Collection and storage of medicinal plants in 
The Canon of Medicine

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**Abstract**
The *Canon of Medicine* was the reference of medical sciences for many years in western and eastern countries. The second book of this medical encyclopedia is on pharmacology which has a chapter on collection and storage of plant materials. In this work a comparison was done on the *Canon of Medicine* and modern rules in this area. It seems that Ibn Sina had developed ideas on the condition of plant collection and storage which guaranteed the quality of primary materials. Overall, his rules and modern ones are alike in the most parts.

**INTRODUCTION**
The *Canon of Medicine* is one of almost 450 treatises written by the Persian scientist and physician Ibn Sina (Avicenna). It remained a medical sciences authority up until the 18th century and early 19th century. The book was translated into Latin, Hebrew, French, English and Chinese. Ibn Sina divided his *Canon of Medicine* into five books. The first book concerns basic medical and physiological principles as well as anatomy, regimen and general therapeutic procedures. The second book is on the pharmacology of medical substances, arranged alphabetically, following an essay on their general properties. The third book concerns the diagnosis and treatment of diseases specific to one part of the body, while the fourth covers conditions not specific to one body part, such as poisonous bites and obesity. The final, fifth, book is a formulary of compound remedies. The 2nd book lists 800 tested drugs, including plant animal and mineral substances, with comments on their application and effectiveness. Ibn Sina begins the second book with a discussion on the nature and quality of drugs and the way that mixing them influences their effectiveness. The 6th chapter of Book 2 is “The collection and storage of drugs”.

This article presents text from the *Canon of Medicine* which discusses about collection and storage of medicinal plants and makes a comparison between these texts with current pharmacognosy literature.

**MATERIAL AND METHOD**
For investigation of Avicenna’s Canon, the electronic manuscript which is available in American University of Beirut library (Figure 1) and also the Persian translation of Canon were used. The section of *collection and storage of drugs* from each book was investigated, compared and also translated in to English. Furthermore, two textbooks of pharmacognosy, *Trease and Evans Pharmacognosy* and *Drugs of Natural Origin*, were considered as the main references of modern pharmacognosy. Finally, Avicenna’s theories were compared with the modern ones.

**RESULTS AND DISCUSSION**
According to the *Canon of Medicine* the parts of the herbs that can be used as medicine include leaves, roots, branches, seeds, fruits, flowers, and gums. Most of these parts are the same as those are used today (Table 1).
Ibn Sina considered some special conditions for plant collection. He said: “It is essential that the herbs to be procured should be fresh and seeds should have formed within them, their roots should not be deformed or old, the seeds should be mature and not shriveled. The best fruit are those which have attained full size and weight. Nuts which are shriveled or broken are of no advantage; better among them are those which have acquired their full weight”.\[4\]

Table 1 shows that the leaves should be collected before discoloration and in the time of complete growth which seems to be the flowering stage. About seeds, fruits, branches and flowers traditional and modern opinions confirm each other (Table 1). For gums they should be collected when coagulated but they are not so much hard that they begin to be frittered away.

Ibn Sina, of course, considered some criteria for perfect growth like for seeds that should be totally hard and without moisture; fruits should be plucked before they fell down; branches when they have reached perfection and have not started drying or withering. The interesting point is about roots. Ibn Sina knew that the time of compound accumulation in roots is in autumn and at the end of vegetation period or in his term “when the Plants are on the threshold of shedding their leaves”.\[4\]

He also believed that the plants which are procured when the weather is clear are better than those which are collected when the weather is humid or the rainy season is near. This idea is completely in conformity with what is mentioned in new texts where it said that leaves, flowers and fruits should not be collected when covered with rain.\[6\]

![Figure 1](image-url) The plant collection and storage part of the second book of the Canon of Medicine in Arabic on bladder. Adapted from the web site of the Saab Medical Library of the American University of Beirut.

<table>
<thead>
<tr>
<th>Part of the herb</th>
<th>Ibn Sina’s theory</th>
<th>Time of collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flowers</td>
<td>When they have reached full bloom but have not dried up or fallen down.</td>
<td>Just before they are fully expanded[6], When fully developed[7].</td>
</tr>
<tr>
<td>Fruits</td>
<td>When fully matured but before they fell down.</td>
<td>When fully ripped[7].</td>
</tr>
<tr>
<td>Leaves</td>
<td>When they have attained their full size. The withered, discolored, shattered and also fallen ones should not be taken.</td>
<td>As the flowers are beginning to open[6], at the flowering stage [7].</td>
</tr>
<tr>
<td>Roots</td>
<td>When the plants on the threshold of shedding their leaves.</td>
<td>As the aerial parts die down[6], at the end of vegetation period, i.e. usually in the autumn [7].</td>
</tr>
<tr>
<td>Seeds</td>
<td>When their mass condensed and their rawness and moisture have been disappeared.</td>
<td>When fully ripped[7].</td>
</tr>
</tbody>
</table>

Table 1. A comparison between time of collection of plant parts between Canon of Medicine and Modern literature.
He also mentioned that the plants growing on hills or mountains are stronger than those growing in plains. Drugs collected from forests and places which are exposed to the sun-ray are better than those from other (shady) places. In Ibn Sina’s opinion the herbs growing wild are stronger than those which are cultivated and those collected at appropriate times are better than those collected at inappropriate times. He mentioned that all those herbs which have a deep color, definite taste and distinct smell are stronger.

According to the *Canon of Medicine*, the effectiveness of dry plant materials would decrease after three years, it is similar to what new references offer about the shelf life of medicinal plants.\[8\]

Nowadays, plant collection and storage is an important part of herbal medicine industry.\[9\] It seems that Ibn Sina was completely acquainted with the fact that the existing material in plants are different in various seasons, times and places and also long time preservation of the herbs would result in reduction of active constituents. So he posed some rules about collection and storage of medicinal plants. By considering these rules, one can realize the Ibn Sina’s precision and meticulousness about preparation of appropriate primary materials which cause in quality improvement of final products and repeatability of drug effects.

**REFERENCES**