

## Managing Supply Chain for Herbal Ingredients

Huaying Zhang and Ummeayman R.

Herbal medicines are known to human race since the man gained any knowledge about diseases and their treatment. Man discovered that nature has provided him medicinal plants which have therapeutic value that can cure him from many diseases. Therefore, men in every time period have put a great deal of efforts to identify such herbs which have medicinal value. In the modern ages scientists tried to identify the active principal in such medicinal plants which is actually responsible for any particular therapeutic activity. Further research was done to allow the production of such active principals in large quantities by various chemical processes for the benefit of much larger population. When such ingredients are added to the products, their positive qualities make the product stand out from the other products and at times also increase the appeal for the product.

Demand for herbal ingredient containing products is rising along with the increasing number of populations believes that their overall diet is unhealthy. Many people are still dissatisfied with their eating habits though they believe that their overall diet is healthy. In 2006 HealthFocus survey, you can see many countries from developed to developing country belong to this group of unsatisfied consumers. They look towards herbal ingredient containing products to further enhance their diet.

In a review of Mintel Global New Product Database on the consumption of non-alcoholic beverages containing traditional Chinese medicine, the statistics show that USA leads the category by having nearly 800 different variants introduced between 2002-2008 in their market, while UK reaches second location with 250 variants and Germany, Canada and China are nearly on the same level with around 200 variants in their market.

Since herbal ingredients are different from other food ingredients for its efficacy. Standard needs to be clearly set and processes need to be in place to ensure the final product would meet the requirements. One way of ensuring quality in herbal ingredient to identify certain components as markers, and check on whether the final products has required level so that they can be effective. To preserve these effective components of the herbs, the herb manufacture process have to be able to ensure that the active compound are present from the point-of-origin to the point-of-consumption.

Managing herbal ingredient supply chain is a complicated task that involves managing activities that span all movement, process and storage of herb and herbal ingredients. It encompasses the planning and management of all activities involved in planting and harvesting, raw herb processing and storage, herbal ingredient processing, transportation and storage of herbal ingredients. To manage all this steps efficiently one needs to have good collaboration with the suppliers and also with individual departments carrying out the various activities to make the herbal ingredient. 'The best companies are the best collaborators' as collaboration is required to be done within and among the companies.

### **Planting and Harvesting –Ensure Authenticity**

Herbal seedling identification and selection is the most important step, as it ensures that all the efforts put in are for the right out comes from the very beginning. Correct species and part are most easily done at the time of cultivation and at the time of harvesting of the plant material. Tests in this area of QC are based on appearance, morphology (form and structure of plants) and classical taxonomy (technique of classification). Herbs grown from seeds of the desired species with good genetics would provide the desired herbs of best quality. Misidentification, can lead to a number of wrong and dangerous materials on the market. Such mistake can often be prevented with simple steps when careful procedure is in place at the beginning of plantation. The seedling identification can be carried out by experts who have worked on the field. The British Herbal Pharmacopoeia (BHP) is used as a standard work for checking herb quality and specifications. The BHP gives definitions and standards of purity for all herbs as well as macroscopical and microscopical descriptions. It lays down the way in which the herb should be identified using laboratory techniques such as thin layer chromatology and also the storage and preparation requirements to ensure the continued presence of the efficacious ingredients throughout the shelf life of the product in which it is included.

### **Planting and Harvesting –Managing Contamination**

Once the seeds to be cultivated have been identified, it needs to be grown in a region where there is minimum contamination. There are various sources of contamination, to name a few are heavy metals, farm animals, pesticides and fertilizers used, other plants grown in the same location. Contamination is a major point of concern in many regions. Appropriate use of pesticides and fertilizers, and testing of soil and water for heavy metal contamination can minimize the losses caused due to contaminations. Many exports are rejected due to high levels of heavy metals in the product and these needs to be checked in the ingredient itself. This is where knowing the agricultural source of the material is vital. When a similar-looking plant is growing near or around the intended plant, this should prompt a company to seek out or create a way to test for that possible contaminant. If the whole field is not correctly identified as the one right species for humans, the wrong species could pass through many people, such as brokers, who do not know the origin of the material and create and complicated chain of contamination.

Depending on the companies policies and their commitments to the consumers v/s the cost for managing system, many companies go for 'Forward buying' where they work directly with grower. This involves providing technical services from seedling to growing technique to harvesting and processing method. Such direct management minimizes contamination although it is labor intense and time consuming associated with higher financial risks. Alternatively, some companies choose to buy from the open markets. This also has its own pros and cons. The company has to deal with the price fluctuations in the open market; it has to bear the cost for testing the herbal ingredient for its quality. In dealing with dry herbs the company should have the capability of fast and correct identification and testing methods for processed herbs. An inherent risk associated is the lack of knowledge about the unknown potential contaminants being present in the herb.

### **Planting and Harvesting –Ensure Efficacy**

Chinese have a saying that explains this topic, "Ginseng root grown in Sichuan is a laxative." This means that the tonic herb ginseng (*Panax ginseng*), which usually grows in the cold North, completely changes its properties when grown in the different soil and warmer climate of Sichuan province. Thus to ensure efficacy of the product, selection of farm land is a very important aspect. The earth quality and the climatic conditions determine the quality and quantity of the ingredient. We also know that in the presence of certain stressors such as low water levels and poor soil conditions, plants will increase the production of certain beneficial phytochemicals as a defensive reaction.

Under the correct climatic conditions, and with healthy soil, clean air, and the nurturing of a skilled grower who knows when and how to harvest the plants at their peak, we will have the best possible quality herbs. With herbal ingredients, there are different qualities available. An inferior quality could be obtained if proper care is not taken in selecting the seedling and providing appropriate water source, controlling pest and disease. The quality of the herbal ingredient is also affected by the way it has been dried and the conditions in which it has been kept before being incorporated into a product.

### **Raw herb processing –managing contamination**

The physical appearance of most of the herbal ingredients does not remain constant as well as uniform. It changes depending on the various environmental factors, such as when the herb has been collected, from where it has been collected, what was the age of the plant from which the herb has been collected etc. Such changes are very prominent. Since most of the active herbal ingredients are hygroscopic in nature and tend to pick moisture from atmosphere when exposed to high humidity. Such moisture pickup deteriorates the product and may lead to degradation of active compounds. Moisture uptake generally changes the colour of the finish product, giving an impression that the product is no longer suitable for consumption. Due to moisture pickup, there is a possibility of bacterial/fungal growth as many of the herbal ingredients support the bacterial growth in presence of moisture. To maintain the quality of the herbal product there needs to be rigorous humidity maintenance; use of effective preservatives should be done efficiently.

While collecting the raw product there could be several unwanted herbs and plants collected too, such contaminants can be dealt with at this stage too.

### **Herbal ingredient processing –ensure efficacy**

After harvesting, producers begin the various forms of extraction and preparation, which include drying, separating, isolating and extracting the potential ingredient.

Each company has its own methods and proprietary processes for preparing their herbal products. Most crucial is to use the appropriate technology, as technology makes a difference. For a successful operating system the company should also have efficient waste material management system and solvent recovery process.

### **Transportation and storage of herbal ingredients:**

Transportation and storage should be carried out by companies that can provide 'Quality' assurance during shipping and storage. Exposure to sun, heat, and humidity should be avoided and there needs to be a good pest control. The products should be maintained such that there is first in first out, i.e. the product that was collected and stored first should be dispatched first. A continuous monitoring system needs to be in place. Several quarantine issues, material safety data sheets and other important documentation need to be in place so that there are no hurdles in the receipt of international shipments of raw herbs and extracts.

### **21<sup>st</sup> century supply chain management:**

The expanding herbal product market could drive over-harvesting of plants and threaten biodiversity. Poorly managed collection and cultivation practices could lead to the extinction of endangered plant species and the destruction of natural resources. Efforts to preserve both plant populations and knowledge on how to use them for medicinal purposes is needed to sustain the growth of herbal market.

With rapid development and production changes there is also a high demand for reliable supplies. Companies of consumer goods products also rely on herbal suppliers to help them to continuously improve cycle time, cost, quality and delivery performance. To meet these requirements, companies need to have close association with suppliers who work as partners to ensure the best in class supply chain.

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