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INVENTORY SURVEY

(Non - Forest Area)

OF

SONIPAT DISTRICT

(HARYANA STATE)

INVENTORY RESULTS

FOREST SURVEY OF INDIA
NORTHERN ZONE
SHIMLA-1
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Contents

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P R E F A C E

Forest Survey of India, for the first time took up inventory surveys in the rural areas with the primary objective of assessing the distribution of trees and the growing stock in the rural areas and to have an overview of the various social forestry schemes implemented by the State Forest Departments. The inventory survey was carried out according to stratified random sampling methodology. One of the important point in this survey was to categorise various types of trees in a village.The categories were farm forestry, road side plantations, village woodlots, block plantations, plantations done along canals, railway lines, ponds and others. This report pertains to district Sonipat of Haryana State.

The geographical area of Sonipat district is 2206 sq. kms. The survey was carried out during 1992-93 in the rural area of the district covering an area of 2164.62 sq. kms.

Out of the total species inventoried, 20 species on the basis of their predominance and commercial importance have been presented separately. Other species have been grouped together as miscellaneous.

The total number of trees in the district have been assessed at 30.92 lakh i.e.14.29 trees/ha. and the corresponding volume has been assessed at 4.956lakh cum.i.e.2.289cum./ha.Acacia nilotica(Babul) have been found to have the largest representation with 7.43 lakh trees(24.03%) while Tamarix aphylla has the lowest representation.

It is hoped that this report will be of use, not only to the State Forest Department of Haryana but also to others.

The inventory survey and data processing work was carried out by Forest Survey Of India,North Zone, Shimla. The work of the field staff and officers who were associated in carrying out the inventory survey,data processing and writing of this report,is appreciated.

(Dr.S.N. Rai)
Director
Forest Survey of India,
Dehradun - 248 195

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SUMMARY

1. To assess the availability of forest resources for the production of timber, fuelwood and raw material for paper pulp, matchwood, packing cases and essential oils etc. in areas outside the traditional Reserved Forests and those forest areas which could not be covered during the course of regular Inventory Survey of the district, it was proposed to carry out the inventory of such areas. The Inventory Survey has been carried out in the Sonipat district during 1992-93.

2. As per 1981 Census, Sonipat district had a total of 348 villages having a total area of 2164.62 Sq. km. out of which 11 villages having an area of 50.75 Sq. km. were randomly selected and surveyed.

3. In the entire rural area of Sonipat district 30.92 lakh trees (14.29 trees/ha.) have been estimated. The analysis shows that when all the species are combined the maximum number of the estimated trees occur in 10-20 cm. dia-class i.e. 20.54 lakh trees (66.43%) and the minimum in 40 cms. and above dia-class i.e. 1.03 lakh trees (3.33%).

4. The specieswise distribution of total number of estimated trees shows that Acacia nilotica (Babul) has the largest representation i.e. 7.43 lakh trees (24.03%) followed by Prosopis juliflora 4.98 lakh trees (16.11%), Eucalyptus spp. 4.32 lakh trees (13.99%), Dalbergia sissoo 3.56 lakh trees (11.50%), Morus spp. 3.37 lakh trees (10.91%), Mangifera indica 1.79 lakh trees (5.80%), Azadirachta indica 1.68 lakh trees (5.43%), Syzygium cumini 0.97 lakh trees (3.13%), Zizyphus spp. 0.70 lakh trees (2.26%), Salvadora spp. 0.38 lakh trees (1.22%) and Ficus spp. 0.31 lakh trees (1.01%). The representation of the rest of the species is less than 1% each.

5. The distribution of total number of trees categorywise and dia-classwise, when all the species are combined, shows that the representation of trees is maximum in the category-I - Farm Forestry i.e 21.05 lakh trees (68.08%) and minimum in the category-II - Road side Plantations i.e. 0.818 lakh trees (2.65%) for the combined dia-classes.

6. In the entire rural area of Sonipat district, total estimated volume of all the species and dia-classes combined comes to 4.956 lakh cum i.e. 2.289 cum./ha.

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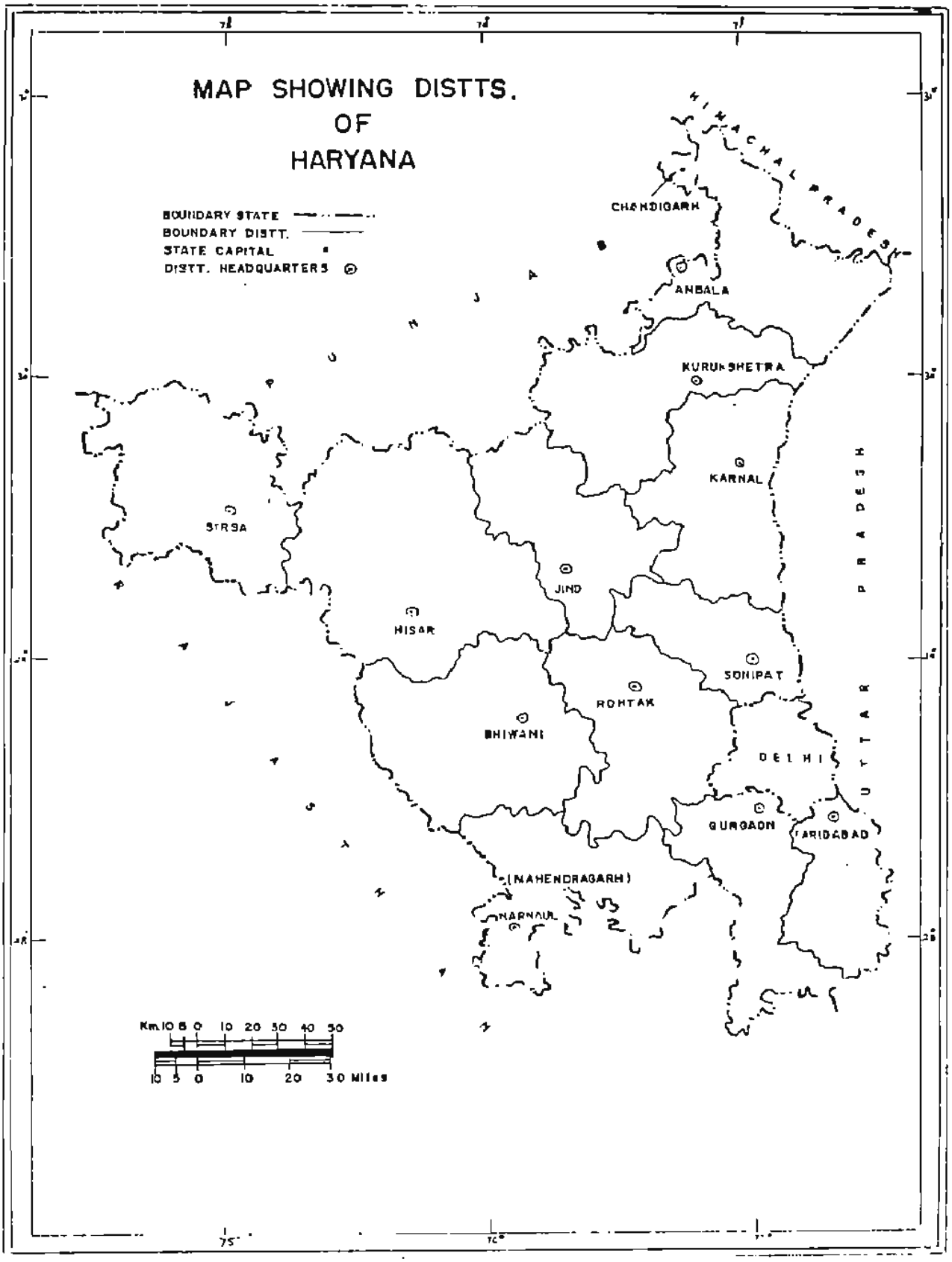
MAP SHOWING DISTTS.
OF
HARYANA
BOUNDARY STATE
BOUNDARY DISTT.
STATE CAPITAL
DISTT. HEADQUARTERS
HIMACHAL PRADESH
CHANDIGARH
ANBALA
KURUKSHETRA
KARNAL
SIRSA
JIND
HISAR
SONIPAT
ROHTAK
BHIWANI
DELHI
GURGAON
FARIDABAD
(MAHENDRAGARH)
NARNAUL
UTTAR PRADESH
Km 10 5 0 10 20 30 40 50
10 5 0 10 20 30 Miles

Contents

CHAPTER 1

1.1 Introduction

The aim of carrying out the inventory survey was to assess the availability of forest resources for the production of timber, fuelwood and raw material for paper pulp, packing cases, essential oils, matchwood etc. in areas outside the traditional Reserved Forest areas and those forest areas which could not be covered during the course of regular Inventory Survey work of Haryana State.

1.2 Discription of the District

Sonipat District is a part of the Eastern Haryana Plain. The name of the district is derived after its headquater town Sonipat. It is often believed that Sonepat (now spelt as Sonipat) was one of the five Prasthas or towns demanded by Yudhishtra from Duryodhana as the price of peace. Another tradition ascribes its foundation to Raja Soni, thirteenth in descent from Arjun, a younger brother of Yudhishtra. Both the traditions, however, are without substance. There is no mention of Sonipat in the Mahabharta although it has been noted much earlier by the great grammerian Panini in his celebrated Ashtadhayaya. The town, therefore, was already in existence around 600 B.C.

1.3 Location

The district lies between 28° 48' 30" and 29° 17' 54" North Latitudes and 76° 28' 30" and 77° 13' 40" East Longitudes. On its North lies Karnal District. To its North-West and West is Jind District. To its South-West and South are the districts of Rohtak and Delhi (U.T.) respectively. The Yamuna river makes the eastern boundary of the district under report and across the river lies Meerut District of Uttar Pradesh. The total area of the district is 2206 Sq. Km. As per the 1981 Census, the population of the district was 8,46,765.

1.4 Physical Features

Soil, geology and topography

The geological structure of the district consists of

into three sub-micro regions on the basis of soils and topography.

(a) Yamuna Khadar - The region extends over the eastern part of Sonipat tehsil of the district. It makes its limits with state of Uttar Pradesh in the East. Union Territory of Delhi in the South. Eastern Sonipat Plain in the West and Karnal District in the North. From relief point of view, the maximum elevation of the region is B.M. 223.80 metres above m.s.l. near village Rajlu while the minimum height is 214 metres above m.s.l. near village Nangal Kalan. It has a gentle slope towards South in which direction the river Yamuna flows. The region contains a few patches of sand and gravel due to riverian action and its deposits. It is obvious to find a few patches of land covered with scrubs and bushes near villages Shahpur Taga, Nisfqarhi Bakhtawarpur, Basaudi, Palra and Khurrampur. The whole region is under cultivation except a few patches of land near the river bed.

The soil found in the region is silty loam (Khadar) with a slightest mixture of sand or the stiff clay due to riverian deposits. Soils as classified by NBSS and LUP (ICAR), Nagpur, the region has Aquents-Fluvents types of soils.

Aquents : Recently formed hydromorphic alluvial soils.
Fluvents : Alluvial soils (Recent alluvium).

With regard to means of communications and transportation facilities, a network of roads are found towards southern parts of the region due to its nearness to Delhi. National Highway No. 1 (NH 1) and Northern Railway line (Broad gauge) also pass through the region.

(b) Eastern Sonipat Plain

The region extends over the parts of Sonipat and Gohana tehsils of the district. From relief point of view, the maximum height of the region is 225 metres above m.s.l. near village Kakrol while the minimum height is 218 metres above m.s.l. near village Jatuala. The region is entirely plain land and is under cultivation. Canal system is main source of irrigation.

Soil found in the region is loam (Bhangar and Nardak). The region is compact and stiff due to addition of silt by canal water. The soil is less granular and

has a low water holding capacity. The moderate permeability characteristic of the soil linked with intensive irrigation has led to water logging near the canals. With sufficient seasonal rains it is a productive region.

Soils as classified by NBSS and LUP (ICAR), Nagpur the region has Aquepts-Ochrepts and Ochrepts types of soils.

Aquepts : Brown soils (Hydromorphic)
Ochrepts : Shallow black, brown and alluvial soils of the northern region.

Communications and transportation facilities in the region are well developed. All kinds of metalled and unmetalled roads exist in the region. Sonipat and Gohana are the main towns in the region.

(c) Western Sonipat Plain

The region spreads over western part of Gohana tehsil in Sonipat District. From relief point of view, the maximum height of the region is 229 metres above m.s.l. near village Kathura (West) while the minimum height is 224 metres above m.s.l. near village Kathura (East). The entire region is a plain land and is under intensive agriculture except a few patches covered with scrubs and grass land near village Banwasa and Rindrana. The intensive network of canals in the region provides irrigation facilities.

Soil found in the region is loam (Bhangar & Nardak). Soils as classified by NBSS & LUP (ICAR), Nagpur, the region has Aquepts-Ochrepts and Ochrepts types of soils.

Aquepts : Brown soils (Hydromorphic)
Ochrepts : Shallow black, brown and alluvial soils of northern region.

As for as communication and transportation are concerned, the region has all kinds of roads. Major metalled roads are passing through the northern and southern parts of the region. Mostly the villages are interlinked with each other by minor mettalled roads.

1.5 Climate

Sonipat district is a part of Eastern Harvana plain. The district has a subtropical continental monsoon climate.

1.6 Rain

Monsoon brings rain from July to September. From October to June, the weather is generally dry except a few showers from western cyclones. Within the district also the rainfall varies. The North-eastern part of the district receives more than 700 mm of rainfall while the western part receives less than 550 mm rainfall. Besides this, the rainfall is also uncertain. While during 1979-80 it was 39.1 cm against 65.9 cm during 1976-77. It was 87.7 cm during 1977-78 and 97.3 cm during 1978-79. The cimate in the district is attributed to short wet months and long dry months. Humidity is very high during the rainy season and very low during dry summer months.

1.7 Temperature

Due to its distance from the sea there is a great difference between maximum and minimum temperatures of day and night as well as temperatures during summer and winter. The maximum daily temperature during summer reaches as high as 45 C. in May-June. Hot dry winds blow during the day in these months due to the proximity of the place to the semi-arid areas of the Haryana and Rajasthan States. During the winter the minimum temperature falls below 5 C. during December-January.

1.8 Frost, Fog & Hails

Ground frost occurs when there is snowfall in the hills of H.P. and U.P. Foggy weather also prevails during January/February. Isolated spells of hailstorms also occur during February to April. During May-June dust storms also occur in the district.

1.9 Socio-Economic Conditions

The economy of the district is primarily agricultural. At the time of 1981 census, 59.40% of the total workers were cultivators and agriculture labourers. The large and medium scale units in the district are en-

goood in the manufacture of bicycles, cycle parts, mopeds, auto components, hand tools, electrical accessories, steel tubes, steels billets, chemicals, Vanaspati ghee, soft drinks , beverages, sheet glass, sugar and beer etc. There are many small scale units in the Sonipat District producing a large variety of products which include rubber, plastic, and chemical products, paints, varnishes, drugs and pharmaceuticals, dyes, PVC shoes, weighing scales, machine tools, agricultural implements, hydraulic presses and other light engineering produts, leather, food products, textiles, bullet proof helmets etc.

Irrigation in the district is mostly done by canals and tube wells. There is good net work of canals. Out of the total area, 85.71% is the cultivable area and of which 77.25% is the irrigated area. Among the food grains mostly wheat is grown. Sugarcane is also grown over a considerable area.

As per 1977 Census, the number of livestock in Sonipat District was 4,54,700 and these mostly included cattles, buffalloes and pigs.

The people of Haryana are hardworking and enterprising. The per capita income of Haryana is second only to Punjab among the states of the country. Milk consumption is 500 gms per persons as compared to 137 gms for the country.

Out of the total population of the district, 82% is the rural population. Out of the total population, 40.35% are literates. Literacy percentage among the rural population is 36.76 while among urban population it is 59.54. While 52% males are literates, only 25.34% females are literates. Out of total population, 32.21% are workers. The schedule caste population is 16.79%.

1.10 Uses

The trees mainly provide timber, fuel, fodder, fruits and shade. Timber is obtained mainly from Dalbergia sissoo, Eucalyptus spp., Melia azedarach, Syzygium cumini, Morus spp., Mangifera indica, Azadirachta indica, Albizia spp. etc. Small timber is obtained mainly from Acacia nilotica, Acacia spp., Prosopis cineraria, Tamarix articulata etc. All the above mentioned tree spp. provide fuelwood also. Trees like Prosopis juliflora, Acacia nilotica, Acacia tortilis, Albizia spp., Morus spp., Prosopis cineraria also

provide fodder in the form of leaves pods. Morus spp. provide wood for manufacturing hockey sticks and other sports goods. Poplars provide match wood and Eucalyptus spp. paper pulpwood. Fruits are obtained from Zizyphus spps. and Syzygium cumini. Katha is extracted from Acacia catechu. Neem oil is obtained from Azadirachta indica.

It has been seen that with the ban on felling of green trees in Himachal Pradesh, packing cases for apple and other fruits/vegetables are supplied from Haryana which are obtained from Eucalyptus wood. Wood of Eucalyptus spp. is also used for making cheap furnitures and also as a fuel.

Contents

HARYANA
DISTRICT SONIPAT
10 Miles
Km
UTTAR PRADESH
KARNAL DISTRICT
GANAUR
SONIPAT
GOHANA
ROHTAK DISTRICT
DELHI
From Panipat
To Delhi
Chulkana
Rathdhana
Nahri
Khanda
Kharkhoda
Sisana
Farmana
Mundlana
Khanpur Kalan
Jagsi
Barota Mor
Bhawar
Dhanana
Ata Dadpur
Ahulana
Kathura
To Safidon
From Safidon
From Jind
From Rohtak
From Bahadurgarh
From Jhajjar
From Bhiwani
Marthal Khas
Jakhauli
Khewra
Boundaries :-
State
District
Tahsil
Highways :-
National
State
Metalled Road
Railway
Line with Station
River
Urban Area and Places

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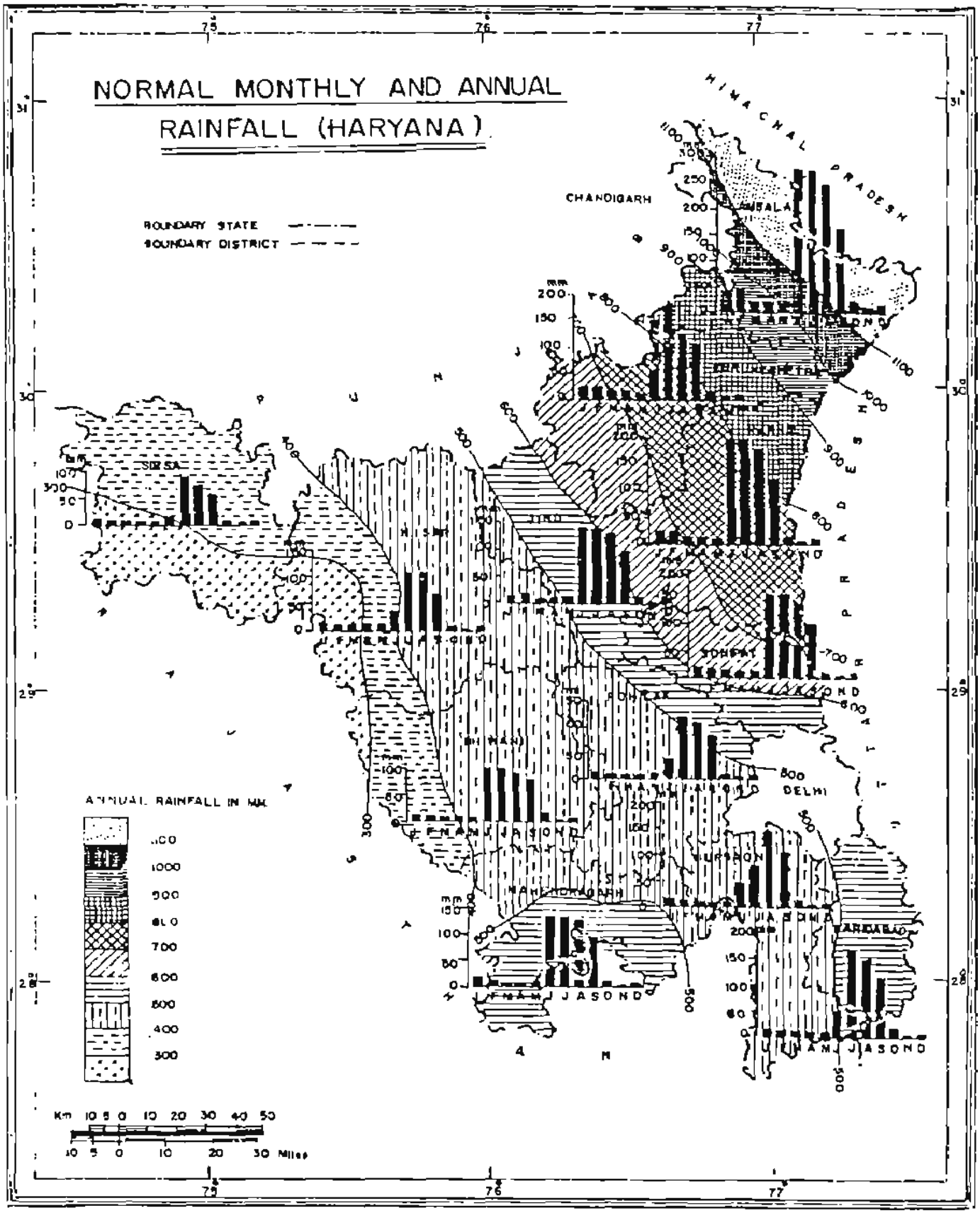
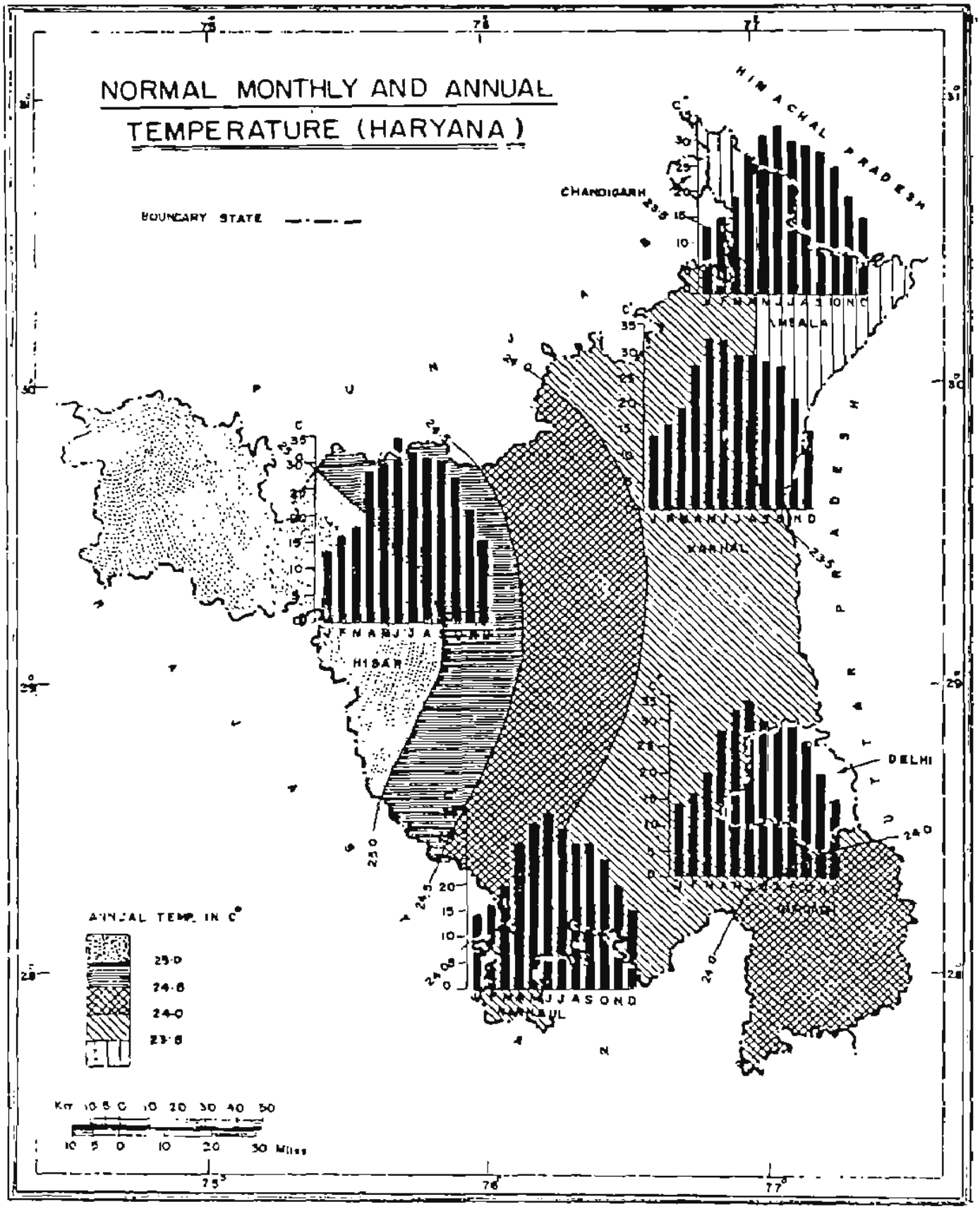

NORMAL MONTHLY AND ANNUAL
RAINFALL (HARYANA)
BOUNDARY STATE
BOUNDARY DISTRICT
CHANDIGARH
HIMACHAL PRADESH
UTTAR PRADESH
RAJASTHAN
SIRSA
HISAR
JIND
KARNAL
KAITHAL
SONIPAT
ROHTAK
JHAJJAR
DELHI
GURGAON
MAHENDRAGARH
FARIDABAD
ANNUAL RAINFALL IN MM
1100
1000
900
800
700
600
500
400
300
Km 10 5 0 10 20 30 40 50
10 5 0 10 20 30 Miles
75
76
77
29
30
31

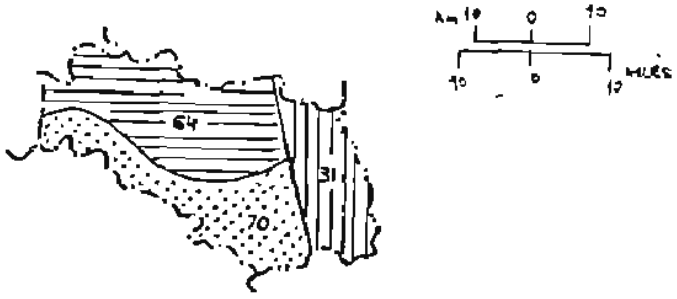
Contents


NORMAL MONTHLY AND ANNUAL
TEMPERATURE (HARYANA)
BOUNDARY STATE
HIMACHAL PRADESH
CHANDIGARH
AMBALA
KARNAL
HISAR
DELHI
UTTAR PRADESH
MATHURA
ANNUAL TEMP IN C°
25·0
24·6
24·0
23·6
J F M A M J J A S O N D
Km 10 5 0 10 20 30 40 50
10 5 0 10 20 30 Miles
75°
76°
77°

Contents

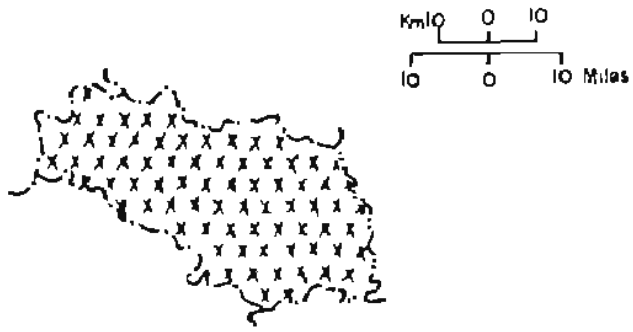
HARYANA
DISTRICT SONIPAT

SOILS



AQUENTS – FLUVENTS (33)
AQUEPTS – OCHREPTS (64)
OCHREPTS (70)

GEOLOGY



ALLUVIUM RECENT

Contents

CHAPTER 2

2.1 Design and Methodology of Non-Forest Inventory Survey

District Census Books of Census Survey 1981 were used as basis of Inventory of Non-Forest Areas. A list of villages in the district was prepared and each village was given a serial number.

2.2 Definition of Non-Forest Area

For the purpose of this survey

(1) All those areas were taken which were outside the traditional Reserved Forest Areas.

(2) All those areas which satisfied the following conditions were also excluded:-

(a) All places within the Municipality, Corporation, Cantonment Board or a notified area Committee etc.

(b) All other places which satisfied the following criteria:-

(i) A minimum population of 5,000;

(ii) At least 75% of the male working population engaged in non-agricultural persuits and

(iii) A density of population of at least 400 per Sq.km. (1,000 per Sq.mile).

In addition to all municipal areas/Cantonment Board, four villages namely (1) Babiyal in Ambala district, 2) Smalakha in Karnal district, (3) Gurgaon (rural) and 4) Jharsa in Gurgaon district satisfying the above criteria had been treated as Census towns (non-municipal) in 1981 Census. Panchkula Urban Estate in Ambala district had also been treated as a town. The Faridabad Complex Administration consisting of Faridabad, Faridabad Township and Ballabgarh towns of 1971 and some surrounding villages in Faridabad district had been treated as towns.

2.3 Sampling Design and Method of Selection of Sample Villages

The inventory survey was undertaken in the rural area (non-forest area only) of the state. The design followed in the field inventory was random sampling with the villages as sampling units. A list of villages of Sonipat district was prepared according to 1981 Census and each village was given a serial number.

Firstly, the number of sample villages to be surveyed in the state was decided by taking a pilot survey such that the results of the survey at State level would be at the precision level of ±10% at 95% probability.

For carrying out pilot survey, 2 in 3 villages were taken from each district of Haryana State. Total 31 villages were selected for pilot survey in Haryana State. A list of the villages selected for pilot survey is given in Appendix-I.

The villages selected for pilot survey were taken up one by one for carrying out complete enumeration of all the trees of 10 cms. and above diameter at B.H(OB). Each of these selected villages, with its area and boundaries as per the revenue records, was treated as a sampling unit.

After completing the pilot survey the data was processed for obtaining number of trees/Ha. in each village for calculation of sample size by using the formula

$$n = \frac{\left(\frac{2 * c.v.}{10}\right)^2}{1 + \frac{1}{N}\left(\frac{2 * c.v.}{10}\right)^2}$$

where $c.v. = \frac{s}{\bar{x}} * 100$ and

N = total no. of villages in the State.

For large N, it will be equal to

$$n = \left(\frac{2 * c.v.}{10}\right)^2$$

The method used was ratio method of estimation. The sample size obtained from pilot survey was 219 villages.

These 219 villages were distributed over all the districts proportional to the rural area of the district. A list of number of villages selected for each district is given in the Appendix-II.

These randomly selected villages in each district were taken up one by one for carrying out complete enumeration of all the trees of 10 cms. and above diameter. Each of these randomly selected villages, with its area and boundaries as per the revenue records, was treated as a sampling unit.

2.4 Field Methodology

The field data is collected by a Crew, consisting of one Junior Technical Assistant (Crew Leader), a Deputy Ranger, two Fieldmen, a Khalasi and unskilled labourers engaged locally wherever necessary for showing the boundary of the village as well as helping in the survey work.

Each Crew Leader is provided with a list of villages to be tackled alongwith a set of 1:50,000 scale maps with location of villages duly marked. The Crew Leader is required to find the nearest convenient route so that they can reach the village with minimum traverse by jeep or on foot. After reaching the village the next job is to determine the boundary of the village. For this purpose, the maps of the Revenue department are referred and in addition the help of village level authorities are obtained. The unit of sampling is the whole of sample village. To begin the data collection it is necessary to select the starting/reference point preferrably centre of the village. This reference point/centre is not necessarily to be the centre of the area. The details of the location of the reference point/centre and its description are recorded in the village description form. This is very important to enable the checking crew to reach this point and commence checking.

After fixing the starting/reference point, the enumeration work is started from the reference point by dividing the entire village into suitable sized angular quadrants with the help of compass in such a way that enumeration within each angular quadrant could be completed in one working day. The size of each angular quadrant is decided by the Crew Leader accordingly. Enumeration of trees/bamboo is commenced from the line marking due North from the centre/reference point and is proceeded in clockwise direction (i.e. North to East).

This procedure is important to avoid duplication/ommission of trees when the enumeration work is continued on the next day. Further, all the enumerated trees are suitably marked with chalk to achieve this objective. The

informations regarding number of angular quadrants, the size of each angular quadrant and number of trees enumerated in each quadrant are recorded in the prescribed Field forms given below:

(1) Village Description Form
(2) Village Tree Enumeration Form
(3) District Tree Form

Samples of the above field forms may be seen in the Appendix-VI. The field forms are briefly described below:

(1) Village Description Form

The information regarding the conspicuous features of the point selected as the Centre for starting the enumeration, number of angular quadrant, Size of each angular quadrant and number of trees enumerated in each quadrant are recorded in this form.

(2) Village Tree Enumeration Form

In this form the data of all trees of 10 cms. and above diameter at breast height over bark [DBH(OB)] in a sampled village are recorded. The dead trees having utility less than 70% and all trees of less than 10 cms. diameter are ignored.

(3) District Tree Form

This form has to be filled in for each sampled village selected in the district.

While carrying out the survey, i.e. enumeration and measurement of trees, the category of each tree - indicating the type of plantation it belongs to is also recorded in the columns of Village Tree Enumeration Form. The definitions used for this classification are as under:

Farm Forestry: Trees along the farm bunds and in small patches up to 0.1 ha. in area.

Road side Plantation: For trees planted along the road side.

Village Woodlot: Naturally growing trees on community/ private land.

Block Plantation: Patches covering an area of more than 0.1 ha. and not falling in any of the above.

Ponds: For trees planted in and around water ponds.

Railway Lines: For trees planted along the railway lines.

Canals: Trees planted along the canals.

Rest: Trees not falling in any of the above categories.

CHAPTER 3

Data Processing

3.1 Processing of the Data

After completion of field work, the field forms of the villages surveyed were consolidated and checked for inconsistencies and Coding mistakes, if any. Forms for each village were then processed manually and information was filled in the tables. The species found in sample villages of Sonipat district during survey are given in Appendix-III. Since many of the species in the region were having a very small number of trees, they were clubbed together under Miscellaneous species. Twenty main species were selected for calculating the number of stems on the basis of their numerical occurrance, commercial importance and regional importance. After manual processing of the data the tabulated data was then transferred to the data files in the Personal Computer (PC) using suitable softwares. The data files were then processed for making various tables in desired formats required to be incorporated in the Report.

3.2 Area Computation

Rural area of the district was calculated by adding up the areas of the villages given in the Census Book of 1981 of that district.

3.3 Procurement of Volume factors

Collection of felled tree data has been discontinued by zones, for developing volume equations. The volume factors have been obtained from the Logging Divisions and Territorial Forest Divisions of the State Forest Department of Haryana.

The volume factors used for different tree species have been given in the volume table at the end of this chapter.

3.4 Estimation Procedure

The estimation procedure is given below:

Let

x_i = area of the ith village

y_i = volume/no. of trees for the ith village

n = no. of sample villages in the district/state
N = total no. of villages in the district/state

$\bar{x} = \sum_{i}^{n} x_i / n$ = average area per village in the sample

$\bar{X} = \sum_{i}^{N} x_i / N$ = average area per village in the population (District/State)

$\bar{v} = \sum_{i}^{n} y_i / n$ = averane volume/no. of trees in the sample

$\bar{Y} = \sum_{i}^{N} y_i / N$ = average volume/no. of trees in the population (District/State)

$A = \sum_{i}^{N} x_i$ = total area of all villages in the population (District/State)

Then the mean volume/no. of trees per unit area for the population (District/State) is given by

$$\hat{R} = \frac{\bar{Y}}{\bar{X}}$$

The estimate of R is the sample ratio

$$\hat{R} = \frac{\sum_{i}^{n} v_i}{\sum_{i}^{n} x_i} = \frac{\bar{v}}{\bar{x}}$$

The estimate of total volume/no. of trees in the population (District/State) is given by

$$\hat{T} = \frac{A * \bar{v}}{\bar{x}} = A * \hat{R}$$

Estimated variance of $\hat{R}$ is given by

$$\hat{V}(\hat{R}) = \frac{N - n}{N n \bar{x}^2} * \frac{1}{(n-1)} \left[\sum_{i}^{n} v_i^2 - 2\hat{R} \sum_{i}^{n} v_i x_i + \hat{R}^2 \sum_{i}^{n} x_i \right]^2$$

When N is large, then

$$\hat{V}(\hat{R}) = \frac{1}{n(n-1)\bar{x}^2}\left[\sum_{i}^{n} y_i^2 - 2\hat{R}\sum_{i}^{n} y_i x_i + \hat{R}^2\sum_{i}^{n} x_i\right]^2$$

Estimated variance of $\hat{T}$ is given by

$$\hat{V}(\hat{T}) = A^2 * \hat{V}(\hat{R})$$

$$\text{S.E. of } \hat{R} = \sqrt{\hat{V}(\hat{R})} \quad \text{and} \quad \text{S.E.\%} = \frac{\text{S.E.}}{\hat{R}} * 100$$

$$\text{S.E. of } \hat{T} = \sqrt{\hat{V}(\hat{T})} \quad \text{and} \quad \text{S.E.\%} = \frac{\text{S.E.}}{\hat{T}} * 100$$

Contents

Volume Table - specieswise and dia-classwise

S.No.	Name of Species	10-20	20-30	30-40	40+
1	Acacia catechu	0.10	0.21	0.51	1.13
2	Acacia nilotica	0.06	0.14	0.57	1.13
3	Acacia spp.	0.06	0.14	0.57	1.13
4	Acacia tortilis	0.06	0.14	0.57	1.13
5	Albizia spp.	0.06	0.14	0.57	1.13
6	Azadirachta indica	0.06	0.14	0.57	1.13
7	Dalbergia sissoo	0.06	0.14	0.57	1.13
8	Eucalyptus spp.	0.10	0.41	0.95	1.71
9	Ficus spp.	0.06	0.14	0.57	1.13
10	Mangifera indica	0.06	0.14	0.57	1.13
11	Melia azedarach	0.06	0.14	0.57	1.13
12	Morus spp.	0.06	0.14	0.57	1.13
13	Populus spp.	0.07	0.35	0.73	1.26
14	Prosopis cineraria	0.06	0.14	0.57	1.13
15	Prosopis juliflora	0.06	0.14	0.57	1.13
16	Psidium guyava	0.06	0.14	0.57	1.13
17	Salvadora spp.	0.06	0.14	0.57	1.13
18	Syzygium cumini	0.06	0.14	0.57	1.13
19	Tamarix aphylla	0.06	0.14	0.57	1.13
20	Zizyphus spp.	0.06	0.14	0.57	1.13
21	Misc. spp.	0.06	0.14	0.57	1.13

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CHAPTER 4

Stand and Stock Tables

As per 1981 Census Sonipat district has a total of 348 villages having an area of 2164.62 Sq. km. Out of these, 11 villages having an area of 50.75 Sq. km. were randomly selected and surveyed (see Appendix-IV).

During the course of inventory, data have been collected for trees having 10 cms. and above diameter only. The data collected from 11 villages have been statistically analysed for variability in respect of stand and stock parameters of trees and "number of trees/ha." and "volume/ha." The analysis shows that the estimated number of trees/ha. is 14.29 and the corresponding volume is 2.289 cum./ha. for the entire district of Sonipat.

The distribution of total number of stems and stems/ha. as well as corresponding total volume and volume/ha. which have been estimated on the basis of survey for the entire district have been included as table nos. 1 to 6.

In the entire rural area of Sonipat district 30.92 lakh trees having volume of 4.956 lakh cubic meters have been estimated and the distribution thereof is discussed below:

1. The distribution of total number of trees (estimated), specieswise and dia-classwise (all categories combined), is given in table no. 1. The specieswise distribution of total number of trees in the State has been estimated by ratio estimation method.

The analysis shows that, when all species are combined, the maximum number of the estimated trees occur in 10-20 cms. dia-class i.e. 20.54 lakh trees (66.43%) followed by 7.15 lakh trees (23.13%) in 20-30 cms. dia-class, 2.20 lakh trees (7.11%) in 30-40 cms. dia-class and 1.03 lakh trees (3.33%) in 40 cms. and above dia-class.

It also shows that in the rural area of Sonipat district, when all the dia-classes are combined, *Acacia nilotica* (Babul) has the largest representation i.e.7.43 lakh trees (24.03%) followed by*Prosopis juliflora* 4.98 lakh trees (16.11%) *Eucalyptus spp.* 4.32 lakh trees(13.99%), *Dalbergia sissoo* 3.56 lakh trees (11.50%). *Morus spp.* 3.37 lakh trees (10.91%). *Mangifera*

indica 1.79 lakh trees (5.43%). Syzygium cumini 0.97 lakh trees (3.13%), Zizyphus spp. 0.70 lakh trees (2.26%).Salvadora0.38 lakh trees (1.22%)and Ficus spp.0.31 lakh trees (1.01%). (2.03%). The representation of the rest of the species is less than 1% each.

2. The distribution of total number of trees (estimated), categorywise and dia-classwise (all species combined), is given in table no. 2.

It shows that, when all the dia-classes are combined. the representation of trees in Category-I - Farm Forestry is the highest i.e. 21.05 lakh trees (68.08%) followed by Category-IV - Block plantation 5.84 lakh trees (18.88%), Category-VII - Canals 2.36 lakh trees (7.62%), Category-III- Village woodlots 0.82 lakh trees (2.66%) and Category-II- Road side plantation 0.81 lakh trees (2.65%). The representation of trees in Category-V - Ponds is found to be very poor while Category VI-Railway lines and Category-VIII- Rest has been found to be absent.

The dia-classwise distribution of total number of stems and percentage thereof. for combined categories, are the same as in table no. 1 i.e. dia-classwise total number of trees for all species combined as already described above in para 1.

The distribution of stems per hectare is maximum in dia-class 10-20 cms. i.e. 9.46 followed by 3.31 in 20-30 cms dia-class. 1.02 in 30-40 cms. dia-class and 0.47 in 40 cms. and above dia-class.

3. The distribution of total number of estimated trees, specieswise and categorywise (all dia-classes combined), has been presented in table no. 3.

The specieswise total number of trees (all categories combined) and the percentage thereof are the same as in table no. 1 i.e. specieswise distribution of total number of trees for combined dia-classes as already described above in para 1.

Similarly, categorywise total number of trees estimated (all species combined) and the percentage thereof are also same as in table no. 2 i.e. categorywise total number of trees for combined dia-classes as described in para 2 above.

The analysis shows that the specieswise total number of estimated trees (in order of decreasing number) in the various prescribed categories are as under:

Contents

Category-I - Farm Forestry

As per the estimate, this category has a total number of 21.05 lakh trees (68.08%) which is the highest amongst all the categories. It is mainly comprised of Prosopis juliflora 3.51 lakh trees, Dalbergia sissoo 3.41 lakh trees, Morus spp.3.31 lakh trees, Acacia nilotica 2.72 lakh trees, Eucalyptus spp. 2.64 lakh trees, Azadirachta indica 1.61 lakh trees, Magifera indica1.50 lakh trees, Syzygium cumini 0.91 lakh trees,Psidium guyava 0.24 lakh trees, Melia azedarach 0.22 lakh trees, Populus spp. 0.21 lakh trees, Ficus spp. 0.20 lakh trees and Zizyphus spp.0.13 lakh trees. The remaining species are represented very poorly.

Category-II - Roadside Plantation

As per the estimation there are 0.819 lakh trees (2.65%) in all in this category. It is mainly represented by Acacia nilotica 0.41 lakh trees,Prosopis juliflora 0.13 lakh trees,Dalbergia sissoo 0.10 lakh trees and Eucalyptus spp. 0.09 lakh trees. The representation of the remaining species is very poor and hence not presented here.

Category-III - Village Woodlots

In this cateoory the total number of trees, as per the estimation, is 0.823 lakh trees (2.66%). The predominent species in this category are Salvadora spp. 0.25lakh trees, prosopis juliflora 0.16 lakh trees andZizyphus spp. 0.15 lakh trees. The remaining species have a poor representation.

Category-IV - Block Plantations

There are 5.84 lakh trees (18.18%) in all in this category. The main species forming bulk of the crop are Acacia nilotica 2.85 lakh trees,Prosopis juliflora 1.12 lakh trees,Eucalyptus spp. 0.85 lakh trees, Zizyphus spp.0.42 lakh trees, Mangifera indica0.28 lakh trees and Salvadora spp. 0.12 lakh trees. The representation of the remaining species being very poor are not mentioned here.

Category-V - Ponds

As per the estimate, there are only 0.12 lakh trees (0.12%) in this category.

Category-VI - Railway Lines

This category has been found to be absent in this district.

Category-VII - Canals

It is estimated that this category in total has 2.36 lakh trees (7.62%). The main species in this category

are Acacia nilotica 1.43 lakh trees and Eucalyptus spp. 0.74 lakh trees, the representation of the rest of the spp. is very poor.

Category-VIII - Rest

This category is found to be altogether absent.

Analysis of Volume (Stock)

As per the estimate the entire rural area of Sonipt district has a total volume (all species and dia-classes combined) of 4.956 lakh cubic meters corresponding to the estimated total of 30.92 lakh trees. The distribution of this stock is discussed below:

1. An assessment of dia-classwise and specieswise distribution of volume (all categories combined) has been presented in table no. 4. The dia-classwise total estimated volume of trees and percentage thereof (in decreasing order) of all species is as given below :

Dia-class 10-20 cms. having a volume of 1.35 lakh cubic meters (27.15%) followed by dia-class 20-30 cms. having a volume of 1.23 lakh cubic meters (24.73%), dia-class 40cms.and above having 1.20 lakh cubic meters (24.17%) and 30-40 cms dia-class having 1.19 lakh cubic meters (23.95%).

It also shows that the total volume per hectare contributed by trees of all species of all dia-classes combined is 2.289 cum. The volume per hectare for different dia-classes (in decreasing order) are as below:

10-20 cms. dia-class (0.622 cum.), 20-30 cms. dia-class (0.566 cum.), 40 cms. and above dia-class (0.553 cum.) and 30-40 cms. dia-class (0.548 cum.).

It may also be seen from the said table that the bulk of the volume, for combined dia-classes, is mainly contributed by the following species (in decreasing order):

Eucalyptus spp. 1.14 lakh cum (23.03%), Acacia nilotica 0.96 lakh cum (19.28%), Dalbergia sissoo 0.77 lakh cum (15.53%), Morus spp. 0.44 lakh cum (8.84%), Mangifera indica 0.42 lakh cum (8.52%), Azadirachta indica 0.32 lakh cum (6.44%), Prosopis juliflora 0.31 lakh cum (6.34%), Salvadora spp. 0.17 lakh cum(3.44%), Ficus spp. 0.12 lakh cum(2.37%) and Syzygium cumini 0.10 lakh cum (1.97%). The volume contributed by the rest of the species is very less.

2. The distribution of total volume (estimated), categorywise and dia-classwise (all species combined), is given in table no. 5.

It shows that, when all dia-classes are combined, category-I has the maximum volume of 3.33 lakh cum (67.16%) followed by category-VII having 0.66 lakh cum (13.32%), category-IV having 0.60 lakh cum (12.20%), category-III having 0.22 lakh cum (4.36%) and category-II having 0.14 lakh cum (2.73%). Category V has less than 1% contribution each, while categories VI and VIII have been found to be absent.

It also shows that the dia-classwise total volume of all categories combined and the percentage thereof are the same as in table no. 4 i.e. dia-classwise total volume of all species combined as described in para 1 above.

3. The distribution of total estimated volume, specieswise and categorywise (all dia-classes combined), is given in table no. 6.

The specieswise total volume of trees (all categories combined) and the percentage thereof are the same as in table no. 4 i.e. specieswise distribution of total volume of trees for combined dia-classes as described above in para 1.

Similarly, the categorywise total volume of trees (all species combined) and the percentage thereof are also same as in table no. 5 i.e. categorywise total volume of trees for combined dia-classes as described in para 2 above.

Table No. 1

Distribution of total number of stems - specieswise and dia-classwise
(All categories combined)

Rural area of SONIPAT DISTRICT : 2164.62 Sq. km.

S.No.	Name of Species	10-20	20-30	30-40	40+	Total	% age
1	Acacia catechu	0	0	0	0	0	0.00
2	Acacia nilotica	507695	175345	48539	11388	742967	24.03
3	Acacia spp.	0	0	0	0	0	0.00
4	Acacia tortilis	0	0	0	0	0	0.00
5	Albizia spp.	5417	2218	1066	683	9384	0.30
6	Azadirachta indica	105309	37450	14160	10876	167795	5.43
7	Dalbergia sissoo	179269	108551	45980	21924	355724	11.50
8	Eucalyptus spp.	278692	119215	28663	5928	432498	13.99
9	Ficus spp.	13691	6740	3967	6867	31265	1.01
10	Mangifera indica	96438	46320	20099	16379	179227	5.80
11	Melia azedarach	20132	4777	1194	213	26316	0.85
12	Morus spp.	235443	74386	20985	6484	337298	10.91
13	Populus spp.	15739	4990	640	128	21497	0.70
14	Prosopis cineraria	3800	1621	725	640	[illegible]	0.28
15	Prosopis juliflora	403492	83258	9853	1450	498053	16.11
16	Psidium guvava	23417	55[illegible]	43	0	24014	0.78
17	Salvadora spp.	48[illegible]	9096	9341	13820	37877	1.22
18	Syzygium cumini	69395	16805	6953	3711	96864	3.13
19	Tamarix aphylla	299	342	214	128	983	0.03
20	Zizyphus spp.	58050	10578	1280	86	69994	2.26
21	Misc. spp.	31179	12370	6143	2217	51909	1.68
	Total	2054277	715416	219836	102922	3092451	100.00
	% age	66.43	23.13	7.11	3.33	100.00	

Table No. 2

Distribution of total number of stems - categorywise and dia-classwise
(All species combined)

Rural area of SONTPAL DISTRICT: 2164.62 Sq. km.

S.No.	Category	10-20	20-30	30-40	40+	Total	% age
1	I	1414574	474209	145403	71144	2105330	68.08
2	II	47770	22821	9426	1834	81851	2.65
3	III	40000	17061	10493	14759	82321	2.66
4	IV	445123	113757	19109	5716	583705	18.88
5	V	1664	1025	385	640	3714	0.12
6	VI	0	0	0	0	0	0.00
7	VII	105138	86543	35020	8829	235530	7.62
8	VIII	0	0	0	0	0	0.00
	Total	2054277	715416	219836	102922	3092451	100.00
	% age	66.43	23.13	7.11	3.33	100.00	
	Stems/ha.	9.490	3.305	1.016	0.475	14.286	

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Table No. 3

Distribution of total number of steas - specieswise and categorywise
(All dia classes combined)

Rural area of SONIPAT DISTT. : 2164.62 Sq. km.

S.No.	Name of Species	I	II	III	IV	V	VI	VII	VIII	Total	% age
1	Acacia catechu	0	0	0	0	0	0	0	0	0	0.00
2	Acacia nilotica	272209	41458	0	284621	1536	0	143143	0	742967	24.03
3	Acacia spp.	0	0	0	0	0	0	0	0	0	0.00
4	Acacia tortilis	0	0	0	0	0	0	0	0	0	0.00
5	Albizia spp.	7891	341	1109	43	0	0	0	0	9384	0.30
6	Azadirachta indica	161055	1963	0	2901	682	0	1194	0	167795	5.43
7	Dalbergia sissoo	340581	9682	0	2944	43	0	2474	0	355724	11.50
8	Eucalyptus spp.	264361	8701	0	85050	86	0	74300	0	432498	13.99
9	Ficus spp.	20217	128	9810	683	85	0	342	0	31265	1.01
10	Mangifera indica	150479	0	43	28449	0	0	256	0	179227	5.80
11	Melia azedarach	22093	3967	0	128	0	0	128	0	26316	0.85
12	Morus spp.	330984	1195	0	3370	43	0	1706	0	337298	10.91
13	Populus spp.	21070	0	0	427	0	0	0	0	21497	0.70
14	Prosopis cineraria	43	213	5886	597	0	0	2047	0	8786	0.28
15	*Prosopis juliflora*	351030	12838	15781	112432	725	0	5247	0	498053	16.11
16	Psidium guvava	23587	0	0	427	0	0	0	0	24014	0.78
17	Salvadora spp.	0	85	25037	12284	428	0	43	0	37877	1.22
18	Syzygium cumini	90935	43	0	5672	86	0	128	0	96864	3.13
19	Tamarix aphylla	854	0	129	0	0	0	0	0	983	0.03
20	Zizyphus spp.	13222	427	14545	41672	0	0	128	0	69994	2.26
21	Misc. spp.	34719	810	9981	2005	0	0	4394	0	51909	1.68
	Total	2105330	81851	82321	583705	3714	0	235530	0	3092451	100.00
	% age	68.08	2.65	2.66	18.88	0.12	0.00	7.62	0.00	100.00	

Table No. 4

Distribution of total volume (cum.) - specieswise and dia-classwise
(All categories combined)

Rural area of SONIPAT DISTRICT: 2164.62 Sq. km.

S.No.	Name of Species	10-20	20-30	30-40	40+	Total	% age	Vol./ha.
1	Acacia catechu	0.000	0.000	0.000	0.000	0.000	0.00	0.000
2	Acacia nilotica	30461.700	24548.300	27667.230	12868.440	95545.670	19.28	0.441
3	Acacia spp.	0.000	0.000	0.000	0.000	0.000	0.00	0.000
4	Acacia tortilis	0.000	0.000	0.000	0.000	0.000	0.00	0.000
5	Albizia spp.	325.020	310.520	607.620	771.790	2014.950	0.41	0.009
6	Azadirachta indica	6318.540	5243.000	8071.200	12289.880	31922.620	6.44	0.147
7	Dalbergia sissoo	10756.140	15197.140	26208.600	24774.120	76936.000	15.53	0.355
8	Eucalyptus spp.	27869.200	48878.150	27229.850	10136.880	114114.080	23.03	0.527
9	Ficus spp.	821.460	943.600	2261.190	7759.710	11785.960	2.38	0.054
10	Mangifera indica	5786.280	6484.800	11451.300	18508.270	42230.650	8.52	0.195
11	Melia azedarach	1207.920	668.780	680.580	240.690	2797.970	0.56	0.013
12	Morus spp.	14126.580	10414.040	11961.450	7326.920	43828.990	8.84	0.202
13	Populus spp.	1101.730	1746.500	467.200	161.280	3476.710	0.70	0.016
14	Prosopis cineraria	348.000	97.260	43.500	723.200	1211.960	0.24	0.006
15	Prosopis juliflora	24209.520	4995.480	591.180	1638.500	31434.680	6.34	0.145
16	Psidium guvava	1405.020	33.240	2.580	0.000	1440.840	0.29	0.007
17	Salvadora spp.	289.200	593.760	560.460	15616.600	17060.020	3.44	0.079
18	Syzygium cumini	4163.700	1008.300	417.180	4193.430	9782.610	1.97	0.045
19	Tamarix aphylla	17.940	20.520	12.840	144.640	195.940	0.04	0.001
20	Zizyphus spp.	3483.000	634.680	76.800	97.180	4291.660	0.87	0.020
21	Misc. spp.	1870.740	742.200	368.580	2505.210	5486.730	1.11	0.025
	Total	134561.690	122560.270	118679.340	119756.740	495558.040	100.00	2.289
	% age	27.15	24.73	23.95	24.17	100.00		
	Vol./ha.	0.622	0.566	0.548	0.553	2.289		

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Table No. 5

Distribution of total volume (cum.) - categorywise and dia-classwise
(All species combined)

Rural area of SONIPAT DISTT. : 2164.62 Sq. km.

S.No.	Category	10-20	20-30	30-40	40+	Total	% age
1	I	92529.320	78964.920	79979.280	81324.600	332798.120	67.16
2	II	3185.240	3173.180	5068.350	2121.720	13548.490	2.73
3	III	2400.480	1197.660	1347.150	16677.670	21622.960	4.36
4	IV	29308.330	17183.820	7113.180	6830.280	60435.610	12.20
5	V	99.840	151.670	191.930	723.200	1166.640	0.24
6	VI	0.000	0.000	0.000	0.000	0.000	0.000
7	VII	7038.480	21889.020	24979.450	12079.270	65986.220	13.32
8	VIII	0.000	0.000	0.000	0.000	0.000	0.000
	Total	134561.69	122560.27	118679.34	119756.74	495558.040	100.00
	% age	27.15	24.73	23.95	24.17	100.00	

Table No. 6

Distribution of total volume (cum.) - specieswise and categorywise
(All dia-classes combined)

Rural area of SONIPAT DISTT. : 2164.62 Sq. km.

S.No.	Name of Species	I	II	III	IV	V	VI	VII	VIII	Total	% age
1	Acacia catechu	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
2	Acacia nilotica	36449.730	7306.850	0.000	25918.790	237.370	0.000	25632.930	0.000	95545.670	19.28
3	Acacia spp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
4	Acacia tortilis	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
5	Albizia spp.	1668.330	30.700	309.900	6.020	0.000	0.000	0.000	0.000	2014.950	0.41
6	Azadirachta indica	31024.160	282.500	0.000	197.980	325.860	0.000	92.120	0.000	31922.620	6.44
7	Dalbergia sissoo	72721.370	3073.760	0.000	482.730	6.020	0.000	652.120	0.000	76936.000	15.53
8	Eucalyptus spp.	58266.150	1205.350	0.000	16730.050	58.480	0.000	37854.050	0.000	114114.080	23.03
9	Ficus spp.	7194.790	53.690	4203.920	167.540	96.050	0.000	69.970	0.000	11785.960	2.38
10	Mangifera indica	39458.490	0.000	2.580	2504.380	0.000	0.000	265.200	0.000	42230.650	8.52
11	Melia azedarach	2534.350	248.260	0.000	7.680	0.000	0.000	7.680	0.000	2797.970	0.56
12	Morus spp.	43238.450	117.550	0.000	234.370	2.580	0.000	236.040	0.000	43828.990	8.84
13	Populus spp.	3446.820	0.000	0.000	29.890	0.000	0.000	0.000	0.000	3476.710	0.70
14	Prosopis cineraria	2.580	12.780	1037.960	35.820	0.000	0.000	122.820	0.000	1211.960	0.24
15	Prosopis juliflora	22065.460	998.190	1037.810	6928.890	43.500	0.000	360.830	0.000	31434.680	6.34
16	Psidium guvava	1415.220	0.000	0.000	25.620	0.000	0.000	0.000	0.000	1440.840	0.29
17	Salvadora spp.	0.000	96.050	12592.770	3927.000	345.610	0.000	48.590	0.000	17060.020	3.44
18	Syzygium cumini	9289.910	2.580	0.000	431.270	51.170	0.000	7.680	0.000	9782.610	1.97
19	Tamarix aphylla	142.190	0.000	53.750	0.000	0.000	0.000	0.000	0.000	195.940	0.04
20	Zizyphus spp.	793.320	25.620	918.710	2546.330	0.000	0.000	7.680	0.000	4291.660	0.87
21	Misc. spp.	3086.800	94.610	1465.560	211.250	0.000	0.000	628.510	0.000	5486.730	1.11
	Total	332798.120	13548.490	21622.960	60435.610	1166.640	0.000	65986.220	0.000	495558.040	100.00
	% age	67.16	2.73	4.36	12.20	0.24	0.00	13.32	0.00	100.00	

Contents

Appendix-I

List of villages selected for Pilot Survey in Haryana State.

S.No.	Name of the village	Area of Village (Ha.)
1.	Bachhara	1479.51
2.	Baidwala	1116.38
3.	Bhandari	677.00
4.	Bhatoo	583.00
5.	Bondkalan	2353.00
6.	B. Busna	248.00
7.	B. Launa	184.94
8.	Dachaur	2791.00
9.	Dichaul	2211.00
10.	Dobli	894.00
11.	Doraikhpur	4370.00
12.	Dorantha	1720.00
13.	Dudoli	150.00
14.	Kahnaur	2762.00
15.	Khandalheri	2324.00
16.	Kharkhara	979.00
17.	Kona	266.28
18.	Kurumanwali	1479.00
19.	Kalalhasinah	140.00
20.	Latheri	267.09
21.	Mammonmaira	199.51
22.	Mohammedpur	1731.00
23.	Nandoson	825.14
24.	Nathusari	1741.00
25.	Phadani	208.00
26.	Ratour	130.00
27.	Saundhad	2752.00
28.	Shampura	1017.00
29.	Shoadapur	316.00
30.	Siwara	1126.00
31.	Sulehra	572.00
	Total	40192.90

Appendix - II

Districtwise number of the villages selected for Inventory Survey in Haryana State.

S.No.	Name of the District	Total no. of villages in the District	No. of villages selected for survey
1.	Ambala	1306	39
2.	Bhiwani	428	23
3.	Faridabad	505	11
4.	Gurgaon	721	14
5.	Hisar	510	33
6.	Jind	354	16
7.	Kurukshetra	743	20
8.	Karnal	634	18
9.	Mohindergarh	743	16
10.	Rohtak	458	19
11.	Sirsa	323	21
12.	Sonipat	348	11
	Total	7073	241

Appendix - III

List of species found in Sample villages in Sonipat District.

S.No.	Botanical name	Common name
1	2	3
1.	Acacia lenticularis	Safed babul, Amiar, Kanti, Gohira
2.	Acacia nilotica	Babul, Kikar, Bawar, Baval
3.	Aegle marmelos	Bel, Belpara, Bil, Billi
4.	Ailanthus excelsa	Ardusa, Maharukh, Mahalimla Rutazod, Dhella, Peddamman, Arru
5.	Albizia lebbek	Kala siris, Kalbage, Koko, Siris, Bhander, Sarsaoda
6.	Albizia procera	Safed siris/siras, Karha, Karhar, Karhai
7.	Albizia spp.	Hiharu, Morai, Mog, Sundi, Kunis
8.	Alstonia scholaris	Chatidu, Chatian, Chatiwan, Chatuin, Chatim, Chaitan, Cheeni, Pala, Pale, Satiama
9.	Anthocephalus chinensis	Kadam, Kadamb, Kodavara, Attutek, Vellaikadamby
10.	Artocarpus heterophyllus	Plavu/Thannas, Phannas Kathal
11.	Artocarpus spp.	
12.	Azadirachta indica	Neem, Nimbo, Nibbaro, Vepa
13.	Bauhinia spp.	Kachnar, Papri, Jhingora
14.	Bombax ceiba	Semal, Savar, Semer, Shimola
15.	Butea monosperma	Palas, Dhak, Palasin, Kakhar
16.	Casearia graveolens	Dedak, Gilchi, Maiya, Mango
17.	Cassia fistula	Amaltas, Bahra, Bhawa, Sonari
18.	Cassia siamea	Minjiri, Nellatangedu
19.	Citrus spp.	Nimbu, Lemon
20.	Cordia spp.	Lassora, Bairula, Borala
21.	Dalbergia sissoo	Sisoo, Shisham, Tahli
22.	Delonix regia	Gulmohar, Krishnachura, Golmohan
23.	Emblica officinalis	Amla, Aonla, Amlaki, Nellimara
24.	Eucalyptus spp.	Nilgiri, Safeda
25.	Ficus bengalensis	Bargat, Bad, Fig

26.	Ficus elastica	Ved, Vadlo
27.	Ficus recemosa	Gular, Atthi, Atti, Rumdi,
28.	Ficus religiosa	Pipal, Pipli, Papada, Pripari
29.	Ficus spp.	Anjar, Akhar, Budita
30.	Flacourtia indica	Kakai, Kangu
31.	Grevillea robusta	Silver oak
32.	Hildina cordifolia	Haldu, Hedu, Haladva, Maza, Bandar, Taraksopa, Kadambu, Arasintega
33.	Holoptelia integrifolia	Abal, Chielbil, Kaneji
34.	Ixora arborea	Korvi, Lakhandi, Telkurma
35.	Khasiaculnea oligocephala	Haldu, Haludchapa
36.	Kigelia africana	
37.	Lannea coromandelica	Nabbe, Gompena, Godal, Godda Modo, Modad, Moyna, Zhingan
38.	Madhuca latifolia	Mohwa, Mahudo, Iappa
39.	Mangifera indica	Am, Amb, Ambo, Mavu, Moru
40.	Melia azadirach	Bijain, Baknia, Betain, Bakain
41.	Mitragyna parvifolia	Phaldu, Mundi, Kaiz, Battaganum
42.	Moringa spp.	Sajna, Sohjna, Sanjna, Saijna
43.	Morus spp.	Tut, Kimu, Shahtoot
44.	Nyctanthes arbortristis	Harshingar, Kari
45.	Olea dioica	Akksale, Madle
46.	Persea odoratissima	Lati kawala
47.	Phoenix sylvestris	Khajur, Betha
48.	Populus spp.	Banpipal, Godhipipal, Pahari Pipal
49.	Prusopis cineraria	Jand, Jant
50.	Prosopis juliflora	Juliflora
51.	Prunus spp.	Aru, Aria, Gont, Khurmani
52.	Psidium guyava	Amrud
53.	Salvadora spp.	Jal, Jhal
54.	Saraca asoca	Ashoka
55.	Spondias pinnata	Ambra, Amra, Amar, Amria
56.	Syzygium cuminii	Jamun, Jamoon, Jamak
57.	Tamarindus indica	Imli, Amli, Ambli, Chinch
58.	Tamarix aphylla	France, Farash
59.	Tectona grandis	Sagwan, Sagun, Teak, Theku
60.	Terminalia arjuna	Arjun, Kahuwa, Sadadoe
61.	Toona ciliata	Tun, Toon, Mathagiri, Vedi
62.	Zizyphus mauritiana	Ber, Beri
63.	Zizyphus spp.	

Appendix IV

List of the villages surveyed in Sonipat District.

S.No.	Name of the village	Name of Tehsil	Area of Village (Ha.)	Map sheet No.
1.	B. Busna	Gohana	248.00	53 C/15
2.	Lalheri	Sonipat	267.09	53 D/ 4
[illegible]	Dobheta	-do-	560.00	53 C/16
4.	Nandnaur	-do-	636.9	53 G/ 4
5.	Fatehpur	-do-	302.30	53 D/13
6.	Joli	-do-	769.47	53 C/16
[illegible]	Sersa	-do-	629.[illegible]	53 H/ 1
8.	Giaspur	-do-	387.[illegible]	53 G/ 4
9.	Mahri	-do-	928.05	53 H/ 1
10.	Aurangabad	-do-	216.60	53 H/ 1
11.	Malikpur	-do-	513.[illegible]	53 G/ 4
	Total		5[illegible]75.20	

Contents

Appendix - V

Definitions of Categories

Code No.	Category	Definition
1.	Farm forestry	Trees along the farm bunds and in small patches upto 0.1 ha. in area.
2.	Roadside plantation	Trees planted along the roadside.
3.	Village woodlot	Naturally growing trees on private/ community land.
4.	Block Plantation	Block plantation having an area of more than 0.1 ha. and not falling in any of the above categories.
5.	Ponds	Trees planted in and around water ponds.
6.	Railway lines	Trees planted along the railway lines.
7.	Canals	Trees planted along the canals.
8.	Rest	Trees not falling in any of the above categories.

APPENDIX-VI

FIELD FORMS

Contents

DISTRICT TREE FORM

(ABSTRACT OF ENUMERATION IN SAMPLE VILLAGES)

JOB NO.	CARD DESIGN NO.	STATE	DISTRICT	NO. OF VILLAGES IN THE DISTRICT	NO. OF SAMPLE VILLAGES IN THE DISTT.	TOTAL AREA OF THE VILLAGES IN THE DISTT. (Km^2)	SAMPLE VILLAGE	GEOGRAPHICAL AREA OF THE SAMPLE VILL. (Hect.)	CATEGORY OF THE SAMPLE VILLAGE
1-3	4-6	7-8	9-10	11-15	16-17	18-22	23-27	28-31	32

Number Of Trees In The Sample Village According To Category Of The Plantation / Trees

FARM FORESTY	ROAD SIDE PLANTATION	VILLAGE WOODLOT	BLOCK PLANTATION	PONDS	RAILWAY LINES	CANALS	REST	TOTAL
33-36	37-40	41-44	45-48	49-52	53-56	57-60	61-64	65-70

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Total No. Of Pages .....

Sign. Of Crew Leader .....
Name Of Crew Leader .....

VILLAGE DESCRIPTION FORM

1. State and code
2. Division and code
3. District and code
4. Mapsheet and code
5. Name of the Village
6. Area of the Village
7. Crew Leader (Name)
8. Date of commencement of survey
9. Date of completion of survey
10. Conspicuous feature selected as the centre for starting the survey
11. Description of this centre and approach to this point
12. Number of angular quadrants into which the area of village has been divided (give size of quadrants in degrees)
13. Compassing done by
14. Tree enumeration done by
15. Height measurements taken by

P.T.O.

16. D. T. and other measurements
Taken by

17. Quadrant-wise summary of enumerations

QUADRANT No.	DATE OF SURVEY	TOTAL No. OF TREES

Dated :

Signature of
Crew Leader

Diagram etc. of village

गाँव वृक्ष गणन फार्म/VILLAGE TREE ENUMERATION FORM

कार्य संख्या Job No.	कार्ड डिजाइन Card design	राज्य State	जिला District	प्रावदर्श गाँव Sample Vill.	Geographical Area of the Sample Village (hect.) प्रतिदर्श गाँव का भौगोलिक क्षेत्र हैक्टे.
1-3	4-6	- 7-8	9-10	11-15	16-19

वृक्षों का कुल संख्या Total No. of Trees
42-47

स्पीशीज/जाति SPECIES नाम Name	कोड Code	डी बी एच ओ बी (सें.मी.) DBH OB (Cm)	वृक्ष की ऊँचाई (मी.) Tree Height (Mt.)	क्लीयर बोल/स्पष्ट प्रकाण्ड (मी.) Clear Bole (Mt.)	पौध रोपण/वृक्षों का वर्ग Category of Plantation/Trees	स्पीशीज/जाति SPECIES नाम Name	कोड Code	डी बी एच ओ बी (सें.मी.) DBH OB (Cm)	वृक्ष की ऊँचाई (मी.) Tree Height (Mt.)	क्लीयर बोल/स्पष्ट प्रकाण्ड (मी.) Clear Bole (Mt.)	पौध रोपण/वृक्षों का वर्ग Category of Plantation/Trees
	20-22	23-25	26-27	28-29			31-33	34-36	37-38	39-40	14

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Date....................19

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Sig. of Crew Leader.......................
नाम दल नायक.......................
Name of Crew Leader ....

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