INVENTORY SURVEY
(NON-FOREST AREA)
OF
SIRSA DISTRICT
HARYANA STATE
INVENTORY RESULTS

Forest Survey of India

Northern Zone

SHIMLA

1997

Contents

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PREFACE

Trees growing / planted in the rural areas and in other vacant lands outside conventional forests have gained importance in meeting timber , fuel wood and other non-wood products requirements specially in forest deficient States The distribution, extent and volume of such trees have not been generally assessed

The FSI took up the inventories of such trees growing in the the rural areas The inventory is carried out in two stages The sampling unit in the first stage is a district and in the second stage a village Planted trees are classified in eight categories , Farm forestry , Village woodlots, Block Plantations, Road Ponds, Rail and Canalside Plantations and others The trees standing in the selected villages are measured by the field parties and data is analysed at the district level

This report pertains to **Sirsa** district of Haryana State The geographical area of the district is about 4141 sq km The inventory was carried out during 1995 in the rural areas of the district covering sampled villages having an area of about 284 sq km Out of the total species inventoried , 20 species have been presented separately on trees basis predominance and commercial importance Other important species have been grouped miscellanaous

It is heartening to note that **Sirsa** district has insignificant forest area (about one sq km) but the total number of trees growing in the rural areas are 35 8 lakhs constituting about 0 9 million cu m standing volume Among the species *Acacia nilotica* has the largest representation i e 12 74 lakh (34 63%) followed by *Dalbergia sissoo* 5 48 lakh trees (14 89%) *Prosopis cineraria* 4 58 lakh trees (12 45%), *Eucalyptus species* 3 54 lakh trees (9 61%)

It is hoped that this report will assist the State Government and District Administration in the Planning process of forestry and related sectors

Dr Devendra Pandey
Director
Forest Survey of India

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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 Sirsa district in 1995.

2. As per 1981 Census, Sirsa district had a total of 323 villages having a total area of 4140 91 Sq. km. out of which 21 villages having an area of 283 77 Sq. km. were randomly selected and surveyed.

3. In the entire rural area of Sirsa district 36.80 lakh trees (8.68 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. 19.86 lakh trees (53.97%) and the minimum in 40 cms. and above dia-class i.e. 2.69 lakh trees (7.30%).

4. The specieswise distribution of total number of estimated trees shows that Acacia nilotica (Babul) has the largest representation i.e. 12.74 lakh trees (34.63%) followed by Dalbergia sissoo 5.48 lakh trees (14.89%), Prosopis cineraria 4.58 lakh trees (12.45%), Eucalyptus spp. 3.54 lakh trees (9.61%) Acacia tortilis 2.90 lakh trees (7.89%) Zizyphus spp. 2.90 lakh trees (7.89%), Azadirachta indica 0.94 lakh trees (2.56%), Melia azadirach 0.80 lakh trees (2.17%), Morus spp. 0.61 lakh trees (1.65%) and Prosopis juliflora 0.44 lakh trees (1.20%). 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 12.14 lakh trees (33.00%) and minimum in the category-V - Ponds i.e. 0 03 lakh trees (0.09%) for the combined dia-classes.

6. In the entire rural area of Sirsa district, total estimated volume of all the species and dia-classes combined comes to 8.81 lakh cubic meters i e. 2.078 cum./ha.

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7. The specieswise contribution of volume is maximum by Acacia nilotica (31.31%) followed by Dalbergia sisso (19.13%) Prosopis cinerereia (15.57%) and Eucalyptus sps.(12.58%)

8. The categorywise volume contribution shows that 32.72% volumecomes from farm forestry sector followed by village woodlot (20.84%) and roadside plantation(16.02%)

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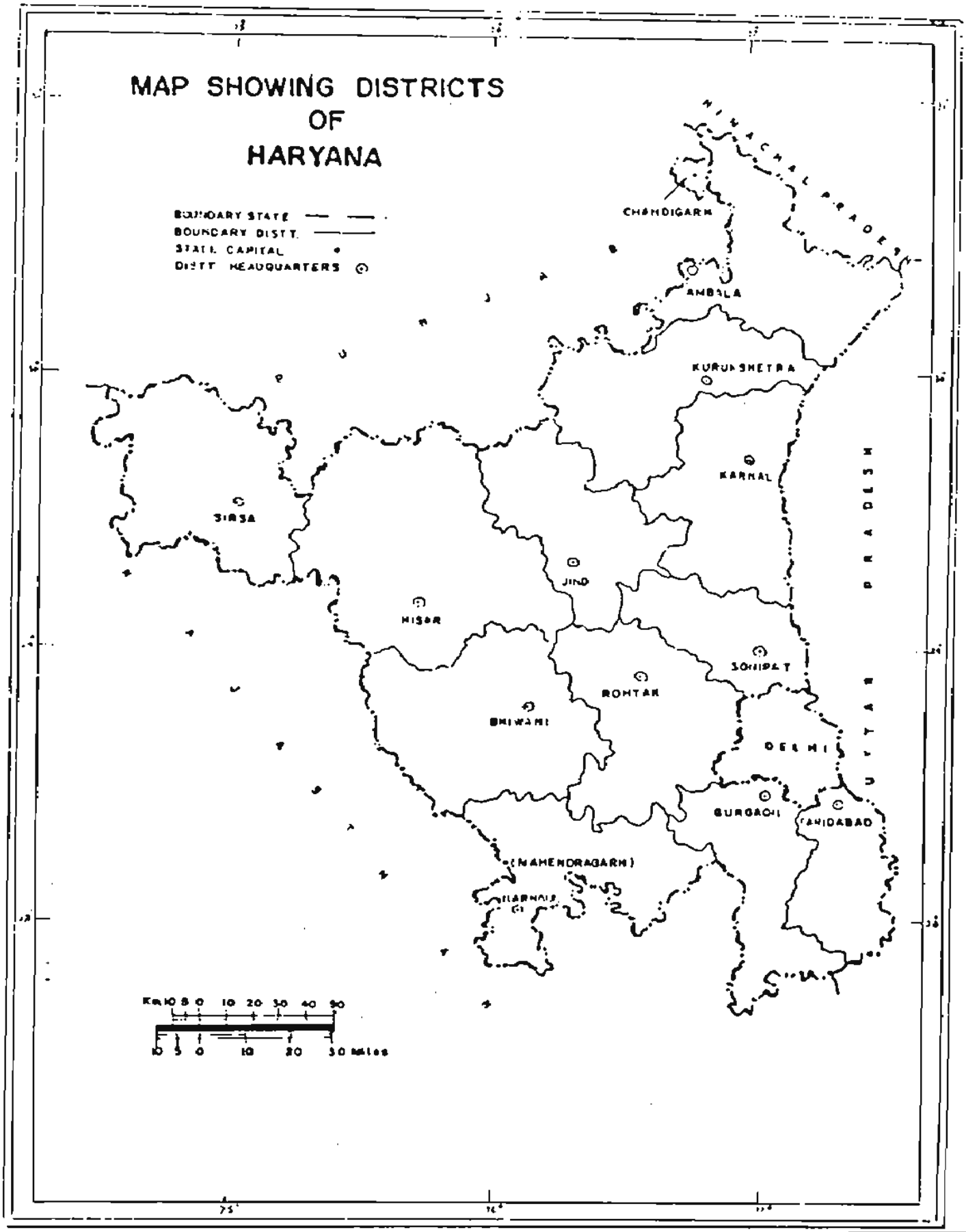
MAP SHOWING DISTRICTS
OF
HARYANA
BOUNDARY STATE
BOUNDARY DISTT.
STATE CAPITAL
DISTT HEADQUARTERS
CHANDIGARH
AMBALA
KURUKSHETRA
KARNAL
SIRSA
JIND
HISAR
SONIPAT
ROHTAK
BHIWANI
DELHI
GURGAON
FARIDABAD
(MAHENDRAGARH)
UTTAR PRADESH
Km 10 5 0 10 20 30 40 50
10 5 0 10 20 30 Miles

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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, matchwood 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 Haryana State.

1.2 Description of the District

Sirsa district is a part of the western Haryana Plain. The district has two tahsils namely Sirsa and Dabwali. The district is named after its headquarters town Sirsa which is a town of great antiquity. Its first known mention occurred in Paninis celebrated sanskrit grammar Ashtadhyayi, where the name is given as Shairisha meaning "Acacia spiciosa" tree suggesting its preponderance in the flora of the region.Local tradition ascribes the origin of the town to an eponymous Raja Saras who is supposed to have built it along with the fort lying to its south-west nearly three miles in circuit about 1400 years ago.

1.3 Location, Area, Population etc.

The district lies between 29° 14' and 29° 59' North latitudes and 74° 27' 08" and 75° 18' East longitudes. It is the western most districts of State enclosed by Punjab state in the north and north-east,by Hisar district of Haryana in the east and by Rajasthan state in the south and south-west. To its South is the district of Mahendergarh. To its West are the districts of Bhiwani and Hisar.

As per 1981 Census, the geographical area of district was 4276 sq. km. occupies 9.67 percent of the total area (44212) sq. km. of the state areawise ranks third in the state.Its population was 7,07,068, which is 5.47 percent of the total population of the state i.e. 165 persons/sq. km. as it is smallest district population wise.

1.4 Physical Features

Soil, geology and topography

The district as a whole is divided in to four submicro regions on the basis of soils, topography, climate and natural vegetation.

(a) Dabwali Plain

The region spreads over the parts of Dabwali and Sirsa tahsil covering the upper half of the district.It has a border with the Punjab in the north and north-east with Rajasthan and Ellanabad-Nathohar Sandy Plain in the west and with Ghagger Flood Plain in the south.Western part of the region is relatively low as compared to its eastern parts. The general slope of the region is from north-east to south-west.Some sand dunes are found in the south western part.

From relief point of view, the maximum height of the region is 249 metres above m.s.l. near village Bawa (175) while the minimum height is 217 metres above m.s.l. near village Kalanaur Kalan (101) in Jhajjar and Rohtak tahsils respectively. The region is entirely plain land. Due to the intensive network of canals in the region, the area is under cultivation with high crop yields. A few patches of scrub are found near villages Seman (4), Bhaini Bharon (10) and Madina Gindhran (27) in Maham tahsil and village Kharari (108) of Rohtak tahsil.

The soil found in the region is mainly sandy soft loam which is generally a light loam interspersed here and there with sandy undulations.The soils, as classified by the NBSS & LUP (ICAR), Nagpur,the region has Ustalf- Ochrepts and Psamments-Fluvents-Orthids type of soil.The area had Steppe type of vegetation but with the introduction of canal irrigation it has turned in to a cotton belt of Haryana. Gram, wheatand oil seeds are other important cash crops of the region.

Ochrepts : Shallow black, brown and alluvial soils of northern region.
Orthids : Soils of arid region with some developments
Fluvents : Alluvial soils (Recent alluviam)

A satisfactory network of roads and railways are found in the region. Dabwali and Kalanwali are two towns

in the region with 140 odd villages with an area of 1913.877 sq.km. and is inhabited by 297,112 of which 240,398 reside in rural area and 38,714 in urban areas. its density is 146 persons per sq. km.

(b) Ellanabad-Nathohar Sandy Plain

The region spreads over the western and south western parts of the district,which is separated by two parts of Ghaggar Flood Plain in the north. The soil of the region makes its limits with state of Rajasthan in the west, Ghagger Flood Plain in the remaining two sides i.e. east and north. Another part of the region makes its boundaries with the state of Rajasthan in the west and south, Sirsa Bager in the east and Ghagger Flood Plain in the north. The soil of the region are mostly alluvial, sandy soft loam and silty clay covered with sand flats.The soil as classified by the NBSS & LUP (ICAR), Nagpur, the region has Ustalfs-Ochrepts, Psamments-Fluvents-Orthids type of soils. It has unreliable rainfall and accordingly scattered scrubs and bushes are found in the region. Sand dunes are common as it lies close to the desert of Rajasthan. These sand dunes are of shifting nature but their march has been checked with the extension of irrigational facilities and plantation of trees. The sand dunes are flat and cresantric in shape. The major part of the region has been brought under cultivation on account of its suitatibility to non irrigated and irrigated farming. Gram and Bajra are the principal crops. It contains 29 villages, with an area of 559.6355 sq. km. and is inhabited by 69,531 persons. Communication facilities are poor

(C) Ghagger Flood Plain

The region spreads over the middle of the district from east to west along the Ghagger river, covering the areas of Sirsa tahsil. It makes boundaries with main part of Ellanabad-Nathohar Sandy Plain in the north and state of Punjab in the east, Sirsa Bager and another part of Ellanabad-Nathohar Sandy Plain in the south and state of Rajasthan in the west. The region is built and drained by Ghagger river.The region is made up of silty clay with certain features of sand deposition in the eastern side. The soil as classified by the NBSS and LUP(ICAR), Nagpur the region has Ustalf-Ochrepts type of soils. It is gently sloping from north-east to south-west in which direction the river flows. The silt and clay features have association with the old abandon

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bed of Ghaggar. Swamps are found in the western parts. The best texture of the soil for good agriculture use is that of soft loam i.e. a mixture of sand and silt with moderate proposition of clay in order to retain moisture and to present the rapid drainage of the moisture and fertilizers from the soil.These soils are available here and good for wheat ,gram and Barley. It contains 65 villages and one town Rania with an area of 675.826 sq.km. and is inhabited by 124,228 persons of which 107,574 reside in rural areas. Its density is184 persons per sq. km. Communication facilities in the region is satisfactory.

(D) Sirsa Bagar

The region extends over the south eastern parts of Sirsa tahsil. It makes its boundaries with Ellanabad-Nathohar Sandy Plain in the west, state of Rajasthan in the south Hisar district in the east and Ghagger Flood Plain in the north. Sand dunes are mostly latitudinal in extent in the south western part of the region.The concentration of sand dunes and undulation in topography is relatively higher in southern south-western parts. The soil are mostly sandy and loamy sand. The soil classified by the NBSS & LUP(ICAR), Nagpur Ustalf-Och-repts and Psamments-Fluvents-Ochrepts type of soil are available in this region. The pattern of sand dunes frequently varies over the dune and inter dune soils are loamy sand. The area is subjected to excessive wind erosion and to overlying by drifting sand cover.

The chief characteristics of the soil are that they are very deep,light and highly permeable. They suffer from drawbacks of maximum permeability causing excessive drainage, tendency to dry up rapidly and a low water holding capacity.A steppe type of vegetation is found here.A network of roads is less developed in relation to Dabwali plain. It contains 89 villages and one town of Sirsa with an area of 1121.1257 sq.km. and is inhabited by 234,137 persons of which 145,069 reside in rural and 89,068 in urban areas. Its density of population is 209 persons per sq.km. The network of roads is less developed in relation to Dabwali Plain. Only eastern part of the region, NH 10 and a railway meter gauge are available.

1.5 Climate

Sirsa is comparatively a very hot and dry district.

1.6 Rain

Monsoon brings rain in the district from July to September. From October to June, the weather remains generally dry except a few showers received from the western cyclones. The rainfall varies from year to year. The rainfall during 1979-80 was 109 mm against 379 mm during 1976-77, 507 mm during 1977-78 and 422 mm. during 1978-79.It reflects the in adequacy and uncertainty of the rainfall which is mainly concentrated during the rainy season. The rainfall also varies from place to place. The annual rainfall in the district varies from 100 mm to 500 mm. The northern parts of the district receive rainfall between 300 to 400 mm whereas the southern parts of the district adjoining Rajasthan receive between 300 to 100 mm of rainfall. The climate in the district is attributed to short wet months and long spells of dry months. Humidity is very high during rainy season and very low during dry summer months i.e. May-June.

1.7 Temperature

Due to its distance from the sea and closeness to the Arid and Semi-arid areas of Haryana and Rajasthan, there is a great difference between the maximum and minimum temperatures of the day and night as well as during winter and summer.

The maximum temperature during summer months may reach more than 45°C during May-June. Hot dry winds blow during the day in summer due to its proximity to the arid areas of Haryana and Rajasthan. During winter, chilly winds blow in the district due to snowfall in the hills of Himachal Pradesh and Uttar Pradesh. The minimum temperature during winter falls as low as 5° C during December-January.

1.8 Frost, Fog and Hails

Ground frost occurs in the district when there is snowfall in the hills of Himachal Pradesh and Uttar Pradesh. Foggy weather condition prevails after rains in winter during the months of January and February. Occasional spells of hailstorms also occur during the period from February to April. During May-June dust storms also occurs in the district.

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1.9 Socio-economic conditions

The economy of the district is primarily agricultural. At the time of 1981 Census, about 70.61% of the total main workers were cultivators and agricultural labourers. The industrial base of the district is mainly agro-based like flour mills, dal mills rice shellers and agricultural implements manufacturing units. There is ample scope for divercification of industries in order to utilise all physical and human resources of the district. Industries are concentrated at Sirsa,Rania,Kalawali, Ellenabad and Mandi Dabwali. There were 81 registred working factiries in the district during the year 1979 and the estimated number of workers employed therein was 3591.In the small scale sector many units are registered and they produce straw board,crushed bones,oil,wollen blankets,waste paper products etc.Under the Rural Industries Scheme also many units were set up and these are manufacturing items like agricultural implements hand loom cloth,dal and oil, filter elements, steel boxes and candles etc.

The district has adequate canal irrigation facilities and it is famous for the cultivation of food grains and cotton. Out of 313.4 thousand hectares of area under cotton cultivation in the state, 106.5 thousand hectares was in Sirsa district alone. Area under cultivation of food grains mostly in Wheat and gram was 237.7 thousand hectares during the year 1979-80. There are no reserved forests. In 1977, the number of live stock in Haryana was 6,904,800 which includes cattle, buffaloes, horses and ponies, donkeys, sheep,goats camels,pigs etc. Sirsa district contributed only 429,000 animals to this figure which was the lowest in the State.It may be mentioned that among , cattle, buffaloes,sneep, goats and camels are dominant in this dry tract of land.

Out of the total population of the district, 79.56% is the rural population and 20.44% is urban. 29.87% of the total population are literates. Literacy percentage among urban and rural population is 59.65% and 38.32% respectively while among male and female population is 39.52% and 18.88% respectively. Out of total population 29.74% are main workers, 2.12% are marginal workers, while 68.14% are non-workers.

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1.10 Uses

The trees provide mainly timber, fuelwood, fodder, fruit and shade. Timber is obtained mainly from Dalbergia sissoo, Eucalyptus spp., Melia azedarch, Syzygium cumini, Morus alba, Mangifera indica, Azadirachta indica, Albizia spp. etc. Small timber is mainly obtained from Acacia nilotica, Acacia spp., Morus alba, Prosopis spp. etc. All the above mentioned tree spp. provide fuelwood also. Trees of Acacia nilotica, Albizia spp., Morus alba, Prosopis spp. etc. also provide fodder in the form of leaves or pods. Morus spp. provides wood for manufacturing hockey sticks and other spots goods. Populus spp. provide matchwood and Eucalyptus spp. paper pulpwood. Fruits are obtained from Zizyphus spp. and Syzygium cumini. Katha is extracted from Acacia catechu. Neem oil is obtained from Azadirachta indica.

It has been seen that ban on felling green trees in Himachal Pradesh, packing cases for apple and other fruits/vegetables are being supplied from wood of Eucalytus spp. Eucalpytus wood is also used for making cheap furniture and as a fuelwood.

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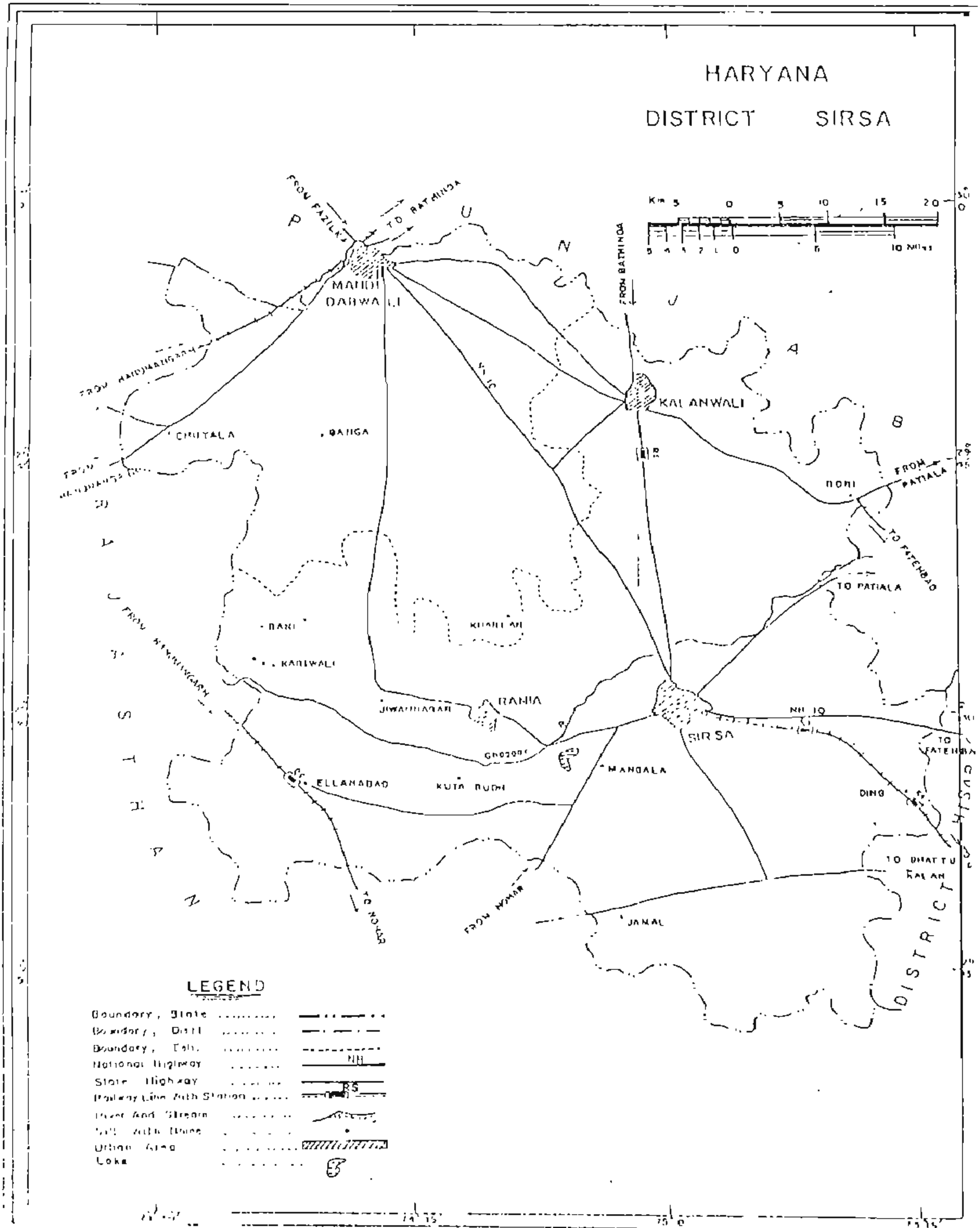
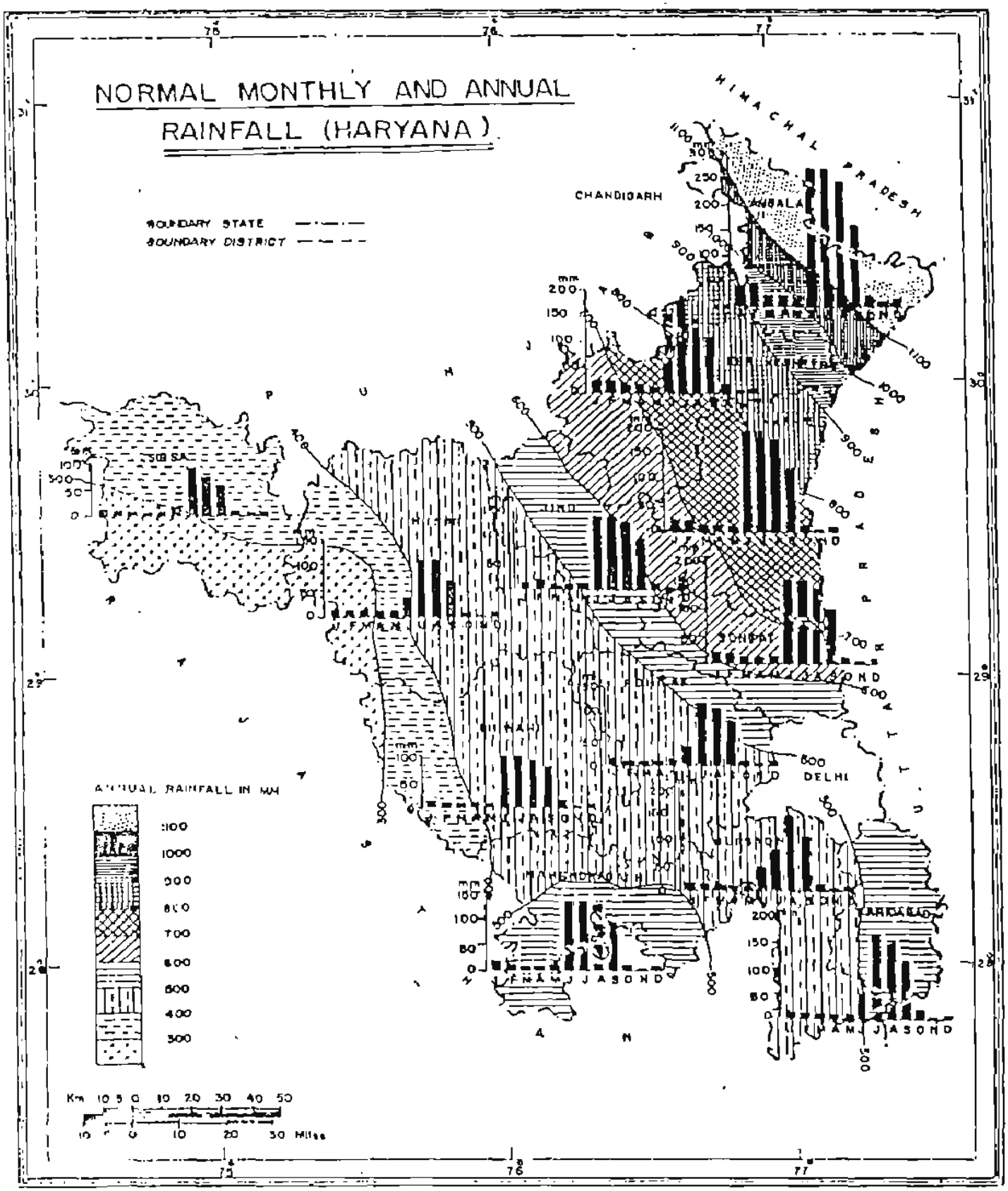

HARYANA
DISTRICT SIRSA
Km 5 0 5 10 15 20
10 Miles
P U N J A B
FROM FAZILKA
TO BATHINDA
FROM BATHINDA
MANDI DABWALI
KALANWALI
CHUTALA
RANIA
SIRSA
ELLANABAD
KUTA BUDH
MANGALA
JAMAL
DING
RORI
FROM PATIALA
TO FATEHABAD
TO PATIALA
TO FATEHABAD
TO BHATTU KALAN
FROM NOHAR
TO NOHAR
DISTRICT HISAR
LEGEND
Boundary, State
Boundary, Distt
Boundary, Teh.
National Highway
State Highway
Railway Line With Station
River And Stream
Urban Area
Lake

Contents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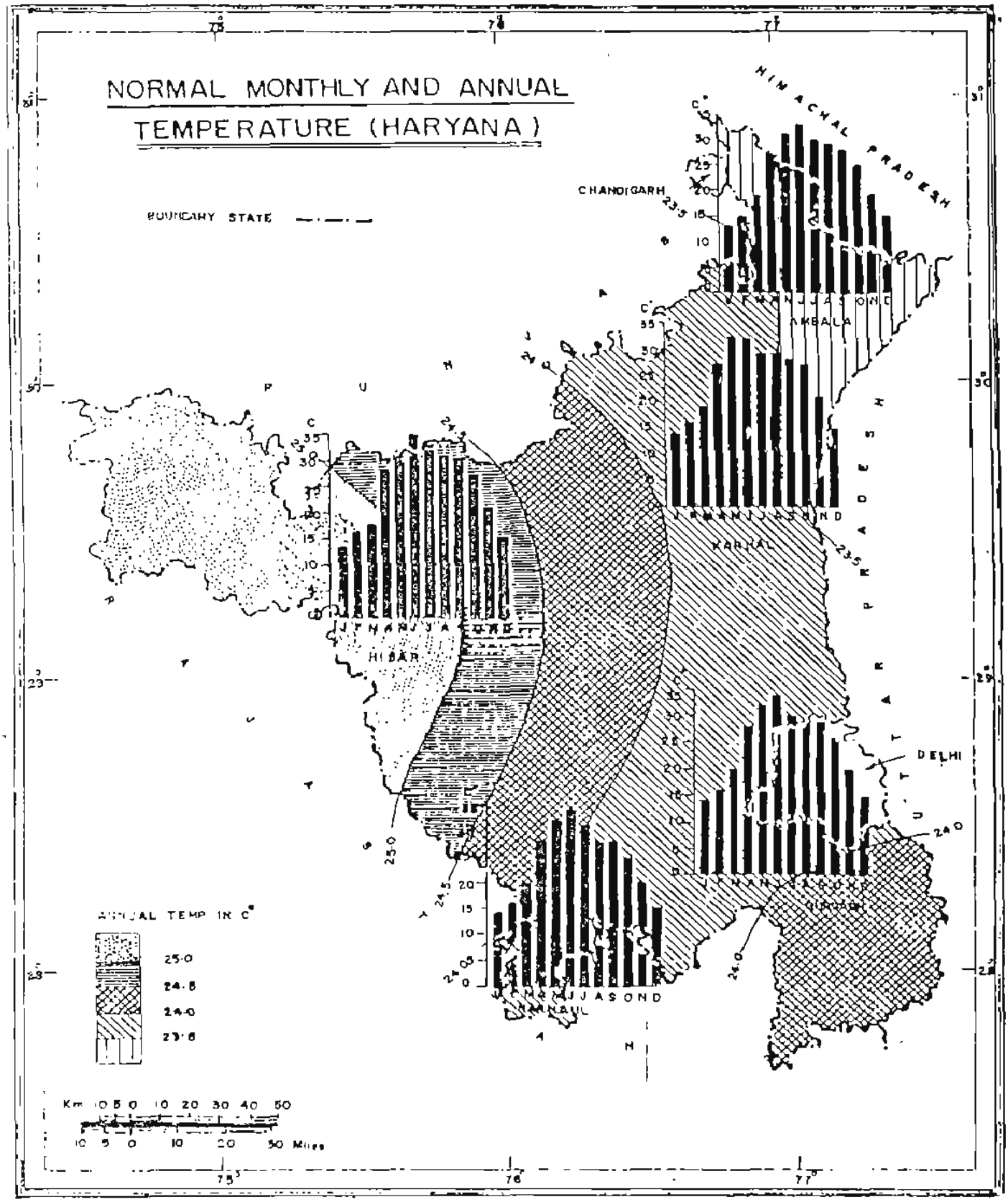
BOUNDARY STATE
BOUNDARY DISTRICT
HIMACHAL PRADESH
CHANDIGARH
AMBALA
DELHI
RAJASTHAN
UTTAR PRADESH
ANNUAL RAINFALL IN MM
1100
1000
900
800
700
600
500
400
300
Km 10 5 0 10 20 30 40 50
10 5 0 10 20 30 Miles
75
76
77
31
30
29
28

Contents


NORMAL MONTHLY AND ANNUAL
TEMPERATURE (HARYANA)
BOUNDARY STATE
HIMACHAL PRADESH
CHANDIGARH
AMBALA
KARNAL
HISAR
DELHI
UTTAR PRADESH
PUNJAB
RAJASTHAN
ANNUAL TEMP IN C°
25·0
24·8
24·0
23·8
Km 10 5 0 10 20 30 40 50
10 5 0 10 20 30 Miles
75°
76°
77°

Contents

HARYANA

DISTRICT SIRSA

GEOLOGY

Km 10 0 10

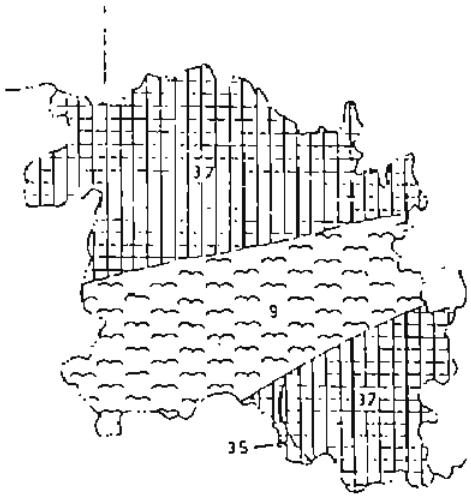
10 0 10 Miles

ALLUVIUM RECENT

SOILS

Km 10 0 10

10 0 10 Miles



USTALFS - OCHREPTS (9)

PSAMMENTS (35)
PSAMMENTS - FLUVENTS - ORTHIDS (37)

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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 Sirsa 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 to 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.Ht(DB). 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

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sample size obtained from pilot survey was 241 villages.

These 241 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 making 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

Forest. 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.

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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 Sirsa 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)

$\bar{y} = \sum_{i}^{n} y_i / n$ = average 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

$$\hat{R} = \frac{\sum_{i}^{n} y_i}{\sum_{i}^{n} x_i} = \frac{\bar{y}}{\bar{x}}$$

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

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

Estimated variance of R is given by

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

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When N is large, then

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

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

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

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

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

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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 guvava	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 articulata	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 Sirsa district has a total of 323 villages having an area of 4240.91 Sq. km. Out of these, 21 villages having an area of 283.77 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 21 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 8.68 and the corresponding volume is 2.078 cum./ha. for the entire district of Sirsa.

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 Sirsa district 37.80 lakh trees having volume of 8.81 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. 19.86 lakh trees (53.97%) followed by 9.52 lakh trees (25.87%) in 20-30 cms. dia-class, 4.73 lakh trees (12.86%) in 30-40 cms. dia-class and 2.69 lakh trees (7.30%) in 40 cms. and above dia-class.

It also shows that in the rural area of Sirsa district, when all the dia-classes are combined, *Acacia nilotica* (Babul) has the largest representation i.e. 12.74 lakh trees (34.63%), followed by *Dalbergia sissoo* 5.40 lakh trees (14.89%) *Prosopis cineraria* 4.58 lakh trees (12.45%), *Eucalyptus spp.* 3.54 lakh trees (9.61%). *Acacia tortilis* 2.90 lakh trees (7.89%). *Zizyphus spp.*

2.90 lakh trees (7.89%). Azadirachta indica 0.94 lakh trees (2.56%),Melia azadirach 0.80 lakh trees (2.17%). Morus spp. 0.61 lakh trees (1.65%) and Prosopis juliflora 0.44 lakh trees (1.20%). 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. 12.14 lakh trees (33.00%) followed by Category-VII - Canals 6.02 lakh trees (16.37%), Category-III - Village Woodlot 5.96 lakh trees (16.19%), Category-II- Roadside Plantations 5.84 lakh trees (15.88%), Category-II-Block Plantation5.54 lakh trees (15.06%) and Category-VI- Railway lines 1.09 lakh trees (2.97%). The representation of trees in Category-V - Ponds and Category-VIII- Rest has been found to be poor.

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.

Though the overall distribution of stems per hectare is 8.60,the dia-classwise distribution of stems per hectare is maximum in dia-class 10-20 cms. i.e. 4.68 followed by 2.24 in 20-30 cms dia-class, 1.12 in 30-40 cms. dia-class and 0.63 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 categotries 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 the various prescribed categories are as under:

Category-I - Farm Forestry

As per the estimate, this category has a total number of 12.14 lakh trees (33.00%) which is the highest amongst all the categories. It is mainly comprised of Dalbergia sissoo 3.99 lakh trees, Acacia nilotica 3.13 lakh trees, Eucalyptus spp. 1.47 lakh trees, Azadirachta indica 0.88 lakh trees, Melia azadarch 0.66 lakh trees, Morus spp. 0.59 lakh trees, Populus spp. 0.32 lakh trees, Prosopis juliflora 0.29 lakh trees, Ficus spp. 0.13 lakh trees and Syzygium cumini 0.12 lakh trees. The remaining species are represented very poorly.

Category-II - Roadside Plantation

As per the estimation there are 5.84 lakh trees (15.88%) in all in this category. It is mainly represented by Acacia nilotica 2.81 lakh trees, Acacia tortilis 1.36 lakh trees, Prosopis cineraria 0.46 lakh trees, Eucalyptus spp. 0.45 lakh trees, Dalbergia sissoo 0.32 lakh trees, Zizyphus spp. 0.17 lakh trees and Melia azedarach 0.12 lakh trees. The representation of the remaining species is very poor and hence not presented here.

Category-III - Village Woodlots

In this category the total number of trees, as per the estimation, is 5.96 lakh trees (16.19%). The predominent species in this category are Prosopis cineraria 3.56 lakh trees, Zizyphus spp. 2.03 lakh trees, and Salvadora spp. 0.14 lakh trees. The remaining species have a poor representation.

Category-IV - Block Plantations

There are 5.54 lakh trees (15.06%) in all in this category. The main species forming bulk of the crop are Acacia nilotica 3.18 lakh trees. Eucalyptus spp. 0.69 lakh trees, Zizyphus spp. 0.51 lakh tree Acacia tortilis 0.48 lakh trees, Dalbergia sissoo 0.16 lakh trees and Prosopis cineraria 0.13 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 0.03 lakh trees (0.09%) in this category. Acacia nilotica has 0.02 lakh trees. Other spp. are either absent or have a very poor representation.

Category-VI - Railway Lines

This category has 1.09 lakh trees (2.97%) in all. Acacia tortilis having 0.71 lakh trees.Acacia nilotica 0.23 lakh trees and Prosopis cineraria 0.13 lakh trees. The rest of the main spp. are either very poorly represented or are found to be absent in this district.

Category-VII - Canals

It is estimated that this category in total has 6.03 lakh trees (16.37%). The main species in this category are Acacia nilotica 3.20 lakh trees. Dalbergia sissoo 1.00 lakh trees.Eucalyptus spp. 0.92 lakh trees, Prosopis cineraria 0.31 lakh trees. Acacia tortilis 0.27 lakh trees and Zizyphus spp. 0.18 lakh trees.The representation of the rest of the spp. is very poor.

Category-VIII - Rest

This category has 0.16 lakh trees (0.45%) in all.Acacia nilotica having 0.12 lakh trees. The rest of the main spp. are either very poorly represented or found to be absent in this district.

Analysis of Volume (Stock)

As per the estimate the entire rural area of Sirsa district has a total volume (all species and dia-classes combined) of 8.81 lakh cubic meters corresponding to the estimated total of 37.82 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 40 cms.and above having a volume of 3.09 lakh cubic meters (35.03%) followed by dia-class 30-40 cms. having a volume of 2.84 lakh cubic meters (32.17%), dia-class 20-30 cms. having 1.61 lakh cubic meters (18.29%) and 10-20 cms dia-class having 1.28 lakh cubic meters (14.51%).

It also shows that the total volume per hectare contributed by trees of all species of all dia-classes combined is 2.078 cum. The volume per hectare for different dia-classes (in decreasing order) are as below:

40cms.and above dia-class (0.728 cum.), 30-40 cms. dia-class (0.669 cum.), 20-30 cms. dia-class (0.380

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cum.) and 10-20 cms. dia-class (0.301 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):

Acacia nilotica 2.76 lakh cubic meters (31.31%), Dalbergia sissoo 1.69 lakh cubic meters (19.13%), Prosopis cineraria 1.37 lakh cubic meters (15.57%), Eucalyptus spp. 1.11 lakh cubic meters (12.58%), Zizyphus spp. 0.68 lakh cubic meters (7.70%), Acacia tortilis. 0.38 lakh cubic meters (4.36%), Azadirachta indica 0.20 lakh cubic meters (2.27%)and Morus spp. 0.09 lakh cubic meters (1.06%).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 2.88 lakh cubic metres (32.72%) followed by category-VII having 1.93 lakh cubic metres (21.93%), category-III having 1.84 lakh cubic metres (20.84%), category-II having 1.41 lakh cubic metres (16.02%) ,category-IV having 0.53 lakh cubic metres (6.06%)and category- VI 0.17 lakh cubic metres (1.93%).Volume contributedby Category V and VIII have been found to be less than 1% each.

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 categotries 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 SIRSA DISTT. : 4240.91 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	720851	309809	153154	90282	1274096	34.63
3	Acacia spp.	0	30	30	15	75	0.00
4	Acacia tortilis	189831	76219	19624	4604	290278	7.89
5	Albizia spp.	7711	5395	3677	2704	19487	0.53
6	Azadirachta indica	48990	27438	12240	5515	94183	2.56
7	Dalbergia sissoo	230630	152677	93854	70690	547851	14.89
8	Eucalyptus spp.	210499	97978	36271	8878	353626	9.61
9	Ficus spp.	7113	3871	2273	5201	18458	0.50
10	Mangifera indica	2884	1330	478	463	5155	0.14
11	Melia azedarach	63935	11762	3139	867	79703	2.17
12	Morus spp.	40755	13122	4872	1988	60737	1.65
13	Populus spp.	26632	6695	463	0	33790	0.92
14	Prosopis cineraria	164395	152647	95348	45658	458048	12.45
15	Prosopis juliflora	31996	9506	2227	583	44312	1.20
16	Psidium guyava	10566	194	15	30	10805	0.29
17	Salvadora spp.	6262	2661	2287	3946	15156	0.41
18	Syzygium cumini	8385	3916	1464	538	14303	0.39
19	Tamarix aphylla	254	105	105	90	554	0.02
20	Zizyphus spp.	161898	66670	37407	24286	290261	7.89
21	Misc. spp.	52366	9954	4170	2317	68807	1.87
	Total	1985953	951979	473098	268655	3679685	100.00
	% age	53.97	25.87	12.86	7.30	100.00	

Table No. 2

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

Rural area of SIRSA DISTT. : 4240.91 Sq. km.

S.No.	Category	10-20	20-30	30-40	40+	Total	% age
1	I	651477	330730	154336	77652	1214195	33.00
2	II	275568	186391	87445	34809	584213	15.88
3	III	227715	180984	118766	68105	595570	16.19
4	IV	491883	48108	9504	4769	554264	15.06
5	V	1644	778	239	733	3394	0.09
6	VI	67283	29473	9161	3214	109131	2.97
7	VII	264046	168146	91435	78895	602522	16.37
8	VIII	6337	7369	2212	478	16396	0.45
	Total	1985953	951979	473098	268655	3679685	100.00
	% age	53.97	25.87	12.86	7.30	100.00	
	Stems/ha.	4.68	2.24	1.12	0.63	8.68	

Table No. 3

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

Rural area of SIRSA DISTT. : 4240.91 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	312603	280725	5365	318086	2466	23059	320000	11792	1274096	34.63
3	Acacia spp.	0	0	0	30	0	0	45	0	75	0.00
4	Acacia tortilis	7055	136373	0	48392	0	71497	26796	165	290278	7.89
5	Albizia spp.	9654	4109	0	2347	30	15	3332	0	19487	0.53
6	Azadirachta indica	88189	2361	60	1913	30	135	1495	0	94183	2.56
7	Dalbergia sissoo	399417	32013	75	16319	0	344	99683	0	547851	14.89
8	Eucalyptus spp.	147087	44955	0	69001	0	0	92493	90	353626	9.61
9	Ficus spp.	13017	538	1689	1285	539	75	1300	15	18458	0.50
10	Mangifera indica	5020	0	0	30	0	0	105	0	5155	0.14
11	Melia azedarach	65683	11509	0	1823	0	0	688	0	79703	2.17
12	Morus spp.	59002	374	60	822	0	0	479	0	60737	1.65
13	Populus spp.	31713	1330	0	344	0	0	403	0	33790	0.92
14	Prosopis cineraria	0	46105	355644	12600	15	12643	31041	0	458048	12.45
15	Prosopis juliflora	28649	672	5141	224	105	285	4917	4319	44312	1.20
16	Psidium guyava	9026	0	0	1719	0	45	15	0	10805	0.29
17	Salvadora spp.	0	867	13510	90	0	180	509	0	15156	0.41
18	Syzygium cumini	12000	0	2048	195	0	0	60	0	14303	0.39
19	Tamarix aphylla	285	164	105	0	0	0	0	0	554	0.02
20	Zizyphus spp.	15	17351	202951	51381	15	763	17785	0	290261	7.89
21	Misc. spp.	25780	4767	8922	27063	194	90	1376	15	68807	1.87
	Total	1214195	584213	595570	554264	3394	109131	602522	16396	3679685	100.00
	% age	33.00	15.88	16.19	15.06	0.09	2.97	16.37	0.45	100.00	

Table No. 4

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

Rural area of SIRSA DISTT. : 4240.91 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	0.00	0.00	0.000
2	Acacia nilotica	43251.060	43373.260	87297.780	102018.660	275940.76	31.31	0.651
3	Acacia spp.	0.000	4.200	17.100	16.950	38.25	0.00	0.000
4	Acacia tortilis	11389.860	10670.660	11185.680	5202.520	38448.72	4.36	0.091
5	Albizia spp.	462.660	755.300	2095.890	3055.520	6369.37	0.72	0.015
6	Azadirachta indica	2939.400	3841.320	6976.800	6231.950	19989.47	2.27	0.047
7	Dalbergia sissoo	13837.800	21374.780	53496.780	79879.700	168589.06	19.13	0.398
8	Eucalyptus spp.	21049.900	40170.980	34457.450	15181.380	110859.71	12.58	0.261
9	Ficus spp.	426.780	541.940	1295.610	5877.130	8141.46	0.92	0.019
10	Mangifera indica	173.040	186.200	272.460	523.190	1154.89	0.13	0.003
11	Melia azedarach	3836.100	1646.680	1789.230	979.710	8251.72	0.94	0.019
12	Morus spp.	2445.300	1837.080	2777.040	2246.440	9305.86	1.06	0.022
13	Populus spp.	1864.240	2343.250	337.990	0.000	4545.48	0.52	0.011
14	Prosopis cineraria	9863.700	21370.580	54348.360	51593.540	137176.18	15.57	0.323
15	Prosopis juliflora	1919.760	1330.840	1269.390	658.790	5178.78	0.59	0.012
16	Psidium guyava	633.960	27.160	8.550	33.900	703.57	0.08	0.002
17	Salvadora spp.	375.720	372.540	1303.590	4458.980	6510.83	0.74	0.015
18	Syzygium cumini	503.100	548.240	834.480	607.940	2493.76	0.28	0.006
19	Tamarix aphylla	15.240	14.700	59.850	101.700	191.49	0.02	0.000
20	Zizyphus spp.	9713.880	9333.800	21321.990	27443.180	67812.85	7.70	0.160
21	Misc. spp.	3141.960	1393.560	2376.900	2618.210	9530.63	1.08	0.022
	Total	127843.460	161137.070	283522.920	308729.390	881232.840	100.00	2.078
	% age	14.51	18.29	32.17	35.03	100.00		
	Vol./ha.	0.301	0.380	0.669	0.728	2.078		

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Table No. 5

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

Rural area of SIRSA DISTT. : 4240.91 Sq. km.

S.No.	Category	10-20	20-30	30-40	40+	Total	% age
1	I	42355.720	60882.440	95145.280	89922.340	288305.780	32.72
2	II	17394.620	29337.500	52876.430	41596.750	141205.300	16.02
3	III	13662.900	25337.760	67696.620	76958.650	183655.930	20.84
4	IV	31741.130	9498.720	6399.580	5779.310	53418.740	6.06
5	V	98.340	108.920	136.230	828.290	1172.080	0.13
6	VI	4036.980	4126.220	5221.770	3631.820	17016.790	1.93
7	VII	18172.050	30797.650	54786.170	89472.090	193227.960	21.93
8	VIII	381.420	1047.860	1260.840	540.140	3230.260	0.37
	Total	127843.460	161137.070	283522.920	308729.390	881232.840	100.00
	% age	14.51	18.29	32.17	35.03	100.00	

Contents

Table No. 6

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

Rural area of SIRSA DISTT. : 4240.91 Sq. km.

S.No.	Name of Species	I	II	III	IV	V	VI	VII	VIII	Total	% age
1	Acacia catechu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Acacia nilotica	67916.50	70612.82	677.39	23001.61	581.67	5431.98	105099.11	2619.68	275940.76	31.31
3	Acacia spp.	0.00	0.00	0.00	10.65	0.00	0.00	27.60	0.00	38.25	0.00
4	Acacia tortilis	834.44	22548.30	0.00	3437.01	0.00	7360.89	4254.58	13.50	38448.72	4.36
5	Albizia spp.	2822.77	1304.09	0.00	605.36	4.20	2.10	1630.85	0.00	6369.37	0.72
6	Azadirachta indica	18968.71	458.98	21.30	312.11	33.90	24.15	170.32	0.00	19989.47	2.27
7	Dalbergia sissoo	108729.25	9736.29	8.10	4227.59	0.00	68.04	45819.79	0.00	168589.06	19.13
8	Eucalyptus spp.	51909.39	21229.12	0.00	13303.51	0.00	0.00	24390.09	27.60	110859.71	12.58
9	Ficus spp.	5489.75	188.35	1113.49	429.95	499.27	37.80	381.95	0.90	8141.46	0.92
10	Mangifera indica	1107.49	0.00	0.00	3.00	0.00	0.00	44.40	0.00	1154.89	0.13
11	Melia azedarach	6217.19	1840.60	0.00	122.50	0.00	0.00	71.43	0.00	8251.72	0.94
12	Morus spp.	9056.94	49.74	20.85	133.54	0.00	0.00	44.79	0.00	9305.86	1.06
13	Populus spp.	4213.13	155.82	0.00	82.60	0.00	0.00	93.93	0.00	4545.48	0.52
14	Prosopis cineraria	0.00	8226.75	117967.58	1419.65	0.90	3642.16	5919.14	0.00	137176.18	15.57
15	Prosopis juliflora	3083.29	80.74	633.13	24.69	6.30	72.15	712.00	566.48	5178.78	0.59
16	Psidium guyava	594.43	0.00	0.00	103.14	0.00	5.10	0.90	0.00	703.57	0.08
17	Salvadora spp.	0.00	217.39	6043.90	21.45	0.00	79.50	148.59	0.00	6510.83	0.74
18	Syzygium cumini	2128.92	0.00	311.44	17.70	0.00	0.00	35.70	0.00	2493.76	0.28
19	Tamarix aphylla	89.20	25.89	77.40	0.00	0.00	0.00	0.00	0.00	191.49	0.02
20	Zizyphus spp.	16.95	4174.36	54848.21	4260.58	16.95	267.87	4227.93	0.00	67812.85	7.70
21	Misc. spp.	5128.43	356.06	1933.14	1902.10	28.89	25.05	154.86	2.10	9530.63	1.08
	Total	288305.78	141205.30	183655.93	53418.74	1172.08	17016.79	193227.96	3230.26	881232.84	100
	% age	32.72	16.02	20.84	6.06	0.13	1.93	21.93	0.37	100.00	

Appendix-I

List of villages selected for Pilot Survey in Haryana State.

S.No.	Name of the village	Area of Village (Ha.)
1.	Badhana	1479.51
2.	Baidwala	1116.38
3.	Bhandari	677.00
4.	Dhaloo	583.00
5.	Bondkalan	2353.00
6.	B. Rusma	248.00
7.	B. Tauru	184.94
8.	Dachaur	2728.00
9.	Dighal	2211.00
10.	Dobhi	2894.00
11.	Gorakhpur	4370.00
12.	Gurauthi	1720.00
13.	Haliaki	480.00
14.	Kalmeur	2762.00
15.	Khandelhuri	2324.00
16.	Kharkhara	979.00
17.	Kona	266.28
18.	Kumanawali	1479.00
19.	K.Lakhasingh	140.00
20.	Lalheri	267.09
21.	Mamoonmaira	199.51
22.	Mohammedpur	1731.00
23.	Nandusan	825.14
24.	Nathusari	1741.00
25.	Phadani	208.00
26.	Rajpur	130.00
27.	Saundhad	2753.00
28.	Shampura	1017.00
29.	Shoalapur	316.00
30.	Siwana	1126.00
31.	Sultahra	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 Sirsa District.

S.No.	Botanical name	Common name
1	2	3
1.	Acacia nilotica	Babul, Kikar, Bawar, Baval
2.	Acacia tortilis	Israeli kikar
3.	Acacia spp.	
4.	Ailanthus excelsa	Ardusa,Maharukh,Mahalimla
5.	Albizia lebbek	Kala siris, Kalbage, Koko, Siris, Bhander, Sarsaoda
6.	Albizia procera	Safed siris/siras, Karha,Karhar,karhai
7.	Albizia spp.	Mog,Hiharu,Morai,Sundi,Kunis
8.	Azadirachta indica	Neem, Nimbo, Nibbaro, Vepa
9.	Cassia siamea	Minjiri, Nellatangedu
10.	Cordia spp.	Lassora, Bairula, Borala
11.	Dalbergia sissoo	Sisoo, Shisham, Tahli
12.	Delonix regia	Gulmohar, Krishnachura, Gulmohan
13.	Erythrina suberosa	Dhaul, Gararu, Mander, Pangra
14.	Eucalyntus spp.	Nilgiri, Safeda
15.	Ficus bengalensis	Bargat, Bad, Fig
	Ficus elastica	Ved, Vadlo
16.	Ficus religiosa	Pipal, Pipli, Papada, Pripri
17.	Ficus spp.	Anjar, Akhar, Budita
18.	Mangifera indica	Am, Amb, Ambo, Mavu, Moru
19.	Melia azedarach	Bijain, Baknia, Betain, Bakain
20.	Moringa spp.	Sajna, Sohjna, Sanjna, Saijana
21.	Morus spp.	Tut, Kimu, Shahtoot
22.	Phoenix sylvestris	Khajur, Betha
23.	Populus spp.	Banpipal, Godhpipal, Pahari Pipal
24.	Prosopis cineraria	Jand, Jant
25.	Prosopis juliflora	Juliflora

26. Prunus spp.	Aru, Aria, Gont, Khurmani
27. Psidium guyava	Amrud
28. Salvadora spp.	Jal, Jhal
29. Syzygium cumini	Jamun, Jamoon, Jamak
30. Tamarindus indica	Imli, Amli, Ambli, Chinch
31. Tamarix aphylla	France, Farash
32. Zizyphus spp.	

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Appendix-IV

List of the villages Surveyed in Sirsa District.

S.No.	Name of the village	Name of Tehsil	Area (Ha)	Map sheet No.
1.	Baidwala Fatehpuri	Sirsa	1416.38	44 O/ 2
2.	Kaurangawali	-do-	1479.00	44 O/ 1
3.	Nathusari Kalan	-do-	1741.00	44 O/ 3
4.	Sahuwala	-do-	904.00	44 O/ 3
5.	Shekhu Khera	-do-	481.00	44 K/15
6.	Abub Shehar	Dabwali	4370.54	44 K/ 9
7.	Natar	Sirsa	1089.00	44 O/ 3
8.	Burj Karamgarh	-do-	543.89	44 O/ 2
9.	Darba Kalan	-do-	2225.00	44 O/ 3
10.	Ghukanwali	Dabwali	1891.07	44 K/14
11.	Ramnagar	-do-	1006.00	44 K/14
12.	Dhingtania	Sirsa	1042.00	44 O/ 3
13.	Jhopra	-do-	320.00	44 O/ 2
14.	Mithisurea	-do-	1015.00	44 K/11
15.	Chatta	Dabwali	538.00	44 K/13
16.	Gubewala	Sirsa	804.00	44 O/ 2
17.	Kuka Budh	-do-	3555.00	44 K/15
18.	Teja Khera	Dabwali	1015.00	44 K/ 9
19.	Harni Khurd	Sirsa	723.00	44 K/10
20.	Sikandarpur	-do-	1465.00	44 O/ 2
21.	Tiloke Wala	-do-	753.00	44 O/ 1
	Total		28376.88	

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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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.

Contents

16. B. 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

काम संख्या Job No.	कार्ड रूप रेखा Card design	राज्य State	जिला District	प्रतिदर्श गाव Sample Vill.	Geographical Area of the Sample Village (Hect.) प्रतिदर्श गाव 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 ओब (सी एम) DBH OB (CM)	वृक्ष की ऊंचाई (मी.) Tree Height (Mt.)	क्लीयर बोल/ स्पष्ट प्रस्तम (मी.) Clear Bole (Mt.)	पोल रोपण/वृक्षों का वर्ग Category of Plantation/Trees	स्पीशीज/जाति SPECIES नाम Name	कोड Code	डी बी ओब (सी.मी.) DBH OB (Cm)	वृक्ष की ऊंचाई (मी.) Tree Height (Mt.)	क्लीयर बोल/ स्पष्ट प्रस्तम (मी.) Clear Bole (Mt.)	पोल 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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