

SHORT COMMUNICATION

Traditional uses of *Solanum* species by the tribal communities of Lower Subansiri district, Arunachal Pradesh, India

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Abstract

Arunachal Pradesh, being one of the mega biodiversity hotspots, is blessed with rich flora and fauna among which the species of *Solanum* L. is abundantly found in the state and has been extensively used by different tribes of the state. The current study reports traditional uses of the genus *Solanum* L. by the indigenous communities of the Lower Subansiri district of Arunachal Pradesh. The study has revealed 10 species of *Solanum* which are traditionally used for different purposes. Greater majority of the species have been reported to be used as food and medicine while 9 species have been reported to be used as food, 5 species as a medicine and 4 species have been reported to be used as both food and medicine. Fruits were reported to be frequently harvested parts used followed by leaves and tubers. This study revealed economic value of the *Solanum* species potential to sustain rural food and medicinal security.

Keywords: *Solanum*; Species Diversity; Indigenous Tribes; Traditional Uses; Food and Medicine; Economic Importance

1. Introduction

The genus *Solanum* L. (Solanaceae) is a vast and diverse group of flowering plants. They are considered as one of the largest genera among the angiosperm. It is the largest genus in the family Solanaceae, which accounts for approximately 1500-2000 species widespread throughout the world. In India, Solanaceae have been reported with 122 species of which 49 species are belonging to the genus *Solanum* L. (Kalidass and Panda, 2019) while 12 species of *Solanum* have been reported from the state of Arunachal Pradesh (Chowdhery et al.; 2008). Greater majority of the species under the genus *Solanum* L. have been reported as a food plant such as *S. tuberosum* L. *S. lycopersicum* L. and *S. melongena* L. (Eskandari et al.; 2019). The genus *Solanum* L. is reported to be found in temperate and tropical region of the world with wide morphological variations and they had often posed taxonomic puzzle due to diversity in their morphology and eco-geographical distribution (Fawzi et al.; 2016). They display wide range of growing habits, like annual and perennial herbs, vines, undershrubs, shrubs, and small trees. The Indian state of Arunachal Pradesh in the Eastern Himalaya region is reported among 200 globally important eco-regions and endowed with rich flora and fauna including diversity of Solanaceae (Choudhry et al.; 2011). Earlier, the various uses of different species of genus *Solanum* L. have been reported from Arunachal Pradesh (Payum et al.; 2015, Yanka et al.; 2019). However, many of the *Solanum* L. species that occur in the lower Subansiri district of Arunachal Pradesh are not properly reported to date. Therefore, the present study aims to document traditional uses of the species under *Solanum* L. by the local tribal communities of the Lower Subansiri district of Arunachal Pradesh India which mainly focused on food, medicinal and economic importance.

2. Materials and methods

An ethnobotanical information on the *Solanum* species was collected from the tribal communities of the Lower Subansiri district of Arunachal Pradesh during 2019-2021 using rapid ethnobotanical appraisal (REA) method (Martin, 1995). The district has a total geographical area of around 3875 sq.km, which lies between 26° 55' and 28° 40' N latitude and longitude 92° 40' and 94° 2' E (Figure 1). The district is inhabited by the two major

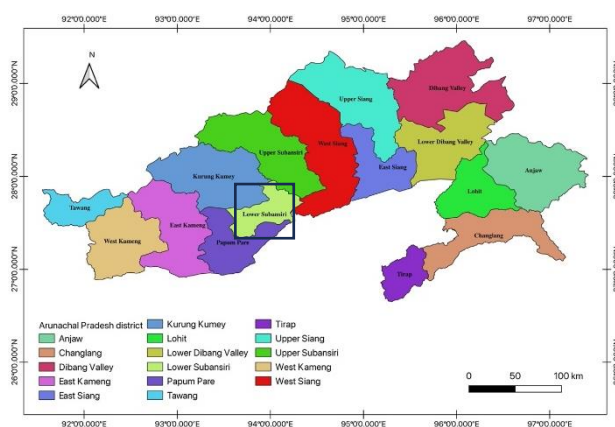


Figure 1. The square mark on the map of Arunachal Pradesh, India indicating study site - the Lower Subansiri district.

tribes of the state, i.e., the Apatani and the Nyishi reported to be rich in traditional biocultural knowledge. The traditional uses of *Solanum* species were recorded from the six villages, namely, Joram, Yazali, Potin, Bamin Michi, Hari and Hong covering 34 informants. The *Solanum* species were collected with the help of local informants who possess sound knowledge on traditional uses. The voucher specimens were collected following standard field and herbarium methods (Rao and Jain, 1977) and each species were identified by consulting the local flora such as *Materials for the Flora of Arunachal Pradesh* (Vol.2) by Chowdhery et al (2008) and *Flora of Lower Subansiri District, Arunachal Pradesh, India* (Vol.1) by Pal (2013). The accepted names of each species were verified in Plants of the World Online (POWO) hosted by Royal Botanic Garden, Kew UK (<https://powo.science.kew.org>) and later the voucher specimens were deposited in the Herbarium of Arunachal University (HAU/RGUH); Department of Botany, Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh, India for the future references.

3. Results and discussions

3.1. Taxonomic diversity and traditional uses of *Solanum* species

The present studies have revealed a total of 10 species of *Solanum* L. used by the indigenous tribal communities of the Lower Subansiri district of Arunachal Pradesh (Table 1). 30% (3 species) were perennial herbs followed by annual herb and under shrub which is represented by 2 species each while rest 20% species were deciduous shrub, herbaceous perennial shrub and shrub represented by 1 species each (Figure 2a). The greater majority of the *Solanum* species reported were found to be used as a food or

medicine. 90% species (9 species) have been reported to be consumed as food while 50% (5 species) have been reported to be used as a medicine and they have been found to be consumed either in cooked or raw form while 40% (4 species) have been reported to be used as both food and medicine (Figure 2b). Furthermore, the study has revealed that the majority of 90% species were found to be harvested from fruit part followed by leaves and tubers with 1 species each (Figure 2c). Taxonomic diversity of Solanaceae in India has reported to be rich with significant bearing on economy and livelihood of the local communities in rural landscape (Kalidass and Panda, 2019). Further studies are required to unveil the species diversity of Arunachal Pradesh and North East India.

Table 1. Checklist of the species of *Solanum* L. and their traditional uses, part harvest recorded from the Apatani and Nyishi tribes of Lower Subansiri District of Arunachal Pradesh, India [L = Leaf; F= Fruit; Tu= Tuber; A= Apatani, N= Nyishi]

Botanical Names	Type of use	Vernacular name	Ethnic Tribal	Part used	Habit	Ethnic use
<i>Solanum aethiopicum</i> L. [Solanaceae] HY/HT/HAU/1653/2019	Food; Medicine	Byako (A), Byake (N)	Apatani, Nyishi	F	Deciduous Shrub	Fruits are cooked and consumed as vegetable or simply boiled and eaten to cure stomach problems.
<i>Solanum aculeastrum</i> Dunal [Solanaceae] HY/HT/HAU/1663/2019	Medicine	Swtw Byako (A), Swtwr Byake Ahi (N)	Apatani, Nyishi	F	Shrub	Fruit is chewed between the teeth to cure teeth pain
<i>Solanum anguivi</i> Lam [Solanaceae] HY/HT/HAU/1657/2019	Food; Medicine	Adi Byako (A), Sab Byake (N)	Apatani, Nyishi	F	Under shrub	Fruits are boiled and consumed as vegetable and as a medicine against diabetes and stomach disorder
<i>Solanum lycopersicum</i> L. [Solanaceae] HY/HT/HAU/1696/2021	Food	Tamator (A, N)	Apatani, Nyishi	F	Herb	Consumed as a vegetable
<i>Solanum melongena</i> L. [Solanaceae] HY/HT/HAU/1695/2021	Food	Byayung (A), Bayom (N)	Apatani, Nyishi	F	Perennial herb	Consumed as a vegetable
<i>Solanum nigrum</i> L. [Solanaceae] HY/HT/HAU/1656/2019	Food; Medicine	Hwro Hamang (A), Hor Oh (N)	Apatani, Nyishi	F, L	Annual herb	Leaves are taken orally for dysentery and also warmed leaves are applied on bruises
<i>Solanum torvum</i> Sw. [Solanaceae] HY/HT/HAU/1694/2021	Food; Medicine	Missang byako (A), Pata Byak (N)	Apatani, Nyishi	F	Perennial Shrub	Fruits consumed as vegetable as well as to cure stomach pain
<i>Solanum tuberosum</i> L. [Solanaceae] HY/HT/HAU/1652/2019	Food	Aalu (A), Teri Bayom/Aalu (N)	Apatani, Nyishi	Tu	Perennial herb	Tubers are either roasted, boiled or fried and taken as food

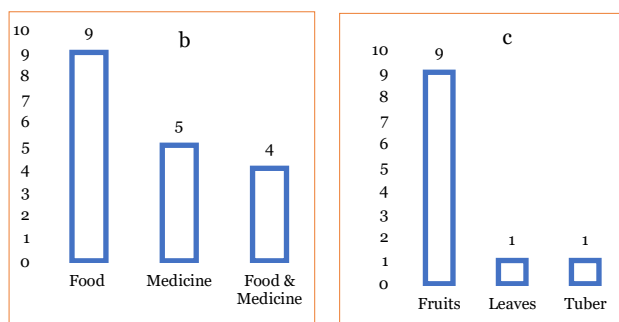
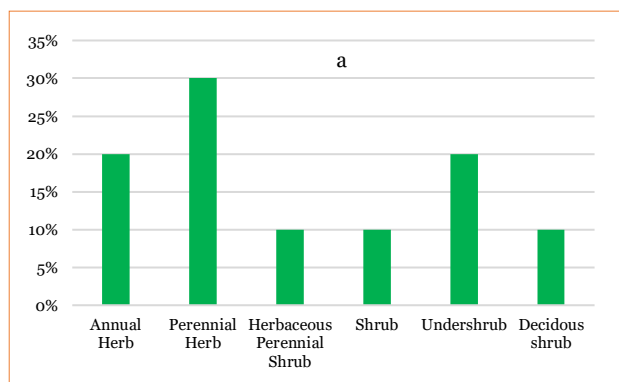


Figure 2a. Habits of the genus *Solanum* species; **b.** No. of *Solanum* species used as food and medicine; **c.** Parts used of the *Solanum* species (Number) by the ethnic tribe of Lower Subansiri district of Arunachal Pradesh India.

3.2. Economic importance of *Solanum* species

Of the total 10 species reported, *Solanum aethiopicum* L., *Solanum anguivi* Lam., *Solanum torvum* Sw. and *Solanum violaceum* Ortega. have reported with higher market values (INR 100/- per kilogram each species) which have been found to be frequently sold in the local markets by vegetable vendors of Lower Subansiri district of Arunachal Pradesh. This is followed by *Solanum lycopersicum* L. (INR 80/- per kilogram), *Solanum melongena* L. and *Solanum tuberosum* L. (INR 40/- per kilogram) and *Solanum nigrum* L. (INR 20/- per bundle) (Table 2). Previous studies of Kala et al (2005) also reported traditional medicinal uses of some *Solanum* species of Apatani tribes with high ethnopharmacological relevance. Although food and nutritional value of *S. tuberosum* L. *S. lycopersicum* L. and *S. melongena* L. are well reported (Eskandari et al., 2019), however, some species namely, *Solanum aethiopicum* and *Solanum nigrum* need further studies for their medicinal and nutritional potential against target ailments (Yanka et al., 2019).

Table 2. List of economic value of *Solanum* species used by tribal community of the Lower Subansiri District of Arunachal Pradesh, India

Botanical Names	Economic value (INR)
<i>Solanum aethiopicum</i> L.	100/per kg
<i>Solanum aculeastrum</i> Dunal	-
<i>Solanum anguivi</i> Lam	100/per kg
<i>Solanum lycopersicum</i> L.	80/ per kg
<i>Solanum melongena</i> L.	40/per kg
<i>Solanum nigrum</i> L.	20/per bundle
<i>Solanum torvum</i> Sw.	100/per kg
<i>Solanum tuberosum</i> L.	40/per kg
<i>Solanum viarum</i> Dunal	-
<i>Solanum violaceum</i> Ortega.	100/per kg

4. Conclusion

In the studies, the traditional uses of the *Solanum* species were observed to be popular among the Apatani and the Nyishi communities of Lower Subansiri district of Arunachal Pradesh as both food and medicinal purposes. This study revealed *Solanum aethiopicum* L., *Solanum nigrum* L. and *Solanum anguivi* Lam. to be frequently harvested, sold and consumed daily along with rice (*Oryza sativa*) and also reported to be traditionally used as a source of medicine against stomach-related ailments. Although the introduction of modern medicine is already prevalent in the area, still some households prefer to treat their ailments using the *Solanum* species as they believe herbal as the best remedies for some ailments without side effects. Greater majority of the *Solanum* species reported in present studies are harvested from fruit parts which possess bitter principle. The *Solanum torvum*, *Solanum viarum* and *Solanum aculeastrum* were found to be harvested from wild sources for both food and medicinal purposes while *Solanum aethiopicum* L., *Solanum lycopersicum* L., *Solanum melongena* L., *Solanum nigrum* L. and *Solanum tuberosum* L. were found to be domesticated which has higher market values and economic significance to the local tribes.

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Author's contributions

The first author (HY) conducted the field work, generated ethnobotanical data and preparation of draft manuscript. The second (PKH) and third (HT) authors contributed in concept, statistics, language editing and finalization of manuscript.

References

- Chaudhry P, Dollo M, Bagra K and Yakang B. 2011. Traditional biodiversity conservation and natural resource management system of some tribes of Arunachal Pradesh, India. *Interdisciplinary Environmental Review* 12 (4): 338-348.
- Chowdhery HJ, Giri GS, Pal GD, Pramanik A and Das SK. 2008. *Materials for the flora of Arunachal Pradesh*, Vol. 2. Botanical Survey of India, Kolkata. Pp. 198.
- Eskandari M, Assadi M, Shirzadian S and Mehregan 2019. Ethnobotanical Study and Distribution of the *Solanum* Section *Solanum* Species (Solanaceae) in Iran. *Journal of Medicinal Plants*. 18: 71
- Fawzi NM and Habeeb HR. 2016. Taxonomic study on the wild species of the genus *Solanum* L. in Egypt. *Annals of Agricultural Sciences*. 61 (2): 165-173.
- Jain SK and Rao RR. 1997. *A Hand Book of Field and Herbarium Methods*. Today and Tomorrow's Prints and Publishers, 24B/DBG Road, New Delhi-110 001. Pp. 1-70.
- Kalidass C and Panda PC. 2019. *The Genus Solanum L. (Solanaceae) in Eastern Ghats of India: An Account of the Diversity, Distribution and Taxonomy of the Wild and Naturalized Species of Solanum L. Occurring in Eastern Ghats of India*. Regional Plant Resource Centre, Forest and Environment Department, Nayapalli, Bhubaneswar, Orissa-751015, India. Pp. 1-76.
- Martin GJ. 1995. *Ethnobotany: A Methods Manual*. 1st ed. New York, Chapman & Hall, London. Pp. 1-64.
- Payum T, Das AK, Shankar R, Tamuly C and Hazarika M. 2015. Antioxidant potential of *Solanum* spirale shoot and berry: a medicinal food plant used in Arunachal Pradesh. *American Journal of Pharmtech Research* 5 (4): 307-314.
- Pal GD. 2013. *Flora of Lower Subansiri District, Arunachal Pradesh*, Vol. 1. Botanical Survey of India, Kolkata.
- POWO. 2020. Plants of the world online hosted by Royal Botanic Garden, Kew, UK. <https://powo.science.kew.org>
- Yanka H, Rinyo R, Das SK, Das TJ, Paul D, Gupta DD, and Tag H. 2019. A brief cross-cultural ethnobotanical note on the Abotani tribes of Arunachal Pradesh, India. *Pleione* 13 (2): 269 - 283.

Conflict of interests

The authors have no conflict of interests.

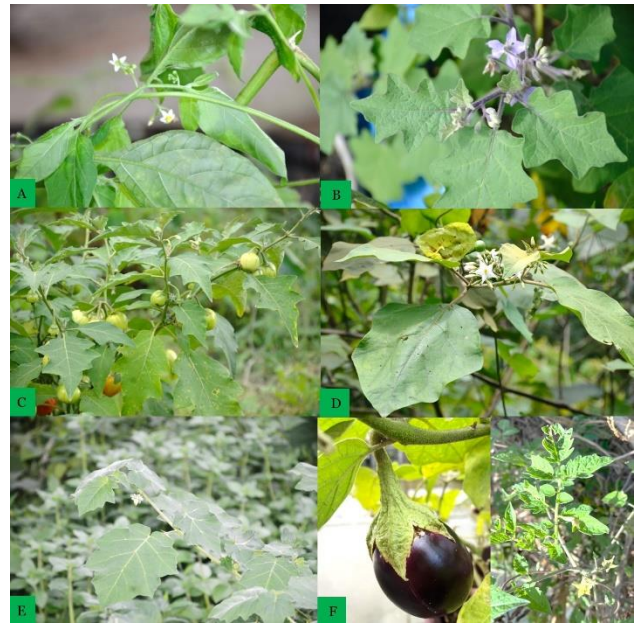


Figure 3A. *Solanum nigrum* L. **B.** *Solanum violaceum* Ortega., **C.** *Solanum aethiopicum* L. **D.** *Solanum torvum* Sw. **E.** *Solanum viarum* Dunal **G.** *Solanum melongena* L. **H.** *Solanum lycopersicum* L.

