Ethnobotanical Study of Fodder Plant Species used by the Batak Parmalim Communities in Toba Samosir, Indonesia

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Abstract. Batak Parmalim used various plant species to fulfill their daily activities. Several plants are also used traditionally as live feeds or fodders. Livestock raised by the Batak Parmalim community includes buffalo, cattle, goats, sheep, chickens, and ducks. The purpose of this study was to obtain information of utilized plant species, its locations, and methodology in practicing plant species as fodders. Research methodology used in this study was an in-depth interview by determining key informants. In addition, interviews and questionnaires were distributed to the people who owned livestock farms/ ranches. Through interviews and observations in the field, 34 plant species were documented as fodders. The plant may be prepared in fresh or dried fodders. Fodders were obtained from fields, farms, grazing fields, roadside (cliffs) and cultivated plants. Most farmers used members of Poaceae consisted of 12 species in this study.

1. Introduction

Parmalim or Ugamo Malim is a traditional belief adopted by the Batakneese, one of indigenous tribes in North Sumatra. The Parmalim community are known to utilize various plant species, especially as fodders to feed their livestocks. During a preliminary survey in Toba Samosir and interview with key informant, livestock has a meaning as a religious symbol and as food. Livestock raised by the Parmalim community include chickens, ducks, sheep, goats, cows, and buffaloes. Chickens are symbolized in religious activity or ceremonies by Parmalim community. In addition, during Sipaha lima religious ceremonial, buffaloes, goats, and chickens are used as offerings to the God, as gratitude for the God’s provision.

Ethnobotanical study of fodder plant species has been reported by Maisaraty [1] in Central Aceh. More than 91 plant species belonging to 27 families are utilized as fodders by local Acehnese. Nasution [2] reported that the Mandailing community in the Batang Gadis National Park Area used 262 plant species in their daily lives, 25 of which were used as fodders. Similar study also reported on
the community inhabiting Gunung Halimun Salak National Park who used more than 85 species of plants as fodders [3].

Study on Parmalim community has been conducted regarding their Religious Rationalization in Parmalim Religion [4], practice of Sipaha lima ceremony [5], historical footprints in Medan city [6], and musical instruments used by the Parmalim community in several activities [7-10]. Most of the studies were still focused on their socio-cultural relationship and religious practices. However, studies on botanical aspect or ethnobotany is still limited yet needed to explain the whole cultural aspect of Parmalim community as one of indigenous tribe of North Sumatra.

2. Method
The present study was based on extensive surveys to six villages: Pardomuan Nauli Hutatinggi, Nalela and Sampura (Toba Samosir regency); Onan rungu, Sipako and Tomok (Samosir regency), North Sumatera, Indonesia. This study applied observation and in-depth interview aided with questionnaires and observation [12]. Local names of the utilized plants and their uses as fodders were documented by interviewing selected respondents. Preliminary investigations had been conducted to ensure the precise respondents or knowledgeable persons based on previous study [13]. Respondents were selected purposively and randomly stratified. Fifty respondents were selected to investigate and grouped based on age structure: elder, adult and children. Specimen vouchers were deposit and authenticated in the Herbarium Medanese, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Sumatera Utara for future purposes. Some plants were also identified in the field using available literatures.

![Figure 1. Map location of study sites](image)

3. Results and Discussion
The results of field observations and interviews with farmers or breeders revealed 34 plant species commonly used as fodder consisted of 13 families (Table 1). Most species were from Poaceae (Figure 1), consisted of 12 species. Members of Poaceae recorded in this study were: *Zea mays*, *Oryza sativa*, *Pennisetum purpureum*, *Paspalum conjugatum*, *Pennisetum purpupoides*, *Arrhenatherum* sp., *Sporobolus* sp., *Dactylolocentium aegyptium*, *Digitaria ciliaris*, *Cynodon dactylon*, *Axonopus compressus*, and *Eragrostis amabilis* [2]. In comparison, Batak Mandailing community was reported to utilize 25 plants species as fodders with most species from Malvacea, Compositeae, and Poaceae [2]. Other report from local community in Pesaguan Kanan village, Ketapang district utilized most plant species from Arecaceae [14]. Manggarai community utilized 8 species of forest plants as fodders [15]. Herbaceous species of Poaceae are often found in pastures and favored by livestocks. Species
like *Paspalum conjugatum* and *Cynodon dactylon* are often encountered by livestock among others [3]. Similar result in finding most fodders from Poaceae was also reported from local community in Central Punjabi, India who utilized 30 species [16].

Table 1. List of native plant that used for fodder

| Family          | Botanical Name               | Local Name          |
|-----------------|------------------------------|---------------------|
| Poaceae         | *Zea mays*                   | Jagung              |
|                 | *Oryza Sativa*               | Padi                |
|                 | *Pennisetum purpureum*       | Rumput Gajah        |
|                 | *Paspalum conjugatum*        | Rumput Paitan       |
|                 | *Pennisetum purpupoides*     | Rumput Raja         |
|                 | *Arrhenatherum*              | Rumput              |
|                 | *Sporobolus sp*              | Rumput              |
|                 | *Dactyloctenium aegyptium*   | Rumput              |
|                 | *Digitaria ciliaris*         | Rumput              |
|                 | *Cynodon dactylon*           | Rumput              |
|                 | *Axonopus compressus*        | Rumput              |
|                 | *Eragrostis amabilis*        | Rumput              |
| Asteraceae      | *Tithonia diversfolia*       | Bunga Sipaet-Paet   |
|                 | *Crassocephalum crepidioides*| Toloudut (Kapal Terbang), |
|                 | *Synedrella Nodiflora*       | Rumput              |
|                 | *Bidens pilosa*              | Hasoli (Jarum-Jarum) |
| Cyperaceae      | *Cyperus rotundus*           | Rumput Teki         |
|                 | *Kyllinga monocephala*       | Rumput Teki         |
|                 | *Fimbristylis annua*         | Rumput              |
| Euphorbiaceae   | *Manihot utilissima*         | Singkong            |
|                 | *Euporbia hypericifolia*     | Rumput              |
| Fabaceae        | *Leucaena glauca*            | Lamtoro             |
|                 | *Trifolium sp*               | Semanggi Gunung     |
|                 | *Desmodium triflorum*        | Semanggi            |
| Gramineae       | *Agrostis capillaris*        | Rumput              |
|                 | *Paspalum sp.*               | Rumput              |
|                 | *Brachiaria mutica*          | Rumput              |
| Convolvulaceae  | *Ipomoea batatas L.*         | Ubi Rambat          |
| Moraceae        | *Artocarpus heterophyllum*   | Daun Nangka         |
| Musaceae        | *Musa paradisiaca*           | Pisang              |
| Convolvulaceae  | *Ipomoea aquatica*           | Kangkung            |
| Caricaceae      | *Carica papaya*              | Pepaya              |
| Malvaceae       | *Hibiscus rosasinensis*      | Rondang             |
| Phyllanthaceae  | *Phyllanthus nururi*         | Sidukung Anak       |
The utilized part of plants documented were seeds, leaves, flowers, bulbs, and fruit. The plants might be given in fresh or dried conditions. Leaves Most of the plants given were leaves, or being called as forage (76%) (Figure 3). Composition of common forage for livestocks are mixture of vegetative parts (leaves, stems) along with some of generative parts (flowers, inflorescences) to ruminants [17]. Foraging animals prefer to consume leaves (50%) as prominent diet followed by followed by the stem (21%), whole plant (15.8%), fruits (10.5%) and receptacles (2.6%) [18].

Plants given to livestock are wild plants and cultivated plants. More wild plants are given, which is 66% of the total plants used (Figure 3). fodder in the form of wild plants is obtained from grazing fields or given directly by farmers. 34% of the cultivated plants in the form of agricultural residues such as corn stalks and straw. According to Purnamaningsih et. al., [19] straw can be used as fodder and still be given additional feed from other sources. Research conducted by Widarti and Sukaesih [3], reported the same thing where farmers rely on their livestock from wild grass (86.67%) and cultivated plants 6.67%.
During daily foraging, Parmalim people usually obtained these plants from various sources in the wild, i.e. private fields, road sides (cliffs), rice fields etc. In addition, livestock breeders also release their livestock to graze in pastures. Similar result was also reported from local communities of Gunung Halimun Salak National Park who usually obtain fodder source from nature, i.e. roadside, river banks, rice fields, burial grounds, the edge of forest areas etc [3]. In addition, local community in high river of Ter valley, Peninsula were heavily dependent on wild plants as fodder source, in the percentage of 83% (83 species) from total species [20].

4. Conclusions
Batak Parmalim community utilized 32 plant species belonging to 13 families as fodder source. The highest number of species utilized was from Poaceae with 12 species. Fodder sources were obtained by harvesting in the wild (66%), around yard and grazing fields, and cultivated plants (34%) originating from the rest of agricultural production.

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