered when needed and appropriate.

2.2 Facilities
The buildings and facilities used in all post-harvest handling operations must be of suitable design and sound construction. Such facilities should meet the following standards at a minimum.
2.2.1. Light. Design post-harvest handling facilities to provide sufficient space and light21 to accomplish the operations undertaken in the facility.
2.2.2. Pest control. Design, manage, and monitor post-harvest handling facilities to keep out pests, including insects, rodents, and other animals by using the natural materials of traditional non chemical technologies.
2.2.3. Order and cleanliness. Design and maintain post-harvest handling facilities with sufficient order and cleanliness to prevent contamination of crops treated in these locations.

2.3 Equipment
Each of the above sections have addressed the need for providing and maintaining equipment used in harvest and collection activities so that the equipment is adequate for the intended use, functions properly, and is clean. All of the same factors apply to equipment (including utensils) used in post-harvest handling, and the following points should be considered.

2.3.1. Materials. Use only post-harvest handling equipment that is made of nontoxic corrosion-resistant or natural materials that can be easily and thoroughly cleaned.
2.3.2. Maintenance. Examine all equipment used in post-harvest handling operations and maintain in proper working order; repair as necessary.
2.3.3. Cleanliness. Design and install post-harvest handling equipment in a manner that permits easy access for cleaning, and maintain all post-harvest handling equipment in clean condition. Pay particular attention to ensuring that those parts of equipment that come in direct contact with the plant material are clean and free of potential contaminants (e.g., chipping paint, lubricants, etc.).
2.3.4. Absence of cross-contamination. Clean all post-harvest handling equipment to remove remnants of any other material for which the equipment was used.
2.3.5. Dedicated containers. Do not re-use containers that are used for storing harvested materials at any post-harvest handling stage for any other storage purpose.
2.3.6. Training. Ensure that all personnel are properly trained in the use of post-harvest handling equipment, especially mechanized equipment, and that equipment is operated in a manner that ensures the safety of the operators and avoids or minimizes damage to the harvested material.

2.4 Washing and cleaning
Many harvested materials, especially roots, need to be washed immediately after harvest to remove dirt and soil from the crop. Cleaning is also needed to remove any foreign matter that may have been inadvertently mixed in with the harvest. The following activities apply to all washing and cleaning operations.
2.4.1. Water quality. Use only potable water for washing the harvested plant material.
2.4.2. Facility design. Carry out washing operations in a facility designed to prevent build-up of mud and other possible sources of contamination.
2.4.3. Drainage. Provide adequate drainage from the washing facility, sufficient to dispose of peak water usage. The drainage system must be designed to avoid contamination of potable water supplies.
2.4.4. Drying. Arrange and handle washed harvest material in a manner that ensures adequate drying of the material. Drying must be done under the ceramic roof natural dryer that must protect the herbal materials from direct influence of sun.
2.4.5. Removal of foreign matter. Inspect for and remove all visible foreign matter and sub-standard material. Foreign matter includes plant material from other species or from other parts of the harvested species; soil and rocks; insects and other animals; and wire, glass, paper, tools or tool parts, and other man-made objects. Sub-standard material includes, for example, discolored leaves or flowers; immature, overripe, or badly bruised fruits; or any other material that would cause the crop to fail to meet its specifications. Conduct the inspection for foreign matter and sub-standard material while the crop is sufficiently well displayed to allow for their ready visibility (e.g., on a conveyor, or spread out on tables, screens, or tarps).

2.5 Special preparation
Certain crops require special attention to meet quality specifications. Traditional preparation of herbs used sometimes may include such actions as roasting, frying, steaming, fumigation, fermenting, etc. Information about such preparation must be obtained from knowledgeable sources and is beyond the scope of this document.
Any such post-harvest preparation must be done in a manner than ensures that the prepared product meets specifications, and must be done by personnel with sufficient training and with appropriate equipment in a suitably clean environment.

2.6 Dehydration

Many of the plants that are grown or collected for use in herbal products must be properly dried prior to use, and drying of plant materials is often performed by the same individuals and companies that harvest the plants. Drying conditions can either preserve or degrade naturally occurring plant compounds and can greatly affect the quality of the traded material. Insufficient drying can result in microbial or mold growth, while either insufficient or excessive drying can result in compound degradation. Adherence to proper dehydration conditions is therefore an essential part of post-harvest handling operations.

2.6.1. Timing. Conduct the dehydration process as quickly after harvest as is feasible.

2.6.2. Sunlight and shade. As a general rule, flowers and leaves in which color preservation is important should be dried in the shade, unless otherwise specified. Direct sunlight may be utilized for drying when appropriate.

2.6.3. Temperature control. The optimal drying temperature differs for various plants and plant parts, though; in general, an air temperature of 45°-65° C (110° - 135°F) is appropriate for a wide range of herbal materials. Some plants, however, are particularly susceptible to excessive temperatures. Establish and maintain a temperature that is appropriate for the specific crop and do not allow the temperature in the drying facility or in the herbal material itself to rise above the temperature at which damage to the quality of the crop may occur.

2.6.4. Cutting before drying. If it is necessary, for example when drying large roots, slice, chop or split these in accordance with product specifications to ensure that they dry quickly and thoroughly.

2.6.5. Air drying. Drying processes in open air, such as barns and sheds may rely entirely on ambient heat and the following practices are essential to all such operations.

2.6.5.1. Design outdoor drying operations with sufficient covering over the dehydrating herbal material (e.g., a tarp or roof) to protect against contamination from birds and other flying animals such as natural ceramic roof dryer. Also, establish procedures to rapidly provide cover in case of rain or other events that could interrupt the drying process or contaminate the in-process material.

2.6.5.2. Design indoor drying operations to ensure that there is sufficient ventilation for airborne moisture to escape.

2.6.5.3. Provide adequate air circulation throughout the drying area.

2.6.5.4. Place material to be dried in thin layers on clean food-grade surfaces that afford adequate air circulation.

2.6.5.5. Carefully turn the dehydrating material as needed to facilitate rapid and complete drying.

2.6.5.6. Mechanical drying. If using mechanical drying equipment, such as belt, drum, rotary, or oven-tray dryers, follow all manufacturer instructions and established operating procedures to ensure that quality of the herbal material is maintained.

2.6.7. Finished moisture content. Ensure that the moisture content of the material at the time that dehydration is completed is in conformity with the specifications for the crop. If a moisture specification is expressed quantitatively (e.g., 12 percent), use adequate analytical tools to accurately measure moisture content. Recommended moisture content of many plant materials and appropriate tests are provided in standards and pharmacopoeia monographs.

2.7 Cutting and milling

Plant material can be traded in a number of forms, including whole, chopped, cut and sifted, teabag cut, shredded, and powder. Cutting of plant materials can occur either before or after dehydration, while milling to powder is always undertaken after drying. Cutting and milling operations must be conducted with practices that ensure that the material's quality and purity is maintained. It's recommended to use the traditional tools for manual cutting and drying in the case if the production is not large or "cottage style".

2.7.1. Timing. Conduct cutting and milling operations as close to the time of manufacture of finished products as is feasible, in order to reduce quality degradation that may be associated with storage of cut or powdered forms.
2.7.2. Advance cleaning and preparation. Before conveying herbal materials into cutting or milling equipment, perform all necessary in-line cleaning and screening steps. These may include, for example, use of a de-stoner, a gravity separator, or a metal detector. In case of hand cutting its important to separate the cutters, clean then and use the hand milling equipments such a different grade sieves, bolt, bolter, crible, separator, etc at depends of fraction.
2.7.3. Protection of operators. Provide adequate ventilation in the cutting and milling facility to protect operators' health. Also provide any needed protective gear, such as breathing masks, eye protection, and ear plugs.
2.7.4. Equipment maintenance. Maintain all cutting and milling equipment in clean and well-functioning condition.
2.7.5. Absence of cross-contamination. Establish and follow procedures to adequately clean cutting and milling equipment that is used for more than one crop, to ensure that cross-contamination with other crops does not occur.
2.7.6. Temperature control. Do not allow the temperature in milling equipment to rise above the temperature at which damage to the quality of the crop may occur in case of industrial manufacturing.
2.7.7. Size requirements. Ensure that the cut or milled product meets all established specifications with regard to particle size and length and density requirements.
2.7.8. Retention samples. Take a retention sample, in a form that is sufficiently whole to allow for visible identification, of each lot of the herbal material before cutting or milling. Also take a retention sample of the cut or milled form, and store these related samples in a manner that maintains their correlation in the event that assurance of accurate identity needs to be reconfirmed at a later date. See Part 5 of this document for additional information on retention samples.

2.8 Packaging and storage
The use of adequate packaging equipment and materials will affect the quality of packaged herbal crops, as will storage conditions. The following practices are relevant to packaging (including drums, boxes, cotton and paper bags and all other packaging) and storage operations for bulk herbs.
2.8.1. Packaging materials. Use only food- or pharmaceutical-grade packaging materials. Do not reuse any packaging material, except that packaging material that includes recycled material is acceptable so long as the recycling process results in packaging material that maintains food-grade or pharmaceutical-grade status.
2.8.2. Conformity to specifications. Use only packaging material that conforms to the product's packaging specifications, if any. For example, high volatile-oil-containing herbs should be stored in non-plastic containers.
2.8.3. Labeling. Labeling process is divided in to two stages: the labeling of raw material or prepared blend for packing and package labeling. For raw material labeling the package label should identify the plant name (common name); the part of the plant; the form of the material (e.g., "whole," "teabag cut," "powder," etc.); the name of the collector/supplier; the place/region of harvest or collection; a date of production; the quantity by weight in the package; the item number (if any) and a lot number. The ready made whole product blend labels must identify the tea bland name; the form of the material (e.g., "whole," "teabag cut," "powder," etc.); the name of bland master; a date of production; the quantity by weight in the package; the item number (if any); and in the record keeping registration book the identity and quantity or proportion of ingredients and any substances added to the material, if any; and a lot number. The finished product labels must identify product name, the contents by the plant name (its common name

(Armenian, Russian or English) and by its scientific binomial/botanical name); the part of the plant; the country of origin; a date of production; the quantity by weight in the package; the identity and quantity or proportion of any substances added to the material, if any; expiration date, direction to use, and a lot number. Labels must be clearly printed, permanently affixed, and conform to any labeling regulations in the country in which the material was produced and in any countries to which it is intended to be shipped.

2.8.4. Storage. Store packaged herbal crops in cool, dry areas away from direct sunlight and exterior walls and off the ground in containers that protect against excessive exposure to air, light, and moisture. Storage facilities should be dry, well ventilated, and have sufficient insulation or other temperature-control features to avoid extreme temperature fluctuations. Its strongly recommended that storage of ready made raw herbal materials, whole blends and finished product must be separated.

2.8.5. Separation from non-food storage. Segregate packaged herbal materials in different areas from non-food items.

2.8.6. Control of odor absorption. Segregate herbal materials that are high in essential oils so that other herbs do not inadvertently absorb their odors.

2.9 Shipping

The quality of herbal materials must be maintained through the shipping procedures, and these must be designed and carried out to minimize damage and degradation.

2.9.1. Shipping containers. Ensure that shipping containers are suitable for transporting food- or pharmaceutical-grade products, as applicable, are clean and dry, and are designed to meet any special needs of the crop. For example, fresh material must be shipped in containers that provide adequate ventilation, while dehydrated plants must be packed in containers that will protect against moisture.

2.9.2. Carriers. Ship herbal crop products or tea blends via carriers that are suitable for transportation of food or pharmaceutical-grade products, as applicable, with special emphasis on temperature control.

2.9.3. Classification. Specify on bills of lading the accurate freight classifications or, for international shipments, the appropriate Harmonized Tariff System code.

3. Personnel Sanitary

There are three primary areas related to wild collection and production practice over which collectors of herbal plant materials must exercise some control of their personnel. These are training, safety and hygiene. Guidance for addressing these three personnel issues follows, and is relevant to all phases of growing, collecting and post-harvest handling.

3.1 Training

3.1.1. Relevance to tasks. Provide relevant and adequate training for all tasks undertaken by each individual involved in plant collection, and post-harvest activities.

3.1.2. Plant identification. Ensure that personnel responsible for plant identification have adequate training and experience to be certain in their identification of any species for which they are responsible.

3.1.3. Hygiene. Provide personnel who handle herbal materials with appropriate training in proper hygienic practices with specific attention to preventing microbial contamination of handled crops.

3.2 Safety

3.2.1. Clothing. Ensure that personnel wear clothing and shoes that provide protection that is appropriate to the work environment.

3.2.2. Protective gear. Provide additional protective gear as appropriate, such as face masks, eye coverings, ear plugs, gloves water-proof boots and raingear, etc.
3.2.3. Environmental factors. Consider and establish procedures to protect personnel from environmental factors that are relevant to worker safety, such as extreme heat or cold, presence of noxious plants, insects, or animals in collection areas, work environments in which personnel may encounter excessive noise, dust or other factors related to specific operations, etc.
3.2.4. Tools and equipment. Maintain all tools, equipment and vehicles used by personnel to ensure that these will be reasonably expected to be reliable and safe.

3.3 Hygiene
3.3.1. Prevention of contamination. As noted in the training section above, provide personnel who handle herbal plant materials with adequate training in proper personal hygiene, with specific attention to preventing microbial contamination of handled crops.
3.3.2. Toilet facilities. Provide toilets, hot running water and soap at post-harvest handling facilities. Provide portable toilets at field locations as appropriate. Ensure that all such facilities are adequately stocked, for example with toilet paper and single-use paper towels; that they comply in number, location, installation, and function, including effluence, drainage, and sewage functions, with all relevant local, state, and federal regulations; and that they are maintained in a clean and functioning condition to ensure that herbal materials are protected from contamination due to personnel hygiene.
3.3.3. Hand washing. Establish minimum hand washing requirements for washing with soap and hot water before beginning work, after using the bathroom, and after meal breaks. Place instructive signs in appropriate areas such as bathrooms, kitchens, and lunch areas, and in multiple languages as needed.
3.3.4. Personnel health. Do not allow personnel to work in any handling operation if they are sick or if they have open wounds, sores or skin infections.

4. Record-keeping and retention samples
An integral part of any good practice guideline is a focus on record-keeping. Accurate records must be prepared at every stage of cultivation, harvest, and post-harvest handling of herbal raw materials, as well as to adequately record relevant personnel issues. These records must also be maintained for a sufficient time to ensure that they are available should a need arise at a later time in any ingredient's distribution through subsequent channels of trade. In addition, in order to facilitate any eventual need to trace back a specific herbal raw material to its source, retention samples should be taken and maintained for each lot of herbal material produced. Guidance for taking and maintaining retention samples is also included in this part.

4.1 Record-keeping
Make written and dated records for all of the below listed factors that apply to each grown, collected or handled crop. Maintain all such records for a period of not less than five years after the last shipment of any lot of the herbal crop.
4.1. Wild-harvested crops. A collection record should be prepared for each wild-harvested crop, consisting of any of the following that are relevant to the specific collection.
4.1.2. Actual legal permits and licenses, as well as permissions obtained from property owners to harvest wild plants on public or private property.
4.1.2. Identification of collection sites, including a general description of the site; site location (if required by regulation or by buyers); site history; proximity to roadways; and other relevant information.
4.1.2.3. All steps taken to identify harvested wild plants. If a voucher specimen was prepared, include either the specimen itself or the specimen's unique tracking or identification number and information about where the specimen is stored.

4.1.2.4. Information to show that each wild-harvested crop was collected in a manner that ensures the survival of the species. Include, for example, general information about the species' biology, life cycle, and reproductive strategy and specific information about each of the factors identified in Section 2.5 of this document (e.g., the plant's abundance in the collection areas; the plant's life-stage at the time of harvest; the proportion of plants harvested from each population; specific harvest practices; steps taken to promote propagation and regeneration; etc.).
4.1.2.5. Additional information consisting of, at a minimum, the quantity of the harvest; the date of harvest; and the life-stage and other relevant conditions of the collected material. Lot umber or other identifying code should be assigned to each specific collected crop.
4.1.3. Post-harvest handling. Prepare additional records for each post-harvest handling operation performed, including any of the following that are applicable.
4.1.4. Identification of each facility in which any post-harvest operation was undertaken for each crop, including information about pest control plans and cleaning and maintenance procedures at each such facility.
4.1.4.1. Description of equipment used in all post-harvest handling operations. Such records should adequately describe the equipment used for each post-harvest operation, and should also provide information about equipment maintenance.
4.1.4.2. All washing and cleaning operations. Include information to identify the water source for such operations, general information on washing and cleaning procedures, and specific information about washing and cleaning of each crop.
4.1.4.3. Special preparation, if any, which may include peeling of root barks, removal of outer bark, cooking, fermenting; etc. Records should be sufficiently specific so that buyers of the crop are completely informed of all information needed to ensure that crop specifications have been met.
4.1.5. Drying operations, including documentation of drying conditions and times; beginning and ending weights of each crop; beginning and ending moisture content of each crop, if required by the crop's specifications; and any additional information relevant to the drying process.
4.1.6. Cutting and milling operations. These records should correlate the specific identity (e.g., lot number, source, harvest date, etc.) of the lot or lots of whole herbal materials that are cut or milled (i.e., the pre-cut/pre-milled lot(s)) with each specific lot of cut, hand milled or mechanically milled material (i.e., the post-cut/post-milled lot); and that document cutting and milling conditions; beginning and ending weights; presence, identity, and any additional information relevant to the cutting and milling process.
4.1.7. Packaging operations, with sufficient detail to allow trace-back of any packaged lot to the specific point of agricultural or collection origin.
4.1.8. Shipping records, with sufficient detail to trace distribution of each crop, if necessary, throughout the chain of custody, from the agricultural or collection source to the buyer(s) who receive(s) any portion of the crop.
4.1.9. Personnel. Make and maintain dated personnel records. These records should adequately describe all training received by each person involved in any phase of the production of herbal raw materials, and should also describe the steps that are taken to ensure worker safety and hygiene.

4.2 Retention samples
Take retention samples of each lot of herbal material produced, as applicable and in accordance with the following practices. Maintain retention samples for a sufficient period of time to meet any recall needs that may arise in relation to consumer products that will contain the herbal ingredient, and not less than three years after the last shipment of the herbal material lot.
4.2.1. Representative. Take retention samples that are representative of the entire lot by use of an appropriate sampling plan.

4.2.2. Labeling. Label retention samples to identify the contents by the plant name (both by its common English name and by scientific name); the part of the plant; the form of the material (e.g., "whole," "teabag cut," "powder," etc.); the name and contact information of the grower and/or the distributor; the country of harvest or collection; the harvest year; the item number (if any); and the lot number.

4.2.3. Storage. Store retention samples separately from product inventories.

4.2.4. Correlated samples at time of cutting or milling. Take a retention sample, in a form that is sufficiently whole to allow for visible identification, of each lot of the herbal material before cutting or milling, and also a retention sample in the cut or milled form, and store these related samples in a manner that maintains their correlation in the event that assurance of accurate identity needs to be reconfirmed at a later date.