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Documentation of plant taxa used as bio-fence in Ranchi district, Jharkhand: Way to conservation of plant biodiversity

Diwakar Prasad Nirala, Amit Kumar, Santosh Prasad and Dipti Shradha Tirkey

Abstract
Extensive field trips were carried out to different villages/agriculture fields of ranchi district mainly in area of Pithoria /Kanke /Namkum /Hatia /Bundu /Boreya /Ormanjhi during the year 2016-18 in different field tour purposes. Jharkhand is blessed with abundant natural resources mainly plants which are used in so many purposes like fencing that protect the agricultural field and help the farmer to increase the income. Several types of plant taxa are greatly concerned with many rituals, festivals and other cultural ceremonies. Fencing of agricultural crops is done with the help of trees, shrubs and herbal plants on farmlands and rural landscapes that enhance productivity, profitability, diversity and ecosystem sustainability and increase the income of farmers. Main objective of this paper to write the literature which is related with survey and documentation of plant taxa used by the villagers/farmers of Ranchi District, Jharkhand for fencing at their agriculture field.

Keywords: Bio fencing, tree, Ranchi, income, conservation

Introduction
Jharkhand is blessed with abundant natural and mineral resources as well as a cheerful and hardworking human population, mostly of tribal families with a rich cultural heritage and traditional knowledge. Out of a total geographical area of 7.9 million ha, nearly 2.6 million ha are cultivated, while 2.3 million ha (29% of total area) are under notified Forests.

Several plant taxa are greatly concerned with many rituals, festivals and other cultural ceremonies. All over the world the tribals possess a vast emporium of indigenous knowledge system which has been unique to a given culture or a society this can be seen in Jharkhand state also. Traditional knowledge (TK) is a result of co-evolution and coexistence of indigenous cultures and their traditional resource use. It can also be termed as 'Natural Capitalism' or a 'Green Economy'. A good number of faith, taboos, totems, worships are directly or indirectly associated with the life of people.

Agro-forestry is defined as a land use system which integrates trees, shrubs and herbal plants with agricultural crops on farmlands and rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability. Villages of Ranchi District are one of the famous centres of agricultural practices in state Jharkhand. Instead of this agro-forestry this study aims to observe the biodiversity documentation as fencing of plants taxa somehow related to above subject.

The main objective of this survey to documentation of plant taxa used as bio-fence in Ranchi district, Jharkhand –way to conservation of plant biodiversity.

The literature is related with survey and documentation of plant taxa used by the villagers/farmers of Ranchi District, Jharkhand for fencing at their agriculture field.

Methodology

Ranchi, a city of beautiful waterfalls, mesmerizing lakes, and dense forests, is the capital of the Indian state Jharkhand and located on 23º21′0″N 85º20′0″E. Spread over 7574 sq.km, Ranchi lies at an altitude of 2140 feet (i.e, 447039.47 mt.) above MSL. It is situated on the eastern edge of the Deccan Plateau, which falls on the southern part of Chhotanagpur Plateau. The hilly topography, combined with dense tropical forests, is responsible for the mild and moderate climate all-round the year. Blessed with numerous waterfalls and lakes, Ranchi is also known as the "City of Waterfalls". And with several varieties of green vegetables cultivated here, Ranchi is often described as "Vegetable Bowl" of Jharkhand (Puja, 2017) [1]. Simple random procedure was adopted for the selection of agricultural dominated villages of Ranchi district. Many extensive field trips were carried out to different villages/agriculture fields of Ranchi district mainly in area of Pithoria /Kanke /Namkum /Hatia /Bundu /Boreya /Ormanjhi during the year 2016-18 in different field tour purposes.

Results and Discussions

The district village areas agricultural fields often face the threat of grazing, entry of human beings. In context of this rural farmer developed unique fencing methods through trial and error method called Ghorna/Bada. The village people construct temporary boundaries around their field or courtyard using different plants collected from nearby forest or generally planted via vegetative mode locally called "Ghorna". This may be mixing of dry bamboo splits or dry sticks as well as planted shrubs or tree useful during climber crop season (e.g, pumpkin, cucumber etc.) as Jhaunkh /support stick for climbing plant. Commonly the tree species branches are used as Jhaunkh /support stick for climbing plant Later on, subsequent to crop harvest season these all used as fuel source for many purposes.

Personal observation of the process of construction of these fences were done and recorded. Information's regarding the different plants used for this purpose; their properties, uses, and effectiveness are collected through personal interview with the farmers and villagers. Plants were collected, made into herbarium, identified using local floras.

Table 1: Plant taxa were used as bio fencing id different areas of Ranchi district

Sl. No.	Plant Species	Common Name	Family	Uses/purpose	Habitat
1	*Abrus precatorius*	Ratii	Papilionaceae	Fencing /medicine	Climber
2	*Bauhinia vahlii*	Chihor/Mahulan	Caesalpinaceae	Fencing/leaf used as *Ghunghu*(umbrella) in rainy season	
3	*Dioscorea bulbifera*	Gachalu, Ratalu	Dioscoraceae	Vegetable	
4	*Mucuna pruriens*	Alkusi, Kweanch	Paplionaceae	Medicine/fencing	
5	*Smilax macrophylla*	Ramdatwan	Liliaceae	Medicine/fencing	
6	*Calotropis procera*	Akwan	Asclepiadaceae	Medicine/fencing	Shrub
7	*Carissa opaca*	Karaunda (Jangli)	Apocynaceae	Medicine/fishing/fencing	
8	*Casearia elliptica*	Beri	Flacourtiaceae	Medicine/fishing/fencing	
9	*Citrus medica*	Lemon	Rutaceae	Medicine/vegetable /fencing	
10	*Cleistanthus collinus*	Podasi	Euphorbiaceae	Fencing	
11	*Croton oblongifolia*	Putla	Euphorbiaceae	Fencing	
12	*Ipomea carnea*	Tethar	Convolvulaceae	Fencing/heel healing medicine	
13	*Lagerstroemia parviflora*	Sidha	Lythraceae	Fencing/ branch used as support stick	
14	*Lantana camara*	Putus	Verbenaceae	Fencing	
15	*Lawsonia inermis*	Mehendi	Lythraceae	Fencing/medicine	
16	*Morus alba*	Shahtot	Moraceae	Fencing/fruit	
17	*Murraya koenigii*	Mithi Neem	Rutaceae	Fencing/medicine	
18	*Nyctanthes arbortristis*	Harsringar	Oleaceae	Fencing/medicine	
19	*Randia dumetorum*	Mainphal	Rubiaceae	Fencing/medicine	
20	*Ricinus communis*	Arandi	Euphorbiaceae	Fencing/medicine	
21	*Thevetia neriifolia*	Kaner	Apocynaceae	Fencing/medicine	
22	*Vitex negundo*	Nisinda	Verbenaceae	Fencing/medicine/insect repellent	
23	*Acacia catechu*	Khair	Mimosaceae	Fencing/medicine	Tree
24	*Adina cordifolia*	Haldu	Rubiaceae	Fencing/medicine/ritual	
25	*Aegle marmelos*	Bel	Rutaceae	Fencing/medicine/ fruit/ ritual	
26	*Ailanthus excelsa*	Ghorkaranj	Simaroubaceae	Fencing/medicine/fuel wood	
27	*Albizia procera*	Safed Shirish	Fabaceae	Fencing/medicine/fuel wood	
28	*Albizzia lebbeck*	Kala Shirish	Fabaceae	Fencing/medicine/fuel wood	
29	*Annona squamosa*	Custard apple	Annonaceae	Fencing/medicine/ fruit/ ritual	
30	*Anthocephalus cadamba*	Kadam	Rubiaceae	Fencing/medicine/ fruit	
31	*Artocarpus heterophyullus*	Jack fruit	Moraceae	Fencing/fruit	
32	*Artocarpus lakoocha Roxb.*	Barhar	Fabaceae	Fencing/fruit	
33	*Azadirachta indica*	Neem	Meliaceae	Fencing/medicine/ fruit/ ritual	
34	*Bauhinia racemosa*	Maula/Kathmuli	Caesalpiniaceae	Fencing/leafy vegetable	
35	*Bauhinia variegata*	Kachnar	Caesalpiniaceae	Fencing/leafy vegetable	
36	*Bombax ceiba*	Shemal	Bombacaceae	Fencing/medicine/fuel wood	
37	*Buchanania lanzan*	Piyar, Achar	Anacardiaceae	Fencing/fruit	
38	*Butea monosperma*	Palas	Ceasalpiniaceae	Fencing/flower/dye/lac cultivation	
39	*Casia siamea*	Chukundi	Fabaceae	Fencing/ branch used as support stick	
40	*Cassia fistula*	Amaltas	Fabaceae	Fencing/ branch used as support stick	
41	*Dalbergia sisoo*	Shisham	Fabaceae	Fencing/medicine/timber	

42	*Emblica officinalis*	Aanwala	Euphorbiaceae	Fencing/medicine/ritual	
43	*Erythrina variegata*	Pailda/Farhad	Fabaceae	Fencing/medicine/fuel wood	
44	*Ficus infectoria*	Putkal	Moraceae	Fencing/leafy vegetable	
45	*Ficus lacor*	Pakar	Moraceae	Fencing/leafy vegetable	
46	*Ficus racemosa*	Gular	Moraceae	Fencing/medicine	
47	*Gmelina arborea*	Gamhar	Rubiaceae	Fencing/medicine/timber	
48	*Holoptelia integrifolia*	Chilbil	Ulmaceae	Fencing/medicine/timber	
49	*Leucaena leucocephala*	Su-babul/Subbul	Fabaceae	Fencing/medicine/fuel wood	
50	*Madhuca indica*	Mahua	Sapoyaceae	Fencing/medicine/"Mahuwa liquor and tori"flower and fruit used	
51	*Mallotus philippensis*	Sindur	Euphorbiaceae	Fencing/flower/dye/lac cultivation	
52	*Mangifera indica*	Mango	Anacardiaceae	Fencing/medicine/ritual	
53	*Melia azedarach*	Bakain	Meliaceae	Fencing/medicine/timber	
54	*Mitraguna parvifolia*	Gurikaram	Rubiaceae	Fencing/medicine/timber	
55	*Moringa oleifera*	Munga	Moringaceae.	Fencing/fruit	
56	*Plumeria acutifolia*	Gulaichi	Apocynaceae	Fencing/flower/ritual	
57	*Pongamia pinnata*	Karanj	Fabaceae	Fencing/fruit/oil cake	
58	*Psidium guajava*	Guava	Myrtaceae	Fencing/fruit	
59	*Pterocarpus marsupium*	Bijasal	Fabaceae	Fencing/medicine/timber	
60	*Putranjiva roxburghi*	Puntrajiva	Euphorbiaceae	Fencing/medicine/ritual	
61	*Samanea saman*	Rain-tree	Fabaceae	Fencing/medicine/timber	
62	*Schleichera oleosa*	Kusum	Sapindaceae	Fencing/medicine/ritual	
63	*Shorea robusta*	Sal	Dipterocarpaceae	Fencing/medicine/ritual	
64	*Spondias pinnata*	Amra	Anacardiaceae	Fencing/medicine/fruit	
65	*Syzygium cumini*	Jambul	Myrtaceae	Fencing/medicine/fruit	
66	*Tamarindus indica*	Imli	Leguminosae	Fencing/medicine/fruit	
67	*Tectona grandis*	Sagwan	Verbenaceae	Fencing/medicine/timber	
68	*Terminalia arjuna*	Anjani	Combretaceae	Fencing/medicine/ritual	
69	*Terminalia belerica*	Bahera	Combretaceae	Fencing/medicine/ritual	
70	*Terminalia chebula*	Harre	Combretaceae	Fencing/medicine/ritual	
71	*Bambusa bambos*	Kanta Bans	Poaceae	Fencing/medicine/ritual/marriage	Bamboo
72	*Dendrocalamus strictus*	Lathi bans	Poaceae	S*andhna or karil*" is famous product in state	
73	*Bambusa tulda*		Poaceae	Handicraft, construction purpose	
74	*Bambusa nutan*	Ropa bans	Poaceae	Construction purpose	
75	*Bambusa multiplex*	Hedge bamboo	Poaceae	Ornamental purpose	

These fences not only protect the fields but also play an important role in the conservation of some plants. Many fruit yielding species of trees also provide some economical support to many people of the society. Many ecological balance activity birds nest/rodents reptiles/small insects/bee-bat pollination can be seen secured and supported by these fencing methods in this state. It provides a range of provisioning services, particularly fuel wood, fodder, small timber, NTFP and medicinal plants, and artisan raw material like bamboo, that are crucial to livelihood security of agriculture as well as forest-dependent communities. The medicinal and other uses are not described here in this article since of words limitation.

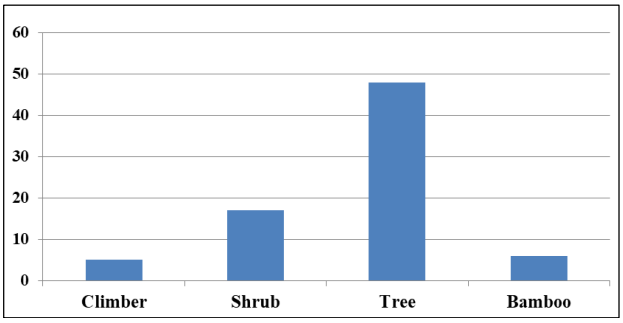

Fig 1: Major group of taxa recorded with total number according to their habitat

It is also to be mentioning that in nearby forest area elephant's herds entry is most danger situation for farmer where these fence could not be consider as barrier for entry of the elephants. Present study is only aimed at the survey and documentation of different plants used for traditional fencing. Now these day invasion of many plant mostly herbaceous taxa are seems to take dominant space in these fences which is in one way hinder the animal and man entry but in another way serves as an alarm of changing global warming and encroachments for the local plant species as a good competitor by several way includes *Cassia tora, Clerodendron infortunatum, Eupatorium odoratum, Hyptis suaveolens, Euphorbia hirta, Parthenium hysterophorus*. The bio fencing plant used as soil filter preventing soil erosion and with time makes the terraced fields more stable. Fast growing plant species are effective and some of them can be used as fodder or fuel. Such type of bio fencing plants are also help in storing some moisture content in soil (Samra *et al*., 1999) [2] and have strong soil binding capacity and are efficient enough to strengthen the mud boundaries of crop fields and houses (Eyzaquirre and Linares, 2001; Ramakrishnan *et al*., 1996) [3]. The indigenous peoples inhabiting in Jharkhand have tremendous knowledge about plant and its parts used for pest and disease management. It has been documented by several workers upon few plants like *Vitex negundo, Pongamia pinnata, Ricinus communis, Semecarpus anacardium, Adina cordifolia, Azadirachta indica* etc. used for remedial properties to cure pest and disease management in many areas of this state. So these fencing systems play a key role in maintaining the biodiversity and support various components of an ecosystem.

Conclusion

From the above statements, it can be concluded that these fences play an important role in conservation of some

important plants. Many fruit yielding species of trees also provide some economical support to many poor people of the society. It provides food, fuel wood, fodder, small timber, NTFP and medicinal plants, and artisan raw material like bamboo.

References

1. Puja S. Study on the biodiversity status of Sarna Sthal of Ranchi district of Jharkhand state and its ecotourism importance, Thesis report, BAU, Ranchi, 2017, 43.
2. Samra JS, Dhyanai SK, Sharma AR. Soil and water conservation strategies for sustainable agriculture in North-Eastern Hill region. Proceedings of the National Seminar on Strategies for Agricultural Research in the North East, November, NAAS, 1999, 10-12.
3. Eyzaquirre PB, Linares OF. A New Approach to the Study and Promotion of Home Gardens. In: People and Plants Handbooks, Growing Diversity, Issue 7, Martin, G.J., S. Barrow and P.B. Eyzaguirre (Eds). WWF-UNESCO-RBG, Kew, 2001, 30-33.
4. Ramakrishnan PS, Das AK, Sexena KG. Conserving Biodiversity for Sustainable Development. Indian National Science Academy, New Delhi, 1996.