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## TREE SEED REQUIREMENTS IN PAKISTAN

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### ABSTRACT

It is estimated that an area of 774,700 hectares will be planted in Pakistan during the 8th Five Year Plan (1993-94 to 1997-98) for which 1309.4 million plants will be raised. On the basis of these targets, 992,710 kg seeds of various tree species would be required during this period.

### INTRODUCTION

Realizing the vital role of forests in the development of national economy and improvement of general environment, the Government of Pakistan has planned large scale afforestation programmes for conservation of fragile mountain, watersheds and promotion of tree planting on farmlands throughout the country. A Forestry Sector Master Plan for the country has recently been prepared and an increase in the forest area from 5.2% to 25% within next 25 years has been proposed in it. Large scale afforestation can only be carried out by a well organized programme of quality seed production, collection, processing and storage for sustained supply of seeds for raising nurseries and plantations. Therefore a National Workshop on Tree Seed Technology was held at the Pakistan Forest Institute, Peshawar in collaboration with Technical Assistance Team of Forestry Planning and Development Project, Government of Pakistan from November 21-26, 1992. A large number of participants from

Federal and Provincial Forest Departments attended this Workshop. They were asked to determine targets of plantations, choice of species and seed requirements in different provinces/territories. This paper gives the seed requirements for different species according to planting targets of each province/region.

### PLANTING TARGETS OF FOREST DEPARTMENTS

During the Eight Five Year Plan period (1993 to 1998) an area of 774,740 hectares will be planted in the country. Each provincial forest department has fixed target area to be planted with various species and nursery plants to be raised. The requirements of seed of different tree species in their afforestation programmes are given below:

#### Punjab Forest Department

Punjab is a land of great diversity. Ranging from deserts to moist temperate regions it encompasses a variety of land types, in which a number of tree species can be planted. However, some of the species have gained high priority due to the local conditions of climate, soil and market. It is estimated that an area of about 222,640 hectares would be planted in the Punjab during the period 1993-94 to 1997-98. A break-up of planting stock of major species required during this period is given in Table 1.



Table 1. Planting stock requirements by species during 1993-94 to 1997-98 in Punjab.

Species	(in millions)					Total
	1993-94	1994-95	1995-96	1996-97	1997-98	
1. <i>Dalbergia sissoo</i>	54.0	60.0	66.0	73.2	81.0	334.2
2. <i>Eucalyptus</i> spp.	22.5	25.0	27.5	30.5	33.8	139.3
3. <i>Populus</i> spp.	4.5	5.0	5.5	6.1	6.8	27.9
4. <i>Bombax</i> spp.	4.5	5.0	5.5	6.1	6.8	27.9
5. <i>Acacia</i> spp.	1.8	2.0	2.2	2.4	2.7	11.1
6. <i>Pinus</i> spp.	0.9	1.0	1.1	1.2	1.3	5.5
7. Misc. spp.*	1.8	2.0	2.2	2.5	2.6	11.1
Total	90.0	100.0	110.0	122.0	135.0	557.0

\* Misc. includes (*Prosopis cineraria*, etc.)

It is estimated that a 38,671 kg seed will be required to raise the planting stock of

species mentioned above. Year-wise break-up of seed requirement for each species is given in Table 2.

Table 2. Seed requirements (kg) by species during 1993-94 to 1997-98 in Punjab.

Species	1993-94	1994-95	1995-96	1996-97	1997-98	Total
1. <i>Dalbergia sissoo</i>	4,255	4,727	5,200	5,767	6,382	26,331
2. <i>Eucalyptus</i> spp.	310	345	379	421	466	1,921
	0.9	1.0	1.1	1.2	1.4	5.6
3. <i>Bombax</i> spp.	468	520	572	634	7.7	2,901
4. <i>Acacia</i> spp.	312	347	382	416	468	1,925
	540	600	660	720	810	3,330
5. <i>Pinus</i> spp.	225	250	275	300	325	1,375
6. Misc. spp. ( <i>Prosopis cineraria</i> , etc)	144	160	176	200	208	888
Total	6,254	6,949	7,644	8,458	9,366	38,671



## Sindh Forest Department

Riverain forests of *Acacia nilotica* constitute the main forest types in Sindh province. However, irrigated plantations of *Acacia nilotica*, *Eucalyptus camaldulensis* and

*Dalbergia sissoo* are also raised. An area of 101,500 hectares is planned to be planted during the 8th Five Year Plan, for which about 687,108 kg seed of various species will be required. Seed requirement for each species is given in Table 3.

Table 3. Area to be planted and seed requirement for different species during the 8th Five year Plan in Sindh Province.

Species	Area (ha)	Quantity of seed (kg)
<i>Acacia nilotica</i>	46,000	552,000
<i>Rhizophora/ceciops</i> spp	7,500	31,250
<i>Prosopis cineraria</i>	2,500	30,000
<i>Avicinnia marina</i>	12,500	3,125
<i>Dalbergia sissoo</i>	3,000	375
<i>Eucalyptus camaldulensis</i>	23,000	358
Miscellaneous*	7,000	70,000
Total	101,500	687,108

\* Includes *Albizia procera*, *A. lebbek*, *Melia azedarach*, *Zizyphus mauritiana*, *Ailanthus excelsa*.

## N.W.F.P. Forest Department

Natural coniferous forests of North West Frontier Province are the main source of coniferous timber supply in the county. Besides the regeneration of natural forests, large scale planting is proposed to be carried out under various forestry projects in the province. During

the period of 1993-94 to 1997-98 an area of 371,570 hectare is to be planted with 600.5 million plants for which 163,600 kg seeds of coniferous as well as broad leaved species will be required. The number of seedlings of different species required during the period 1993-94 to 1997-98 is given in Table 4 and 5.



Table 4. Planting programme of coniferous species during the period  
1993-94 to 1997-98 in N.W.F.P.

Species		1993-94	1994-95	1995-96	1996-97	1997-98	Total
<i>Pinus roxburghii</i>	Plants(mill.)	22.09	26.51	30.92	35.34	39.76	154.62
	Area (ha)	13667	16401	19134	21868	24601	95671
<i>Pinus wallichiana</i>	Plants(mill.)	3.01	3.62	4022	4.82	5.42	21.09
	Area (ha)	1864	2237	2610	2982	3355	13048
<i>Cedrus deodara</i>	Plants(mill.)	1.00	1.20	1.40	1.60	1.80	7.00
	Area (ha)	619	743	866	990	1114	4332
<i>Abies pindrow</i>	Plants(mill.)	1.44	1.68	1.92	2.16	2.40	9.60
	Area (ha)	891	1040	1188	1337	1485	5941
<i>Pinus gerardiana</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	31	31	31	31	31	155
<i>Picea smithiana</i>	Plants(mill.)	0.49	0.57	0.66	0.74	0.82	3.28
	Area (ha)	304	355	406	456	507	2028
<i>Pinus halepensis</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	31	31	31	31	31	155
<i>Taxus baccata</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	31	31	31	31	31	155
Total	Plants(mill.)	28.18	33.73	39.27	44.81	50.35	196.34
	Area (ha)	17438	20869	24297	27726	31155	121485



Table 5. Planting programme of broad-leaved species during the period 1993-94 to 1997-98 in N.W.F.P.

Species		1993-94	1994-95	1995-96	1996-97	1997-98	Total
<i>Eucalyptus camaldulensis</i>	Plants(mill.)	26.0	29.5	33.0	30.4	40.0	164.9
	Area (ha)	16089	18253	20419	22586	24752	102099
<i>Robinia pseudoacacia</i>	Plants(mill.)	8.03	8.76	9.49	10.22	10.95	47.45
	Area (ha)	4969	5420	5872	6324	6776	29361
<i>Acacia modesta</i>	Plants(mill.)	6.16	6.72	7.28	7.84	8.40	36.40
	Area (ha)	3811	4159	4505	4850	51.97	22522
<i>Acacia nilotica</i>	Plants(mill.)	5.30	5.78	6.27	6.75	7.23	31.33
	Area (ha)	3281	3578	3877	4175	4473	19384
<i>Ailanthus altissima</i>	Plants(mill.)	4.20	4.90	5.60	6.30	7.00	28.0
	Area (ha)	2599	30.32	3465	3898	4331	17325
<i>Dalbergia sissoo</i>	Plants(mill.)	3.75	4.5	5.25	6.00	6.75	26.25
	Area (ha)	2320	2783	3249	3712	4177	16241
<i>Morus alba</i>	Plants(mill.)	0.06	0.07	0.08	0.09	0.10	0.40
	Area (ha)	31	31	31	31	31	155
<i>Eucalyptus citriodora</i>	Plants(mill.)	0.11	0.12	0.13	0.14	0.15	0.65
	Area (ha)	68	74	80	87	93	402
<i>Alnus nitida</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	7	7	7	7	7	35
<i>Aesculus indica</i>	Plants(mill.)	0.02	0.02	0.03	0.03	0.03	0.13
	Area (ha)	14	15	16	17	19	81
<i>Juglans regia</i>	Plants(mill.)	0.13	0.15	0.17	0.20	0.23	0.88
	Area (ha)	77	93	108	124	139	541
<i>Acer pictum</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	31	31	31	31	31	155
<i>Fraxinus excelsior</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	31	31	31	31	31	155
<i>Cedrella serrata</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	31	31	31	31	31	155
<i>Bombax ceiba</i>	Plants(mill.)	0.05	0.05	0.05	0.05	0.05	0.25
	Area (ha)	31	31	31	31	31	155
Miscellaneous*	Plants(mill.)	11.16	12.23	13.28	14.44	15.41	66.52
	Area (ha)	6938	7603	8265	8929	9591	41326
Total	Plants(mill.)	65.17	73.00	80.83	88.66	96.50	404.16
	Area (ha)	40328	45172	50018	54864	59710	250092

\* Miscellaneous includes *Prunus padus*, *Betula utilis*, *Eucalyptus tereticornis*, *Quercus* spp. *Olea cuspidata* etc.



To raise the planting stock of 600.5 million plants, the required quantity of seed is given in Table 6 and 7.

Table 6. Seed requirement (kg) of different coniferous species during the period 1993-94 to 1997-98 in N.W.F.P.

Species	1993-94	1994-95	1995-96	1996-97	1997-98	Total
<i>Pinus roxburghii</i>	9,429	11,315	13,201	15,086	16,972	66,003
<i>Pinus wallichiana</i>	603	723	844	964	1,085	4,219
<i>Cedrus deodara</i>	500	600	700	800	900	3,500
<i>Abies pindrow</i>	303	354	404	455	505	2,021
<i>Pinus gerardiana</i>	74	74	74	74	74	370
<i>Picea smithiana</i>	25	30	34	38	42	169
<i>Pinus halepensis</i>	9	9	9	9	9	45
<i>Taxus baccata</i>	7	7	7	7	7	35
Total	10,950	13,112	15,273	17,433	19,594	76,362

Table 7. Seed requirement (kg) of different broad-leaved species during the period 1993-94 to 1997-98 in N.W.F.P.

Species	1993-94	1994-95	1995-96	1996-97	1997-98	Total
<i>Eucalyptus camaldulensis</i>	347	393	440	487	533	2,200
<i>Robinia pseudoacacia</i>	575	627	680	732	784	3,398
<i>Acacia modesta</i>	1,027	1,120	1,213	1,307	1,400	6,067
<i>Acacia nilotica</i>	2,651	2,892	3,133	3,374	3,615	15,665
<i>Ailanthus altissima</i>	639	746	852	959	1,065	4,261
<i>Dalbergia sissoo</i>	652	783	913	1,044	1,174	4,566
<i>Morus alba</i>	1	1	1	1	1	5
<i>Eucalyptus citriodora</i>	4	4	4	5	5	22
<i>Alnus nitida</i>	18	18	18	18	18	90
<i>Aesculus indica</i>	1,760	1,920	2,080	2,240	2,400	10,400
<i>Juglans regia</i>	5,000	6,000	7,000	8,000	9,000	35,000
<i>Acer pictum</i>	8	8	8	8	8	40
<i>Fraxinus excelsior</i>	8	8	8	8	8	40
<i>Cedrella serrata</i>	20	20	20	20	20	100
<i>Bombax ceiba</i>	7	7	7	7	7	33
<i>Melia azedarach</i>	38	38	38	38	38	190
<i>Zizyphus mauritiana</i>	100	100	100	100	100	500
Miscellaneous *	931	930	931	930	932	4,654
Total	13,786	15,615	17,446	19,278	21,108	87,233

\* Misc. includes *Populus* spp. *Quercus* spp. *Betula utilis* etc.



## Azad Jammu and Kashmir Forest Department

The forests in Azad Jammu and Kashmir cover an area of 360,000 hectares, which is the largest and the highly productive forest area (2) in the country. Chir, Kail and Deodar are the major timber producing tree species. There are several development projects in the region through which large scale planting operations

are being carried out. A summary of the areas to be reforested, seedling requirement and quantity of seed needed during the 8th Five Year Plan is given in the following tables. Year-wise detail of planting area and number of coniferous as well as broad leaved seedlings needed for planting are given in Table 8.

Table 8. Planting programme of coniferous and broad leaved species during the period 1993-94 to 1997-98 in Azad Jammu & Kashmir.

Species		1993-94	94-95	95-96	96-96	97-98	Total
Conifers	Plants (mil)	7.4	7.3	8.2	8.2	8.2	39.3
	Area (ha)	6364.0	6219.0	6816.0	6816.0	6816.0	33031.0
Broad leaved	Plants (mil)	9.9	9.2	14.5	14.5	14.5	62.6
	Area (ha)	7802.0	6684.0	10506.0	10506.0	10506.0	46004.0
Broad leaved for public distribution)	Plants (mil)	7.0	9.0	10.0	12.0	12.0	50.0
Total	Plants(mil)	24.3	25.5	32.7	34.7	34.7	151.9
	Area (ha)	14166.0	12903.0	17322.0	17322.0	17322.0	79035.0

To raise 151.9 million seedlings of different coniferous and broad leaved species, it is estimated that a total quantity of 103,342 Kg

seed will be needed. The year-wise seed requirement for major coniferous and broad leaved species is given in Table 9.



Table 9. Seed requirement (Kg) of different coniferous and broad leaved species during the period 1993-94 to 1997-98 in Azad Jammu & Kashmir.

Species	1993-94	94-95	95-96	96-97	97-98	Total
<i>Pinus roxburghii</i>	2960	2960	3280	3280	3280	15720
<i>Pinus wallichiana</i>	1480	1460	1640	1640	1640	7860
<i>Cedrus deodara</i>	493	487	547	547	547	2621
<i>Robinia pseudoacacia</i>	1574	1694	2294	2480	2480	10522
<i>Ailanthus altissima</i>	127	139	190	203	203	862
<i>Juglans regia</i>	4286	5714	7143	7143	7143	31429
<i>Prunus armeniaca</i>	1613	2151	2688	2688	2688	11828
Miscellaneous*	3500	3600	4800	5300	5300	22500
Total	16033	18165	22582	23281	23281	103342

\* Miscellaneous includes *Eucalyptus* spp., *Melia azedarach*, *Dalbergia sissoo*, *Aesculus indica*, *Acacia modesta*, *Albizia* spp. etc.

#### SUMMARY OF PLANTING AND SEED REQUIREMENT IN THE COUNTRY

It is estimated that during the 8th Five Year Plan (1993-94 to 1997-98) a total area of 774,700 hectares (excluding Balochistan and

Northern Areas) will be planted in the country. To achieve this target, about 1309.4 million seedlings will be raised (except for Sindh) for which 992,710 Kg seed will be required. A summary of these estimates is given below.

Table 10. Total requirement of plants and seed during five year period.

Province/Species	Area (1000 ha)	Plants required (millions)	Quantity of seed required (Kg)
<b><u>N.W.F.P</u></b>			
Coniferous	121.48	196.34	76.36
Broad leaved	250.09	404.16	87.23
Sub-total	371.57	600.50	163.59
<b><u>Punjab</u></b>			
Coniferous	2.20	5.50	1.37
Broad leaved	220.44	551.50	37.30
Sub-total	222.64	557.00	38.67
<b><u>Sindh</u></b>			
Broad leaved	101.50	-	687.11
<b><u>Azad Jammu &amp; Kashmir</u></b>			
Coniferous	33.03	39.30	26.20
Broad leaved	46.00	112.60	77.14
Sub-total	79.03	151.90	103.34
Grand total	774.74	1309.40	992.71



## SEED STORAGE

Seed storage is an essential part of a system which requires a regular and sustained seed supply for planting programmes. Seed moisture and temperature are two primary factors for maintaining viability of seed in storage. Amongst these, moisture is more important than temperature (3,5). The seed moisture content of 5 to 10 percent and storage temperature of 0° to 5°C has been generally found to be suitable for different tree seeds (4).

Such facilities of seed storage are presently available only in the Pakistan Forest Institute, Peshawar. In view of the continuous and increasing demand for quality seeds of different tree species from various government and private organizations, such facilities are needed in all provinces and regions of Pakistan.

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