**Report on survey of low altitude medicinal plants of Phankhar, Goshing and Ngangla Geogs under Panbang Drungkhag**

*Kinga Jamphel, Head, PRU, MOH*

## 1. Introduction

The Pharmaceutical and Research Unit (PRU) manufactures ninety eight essential traditional medicine formulations and supplies to all the Traditional Medicine Units in the country. In addition, to sustain the production of traditional medicines, PRU also produces about fourteen commercial products. All these products including essential traditional medicines use medicinal plants as raw materials. Around 90% of the plant raw materials are sourced from the wild within the country and only some low altitude medicinal plants are imported from India.

Since the inclusion of *gSo-ba rig-pa* medical system in the primary health care system in 1967, the principal collection sites for medicinal plants have been Lingshi and Langthel for high and low altitude medicinal plants respectively.

The persistent collection of medicinal species from the same collection areas for over 35 years, triggered by expansion of traditional medical health care services in all the Dzongkhags, inevitably exerts pressure on medicinal plant resources at those two localities. The expansion of traditional medical services to all the geog level BHUs will have even greater pressure and impact on the medicinal plants in Lingzhi and Langthel areas.

Therefore, sustainability of raw materials including medicinal plants has been always a concern for PRU and to ease the pressure on the existing collection areas, it has become crucial to identify new collection sites. Dagala and Bumthang have been identified as an alternative collection sites for high altitude medicinal plants. However, no survey has been carried out to identify the alternative collection sites for the low altitude medicinal plants.

With this understanding, a field survey of low altitude medicinal plants was carried out in Goshing, Ngangla ang Phankhar geogs under Panbang Dungkhag from 2-22$^{nd}$ January 2009. The rotation of collection sites is expected to ease the pressure on the low altitude medicinal plant

populations in Langthel geog and also provide income opportunities to the communities of the surveyed areas. The findings of this survey would also contribute towards the conservation and sustainable utilization of medicinal plants resources in those areas.

## 2. Objectives

### 2.1 General objective

To document low altitude medicinal plants in Panbang Drungkhag under Zhemgang Dzongkhag with a view to understand the availability of medicinal plants and identify an alternative low altitude medicinal plants collection site.

### 2.2 Specific objectives

(i) To document and identify low altitude medicinal plants growing in Goshing, Ngangla and Phankhar Geogs.
(ii) To identify an alternative low altitude medicinal plants collection site for PRU so as to facilitate the rotation of low altitude medicinal plants collection program.
(iii) To facilitate the income generation to the poor rural communities of three Geogs through facilitation of cultivation and collection of medicinal plants.

## 3. Survey Team

The survey team consisted of 5 members.

a. Mr. Kinga Jamphel, DCP/Head, PRU
b. Drungtsho Karma Gayleg, Deputy Superintendent, NTMH
c. Mr. Jigme Thinley, Procurement Officer, PRU
d. Mrs. Tshering Zam, Research Assistant, PRU
e. Mrs. Norbu Dolma, Research Assistant, PRU

Three local informants were hired to help the survey team with the location of the trails and the places from every village of three Geogs.

## 4. Methodology

### 4.1 Study area

The Goshing, Ngangla and Phankhar Geogs were chosen as the study area mainly because:

(i) Informal report on the availability of many low altitude medicinal plants has been received through local informants. This is possible since surveyed areas share similar agro-climatic features to that of Namther geog, Trongsa Dzongkhag.

(ii) Communities under the above-mentioned three Geogs of Panbang Drungkhag are backward, poor and not much developmental activities had taken place. The medicinal plants program would help them generate additional income and partially overcome their poverty.

Under Panbang Dungkhag, following communities were covered:

a) Phangkhar Geog (Pantang, Shilingtoed, Kulumtay)
b) Goshing Geog (Lichibi, Buddhashi, Lamthang)

Under Goshing following villages are there:

a) Lichibi
b) Samcholing
c) Umbling
d) Goshing Trong

e) Lempong

f) Mathangor

g) Toenkhar


**Figure 1:** *Map showing Zhemgang Dzongkhag (Phankhar, Goshing and Ngangla) - Study area highlighted with line*

Under Buddhashi the major villages include:

a) Buddhishi
b) Bobtsar
c) Surphang
d) Selingbi
e) Solongmed

Under Ngangla Geog the following were covered:

a) Ribarty
b) Tungu Demba
c) Manas
d) Sonamthang
e) Kagtong

### 4.2 Study design and sampling method

The study was descriptive where low altitude medicinal plants growing in three Geogs were observed, identified and recorded. The survey was carried out from 2-22$^{nd}$ January 2009.

The purposive and convenience sampling method was used to identify and locate the medicinal plants. The sample size as per se was not an issue in this study, as the inventory included all the medicinal plants known and available within the study areas.

### 4.3 Data collection methods

The primary data was collected during the survey. All the medicinal plants seen within the proximity of about 100 meters around the trail points are recorded and identified on the spot. At the halt points, the survey areas ranged from 1 kilometer to more than 20 kilometers (that took us a day to travel to and fro from the halt points). The leaves, flowers, fruits, stem and roots of the medicinal plants were observed on the spot and were identified by the team. The organoleptic observations such as taste, odour and the colour were used to aid the identification of the medicinal plants.

Live specimens were collected on the way to reconfirm the plants on reaching the halt points. Those medicinal plants found and identified for the first time were pressed and made into the herbarium specimens. The photographs of the live medicinal plants were also taken during the survey. The altitude and the name of the places where the medicinal plants grew were recorded on the spot. The type of habitat for the particular species of the medicinal plants was also observed during the survey. In order to generate the secondary data on the availability of the medicinal plants in three geog, some local inhabitants who had knowledge about the medicinal herbs were also taken with the survey team. In addition, some PRU staffs whose villages fall

under the surveyed areas were involved in the discussions and information provided by them on the medicinal plants was included in the report.

### 4.4 Data collection tool

The altimeters, herbarium press, water absorber papers, scissors, plow hand (made of wood), digital camera, plastic bag, pen and paper has been used for collecting the data during this survey.

### 4.5 Data management and analysis

The research team has evaluated the data gathered during the survey. All the information has been entered into MS excel sheet and the analysis has been done using simple statistics. The information was maintained with the Research and Development Section of the PRU and the duplicates were shared with the ITMS.

## 5. Results and discussions

### 5.1 Low altitude medicinal plants growing in three Geogs: Phangkhar, Goshing and Ngangla

During the survey, a total of forty eight species of medicinal plants were found to grow in the three Geogs under Zhemgang Dzongkhag (Table 11). Out of these, thirty eight species of plants are used for the day-to-day formulation of the traditional medicines at PRU and other 10 species of plants are not used in the current formularies. However, they are mentioned in the *gso-ba rig-pa* texts and therefore could be used in future in the new formulations.

### 5.2 Distribution pattern of medicinal plants

Out of forty eight medicinal plant species found growing in the three Geogs, eight species were found rare, twenty one species were available and nineteen species were found growing abundantly (Chart 1). However, for the collection program, nineteen species of the medicinal plants that are found in abundance and are being currently in use by PRU are viable for the immediate collection. Only three species of medicinal plants that are found abundantly growing in the study area are currently not used in the formulation of traditional medicine at PRU.

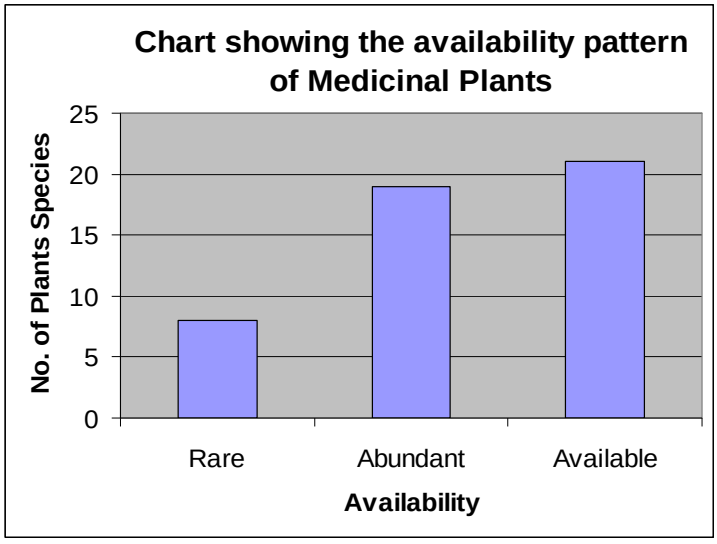
Out of ten places surveyed under three geogs, Buddhashi was found to host maximum number of medicinal plant species (42 species) followed by Lichibi (37 species), Pantang (32 species), Rebarty (26 species), Shilingtoed (24 species), Lamtang (18 species each), Kagtong and Sonamthang (17 species each), Manas (10 species) and Kulumtay (9 species).

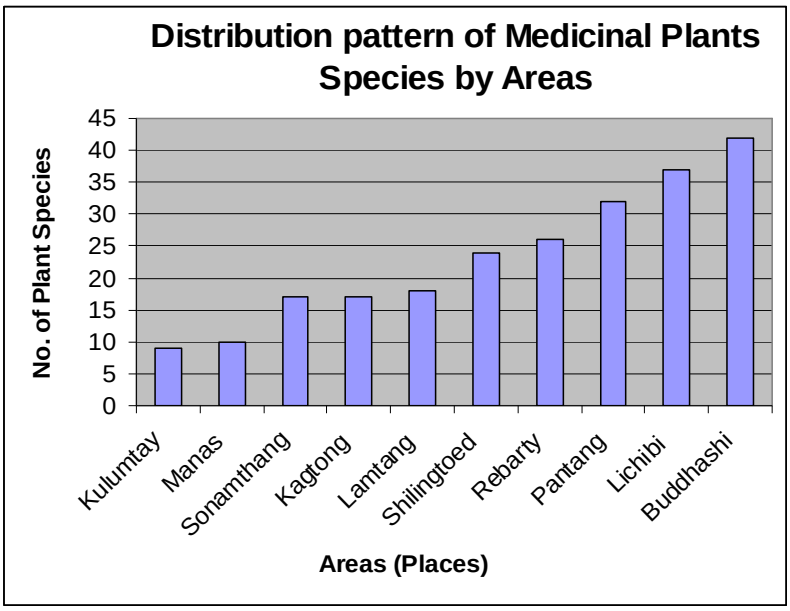
The habitation pattern of medicinal plants by altitudes found that maximum number of medicinal plant species grow in an altitude ranging from 250-1000 metres above sea level.

About ten species of medicinal plants such as *Skyu-ru*, *Sle-tres*, *Thal-ka-rdo-rje*, *Khrog-ba-sha-ka* (red), *Khrog-ba-sha-ka* (white), *Sga-skya*, *Dpow-ser-po*,*Spos-dkar Pu-shel-rtse*, *pi-pi-ling*, *pad-ma-ge-sar*, *mkhal-ma-zho-sha*, *du-ru-ka*,*da-trig*, *Shing-rtsa*, *A-ga-ru*, *zhu-mkhen*, *gla-gor-zho-sha*, *Ga-bur-nag-po*, *A-ru* and *Sning-zho-sha* were found in almost all the places surveyed. Among these medicinal plants *Skyu-ru*, *Sle-tres*, *Sning-zho-sha*, *gla-gor-zho-sha*, *Ga-bur-nag-po*, *mkhal-ma-zho-sha*, *Pu-shel-rtse*, *Da-trig*, *pad-ma-ge-sar* and *zhu-mkhen* are currently collected from Trongsa. Other species like A-*ru*, *Pi-pi-ling*, *A-ga-ru*, *Du-ru-ka*, *Shing-rtsa* and *Thal-ka-rdo*-rji are collected from other Dzongkhag currently and these species in future can be acquired from the three geogs. Although, *Sga-skya*, *Dpow-ser-po and Spos-dkar* were found in almost all the three geogs, this species were found rare.

Besides the medicinal species found there that are used by PRU, some other herbs such as *Zemaro*, *Dabma* (used for toothache), *Pharchagpa* (Used for Cut, fracture etc), *Lomathur* (neurological problem) called in their local name are also noted since these herbs are used as medicinal plants by the local community.

*Khrog-ba-sha-ka* (red) are found in almost all the three Geogs and this species are available only in this region and are not found in any current collection sites of low altitude medicinal plants.






**Low altitude medicinal plants growing in three Geogs (Phangkhar, Goshing and Ngangla)**

| Sl. No. | gSo-rig Name | Botanical Name | Availability | Remarks |
|---|---|---|---|---|
| 1 | Tsam-pa-ka-me-tog | *Oroxylum indicum* | Abundant | |
| 2 | Thal-ka-rdo-rje | *Cassia tora* | Abundant | |
| 3 | Khrog-ba-sha-ka (red) | *Adhatoda sp.* | Abundant | |
| 4 | Khrog-ba-sha-ka (white) | *Adhatoda vasica* | Abundant | |
| 5 | Pi-pi-ling(fruits) | *Piper mullesua* | Abundant | There are three different species |
| 6 | Pad-ma-ge-sar | *Bombax ceiba* | Abundant | |

| | | | | |
|---|---|---|---|---|
| 7 | Mkhal-ma-zho-sha | *Erythrina arborenscens* | Abundant | |
| 8 | Nyi-shing | *Asparagus racemosus* | Available | |
| 9 | Du-ru-ka | *Knema tenuinervia* | Abundant | Small trees were found |
| 10 | Sle-tres | *Tinosphora cordifolia* | Available | |
| 11 | Dan-rog | *Ricinus cummunis* | Abundant | |
| 12 | A-bras | *Not identified* | Available | |
| 13 | Gser-gi-phud-bu | *Not identified* | Available | |
| 14 | A-ga-ru | *Aquillaria agallocha* | Abundant | Big trees are found in private fields |
| 15 | Shing-tsa | *Cinnamomum cassia* | Abundant | It has good aroma and taste. |
| 16 | Shing-tsa | *Cinnamomum tamala* | Available | |
| 17 | Da-trig | *Rhus semilata* | Abundant | |
| 18 | Skyu-ru | *Phyllanthaus emblica* | Abundant | |
| 19 | Zhu-mkhen | *Symplococus* | Rare | |

| | | | | |
|---|---|---|---|---|
| | | *lurida* | | |
| 20 | Sga-skya | *Hedychium thyrsiforme* | Rare | |
| 21 | A-ru | Terminalia chebula | Rare | |
| 22 | Seng-ldeng | *Morus macroara* | Abundant | |
| 23 | spos-dkar | *Shorea robusta* | Rare | |
| 24 | Byai-tser | *Not identified (cactus?)* | Rare | |
| 25 | Gla-gor-zho-sha | *Mimosa himalayana* | Abundant | |
| 26 | Sning-zho-sha | *Choeraspondias axillaris* | Available | |
| 27 | Re-ral | *Dryopteris fragrans* | Available | |
| 28 | Stabs-seng | *Fraxinus sp.* | Available | |
| 29 | Pu-shel-rtse | *Pholidota recurva* | Available | |
| 30 | Chu-sren-sder-mo | *Salaginella pulvinata* | Rare | |
| 31 | So-ma-ra-za | *Abelmos moschatus* | Available | |
| 32 | Dug-mo-nyung | *Beaumomia grandiflora* | Abundant | |
| 33 | A-gar-go-snod | *Cinnamomum grandiferumn* | Available | |

| | | | | |
|---|---|---|---|---|
| 34 | Po-so-sha | *Sapindus mukorossi* | Available | |
| 35 | Til-dkar | *Sesamum indicum (white)* | Abundant | |
| 36 | Til-nag | *Sesamum indicum (black)* | Available | |
| 37 | Ba-ru | *Terminalia bellirica* | Available | |
| 38 | Ka-bed | *Luffa aegytiaca* | Abundant | |
| 39 | Dpow-ser-po | *Not identified* | Rare | |
| 40 | Btsod | *Rubia cordifolia* | Available | |
| 41 | Yung-ba | *Curcuma longa* | Available | |
| 42 | Ga-bur-nag-po | | Available | |
| 43 | Sa-day | *Not identified* | Available | |
| 44 | Ba-le-ka | *Aristolochia griffithii* | Abundant | |
| 45 | Chen-pa-sho-sha | *Not identified* | Available | |
| 46 | Mon-cha-ra | *Quercus sp.* | Available | |
| 47 | Ma-ru-tse | *Butea buteiformis* | Rare | |
| 48 | Gyer-ma | Xanthoxylum | Available | |

| | | | | |
|---|---|---|---|---|
| | | bungeanum | | |

## 7. Feasibility of an alternative collection site

### 7.1 Critical feasible factors

For the establishment of an alternative collection site, following factors are considered:

a) There should be at least ten medicinal plants species growing abundantly in that area.
b) The farmer of those areas should get good income generation from the collection of medicinal herbs.
c) The area should be nearest to the manufacturing section (PRU) to reduce the cost of transportation and thereby the production.
d) There should be a centre location point where all the plant materials could be transported from the collection sites, preferably within a day.

Upon final analysis, it was found that the current survey area meets the above set criteria and with the possibility of motorable road connection of all the three Geogs in future, it can be a good alternative collection site for the low altitude medicinal plants. There are more than nineteen of medicinal plants growing abundantly in the surveyed area and also a number of other medicinal plants that are available which could be collected in future.

The geographical features of the area are also favorable and can be accessible by the farmers in Phangkar, Goshing and Nganglag Geogs. Panbang Dungkhag can be reached from PRU within two days travel. Considering the availability of medicinal plants and the distance from the road head, Buddhishi and Sonamthang could be the potential collection centres in Panbang Dungkhag. Although not more than three medicinal plants species are found growing abundantly in Sonamthang, probably due to the very low altitude of the area, the area is wide and nearer to the road from Gelephu to panbang via Assam. It can be the collection site for places like Morangdund and Tunggudemba. All the three collection sites (Manas, Morangdund and Tunggudemba) are within close proximities taking a minimum of three hours to a maximum of five hours walk. There is a potential of high abundance of medicinal plants in the Manas area but due to Manas being the wildlife sanctuary, there could be collection restrictions.

When some of the farmers were asked if they would be interested in the medicinal plants collection program, most of them responded positively and said that it would be a profitable business for them since they don't have any other income generation sources available other than the orange business during winter season.

### 7.2 Establishment of drying centres

Although the numbers of medicinal plants that are available for collection are plenty but due to road connectivity and far away from PRU, it does not justify for immediate establishment of a drying unit. However, in future such facilities could be explored once the people are more aware of the collection program and the transportation facilities are improved. In the mean time, the medicinal plants collected could be directly transported to the PRU since the two places are only two days travel from Thimphu.

## 8. Limitation of the survey

Due to limited time and budgetary constraints, the survey was limited to only a few places of the Drungkhag. Given this limitation, this survey may not give the exact picture in terms of the number of species and the abundance of the medicinal plants in the surveyed areas. Dogar Geog could not be surveyed due to budgetary and short time frame. In addition, there could be certain variations in the no. of species of medicinal plants in some surveyed areas as detail information could not be sourced as much as Buddhashi and Lichibi due to lack of additional informants.

## 9. Conclusion and recommendations

### 9.1 Conclusion

From this study, it was concluded that forty eight plant species of low altitude medicinal plants grow in three Geogs. Going by the availability pattern, nineteen species of medicinal plants are found in abundance and almost all of them could be immediately collected by the PRU. Besides, other available species could be also collected as and when needed. Some of the medicinal plants that PRU imports from India could also be collected from these areas. The example is Shing-tsha.

Distribution pattern by area showed that Buddhashi has the highest number of medicinal plants species. The highest concentration of medicinal plants (42 species) is found in Buddhashi and this is a clear indication that it meets the set criteria. Buddhashi is also a centre point from where all the other Geogs (including Dogar) can be reached easily. From Buddhashi, Phangkhar is few hrs walk. Similarly, Lichibi and Kagtong is only one and half day walk respectively. Dogar and Panbang is the farthest which can take two days from Buddhashi. It has also been informed that Buddhashi will be connected by road in the Tenth Five Year Plan and that will make the journey much shorter. More over almost ten species which are found abundant under Buddhashi are immediately collectable. In order to ease the pressure on the existing collection site at Langthel, some medicinal plants, especially those that are found abundantly could be collected from three Geogs. The improvement in the road connectivity and the practical experience gained as collection program is implemented will determine whether a proper collection site could be established in three Geogs. The benefit to the farmers is imminent considering the low socio-economic development since they don't have any other income generation sources available other than the orange business during winter season and there is lack of other income generating activities in the area.

### 9.2 Recommendations

Based on the study findings, following recommendations were derived:

1. While Panbang Drungkhag has a lot of medicinal plants resources, consideration should be given on the accessibility of road and the cost escalation. As the road connectivity reaches the Drungkhag, it will be more feasible as an alternative collection site.
2. A team should visit few selected places, preferably, Buddhashi and Sonamthang to provide short training on identification and sustainable collection practices. This training will increase awareness and enable discussion on the initiation of the collection program for some low altitude medicinal plants in the area on a trial basis.
3. In order to promote awareness on the importance of medicinal plants as well as to improve availability of raw materials, discussions should be held with the farmers on the establishment of community medicinal herb gardens (wild) at Buddhashi, Toenkhar (Lichibi) and Kagtong.
4. Some of the low altitude medicinal plants are cultivable and this cultivation programs should be encouraged in this three Geogs with MAP section and RNR centres at Goshing and Pantang.

**Photos of some of the medicinal plants found in the surveyed areas**

Khrog-ba-sha-ka red (*Adhatoda sp*.) is found only in these regions.

Thal-ka-dorji (*Cassia tora*)

Dan-rog (*Ricinus cummunis*)

Shingtsha(*Cinnamomumcassia*)

Sle-tres (*Tinosphora cordifolia*)

A-ga-ru (*Aquillaria malaccensis*)

Nye-shing *(Asparagus racemosus)*

Da-trig (*Rhus semilata*)

Du-ru-ka *(Knema tenuinervia)*

Pema-ge-ser *(Bombax ceiba)*

*Shing-tsha* (Cinnamom tamala)

Spos-dkar (*Shorea robusta*)

Ba-ru *(Terminalia bellirica)*

Pi-pi-ling *(Piper mullesua)*

***Acknowledgement***

The survey team would like to thank the *Gups* of Phangkar, Nangla and Goshing *Geogs* for arranging the horses and all the *Tshogpas* of these *Geog* for being good local informants and assisting the team during the survey.

We are thankful to the inhabitants of the Rebarty, Sonamthang, Kagtong, Lichibi and Buddhashi villages for their warm hospitality.

In addition, the team would like to acknowledge the valuable suggestions and inputs received from Mr. Phurpa Wangchuk and Samten of R & D Section, PRU.