(ISSN 2395 - 468X)
Year - 2017 Vol. 4, No. 4 Issue: April 2017

Van Sangyan

A monthly open access e-magazine

Indexed in:

COSMOS Foundation (Germany)

International Inst. of Org. Res. (Australia)

Tropical Forest Research Institute
(Indian Council of Forestry Research and Education)
Ministry of Environment, Forests and Climate Change (MoEFCC)
PO RFRC, Mandla Road, Jabalpur – 482021. India

Van Sangyan

Editorial Board

Note to Authors:

We welcome the readers of Van Sangyan to write to us about their views and issues in forestry. Those who wish to share their knowledge and experiences can send them:

by e-mail to vansangyan_tfri@icfre.org

or, through post to The Editor, Van Sangyan,
Tropical Forest Research Institute,
PO-RFRC, Mandla Road,
Jabalpur (M.P.) - 482021.

The articles can be in English, Hindi, Marathi, Chhattisgarhi and Oriya, and should contain the writers name, designation and full postal address, including e-mail id and contact number.

TFRI, Jabalpur houses experts from all fields of forestry who would be happy to answer reader's queries on various scientific issues. Your queries may be sent to The Editor, and the expert's reply to the same will be published in the next issue of Van Sangyan.

Cover Photo: Panoramic view of Achanakmar-Amarkantak Biosphere Reserve
Photo credit: Dr. N. Roychoudhury and Dr. Rajesh Kumar Mishra, TFRI, Jabalpur (M.P.)

From the Editor's desk

Non wood forest products (NWFPs) are goods of biological origin derived from forests, wooded lands and trees outside forests.The modern scope of forestry is being reported to have expanded, reflecting the fact of the importance of many nonwood forest products which has increased, leading to new interfaces with related disciplines. Non wood forest products play a crucial role in the daily life and welfare of people all over the world. They cover a wide range of; food, fodder, fibre, fertiliser, organic construction materials, non- wood ligno - cellulosic products, natural dyes, tannins, gums, resins, latex and other exudates, waxes, essential oils, spices, edible oils, medicinal extracts, phyto - chemicals, aroma - chemicals, decorative articles, horns, bones, pelts, plumes, hides and skins. These products are derived from a variety of sources- plants (palms, grasses, herbs, shrubs, trees) and animals (insects, birds, reptiles, large animals). Different parts of a plant or animal often provide different products, simultaneously and/or at different times.

Non wood forest products exhibit considerable variation in their use. Some are consumed immediately on harvest (e.g. fruits, fodder, wild meat) or after primary processing (e.g. edible nuts, bamboo products). Some others go through a series of down stream processing or refinements to meet the market specification or standards, adding value to the product all along the way, as for example phyto - chemicals, food additives and flavouring. A large number of NWFP appears as ingredients of varying medicines, perfumes, suntans lotions, nails polish, mouth wash, hair butter, breakfast cereals, golf balls, paints, corrosions inhibitors, insecticides, fungicides, and a host of others.

As plants and animals show regional and sub regional and local variations due to differences in habitats conditions, so the nature and utility of the NWFP varies. Thus the NWFP which are important in a specific locality are usually restricted in number. Inspite of this, however, the range of activities related to their production, management, processing and marketing is highly complex requiring adequate technology, support infrastructure, research facilities and skilled manpower. The technology currently in use in the area of NWFP varies between countries, ranging from crude to appropriate and sophisticated.

This issue of Van Sangyan contains an article on Role of forest products in sustaining food security. There are also useful articles, such as Problem of leaf curling of teak seedlings in nursery, Pharmacognosy- a blended science, Satellite meteorology- A review, तेंन्दुपत्ता संग्रहण, प्रसंस्करण एंव भंडारण का आर्थिक एवं पारम्परिक महत्व (in Hindi), अजोला खरपतवार: हानिकारक या लाभदायक (in Hindi), Ecological forestry, Lac culture as income generation activity of tribal people in Achanakmar-Amarkantak biosphere reserve, वन बीजों का एकत्रीकरण (in Hindi) and Biodiversity of Saussurea costus and Psilopogon viridis.

I hope that readers would find all information in this issue relevant and valuable. Van Sangyan welcomes articles, views and queries on various issues in the field of forest science.

Looking forward to meet you all through forthcoming issues.

Dr. N. Roychoudhury
Scientist G & Chief Editor

Contents

Role of forest products in sustaining food security

Moses Fayiah and Williams M. Kpama
Department of Forestry
School of Natural Resources Management
Njala University, Sierra Leone.
Email: moses.fayiah@yahoo.co.uk, mfayiah@njala.edu.sl

Abstract
The purpose of this study was to investigate the role forest products are playing in sustaining food security in Sierra Leone. The study was conducted in Nongowa Chiefdom Kenema District Eastern Sierra Leone. The data collection strategy use in the survey includes structural questionnaire, oral interview desk research and observations. Forty respondents were randomly selected from the four villages within the study area and they were Komendeh, Tissor, Bowebu and Combama respectively. The research results revealed that respondents within age range of 25 to 35 years were actively engaged in forest products collection with 70% of them being farmers. Over 70% of the respondents had no formal education therefore their only source of livelihood was through forest products and subsistence farming. According to the findings majority of the respondents depend on forest products such as forest fruit and nut, bush yam, bush meat, honey, snail, mushroom fish etc to support basic livelihood especially during the raining season when food shortage is experienced. The result further revealed that the forest does not only support food security but it does provide cash income through the sale of various products from the forest. This research concluded that forest product is contributing greatly to food security in the Eastern part of Sierra Leone.

Key words: Forest, forest products, food security, livelihood and fruits

Introduction

Food security has been defined by the committee on World Food Security as economic and physical access to food by all people at all time (FAO, 1983). Embodied in the concept is the recognition that people's ability to consumed food may be dependent on their own production as well as on their ability to purchase food, and that sufficiency, stability and continuity of supply are necessary to achieve food security. The definition also implies that food security entails meeting food requirements not only for current population but also future generations.Trees and forests contribute to improving the well-being of local populations by providing a wealth of food, flavorings, medicines and beverages. In fact, it can be said that nearly every tree, shrub or grass species is used in one way or another for food and nutrition. Plants provide food either directly in the form of fruits, seeds and other edible parts or indirectly by providing products that facilitate consumption of other foods (FAO, 2000).

In Africa, all species of wild animals, from insect to reptiles and from rodent to large mammals, are used as a food resource. The meat of wild animals that are hunted or collected for food is referred to by the West African term "bush meat", to differentiate it from "game", which refers to animals hunted for sport or trophy. In addition to being a highly preferred food item in many areas of Africa, wild animal

foods life-saving reserves in times of food shortage and hunger. The importance of caterpillars, beetles and termites as key sources off food in times of famine is particularly well documented for communities in the central African sub region (FAO, 1997). Bush meat is an important source of animal protein in both rural and urban household in Sierra Leone. Forests and the benefits they provide in the form of food, incomes and watershed protection have an important and often critical role in enabling people around the world to secure a stable and adequate food supply. Forests are important to the food security drive because they are one of the most accessible productive resources available free of charge. Foods from forests and other tree systems in Africa constitute an important component of household food supply. They include a wide variety of plant and animal products found in markets in both rural and urban areas. In many villages and small towns, the contribution of forests and trees to food supply is essential for food security, as they provide a number of important dietary elements that the normal agricultural produce does not provide adequately (FAO, 2000).

FAO (1998), in examining the contribution of forests to food and sustainable livelihoods, defines forests "to include all resources that can produce forest products. These can comprise wood land, scrubland, bush fallow and farm bush, and trees on farm, as well as forests". FAO's definition focuses not on tenure or tree cover as the basis for defining on forest, but on the potential for producing food products. Moreover, the contribution of forests is measured not only by the products they provide, but also by the non-tangible services they offer. Nonetheless, the general contribution of forest to livelihood outcomes can be identified. Tropical forests are located in the areas of the world with the highest concentration of food insecurity. They are home to approximately 300 million people who depend on shifting cultivation, hunting and gathering to survive (FAO, 1996), many are at risk of not consuming enough food to meet their daily energy requirement on a chronic, transitory or seasonal basis. In addition to this forest inhabitant, millions of people living adjacent to forest areas depend on forest for some aspect of their food security. One issue that is assuming increasing in significance is the contribution of forests to food security through root tubers. Forest has a large and essential contribution to play in improving present and future food security. A number of forests perennial are not food of choice in good terms but are lifesaving reserves in terms of food shortage which are eaten during the rainy season. Forest products help to improve both the physical and mental wellbeing of rural people in terms of food, employment and medicine (Kajembe, 1995).

Wildlife is important to food security not only through its direct contribution as a food resources, but also through its influences on access to food through employment and income generation, its influence on the physical, spiritual and cultural well-being of people and it positive and negative influence on food production capabilities. One third of the population in Africa is chronically undernourished, and rural population in many areas is compelled by socio-economic stresses to use all the natural resources available. Thus, animal species that were not normally exploited for food were eaten only by children as snacks are

now important items in the family diet and /or trade. Subsistence hunting account for more than 90% of the bush meat supply on the African continent (FAO, 1997).The use of wildlife as food resources is controversial because at current levels of exploitation it is considered unsustainable. The potential of mushrooms in African forests and other landscapes is largely untapped. The combination of warm weather and air moisture over long periods provides excellent condition for the production of mushrooms. Several varieties grow on decaying roots dead wood, termite mounds or directly on cultivated land (FAO, 1986).

The meats of wildlife, the so-called "bush meat", is an important complement to household food supply and nutrition in Africa. In addition to hunting by adults, the capture and direct consumption of small wild animals by children of small rodents, reptiles and fowl contributed an average of 400g of protein per person per month to children's intake (Vinctes, Sournia and Wangari, 1987) enough to meet about a half to one third of the daily protein requirement of a seven to ten year old child (WHO, 1985). Hunting still provides a sizeable part of meat consumption for many societies, but also cash income that contributes to food security, (FAO, 1997).

There is a wealth of wild fruits and flowers that have great potential for local use as well as commercial development. Many fruits are produced in West African agro-forestry parklands and fallows. Some nutritious examples with potential for further development include fruits of the Tamarinda tree (*Tamarindusindicus*), whose use is already highly developed in Asia (Thailand in particular); the pods of the locust bean tree (*Parkiabiglobosa*), highly rich in vitamins and present in many preparations and recipes; the drupes (one-seeded fruits) of *Spondiamombin*; and the fruit of *Detariumspp* (FAO, 2000).

Table 1: Trees species with great food and medicinal potentials in Africa

NO	SPECIES NAME	USE
1	*AgaricuCompestris*	Food and medicine
2	*AgaricusSilvaticus*	Food
3	*ArmillariaMellea*	Food
4	*CalocybeGambosa*	Food and medicine
5	*ConthorellusCibarius*	Food
6	*LactariusDeliciosus*	Food
7	*LepistaNuda*	Food and medicine
8	*LepistaPersonata*	Food
9	*Microlepiota excoriate*	Food
10	*Microlepiotaprocera*	Food
11	*Pleurotuseryngii*	Food
12	*Suillus granulates*	Food and medicine
13	*Suilluslueus*	Medicinal
14	*Dictyophoraindusiata*	Food
15	*Fflammulianavelutipes*	Food and medicine

16	*Ganadermalucidum*	Food
17	*Hericiumerindum*	Food
18	*Lactariusathahatsu*	Food and medicine
19	*Lactariusdeliciosus*	Food
20	*Cyttarraespinosea*	Medicinal

Source: modified from Armenia managuylan (2002)

Minor forest products like medicinal plant, species gums, latex, bamboo cane, rope, raffia, rattan, honey, nuts, mushroom, resins and essential oil were recognized to contribute greatly to food security (FAO, 2003). According to Falconer (1990), forest dwelling household in India have always benefited a great deal from "Minor" forest products such as gums, oils, spices, medicinal drugs, food with export potential, such as bamboo shoots, mushrooms, edible fungi, snails, tons, dyes, fibers, grasses, furniture, basket and paper which are sources of foreign exchange for urban and rural people in India. Minor forest product may also provide raw materials for small-scale cottage industries and these are important to local economics and food supply (Hamilton and kings, 1982). Some minor forest products use from tropical forests as raw materials include honey, rattan, bamboo, rope and raffia (Hamilton and kings, 1982). In Africa, minor forest products are located in sparse remote rural areas in which they have great potential to contribute to food, income and employment facilities where it is most needed (Kajembe, 1995). In 2008, Argentina, China, Tuckey, Ukraine and USA were the top five producing countries of honey. The world production of honey increased by 32% from 2000-2008 to reach 1,517,747 tons. In Koinadugu District of Sierra Leone, Food and Agriculture Organization of the United Nations (FAO), identified honey as one of the products that has potential to become an income earner for farmers in the Districtwomen package the honey into seven kilo gram (7kg) plastic containers and send to market places where buyers from neighboring Guinea, cross the border into Sierra Leone and buy at cheap prices (Aidoo, 2011).

Table 2: Names of plants and their parts use as food supplements in Africa

Plants parts	Species name	Use	Country
Leaf	*Adansoniadigitara*	Medicinal	Nigeria
	Alstonia boonei	Medicinal	Nigeria, Sierra Leone
	Vitex doniana	Food and medicine	Nigeria
	Anisophylalaurina	Medicinal	Nigeria, Sierra Leone
Fruits	*Parkiabiglobsa*	Food	Nigeria
	Spondiamonbin	Medicinal	Nigeria, Sierra Leone
	Avingiagabnnensis	Food	Nigeria, Sierra Leone
	Diliumginnensis	Food	Nigeria, Sierra Leone
	Acacia senegal	Tannin	Sudan, chard

Exudates	*Phycnanthus angolense*	Medicinal	Nigeria
	Phizophora recemosa	Tannin	Cameroon
	Prunus africa	Tannin	Cameroon
	Milicia excels	Medicinal	Nigeria, Sierra Leone
	Spondiamonbin	Medicinal	Sierra Leone, Nigeria
Nuts	*Vitelaria parkia*	Cosmetic food	Nigeria
	Vitelaria paradoxum	Cosmetic	Nigeria
	Kala acumunata	Food	Sierra Leone
	Kola nitida	Food	Sierra Leone
Seed	*Treculia africana*	Food	Nigeria, Sierra Leone
	Pterocarpus samtalinoides	Food, medicine	Nigeria, Sierra Leone
Extracts	*Lonchocarpus cyanesccens*	Dyes	Sierra Leone
	Pterocarpus osum	Dyes	Sierra Leone, Nigeria
Tuber	*Harpagophytum* spp.	Medicinal	Namibia, Botswana

Sources: modified from Omiyale and Ikotun (2009)

Research methodology

Study area

Kenema is a cosmopolitan city that has in the past and still attracting international investors and business people from other parts of the country from different cultural background**.** The study was carried out in Nongowa Chiefdom, Kenema District in the Eastern Province of Sierra Leone. Nongowa Chiefdom lies between latitude 7^{o}_{N} and longitude 11^{o}_{W} with maximum temperature between 22^{o}_{c} and 30^{o}_{c}. The population of Nongowa Chiefdom is 179,888 (Statistic, 2004). The climate is seasonal with six month raining season (May to October) and six month dry season November to April. The average rainfall for the entire Kenema District is 117,628 mm (FAO, 2005). Nongowa Chiefdom was originally covered with tropical rainforest, but man's interferences with the vegetation for lumbering, mining and agriculture have given way for the destruction of the forest to farm bush in some part of the area. However, rainforest could still be found in patches along the Kambui hill and along river valley of the District. The predominant tribe in the study area is Mende with other ethnic group such as Temne, Fullah, Mandigo, Kissi, Kono etc.

Sources of data collection and sampling procedure

Therandom sampling method was adopted to select respondents in the four villages. The target groups were civil servant, elderly, women and youth. Based on a reconnaissance survey, 10 respondents were selected from each village. In total 40 questionnaires were administered. Another relevant source of information was observation, group discussion and desk review.

Findings and analysis

Demographic features of respondent

Results reveal that 37.5% of the respondents were between the age brackets of 25-35 while 27.5% were between 47-57 years respectively Table 3. The life expectancy is in Sierra Leone ranges from 55-60 therefore respondents within this age group show high responsibility in communities.

Table 3: Distribution of respondent based on age group

Age range	Villages									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indiv	%	Indiv	%	Indiv	%	Indiv	%	Indiv	%
25- 35	6	15	5	12.5	2	5	2	5	15	37.5
36-46	--	---	2	5	4	10	3	7.5	9	22.5
47-57	2	5	3	7.5	3	7.5	3	7.5	11	27.5
58-68	2	5	-----	--	----	---------	2	5	4	10
69>	---	-	-----	----	1	2.5	---	--------	1	2.5
Total	10	25	10	25	10	25	10	25	40	100

Source: field survey 2013

The table below reveals the occupation of respondents in the study area. Farming was found to be the major occupation in the study area. Civil service and students accounted for 7.5% each while trading accounted for 10%. Subsistence agriculture is the main farming type in these villages

Table 4: Occupation of respondents

Occupation	Villages									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indi	%	Indi	%	Indiv	%	Indi	%	Indiv	%
Farming	6	15	7	17.5	6	15	9	22.5	28	70
Trade	-------		2	5	1	2.5	1	2.5	4	10
Civil servant	2	5			1	2.5			3	7.5
Student			1	2.5	2	5	---------		3	7.5
Blacksmith	2	5	-------		-------		---------		2	5
Total	**10**	**25**	**10**	**25**	**10**	**25**	**10**	**25**	**40**	**100**

Source: field survey 2013

The result from table 5 below reveals that 77.5% of the respondents in the study area did not attend any form of school. However, 12.5% had secondary school education, while 10% had primary education.

Table 5: Respondents education

Education	Villages									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indiv	%	Indiv	%	Indiv	%	Indiv	%	Indiv	%
Tertiary	---------		-------		------		----		----------	
Secondary	1	2.5	3	7.5	1	2.5	---	------	5	12.5
Primary	2	5	---	---	2	5	2	5	4	10

None	7	17.5	7	17.5	9	22.5	8	20	31	77.5
Total	**10**	**25**	**10**	**25**	**10**	**25**	**10**	**25**	**40**	**100**

Source: field survey 2013

Fifty percent of the respondents in the table below had family size between 5-8 people while 20% had 1-4 dependents Table 6. Having plenty children in rural areas of Sierra Leone gives greater workforce advantage.

Table 6: Family size of respondents

Family size	**Villages**									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indiv	%	Indiv	%	Indiv	%	Indiv	%	Indiv	%
1---4	2	5	1	2.5	4	10	1	2.5	8	20
5---8	6	15	4	10	3	7.5	7	17.5	20	50
9—13	---	--------	5	12.5	3	7.5	----	--------	8	20
14>	2	5	-----	-----	---	----------	2	5	4	10
Total	**10**	**25**	**10**	**25**	**10**	**25**	**10**	**25**	**40**	**100**

Source: field survey 2013

The research result reveals that 37.5% of respondents in the four villages depend on bush yam and other rooted tubers for food especially during the raining season. Fruits and nuts 17.5% was the second most collected food supplements alongside bush meat 15%. Honey, mushroom, insects and birds were other food supplements collected from the forest for consumption. Fruits and bush meat were also collected on a large scale respectively Table 7.

Table 7: Food products collected from the forest for consumption

Food products	**Villages**									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indiv	%	Indiv	%	Indiv	%	Indiv	%	Indiv	%
Bush yam & other tubers	5	12.5	3	7.5	3	7.5	4	10	15	37.5
Fruits and nuts	3	7.5	2	5	1	2.5	1	2.5	7	17.5
Mushroom	----	-----	1	2.5	----	----------	1	2.5	2	5
Honey	1	2.5	1	2.5	----	----------	2	5	4	10
Bush meat	1	2.5	1	2.5	2	5	2	5	6	15
Snail	------	----	1	2.5	1	2.5			2	5
Insects and grasshoppers	----	-----			1	2.5	1	2.5	2	5
Birds and reptiles	----	-------	1	2.5	1	2.5			25	
Total	**10**	**25**	**10**	**25**	**10**	**25**	**10**	**25**	**40**	**100**

Source: field survey 2013

According table 8, Mangiferaindica 37.5%, Kola nitida 17.5% and Anisophyllalaurina 12% were the trees respondents collected or gathered fruits from mostly. These trees provide succulent fruits that attract all ages.

Table 8: Trees species with edible fruits in the study area

Trees with edible parts	Villages									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indi	%	Indi	%	Indiv	%	Indi	%	Indiv	%
Treculiaafricana	----	----	1	2.5	----	-------	2	5	3	7.5
Kala acumunata	1	2.5	1	2.5	---------		3	7.5	5	12.5
Kola nitida	2	5	2	5	1	2.5	2	5	7	17.5
Anisophylalaurina	1	2.5	2	5	1	2.5	1	2.5	5	12.5
Perenarieexcelsa	---	--------	1	2.5	1	2.5	---	---	2	5
Dialiumininess	1	2.5	-----	-----	1	2.5	----	---	2	5
Mahogany spp	----	--------	---	---	1	2.5	---	- -------	1	2.5
Mangiferaindica	5	12.5	3	7.5	5	12.5	2	5	15	37.5
Total	**10**	**25**	**10**	**25**	**10**	**25**	**10**	**25**	**40**	**100**

Source: field survey 2013

The study shows that *Kola nitida* 37.5% was the forest products collected mostly for sale even among locals themselves. Honey and timber were also sold though in smaller quantity Table 9.

Table 9: Mostly collected/harvested forest products for sale in study area

Saleable forest product	Villages									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indi	%	Indi	%	Indiv	%	Indi	%	Indiv	%
Kola nitida	5	12.5	3	7.5	3	7.5	4	10	15	37.5
Honey	3	7.5	2	5	1	2.5	1	2.5	7	17.5
Fruits	----	-----	1	2.5	----	----------	1	2.5	2	5
Timber	1	2.5	1	2.5	----	----------	2	5	4	10
Poles	1	2.5	1	2.5	2	5	2	5	6	15
Fuel wood	------	----	1	2.5	1	2.5	----	--	2	5
Bush meat	----	-----	----	---	1	2.5	1	2.5	2	5
Bush yam	----	-------	1	2.5	1	2.5	----	----	2	5
Total	10	25	10	25	10	25	10	25	40	100

Source: field survey 2013

Table 10 below reveals that 45% of the respondents used all harvesting methods to gather forest products whilenatural gathering 22.5% of forest products from the floor was the most common method of collecting forest products. Climbing and shaking was also considered as an alternative to collecting fruits from certain trees.

Table 10: Forest products harvesting methods

Harvesting methods	Villages									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indi	%	Indi	%	Indiv	%	Indi	%	Indiv	%
Floor gathering	2	5	3	7.5	2	5	2	5	9	22.5
Felling	-----	----	2	5	1	2.5	2	5	5	12.5
Climbing and shaking	4	10	1	2.5	---	--------	3	7.5	8	20
Combination of all methods	4	10	4	10	7	17.5	3	7.5	18	45
Total	**10**	**25**	**10**	**25**	**10**	**25**	**10**	**25**	**40**	**100**

Source: field survey 2013

The result reveals that energy 27.5%, food security 22.5% and building materials 22.5% were the major livelihood dependence on forest resources. Cash income, medicinal and domestic utensil were other important areas supplemented by forest products.

Table 11: Distribution of respondents based on forest dependence

Forest dependence	Villages									
	Komendeh		Tissor		Cambowebu		Combema		Total	%
	Indiv	%	Indiv	%	Indiv	%	Indiv	%	Indiv	%
Food	2	5	3	7.5	1	2.5	3	7.5	9	22.5
Building materials	2	5	3	7.5	2	5	2	5	9	22.5
Medicinal herbs	1	2.5	1	2.5	1	2.5	----	----	3	7.5
Energy	2	5	2	5	4	10	3	7.5	11	27.5
Cash income	2	5	----	-------	2	5	1	2.5	5	12.5
Domestic utensils	1	2.5	1	2.5	---	----	1	2.5	3	7.5
Total	**10**	**25**	**10**	**25**	**10**	**25**	**10**	**25**	**40**	**100**

Source: field survey 2013

Discussion

About 37.5% of the respondents were between the age ranges of 25-35 as seen in (Table 3). This age range is the labor for in local communities because they have enough energy undertake any kind of task. Another labor force age range are those whose ranging from 47- 57 and they are

characterized by family responsibility and experience. This age group was very instrumental in the collection of information on this research based on their experience, and responsibility. A greater proportion of the respondents 77.5% were farmers. In rural areas of Sierra Leone getting a job is one in a million opportunity therefore, locals have no choice but to engaged in subsistence agriculture which helps them full filled their survival challenge. Another reason why majority of the respondents living in Nongowa Chiefdom were farmers was attributed to high illiteracy 77.5% and poverty level (Table 4). About 10% of the respondents were traders engage in diverse trade in commodities ranging from domestic items to forest products. Only 12% of the respondents had secondary education though incomplete. However, their little education doesn't change their status nor capable of giving them a job. The educational status, occupation and family size have direct bearing with poverty level in local communities. It has been proven that educational civilization foster rapid development in any community around the world with the inverse being reciprocal. Consequently, large family sizes and high illiteracy in any community bring retrogression and poverty. Busy yam & other tubers 37.5%, Bush meat and fruits are the food resources collected from the forest for consumption especially during the raining season. The collection of bush yam and fruits is mostly active during the raining season as that is the hunger period in local communities within Sierra Leone. Bush meat and bush yam are active food supplements during those periods. Honey, mushrooms, snails, birds and reptiles as well as insects all contribute greatly to the everyday diet in the study area. FAO (1997) reported that wild animal food is a life-saving reserve in terms of food shortage and hunger. It was also report that caterpillars, beetles and termite as the sources of food in term of famine is particularly well documented for communities in the central Africa sub region. FAO (2003) confirms that minor forest products like nut and fruit were sold to earn income, while bush yam were recognized to contribute to food security especially during food shortage (rainy season) in remote areas of Sierra Leone. Vantomme et al. (2004) explained that in central Africa Republic, insect like dried *ambrosia caterpillar* contribute up to one third of bush meat and fish declined. FAO (1997), also reports that subsistence's hunting account for more than 90% of the bush meat supply on the Africa continent. In Sierra Leone forest products are great supplements to food security because of the diverse eating habit and the large number of wild fruits and animals trapped for consumption on a daily basis. *Mangiferaindica*, *Kola nitida*, *Kola acumunata* and *Anisophyllalaurina* fruits are among the trees whose fruits are cherished and consumed by all tribal and local people. In addition to those trees species there are many more trees with edible fruits in the study area. Some fruits produce fruits throughout the year while others are seasonal like *Mangiferaindica*. Kajembe, (1995) said that in part of Africa, diet based on staple grains depend large on sources made from trees products to provide this nutrient which is essential to prevent nutritional blindness.

Kajembe (1995) also concludes that in Africa today, one issue that is assuming increasing in significance in West Africa to be precise is the contribution of forest in

food security. Forest has a large and essential role to play in improving present and future food security.Though a number of forests perennial are not food of choice in good terms but are lifesaving reserves in terms of food shortage which are eaten during the rainy season.

Kola nitida commonly called kola nut in Sierra Leone is chewed by many as it is believed to sustain people from hunger. Therefore, plenty people enjoy trading the nut which is mostly collected by natives in villages. About 37.5% of respondents within the study area were found to be engaged in the selling of Kola nitida while 17.5 % were engaged with in honey trading. In Sierra Leone, Koina, pure forest honey is now sold in supermarkets and is contributing to food security in the sub region. (Aidoo, 2011). In Eastern Sierra Leone, palm oil, giant snail, honey, rattan chair are the most marketable minor forest products produced. The sale of poles along high way in Sierra Leone emerged after the brutal civil war when the need for rebuilding became a priority among citizens. Since then, poles can be seen along highways especially towards the capital city Freetown and it has become an employment for jobless youths (table 9). Majority of the respondents collected forest products using various method of collection as stated in table 10. Most people living in Sierra Leone rely on forest for their livelihood. Such as timber, logs, fuel wood, pole, bamboo cane, rope, rattan, raffia, honey, nuts, mushroom, resins, charcoal, to improve on their living standard and nutrition.However, the extent to which forests can alleviate poverty and improve food security for susceptible population is not well documented (Foley and Bernard 1984). Natives in the study area mostly depend on the forest to fulfill their basic livelihood needs on every day basis.

Conclusion

The role of forest products in sustaining food security is significantly diversified and valuable. It ranges from direct production of food to provision of job and financial income especially in rural communities. The findings revealed that age range of 25 to 35 years, were actively engaged in forest products collection with 70% of them being farmers. Over 70% of the respondents had no formal education. Hence farming and the forest are the only source of livelihood in the villages. According to the findings, it was concluded that majority of the respondents depended on forest products such as forest fruit and nut, bush yam, bush meat, honey, snail, mushroom fish etc to support their livelihood especially during the raining season. It is concluded that forest product are contributing greatly to food security in the Eastern part of Sierra Leone and the sub Western African region.

References

Aidoo K. (2010). Making local been keeping sustainable in Sierra Leone. Bees for Development Journal, issue # Vol. (1) pp 6 - 10

FAO (1986). African agriculture - the next 25 years. Rome.

FAO. (1986). Forests resources development and conservation. A Preliminary investary by consultants to ECA / FAO.pp 57 - 65

FAO (1997). Wildlife and Food Security in Africa, by YaaNtiamoa. FAO Conservation Guide No 32 Rome.

FAO (1997) Mangrove Forest Management Guide Line FAO Forestry paper 116 Rome

FAO (2000) Forest, Trees and people. Forestry Topics report No 2, FAO Forestry Department pp 40

FAO (2003) Forest and forestry Rome Italy pp - 13 - 16

FAO (2005). Global Forest Resource Assessment, 2005 In: www.fao.org/ forestry/ site/ 32185/en sie.

Falconer, J. (1990). The major significance of minor forest products the local use and value of forest in the West African Human Forest Zone.

Foley G. and Barnard, G. (1984) Farm and Community Forestry. An energy information programmed Technical Report No 3 By LLED pp 289.

Hamilton L.S and king P.N.J (1982). The Tropical Forested Watersheds Hydrological and soil response to major uses or conservation. West view press / builder, Colorado pp 160

Kujembe G.C (1995). Indigenous management system as a Basis for Community Forestry in Tanzania. A case study of Dodoma urban and Lesotho District. Tropical Resources Management paper No 6. Wagenigen Agriculture University. The Netherlands pp 194.

OlufemiOmiyale and BubatundeIkotun, (2009). Non wood Forest products and prospect for their contribution to the cross domestic product of Sierra Leone: Njala Journal of Agriculture, Sciences and Technology. School of Forestry and Horticulture, Njala University, private mail bag, Freetown, Sierra Leone, Vol (1) No pp 124 - 128.

Vinke, P.P., Sournia, G and Wangari, E.J. eds. (1987). Enjeux et perspectives de la conservation all service du development: le cas de la mouritanie. In pour unegestion de la faune du sahel: versunepolitiqu de concertation et de cooperation regionaleinternationale. Proceedings of a seminor, mouakchott, mauritania. Dakar, Senegal, ENDA Tiers monde.

World Health Organization (WHO) (1985). Energy and protein requirements. Report of a joint FAO/WHO/UNU Export consultation. WHO Technical Report Series No 724 Geneva, Switzerland.

Problem of leaf curling of teak seedlings in nursery

P. B. Meshram and R.K.Verma
Forest Entomology Division and Forest Pathology Division
Tropical Forest Research Institute
(Indian Council of Forestry Research & Education, Ministry of Environment, Forests and Climate Change, Govt. of India)
P.O. RFRC, Mandla Road Jabalpur - 482021, M.P.
Email: pbmeshram1959@gmail.com

Introduction

Teak (*Tectona grandis* Linn. f., Family Verbeanaceae) is a major tropical timber yielding species distributed in India and South-East Asian regions. Owning to its good quality timber, teak is widely planted throughout its geographical range as well as other countries of tropical Asia, Africa and Latin America. *Tectona grandis* has a worldwide reputation as a quality timber trees on account of its remarkable physical and mechanical properties, particularly elasticity, strength and durability. Indian teak varies greatly from locality to locality in timber characteristics such as color, grain, texture and figure. According to an estimate (Prasad, 1986), teak is annually being raised over an estimated area of 15,000 hectares and for this, plantation target about 500 tones of teak seeds are required. In productive nurseries, large number of seedlings is raised for further plantations programmes. Due to the climatic change, the insect pests and diseases are prone to the seedlings of teak in nurseries. Such an economically important forest tree species is attacked by the viruli-form sap suckers which affect the growth of plants. Jassids or leaf hoppers are polyphagous and feed on the plants including *Santalum album* and cause spike disease (Pruthi, 1936; Rangaswami & Griffith, 1940; Beeson, 1941; and Brown, 1968). The present paper deals with the leaf curling of teak seedlings in forest nursery at Khakarapura (Hoshangabad), Madhya Pradesh.

Fig. 1: Teak seedlings raised in beds in forest nursery, Khakrapura (Hoshangabad)

With reference to the letter no. vyay /2016/2234/ November 18, 2016 regarding the leaf curling in teak seedlings in forest nursery, Khakarapura and instruction of Director, TFRI, Jabalpur, a team of Scientists of this institute visited to Khakarapura on December 10, 2016 to record the observations on pest status and to discuss with Chief Conservator of Forest, Research & Extension Circle, Betul and staff of Khakarapura in order to know the details of leaf curling of teak seedlings.

Forest Nursery, Khakarapura (Hoshangabad) has raised by Research & Extension Circle, Betul, Madhya Pradesh in area 18.50 ha. Teak (*Tectona grandis*) seedlings were grown in 3000 beds (size-10x1 m) during 2016. The teak seeds were sown during May-June, 2016. Neem cake 2kg, FYM 15 kg, vermicompost 2 kg and

BHC (Lindane) powder 50 g per bed were applied at the time of sowing. The average seedlings per bed were 600. As per the information given by the staff, the incidence of leaf curling was started from October, 2016. For protection of the seedlings, they applied omite (propargite) 25 ml, chlorpyrifos 20 ml, organic plant growth promoter (Bhalla) 30 ml, Imidacloprid (Bullet) 70% 10 ml in 15 lit of water.

Observations

Survey was conducted in forest nursery at Khakarapura in different sectors and beds. It was observed that the teak seedlings

Fig.2: Leaf curlings in teak seedlings

attacked by leaf curling. The symptoms of leaf curling are the shortened inter-node, leaf roll and necrosis were observed. Puckering and mottling of leaf blade and gradual reduction in size were also observed. Curling leaves, thickening, swelling of veins and affected seedlings appear busy with stunted growth (Figs.1-3) The disease possibly caused by viruses / phytoplasma. Generally leaf curling virus transmitted by viruliform insects i.e. sap suckers (jassids).

Fig. 3: Teak leaves curling

In Tropical Forest Research Institute, Jabalpur, no any virologists are working. Therefore, the present problem of leaf curling was referred to the Virologist Dr. G.P.Rao, Principal Scientist, Division of Pathology and Dr. N.M.Meshram, Scientist (Taxonomist-Hemiptera), Division of Entomology, Indian Agricultural Research Institute (ICAR), New Delhi for further diagnosis and actual cause of leaf curling in teak seedlings. As per the information given by the scientists, there was no any virus, the teak seedlings damaged by Phytoplasmas. Phytoplasmas are spread principally by insect of the families Cicadellidae (leafhoppers) which feed on the phloem of infected plants, ingesting phytoplamsa and transmitting them to the next plant on which they feed. Thus, the host range of phytophagous is strongly dependent upon that of the insect vector. The observations on the incidence of leaf curling in teak seedlings are summarized in Table 1. The incidence of leaf curling ranges from 39.00 to 77. 65 per cent in different beds and sectors of forest nursery. The average incidence of leaf curling was recorded 55.37 per cent.

On the basis of the nature of damage, the insect pest i.e. jassids suck sap from leaves and cause characteristics hopper burn (Figs. 2-3) i.e. yellowing of leaves all along the leaf margin in the final stage of attack, the leaf becomes cup shaped.

Control measures

1. Installation of light trap for collection of the jassids or use yellow sticky traps 50 nos./ ha.
2. For protection of seedlings against leaf curling insecticide combination like imidachloprid 17.8 EC @ 0.1% 0.5 ml or monocrotophos 36 E.C. @ 0.05% 1.5 ml + plant antibiotic Streptocyclin (plant antibiotic) 0.1% 1.5 ml per lit of water should be sprayed after 15 days interval.
3. As a preventive measure, in next year this combination should be sprayed after rainy season for protection of teak seedlings.

The insect pest i.e. jassids occur throughout in cultivated land and fairly commonly in forests, frequently several species. They occur from November to February. Both adults and nymphs jump very actively and move side ways. Most obvious sign of the injury is the reduced stem height (Beeson, 1941 and Browne, 1968). This is the first report of leaf curling of teak seedlings due to the phytoplasma transmitted by the jassids in forest nursery.

Conclusion

It can be concluded that teak seedlings were damaged by phytoplasmas and spread principally by insect of the families Cicadellidae (leafhoppers) which feed on the phloem of plants, ingesting phytoplamsa and transmitting them to the next plant on which they feed. On the basis of the nature of damage, the insect pest-jassids suck the sap from leaves and cause characteristics hopper burn i.e. yellowing of leaves all along the leaf margin in the final stage of attack and leaf becomes cup shaped.

Table 1: Observations on the incidence of leaf curling in teak seedlings

Sl. No.	Total seedlings	Affected seedlings	% incidence
1	650	285	43.84
2	485	190	39.12
3	592	308	52.02
4	465	361	77.65
5	676	434	64.20
		Average	55.37

Acknowledgement

Authors are thankful to Dr. U. Prakasham, IFS, Director and Shri P. Subramanyam, IFS Head of Office, Tropical Forest Research Institute, Jabalpur, for providing the necessary facilities for carrying out the study. We are also thankful to the Chief Conservator of Forest, Research & Extension Circle, Betul and staff of Khakarapura (Hoshangabad) for providing the necessary field facilities.

References

Banttari, E. E. and Zeyea, R. J. (1979). Interactions of mycoplasma like organisms and viruses in dually infected eafhoppers, plant hoppers and plants. Leafhopper vector and Plant Disease Agents, 327-347.

Beeson, C.F.C. (1941). The Ecology and Control of Forest Insects of India and Neighbouring Countries. Vasant Press, Dehra Dun, ii + 1007 pp.

Break, J. (1979). leafhopper and lanthopper vectors of plant disease agents in central and southern Europe. Leafhopper Vector and Plant Disease Agents, 97: 154.

Browne, F. G. (1968). Pests and Diseases of Forest Plantation Trees. Clarendon Press, Oxford, 1330 pp.

Lee, I. M. and Davis, R. E. (1992). Mycoplasmas which infect insects and plants. In: Mycoplasmas: Molecular Biology and Pathogenesis. Eds. Maniloff, J.,McElmansey, R. N., Finch, L. R. and Baseman, J. B., American Society for Microbiology, Washington DC, p. 609.

Pruthi, H.S. (1936). Jassids of Sandal. Mem, Ind. For. Rec., XIX, vi, pp.3 0. fig.8 pl.i.

Rangaswami, s. and Grifith, A.L.(1940). Further studies in the spike disease of sandal. Ind. For.Rec.Ent.vi, No.4,pp.85-196.pls i-xii.

Weintraub, P.G. and Beanland, LeAnn. (2006). Insect vectors of Phytoplasmas. Annual Review of Entomology, 51:91-111.

Pharmacognosy- a blended science

Vineet Singh and Arti Garg
Botanical Survey of India, Central regional Centre
Allahabad (U.P.)-211002
E-mail: vineet.singh332@gmail.com

Academic prosperity has triggered real changes in course structures countrywide, including the basic syllabus of graduate and postgraduate examinations. However, in pursuit of evolving modern methods of education, the life science discipline got embedded with bioinformatics and biotechnology studies, while the vital basic subjects went underrated.

Pharmacognosy, a discipline of science deals with the knowledge of therapeutic plants is one of the most significance subjects for research and development of new drugs. It is perhaps the oldest modern science, and generally the study of crude drugs of plant and animal origin (in the form of tinctures, teas, poultices, powders, and other herbal formulations), and it incorporates authentication and quality control of such drugs, based on macroscopic and microscopic examinations of crude drugs. This branch nowadays amalgamated with the different modern branches of biology in search of some noble discoveries in relation to natural products.

This involves the extensive study of natural products from various sources including plants, bacteria, fungi, and marine organisms. It has always been a translational or multidisciplinary science, and during the evolution of the scope of this subject area, phytochemistry and phytochemical analysis have become integral parts of this important branch. Molecular biology has become essential to medicinal plant drug discovery through the determination and implementation of appropriate screening assays directed toward physiologically relevant molecular targets, and modern Pharmacognosy also encapsulates all these relevant new areas into a distinct interdisciplinary science.

The emphasis and focus of research in this field have changed significantly, from focusing on identification of drugs, including the isolation of active principles, and more recently, the investigation of biological activity. This also includes research in ethnobotany, ethnomedicine, and ethnopharmacology.

It also formed the basis of the development of the subject “Pharmacy.” However, it is rather unfortunate that this subject is somewhat neglected nowadays as a major subject area within the modern Pharmacy curricula. For the sake of new hypes of modern medicine, one should not forget the usefulness traditional medicines based on plants.

Current research in drug discovery from medicinal plants involves a multifaceted approach combining botanical, computational, phytochemical, biological, and molecular techniques. It is evident that drug discovery from medicinal plants continues to provide new and important leads against various pharmacological targets including cancer, HIV/AIDS, Alzheimer's, malaria, and pain. Several natural product drugs of plant origin have either recently been introduced or are currently involved in late-phase clinical trials.

India is the world’s third largest manufacturer of pharmaceuticals, with

export to over 65 countries[1.] The fact that we need to attract students to pursue a career in science has been well established, particulary as one sees the dwindling admission for science stream courses in number of colleges. A degree in science is not considered to be useful in the Indian job markets. The journey of synthesis of natural products isolated from medicinal plants or microorganisms e.g. Atropine, Aspirin, Quinine, Morphine, Reserpine, Colchicine, Vincristine, Azadirachtin etc. have remarkable and breathtaking enriching organic chemistry as well as interfacing biological sciences[2].

Introduction of Undergraduate course as B.Sc. (Hons.) in pharmacognosy after 12th standard in Science and M.Sc. (Pharmacognosy) courses after graduation in basic sciences in state and central universities is crucial in this modern scenario to create interest in pursuing graduation and P.G. like B.Sc.(Hons) in different science subjects or atleast specialisation in pharmacognosy during PG in botany. In India, it is common phenonmenon that if one passed 12th with Mathematics he is bound to pursue career in Engineering (B.Tech) and a student passsed 12th with Biology he or she should opt Medical as career. But both the career option are limited and a hard nut to crack because there are limited seats in the premier institute of the country related to these disciplines. Many students waste their valuable time in preparation for the entrance examinations for these two elite careers. There are many opportunity for Pharmacognosy graduate and post graduate in India like as in BSI (Botanical Survey of India), CCRAS(Central Council for Research in Ayurveda and Siddha), CCRUM (Central Council for Research in Unani Medicine) ,Pharmacognosy laboratories in CSIR viz. NBRI (Lucknow), CIMAP (Lucknow),IIIM (Jammu) etc.

This type of UG and PG courses in different universities may opened new horizon for well trained Ph D graduates from the country and abroad to join the Pharmacognosy Department to teach modern and applied concept of this classical branch of Botany like Department of Biotechnology (DBT), Govt. of India supports the M.Sc Biotech programme across different universities and Institutions in India. As this course has discrete impact on biology education and research such as it attracted many young talented science graduates to take up this modern biological course. Such specialization is also expected to provide better job opportunities in premiere Government Institutions and to generate better qualitative and quantitative pharmacognostic approaches in our country.

Gopalkumar, K.M. and Santosh, M.R. (2012). Third World Resurgence., 259, 9-14.Vishwakarma, R. *Curr. Sci*. 107(3): 335-336. 2014

Satellite meteorology- a review

S. Sahoo[1], S. Rout[1], N. Khare[1], S. S. Patra[2] and S. Nayak[3]
[1]College of Forestry, SHUATS, Allahabad- 211007
[2]Department of Meteorology & Oceanography, Andhra University, Vishakhapatnam- 530003
[3]College of Forestry, OUAT, Bhubaneswar- 751003

Introduction

A satellite consists of many cameras and sensors fitted on it, which help them to capture images or to collect the information from a place on a planet. It uses the reflected radiation either from the sun or the satellite itself to acquire the information. The satellite after receiving the information from the target location transmits the waves to the ground station, where the satellite images are further processed to get proper information.

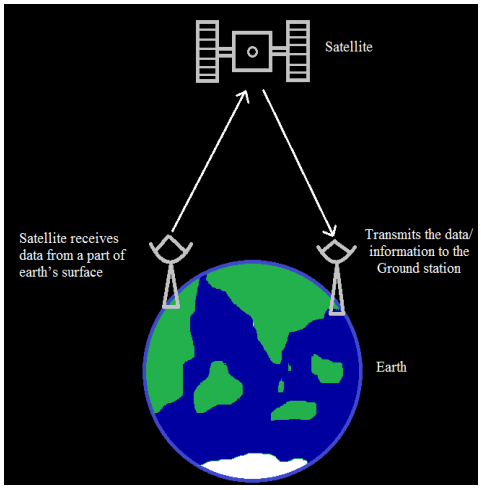

Fig 1. Illustration of working of a satellite

Satellite meteorology

It is a part of remote sensing which deals with the study of changes in the atmosphere and oceans by the data obtained from the remote sensing devices fitted on the satellites orbiting around the Earth. The satellites used for these purpose are known as weather satellites. These satellites are used to study and monitor the weather and climate of earth. Other than studying about weather, it also gives information about forest fires, pollution levels of any location, sand storms, auroras, ice mapping etc.

In 1963, the World Meteorological Organization (WMO) set up the World Weather Watch programme to establish an operational satellite observation network of geostationary and polar-orbiting meteorological satellites – the global observing system (WMO, 2005).

History

Sputnik-1 was the first satellite launched on 4th October 1957 by Soviet Space Program, Soviet Union. This satellite was built for the purpose of earth observation.

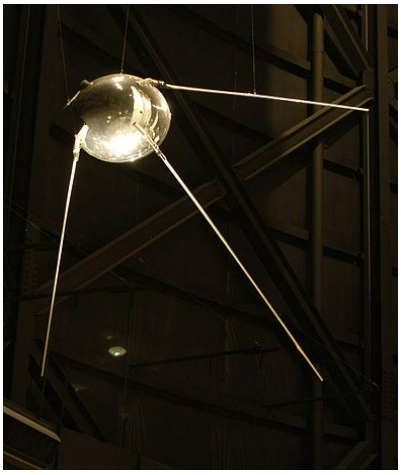

Fig 2. Replica of Sputnik-1

Aryabhata was the first Indian satellite

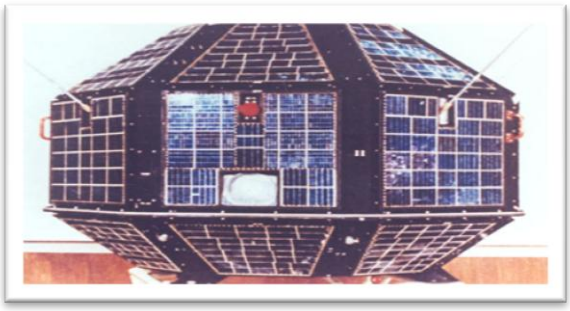

Fig 3. Aryabhata Satellite

launched on 19th April 1975 by ISRO. This satellite was named after the Indian astronomer Aryabhata. The satellite Aryabhata was built for astrophysics purpose.

TIROS- Television and infrared observation satellite was the first meteorological satellite launched on 1st April 1960 (Kidd *et. al.*, 2009).TIROS was operational for 78 days and proved that satellites could be a useful tool for studying global weather conditions from space.

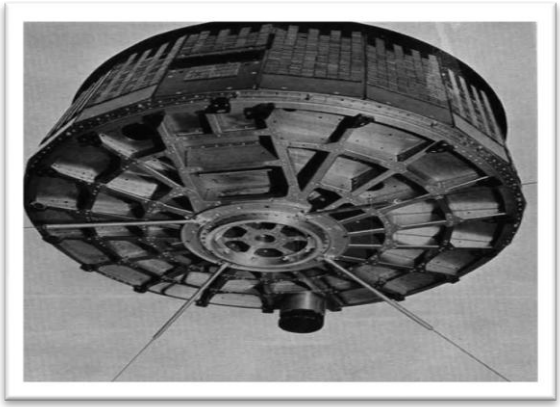

Fig. 4. TIROS-1 satellite

Indian Satellite System, INSAT-1A was the first Indian meteorological satellite which also helped in communication purpose. It was launched on 10th April 1982 by ISRO. It was operational for 6 months.

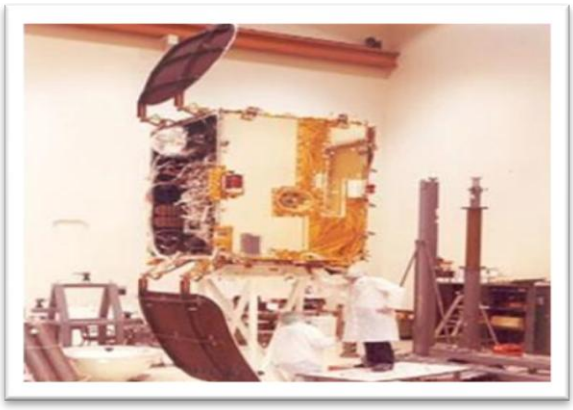

Fig. 5. INSAT-1A

Types of satellite

There are two types

i) Geostationary satellites

ii) Polar satellites

Geostationary satellites:

These satellites orbit along the equator of earth from west to east direction. It usually situated at 36,000 km above the earth surface. The speed of revolution of the satellite coincides exactly with the speed of earth's rotation along its own axis, therefore, the satellite appears stationary to the earth and can view the same area on earth continuously.

Geostationary satellites are mainly used as weather satellites because they keep transmitting the data i.e., the continuous changes occurring on a particular place on earth surface. These satellites capture continuous pictures in a short duration, creating a series of pictures which enables to distinguish the changes very clearly.

INSAT-2B, INSAT-1D, INSAT-2A are some of the examples of geostationary satellites.

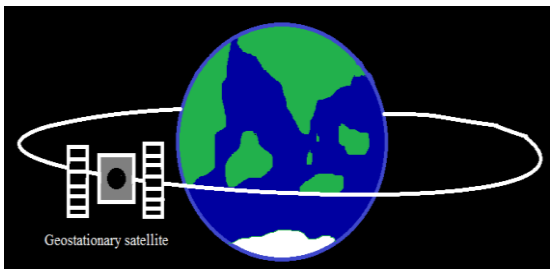

Fig. 6. Illustration of a geostationary satellite

Polar satellites

These satellites move around the earth from pole to pole. These satellites pass above both the poles on each revolution. It therefore has an approximate inclination of 90° to the equator. Polar satellites will pass over the equator at a different longitude on each of its orbits. These satellites orbit at a height of 750 km from earth surface.

Polar satellites are usually used as earth observation purpose.

Landsat, NOAA, SPOT, ERS are few examples of polar satellite.

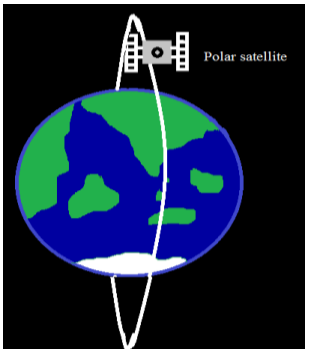

Fig. 7. Illustration of a polar satellite

Table 1: List of indian meteorological satellites

Satellite	Launch date	Launch vehicle
INSAT-1A	10 April 1982	Delta 3910 PAM-D
INSAT-1B	30 August 1983	Shuttle [PAM-D]
INSAT-1C	21 July 1988	Ariane-3
INSAT-1D	12 June 1990	Delta 4925
INSAT-2DT	26 February 1992	Ariane-44L H10
INSAT-2A	10 July 1992	Ariane-44L H10
INSAT-2B	23 July 1993	Ariane-44L H10+
INSAT-2C	7 December 1995	Ariane-44L H10-3
INSAT-2D	4 June 1997	Ariane-44L H10-3
INSAT-2E	3 April 1999	Ariane-42P H10-3
INSAT-3B	22 March 2000	Ariane-5G
INSAT-3C	24 January 2002	Ariane-42L H10-3
Kalpana-1 (METSAT)	12 September 2002	PSLV-C4
INSAT-1A	10 April 1982	Delta 3910 PAM-D
INSAT-1B	30 August 1983	Shuttle [PAM-D]
INSAT-1C	21 July 1988	Ariane-3
INSAT-1D	12 June 1990	Delta 4925
INSAT-2DT	26 February 1992	Ariane-44L H10
INSAT-2A	10 July 1992	Ariane-44L H10
INSAT-2B	23 July 1993	Ariane-44L H10+
INSAT-2C	7 December 1995	Ariane-44L H10-3
INSAT-2D	4 June 1997	Ariane-44L H10-3
INSAT-2E	3 April 1999	Ariane-42P H10-3
INSAT-3B	22 March 2000	Ariane-5G
INSAT-3C	24 January 2002	Ariane-42L H10-3
Kalpana-1 (METSAT)	12 September 2002	PSLV-C4

(Note- Red colour: the satellites no more in service; Green colour: the satellites still active)

Sensors in satellite

There are two types of sensors:

1. Passive sensors
2. Active sensors

Passive sensors

The satellites having passive sensors depend upon external source of light or radiation to acquire the information. These satellites receive the reflected lights coming from the planets and convert it into digital form. It further transmits the radiations to their respective ground stations.

Active sensors

These satellites emit their own radiation for a specific target location on a planet. The emitted radiation then is reflected back to the satellite, hence acquiring the information about the location. It further processes the data and transmits it to the ground station.

Some of the sensors used in satellites for various purposes are:

To get more knowledge about the energy budgets, both broadband radiometers and interferometers has been developed to measure the gas and aerosols that affect the energy fluxes.

These include-

Total ozone mapping spectrometer (TOMS) (Stolarski *et. al.,* 1991), the measurement of pollution in the troposphere (MOPITT) (Drummond, 2002), the atmospheric infrared sounder (AIRS) (Chahine et al., 2006), the infrared atmospheric sounding interferometer (IASI) (Chalon et al., 2001), the moderate resolution imaging spectroradiometer (MODIS) (Remer et al., 2005), the scanning imaging absorption spectrometer for atmospheric chartography (SCIAMACHY) (Buchwitz et al., 2004).

Uses of weather satellites

- Measuring radiation from the earth's surface and atmosphere give information on amounts of heat and energy being released from the Earth and the Earth's atmosphere.
- Helps to detect and forecast the natural calamities like cyclone etc.
- Satellites detect the quantity of snow deposit in winter, the movement of icebergs in the Arctic and Antarctic.
- Helps in finding the depth of oceans.
- Some satellites also have a water vapour sensor that can measure and describe how much water vapour is present in different parts of the atmosphere.
- Infrared sensors on satellites help in examining crop conditions, deforested areas and regions of drought.
- Satellites can detect volcanic eruptions anywhere on the earth surface and the motion of ash clouds.
- Fishermen who sail mid-ocean for fishing, can find out important information about the temperature of the sea from measurements that satellites make and also the news about the approaching storm.
- Meteorological satellites help in mapping and monitoring of rainfall on a global scale (Kidd *et. al.,* 2009).
- It helps in weather forecasting, which is the most important part in our daily lives.

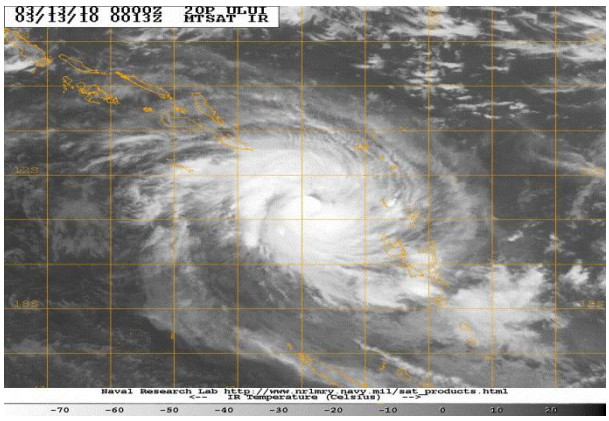

Fig 8. Cyclone Ului undergoing an unusually explosive intensification phase during March 13, 2010. Captured by "MTST-1R (a.k.a Himawari-6), near Japan

Conclusion

It is true that, satellites are the eyes in the sky. Satellites are extremely important for the world. They are used to warn us about natural disasters and their severity (like-

cyclonic storms, heavy rainfall), forecasting weather, communication with other countries, identifying different type of crops and finding natural resources.

These technologies have become so important and we are now so used to it that we can't imagine our society without it.

Reference

Buchwitz, M., Noël, S., Bramstedt, K., Rozanov, V.V., Eisinger M., Bovensmann, H., Tsvetkova, S. and Burrows, J.P. **(**2004). Retrieval of trace gas vertical columns from SCIAMACHY/ENVISAT near-infrared nadir spectra: first preliminary results. Advances in Space Research 34, 809–14.

Chahine, M. T., Pagano, T. S., Aumann, H. H., Atlas, R., Barnet, C., Blaisdell, J., Chen, L., Divakarla, M., Fetzer, E. J., Goldberg, M., Gautier, C., granger, S., Hannon, S., Irion, F. W., Kakar, R., Kalnay, E., Lambrigtsen, B. H., Lee, S. – Y., Le Marshall, J., McMillan, W. W., McMillin, L., Olsen, E. T., Revercomb, H., Rosenkranz, P., Smith, W. L., Staelin, D., Larrabee, Strow, L., Susskind, J., Tobin, D., Wolf, W. and Zhou, L. (2006). AIRS: Improving weather forecasting and providing new data on greenhouse gases. Bulletin of the American Meteorological Society 87, pp. 911-26.

Chalon, G., Cayla, F. and Diebel, D (2001). IASI: an advanced sounder for operational meteorology. In proceedings of the 52nd congress of the International Astronautical Federation (IAF) Toulouse, France, 1–5 October.

Drummond, J. R. (2002). MOPPIT: 12 years of planning and 2.5 years of operations. Geoscience and Remote Sensing Symposium.IGARSS '02. 2002 IEEE International *2*, pp. 1085-87.

Kidd, C., Levizzani, V. and Bauer, P. (2009). "A review of satellite meteorology and climatology at the start of the twenty-first century". Progress in physical geography 33(4), pp. 474-489.

Remer, L.A., Kaufman, Y.J., Tanré, D., Mattoo, S., Chu, D.A., Martins, J.V., Li, R.-R., Ichoku, C., Levy, R.C., Kleidman, R.G., Eck, T.F., Vermonte, E. and Holben, B.N. **(**2005). The MODIS aerosol algorithm, products and validation. Journal of Atmsopheric Sciences 62, 947–73.

Stolarski, R. S., Bloomfield, P., McPeters, R. D. and Herman, J. R. (1991). Total ozone trends deduced from Nimbus 7 TOMS data. Geophysics Research Lett*ers* 18, pp. 1015-18.

World Meteorological Organization (WMO) (2005). World weather watch – twenty-second status report on implementation. Geneva: WMO, pp: 60.

तेंन्दुपत्ता संग्रहण, प्रसंस्करण एंव भंडारण का आर्थिक एवं पारम्परिक महत्व

धनी राम, धीरज कुमार यादव एवं मनोज कुमार झारिया

विश्वविद्यालय शिक्षण विभाग, प्रक्षेत्र वानिकी विभाग

सरगुजा विश्वविद्यालय, अम्बिकापुर-497001, छत्तीसगढ.

सारांश

मानव जाति अपनी विभिन्न प्रकार के आवश्यकताओं की पूर्ति के लिए प्रत्यक्ष या अप्रत्यक्ष रूप से वनों पर निर्भर है। मनुष्य वनों से विभिन्न प्रकार के वनोपज जैसे-लकड़ी, चारा, घास, साल बीज, महुआ, ऑवला, बहेरा, हर्रा, इत्यादि, प्राप्त करता आ रहा है। तेन्दूपत्ता जो कि एक प्रमुख वनोपज है, जिसका आादिवासी समुदाय पीढ़ियों से उपयोग करता आ रहा है। तेन्दूपत्ता संग्रहण लोगों की आर्थिक स्थिति को समृध्द एवं सक्षम बनाता है । तेन्दू पत्ते का उपयोग बीड़ी बनाने के साथ-साथ खाद, दोना, पत्तल, इत्यादि बनाने में किया जाता है। इसमें विभिन्न प्रकार के औषधीय गुण भी पाये जाते है। तेंन्दूफल में विभिन्न प्रकार के पोषक तत्व होते है, जिससे इसकी बाजार में माँग बहुत ज्यादा है। भारत सरकार के द्वारा आदिवासी परिवारों को रोजगार तथा जीवन शैली की गुणवत्ता में सुधार लाने के विभिन्न योजनाएं चलाई जा रही है तथा वन विभाग के माध्यम से आवश्यक प्रयास भी किए जा रहे है। इस दिशा में शिक्षा प्रोत्साहन योजनाओं के अंतर्गत आदिवासी परिवार तथा तेन्दुपत्ता संग्राहक के बच्चों को व्यावसायिक शिक्षा हेतु छात्रवृत्ति, मेधावी छात्रा-छात्राओं को पुरस्कार दिया जा रहा है। तेन्दुपत्ता जो कि एक राष्ट्रियकृत अकाष्ठीय वनोपज है जिससे वन विभाग को आर्थिक लाभ प्राप्त होता है। सरगुजा वनमंडल जैवविविधता से सम्पन्न है जिसमें विभिन्न प्रकार की प्रजातियाँ पाई जाती है जो कि आर्थिक एंव पारम्परिक दृष्टि से महत्वपूर्ण है। आदिवासी बाहुल्य क्षेत्र होने के कारण तेन्दुपत्ता गामीण समुदाय में एक विशेष महत्व रखता है। भविष्य को ध्यान में रखते हुए पेड़-पौधों का संरक्षण एवं संवर्धन किया जाना चाहिए जिससे की पारिस्थितिक तंत्र का संन्तुलन बना रहे।

प्रस्तावना

तेन्दूपत्ता का वानस्पतिक नाम *डायोस्पोरस मेलानोजायलोन* है, जो कि एबिनेसी कुल का एक सदस्य है। तेन्दू की अन्य प्रजातियॉ *डायोस्पोरस प्रग्रिना, डायोस्पोरस टोमेनटोसा, डायोस्पोरस डूबिया, डायोस्पोरस एक्सक्यूलपटा, डायस्पोरस रॉयली, डायोस्पोरस टुपरू, डायोस्पोरस वेटीयाना* है। मुख्य रूप से बीड़ी बनाने के लिए *डायोस्पोरस मेलानोजायलोन* प्रजाति का उपयोग किया जाता है। तेन्दूपत्ता का संग्रहण आज सें नही बल्कि प्राचीन काल से चला आ रहा है। ग्रामीण तेंदूपत्ता का उपयोग बीड़ी बनाने के अलावा दोना, पत्तल एवं कुटीर उद्योग में करते है। पूरे भारत में छ.ग., मध्यप्रदेश, उड़ीसा, अरूणाचल प्रदेश, पं. बंगाल, महाराष्ट्र, आसाम, कर्नाटक, तमिलनाडू, में तेन्दूपत्ता का संग्रहण किया जाता है। तेन्दूपत्ता का संग्रहण छ.ग. के सरगुजा संभाग के जिले सरगुजा, सूरजपुर, बलरामपुर, कोरिया, जशपुर तथा बस्तर संभाग के जिले कांकेर, नारायणपुर, बीजापुर, कोण्डागॉव, दन्तेवाड़ा, सुकमा के अलावा राजनांदगांव में किया जाता है। तेंन्दुपत्ता संग्रहण

का मुख्य उद्देश्य लोगों को काम देना, आर्थिक एवं सामाजिक जीवन में सुधार लाना है । तेन्दुपत्ता संग्राहक परिवार के बच्चों हेतु शिक्षा प्रोत्साहन योजना, व्यावसायिक शिक्षा हेतु छात्रवृत्ति, मेधावी छात्रा-छात्राओं को पुरस्कार, तेंन्दुपत्ता संग्राहक परिवार को अनुदान एवं विभिन्न योजनाऐ चलाई जा रही है ।

वितरक एवं उत्पादन

भारत में तेंदूपत्ता उत्पादन एवं वितरण के क्षेत्र में मध्यप्रदेश प्रथम स्थान रखता है । इसके अलावा छत्तीसगढ़, अरूणाचलप्रदेश, उतराखंड, केरल, आन्ध्रप्रदेश, तमिलनाडू, कर्नाटक, महाराष्ट्र, पं. बंगाल, उत्तरप्रदेश, गुजरात में वितरण पाया जाता है । सबसे कम वितरण जम्मू-कश्मीर, शिमला, हरियाणा आदि राज्यों में पाया जाता है।

तेंन्दु का उपयोग

फल

- खाने में, पेट संबधी रोग के उपचार में, कब्ज, पेचिस के इलाज में प्रयोग किया जाता है ।
- इसके फल में प्रोटीन (7.13±0.11g/100g), कार्बोहाइडेट (16.35±0.15g/100g), फाइबर (54.05±0.23g/100g), विटामिन (C), एवं खनिज(Cu, Fe, Na, K) तत्व पाया जाता है ।

पत्ती

खूनी पेचिस के उपचार में उपयोग किया जाता है साथ ही यह खून बनाने में सहायता करता है।

कार्बनिक खाद

तेंन्दुपत्ता के कटे-फटे बेकार पत्ती को गडढें में सड़ा कर कार्बनिक खाद बनाया जाता है ।

जीविकोपार्जन

वनवासियों को तेन्दुपत्ता संग्रहण से रोजगार मिलता है जिससे उनके आर्थिक एवं सामाजिक स्तर में सुधार होता है । वनवासी एंव गामीण अंचल के लोग विभिन्न प्रकार के वनोत्पाद का संग्रहण करते है जिससे उन्हे आय तो प्राप्त होती है साथ ही घरेलू उपयोग भी करते है । वनों से प्राप्त विभिन्न उत्पाद इनकी दैनिक आवश्यकता का अभिन्न अंग है । इसके बिना इनके जीवन की कल्पना भी नहीं की जा सकती क्योकि ये सदियों से इनके सामाजिक, सांस्कृतिक, आर्थिक एवं पारम्परिक महत्व रखते है । तेंदूपत्ता संग्रहण कार्यक्रम को और अधिक सफल बनाने के लिए सरकार द्वारा वन विभाग के माध्यम से विभिन्न योजनाऐं समय समय पर संचालित की जा रही है जिनमें प्रमुखतः चरण पादूका वितरण, शिक्षा प्रोत्साहन योजना, व्यावसायिक शिक्षा हेतु छात्रवृति, मेधावी छात्र/छात्राओं को पुरस्कार, गैर-व्यावसायिक स्नातक कोर्स हेतु अनुदान योजना, तेंदूपत्ता संग्राहक परिवार के प्रतिभावान बच्चों कें लिए शिक्षा प्रोत्साहन योजना संचालित की जा रही है । तेन्दुपत्ता संग्रहण से छ.ग. ग्रामीण क्षेत्रों के लगभग 24 लाख से अधिक परिवारों को सुरक्षा मिल रही है व आय के साधन उपलब्ध हो रहे है ।

तेंन्दुपत्ता संग्रहण विधि – (चित्र 1)

शाख कर्त्तन

तेंन्दुपत्ता तोड़ने से पूर्व शाखकर्तन किया जाता है। तेंन्दुपत्ता के गुणवत्ता के लिए शाखकर्तन एक महत्वपूर्ण कार्य है जिसके फलस्वरूप निकलने वाले पत्ते न केवल अधिक मात्रा में आते हैं बल्कि उनके आकार में वृध्दि तथा रंगरूप में भी गुणात्मक सुधार होता है ।

तेंन्दुपत्ता तुड़ाई

शाखकर्तन के पश्चात तेन्दुपत्ता 40-50 दिनों में तैयार हो जाता है। इसकी पहचान यह है कि यह हरा होकर तिरछा झाड़ियों में दिखता है। यदि पत्ता झाड़ियों पर झुलता हुआ, गिरा हुआ, दिखे तब समझना चाहिए कि पत्ता तुड़ाई योग्य नहीं है। कोमल पत्तों को नहीं तोड़ना चाहिए तथा पत्ते की तुड़ाई में विलंब भी नहीं करना चाहिए। अतः पत्ता तुड़ाई की प्रारंभिक तिथि नये पत्ते के रंग के परिवर्तन के आधार पर निर्धारित किया जाना चाहिए । बहुत मोटा, नसो वाला, कटा-फटा, कीड़े खाया हुआ एवं माता दाग वाला पत्ता बीड़ी बनाने के लिए अनुपयोगी होता है।

गड्डी बंधाई

बीड़ी बनाने योग्य 50 पत्तों की एक गड्डी को मानक गड्डी कहा जाता है । परन्तु व्यवहारिक रूप से मानक गड्डी में दो पत्ते अधिक या दो पत्ते कम हो सकते हैं। परन्तु संग्राहकों को यह सलाह दी जानी चाहिए कि वे 50 अच्छे पत्तों का ही गड्डियाँ बनाऐ। गड्डियाँ बनाते समय 25 पत्तों के डंठल के एक ओर तथा 25 पत्तों के डंठल दूसरी ओर रखकर इस प्रकार की गड्डी बनाई जाती है, कि पत्तो की चिकनी वाली सतह अंन्दर की ओर रहती है। पत्तियों के ऊपर दोनों ओर तुलनात्मक रूप से दो बड़े तेन्दूपत्ते रखे जाते हैं।

गड्डियों की संग्रहण केंन्द्र पर खरीदी

तेंन्दुपत्तों की गड्डियाँ बांधकर ग्रामीण शाम से फड़ों पर लाना प्रारंभ कर देते हैं। फड़ मुंशियों द्वारा क्रय करने के पश्चात उनका संग्रहण किया जाता है। खरीदी के समय मुंशी तथा अभिरक्षक कुछ गड्डियों को खोलकर उनकी संख्या एंव गुणवत्ता सुनिश्चित करते है। गड्डियों को पूर्व से पश्चिम की ओर सुखाने हेतु इस प्रकार रखा जाता है की डंठल पश्चिम दिशा की ओर हो।

तेंन्दुपत्ता का उपचार

गड्डियों को संग्रहण के चौथे दिन पेंन्ट लगाकर पलट देना चाहिए, इसका कारण है कि पत्ता सुखकर फूलता है जिससे बीच में पोलापन होता है तथा सूर्य का प्रकाश एवं गर्म हवाएं अन्दर तक प्रवेश करती है। फलस्वरूप पत्ता सूख जाता है एवं काले धब्बे एवं दाग नहीं पड़ते है। गड्डियों की पलटी के उपरान्त यह गड्डियाँ एक दुसरे से एकदम जुडी रहनी चाहिए अन्यथा गड्डी सुखने के बाद हल्की होने से हवा से पलट जायेगी। जिससे सुख-दोष की संभावना बनी रहती है। परन्तु यह भी ध्यान रखा जावे की गड्डियाँ आंशिक रूप से भी एक दूसरे के ऊपर नहीं होना चाहिए।

सिंचाई

बोरों की भराई एक अत्यंत महत्वपूर्ण एवं नाजुक कार्य है । जिसमें तेंन्दुपत्ता की गुणवत्ता बनाये रखने के लिए पर्याप्त सावधानी रखने की आवश्यकता है। बोरा भरने का कार्य प्रातः एवं सांयकाल की अवधि में करना चाहिए। दो-दो हजार के ढेर में रखी गड्डियों में करीब 20 लीटर पानी शाम को छिड़कते है तथा पानी छिड़कने के आधे घंटे बाद पत्ते के ढेरी की स्थान परिवर्तित कर दिया जाता है ताकि पत्तों से अधिक पानी निकल जावे । इसके बाद ढेरी को तुरंन्त ही त्रिपाल या खाली बोरों से अच्छी तरह से ढक देते है जिससे वाष्पीकरण के द्वारा सभी गड्डियाँ मुलायम हो जाती है।

बोरा भराई/सिलाई

बोरा भरते समय बोरे के निचले हिस्से के कोनों को सुतली से बांध देते है एंव बोरों को नीचे की ओर इतना उमेठ (मोड) देते है कि बोरों में गड्डियों

की परत आ सके। बोरा तैयार हो जाने पर ढेरी पर ढके त्रिपाल का एक कोना खोलकर देखते है कि पत्ता नरम हुआ है या नहीं। यदि पत्ता नरम हो गया हो तो एक हाथ में तीन गड्डी एक दूसरे हाथ में दो गड्डी पकड़कर उसे आपस में झटकारकर बोरे में डालते है। बोरे के निचले हिस्से में करीबन 125 गड्डी आड़ी-खड़ी आ जाएं इस प्रकार जमाते है। हथेली से दबाकर बोरा भरती करते है जिससे पत्ता चूरा होने से भी बचता है। बोरा भरती बिल्कुल कसी होने से एक वास्तविक बोरे का वजन लगभग 38 से 40 किलो ग्राम होता है। गोदाम पर ढुलाई में कम वजन प्राप्त होने पर यह पता चल जाता है कि किस फड़ पर बोरा भरती ठीक नहीं हुई है।

परिवहन

फड़ से बोरा भराई एंव सिलाई के बाद परिवहन के द्वारा सरकारी गोदाम में सुरक्षित रखा जाता है जिससे कि पानी तथा नमी से बचायी जा सके। इसके बाद यह प्राइवेट कंम्पनी को नीलामी द्वारा बेचा जाता है।

भंडारण/गोदामीकरण

मुख्य गोदाम पर बोरे पहुँचने पर परिवहन अनुज्ञा पत्र अनुसार बोरों की गिनती की जाती है एवं मिलान किया जाता है कि प्रत्येक बोरे पर अंकित फड़ का नाम, बोरा क्रमांक एंव गड्डी की संख्या अनुज्ञापत्र के साथ सलग्न बोरावार सूची फार्म नंबर में मेल खाती है। जब बोरों पर लिखी तथा फार्म में लिखी संख्या एंव जानकारी में भिन्नता हो तो बोरों पर अंकित विवरण ही मान्य किया जाता है तथा इस प्रकार की भिन्नता वाले बोरों के विवरण का पंचनामा भी गोदाम प्रभारी के द्वारा तैयार किया जाता है। फलस्वरूप इसकी सूचना गोदाम प्रभारी द्वारा तत्काल प्रबंध संचालक जिला यूनियन एवं संबधित परिक्षेत्र अधिकारी या पोषक अधिकारी को दी जाती है।

कुटीर उद्योग

बीडी उद्योग में तेंदूपत्ता का उपयोग किया जाता है। म.प्र., छ.ग., ओडिसा, राजस्थान, एवं महाराष्ट्र प्रमुख उत्पादक राज्य है। वनवासी अपनी आवश्यश्यकताओं की पूर्ति के लिए भी तेंदूपत्ता का संग्रहण करते है।

प्रमुख बीड़ी उद्योग

निम्नलिखित बीड़ी उद्योग मध्यभारत क्षेत्र में संचालित हैः

1. आसमा नेचरल प्रोडक्ट बिलासपुर
2. आसमा इटरप्राइजेज बिलासपुर
3. राखी बीडी एजेन्सी अम्बिकापुर
4. एन एन्ड एच कम्पनी छ.ग.
5. हर्बल बीडी जी. एच. जानी बीडी प्राइवेट लिमिटेड छ.ग.
6. शारदा टेडर्स म.प्र.
7. पंकज शर्मा सागर रहली म.प्र.

बीड़ी बनाने की विधियाँ

सिंचाई/पानी का फुहार

पत्ते को पानी का फुहार देकर मुलायम किया जाता है और फिर इसे हल्के ताप से गर्म किया जाता है।

कटाई

पत्तों को हाथों के द्वारा कैंची की सहायता से काटा जाता है। सामान्यतः तेंन्दुपत्ता की साईज 18 सेमी लम्बाई 10 सेमी चौड़ाई लगभग होती है जिससे एक पत्ती से कम से कम एक बीड़ी बन जाये।

रोलिंग करना

तेंन्दुपत्ता को इस प्रकार एक बीडी बनने योग्य

साईज में काटा जाता है। हाथों या लोहे की गोल छड़ से रोलिंग किया जाता है।

तम्बाकू भराई

तम्बाकू की भराई हाथों के द्वारा करते है। 1000 बीड़ी तैयार करने में लगभग 300 ग्राम तम्बाकू एंव 600 ग्राम पत्ते की आवश्यकता होती है

धागा बंधाई

बीडी में जब तम्बाकू भरा जाता है, इसके बाद बीड़ी के पीछले हिस्से को धागा से बांधते हैं जिससे तम्बाकू बाहर न निकले।

पैकिंग/सेलिंग

तेंन्दुपत्ता में धागा बंधाई होने के बाद इसको बाजार में बेचने के लिए पैकिंग किया जाता है फिर इसको बेचा जाता है।

छत्तीसगढ में बेची जाने वाली प्रमुख बीड़ी एंव मूल्य

बीड़ी का नाम	मात्रा	रूपये
मनोहर बीड़ी	1000	430
मेघना बीड़ी	1000	400
राखी बीड़ी	1000	280-300

सरकारी योजनाएँ

शिक्षा प्रोत्साहन योजनाएँ

व्यावसायिक शिक्षा हेतु छात्रवृति

प्राथमिक वनोपज सहकारी समिति स्तर पर प्रत्येक वर्ष एक विद्यार्थी का चयन छात्रवृति हेतु किया जाता है। जिसमें किसी भी राज्य शासन/केंन्द्र शासन द्वारा मान्यता प्राप्त शिक्षण संस्था में किसी भी व्यावसायिक विषय जैसे- इंजीनियरिंग, मेडिकल, विधि, एम.बी.ए. एवं नर्सिग लिया हो तथा ऐसे कोर्स में प्रवेश की न्यूनतम शैक्षणिक योग्यता कक्षा 12 वीं हों।

मेधावी छात्र/छात्राओं को पुरस्कार

प्रत्येक प्राथमिक वनोपज सहकारी समिति क्षेत्र मे प्रत्येक वर्ष मेधावी छात्रों को शिक्षा स्तर के अनुसार निम्न राशि पुरस्कार स्वरूप् दी जाती है।

8 वीं	2000
10 वीं	2500
12 वीं	3000

चरणपादुका योजना

इस योजना के अंर्तगत परिवार के मुखिया को एक जोड़ी चप्पल/जूता वितरित किया जाता है जो कि सुरक्षा को ध्यान में रखकर किया जाता है।

बीमा योजना

जनश्री बीमा

परिवार के मुखिया का बीमा किया जाता है। किसी प्रकार के दुर्घटना मृत्यु होने पर बीमा का लाभ मिलता है।

सदस्य बीमा

मुखिया परिवार एवं सदस्य कोई भी जिसकी उम्र 18 - 59 साल के बीच में हो उन्हें सदस्य बीमा योजना का लाभ मिलता है।

तेंन्दु पत्ता तोड़ते समय सावधानियाँ, समस्याएँ/दुर्घटनाएँ

- तेंन्दुपत्ता तोड़ने के लिए ग्रामीण जंगल जाते हैं अतः जंगली जानवरों से सावधान एवं सतर्क रहना चाहिए।
- कई लोग ज्यादा पत्ता तोड़ने के लालच में अंधेरे में भी चले जाते हैं जिससे सांप या जंगली जानवरों का डर बना रहता है।
- बीमा योजना के तहत संग्राहक परिवार के मुखिया की साधारण मृत्यु होने की दशा में उनके नामांकित व्यक्ति को 30000 रूपये मात्र मिलता है।

- अस्थायी अपंगता की दशा में संग्राहक परिवार के मुखिया को 37500 रूपये मात्र मिलता है।
- स्थायी मृत्यु की दशा में परिवार के मुखिया को उनके नामांकित व्यक्ति को 75000 रूपयें मात्र का भुगतान किया जाता है।

निष्कर्ष

छत्तीसगढ़, आदिवासी बाहुल्य एक राज्य है जिसमे लगभग 44 प्रतिशत वन आच्छादित है। वनवासी अपनी आवश्यकताओं की पूर्ति हेतु वनों से मिलने वाले उत्पाद पर आश्रित रहते है। तेंन्दुपत्ता संग्रहण जो कि छत्तीसगढ़ के आदिवासी एवं ग्रामीण लोगों लोगों के लिए वरदान है। जिससे ग्रामीण एवं वनवासी लागों को आय प्राप्त होता है तथो उनकी आर्थिक एवं सामाजिक स्थिति सुदृढ़ होती है। सरगुजा संभाग जैवविविधता से परिपूर्ण है जिसके फलस्वरूप यहा का आदिवासी समुदाय आर्थिक, पारम्परिक एंव सामाजिक विकास कर रहा है। आदिवासी बाहुल्य क्षेत्र होने के कारण तेन्दुपत्ता गामीण समुदाय में एक विशेष महत्व रखता है तथा भविष्य को ध्यान में रखते हुए इन वन धरोहर का संरक्षण एवं संवर्धन किया जाना चाहिए।

चित्र 1: सरगुजा वनमंडल के अंतर्गत तेन्दुपत्ता संग्रहण, प्रसंस्करण एंव भंडारण

अजोला खरपतवार: हानिकारक या लाभदायक

रेखा अग्रवाल

शासकीय आदर्श विज्ञान महाविद्यालय

जबलपुर (म.प्र.)- 482 001

अजोला एक ऐसा पौधा है जो वैज्ञानिकों के मुताबिक 39 लाख साल से धरती पर मौजूद है। इसे मॉस्किटो फर्न भी कहा जाता है क्योंकि यह फर्न प्रजाति का पौधा है। अजोला पानी पर तैरने वाला पौधा है। अगर अजोला के पौधे को पानी की किसी टंकी या हौदी में डाल दिया जाए तो यह इतनी तेजी से बढ़ता है कि पूरी हौदी में कुछ ही दिनों में फैल जाता है। पानी में अजोला, हरे और नीले रंग की परत बना देता है। अगर इसे रूके हुए पानी में डाल दिया जाए, तो अजोला की वजह से मच्छरों के लार्वा और प्यूपा को ऑक्सीजन को नहीं मिलता। इस वजह से वो जल्द ही खत्म हो जाते हैं।

अजोला पानी में पैदा किया जा सकने वाला पशु आहार है और इसे बेहद आसानी से उगाया जा सकता है। दरअसल अजोला पानी में तैरने वाली एक फर्न है। पानी में इसकी

बढ़वार बेहद तेजी से होती है। वैज्ञानिकों की भाषा में इसे म'छर फर्न या बतख बीड के नाम से भी जाना जाता है। जैविक खाद व पशु आहार संपूरक के रूप में अजोला का महत्वपूर्ण स्थान है। अजोला में 30-35 प्रतिशत तक प्रोटीन पाया जाता है और इसका उपयोग पशुओं के चारे के रूप में किया जाता है। किसान इसे आसानी से अपने घर में ही उगा सकते हैं और इसके प्रयोग से जानवर अधिक मात्रा में दूध देने लगते हैं। अजोला जैविक खरपतवार नाशक के रूप में काम करता है। यह मिट्टी की सतह में प्रकाश को घुसने से रोकता है। इससे धान के खेतों में जलीय खरपतवार की बढ़ोतरी नहीं हो पाती है। अजोला में पौष्टिकता भरपूर होती है। पौधा बहते पानी से पौष्टिक तत्व अवशोषित कर लेता है तथा गलने सडने पर इन पौष्टिक पदार्थों को फसल के लिए उपलब्ध करवाता है। पानी पर बिछी अजोला की चादर पानी के पी एच मान को क्षरा में तब्दील नहीं होने देती जिसे सामान्यतया अमोनिया की कमी नहीं होती। अजोला को सुअर, बतख, पोल्ट्री फार्मों व गाय-भैंस के खाने में प्रयोग में लाया जाता है। भारत में अजोला माइक्रोफिला, अजोला रूबरा व अजोला पिनाटा 'यादा प्रयोग में लाई जाती है। अजोला माइक्रोफिला आहार संपूरक के रूप में उपयुक्त है जबकि अजोला पिनाटा 'यादा प्रयोग में लाई जाती है। अजोला माइक्रोफिला आहार संपूरक के रूप में उपयुक्त है जबकि अजोला पिनाटा को इसकी बायोमास उपज के कारण धान के खेतों में ड्यूल कल्चर के रूप में प्रयोग करने की अनुशंसा की जाती है। अजोला की खेती महंगे हानिकारक रासायनिक खादों के सफल विकल्प भी है।

प्रदूषण से घिरी नर्मदा को अब पीली- हरी वनस्पति 'अझोला' के खतरे का सामना करना पड़ रहा है। गत वर्ष इस तरह की वनस्पति की परत जबलपुर से होशंगाबाद तक नर्मदा जल में दिखाई दी थी। इस संबंध में नागरिक उपभोक्ता मार्गदर्शक मंच के पीजी नाजपांडे ने बताया कि अझोला पर नियंत्रण के लिए नेशनल ग्रीन ट्रिब्यूनल ने प्रदूषण नियंत्रण बोर्ड को निर्देश दिए हैं। इस संबंध में डॉ. नाजपांडे ने बताया कि अझोला एक खरपतवार वनस्पति है जो टेरीडोफाईटा ग्रुप की है। यह वनस्पति कम तापमान ठंड के मौसम में होती है। वह जल में घुला हुआ आॅक्सीजन समाप्त करती है। इससे नर्मदा के जीव-जंतुओं के लिए यह खतरनाक साबित हो सकती है। वैज्ञानिकों के अनुसार डेयरियों की गंदगी नालों में बहना, वहां से परियट, हिरन में जाने से अझोला की पैदाइश हुई है। इसे मॉनीटर कर रोकना जरूरी है ।

राजधानी भोपाल स्थित नेशनल ग्रीन ट्रिब्यूनल (एनजीटी) ने नर्मदा में तैर रही हरी-पीली वनस्पति 'अझोला' के कारण प्रदूषण के खतरे को गंभीरता से लिया। इसी के साथ मध्यप्रदेश प्रदूषण नियंत्रण मंडल को इसकी रोकथाम की दिशा में ठोस पहल अविलंब शुरू करने निर्देश दे दिया गया।

बीते वर्ष फरवरी-मार्च के माह में जबलपुर से लेकर हरदा-हंडिया-होशंगाबाद और ओंकारेश्वर के नर्मदा तटों पर अझोला को व्यापक मात्रा में देखा गया। यह फैलने वाली वनस्पति यदि हटाई न गई तो समूची नर्मदा में इसका प्रसार संभव है। वस्तुतः यह एक खरपतवार है, जो टेरीडोफाईटा ग्रुप की है। नतीजतन नर्मदा के जलीय जीव-जंतुओं का जीवन खतरे में है। जल की गुणवत्ता भी प्रभावित होने से इनकार नहीं किया जा सकता। डेयरियों की गंदगी, गंदे नालों का पानी और परियट व हिरण जैसी नदियों का प्रदूषित जल नर्मदा में मिलने से यह स्थिति बनी है। यदि समय रहते इसे मॉनीटर न किया गया तो परिणाम घातक होगा।

अजोला का उत्पादन

1. सबसे पहले खेती की मिट्टी से खरपतवार को पूरी तरह से निकालकर समतल कर लिया जाता है।

2. 2 गुणा 3 मीटर लंबा ईंटों का एक फ्रेंम बना लिया जाता है (वीडियो में 1.39 सेकेंड पर देखें कि कैसे बनता है ये)
3. इसके बाद इस फ्रेम पर सिलपोलिन शीट बिछाई जाती है। सिलपोलिन एक तरह की पॉलीथीन शीट होती हैं, लेकिन इस पर ना तो अल्ट्रा वॉयलेट किरणों का

कोई असर होता है और ना ही ये पानी में खराब होती है। इसे बाजार में आसानी से मिल जाती है।

4. अब इस शीट पर 100 किलो छनी यानी साफ की हुई मिट्टी फैला देनी होती है।
5. अब इस फ्रेम में मिट्टी के चारो कोनों और बीच में 2 किलो गोबर और 30 ग्राम रॉक फॉस्फेट से बना घोल डाल दिया जाता है।
6. अब इस पानी में 1 किलो अजोला कल्चर पूरे फ्रेम में एक समान स्तर पर फैला दिया जाता है।
7. 1 हफ्ते में अजोला पूरी क्यारियां में फैल जाती है।

अजोला में लेमना नाम का एक खरपतवार पाया जाता है। ये बहुत ही ज्यादा खतरनाक होता है। अगर इसे अजोला से बाहर निकाल नहीं फेंका जाता तो, तो ये पूरी मेहनत पर पानी फेर देता है। इसमें सिर्फ पत्ते होते हैं, जिससे इसकी पहचान होती है। इस बाहर निकालकर तुरंत पूरी तरह से जला देना चाहिए और फिर से अजोला की क्यारी बनानी चाहिए।

अजोला इतनी तेजी से फैलता है कि ये पूरी क्यारी को 10 से 15 दिन में भर देता है। 1 से 1.5 किलो अजोला रोजाना चलनी के जरिए निकालनी चाहिए। जितनी मात्रा में अजोला आज आपनी निकली है अगले 24 घंटे में ये उतनी ही मात्रा में क्यारी में दोबारा से बढ़ जाता है।

1. अजोला एक प्रकार की जलीय फर्म है। यह पानी में बहुत तेजी से अपने आप तो दोगुना फैला देती है।
2. अजोला में अनामीना नाम का एक सहजीवी जिवाणु होता है, जिसकी वजह से पानी में अजोला तेजी से फैसला और बढ़ता है।
3. जानवरों के लिए अजोला सस्ता और पोष्टिक खाना है।
4. अगर इसे जानवरों यानी गाय-भैंस को खिलाया जाए, तो इससे जानवरों में कैल्शियम, फास्फोरस, लौह के साथ साथ बाकी कई और प्रोटिन्स की पूर्ति होती है। इन्हीं की वजह से पशुओं के शरीर के विकास में बड़ी मदद मिलती है।

5. अगर गाय-भैंस को उनके रोजाना के खाने में 1.5 से 2 किलो अजोला मिलाकर खिलाई जाए, तो ये आपको 15 से 20 प्रतिशत अधिक दूध दे सकते हैं।
6. अजोला की वजह से ही गाय-भैंस के दूध में गाढ़ापन बढ़ जाता है।

खेतो में अगर किसान यूरिया और बाकी खाद की जगह अजोला से बनी खाद डालें, तो खेत की मिट्टी की उर्वरा शक्ति तो बढ़ती ही है साथ ही उत्पादन भी अच्छा हो जाता है । 1 हेक्येटर (करीब 2.5 एकड़) खेत में 10 टन अजोला से बनी खाद डालने की जरूरत होती है ।

अजोला नाम का यह पौधा, खाद के रूप में बेहतरीन विकल्प है ।

गाय-भैंस के चारे के लिए ये बहुत अच्छा है। सस्ता भी है और पोष्टिक भी है ।

इससे मच्छर पैदा नहीं होते और जहां इस रखा जाता है, वहां मच्छरों बिल्कुल नहीं आते । इसमें 25 प्रतिशत प्रोटीन होता है, जो कि बहुत अधिक और अच्छा है। विटामिन-ए, विटामिन-बी-12,

बीटा कैरोटीन और अमीनो एसिड भी है । इसके अलावा इसमें पोटेशियम, फास्फोरस, कैल्शियम, कॉपर और मैगनीशियम भी होता है ।

अगर इसे गाय-भैंस, भेड़-बगरियों को खिलाया जाता है तो इससे इनका उत्पादन और प्रजनन शक्ति की क्षमता काफी बढ़ जाती है । इसका इस्तेमाल अगर मुर्गीपालन और पशुपालन करने वाले लोग करें, तो इसके फायदा ही मिलेगा ।

इसे होटलों में सजावट के तौर पर भी इस्तेमाल किया जाने लगा है ।

धान के खेतों में या फिर उथले पानी वाले जगह पर इसका उत्पादन किया जा सकता है। इसकी उत्पादन लागत सिर्फ 50 पैसे प्रति किलो आती है ।

अजोला का प्रयोग हरी खाद के रूप में

ताज़ा अजोला दस टन प्रति हैक्टेयर की दर से उपयोग करना चाहिए यद्यपि अजोला उपलब्धता के अनुसार इसकी मात्राको घटा और बढ़ा सकते है | इसके लिए अजोला को अलग खेत में उगाना पड़ता है | और रोपाई से पूर्व खेत की तैयारी के समय मिटटी में मिलाते है | इसके उत्पादन के लिए नर्सरी में 25-50 किलोग्राम प्रति हैक्टेयर की दर पर सिंगल सुपर फास्फेटकी मात्रा दो भाग में देना चाहिए | कीटनाशको का उपयोग आवश्यकता अनुसार कर सकते है| अजोला के उपयोग करने से धान की फसल को 20 से 40 किलोग्राम नाइट्रोजन की मात्रा प्रति हैक्टेयर की दर से प्राप्त की जा सकती है |

धान के साथ अजोला का उत्पादन

इस विधि द्वारा अजोला और धान को एक साथ उगाते है धान की पौधा की रोपाई के 2 – 3 दिन के बाद 0.5 से 1.0 टन प्रति हैक्टेयर की दर से अजोला का टीका देते है | अधिक उत्पादन के लिए मुख्य फसल की खुराक के अनुसार रासायनिक नाइट्रोजन व फास्फोरस देना आवश्यक है | अजोला की मोटी परत 15 से 20 दिन में तैयार हो जाती है इसके बाद अजोला विघटित होकर नाइट्रोजन प्रदान करता है और इसका जैव पदार्थ मृदा में विघटित हो जाता है | इस विधि से औसतन ३० kg/ हैक्टेयर नाइट्रोजन प्राप्त होता है ।

अजोला की कुछ प्रजातियाँ 45 डिग्री सेल्सियस तापक्रम तक जीवित रहती है ॥ अजोला की वृद्धि के लिए प्रकाश की अति आवश्यकता होती है लेकिन अधिक गर्मी के मौसम में यह छाया में उचित वृद्धि करता है । अजोला जैविक नाइट्रोजन

स्थिरीकरण द्वारा नाइट्रोजन प्रदान करने का एक सस्ता स्त्रोत है ॥ जिससे धान की पैदावर में अच्छी वृद्धि होती है | अजोला मृदा की उर्वरता को लम्बे समय तक बनाये रखने में मदद कर सकता है । इसके उपयोग से रासायनिक नाइट्रोजन पर निर्भरता आंशिक रूप से कम कर सकते है और फसलोत्पादन बढ़ने के साथ – साथ स्वच्छ वातावरण भी बनाये रखा जा सकता है |

नर्मदा में बढ़ता अजोला घांस पर्यावरणविदों के लिए चिंता का विषय बन गया है। माना जा रहा है, की इस घांस के बीज सीवेज के पानी के साथ नर्मदा में पहुंचे। अजोला नर्मदा के पानी के साथ ही इसमें रहने वाले जीवों के लिए भी खतरनाक साबित हो सकता है । रसायन और गंदगी से प्रदूषित हो रही नर्मदा के लिए अजोला घास नया खतरा बनकर उभरी है। खेतों में उगने वाली अजोला घास की नर्मदा में मौजूदगी ने वैज्ञानिकों के माथे पर बल डाल दिया है।

जल्द ही इसका निदान नहीं किया गया तो अजोला नर्मदा में मोटी परत बना लेगी और जलीय जीव-जंतुओं को मिलने वाले ऑक्सीजन को खत्म कर सकती है । प्रदूषण नियंत्रण बोर्ड और कृषि वैज्ञानिक पानी में अजोला की मौजूदगी जांचने में जुट गए हैं।

टेरीडोफाइटा ग्रुप की वनस्पति अजोला घास खेतों में उगती है । कृषि वैज्ञानिकों के मुताबिक राई और चावल के खेत में इसे ज्यादा उगाया जाता है। खेतों में यह एक तरह से प्राकृतिक खाद का काम करती है।

जबलपुर समेत कई जगह नर्मदा नदी का पानी हरा-हरा मिला था। पानी के ऊपर घास फैली थी । सेम्पल की जांच कृषि वैज्ञानिकों से करवाई गई । होशंगाबाद, हरदा, नेमावर में नर्मदा में अजोला मिली। हरदा में तो नदी के स्थिर पानी में इसकी मोटी परत जमा हो गई थी।

होशंगाबाद में नर्मदा में 10 किमी से अधिक क्षेत्र में अजोला की चादर फैल गई है। इसके अलावा जबलपुर के परियट नदी और हिरन नदी में अजोला पाई गई। शुरुआती जांच में इससे खतरा नहीं मिला है, लेकिन वैज्ञानिकों ने चेताया है कि पानी में इसकी मोटी परत जमी तो जलीय जीव-जंतुओं के मौत की वजह बन जाएगी । ठंड में तापमान कम होता है । इस वजह से इसकी पैदावार बढ़ने का खतरा है।

वैज्ञानिक अजोला के नदी में आने पर खुद हैरान हैं । उन्होंने इसकी वजह सीवर को बताया है। उनके अनुसार कम सीवर के गदंगी में इसके बीज नदी में मिले होंगे । इसके बाद यह अपने आप विकसित हुई।

कृषि वैज्ञानिकों का मानना है, कि अजोला घास कम तापमान पर विकसित होती है । ठंड और बारिश के मौसम में करीब 6 माह तापमान कम होता है । उस वक्त यह तेजी से पनपती है । हालांकि 25 डिग्री से अधिक तापमान होने पर स्वतः ही घास खत्म हो जाती है । अजोला से अभी नुकसान दिखाई नहीं दे रहा है, लेकिन इसकी परत यदि मोटी हुई तो जरूर पानी में रहने वाले जीव-जंतुओं को आक्सीजन लेने में मुश्किल होगी।

Ecological forestry

S. Suresh Ramanan[1] and Deepak Kumar[2]
[1]Department of Silviculture and Agroforestry,
[2]Department of Forest Management and Utilization,
College of Forestry, Kerala Agricultural University
E-mail: sureshramanan01@gmail.com

Introduction

The concept of managing forests on short rotations is an untenable model of forestry. It can be described as threefold evil that do result in degradation, recruitment of inferior species of trees (probability of spread of invasive species), and vulnerability to extreme weather and insect damage. However, the forest management would be improved by, "correlate[ing] our forest practices with the natural factors operative in the forest". Although, it may not have been the first time to suggest that the dominant methods of forestry were problematic, or that forestry practices should be better aligned with natural forest processes. This has led to the idea that became a common label: "ecological forestry." Forestry has a long history, and ecological forestry is but one of many forms of alternative silviculture (Perevolotsky andSheffer, 2009). However, these alternatives have not been as widely adopted as clear-cutting, part of the so-called efficiency model of forestry, characterized by even-aged stands of trees managed for maximum growth potential and harvested on short rotations. Because of its utility to industrial forestry operations, the efficiency model prevailed throughout most of the 20th century. Interest in alternative methods of forest management increased in the late 20th century, with growing concerns about biodiversity loss and ecosystem degradation leading to a broad push for ecological sustainability.

Ecological forestry

Ecological forestry is situated squarely in this context, in which it could be described quite simply as a tool of sustainable forest management and conservation. However, such a generic description of ecological forestry is overly simplified, and even somewhat misleading. Embedded in ecological forestry are normative concepts that do not have any single or broadly agreed upon meaning, and can refer to a range of ideas. Although different interpretations of these normative concepts could lead to different and potentially conflicting, understandings and implementations of ecological forestry, it seems that some may have become so ubiquitous as to pass largely without critical examination, at least in the ecological forestry literature. For example, as noted above, ecological forestry is sometimes framed as a strategy for sustainability (Lindenmayer et al., 2012; Stoneman, 2007) or conservation (Gustafsson et al., 2012). Without a concomitant inquiry into what quantity and quality of life, human or non-human, should be sustained or conserved for a particular period of time, these words do not themselves clarify the purpose or intent that ecological forestry stands to serve. Similarly, components of ecological forestry are sometimes framed as a strategy for climate change adaptation (Spies et al., 2010) or resilience (Franklin and Johnson, 2012), concepts that are both open to a wide range of interpretations

(Bolte et al., 2009) and could convey conflicting ideas about how forests would be managed under an ecological forestry approach. For example, a resilient forest may be considered one that maintains species valued by and desirable to society, even though they may not be adapted to a future warmer climate. When the concepts of adaptation and resilience seem to point in different directions, how could ecological forestry manage for both? Alternatively, a resilient forest might be considered one that is able to adapt without losing certain key functions and processes. In this case, resilience and adaptation appear to be mutually compatible, and in fact both can be achieved by ecological forestry. Although ambiguous normative concepts are undeniably challenging, and often beyond the scope or, understandably, agenda of any given paper, the overall dearth of research addressing these more philosophical dimensions of ecological forestry becomes problematic when the time comes to take specific management actions.

Ecological forestry has been given many labels

At times it is described as an "approach" or as "concepts". It has been called a form of "active management," and it has also been called a "philosophical basis" or a "philosophy," for forest management. Ecological forestry can be defined as as a strategy for forest management, which attempts to model anthropogenic activities in forests on historic non-anthropogenic patterns of succession and disturbance in order to meet multiple social and ecological objectives. The same ideas are proposed under a variety of other labels. Although each may convey slightly different nuances, the core concepts, as well as the ambiguities, of all of these practices are similar, and they are cited interchangeably in support of one another in the literature.

Conclusion

The idea at the core of ecological forestry is that non-anthropogenic processes of forest development and disturbance should be used as a reference and a guide for humans to selectively take and leave elements of the harvested forest. The tools of ecological forestry are age-old silvicultural concepts and practices: selection, thinning, regeneration, and rotation length re-imagined and described anew as legacies, variable density thinning variable retention harvest, and extended rotations, or recovery periods. Historically, silvicultural practices often aimed to achieve a single goal, namely, the efficient harvest of trees for human use. In ecological forestry, by contrast, the goal is to manage forests to achieve multiple economic and non-economic objectives. This term has more relevance to Indian forest and a small introspect can answer many questions.

References

Perevolotsky, A. and Sheffer, E. (2009). Forest management in Israel—the ecological alternative. Israel Journal of Plant Sciences, 57 (1-2), pp.35-48.

Lindenmayer, D.B., Franklin, J.F., Lõhmus, A., Baker, S.C., Bauhus, J., Beese, W., Brodie, A., Kiehl, B., Kouki, J., Pastur, G.M. and Messier, C. (2012). A major shift to the retention approach for forestry can help resolve some global forest sustainability issues. Conservation Letters, 5 (6), pp. 421-431.

Stoneman, G.L. (2007). 'Ecological forestry'and eucalypt forests managed for wood production in south-western

Australia. Biological conservation, 137 (4), pp.558-566.

Gustafsson, L., Baker, S.C., Bauhus, J., Beese, W.J., Brodie, A., Kouki, J., Lindenmayer, D.B., Lõhmus, A., Pastur, G.M., Messier, C. and Neyland, M. (2012). Retention forestry to maintain multifunctional forests: a world perspective. BioScience, 62 (7), pp.633-645.

Spies, T.A., Giesen, T.W., Swanson, F.J., Franklin, J.F., Lach, D. and Johnson, K.N. (2010). Climate change adaptation strategies for federal forests of the Pacific Northwest, USA: ecological, policy, and socio-economic perspectives. Landscape ecology, 25 (8), pp.1185-1199.

Franklin, J.F. and Johnson, K.N. (2012). A restoration framework for federal forests in the Pacific Northwest. Journal of Forestry, 110 (8), pp.429-439.

Bolte, A., Ammer, C., Löf, M., Madsen, P., Nabuurs, G.J., Schall, P., Spathelf, P. and Rock, J. (2009). Adaptive forest management in central Europe: climate change impacts, strategies and integrative concept. Scandinavian Journal of Forest Research, 24 (6), pp.473-482.

Lac culture as income generation activity of tribal people in Achanakmar-Amarkantak biosphere reserve

Nanita Berry, Rajesh K. Mishra and N. Roychoudhury
Tropical Forest Research Institute
(Indian Council of Forestry Research & Education, Ministry of Environment, Forests and Climate Change, Govt. of India)
Jabalpur – 482021, Madhya Pradesh, India

Lac is the secretions of a sap-sucking insect, *Kerria lacca* (Kerr) (syn. *Lacifer lacca* Cockerell) (Hemiptera: Kerriidae). Lac is a natural product, biodegradable, non-toxic, odourless and eco-friendly product, the only insect origin resin, which thrives on plants and a wonderful gift of nature. India and Thailand are the two major producers of lac in the world, in which India contributes 60% of production. Indian lac is proved to be the best in terms of quality and it generates employment to the millions of tribal people. In India total annual average production of stick lac is approximately 20-22 thousand tons which forms the raw material for lac industries. The raw lac is the source of three valuable and renewable products, viz. resin, dye and wax used in various industries like varnish, cosmetics, toy, jewellary, coating for edibles like fruits, dye industry, pharmaceutical industry for pills coating, wax crayons and many more. Major lac producer states of India are Chhattisgarh (ranked first), Jharkahand, Madhya Pradesh, Maharashtra and West Bengal, which contributes 90% of the national lac production, while minor producers are Uttar Pardesh, Odisha and Gujarat. Nearly 75-80% of the finished products is exported and only small portion of 20-25% is consumed within the country. This lac insect thrives on the host plants and about 400 plant species have been recorded world wide, out of these three important most common species are Kusum, *Schelichera oleosa* (Lour.) Merr. (family Sapindaceae) for *kusumi* strain, Polash, *Butea monosperma* (Lam.) Taub. (family Fabaceae) and Ber, *Zizyphus mauritina* Lam. (family Rhamnaceae) for *ragini* strain existing in natural forests and also on field bunds.

Self Help Group (SHG) comprise of tribal people in Achanakmar-Amarkantak biosphere reserve are carrying out lac cultivation as an income generation activity (Fig. 1). The lac culture is mostly doing on *B. monosperma* available in the forest. The marketing of lac product is also doing by SHG (Fig. 2).

Achanakmar- Amrakanatak biosphere reserve has multiple species of *Flemengia* Roxb. ex W.T. Aiton (family Fabaceae) which can be tested for potential as lac insect host. *Flemingia semialata* W.T. Aiton is proved a very suitable host for *kusumi* strain and can be viable option of income generation for poor women within their courtyard or field bund. Scientists of Lead Institute, Tropical Forest Research Institute, Jabalpur (MP), have standardized *Flemingia* based silvi-agri-lac system and empowering tribal community through lac cultivation in their field by involving them towards conservation of lac host as well as lac insect (Berry, 2016). It is the high time to make good germ plasm bank of lac insects in Achanakmar-Amarkantak biosphere reserve which will be easily accessible by tribal people for better economic return.

Reference

Berry, N. (2006), Development of lac based Agroforestry (silvi-agri-lac) system. Project Completion Report (PCR) submitted to ICFRE, Dehradun.

Brood lac preparation

Inoculation of brood lac

Hatching of eggs of lac insect

Young lac crop

Full grown lac crop

Scraping of lac

Fig. 1: Lac cultivation in Achanakmar-Amarkantak Biosphere Reserve

Fig. 2. Lac collection by SHG at Shivtarai, Achanakmar-Amarkantak biosphere

वन बीजों का एकत्रीकरण

ममता पुरोहित, एस. एल. मीणा एवं राजेश कुमार मिश्रा

उष्णकटिबंधीय वन अनुसंधान संस्थान

(भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार)

मण्डला रोड, ज़बलपुर – 482021 (म.प्र.)

घटते वनों को बढ़ाने तथा चारा, ईंधन, इमारती लकड़ी व काष्ठ आधारित उद्योगों की मांग को पूरी करने के लिए वृक्ष प्रजातियों के रोपण हेतु पौधों की आवश्यकता दिन-प्रतिदिन बढ़ती जा रही है। वृक्षारोपण कार्यक्रमों के लिए प्रत्येक वर्ष बड़े पैमाने पर बीजों की आपूर्ति होते रहना अतिआवश्यक है। एक अनुमान के अनुसार भारत में प्रत्येक वर्ष लगभग 4, 10, 000 हेक्टेयर भूमि पर वृक्षारोपण के लिए विभिन्न वृक्ष प्रजातियों के लगभग 3,500 क्विंटल बीजों की आवश्यकता होती है । किसी भी वृक्षारोपण कार्यक्रम की सफलता मूलतः बीजों की गुणवत्ता पर निर्भर होती है और बीजों की गुणवत्ता बीज एकत्रीकरण के समय, एकत्रीकरण की विधी, उचित प्रसंस्करण व देखभाल तथा भंडारण की विधी पर निर्भर होती है।

बीज एकत्रीकरण

बीजों के एकत्रीकरण का समय, बीज इकट्ठा करने की विधी व एकत्रीकरण के बाद बीजों की साफ-सफाई, ग्रेडिंग, सुखाना आदि बीजों की गुणवत्ता को प्रभावित करती है। यद्यपि बीजों को इकट्ठा करने के समय को निर्धारित करने के लिए बहुत से संकेतक हैं परन्तु बीजों या फलों को ठीक उसी

समय इकट्ठा करना चाहिए जब ये पकना शुरु करते हैं। प्रकृति के अनुसार बीज एकत्रीकरण की निम्नलिखित विधियों को वृक्ष प्रजाति व बीज/फलों के आधार पर वर्गीकृत किया गया है:

1. वन भूमि पर गिरे फल/बीजों का एकत्रीकरण
2. वन भूमि पर गिरे वृक्ष के छत्र से फलों/बीजों का एकत्रीकरण
3. वन भूमि पर खड़े होकर वृक्ष के छत्र से फलों/बीजों का एकत्रीकरण
4. वृक्ष पर चढ़कर वृक्ष के छत्र से फलों/बीजों का एकत्रीकरण
5. किसी अन्य साधन द्वारा वृक्ष के छत्र से फलों/बीजों का एकत्रीकरण

प्रोसेसिंग

प्रोसेसिंग का उद्देश्य ऐसे साफ/स्वच्छ, विशुद्ध फलों/बीजों को प्राप्त करना है जो उच्च कायिकी गुणवत्ता वाले हों एवं जिनका सरलता से भंडारण

एवं उपयोग किया जा सके। प्रोसेसिंग के अन्तर्गत बहुत सी प्रक्रियाएं हैं जो फलों/बीजों के प्रकार, एकत्रीकरण वं भंडारण अवधि के दौरान फलों/बीजों की दशा के अनुसार भिन्न-भिन्न होती है । प्रोसेसिंग मुख्यतः निम्नलिखित 7 प्रक्रियाओं का समूह है:

1. पूर्व साफ-सफाई
2. पूर्व देखभाल
3. फल से बीज निकालना
4. डिविगिंग
5. सफाई
6. श्रेणी निर्धारण या वर्गीकरण
7. नमी का समायोजन

फलों के एकत्रीकरण के बाद जितने जल्दी हो सके फल से बीजों को निकाल लेना चाहिए जिससे खराब न हो सकें साथ ही साथ बीजों की बुआई व

भंडारण आसान हो जाए । कभी-कभी सीधे फल ही बोया जाता है । बीज निकालने की आवश्यकता नहीं होती । कुछ प्रजातियों में बीज निकालने के लिए फलों का गूदा अलग करना जरुरी होता है जैसे नीम, बेल आदि । इसके बाद बीजों को प्राकृतिक तौर पर छाया या धूप में अथवा 'सीड ड्रायर' में सुखाया जाता है । बहुत सी आर्थोडॉक्स प्रजातियों के बीजों को सुरक्षा के लिए रोपणी में बोने से पहले, अन्य जगह भेजने के लिए पेकिंग से पहले तथा भंडारण से पूर्व सुखाना आवश्यक होता है जिससे नमी को सुरक्षित स्तर तक कम किया जा सके अन्यथा अधिक नमी होने पर बुआई के पश्चात भंडारण या एक जगह से अन्य जगह भेजने के दौरान सूक्ष्म

जीवाणुओं के द्वारा बीज नष्ट हो जाते हैं। सुखाने के बाद बीजों को स्क्रीनिंग मशीन और ग्रेविटी सेपरेटर द्वारा साफ किया जाता है । इस तरह सुखाये तथा साफ किये बीजों को नमी रोधक थैलियों या मुहबंद (सील्ड) टंकियों या टिन के डिब्बे में रखकर उचित प्रकार से सूचना पत्र थैलियों/डिब्बों के अंदर रखकर व यथासंभव ऊपर सूचनापत्रक चिपकाकर या लिखकर बीज परीक्षण के लिए प्रयोगशाला में भेजा जाता है जहाँ बीजों की गुणवत्ता की जाँच होती है।

प्रारंभिक परीक्षण

फल इकट्ठा करने के लिए फलों का वजन, फलों की माप, एक फल में बीजों की सँख्या आदि फल एकत्रीकरण के लिए सहायक मानदंड हैं । बीजों की जैवकीय पता करने में फलों एवं बीजों का विवरण मदद करता है । एकत्रीकरण पश्चात

बीजों की नमी का निर्धारण और अंकुरण परीक्षण हमेशा करना चाहिए।

फलों का वजन

फल का वजन ज्ञात करने के लिए 200 फलों का एक रेन्डम नमूना लेते हैं । अब इस नमूना (सेम्पिल) को 50-50 फलों के चार समुच्चयों में बाँट देते हैं । प्रत्येक समुच्चय का अलग-अलग वजन लिख लेते हैं तथा निम्नलिखित तालिका के अनुसार फलों का औसत वजन व प्रति किलोग्राम में फलों की सँख्या ज्ञात कर लेते हैं।

क्र.	समुच्चय A	वजन (ग्राम में) B	फलों का वजन (ग्राम में) = B/A
1.	50 फल	830	16.6
2.	50 फल	855	17.1
3.	50 फल	842	16.8
	50 फल	856	17.1
C = औसत फल का वजन = (B1+B2+B3+B4)/4 = 16.9 ग्राम			
D = प्रति किलो ग्राम में फलों की सँख्या 1000/C = 59			

फलों का आयतन

फलों का आयतन ज्ञात करने के लिए किसी 1 लीटर माप वाले पात्र में फलों को भरकर फलों के ढेर में रेन्डम सेम्पल लेते हैं तथा प्रत्येक समुच्चय (1 लिटर में) में फलों की सँख्या गिनकर लिख लेते हैं । यदि फल बहुत बड़े आकार के हैं तो नमूना लेने के लिए 5 या 10 लिटर माप वाले पात्र का उपयोग करते हैं। निम्नलिखित तालिका के अनुसार प्रति लीटर फलों की औसत सँख्या ज्ञात कर लेते हैं।

समुच्चय A	फलों की सँख्या B	प्रति समुच्चय प्रति लीटर फलों की सँख्या
	532	532
	541	541
	525	525
	537	537
C = प्रति लिटर फलों की औसत सँख्या = (B1+B2+B3+B4)/4 = 534		

फलों का विवरण लिखना चाहिए जिससे फलों की लम्बाई, व्यास, यदि फल में विंग हैं तो विंग की लंबाई आदि लिखकर चित्र बनाना चाहिए। फल के क्रास सेक्सन का विवरण चित्र भी बनाना चाहिए जिससे फल में बीज/बीजों की स्थिति और विन्यास की जानकारी हो।

प्रति फल में बीजों की सँख्या

फलों का वजन ज्ञात करने के लिए उपयोग किये गये चारों समुच्चयों से अलग-अलग बीज निकालते हैं । बीजों को सूखने से बचाने के लिए बीज

निकालने के तुरन्त बाद उन्हे किसी बन्द पात्र (जैसे पेट्री डिशेज आदि) में रखना चाहिए। अब नीचे दी गई तालिका में यह लिख लेना चाहिए कि प्रत्येक समुच्चय में कितने फल बीज रहित हैं (A) तथा प्रत्येक समुच्चय में कुल कितने बीज हैं

(B), प्रति फल में कितने बीज हैं (C), बीज रहित फलों का प्रतिशत क्या है (D), प्रति फल बीजों की औसत सँख्या क्या है (E) तथा प्रति किलो फल में बीजों की सँख्या क्या है (F).

क्र.	समुच्चय	बीज रहित फल (A)	बीज सँख्या (B)	प्रति फल बीजों की सँख्या = B/50 (C)
1.	50 फल	0	247	4.9
2.	50 फल	0	252	5.0
3.	50 फल	0	245	4.9
4.	50 फल	0	253	5.1

D: बीज रहित फलों का प्रतिशत = (A1+A2+A3+A4)/4 = 0%
E: प्रति फल बीजों की औसत सँख्या = (C1+C2+C3+C4+)/4 = 5.0 बीज/फल
F: प्रति किलो फल में बीजों की सँख्या = प्रति किलो फलों की सँख्या x E (फल/बीज) = 59 x 5 = 295 बीज/किलो फल

इन्टरनेशनल सीड टेस्टिंग एसोसिएशन (आई एस टी ए) की स्थापना सन् 1921 में हुई तथा फॉरेस्ट ट्री सीड टेस्टिंग के लिए इन्टरनेशनल मानक, डबलिन में सन् 1961 में हुई मीटिंग के बाद सन् 1953 में तय किये गये एवं माने गये।

Know your biodiversity

Swaran Lata and Preeti Kaushal
Himalayan Forest Research Institute (HFRI)
Shimla (Himachal Pradesh)

Saussurea costus

Saussurea costus is a well known and important medicinal plant widely used in several indigenous systems of medicine for the treatment of various ailments. It has anti-inflammatory, anti-cancer, anti-ulcer properties. It belongs to order Asterales and family Asteraceae. It is commonly known as Kot, Kur, Kust, Kut, Kuth, and Pachak. *Aucklandia costus*, *Aplotaxis lappa* and *Saussurea lappa* are its synonyms.

It is found in the Himalayas from Pakistan to Himachal Pradesh. It is endemic to Indian Himalayan regions growing at altitude of 2000-3600 m. Its natural populations are found in higher elevations of Jammu and Kashmir and Himachal Pradesh and now cultivated in Kashmir, Himachal Pradesh and in some parts of Uttarakhand. In Himachal Pradesh it is found in Kinnaur, Kullu and Lahaul & Spiti districts.

It is an erect, robust, very large, about 2 m, pubescent, perennial herb. Stems 2–2.5 m tall, unbranched, erect, robust, glabrous below, and pubescent above. Leaves pubescent, irregularly toothed, base auricled, rough above, smooth below, terminal lobes 30 cm in diameter. Radical leaves very large, about 30-40 × 20-30 cm, pinnate, triangular, with an irregularly winged petioles. Cauline leaves shorter, 20-30 × 15-25 cm, all irregular toothed, sessile or petiolate, with narrow auricled base. Flowers heads purple, sessile, in axillary or in dense rounded, terminal clusters. Flowering and fruiting period is May-August.

Its most widespread uses include treatment of asthma, bronchitis, colic, cough, dental trouble, diarrhoea and dysentery, fever flatulence, headache, cough, hysteria, in some cases of heart troubles, menstruation trouble, rheumatism and promotes urination; stimulates the brain; cures diseases of the blood, the liver and the kidney; cures headache, deafness, pain in the chest and in the joints, paralysis, inflammations, ophthalmia, and old fevers. It is regarded useful as hair wash, against marks and blemishes and also in skin diseases.

In Himalayan states the root is also used as an insecticide to protect shawls and woollen fabrics. The oil extracted from the roots, known as costus oil, is used in the preparation of hair oil and in high quality perfumes. Costus oil is pale yellow to brownish in colour and is valuable in treating leprosy. In Lahaul, powdered roots are used as incense. Extract obtained by boiling pieces of roots in mustard oil for 30 minutes is used as ear drops for relieving pain. Contents of crushed roots are applied as poultice over painful joints and boils. Roots of this plant are a valuable

perfume. It was formerly smoked as a substitute for opium.

Roots are used medicinally and the chief active constituents of the root are an essential oil 1.5 per cent, an alkaloid which has been named *Saussurine* 0.05 per cent, resin 6 per cent. Besides these, there occurs a fixed oil, traces of bitter substance, small quantities of tannis, inulin, potassium nitrate, sugars, etc. The essential oil has a strong aromatic, penetrating and fragrant odour. It has antiseptic and disinfectant properties; it relaxes the involuntary muscle tissue; it is a cardiac stimulant, a carminative, an expectorant and a diuretic. The alkaloid *Saussurine* has a depressant action on the vagus centre in the medulla as well as on the involuntary muscle fibres of the bronchioles and gastro-intestinal tract. It produces a slight but persistent rise of blood-pressure and increases the force of contraction and amplitude of the ventricles.

Alcoholic extract of roots contains both essential oil and alkaloid. Essential oil inhibits peristalic movement of the gut. It is absorbed from the gastro-intestinal tract and partly excreted by lungs producing an expectorant action and partly by the kidneys producing diuretic effect. The essential oil of the roots exhibit strong antiseptic and disinfectant activity against *Streptococcus* and *Staphylococcus*.

Saussurea costus is one of the important medicinal plants of India which is harvested for its roots. During collection the whole plants is uprooted. The species has sizeable market demand on account of its commercial use as a plant drug and the level of exploitation is high. The root is traded at local, regional, national and international markets. Due to high volume trade and demand the species is collected from its wild habitat in an indiscriminate way. This has a severe impact on natural regeneration. Thus, the population of this species is declining very fast in the natural habitat.

Species according to Appendix 1 of CITES (CITES, 2003). The Jammu and Kashmir has enforced a special Act, The Kuth Act, 1978 for the regulation of trade of S. *costus (*Jain, 2001). In the CAMP workshop organised at Shimla in 2003, it was collectively agreed by experts that more than 80% of the wild population in the Himalayan Region of India had declined over 10 years. The population continues to decline and there have been no significant conservation efforts taken so far (O.P. Sharma pers. comm. 2015). Therefore, the species is assessed as Critically Endangered. Hence in situ and ex situ conservation of this valuable species is necessary to stop its further decline. Beside this sustainable utilization and commercial cultivation of this species is highly needed for its conservation and to fulfill its pharmaceutical demand.

Psilopogon viridis

Psilopogon viridis also known as The Small Green Barbet and White Cheeked Barbet is approximately 23 cm long and about the size of Myna. *Megalaima viridis* is its synonym. It belongs to Order Piciformes and Family Megalaimidae.

Megalaima viridis is mainly distributed in Western Ghats, Hills of Tamil Nadu and the heavy rainfall portions of Eastern Ghats. These birds are commonest and most abundant between 1500-2500 feet elevation.

The Barbet has a dumpy, heavy-billed grass green bird with dark brown crown and nape. Chin and throat is whitish in color. A band running back from the eye and narrow check stripe is dark brown in color. Breast is whitish, streaked with brown color. Abdomen and under tail part is pale green. Small patch of naked skin around eye is brown an inconspicuous. Sexes are almost alike and arboreal.

Within its range the small green Barbet occupies both deciduous and evergreen type of forest, but it is most partial to the zone intermediate between two. They are usually seen in pairs and in small groups. Fairly large gathering will collect on the various wild fig trees when in ripe fruit, whether in forest or in small groves near any village. Sometimes the bird in South Indian coffee plantations are minor pests and sometimes do considerable damage. The bird swallow large quantities of the ripe 'cherries' and disperse seeds (berries) far and wide. They also eat insects occasionally.

Nesting season in these birds ranges between February and June. The site for it is a branch of any height from the ground. Both sexes excavate the nest and it can take about 20 days to complete the nest. Eggs are laid about 3–5 days after nest excavation. Eggs are 2 to 4 in number, pure white and the usual rather regular ovals is the characteristic of Barbets. The incubation period is 14 to 15 days. During the day both sexes incubate, but at night, only the female sits on the eggs. The pair will defend their nests from palm squirrels which sometimes prey on the eggs. Chicks are fed an insect rich diet. The young leave the nest after 36 to 38 days.

According to IUCN Red List of Threatened species, this species has a very large range, and hence does not approach the thresholds for Vulnerable under the range size criterion. The population trend appears to be stable, and hence the species does not approach the thresholds for Vulnerable under the population trend criterion. The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion. For these reasons the species is evaluated as Least Concern.

Although these days these birds are currently confronted with many threats, most important of which are habitat loss and deterioration. Traditional protection, religious beliefs, legal measures and the efforts of conservative organizations have all helped to counter, albeit only partially and thus we need to take care of these species before they come under threatened categories.

References

Kour, S., Singh, Seema and Kaloo, Z. A. (2013). Conservation Strategies of *Saussurea costus*, Critically Endangered Medicinal Herb Growing in Kashmir Himalaya- A Review. International Journal of Science and Research. 4 (7): 257-260.

Chauhan, N.S. (1999). Medicinal and aromatic plants of Himachal Pradesh. Indus Publishing Company, New Delhi, India. 632 pp.

Ambasta, S.P. (1986). The useful plants of India. Publication and Information Directorate. CSIR, New Delhi. 918 pp.

Ali, S and Ripley, S. D. (1983). A pictorial guide to the birds of the Indian sub

continent. Oxford University Press. pp. 60, 129.
Ali, S. (1979). Indian Hill birds. Oxford University Press.pp. 141-143.
Grimmet, R., Inskippt, C and Inskippt, T. (1994). Pocket guide of the birds of the Indian Subcontinent. pp. 52-53.
http://www.iucnredlist.org/

Tropical Forest Research Institute

Published by:

Tropical Forest Research Institute
(Indian Council of Forestry Research & Education)
(An autonomous council under Ministry of Environmnet, Forests and Climate Change)
P.O. RFRC, Mandla Road
Jabalpur – 482021 M.P. India
Phone: 91-761-2840484
Fax: 91-761-2840484
E-mail: vansangyan_tfri@icfre.org
Visit us at: http://tfri.icfre.org or http://tfri.icfre.gov.in