# Miscellaneous Notes

# Phytosociology of temperate forest at Tinjure-Milke-Jaljale (TMJ) area, Nepal

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**Key words:** *Castanopsis*, *Quercus*, Density, Girth, IVI, *Rhododendron*

**DOI:** http://dx.doi.org/10.3126/on.v16i1.22133

**Manuscript details**: Received: 12.07.2018 / Accepted: 22.10.2018

**Citation**: Niroula, B. and S.K. Rai 2018 Phytosociology of temperate forest at Tinjure-Milke-Jaljale (TMJ) area, Nepal, *Our Nature* 16(1): 80-81. DOI: http://dx.doi.org/ 10.3126/on.v16i1.22133



Tinjure-Milke-Jaljale (TMJ) Conservation Area (Lat. 27°6′57″-27°30′28″ N, Long. 87°19′46″ - 87°38′14″ E; alt. 1700-5000 m; area 585.26 km$^2$) lies between Arun and Tamor rivers in eastern Nepal. This area is popular for *Rhododendron*, the national flower of Nepal, and has been recognized by "The capital of *Rhododendron*". Major vegetation types of the area consist of sub-tropical, temperate, sub-alpine and alpine elements. Mean annual rainfall is 1650 mm, mean temperature 2-22°C and characterized by extensive *Rhododendron* forest, high biodiversity, subsistence livelihood and poverty leading to high dependency on natural resources, deforestation and environmental degradation (IUCN, 2010).

In view of long-term conservation strategy, present report aims to communicate status of selected forests along the Basantapur (2200-2350 m), Deurali (2400-2650 m), Tinjure (2700-2850 m) of Terhathum district and Milke (2850-3050m) of Sankhuwasabha district. Phytosociology of the trees was recorded by quadrate method.

Present study identified a total 14 tree species in TMJ area (Table 1). Pure *Rhododendron* forest was found in Tinjure and Milke. Density, stump density and total basal cover area of *Rhododendron* were more in Tinjure forest than in Milke but dead standing, dead fallen and girth –CBH were more in

**Table 1.** List of tree species in the sampling areas at Basantapur, Deurali, Tinjure and Milke.

| SN | Tree species | Local name | Family |
|---|---|---|---|
| 1. | *Alnus nepalensis* D. Don | Utis | Betulace |
| 2. | *Berberis aristata* DC. | Chutro | Berberidaceae |
| 3. | *Castanopsis tribuloides* (Sm.) A. DC. | Katus | Fagaceae |
| 4. | *Lyonia ovalifolia* (Wall.) Drude | Angeri | Ericaceae |
| 5. | *Mahonia nepaulensis* DC. | Keshar | Berberidaceae |
| 6. | *Persea odoratissima* (Nees) Kostem | Kaulo | Lauraceae |
| 7. | *Pieris formosa* (Wall.) D. Don | - | Ericaceae |
| 8. | *Prunus cerasoides* D. Don | Paiyu | Rosaceae |
| 9. | *Quercus semecarpifolia* Sm. | Kharsu | Fagaceae |
| 10. | *Rhododendron arboreum* Sm. | Laligurans | Ericaceae |
| 11. | *R. thomsonii* Hook. f. | Gurans | Ericaceae |
| 12. | *Rhus javanica* L. | Bhalayo | Anacardiaceae |
| 13. | *Symplocos ramosissima* Wall. ex G. Don | Kharane | Symplocaceae |
| 14. | *S. theifolia* D. Don | - | Symplocaceae |

Milke forest than in Tinjure (Table 2). More girth of *Rhododendron* in Milke was due to mature forest. A few dead standing and absence of dead fallen trees in the Tinjure area indicated more human encroachment. Density, total basal area and IVI of *Rhododendron companulatum* along the elevation gradient (3600-4100 m) of Manaslu conservation area were 140-940 tree/ha; 1.0-10.81 $m^2$/ha and 138-180, respectively (Rana *et al*., 2016).

In Deurali forest, *Quercus semecarpifolia* was dominant and *Rhododendron arboreum* was co-dominant trees whereas in Basantapur, *Castanopsis tribuloides* was dominant and *Symplocos ramosisisima* was co-dominant trees (Table 3).

**Table 2.** Status of pure *Rhododendron* forest at Tinjure and Milke. (n=10, mean ± SE).

| Parameter | Tinjure area | Milke area |
|---|---|---|
| Density (tree/ha) | 2870 ± 16.9 | 1630±12.7 |
| Stump density (stump/ha) | 340±5.8 | 330±5.7 |
| Dead standing( tree/ha) | 40±2.0 | 210±4.5 |
| Dead fallen (tree/ha) | 0 | 110±3.3 |
| Girth –CBH (cm) | 59.2±2.4 | 69.6±2.6 |
| Total basal cover area ($m^2$/ha) | 80 ±2.8 | 62.9±2.5 |

**Table 3.** Girth (CBH), frequency, density, total basal cover area (TBA) and importance value index (IVI) of tree species at Deurali and Basantapur forests. (n= 10, mean ± SE)

| SN | Tree species | CBH (cm) | Freq. (%) | Density (tree/ha) | TBA ($m^2$/ha) | IVI |
|---|---|---|---|---|---|---|
| | ***Deurali area*** | | | | | |
| 1 | *Quercus semecarpfolia* | 184.2±4.2 | 100 | 580±7.6 | 156.4±3.9 | 173.1±4.1 |
| 2 | *Rhododendron arboreum* | 93.9±3.1 | 80 | 480±6.9 | 36.3±1.8 | 94.5±3.1 |
| 3 | *Mahonia nepaulensis* | 75.3±2.7 | 20 | 50±2.2 | 2.0±0.2 | 14.0±1.1 |
| 4 | *Symplocos ramosisisima* | 108.1±3.2 | 20 | 20±1.4 | 1.8±0.4 | 11.2±1.1 |
| 5 | *Lyonia ovalifolia* | 53.3±2.3 | 10 | 30±1.7 | 0.7±0.02 | 7.2±0.8 |
| | ***Basantapur area*** | | | | | |
| 1 | *Castanopsis tribuloides* | 57.5±2.7 | 100 | 990±9.9 | 25.9±1.6 | 126.1±3.5 |
| 2 | *Symplocos ramosisisima* | 53.6±2.3 | 90 | 410±6.4 | 9.34±3.1 | 61.0±1.5 |
| 3 | *Pieris formosa* | 34.7±1.8 | 50 | 480±6.9 | 4.57±2.1 | 43.9±2.1 |
| 4 | *Rhododendron arboreum* | 38.8±1.9 | 40 | 130±3.6 | 1.52±0.3 | 19.2±1.3 |
| 5 | *Symplocos theifolia* | 51.5±2.2 | 30 | 40±2.0 | 0.84±0.02 | 10.9±1.0 |
| 6 | *Prunus cerasoides* | 118.5±3.4 | 10 | 20±2.0 | 2.44±0.4 | 8.6±0.9 |
| 7 | Unknown (Lauraceae) | 51.5±2.2 | 20 | 40±2.0 | 0.34± 0.02 | 7.4±0.8 |
| 8 | *Berberis aristata* | 16.2±1.2 | 20 | 30±1.7 | 0.06 | 6.3±0.7 |
| 9 | *Lyonia ovalifolia* | 23.6±1.5 | 20 | 20±2.0 | 0.08 | 5.9±0.7 |
| 10 | *Alnus nepalensis* | 48.3±2.1 | 10 | 20±2.0 | 0.36 | 4.1±0.6 |
| 11 | *Mahonia nepaulensis* | 36.2±1.8 | 10 | 10±1.0 | 0.14 | 3.5±0.5 |
| 12 | *Persea odoratissima* | 42.1±2.0 | 10 | 10±1.0 | 0.10 | 3.1±0.05 |

This is a preliminary work and is recommended for detail socio-economic, taxonomic and ecological studies of TMJ area for long term management and conservation. Authors are grateful to Department of Botany, Post Graduate Campus, T.U., Biratnagar for managing field study.

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