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Review Article

Mapping Traditional Knowledge Associated with *Celastrus paniculatus* in India Using Geographical Information System (GIS)

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ABSTRACT

Introduction: The traditional knowledge mapping of *Celastrus paniculatus* in India using Geographical Information System (GIS) collects and compiles the data about the use and distribution status of *C. paniculatus* in India. The present review gives an idea about the ethnomedicinal importance of *C. paniculatus*. This review provides an idea about the status of *C. paniculatus* in India and aims to make awareness about the conservation of such traditionally and ethnomedicinally important species. ***Methods:*** The ethnomedicinal uses of *C. paniculatus* across several local communities and tribes in India were located on a Quantum GIS 2.10.1-Pisa (Q.GIS) and Google Earth. ***Results:*** The present study resulted in documenting the traditional knowledge mapping of *C. paniculatus* in India. Forty four localities in India revealed 101 indigenous communities identifying *C. paniculatus* by 28 vernacular or local names. *C. paniculatus* is used against almost seventy various ailments. Root, leaves, bark, seed and oil are used against various diseases. ***Conclusion:*** The present study provides a new way for ethnobotanical realm.

KEYWORDS

Ethnobotany , GIS, Jyothishmati, Traditional Knowledge

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The Celastraceae family include a woody climbing shrub species,*C. paniculatus*Willd distributed in China, Malaysia, Philippines, Thailand, North East of Australia and native to India.[1] Ayurveda suggests that *C. paniculatus* stimulate medha (intellect) and promotes smruthi (memory) hence Ayurveda identifies it as Jyothishmati.[2] *C. paniculatus* is mostly used by the tribes, females being more knowledgeable. They have vast knowledge on the properties and uses of *C. paniculatus* in treating diseases like white discharge, burning sensation, blood purification after delivery, and for inducing menstruation and abortion. Root, leaves, bark, seeds and oil are used against various diseases.[3] It is commonly known as Black seed oil plant.[2] This has several medicinal properties like abdominal disorder, abortion, amenorrhoea; antidiabetes, as aphrodisiac, arthralgia, arthritis, asthma, beriberi, bitter, blemishes, blood circulation, brain tonic, bronchitis, body pain, cancer, cardiac debility. *C. paniculatus* belongs to family Celastraceae, it is a climbing shrub with a height of 18m. It is widely spread across in India with an altitude of 1800 m, with reddish brown slender elongated branches and the stem is approximately 23cm in diameter which are covered with lenticles, simple, alternate, oblong and elliptic leaves, paniculate type of inflorescence with unisexual flowers[4]. In *C. paniculatus*, the propagation is done through seeds[5].

This study introduces a method to collect and analyze available information reported on ethnomedicinal uses, status and distribution of various herbs/ extracts used for treatments. It paves a new way to Geo-tag traditional knowledge using Geographical Information System (GIS) and thereby preserve it. Traditional knowledge is lost from generation to generations and it is difficult to protect it from content loss. Still today there is no perfect standard to identify, collect and analyze indigenous knowledge. Knowledge based on tradition provides an opportunity for successful conservation of resources and sustainable development. So there arises the need of ethnobotanical study for the compilation of traditional knowledge.

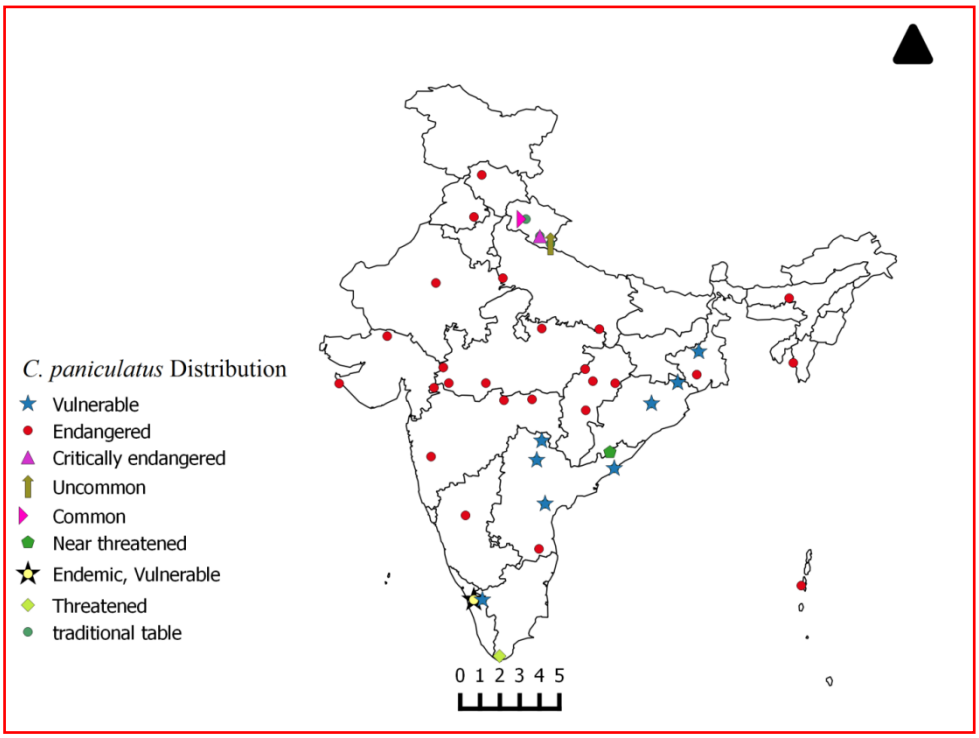
MATERIALS AND METHODS

The present study were conducted by collecting the ethno medicinal uses of *C.paniculatus* from online scientific journals and reports using advanced search word as "celastrus". The information pertaining local name, medicinal use, tribes, status, locality, parts used of *C.paniculatus* from each article were extracted and finally compiled. Later the ethno botanical uses of *C. paniculatus* across various indigenous communities in India were geo-tagged on a Quantum GIS 2.1.0 'Pisa' (Q.GIS) platform. The database created during this study was converted as kml file and it was integrated with Google Earth for data visualization.

RESULTS AND DISCUSSION

Mapping the traditional knowledge of *C. paniculatus* (Figure 1) in India has compiled the diversified ethno botanical utility of the species. Hundred and one indigenous communities residing in Forty four localities identify *C. paniculatus* by 28 vernacular or local names. Root, leaves, bark, seed and oil of *C. paniculatus* was reported to cure almost seventy ailments. Table 1 summarises the ethno medicinal uses of *C. paniculatus* reported from different regions of India. *C. paniculatus* is an endemic, species of Indian sub continent. The present study compiled the reported population status of the species across India. Table 2 summarises the distribution status of *C. paniculatus* in India (Figure 2 and 3).

Figure 1. Reported distribution status of *Celastrus paniculatus*in different regions of India



India is one of the largest Traditional Knowledge holding developing countries in the world[6]. Currently traditional knowledge is under serious of threat in many parts of the India. Hence documentation of traditional knowledge is essential for effective utilization and restoration of such resources. This will not only help to improve the health care system but also the ecological sustainability and utilization of potential medicinal plant species.

The present study on Traditional Knowledge mapping associated with *C. paniculatus* using GIS is an effective strategy against bio-piracy[7] . *C. paniculatus* is listed as endemic, endangered, vulnerable, and critically endangered in various parts of India. Hence, urgent efforts are needed towards conservation of *C. paniculatus* and its associated traditional knowledge from endangerment in India

Table 1. Ethnobotanical uses of *Celastrus paniculatus* by various indigenous communities in India

SN	State	Study Region	Local Name	Ethnic Groups	Part Used	Type Of Uses
1.	Andaman And Nicobar Islands	Andaman And Nicobar Islands	Jyothishmati	Local People	Root, Stem, Leaves, Flowers, Fruits, Barks, Seed	Opium Antidote, Stimulant, Rheumatic Pain, Leprosy, Abortion, Leucoderma, Bitter, Paralysis, Beriberi [8]
2.	Andhra Pradesh	North Coastal Andhra Pradesh	Jyotishmati	Local People	Root	Antidiabetic[9]
3.	Andhra Pradesh	Visakhapatnam	Teegapalleru	Local People	Root, Leaf, Seed	Venereal Diseases, Headache, Skin Diseases, Hair Care[10]
4.	Andhra Pradesh	Khammam	ManerTeega, TeegaPalleru	Koyas, Kondareddis, Lambadas	Leaves	Insect Bite[11]
5.	Andhra	Tiruppati	Jyotishmati	Local People	Seed	Muscular pain[12]

	Pradesh					
6.	Assam	MyongArea,Morigaon	Kunkunilata	Lalung	Seed,Oil	Used in infected part, Leprosy[13]
7.	Chhattisgarh	BhupdeopurForest,Raigarh	Kujur	Baigas,Baidyas	Root, Oil, Bark, Seed	Epilepsy, Headache, Joint pain, Rheumatism, Cough, Chest pain, Abortion[14]
8.	Chhattisgarh	Bilaspur District, Kanker District	Malkagni	Birhor, Pahadi Korwa, Baiga, Uraon, Kamar, Dhurva And Kanwar	Root	Leprosy[15]
9.	Chhattisgarh	Bilaspur, Dhamtari	Malkangni	Local People	Seed	Abortion, Leprosy, Paralysis, Body Pain, Fever, Dysentery, Diarrhoea[16]
10.	Eastern Ghats	Eastern Ghats	Karsona	Local People	Seed	Rheumatism[17]
11.	Gujrat	Banaskantha District	Malkangni	Koli, Deviputra, Maldhari, Adivasi	Seed	Rheumatism, Chronic Lumbago[18]
12.	Haryana	Ambala District	Malkanghi	Local People	Seed, Bark	Paralysis, Leucorrhoea[19]
13.	Himachal Pardesh	Jawalamukhi, District Kangra	Sankhiran	Local People	Seed	Cough and Bronchitis[20]
14.	Himalaya	Himalaya	Jyotishmati	Protoaustroloids, Munda, Kiratas, Mongoloid, Indoaryans, Khasas, Saka	Fruit, Seed	Haemorrhoids, Piles, Gout, Rheumatism, Snakebite, Wound, Dysentery, Diarrhoea, Leprosy[21]
15.	Karnataka	Coastal Karnataka	GangammaBalli	Koraga, Kunbi, Malekudiya, Gowli, HalakkiVokkaliga, Siddi	Root	Skin Problems, Body pain, Urino Genital problems, Gastro Intestinal Problems, Respiratory problem, Animal Bites[1]
16.	Kerala	Attappady	KangogeChedi	Irular, Mudugar, Kurumbar	Tender Leaf	Wound Healing[22]
17.	Kerala	Wayanad	Jyothishmati	Paniya, Adiya, Kattunayika, Kuruma	Root,Bark, Leaves, Seed	Body pain,To Eradicate Worm From Stomach, Early Cure Of Burns And Boils, Arthritis, Anti venom Against Snake Poison, White Discharge, Burning Sensation, Gout, Rheumatism, Inflammation[3]
18.	Madhya Pradesh	Jhabua	Kangan	Bheel, Bhilala and Pataya	Seed	Rheumatism[23]
19.	Madhya Pradesh	Satpuda Mountain	Malkagani	Local People	Seed	Paralysis, Leprosy, Asthma, Scabies, Rheumatism[11]
20.	Madhya Pradesh	Chhindwara, Betul District	Malkangni	Bichhua, Tamia, Junnardeo, Harrai, Betul, Ghora, Dongri, Bhaisdehi, Gonds, Athner, Kol, Chicholi, Santal, Bhomij, Bhuyan, Sounti	Seed	Rheumatism [24]

				Bathuri, Kharia, Mankdias, Pauri Bhuyan, Saharias, Mahalis		
21.	Madhya Pradesh	Vindhyan Plateau, Sidhi District	Malkangani	Gond, Baiga, Kol	Seed	Leprosy[25]
22.	Madhya Pradesh	Chhatarpur District	Malkagni	Gond, Bhil, Bediya	Seed	Epilepsy[26]
23.	Madhya Pradesh	Satpura Plateau	Vadangul	Baiga, Bhariya, Birhor, Gond, Korku, Pardhi	Seed	Aphrodisiac[27]
24.	Madhya Pradesh	Amarkantak Forest Area	Malkangni	Baiga, Panika, Gonds, Kol	Leaves	Liver Disorders[28]
25.	Madhya Pradesh	Amarkantak	Malkangani	Gond, Bhil, Bediya, Baiga, Korku, Halba, Kaul, Mariya	Seed	Abdominal Disorder, Leprosy, Skin Disease, Asthma, Paralysis, , Leucoderma, Cardiac Debility, Inflammation[29]
26.	Madhya Pradesh	Jhabua	Kangan	Bheel, Bhilala, Pataya	Root	Pimple, Blemishes[23]
27.	Maharashtra	Purandhar	Malkangni	Vaidoos	Seed	Joint Pain[30]
28.	Maharashtra	Amaravati District	Pingvel	Korku	Flower, Leaf	Stroke, Menstrual Disorders[31]
29.	Maharashtra	Nandurbar District	Malkangani	Pawra	Seed	Joint Pain, Paralysis, For Muscle Tone Up[32]
30.	Maharashtra	West Vidarbha Region	Jyotishmati	Koraku, Gawli, Gond, Ratthya, Banjara, Kolam	Fruit, Seeds	Brain Tonic[33]
31.	Odisha	Mayurbhanj	Pingu, Kujri, Malkangini, Malkagni, Grism, Sundari, Kujari	Munda, Gond, (Nayak), Kharia, Mahanto, Kolho, Santhal, (Majhi), Lodha Kol (Kolho), Bhumij, Bhuyan, Kumhar, Bathudi	Seed	Gout, Rheumatism, To relieve pain and proper circulation of blood in the body[34]
32.	Odisha	Odisha	Jyothishmati	Dangaria Kandha, Damba, Gonda, Bhuyan, Khadia, Santal	Leaf, Bark, Fruit, Seed	Paralysis, Leprosy, Asthma, Scabies, Rheumatism[1]
33.	Odisha	Odisha	Karsano/ Malkangni	Local People	Seed,Leaf	Rheumatism[35]
34.	Odisha	Mayurbhanj District	Pengu	Local People	Seed, Bark, Oil	Mosquito repellent, Acute stomach pain[36]
35.	Rajastan	Rajastan	Vadangul	Local People	Seed	Improving sexual performance and problem Of sexuality[37]
36.	Rajastan	Kolipura range,Mukundara Hills National Park	Malkangani, Jyotismati	Local People	Seed,Oil	Cough, Asthma, Leprosy, Headache, Ulcers, Scabies, Leucoderma[38]
37.	Tamilnadu	Puzhayaru Riverbank , Kanyakumari	Valuluvai	Local People	Seed	Stomach Problems[39]
38.	Telangana	Adilabad District	ManeruTiga	Kolams, Naik pods, Thotis, Chenchus, Mathuras, Pardhans, Gonds	Fruits	Dysentery[11]
39.	Uttarakhand	Garhwal Himalaya	Malkangni	Local People	Seed	Wounds, Rheumatic Pain, Eye

						Diseases [40]
40.	Uttarakhand	Siwalik, Garhwal Himalaya	Malkuni, Umjan	Tharus, Bhoxas, Gujjars, Raji, Jaunsaris	Seed, Leaves, Bark	Rheumatism Dysentery[41]
41.	Uttarpradesh	Sonbhadra, Varanasi, Kheri	Umjan, Mujhani, Malkangani, Kakundan	Gond, Kol,Tharu	Seed	Tumor Cancer, Rheumatism, Gout Joint Pain[42]
42.	West Bengal	PaschimMedinipur District	Jayotismoti, Kujri, Malkangni, Kujari	Santal, Lodha, Munda, Oraon	Roots, Bark	Nervine Tonic Constipation. Abortifacient[43]

Figure 2. Traditional Knowledge Mapping of *Celastrus paniculatus* in India

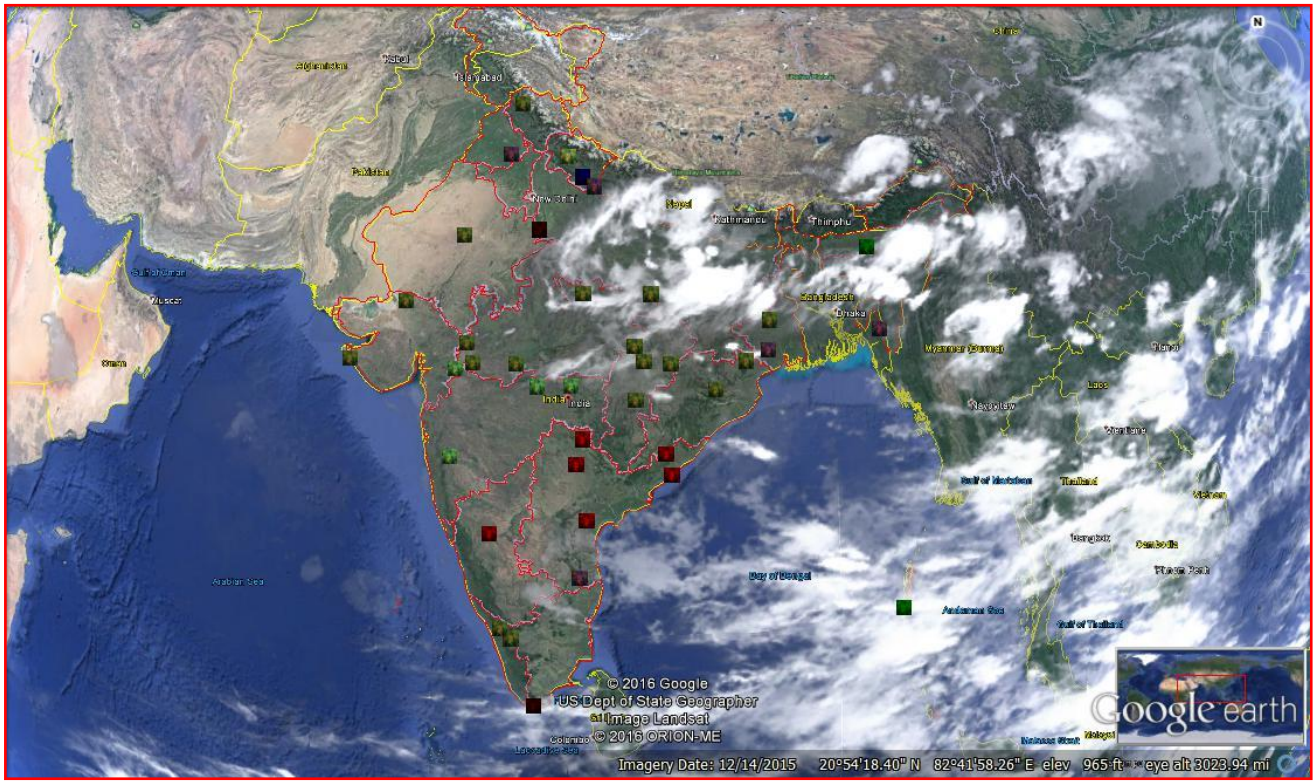
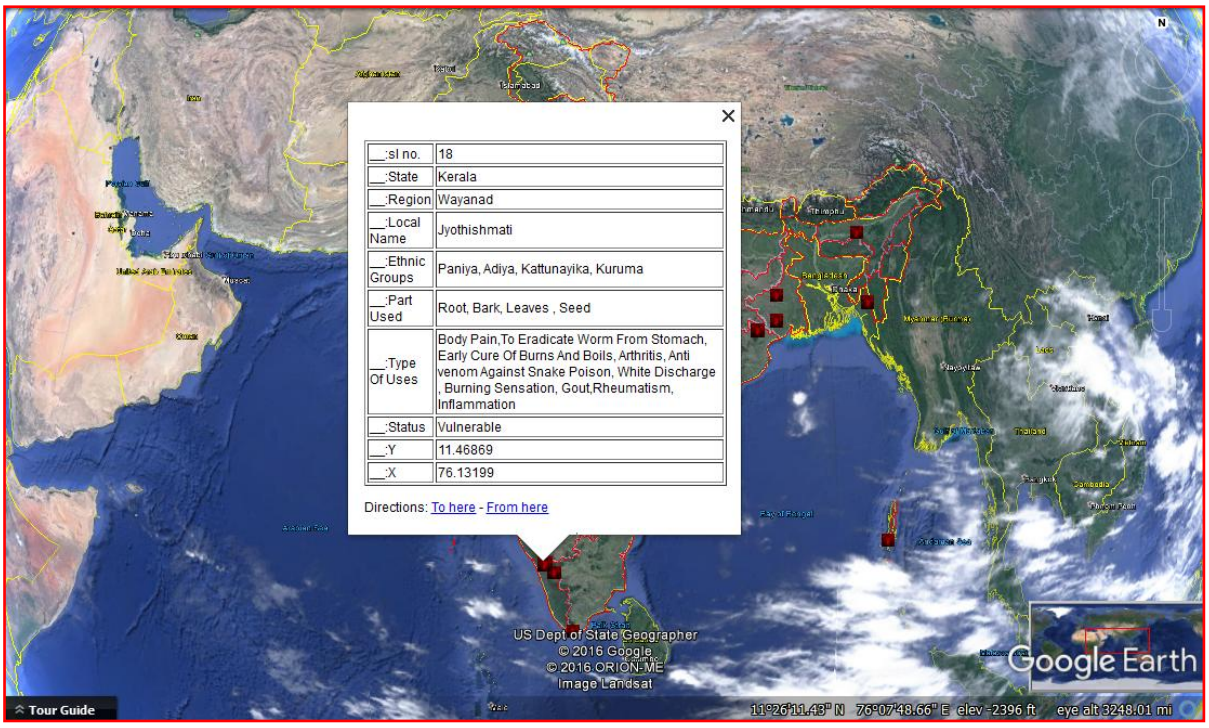


Table 2. Distribution status of *Celastrus paniculatus* in various localities in India

SN	State	Region	Status
1.	Andaman And Nicobar Islands	Andaman And Nicobar Islands	Endemic[44]
2.	Andhra Pradesh	North Coastal Andhra Pradesh	Near threatened[1,45]
3.	Andhra Pradesh	Visakhapatnam	Near threatened[1,45]
4.	Andhra Pradesh	Khammam	Near threatened[1,45]
5.	Andhra Pradesh	Tiruppati	Endangered[12]
6.	Assam	MyongArea,Morigaon	Endemic[46]
7.	Chhattisgarh	Bhupdeopur Forest, Raigarh	Vulnerable[1]
8.	Chhattisgarh	Bilaspur District, Kanker District	Vulnerable[1]
9.	Chhattisgarh	Bilaspur, Dhamtari	Vulnerable[1]
10	Eastern Ghats	Eastern Ghats	Near Threatened[17]
11	Gujrat	Banaskantha District	Vulnerable[45]
12	Haryana	Ambala District	Endangered[47]
13	Himachal Pardesh	Jawalamukhi, Kangra	Vulnerable[45]
14	Himalaya	Himalaya	Endangered[45]
15	Karnataka	Coastal Karnataka	Near threatened[1]
16	Kerala	Attappady	Vulnerable[1]

17	Kerala	Wayanad	Vulnerable[1]
18	Madhya Pradesh	Jhabua	Vulnerable[1,45]
19	Madhya Pradesh	Satpuda Mountain	Vulnerable[1,45]
20	Madhya Pradesh	Chhindwara , Betul	Vulnerable[1,45]
21	Madhya Pradesh	Vindhyan Plateau, Sidhi	Vulnerable[1,45]
22	Madhya Pradesh	Chhatarpur	Vulnerable[1]
23	Madhya Pradesh	Satpura Plateau	Vulnerable[1]
24	Madhya Pradesh	Amarkantak Forest Area	Vulnerable[1]
25	Madhya Pradesh	Amarkantak	Vulnerable[1]
26	Madhya Pradesh	Jhabua	Vulnerable[1]
27	Maharashtra	Purandhar	Least concerned[1]
28	Maharashtra	Amaravati District	Least concerned[1]
29	Maharashtra	Nandurbar District	Least concerned[1]
30	Maharashtra	West Vidarbha Region	Least concerned[1]
31	Odisha	Mayurbhanj	Vulnerable[1]
32	Odisha	Odisha	Vulnerable[1]
33	Odisha	Odisha	Vulnerable[1]
34	Odisha	Mayurbhanj District	Vulnerable[1]
35	Rajastan	Rajastan	Vulnerable[45]
36	Rajastan	Kolipurarange, Mukundara Hills National Park	Threatened[38]
37	Tamilnadu	Puzhayaru Riverbank, Kanyakumari	Threatened[39]
38	Telangana	Adilabad District	Near threatened[48]
39	Uttarakhand	Garhwal Himalaya	Common[40]
40	Uttarakhand	Siwalik, Garhwal Himalaya	Uncommon[41]
41	Uttarpradesh	Sonbhadra,Varanasi, Kheri	Critically Endangered[42]
42	West Bengal	PaschimMedinipur District	Endangered[43]

Figure 3. Pop Up of Wayanad[3] (Table 1: SN 17)



CONCLUSION

The present study provides a new way for ethnobotanical realm. Traditional Knowledge mapping associated with *C. paniculatus* in India has provided geospatial information on the distribution of *C. paniculatus* which is useful for effective conservation of the plant species.

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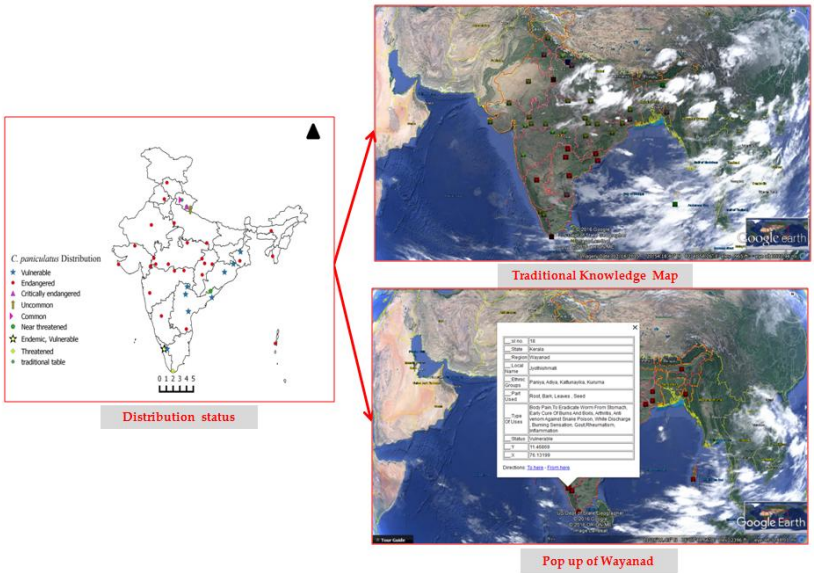
GRAPHICAL ABSTRACT



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