SECTION-VII

Silviculture

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Silviculture

The National Forest Policy stipulates that one third geographic area of the country should be brought under forest/tree cover. Keeping the same in focus, the Approach Paper to the X Five Year Plan has targeted to bring 25 percent area under forest/tree cover by the end of the Tenth Plan period and 33 percent by the end of the Eleventh Plan period. It also emphasises on establishment of modern nurseries on a catchment area basis to provide quality planting material.

Maintenance of seed orchards and nurseries is essential for the success of any afforestation programme. A large number of seeds orchards (clonal as well as seedling), seed production areas, model nurseries and vegetative multiplication gardens (VMG) have been developed in various state forest departments. These provide quality planting stock to the afforestation and reforestation programmes currently being implemented. The seed orchards, especially the Clonal Seed Orchards, have been established by clones from plus trees selected through rigorous scientific protocol. Seedlings from good quality mother plants have been collected and seedlings raised to establish seedling seed orchards. The seed orchards, especially the Clonal Seed Orchards, have been established by clones from plus trees selected through rigorous scientific protocol. Seedlings from good quality mother plants have been collected and seedlings raised to establish seedling seed orchards.

A vast amount of forest wealth is lost annually due to fire incidents in the forests. Fires not only affect flora but fauna as well. They may be caused naturally or may have a human hand, perhaps unintentional. Forest fires are a major hazard and obstacle in forest protection. Fires may be classified into Heavy, Moderate and Mild. In India, forest fire is a widespread and recurring phenomenon and causes extensive damage to forests. The fires are almost entirely attributed to burning by people. People lit fire in forests for variety of reasons: like to encourage a fresh flush of fodder for grazing livestock, to facilitate collection of fuelwood and NTFP like bidi leaf and to carry out shifting cultivation. The 'ground forest fires' are most common in India. It destroys the herb, shrub, lower vegetation as well as the organic matter in dry deciduous forests. The normal fire season in India is from January to mid June and the peak season lies in the months March and April.

Present chapter deals with statistics regarding Seed Production Area (Table 7.1) Vegetative Multiplication Gardens (Table 7.2), Seed Orchards (Table 7.3). Vegetative reproduction (vegetative propagation, vegetative multiplication, vegetative cloning) is a form of asexual reproduction in plants. It is a process by which new individuals arise without production of seeds or spores. It can occur naturally or be induced by horticulturists. In India VMG's for the species Eucalyptus, *E. officinalis, G.aeborea, T.indica,* Bamboo etc. VMG are managed by the states. In the year 2004-2005 the number of locations all over India was 169 numbers and the area under this VMG was 143.42 hactare. During the year 2005-2006 the number of locations was 112 numbers and the area under the plantation was 113.85 hectares.

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A seed orchard is an intensively-managed plantation of specifically arranged trees for the mass production of genetically improved seeds to create plants, or seeds for the establishment of new forests. They are usually managed to obtain sustainable and large crops of seeds of good quality.

In India seed orchard for the species Eucalyptus, Teak, Aonla, *T. grandis, Bambusa arundicacea* etc. Seed orchard are managed by the states. In the year 2004-2005 the number of locations all over India was 128 numbers and the under this plantation was 1034.28 hactare for seed orchards. During the year 2005-2006 the number of locations was 104 numbers and the area under the plantation was 1187.27 hactares.

The seed production area is generally referred to as “A plus stand that is generally upgraded and opened by removal of undesirable trees and then cultured for early and abundant seed production.

During the year 2004-2005 the number of seed production areas were 228 and area was 3636.7 hactares. And During the year 2005-2006 the number of seed production areas were 190 and area was 4139.7 hactares . Thus the number of seed area increased by 503 hactare during the year 2005-06.

Working Plans

For systematic and scientific management of forests operational plans, known as 'Working Plans', are prepared at division level generally for a period of 10 years. The entire forest area of the division is surveyed, stock mapped, partially inventoried and existing status of each forest block in the divisions including blanks etc., are mapped. In the plan the prescription is given for the future treatment of each area which includes different kind of operations in different areas like aiding natural regeneration, cultural operations, plantations, tree felling etc.

Table 7.1: Status of Seed Production Areas

States/UTs	Species	Number of Location	Area (ha)
1	2	3	4
Chhattisgarh	*Emblica officinalis* (Aonla), *Tectona grandis* (Teak), Khamer	3	566.20
Gujarat	*Tectona grandis* (Teak), *Azadirachta Indica* (Neem), *Sapindus mukorossi* (Aritha), *Emblica officinalis* (Aonla) and Desi baval	16	175.00
Himachal Pradesh	*Pinus roxburghii* (Chirpine)	3	50.00
Jammu & Kashmir	*Cedrus deodara* (Deodar), *Pinus wallichiana* (Kail), *Pinus roxburghii* (Chirpine), *Abies pindrow* (Fir), *Robinia sp.* and Bamboo	16	205.00
Madhya Pradesh	*Tectona grandis* (Teak) and others	33	891.00
Maharashtra	*Tectona grandis* (Teak)	84	1359.00
	Acacia catechu (Khair)	4	75.00
Mizoram	*Artocorpus hererophyllus* (Kathal) *Biscofolia javanica* *Thea compacta* *Parkinsonia roxburghii* *Grevillea robusta* (silk oak) *Bambusa bamboo* (Bamboo) *Terminalia myriocarpa*		
	Total	**18**	**NA**
Nagaland	*Tectona grandis* (Teak) *Terminalia myriocarpa* *Albizia procera* (Siris) *Gmelina arborea* (Gamhar) *Azadirachta Indica* (Neem) *Chukrasia tabularis* *Cedrela toona* (Tun) *Linnea grandis*		
	Total	**22**	**NA**
Odisha	*Tectona grandis* (Teak)	2	35.00
	Symplocos racemosa (Lodh)	1	5.00
	Simarouba glauca	2	4.50
Rajasthan	*Acacia nilotica* (Babul)	2	35.00
	Acacia catechu (Khair)	1	10.00
	Acacia senegal	1	10.00
	Acacia tortilis (Israeli babool)	1	10.00
	Dalbergia sissoo (Shisham)	2	30.00
	Eucalyptus tereticornis (Eucalyptus)	2	20.00
	Prosopis cineraria (Khejri)	1	10.00
	Salvadora oleodes	1	10.00
	Total	**11**	**135.00**
Tripura	Kanak kaish Bamboo	1	0.40
	Muli Bamboo	1	0.60

Note: Data of FSI-2007

Table 7.2: Status of Vegetative Multiplication Gardens

States/UTs	Species	Number of Location	Area (ha)
1	2	3	4
Andhra Pradesh	*Pongamia pinnata* (Karanja)	8	4.05
	Tectona grandis (Teak)	2	0.76
	Emblica officinalis (Aonla)	2	0.75
	Syzygium cuminii (Jamun)	2	0.51
	Azadirachta indica (Neem)	4	1.34
	Zyzyphus jujuba (Ber)	3	2.00
	Artocarpus heterophyllus (Kathal)	2	0.75
	Feronia elephantum	2	0.75
	Simarouba glauca	2	1.10
	Caesalpinia sappan	1	0.10
	Eucalyptus	5	2.75
	Sapindus emarginatus	1	0.16
	Madhuca indica (Mahua)	2	0.75
	Annona squamosa (Seetafal)	3	1.13
	Gmelina arborea (Gamhar)	1	0.32
	*Tamarindus indic*a (Imli)	1	0.25
	Aegle marmelos (Bel)	2	1.32
	Madhuca latifolia (Mahua)	2	0.76
Chhattisgarh	*Nilgiri, Emblica officinalis* (Aonla), *Tectona grandis* (Teak), *Khamer, Bamboo*	3	17.00
Gujarat	*Madhuca indica* (Mahua), *Emblica officinalis* (Aonla), *Sapindus mukorossi* (Aritha), *Tamarindus indica* (Imli), *Casurina sp.* etc.	79	34.90
Himachal Pradesh	*Dalbergia sissoo (Shisham)*	1	2.00
Kerala	Eucalyptus	1	0.64
	Acacia sp.	1	0.02
Odisha	*Aegle marmelos* (Bel), *Artocarpus heterophyllus* (Kathal), *Azadirachta indica* (Neem), *Emblica officinalis* (Aonla), *Feronia elephantum* (Elephant apple), *Madhuca indica* (Mahua), *Syzygium cuminii* (Jamun), *S. emergenata, Terminalia bellerica* (Bahera), *Tamirandus indica* (Imli)	**1**	**1.00**
Uttarakhand	*Eucalyptus*	1	0.20
	Taxus baccata (Thuner)	2	0.51
	Ringal	1	2.00
	Bamboo	1	10.00

Note: Data of Forest Statistics India-2007

Table 7.3: Status of Seed Orchards

States/UTs	Species	Number of Location	Area (ha)
1	**2**	**3**	**4**
Andhra Pradesh	Eucalyptus	2	1.14
Arunachal Pradesh	Broad leaved	2	23.00
Chhattisgarh	*Emblica officinalis (Aonla),* Khamer, Nilgiri, *Dalbergia sissoo* (Shisham), *Tectona grandis (Teak)*	12	377.50
Gujarat	*Tectona grandis (Teak), Dalbergia sissoo* (Shisham), *Eucalyptus, Acacia nilotica (babool) & others*	17	114.50
Madhya Pradesh	*Tectona grandis (Teak), Emblica officinalis (Aonla), Eucalyptus, Khamer*	36	343.50
Maharashtra	*Tectona grandis (Teak)*	38	112.80
Odisha	*Sterculia urens (Karaya), Strictus potaterum, Litsea glutimosa* (Chandna), *Sehrebera sweetoniodes* (Mokha), *Acacia mangium*	**3**	**1.50**
Rajasthan	3 species	6	48.00
Tamil Nadu	*Ailanthus excelsa* (Mahaneem)	2	2.50
	Syzygium cumini (Jamun)	1	2.50
Tripura	*Gmelina arborea* (Gamhar)	1	1.70
Uttar Pradesh	*Prosopis juliflora* (Jangli kikar)	1	1.00
	Dalbergia sissoo (Shisham)	1	1.00
	Eucalyptus hybrid	1	1.00
	Dendrocalamus asper	1	0.50
	Bambusa arundicacea	1	0.50
	Tectona grandis (Teak),	1	1.00
	Bombax ceiba (Semal)	1	0.24
Uttarakhand	Eucalyptus	1	0.40

Note: Data of Forest Statistics India-2007

Table 7.4: State-wise estimate of annually burnt forest area due to fires during 2002-2008.

S.No.	States/UTs	Recorded Forest area (In km2)	Heavy & Moderate forest fires (In km2)	Heavy, Moderate & Mild forest fires (In km2)
1	Andaman & Nicobar Islands	7171	0	0
2	Andhra Pradesh	63814	4294.88	5765.52
3	Arunachal Pradesh	51540	881.81	1742.85
4	Assam	26832	379.22	890.27
5	Bihar	6473	12.9	149.34
6	Chandigarh	34	0	0
7	Chhattisgarh	59772	132.71	1238.18
8	Dadra & Nagar Haveli	204	3.44	5.77
9	Daman & Diu	8	0	0
10	Delhi	85	0	0
11	Goa	1224	1.33	24.22
12	Gujarat	18927	101.91	331.2
13	Haryana	1559	53.53	81.18
14	Himachal Pradesh	37033	1165.27	1599.38
15	Jammu & Kashmir	20230	740.09	984.71
16	Jharkhand	23605	46.76	535.9
17	Karnataka	38284	1319.92	2086.66
18	Kerala	11265	151.57	296.49
19	Lakshadweep	0	0	0
20	Madhya Pradesh	94689	322.07	1658.27
21	Maharashtra	61939	437.52	1210.10
22	Manipur	17418	673.63	994.91
23	Meghalaya	9496	373.13	549.16
24	Mizoram	16717	665.65	980.29
25	Nagaland	9222	352.31	521.98
26	Odisha	58136	1253.58	2459.92
27	Puducherry	13	0	0
28	Punjab	3084	24.22	73.53
29	Rajasthan	32639	198.59	795
30	Sikkim	5841	39.41	116.09
31	Tamil Nadu	22877	824.75	1300.27
32	Tripura	6294	233.01	352.06
33	Uttar Pradesh	16583	262.22	570.98
34	Uttarakhand	34651	1420.83	1868.26
35	West Bengal	11879	25.9	273.19
	Total	**769538**	**16392.1**	**29455.6**

Source: **State Forest Departments**

Table 7.5: Number of valid Working Plans in different States in India as on 31.03.2010.

States/U.T.s	No. of Territorial divisions	No. of valid Working Plans (WP)	Remarks
Andhra Pradesh	47	46	WP of Anantpur division under revision; GIS is used in preparation of all WPs and RS also in one case.
Arunachal Pradesh	24	5	WP of 9 divisions have expired and under revision; WP for other divisions yet to be prepared.
Assam	31	1	Draft of 10 WPs had been submitted for approval.
Bihar	17	nil	WP of 6 divisions getting ready; Entire area of 5 divisions fall in PAs and 6 divisions are without forest.
Chhattisgarh	32	32	Modern technology used in preparation in 27 divisions.
Goa	2	nil	WP prepared but not approved.
Gujarat	22	20	WP of 2 divisions being revised.
Haryana	21	21	3 WP revised expired on 31 March 2010.
Himachal Pradesh	37	14	WP of 19 divisions being revised, 4 under active revision.
Jammu & Kashmir	28	4	WP of 24 divisions expired many years ago and under revision.
Jharkhand	32	12	Draft of 3 WP already submitted to GOI for approval; rest are under revision.
Karnataka	40	40	Digitized boundaries of all the management units of the division are put on the web.
Kerala	24	22	2 WP expired on 31 March 2010; GIS applied in the preparation of 5 WP.
Madhya Pradesh	63	57	6 WP being revised; GIS applied in about 25 WP made recently.
Maharashtra	51	43	12 WP under revision; Modern technology used in preparation of 34 WPs.
Manipur	10	10	WP prepared by conventional methods.
Meghalaya	3	nil	All WPs are under revision.
Mizoram	10	1	First WP prepared and the rest under preparation.
Nagaland	9	1	
Odisha		37	2512 WP under revision; GIS applied in 12 WPs prepared with the help of NRSC.
Punjab	17	14	3 WP expired in 2008-09 are under revision.
Rajasthan	42	5	Rest under revision.
Sikkim	4	3	1 WP being prepared first time.

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States/U.T.s	No. of Territorial divisions	No. of valid Working Plans (WP)	Remarks
Tamil Nadu	33	31	GIS applied in preparation of 26 WPs; 2 WP are under preparation.
Tripura	9	9	
Uttarakhand	29	26	3 WP are under preparation.
Uttar Pradesh	75	73	2 WP under revision; boundaries of 3 divisions are digitized.
West Bengal	26	14	Draft for 6 WP and 3 PWPR submitted to RCCF; 3 WP in preparation; GIS is used in preparation of 5 WP.
A & N Islands	6	6	All the boundaries of divisions had been digitized.
Total	**781**	**535**	

NB: The newly established Forest Departments in 5 UTs have in all 7 territorial divisions, three in Delhi, one each in Chandigarh, Daman & Diu, Puducherry and Lakshadweep mainly for protection, hence no WP system exists in these territories. Only one division of Dadar &Nagar Haveli has also no WP system.

Source: **State Forest Departments**