

Journal of Advanced Scientific Research

ISSN 0976-9595 Research Article

Available online through http://www.sciensage.info

SOME NATURAL PRODUCTS OF FOREST IN SOUTHWEST BENGAL AND RESOURCE MANAGEMENT

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ABSTRACT

A large number of forest resources are available in various parts of our country. Pattern of collection and use of forest resources are different even the processing and preservation process is also different from one site to another site. All natural products are used directly or indirectly for the use of local people in various purposes. In the forest of Southwest Bengal such important natural products are available in and around the forest round the year. In this communication, 20 very important plant products and their direct value have been presented under the jurisdiction of Southwest Bengal Forest. The significant role of Joint Forest Management Committees (JFMC) are immense and they are involved to make the system sustainable even they serve as a master ruler to run the process smoothly even to manage the biodiversity. In this article various types of plant based items have been presented viz. whole plant, roots, barks, flowers, fruits, seeds and resins. These are a potent source of economy as well as a good source of chemical constituents to develop various types of industries.

Keywords: Southwest Bengal, Forest, Natural products, Economic development.

1. INTRODUCTION

Forests are plant cover in an area having multi-storied tree species found in a natural way. It is very dense area due to change of vegetation and competition of species or its elements too. It is due to heterogeneity of indigenous as well as foreign plant elements and their composition and even their interactions at the same time under various micro-climatic conditions. In the community, many types of plant species occupy their own position due to various physico-chemical factors. It comprised of herbs, shrubs, trees and liana (climbers) with a good number of lower group of plants viz. mosses, lichens, ferns and fern allies. Temperature, humidity, rainfall and topographical variations change the growth behaviour and species dominance time to time. The overall uniqueness makes the entire ecosystem diverse and the variety including variability constitutes the diversity of biological entities under the group landscape diversity. No ecosystem is entirely static [1]. The change of ecosystem and the process of development in such situation make a succession special kind. He and Hubbell [2] argued that the changes take places overtime are relatively predictable, especially in general terms. So, scientists argued that successions

affect species diversity because the maturation of an ecosystem is usually accompanied by increasing numbers of species. Therefore, in any succession, the overall changes make the ecosystem fit in connection with the altered system. So, researchers argued higher biomass in the species level is a possible cause of the high species diversity at the low altitudes because it offers greater spatial heterogeneity and more opportunities for small organisms to find home. Similarly, in succession it increases biomass and architectural complexity in the vegetation lead to higher species diversity. Under such varied situation, many species found in an ecosystem and their parts develop versatile products that are used by us. We use these items as resource for many purposes. Food, fodder, fibre, flosses, resins, gums, twigs, green leaves, dry leaves, medicines, edible fruits, mushrooms are the resources of forest round the year. The use and pattern of use of these materials are different from site to site. These items rather than wood are called non-timber forest products (NTFPs). Local people use these NTFPs directly for their own even they use these items for income generation and sale them in market. Huge quantities of such products are marketed from forest area through nodal market. These products

is used in industry and circulated for global use [3]. In this communication various types of forest made natural resources has been placed and recommendation given to manage it for sustainable development.

1.1. Area under Study

In this research forests of Southwest Bengal in four lateritic districts have been taken. These were Joypore forest, Gar-Panchakot, Laljaole, Nayagram, Kankrajhore, Ajodhya hills, Bhadutala and Jhitka forest. Among them hill forests were Gar-Panchakot, Laljaole, Ajodhya and Kankrajhore forests in West Bengal. Similarly plain land forests were Bhadutala , Jhitka, Joypore, Nayagram forest.

2. MATERIAL AND METHODS

Regular and periodical survey for consecutive three years (July 2016 to 2019) in the study area of forests was conducted in 4 lateritic districts of Southwest Bengal to collect samples of medicinal plants. Medicinal plants along with the non-timber forest products (NTFPs), unique plant samples etc. were collected from the selected marked small plots at regular intervals. The marked plot for herbs was $1 \ge 1 = m^{2}$, for shrubs it was $5 \ge 1$ 5 m^2 and for tree species it was 10 x 10m² [4]. Harvesting and status study was made as per the work done by Godoy and Bowa [5]. Identification of NTFPs was done following Mishra et al. [6]. Species identification was confirmed using standard literature [7]. The study was conducted for consecutive three years as per the plan discussed with some foresters. Field trips were arranged to cover all the study sites in 4 districts of Southwest Bengal namely Jhargram, West Midnapore, Bankura and Purulia. Data on the ethnomedicinal and medicinal values of plants were collected through cross interviews on local people then matched with literature published time to time. Local and common names including usable plant parts and photographs were taken to verify the authenticity of species and to make record data. Identification of species was done with the help of available literature, herbarium specimens kept in museum of Govt. General Degree College Lalgarh, Jhargram, W.B.

3. RESULTS AND DISCUSSION

Present study reports 20 very important plant products and their direct value from southwest Bengal which has been recorded from the forest jurisdiction of West Bengal (Table 1). The significant role of Joint Forest Management Committees (JFMC) are immense and they are involved to make the system sustainable even they serve as a master ruler to run the process smoothly even to manage the biodiversity in the said area. In this article various types of plant based items have been presented viz. whole plant, roots, barks, flowers, fruits, seeds and resins. India is rich in bio-diversity as its geographical location is distinct. Its floral and faunal elements are so rich and distributed in various nature reserves and in forests of different eco-habitats. In West Bengal, the distribution of non-timber-forest products (NTFPs) is diverse. Here many important plants are found in different co-habits in forest that are truly a source of economic development. Following are the plants that are studied well for present research which could be used as natural resource not only for local economy but also to develop resource management in near future (Table 1).

3.1. Phyllanthus emblica

It is called Indian gooseberry. It is found in plantation stand (Fig. 1). In natural forest its existence is as rare species. In high hills many plants of this species has been reported but species regeneration is obscure. The yield and maturity is also different in compare to species of plantation stand. It is valuable medicinal plant since time immemorial. According to report, fruits contain corilagin, chebulagic acid, geraniin, chebulic acid, punigluconin, pedunculagin. Recent report revealed that it contains 2 new flavonoids and fruits are used as rich source of Vit-C [8]. Earlier publication reported for its valuable importance like existence of Vit.-C, minerals and rich aminoacid properties [9].



Fig. 1: Phyllanthus emblica tree

3.2. Terminalia tomentosa

This plant is found in forest. Bark is important natural source of chemical constituents. Different classes of

compound including tannins, flavonoids, phenolic acids, triterpenes, triterpenoid glycosides, lignin and lignin derivatives present in this plant part [10]. Plant bark is astringent and useful in the treatment of ulcers, fractures, haemorrhages, bronchitis and diarrhoea. It contains flavonoids, polyphenols and tannins. The bark is also showed anti-inflammatory activity and has pronounced effects on adjuvant arthritis also [11].

3.3. Terminalia bellirica

Distribution of this plant is scarce (Fig. 2, 3 and 4). It is called bastard myrobalan, beleric or bahera. Fruit of the plant is important and economically used every areas of West Bengal. It contains glucosides, tannins, gallic acids, ellagic acids, ethyl gallate, galloyl glucose, chebulanic acid. It is known to possess medicinal activity such as analgestic, antioxidant, hepatoprotective, antibacterial, anticancer and immunomodulary activity [12].



Fig. 2: Terminalia bellirica tree in the forest



Fig. 3: Sapling of Terminalia bellirica in the forest



Fig. 4: Seedlings of *Terminalia bellirica* in the forest floor

3.4. Terminalia chebula

It is called black-chebulic or myrobalan. Dry fruits are important for various ingradients and source chemicals for the plant products. It is used to treat chronic diarrhoea, nervous weakness, irritability even in respiratory tract infection. In ayurveda it is a component of *triphala churna* (Mixture of fruits in a dried form). Chemical compositions of this fruits are gallic acid, ellagic acid, chebulinic acid, chebulic acid and chebulagic acid [13].

3.5. Madhuca indica (Madhuca longifolia)

It is a sacred tree in India. It is also a tree of commercial importance. It is used to preparation of jelly, sweet candy, chocolate, jam, biodiesel, fuel, oil, oil cake, fertilizer, animal food [14]. Various chemical constituents found in this plant viz. glycosides, flavonoids, terpenes and saponins. Fruits contain quercetin, dihydro quercertin, beta setosterol, alpha and beta amyrin [15].

3.6. Aristolochia indica

The plant is called Indian Birthwort [16-19]. Its occurrence as rare in forest but edge of the jungle it is found (Fig. 5). Aristolochic acid is a major active constituent of this plant. Root is used in the treatment of sanke bites by aborigin. It is used to treat various ailments by the traditional medicine men. Aristolochic acid is a major active constituent of the plant is reported to cause cancer, nephropathy, sister chromatid exchange and a potent abortifacient [20]. Research revealed that this plant exhibits significant antimicrobial activity in test condition [21].



Fig. 5: Aristolochia indica

3.7. Hemidesmus indicus

The plant is called Indian sarsaparilla. Chemically the root is full of chemical constituents like 2-hydroxy, 4 methoxy benzaldehyde; lupeol, hemidesminine, resin acid, tannins, alpha amyrin, and beta amyrin [22]. Research revealed that it contains chemical that acts as anti-HIV-1 activity.

3.8. Asparagus racemosus

This plant is common in wild condition in the forest (Fig. 6). It is used widely in the traditional system of medicine. In Ayurveda, Siddha and in Unani, plant has been used for its therapeutic properties like anticancer, antiulcer, antioxidant, antidiarrhoeal, antibacterial, diuretic, anti-inflammatory and anti-tubercular activity [23].



Fig. 6: Asparagus racemosus

3.9. Smilax macrophylla

This plant is a woody liana in forest (Fig. 7). Its importance is immense in lateritic forest. Many research activities done on this plant. Rhizome and roots contain carbohydrates, reducing sugars, saponin, protein, alkaloids and tannins [24].



Fig. 7: Smilax macrophylla-a woody climber

3.10. Pterocarpus marsupium

It is a rare tree. It has properties to care the diseases like cancer, diabetes, ulcer, dementia, diarrhoea and so on. Plant contains pterostilbene, alkaloids, tannins, pentosan, pterosupin, pseudobaptiogenin, liquiritigenin, isoliquiritigenin, carpusin, propterol and many more [25].

3.11. Derris indica

It is a tree of lower altitude. In plantation stands, forest department used this species for commercial purpose and somewhere planted as ornamental and avenue tree. It contains karangin, glabrachalcone and isopongachromene [26]. Oil is used as a liniment for rheumatism. Roots are used for cleaning gums, teeth and cure ulcers.

3.12. Andrographis paniculata

It contains diterpenic constituents like andrographolide, andrographiside and neo-andrographilide [27]. A fine tonic plant wild in forest used widely to generate income by local people. It has its high demand in local market for its medicinal property (Fig. 8).



Fig. 8: Andrographis paniculata

3.13. Butea superb

A much spreading woody liana in jungle of hilly tracts as well as in plain forest found as rare plant. It is highly medicinal. Research revealed that it contains tannins, saponins, flavonoids, quinines, glycosides, cardiac glycosides, phenols, terpenoids, steroids, alkaloids, coumarins, anthocyanins and betacyanins [28].

3.14. Butea monosperma

It is a medium sized tree with beautiful flowers. It contains cajanin, isoformononetin and stigmasterol, butin and flavonoids like isobutrin and butrin [29]. Seeds have anthelmintic property especially for round worms and tapeworms.

3.15. Helicteris isora

It is a shrubby plant in hilly tracts of forest (Fig. 9). Plant contains polyphenols, carotenoids and ascorbic acid [30].



Fig. 9: Helicteris isora

3.16. Bombax ceiba

Flowers are used as vegetable and used to prepare soup (Fig. 10). It contains esculetin, fraxetin, scopoletin and epigenin including saponin [31].

3.17. Woodfordia fruticosa

It is a shrubby plant of forest edge and found along the crevices of hill rocks. Sometimes it is found as extra mural plants on buildings and on churches. It has its potency in curing various ailments like leprosy, toothache, leucorrhea, fever, dysentery, bowel diseases [32, 33]. Plant contains phenolics, hydrolysable tannins and flavonoids. Octacosanol and beta sitosterols reported from flowers of the said plant.



Fig. 10: Bombax ceiba

3.18. Terminalia arjuna

A tall tree of forest and sometimes as avenue found everywhere (Fig. 11). Foothills and in degraded land this plant has been planted for its soil binding property. Its bark is important locally as well as in ayurvedic system of medicine. Report revealed that bark of this plant has cardioprotective and antioxidant properties. Chemically its bark contains triterpenoids, ursane triterpenoids, glycosides, flavonoids and phenolics, tannins, including minerals and trace elements [34].



Fig. 11: Terminalia arjuna tree if field

3.19. Syzygium cumuni

A big tree in the forest of West Bengal. It is found wild in the roadside. It contains fair amount of mineral (Ca, K), vitamin (B-complex, vitamin C) and free sugar i.e. glucose, manose and sucrose [35]. Fruits are a rich source and high level of phenolic compounds.

3.20. Azadirachta indica

A tree of deciduous forest and in social forestry side of villages (Fig. 12) in study site. All the plant parts are important. Its activity is high as medicinal plant. Report confirmed that phytochemicals of margosa tree used as anti-inflammatory, antiarthritic, antipyretic, hypo-glycemic, antigastric ulcers, antifungal, antibacterial and antitumor agent. The plant has chemicals like azadirachtin, nimbolinin A, quercetin, nimbin, sitosterol, salanin and gedunin [36]. It is also a source of natural products [37].



Fig. 12: Azadirachta indica

Sr. No.	Types of Resources	Local Name	Scientific Name	Status
1.	- Fruits -	Amla/Amlaki	Phyllanthus emblica	Rare
2.		Mahul/Mahua	Madhuca indica	Rare
3.		Harituki/Hartuki	Terminalia chebula	Rare
4.		Bahera	Terminalia bellirica	Abundant
5.	Roots -	Dudhilata/Anantamool	Hemidesmus indicus	Abundant
6.		Iswarmul	Aristolochia indica	Rare
7.		Satmul/Satavari	Asparagus racemosus	Abundant
8.		Kumarika/Ramdantoon	Smilax macrophylla	Frequently found
9.	Seeds/flowers	Bija Sal/Piya sal	Pterocarpus marsupium	Extremely Rare
10.		Karanja	Derris indica	Rare
11.		Kalmegh	Andrographis paniculata	Common
12.		Latpalas	Butea superb	Rare
13.		Palas	Butea monosperma	Rare
14.		Atmochra/Petmochra	Helicteris isora	Common
15.		Simul/Lal Simal	Bombax ceiba	Common
16.		Dhadki or Abata	Woodfordia fruticosa	Rare
17.	Bark –	Arjun	Terminalia arjuna	Rare
18.		Jamun/Kalo jam	Syzygium cumuni	Rare
19.		Nim/Margosa	Azadirachta indica	Common
20.		Asan	Terminalia tomentosa	Very Rare

Table 1: Natural forest Products of Southwest Bengal, India

4. CONCLUSION

Result revealed that the area has high and diverse potential for natural products as NTFPs. These are whole plant, roots, barks, flowers, fruits, seeds and resins. These natural products are used as a potent source of economy as well as a good source of chemical constituents to develop various types of industries in and abroad. Regeneration of some plants in the forest is good but some are very rare. Therefore to maintain the forest resource it is very essential to study well on their status. Regeneration study on each important forest plant is urgent issue. Main purpose is here to develop local medicinal plant garden or nursery by local people for sustainable resource management and to develop local economy. Our duty is to promote them and encourage them to do it well for betterment of the society. Forest department and local government should promote them to do work along with different projects which could flow the resource as a managerial way for better management of the resource.

5. ACKNOWLEDGEMENTS

I am thankful to the members of organizing committee, ICITNAS, 2021. Foresters, Southwest Bengal, W.B.,

Director, BSI, Kolkata; Principal Chief Conservator of Forests, Govt. of W.B., Director of Public Instructions, Higher Education Department, Govt. of W.B.; Officerin-Charge, Lalgarh Govt. College, Lalgarh, Jhargram, W.B. Special thanks goes to the villagers whose direct assistance helped me to do it better. Last but not least thanks to Dr. Debjani Basu, Retired Scientist, BSI, for her help as and when required.

Conflict of interest

None

6. REFERENCES

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