Report on the bamboos of Pipar

C. Stapleton and S. Tamrakar
1. **Introduction**

Report from C. Stapleton and S. Tamrakar of the Forest Survey and Research Office, Department of Forests, FWC Nepal following a visit to Pipar area and Luclo Agricultural Centre to assist in the WRA-funded investigations of N. Ficocci of the Institute of Terrestrial Ecology, Natural Environment Research Council.

Four days were spent in the proposed reserve area, allowing a generalised picture of distribution and management to be obtained from a large area with great altitudinal variation. Identification of species will follow a detailed examination of collected material.

2. **Species Distribution**

The high rainfall of this area and the relatively intact natural vegetation allow a wide variety of natural bamboos to be found, more than in any other area of Nepal so far studied. There are five species of *Arundinaria* (sensu lato) which form a major understorey component of the vegetation, and probably two or three more which are occasional. The five major species follow a largely altitudinal sequence in the area, table 1.

<table>
<thead>
<tr>
<th>Local name</th>
<th>Approximate altitudinal range, ft/m</th>
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</thead>
<tbody>
<tr>
<td>jarabutto</td>
<td>12,500 - 9,500 / 3,800 - 1,900</td>
</tr>
<tr>
<td>chigar</td>
<td>10,000 - 8,500 / 3,050 - 2,600</td>
</tr>
<tr>
<td>malingo nigalo</td>
<td>9,000 - 7,500 / 2,700 - 2,300</td>
</tr>
<tr>
<td>ghora nigalo</td>
<td>8,000 - 6,000 / 2,400 - 1,800</td>
</tr>
<tr>
<td>cite nigalo</td>
<td>7,500 - 4,500 / 2,100 - 1,400</td>
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</table>

Table 1. Zonation of major bamboo species.

Ghora is the least abundant of these five species, occurring in the ranges of both cite and malingo nigalos. Chigar extends down into the belt of malingo in the driest sites, e.g., spars at 8,500 ft. How far the malingo extends up into the less accessible moist gully sites needs to be studied further. Jarabutto is found as isolated thickets on open grassland and as dense young regeneration under rhododendron and berberis forest and scrub.

In addition to these, ghopi bams is reported to occur occasionally around 5,500 ft (nth of sicas khabang) and dyo nigalo is reported to occur around 10 - 11,000 ft on steep slopes outside the reserve and may possibly occur within it. Tito nigalo most probably represents two species in the reserve, as it does in nearby areas, with one dominant species. These occurrences also require further investigation. Thus there may be a total of eight species in the reserve, although only five are major components of the vegetation. *Arundinaria maling* Gamble, usually
known as malingo rather than malingsa nigalo, has not been seen in the area.

3. Recognition

For quick recognition culm and leaf sheath features are most useful. Culm sheaths may have disintegrated by spring, however, making recognition difficult until sheaths develop on new shoots in late summer. Leaf sheath auricles and setae may be deciduous. This is especially so in gbero at the upper end of its range. Typical bamboo culm sheaths and leaf sheath appendages are described in figure 1. A brief table of these and other useful features for the species is given below, table 2. The characteristics of dya nigalo are not known. Seven species can be separated using the key provided.

4. Flowering

During discussions with guards, bamboo cutters and farmers, conflicting reports on past flowerings were received, which is not surprising considering the variety of species present. Young plants of tite nigalo and jarabutto were found, indicating flowerings about 3 - 8 years ago. No evidence was found of recent flowerings in malingsa nigalo or the other species. Flowerings were reported to be gregarious, i.e. all clumps of the relevant species flowered, but with this taking place over several years and with different sites flowering in successive years. Isolated clumps of jarabutto can be seen which either have not flowered at all, or did not die after flowering, while those plants which are much closer together under the tree canopy have all flowered and died, producing a thick growth of regeneration.

5. Management

Grazing pressure exerts the greatest influence on the bamboos. Past sporadic burning would have had little direct effect as rhizomes can grow new shoots after a fire. All species seem to be capable of growing well without tree cover in their natural sites. Because of their palatability the clumps are heavily grazed in clearings resulting in their reduction or elimination after several years. Natural flowering and regeneration patterns are seen to be completely different when the continuous forest understory is modified into a pattern of separated and exposed clumps in open grazing land.

Harvesting patterns seem reasonable in the malingsa nigalo in the one site studied intensively. The age class distribution showed that nearly all shoots had been removed for human consumption in 1982 while none had been removed in 1981. Because of the large demand for high quality second-year poles for basketwork and matting it is reported that exploitation of new shoots has stopped, under the directives of the local authority, and extraction of poles is controlled by the levying of a duty on each bundle carried. Such control measures seem feasible, because of the limited access available to the area, which channels all entrants through Karuma village and bridge, and the vested interests of the local inhabitants.
<table>
<thead>
<tr>
<th></th>
<th>Tito 1</th>
<th>Tito 2</th>
<th>Ghoro</th>
<th>Malingo</th>
<th>Chigar</th>
<th>Jarabutto</th>
<th>Ghopi bans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Culm sheath</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Blade (from mid-culm sheath)</td>
<td>always reflexed</td>
<td>always reflexed</td>
<td>always reflected</td>
<td>smooth</td>
<td>usually smooth</td>
<td>smooth</td>
</tr>
<tr>
<td>1.2</td>
<td>Interior texture</td>
<td>rough at top</td>
<td>rough at top</td>
<td>rough at top</td>
<td>smooth</td>
<td>smooth</td>
<td>smooth</td>
</tr>
<tr>
<td>1.3</td>
<td>Exterior texture</td>
<td>rough at top</td>
<td>smooth</td>
<td>rough cap, top edges</td>
<td>smooth</td>
<td>rough with short hairs</td>
<td>smooth</td>
</tr>
<tr>
<td>2.</td>
<td>Leaf sheath</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Ligule</td>
<td>long, glabrous</td>
<td>extremely long, glabrous</td>
<td>long, pubescent</td>
<td>long, pubescent</td>
<td>extremely long, pubescent</td>
<td>long or very long, pubescent</td>
</tr>
<tr>
<td>2.2</td>
<td>Auricles</td>
<td>absent, no setae</td>
<td>persistent, long setae</td>
<td>deciduous, absent, no setae</td>
<td>absent, no setae</td>
<td>absent, no setae</td>
<td>absent, no setae</td>
</tr>
<tr>
<td>3.</td>
<td>Leaves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Venation</td>
<td>non-tessellate</td>
<td>non-tessellate</td>
<td>non-tessellate</td>
<td>non-tessellate</td>
<td>tessellate</td>
<td>tessellate</td>
</tr>
<tr>
<td>4.</td>
<td>Culm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Internode length</td>
<td>less than 30 cm</td>
<td>less than 30 cm</td>
<td>less than 30 cm</td>
<td>less than 45 cm</td>
<td>less than 25 cm</td>
<td>less than 25 cm</td>
</tr>
<tr>
<td>5.</td>
<td>Other distinctive features</td>
<td>buds swollen like knees</td>
<td>curving culms</td>
<td>curving culms</td>
<td>curving culms</td>
<td>curving culms</td>
<td>curving culms</td>
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</table>
Simple key to distinguish *Arundinaria* species of Pipar

1. Leaf tessellate
   2. Leaf not tessellate

2. Culm sheath exterior very rough with short hairs
   3. Culm sheath surfaces both smooth

3. Culm sheath with very long feathered margins
   at top

4. Culm sheath with glabrous or short-ciliate margins
   5. Culm sheath interior rough
   6. Culm sheath interior smooth

5. Leaf sheath ligule long
   6. Leaf sheath ligule extremely long

7. Culm sheath exterior rough especially edges at top
   8. Culm sheath exterior very smooth
Figure 1  Leaf and culm sheath morphology

(i) Ligule length
   - extremely long
   - very long
   - long

(ii) Auricle
   - with setae

(iii) Leaf venation
   tessellate
   non tessellate
   visible
   transverse
   veinlets
   obscure
   transverse
   veinlets

(iv) Culm sheath blade
   - erect
   - reflexed

(v) Margins
   glabrous
   short ciliate
   long feathered
Conversion of poles into weavable strips takes place on-site. Removal of poles intact would involve extreme difficulties because of the difficult terrain. Removal of high quality second year shoots (over 50% of total second year numbers), in the winter of the second year is a sound management practice which maintains clump vigour and provides a sustained yield. Removal of new shoots, however, can result in death of the clump if repeated over several successive years. Removal of a small proportion each year in combination with pole production is feasible and is practiced in Japan and China. This, however, requires stricter controls than may be possible under communal ownership. Cutting of shoots for immediate consumption by herders is also very difficult to control. Chigar is occasionally cut for weaving on a very small scale, either by mistake or for very basic standard weaving requirements of passing herders. Apart from the manufacture of brushes from the branches this species has very little utility indeed and is rarely cut for poles or fodder.

6. **Utility as Cover for Pheasants**

The clump size, development and distribution of the different species affect the relative value of the ground cover provided. The lower altitude species are taller and grow in well spaced clumps of densely packed poles which pheasants cannot enter, leaving large areas of open ground under dense shade between impenetrable thickets. The chigar, by comparison, grows in more open, smaller clumps. Pheasants can get through the well-spaced poles, which arch and spread more widely giving a better degree of protection between the clumps as well. The jambutto forms very dense small upright clumps which are close together when mature. The low stature and closeness of clumps give dense cover right to the ground. The foliage of this species being lower down is more available as food. The bamboo provide protection through the winter, as they do not die back with the herbaceous ground cover. Thickets of bamboo also provide food and cover for many other birds and animals notably the Himalayan black bear which eats the young shoots.

7. **Propagation Potential**

Fite nigalo is commonly propagated and planted from 3,000 to 6,000 ft. Ghore is also planted in small numbers. The malungo nigalo offers good prospects for propagation. Unlike the malungs bamboo of eastern Nepal, the rhizomes are short and compact, allowing easy extraction and planting. As it fits into this short-rhizomed category of bamboos, propagation from culm and branch cuttings is also feasible. It evidently requires a cool moist site for establishment and successful development of high quality poles. As its natural range extends down to about 7,500 ft only it is probably unlikely to grow well below 6,000 ft, but it is likely to be very useful in moist gullies from 6,500 to 7,500 ft.

8. **Summary**

There is an unusually large variety of bamboos of the genus *Gigantochloa* in the reserve area, which is in a region of very high rainfall. Five species constitute major components of the understorey vegetation, producing on almost contiguous bamboo ground cover from 4,500 to 12,500 ft. The different species can
be recognised by vegetative features. The lowermost and uppermost species have flowered and regenerated in recent years. One species only, malung nigoal, is harvested for weaving material for a major and expanding cottage industry, as well as for edible shoots on a small scale. The present harvesting practices are satisfactory in the small area studied and allow for a sustained yield. Livestock grazing pressures in the upper areas, however, are reducing the numbers of clumps and seriously affecting flowering and regeneration in the highest altitude species, as well as causing localised destruction of bamboo along movement routes taken in autumn and spring lower down the mountain. The upper two species chigar and jarabutto provide better cover for pheasants than the lower nigoals. The potential for propagating malung nigoal outside the reserve is good, provided that suitable sites can be found. Dry and low-altitude sites will not be suitable, gully sites between 6,000 and 7,500 feet being most likely to produce good quality poles. If the proposed reserve area can be maintained in an ecologically sound state it will have great intrinsic value through the conservation of an exceptionally well-developed and varied bambusoid flora.