



सत्यमेव जयते

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# INVENTORY SURVEY

( Non - Forest Area )

OF

# AMBALA DISTRICT

( HARYANA STATE )

# INVENTORY RESULTS

FOREST SURVEY OF INDIA

NORTHERN ZONE

SHIMLA-1

1995

## PREFACE

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 their 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 points in this survey was to categorise various types of trees in a village. The categories were farm forestry, roadside plantations, village woodlot, block plantations, canals, railway lines, ponds and others. This report pertaining to the district Ambala, of Haryana State is the third in this series by the Northern Zone, Shimla

The geographical area of the Ambala District is 38,32 Sq. Km. The survey was carried out during 1991-92 in the rural areas of the district covering an area of 3738.79 Sq. Km.

Out of the total species inventoried, ten 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 94,10 lakh i.e. 25,17 trees/ha. and the corresponding volume has been assessed at 14,958 lakh cubic meters i.e. 4,001 cum/ha. *Eucalyptus* spp. (Safeda) have been found to have the largest representation with 42,79 lakh trees (45.47%) while *Azadirachta indica* has the lowest representation amounting to 0.74 lakh trees (0.79%)

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 was carried out by the staff of Northern Zone, Shimla and the data was processed at Forest Survey of India, Dehradun. 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.

Sd/-  
(Dr. S.N. Rai)  
Director,  
Forest Survey of India  
Dehradun.

## ACKNOWLEDGEMENTS

The State of Haryana is situated in the North-West part of India. It has extreme climate which is very cold in winter and very hot during summer. Besides this in many villages proper drinking water facility is also not easily available. The staff of the Northern Zone were engaged in carrying out the inventory survey of non-forest areas of Haryana with the co-operation of State Forest Department's officers and staff. The Panchayat Pardhans and members and also the villagers have been very kind to extend their co-operation in making our field work smooth and easy. The Deputy Commissioner and other staff of the Revenue Department of the district were very helpful and co-operative. I acknowledge with thanks for the co-operation and help extended by all concerned as mentioned above.

I am specifically grateful to Shri P. S. Malik, IFS, the Principal Chief Conservator of Forests of Haryana for directing the officers and staff of his department to extend full co-operation to our field staff. I am also thankful to Shri S. K. Dhar, IFS, Conservator of Forests (HQ) and; Divisional Forest Officer Ambala for providing us the required data and informations. Thanks are due to the Range Officers (territorial) of Ambala Forest Division who have also been very co-operative in extending all possible facilities.

Thanks are also due to Shri D. K. Ved, IFS, and Shri D. V. Negi, IFS, the then Joint Director and Deputy Director respectively of this zone, for their pioneer work in evolving the design for field inventory survey of non-forest area in Ambala District.

I acknowledge with thanks, on behalf of Forest Survey of India (Northern Zone), to all the concerned as mentioned above but for their kind co-operation and help extended to this organisation it would not have been so easy to bring out this report successfully.

Sd/-  
(Manjit Singh, IFS)  
Joint Director

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## SUMMARY

1. To assess the availability of forest resources for production of timber, fuelwood and raw material for paper pulp, packing cases, essential oils and matchwood etc. in areas outside the traditional Reserved Forests and those forest areas which could not be covered while undertaking the regular Inventory Survey of Haryana State. The Inventory Survey has been carried out in the Ambala district of Haryana during 1991-92.

2. As per 1981 Census, Ambala district had a total of 1306 villages, having a total area of 3738.72 Sq. Km., out of which 39 villages were randomly selected and surveyed.

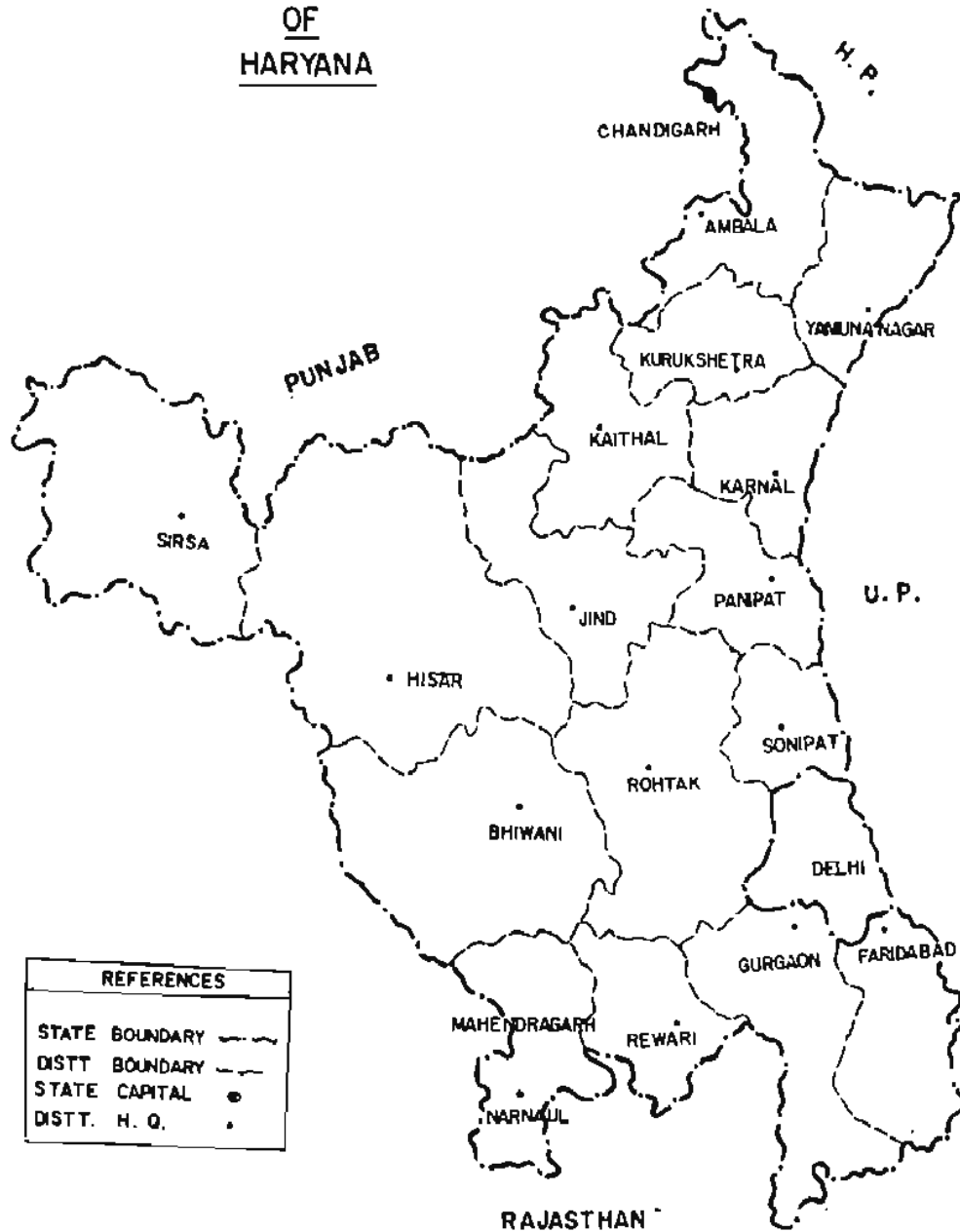
3. In the entire rural area of Ambala district 94.10 lakh trees (25.17 trees/hectare) have been estimated. The analysis shows that maximum number of the estimated trees are in 10-20 cms. dia-class i.e. 72.94 lakh trees (77.51%) and minimum in 40 cms. and above dia-class i.e. 1.75 lakh trees (1.86%).

4. The specieswise distribution of total number of estimated trees shows that *Eucalyptus* spp. has the largest representation i.e. 42.79 lakh trees (45.47%) followed by *Acacia nilotica* 13.34 lakh trees (14.18%), *Populus* spp. 8.05 lakh trees (8.55%), *Dalbergia sissoo* 7.95 lakh trees (8.45%), *Mangifera indica* 5.27 lakh trees (5.59%), *Acacia catechu* 3.38 lakh trees (3.59%), *Syzygium cumini* 2.84 lakh trees (3.02%), *Morus* spp. 1.84 lakh trees (1.95%), and *Melia azedarach* 1.72 lakh trees (1.83%). 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 shows that the representation of trees is maximum in the Category-I - FARM FORESTRY i.e. 44.26 lakh trees (47.03%) and minimum in the Category-VIII - REST i.e. 0.04 lakh trees (0.04%).

6. In the entire rural area of Ambala district total estimated volume of all species and dia-classes combined comes to be 14.958 lakh cubic meters and volume/hectare is 4.001 Cum.

MAP SHOWING DISTTS.  
OF  
HARYANA



REFERENCES	
STATE BOUNDARY	-----
DISTT BOUNDARY	-----
STATE CAPITAL	●
DISTT. H. Q.	•

## CHAPTER 1

### 1.1 Introduction

To assess the availability of forest resources for production of timber, fuelwood and raw material for paper pulp, packing cases, matchwood and essential oils etc. in area outside the traditional Reserved Forest areas 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

The district of Ambala is a part of Eastern Haryana Plain. Its name is derived after its head quarters town, Ambala. According to local saying, it was founded by one Amba Rajput during the 14th Century. Another version associates the name of the town with goddess Bhawani Amba whose temple exists in the town. Yet another version is that the name of the town is a corruption from Ambale or a place abounding in mangoes, from the large number of mango groves that existed at one time in its immediate neighbourhood. The district has many ancient places. It is said that Pinjore in Ambala District has been the earliest habitation of man and it is said that early man lived in Pinjore region.

### 1.3 Location

The district lies between  $30^{\circ} 02' 30''$  and  $30^{\circ} 55' 05''$  North Latitudes and  $76^{\circ} 32' 45''$  and  $77^{\circ} 36' 20''$  East Longitudes. On its North and North-East are the districts of Solan and Sirmour of Himachal Pradesh. To its East and South-East is the Yamuna river and across the river Yamuna is the Saharanpur District of Uttar Pradesh. On its South is the district of Kurukshetra. To its West are the districts of Patiala and Rupnagar of Punjab and the Union Territory of Chandigarh. The geographical area of the district is 3832 Sq. Km. and as per 1981 Census its population was 1,409,463.

### 1.4 Physical Features

#### Soils, Geology and Topography

The district can be sub-divided into the following five sub-micro regions on the basis of geology, soils, topography, climate and natural vegetation:

#### (a) Kalka Shiwalik

The region spreads over North and North-Eastern parts of Ambala District occupying a large part of Kalka Tehsil, some parts of Naraingarh Tehsil and Jagadhari Tehsil. From relief point of view, the region has maximum elevation of 1206 metres above m.s.l near village Bhaj Jabial (23) in Naraingarh Tehsil while the minimum elevation is 480 meters near village Sitomajra (6) in Kalka Tehsil. The maximum elevation is on the top of Morni Hills. Ambala district is bounded by the sharply-rising and straight Shiwalik ranges forming a narrow belt which is mostly sub-mountainous in the North. A large number of rainy seasonal torrents come down the outer slope of the Shiwalik and spread much gravel, boulders and pebbles in the region. Ghaggar river, Dangri Nadi, Somp Nadi, Boli Nadi etc. arise from the Shiwalik range which drain the plain land of Ambala District. Mostly, the land is covered with forests in the region and only a few patches of lands which are lying by the sides of the streams and rivulets are under cultivation.

Soils found in the region are rocky and hilly. In very rare places it has Ghar and Kandi types of soils. Soils as classified by NBSS and LUP (ICAR), Nagpur, the region has Ochrepts-Orthents and Udalfs types of soils.

Ochrepts - Shallow black, brown and alluvial soils of northern region

Orthents - Recently formed soils



### **Udalfs -High base status soils of humid regions**

Transport and communication facilities in the region are quit good. Kalka is the main town for transport facilities. National Highway (NH 22) passes through Kalka town and Broad gauge railway line comes from Ambala Cantt. upto Kalka.

As far as geological formations are concerned, the Shiwalik Murree Series (Dagshai, Kasuali and Dharamsala Beds/Sirmaur Series) and Jutogh group/Vaikrita group/Central Gneiss (equivalents of Salkhalas) are found in the region.

#### **(b) Naraingarh Plain**

The region covers parts of Kalka, Naraingarh and Jagadhari Tehsils. From relief point of view the maximum elevation of the region is 343 metres above ms.l. near the village Tibi Majra (57) in Naraingarh Tehsil while minimum elevation is 327 metres near the village Bir Tahanpur (169) in the Jagadhari Tehsil. It is traversed by a large number of rainy seasonal streams of which chautany, Markanda, Somb and Bali 'Nadies' are the important ones. The region is undulating and it contains a large stretches of silt and pebbles in the bed of seasonal streams which come down the slopes of the Shiwalik.

The region is mostly covered by sandy, shingly soil much over grown with thorny bushes and cut by ravines. The area is known as Ghar in Kalka and Naraingarh Tehsils and Kandi in the Jagadhari Tehsils. Ghar is mostly of very inferior characteristics. Kandi in Jagadhari is a sandy uneven track. The land whether Ghar or Kandi is in similar situation or character, being throughout a sandy, shingly broken area much honey combed with small ravines and called Darrar the locally recognised name of the land hopelessly cut up by deep ravines. The soils are poor and sandy, lying on uneven surface and pebbles, shingles and boulders often lie close to the surface. Soils as classified by NBSS and LUP (ICAR), Nagpur, the region has Ustalfs-Fluents, Udalfs and Ochrepts-Orthents types of soils.

#### **Utalfs -High base status - red loamy, red sandy and alluvial soils**

##### **Fluents -Alluvial soils (Recent alluvium)**

As far as the means of communication and transportation are concerned, all kinds of roads are found in the region connecting the towns with each other situated in the region namely Naraingarh and Sadawa. Most of the villages are interlinked by minor metal roads. The geological formation is alluvium.

#### **(c) Ghaggar Flood Plain**

This region has three parts. One of its parts lie in Kalka and Naraingarh Tehsils. Second part is situated in the extreme West of district covering nine villages. The third part makes its boundaries with Punjab in the North-West and South and Ambala Plain in the East. From relief point of view, the region has the maximum elevation of 487 metres above ms.l near the village Bhainsa Tibba (120) in Kalka Tehsil, while minimum elevation 254 metres near the village Dhelo Majra (330) in Ambala Tehsil. The flood plain is drained by the main river Ghaggar along with seasonal streams. The region has silt and clay over the river borne plain and silt, gravel and pebbles in the bed. After rainy season the streams come into the limits of bed. Soils as classified by NBSS and LUP (ICAR), Nagpur, the region has Ochrepts-Orthents types of soils.

As far as the means of the transportation are concerned, Puca and Kutcha roads are serving the region. Panchkula Urban Estate is the most important town in the region. The geological formation is Alluvium.

#### **(d) Ambala Plain**

The region includes parts of Ambala, Jagadhari and Naraingarh Tehsils of the district. It covers the lower of the district. From relief point of view, the maximum elevation of the region is 299 metres above m.s.l, near the village Kakrali (87) in Naraingarh Tehsil and Bhogpur (4) in Jagadhari Tehsil while the minimum elevation is 265 metres above m.s.l near Kanwalal (48) in Ambala Tehsil. The region slopes towards South- West. Markanda, Chautany and

Sarswati are the main rivers which drain the region along with its tributaries. Seasonal river and other rivulets like Dangri Nadi, Somb Nadi, Boli Nadi, Begna Nadi etc. Bring rain water from the Shiwalik and Naraingarh Plain in the rainy season. The region is largely cleared off of natural vegetation for cultivation.

The soils found in the region are coarse loam (Daharand Chaeknote), light loam (Seati) and loam (Bhangar and Nardak). Loam soils are compact and stiff. It is less granular and has a low water holding capacity. Light loam needs little water for germination and grown of plants. Soils as classified by NBSS and LUP (ICAR), Nagpur, the region has Ustalfs-Fluents, Ochrepts- Orthents and Aquepts-Fluents types of soils.

Aquepts -Recently formed hydromorphic alluvial soils

As for as means of communications and transportation are concerned, the region is well developed. Ambala Cantt., Ambala Sadar, Babigal, Yamunanagar, Jagadhari, Buria, Chhachrauli are the main towns linked with each other by major metal roads and Broad gauge railway line. Most of the villages are connected by metalled link roads. The geological formation is Alluvium.

#### **(e) Yamuna Khadar**

The region includes eastern part of Jagadhri Tehsil. From relief point of view, the maximum elevation of the region is BM 280.40 metres above m.s.l. near the village Lahoriwala (246) while the minimum elevation is 272 metres near the village Gharon (258). The region is formed by deposition of alluvial sediments, clay and sand. Water borne gravels and pebbles are also seen in the bed in lower part towards Kurukshetra District. It is flooded with sand, silt, mud and clay. There is less of Kankar and Reh formation in it.

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

With regards to means of communications and transportation, the area has link roads from one village to another. A main road and Broad gauge railway line passes through the region.

The geological formation is Alluvium.

## **1.5 Climate**

The climate of Haryana is semi-arid in the South-West and of the Gangetic type in the rest of the state due to its location on the outer margins of the Monsoon region between the Thar desert and the Himalayas in the North-West of Indian sub- continent.

## **1.6 Rain**

Monsoon bring rains from July to September. From October to June the weather remains generally dry except a few showers received from western cyclones. Within the district also the rainfall varies. The North-eastern part of the district gets more rainfall than the South-Western part due to its proximity to the mountains. Rainfall in the district varies from 800 mm. in western part to more than 1100 mm. in the North-eastern part adjoining to the mountains. The climate in the district is attributed to short wet months and long dry spells of dry months. Humidity is very high during the rainy season and very low during dry summer months i.e. May-June.

## **1.7 Temperature**

Due to its distance from the sea, There is a great difference between the temperature of day and night as well as during summer and winter. The maximum day temperature during summer months reaches as high as 45 °C during May-June. Hot dry winds blow during the day in the summer due to its proximity to the semi-arid areas of Haryana and Rajasthan. During the winter chilly winds blow in the district due to snowfall in the adjoining hills of H.P. and U.P. The minimum temperature during winter falls below 5 °C during December-January.

## 1.8 Frost, Fog, Hail and Dust Storms

Ground frost occurs in the district when there is snowfall in the adjoining hills of H.P. and U.P. Foggy weather prevails after rains in winter during the months of January and February. Occasional spells of hail storms also take place during the period from February to April. During May-June dust storms also occurs in the district.

## 1.9 Socio-Economic Conditions

The district has a mixed type of economy which is partly agricultural and partly industrial. At the time of 1981 Census, 44.87% of total main workers were cultivators and agricultural labourers. Household claimed 3.57% while 51.56% were other workers. Amabala, Jagadhari and Yamunanagar are important trade centres. Yamunanagar is the biggest timber market in the region. the large and medium scale industrial units in the district are engaged in producing tractors, machine tools, paper, vanaspati ghee, sugar, cement, stainless steel utensils, scientific instruments, leaf springs etc.

Irrigation in the district mostly depends upon tube wells. The irrigation is also done through a net work of canals in the district. The cultivable area in the district is 73.86% of the total geographical area out of which 44.19% area is irrigated. Among the food grains, wheat and rice are grown in the district except Kalka Tehsil where wheat and maize are main crops. Sugarcane is also grown in the area. Area under Reserved Forests is 137 Sq. K. As per the 1977 Census, the number of livestock in the district was 622,000 which mostly include cattle, buffaloes, sheep and goat. The number of motor, vehicles on the road were 20,983 in the district during 1979.80.

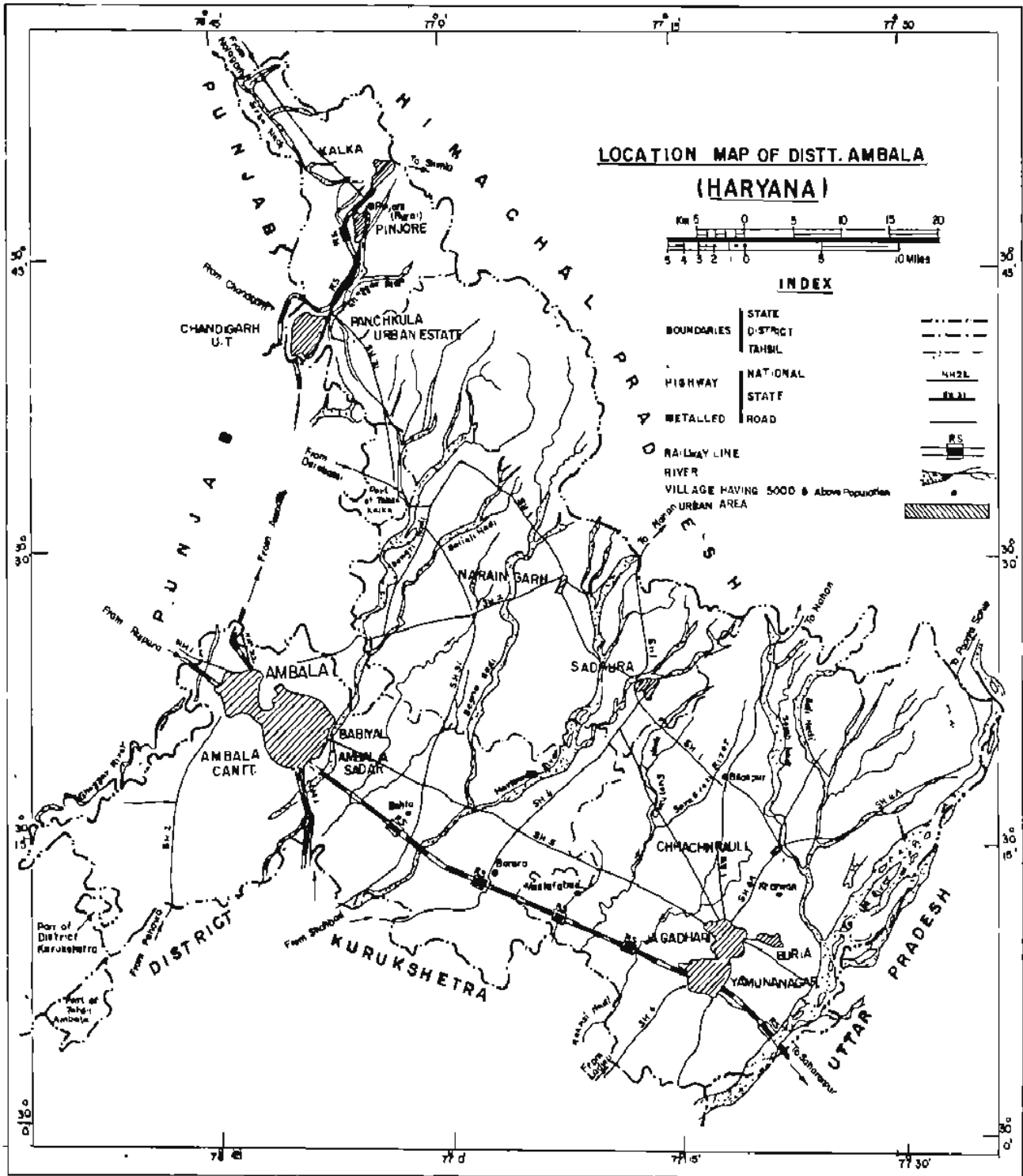
The southern part of the district is having more population density than the central part. The people of the district are hard working. Wheat, rice and maize are the main staple food. Consumption of milk in the district is higher as compared to the All India average.

Out of the total population of the district, 67% is Rural population and 33% is village population. Out of total population 44.62% are literates. The literacy percentage among the rural and urban population is 35.81% and 62.59% respectively. The literacy percentage among the Male and Female population is 53.03% and 34.47% respectively. Out of total population only 29.03% are workers, 0.58% are marginal workers while 70.39% non- workers.

## 1.10 Uses

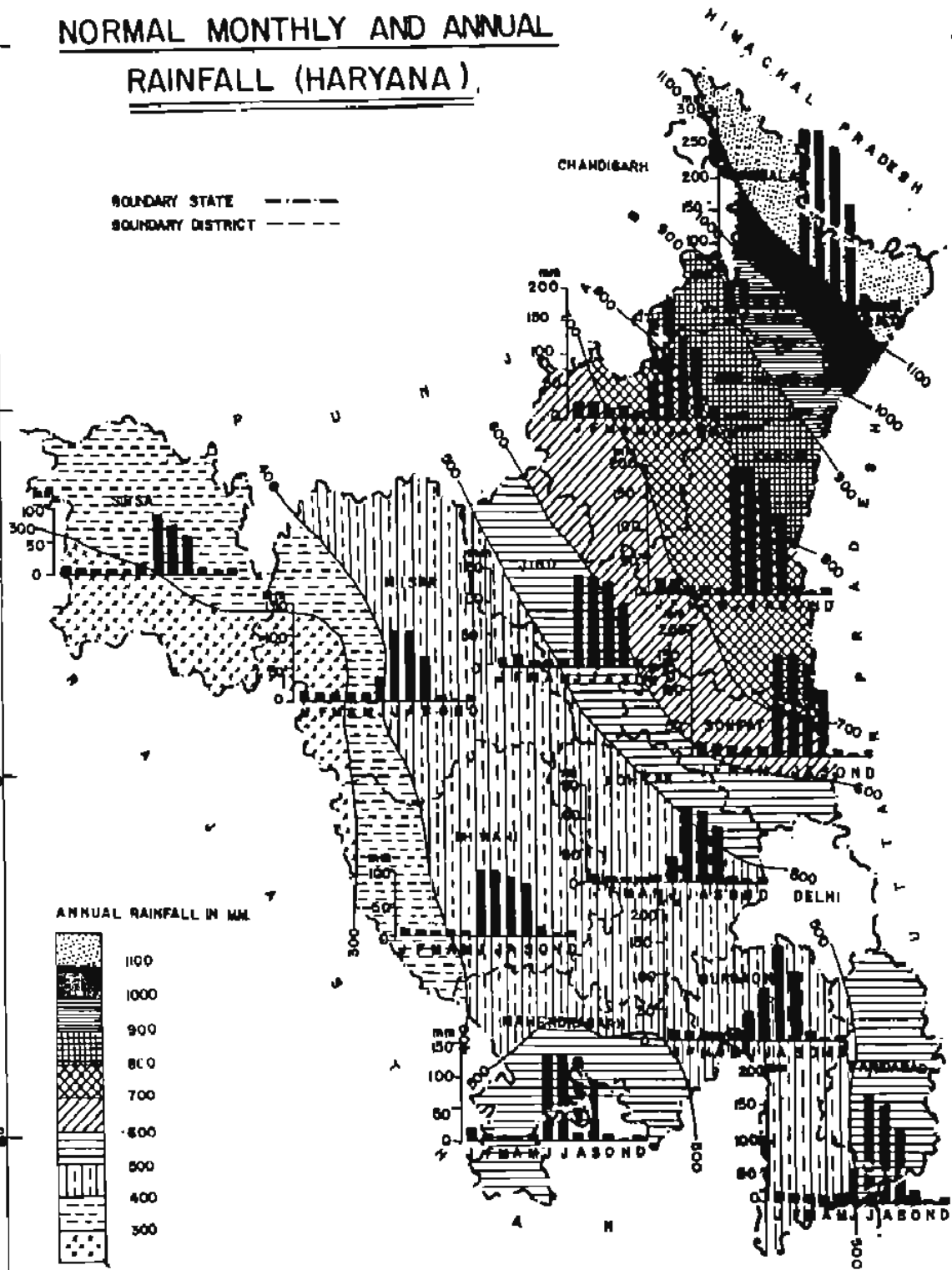
The trees provide mainly timber, fuel, fodder, fruits and shade. Timber is obtained mainly from *Dalbergia sissoo*, *Eucalyptus* spp., *Melia azedarach*, *Syzygium cumini*, *Morus alba*, *Mangifera indica*, *Azadirachta indica*, *Albizia* spp. etc. Small timber is obtained mainly from *Acacia nilotica*, *Acacia* spp., *Prosopis* spp. etc. All the above mentioned tree species provide fuel wood 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 sports 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 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 constructed from the wood of *Eucalyptus* spp. *Eucalyptus* wood is also used for making cheap furniture and also as a fuel.



# NORMAL MONTHLY AND ANNUAL RAINFALL (HARYANA)

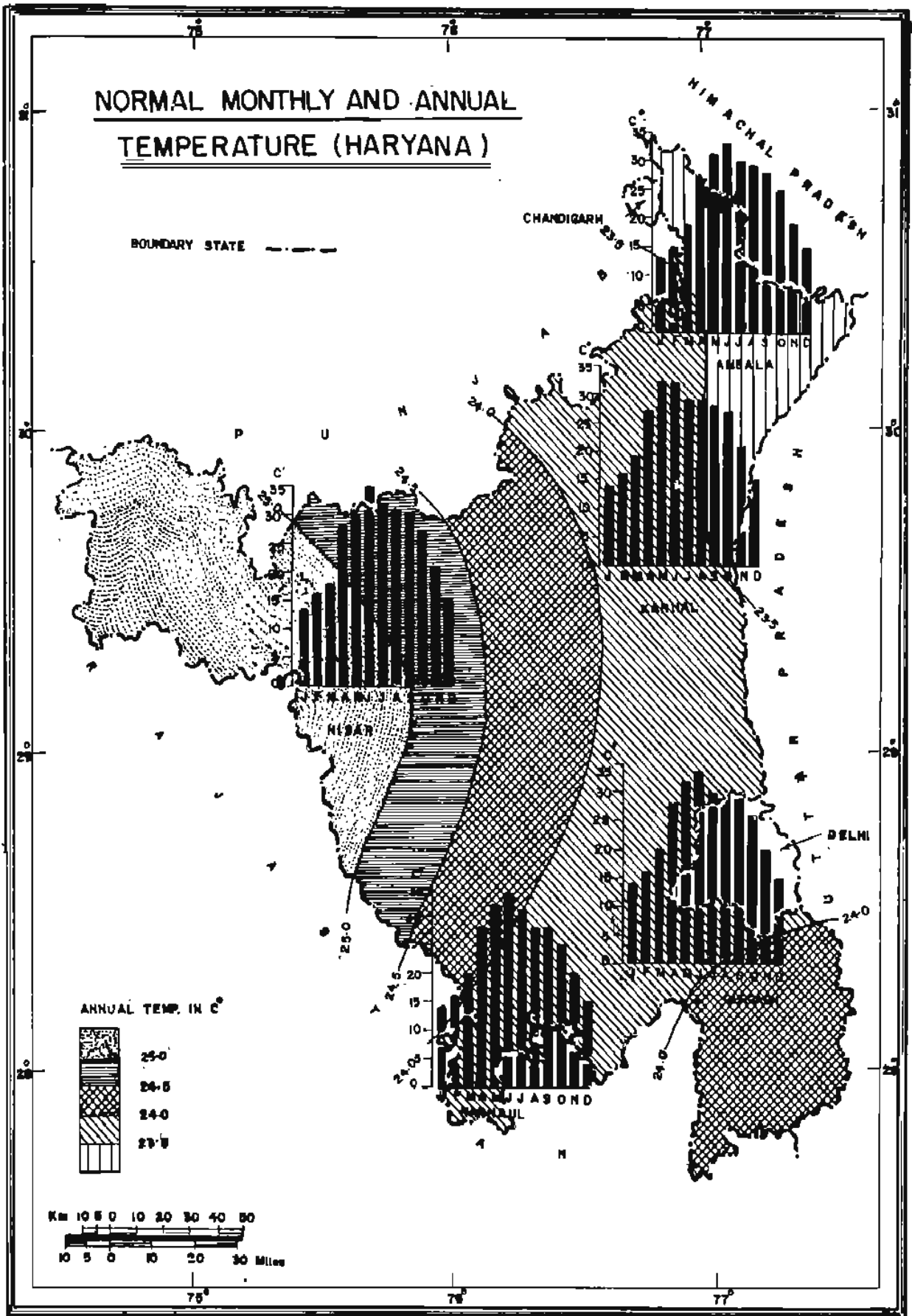
BOUNDARY STATE ———  
BOUNDARY DISTRICT - - - -



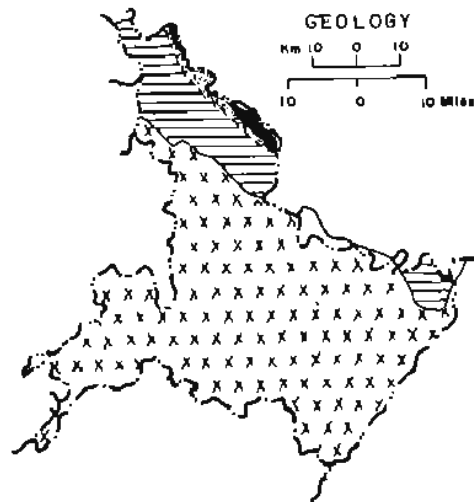
Km 10 5 0 10 20 30 40 50  
10 5 0 10 20 30 Miles

# NORMAL MONTHLY AND ANNUAL TEMPERATURE (HARYANA)

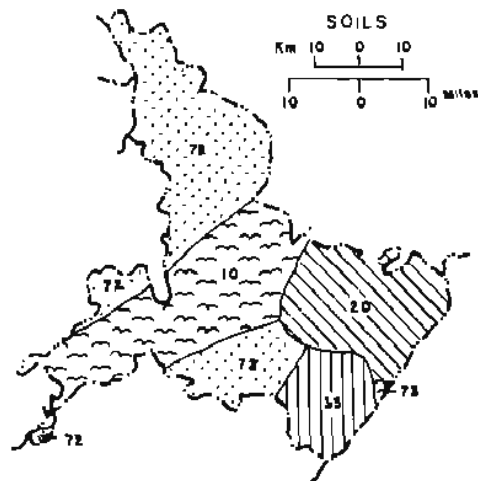
BOUNDARY STATE - - - - -



# TYPE OF SOILS AND GEOLOGY OF DISTT. AMBALA (HARYANA)



- |       |   |                   |
|-------|---|-------------------|
| x x   | Aizeriam  | RECENT            |
| — — — | Siwalik   | MIOPLISTOCENE     |
| ■     | Murrain Series (Dagshai, Kanwali And Dharmadia Beds/Sirmur Series)      | OLIGOCENE         |
| ■     | Jutogh Group / Yakkria Group / Central Gneiss (Equivalents of Balkehal) |                   |
| ■     | Faults / Thrusts  | MIDDLE PROTEOZOIC |



- |       |                          |
|-------|--------------------------|
| ~ ~ ~ | Ustalls - Fluents (10)   |
| / / / | Udette (20)              |
|       | Aqueuta - Fluents (53)   |
| . . . | Oshrepta - Orthents (72) |
| . . . | Oshrepta - Panmours (73) |

## 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 Area. 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 pursuits 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 Ambala 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  $\pm 10\%$  at 95% probability level.

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 (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

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

Where  $c.v. = \frac{s}{\bar{x}} \times 100$  and

$N$  = total no. of villages in the State.

For large  $N$ , it will be equal to

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

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 preferably 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, 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 upto 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 any 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 Ambala 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. Ten main species were selected for calculating the number of stems on the basis of their numerical occurrence, commercial importance and regional importance. The tree species which were not important for estimation of volume were not taken up for calculation of volume. 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.

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.

#### Estimation Procedure.

The estimation procedure is given below

Let

$x_i$  = area of the  $i$ th village

$y_i$  = volume/no. of trees for the  $i$ th village

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

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

$$\bar{x} = \sum_{i=1}^n x_i/n = \text{average area per village in the sample}$$

$$\bar{X} = \sum_{i=1}^N x_i/N = \text{average area per village in the population (District/State).}$$

$$\bar{y} = \sum_{i=1}^n y_i/n = \text{average volume/no. of trees in the sample}$$

$$\bar{Y} = \sum_{i=1}^N y_i/N = \text{average volume/no. of trees in the population (District/State)}$$

$A = \sum_{i=1}^N x_i$  = 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

$$\hat{R} = \frac{\sum_{i=1}^n y_i}{\sum_{i=1}^n x_i} = \frac{\bar{Y}}{\bar{x}}$$

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

$$\hat{T} = \frac{A \times \bar{Y}}{\bar{x}} = A \times \hat{R}$$

Estimated variance of R is given by

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

When N is large, then

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

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

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

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

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

Volume Table – Specieswise and Dia-classwise

S.N.	Name of Species	10-20	20-30	30-40	40 +
1.	<i>Acacia catechu</i>	0.10 <sup>cum/ha</sup>	0.21	0.51	1.13
2.	<i>Acacia nilotica</i>	0.06	0.14	0.57	1.13
3.	<i>Azadirachta indica</i>	0.06	0.14	0.57	1.13
4.	<i>Dalbergia sissoo</i>	0.06	0.14	0.57	1.13
5.	<i>Eucalyptus</i> spp.	0.10	0.41	0.95	1.71
6.	<i>Mangifera indica</i>	0.06	0.14	0.57	0.13
7.	<i>Melia azedarach</i>	0.06	0.14	0.57	1.13
8.	<i>Morus</i> spp.	0.06	0.14	0.57	1.13
9.	<i>Populus</i> spp.	0.07	0.35	0.73	1.26
10.	<i>Syzygium cumini</i>	0.06	0.14	0.57	1.13
11.	Misc. spp.	0.06	1.14	0.57	1.13

## CHAPTER 4

### Stand and Stock Tables

As per 1981 Census Ambala district has a total of 1306 villages having an area of 3738.72 Sq. Km. Out of these, 39 villages were randomly selected and surveyed (see Appendix - IV). The data collected (for trees having 10 cms. and above diameter) from these 39 villages have been statistically analysed for variability in respect of tree stock and tree volume parameters and "number of stems/hectare" and "volume/hectare". The analysis shows that the estimated number of trees/hectare is 25.17 and the corresponding volume is 4.001 Cum./hectare for entire Ambala district.

The distribution of total number of stems and stems/hectare as well as total volume and volume/ha. have been estimated and included as table nos. 1 to 6.

In the entire rural area of Ambala district 94.10 lakh trees have been estimated and the distribution thereof is discussed below:

1. The distribution of total number of estimated trees, dia- classwise and specieswise (all categories combined), is given in table No. 1. The analysis shows that the maximum number of the estimated trees occur in 10-20 cms. dia-class i.e. 72.94 lakh trees (77.51%) followed by 15.15 lakh trees (16.09%) in 20-30 cms. dia-class, 4.26 lakh trees (4.53%) in 30-40 cms. dia-class and 1.75 lakh trees (1.86%) in 40 cms. and above dia-class.

The specieswise distribution of total number of trees in the district has been estimated by ratio estimation method. It shows that in the rural area of Ambala district *Eucalyptus* spp. has the largest representation i.e. 42.79 lakh trees (45.47%) followed by *Acacia nilotica* 13.34 lakh trees (14.18%), *Populus* spp. 8.05 lakh trees (8.55%), *Dalbergia sissoo* 7.95 lakh trees (8.45%), *Mangifera indica* 5.27 lakh trees (5.59%), *Acacia catechu* 3.38 lakh trees (3.59%), *Syzygium cumini* 2.84 lakh trees (3.02%), *Morus* spp. 1.84 lakh trees (1.95%), and *Melia azedarach* 1.72 lakh trees (1.83%). 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 the representation of trees in Category-1 - Farm Forestry is the highest i.e. 44.26 lakh trees (47.03%) followed by Category-IV - Block Plantations 29.63 lakh trees (31.38%), Category-II - Roadside Plantations 10.94 lakh trees (11.62%), Category-III - Village Woodlot 7.24 lakh trees (7.70%), Category-VI - Railway Lines 1.25 Lakh trees (1.33%), Category-VII - Canals 1.99 lakh trees (5.71%) and Category-V - Ponds 0.10 lakh trees (0.11%). The representation of trees in Category-VIII - Rest is very poor.

The distribution of stems per hectare is the largest in dia-class 10-20 cms. i.e. 19.51 followed by 4.05 in 20-30 cms. dia-class, 1.14 in 30-40 cms. dia-class and 0.47 in 40 cms. and above dia-class.

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

The specieswise percentage and categorywise percentage of the estimated trees has already been mentioned in para 1 and 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:

#### Category I – Farm Forestry

As per the estimate, this category has a total number of 44.26 lakh trees (47.03%) which is the highest total of all the categories. It is mainly comprised of *Eucalyptus* spp. having 20.63 lakh trees, *Populus* spp. 4.85 lakh, *Acacia nilotica* 4.15 lakh, *Dalbergia sissoo* 3.37 lakh, *Mangifera indica* 3.23 lakh, *Melia azedarach* 1.45 lakh, *Morus* spp. 1.44

lakh, *Syzygium cumini* 1.22 lakh, *Azadirachta indica* 0.60 lakh, and *Acacia catechu* 0.20 lakh. The representations of the rest of the species are very negligible.

#### Category II – Roadside Plantation

As per the estimation there are 10.94 lakh trees in all in this category i.e. 11.62% of the total number of estimated trees. It is mainly represented by *Eucalyptus* spp. 7.21 lakh, *Acacia nilotica* 2.58 lakh and *Dalbergia sissoo* 0.62 lakh. 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 7.24 lakh (7.70%). The predominant species in this category are *Dalbergia sissoo* 1.88 lakh, *Syzygium cumini* 1.26 lakh, *Acacia nilotica* 1.18 lakh, *Morus* spp. 0.26 lakh, *Melia azedarach* 0.17 lakh and *Acacia catechu* 0.13 lakh. The remaining species have a poor representation.

#### Category IV – Block Plantations

There are 29.63 lakh trees (31.48%) in all in this category. The main species forming bulk of the crop (in decreasing order) are *Eucalyptus* spp. 13.62 lakh, *Acacia nilotica* 4.83 lakh, *Populus* spp. 3.17 lakh, *Acacia catechu* 3.05 lakh, *Dalbergia sissoo* 2.04 lakh, *Mangifera indica* 1.97 lakh, and *Syzygium cumini* 0.29 lakh. The representation of the remaining species being very poor are not mentioned here.

#### Category V – Ponds

As per the estimate, there are in all 0.10 lakh trees (0.11%) in this category. In this category all the species have a very poor representation.

#### Category VI – Railway Lines

It is estimated that this category has a total of 1.25 lakh trees (1.33%) and is mainly represented by *Eucalyptus* spp. having 1.06 lakh trees and *Acacia nilotica* having 0.17 lakh trees. The representations of the rest of the species again are very poor.

#### Category VII – Canals

It is estimated that this category in total has 0.65 lakh trees (0.69%). The main species are *Acacia nilotica* 0.40 lakh, and *Eucalyptus* spp. 0.20 lakh. The representations of the rest of the species are rather very poor.

#### Category-VIII – Rest

All the species have a very poor representation in this category.

#### Analysis of Volume (Stock)

As per the estimate the entire rural area of Ambala district has a total volume (all species and dia-classes combined) of 14.96 lakh cubic meters corresponding to estimated total of 94.10 lakh trees. The distribution of this stock is discussed below:

1. An assessment of dia-classwise and specieswise distribution of volume (all categories combined) is presented in table no.4. The table shows that the total estimated volume of trees of all species belonging to the dia-class 10-20 cms. is 6.00 lakh cubic meters (40.12%) and as such it is the highest volume of all the dia-classes. It is followed by dia-class 20-30 cms. having a total volume of 3.97 lakh cubic meters (26.55%), 30-40 cms. dia-class having 2.88 lakh cubic meters (19.25%) and 40 cms. and above dia-class having 2.11 lakh cubic meters (14.08%).

It also shows that the total volume per hectare contributed by trees of all species of all dia-classes combined is 4.001 cum. The volume per hectare for different dia-classes (in decreasing order) are as below:

10-20 cms. dia-class (1.605 cum.), 20-30 cms. dia-class (1.062 cum.), 30-40 cms. dia-class (0.770 cum.) and 40 cms. and above dia-class (0.563 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. 7.40 lakh cubic meters (49.49%), *Acacia nilotica* 1.85 lakh cubic meters (12.36%), *Dalbergia sissoo* 1.57 lakh cubic meters (10.41%), *Populus* spp. 0.99 lakh cubic meters (6.63%), *Mangifera indica* 0.88 lakh cubic meters (5.86%), *Syzygium cumini* 0.36 lakh cubic metres (2.43%), *Acacia catechu* 0.34 lakh cubic metres (2.30%), *Morus* spp. 0.24 lakh cubic metres (1.58%), *Melia azedarach* 0.17 lakh cubic metres (1.12%) and *Azadirachta indica* 0.15 lakh cubic metres (1.04%). The volume contributed by the rest of the species is very less.

2. The distribution of total estimated volume, specieswise and categorywise (all dia-classes combined), is given in table no. 5. It shows that the categorywise total volume, when all species are combined, are as below (in decreasing order):

Category-I 6.75 lakh cubic meters (45.09%), category-II 3.35 lakh cubic meters (22.38%), category-IV 3.32 lakh cubic meters (22.22%), category-III 1.03 lakh cubic meters (6.89%), category-VI 0.39 lakh cubic meters (2.26%), and category VII 0.15 lakh cubic meters (0.97%). Category-V and category-VIII have a very poor representation.

It can also be seen that the distribution of specieswise total volume, when all categories are combined, are as under (in decreasing order):

*Eucalyptus* spp. 7.40 lakh cubic meters (49.49%), *Acacia nilotica* 1.85 lakh cubic meters (12.36%), *Dalbergia sissoo* 1.57 lakh cubic meters (10.41%), *Populus* spp. 0.99 lakh cubic meters (6.63%), *Mangifera indica* 0.88 lakh cubic meters (5.86%), *Syzygium cumini* 0.36 lakh cubic metres (2.43%), *Acacia catechu* 0.34 lakh cubic meters (2.43%) *Morus* spp. 0.24 lakh cubic metres (1.58%), *Melia azedarach* 0.17 lakh cubic metres (1.12%) and *Azadirachta indica* 0.15 lakh cubic metres (1.04%).

3. The distribution of total volume (estimated), categorywise and dia-classwise (all species combined), is given in table No.6. It shows that the total volume of all the categories in the dia-class 10-20 cms. is 6.00 lakh cubic meters (40.12%) and as such is the highest among all the dia-classes. It is followed by 30-40 cms. dia-class having a total volume of 3.97 lakh cubic meters (26.55%), 30-40 cms. dia-class having 2.88 lakh cubic meters (19.25%) and 40 cms. and above dia-class having 2.16 lakh cubic meters (14.08%).

It also shows that category-I (all dia-classes combined) has the highest volume of 6.75 lakh cubic meters (45.09%), followed by category-II having 3.35 lakh cubic meters (22.38%), category-IV having 3.32 lakh cubic meters (22.22%), category-III having 1.03 lakh cubic meters (6.89%), category-VI having 0.39 lakh cubic meters (2.26%) and category-VI having 0.39 lakh cubic meters (2.26%) and category-VII having 0.15 lakh cubic meters (0.97%).



**Table No. 1**  
**Total number of stems specieswise and dia-classwise**  
**(All categories combined)**

Rural area of AMBALA DISTRICT : 3738.72 Sq.Km.

S.No.	Name of Species	10-20	20-30	30-40	40 +	Total	% age	Stems/ha.
1.	<i>Acacia catechu</i>	333340	4501	270	38	338148	3.59	0.904
2.	<i>Acacia nilotica</i>	931395	270603	103549	28427	1333974	14.18	3.568
3.	<i>Azadirachta indica</i>	44505	16771	7310	5577	74163	0.79	0.198
4.	<i>Dalbergia sissoo</i>	486469	174017	89048	45467	795001	8.45	2.126
5.	<i>Eucalyptus spp.</i>	3563457	577707	115550	21809	4278526	45.47	11.444
6.	<i>Mangifera indica</i>	374190	90199	31541	30580	526511	5.59	1.408
7.	<i>Melia azedarach</i>	135592	30156	4886	1460	172094	1.83	0.460
8.	<i>Morus spp.</i>	131320	38119	10616	3808	183864	1.95	0.492
9.	<i>Populus spp.</i>	661217	137358	5653	576	804806	8.55	2.153
10.	<i>Syzygium cumini</i>	210064	51390	16080	6539	284075	3.02	0.760
11.	Misc. spp.	422733	123781	41926	30810	619250	6.58	1.656
<b>Total</b>		<b>7294282</b>	<b>1514602</b>	<b>426429</b>	<b>175091</b>	<b>9410404</b>	<b>100</b>	<b>25.170</b>
<b>%age</b>		<b>77.51</b>	<b>16.09</b>	<b>4.53</b>	<b>1.86</b>	<b>100</b>		

**Table No. 2**  
**Total number of stems categorywise and dia-classwise**  
**(All species combined)**

Rural area of AMBALA DISTRICT : 3738.72 Sq. Km.

S.No.	Category	10-20	20-30	30-40	40 +	Total	% age
1.	I ?	3445218	729109	163056	88316	4425699	47.03
2.	II	570670	313912	161632	47583	1093797	11.62
3.	III	509091	145629	48619	20964	724303	7.70
4.	IV	2657718	255872	37197	11922	2962709	31.48
5.	V	6844	2036	1154	192	10226	0.11
6.	VI	67314	48157	6040	3268	124779	1.33
7.	VII	35157	18925	8461	2692	65235	0.69
8.	VIII	2270	962	270	154	3656	0.04
<b>Total</b>		<b>7294282</b>	<b>1514602</b>	<b>426429</b>	<b>175091</b>	<b>9410404</b>	<b>100</b>
<b>%age</b>		<b>77.51</b>	<b>16.09</b>	<b>4.53</b>	<b>1.86</b>	<b>100</b>	
<b>Stems/ha.</b>		<b>19.51</b>	<b>4.05</b>	<b>1.14</b>	<b>0.47</b>	<b>25.17</b>	

**Table No. 3**  
**Total number of stems specieswise and categorywise**  
**(All dia-classes combined)**

Rural area of AMBALA DISTRICT: 3738.72 Sq.Km.

S.No.	Name of Species	C a t e g o r i e s								Total	%age
		I	II	III	IV	V	VI	VII	VIII		
1.	<i>Acacia catechu</i>	20003	0	12693	305453	0	0	0	0	338149	3.59
2.	<i>Acacianilotica</i>	414809	258102	118319	482931	2692	17156	39927	38	1333974	14.18
3.	<i>Azadirachta indica</i>	59890	1540	8156	4231	154	38	0	154	74163	0.79
4.	<i>Dalbergia sissoo</i>	337264	62007	187980	204020	228	616	2616	270	795001	8.45
5.	<i>Eucalyptus spp.</i>	2063427	721223	1384	1361978	2614	105549	20462	1886	4278523	45.47
6.	<i>Mangifera indica</i>	322915	3692	2807	196596	38	38	0	424	526510	5.59
7.	<i>Melia azedarach</i>	144514	4194	17309	5423	0	384	0	270	172094	1.83
8.	<i>Morus spp.</i>	143515	6155	26388	6769	654	76	76	230	183863	1.95
9.	<i>Populus spp.</i>	484624	1728	1076	317338	0	0	38	0	804804	8.55
10.	<i>Syzygium cumini</i>	122054	4230	126248	28581	2884	76	0	0	284073	3.02
11.	Misc. spp.	312684	30926	221943	49389	962	846	2116	384	619250	6.58
<b>Total</b>		<b>4425699</b>	<b>1093797</b>	<b>724303</b>	<b>2962709</b>	<b>10226</b>	<b>124779</b>	<b>65235</b>	<b>3656</b>	<b>9410404</b>	<b>100</b>
<b>%age</b>		<b>47.03</b>	<b>11.62</b>	<b>7.70</b>	<b>31.48</b>	<b>0.11</b>	<b>1.33</b>	<b>0.69</b>	<b>0.04</b>	<b>100</b>	

**Table No. 4**  
**Total volume and vol./ha. specieswise and dia-classwise**  
**(All categories combined)**

Rural area of AMBALA DISTRICT : 3738.72 Sq.Km.

S.No.	Name of Species	10-20	20-30	30-40	40+	Total	%Age	Vol./ha.
1.	<i>Acacia catechu</i>	33334	945	138	43	34460	2.30	0.092
2.	<i>Acacia nilotica</i>	55885	37885	59024	32122	184916	12.36	0.495
3.	<i>Azadirachta indica</i>	2669	2348	4167	6302	15486	1.04	0.041
4.	<i>Dalbergia sissoo</i>	29189	24363	50758	51377	155687	10.41	0.416
5.	<i>Eucalyptus spp.</i>	356346	236861	109773	37293	740273	49.49	1.980
6.	<i>Mangifera indica</i>	22452	12629	17979	34555	87615	5.86	0.234
7.	<i>Melia azedarach</i>	8135	4221	2784	1650	16790	1.12	0.045
8.	<i>Morus spp.</i>	7880	5337	6052	4303	23572	1.58	0.063
9.	<i>Populus spp.</i>	46285	48076	4127	726	99214	6.63	0.265
10.	<i>Syzygium cumini</i>	12604	7194	9166	7389	36353	2.43	0.097
11.	Misc. spp.	25363	17328	23897	34815	101403	6.78	0.271
	<b>Total</b>	<b>600142</b>	<b>397187</b>	<b>287865</b>	<b>210575</b>	<b>1495769</b>	<b>100</b>	<b>4.001</b>
	<b>% age</b>	<b>40.12</b>	<b>26.55</b>	<b>19.25</b>	<b>14.08</b>	<b>100</b>		
	<b>Vol./ha.</b>	<b>1.605</b>	<b>1.062</b>	<b>0.770</b>	<b>0.563</b>	<b>4.001</b>		

**Table No. 5**  
**Distribution of total volume (Cum.) - specieswise and categorywise**  
**(All dia-classes combined)**

Rural area of AMBALA DISTRICT: 3738.72 Sq. Km.										
C a t e g o r i e s										
S.No. Name of Species	I	II	III	IV	V	VI	VII	VIII	Total	%age
1. <i>Acacia catechu</i>	2186	0	1428	30846	0	0	0	0	34460	2.30
2. <i>Acacia nilotica</i>	55140	62942	17942	35771	386	3587	9146	2	184916	12.36
3. <i>Azadirachta indica</i>	13080	458	1452	476	9	2	0	9	15486	1.04
4. <i>Dalbergia sissoo</i>	67530	29386	30041	26891	59	507	1244	29	155687	10.41
5. <i>Eucalyptus</i>	309900	230238	242	166038	285	29156	3618	796	740273	49.49
6. <i>Mangifera indica</i>	63057	1533	549	22431	2	5	0	38	87615	5.86
7. <i>Melia azedarach</i>	14270	453	1492	433	0	126	0	16	16790	1.12
8. <i>Morus</i> spp.	18111	861	3752	707	55	48	24	14	23572	1.58
9. <i>Populus</i> spp.	57589	956	186	40480	0	0	3	0	99214	6.63
10. <i>Syzygium cumini</i>	19831	929	11521	3581	467	24	0	0	36353	2.43
11. Misc.spp.	3823	7054	34429	4688	430	419	494	66	101403	6.78
<b>Total</b>	<b>674517</b>	<b>334810</b>	<b>103034</b>	<b>332342</b>	<b>1693</b>	<b>33874</b>	<b>14529</b>	<b>970</b>	<b>1495769</b>	<b>100</b>
<b>%age</b>	<b>45.09</b>	<b>22.38</b>	<b>6.89</b>	<b>22.22</b>	<b>0.11</b>	<b>2.26</b>	<b>0.97</b>	<b>0.06</b>	<b>100</b>	

**Table No. 6.**  
**Distribution of total volume (Cum.) - Categorywise and dia-classwise**  
**(All species combined)**

Rural area of AMBALA DISTRICT : 3738.72 Sq. Km.

S.No.	Category	10-20	20-30	30-40	40 +	Total	%age
1.	I	282475	189752	101051	101239	674517	45.09
2.	II	51434	95323	124414	63639	334810	22.38
3.	III	31075	20544	27721	23694	103034	6.89
4.	IV	225356	69025	24110	13851	332342	22.22
5.	V	513	305	658	217	1693	0.11
6.	VI	6373	18113	4758	4630	33874	2.26
7.	VII	2746	3823	4896	3064	14529	0.97
8.	VIII	170	302	257	241	970	0.06
<b>Total</b>		<b>600142</b>	<b>397187</b>	<b>287865</b>	<b>210575</b>	<b>1495769</b>	<b>100</b>
<b>% age</b>		<b>40.12</b>	<b>26.55</b>	<b>19.25</b>	<b>14.08</b>	<b>100</b>	

**Appendix - I****List of the villages selected for Pilot Survey In Haryana State.**

<b>S.No.</b>	<b>Name of the village</b>	<b>Area (Ha)</b>
1.	Golapur	123.00
2.	Dhaurala	511.11
3.	Mohammedpur	1731.00
4.	Bhatoo	83.00
5.	Dobhi	2896.00
6.	Khandakheri	2324.00
7.	Baidwala	1416.38
8.	Kuranganwali	1479.00
9.	Siwara	1126.00
10.	B. Busna	248.00
11.	Lalheri	267.09
12.	B. Tauru	184.94
13.	Haliaki	480.00
14.	Nathusari	1741.00
15.	Bondkalan	2353.00
16.	Gorakhpur	4370.00
17.	Baghana	1479.51
18.	K.Lakasingh	140.00
19.	Shohdapur	316.05
20.	Nandgaon	825.14
21.	Gurauthi	1720.00
22.	Kharkhara	979.00
23.	Mammon Majra	199.51
24.	Sulhera	572.00
25.	Bhandari	677.00
26.	Saundhad	2753.00
27.	Dachaur	2728.00
28.	Dighal	2211.00
29.	Kahnaur	2762.00
30.	Shampura	1017.00
31.	Phadani	208.00
	<b>Total</b>	<b>40420.73</b>

**Appendix – II**  
**Districtwise number of the villages selected**  
**for Inventory Survey in Haryana State.**

<b>S.No.</b>	<b>Name of the District</b>	<b>Total No. of villages in the District</b>	<b>No. of villages selected for survey</b>
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.	Sonapat	348	11
	<b>Total</b>	<b>7073</b>	<b>241</b>



Appendix - III

List of species found in Sample villages in Ambala District.

S.No.	Botanical name	Common name
1.	2.	3.
1.	<i>Acacia catechu</i>	Khair
2.	<i>Acacia lenticularis</i>	Safed babul, Amiar, Kanti
3.	<i>Acacia nilotica</i>	Babul, Kikar, Bawar, Bawal
4.	<i>Acacia</i> spp.	
5.	<i>Aegle marmelos</i>	Bel, Belpara, Bil, Billi
6.	<i>Ailanthus excelsa</i>	Maharukh, Arru, Ardusa, Butazod, Dhella, Mahalimla
7.	<i>Albizia lebbek</i>	Kala siris, Kalbage, Koko, Siris, Bhandar, Sarsaoda
8.	<i>Albizia procera</i>	Safed siris/siras, Karha, Karhar, Karhai
9.	<i>Albizia</i> spp.	Hiharu, Morai, Mog, Sundi, Kunis
10.	<i>Anogeissus latifolia</i>	Bakli, Bankli
11.	<i>Anthocephalus chinensis</i>	Kadamb, Kadam, Kodavara, Attutek, Vellaikadamby
12.	<i>Azadirachta indica</i>	Neem, Nimbo, Nibbaro, Vepa
13.	<i>Bauhinia</i> spp.	Kachnar, Papri, Jhingora
14.	<i>Bombax ceiba</i>	Semal, Savar, Semer, Shimola
15.	<i>Bridelia squamosa</i>	Ekdania, Gondni, gaya, Khaja.
16.	<i>Butea monosperma</i>	Palas, Dhak, Palasin, Kakhar
17.	<i>Canarium</i> spp.	
18.	<i>Cassia fistula</i>	Amaltas, Bahra, Bhawa, Sonari
19.	<i>Cordia</i> spp.	Lassora, Bairula, Borala
20.	<i>Dalbergia sissoo</i>	Sisoo, Shisham, Tahli
21.	<i>Diospiros variegata</i>	
22.	<i>Emblica officinalis</i>	Amla, Aonla, Amlaki, Nellimara
23.	<i>Eucalyptus</i> spp.	Nilgiri, Safeda
24.	<i>Ficus elastica</i>	
25.	<i>Ficus religiosa</i>	Pipal, Pipli, Papada, Pripari
26.	<i>Ficus</i> spp.	Anjar, Akhar, Budita
27.	<i>Flacourtia indica</i>	Kakai, Kangu
28.	<i>Grevillea robusta</i>	Silver oak
29.	<i>Grewia oppositifolia</i>	Biul, Biur, Bewal, Behel, Bhimal

S.No.	Botanical name	Common name
1.	2.	3.
30.	<i>Grewia</i> spp.	Diamiul, Gharbhimti, Pharasai
31.	<i>Lagerstroemia parviflora</i>	Dhaura, Dhauri, Adhuari
32.	<i>Lannea coromandelica</i>	Jhinghan, Jinghini
33.	<i>Mangifera indica</i>	Am, Amb, Ambo, Mavu, Moru
34.	<i>Melia azedarach</i>	Bijain, Baknia, Betain, Bakain
35.	<i>Mitragyna parvifolia</i>	Phaldu, Mundi, Kaiz, Battaganum
36.	<i>Moringa</i> spp.	Sajna, Sohjna, Sanjna, Saijna
37.	<i>Morus</i> spp.	Tut, Kimu, Shabtoot
38.	<i>Phoenix sylvestris</i>	Khajur, Betha
39.	<i>Populus</i> spp.	Banpipal, Godhpipal, Pahari Pipai
40.	<i>Prosopis</i> spp.	
41.	<i>Prunus</i> spp.	Aru, Aria, Gont, Khurmani
42.	<i>Salix</i> spp.	
43.	<i>Syzygium cumini</i>	Jamun, Jamoon, Jamak
44.	<i>Syzygium</i> spp.	
45.	<i>Tamarindus indica</i>	Imli, Amlı, Ambli, Chinch
46.	<i>Terminalia alata</i>	Asaina, Sain
47.	<i>Terminalia bellerica</i>	Bahera
48.	<i>Toona ciliata</i>	Toon, Tun
49.	<i>Zizyphus mauritiana</i>	Ber, Beri
50.	<i>Zizyphus</i> spp.	

**Appendix - IV**

**List of the villages surveyed in Ambala District**

<b>S.V. No.</b>	<b>Name of the village</b>	<b>Name of Tehsil</b>	<b>Area (ha)</b>	<b>Map No.</b>	<b>Sheet</b>
1.	Kona	Kalka	266.28	53	B/13
2.	Ratpur	Kalka	130.00	53	B/13
3.	Gobindpur	Naraingarh	156.21	53	B/15
4.	Chhajal Majra	Naraingarh	77.00	53	F/3
5.	Raju Majra	Naraingarh	63.00	53	F/3
6.	Asgarpur	Naraingarh	228.00	53	F/3
7.	Golapur	Naraingarh	123.00	53	F/7
8.	Berkheri	Naraingarh	255.00	53	F/3
9.	Devi Nagar	Ambala	169.00	53	B/11
10.	Khatoli	Ambala	271.00	53	B/15
11.	Dhankaur	Ambala	175.00	53	B/15
12.	Nanhera	Ambala	115.00	53	B/15
13.	Munheri	Ambala	219.00	53	B/15
14.	Durala	Ambala	511.11	53	B/15
15.	Chandiala	Ambala	369.00	53	B/15
16.	Dhanipur	Ambala	313.22	53	B/12
17.	Deodhar	Jagadhri	887.00	53	F/8
18.	Rampur Khadir	Jagadhri	503.00	53	F/8
19.	Patagarh	Jagadhri	79.72	53	F/4
20.	Chhota Khera	Jagadhri	98.00	53	F/4
21.	Tasraula	Naraingarh	102.00	53	B/15
23.	Haripur	Kalka	127.00	53	B/14
24.	T. Harisingh	Kalka	28.00	53	B/13
25.	Kalyanpur Attari	Naraingarh	276.40	53	F/7
26.	Chakma Jumu Dat	Naraingarh	12.95	— 53	F/3
29.	Kansapur	Jagadhri	242.00	53	F/8
30.	Paplotha	Ambala	429.37	53	F/3
31.	Fatehpur	Kalka	91.00	53	B/14

S.V. No.	Name of the village	Name of Tehsil	Area (ha)	Map No.	Sheet No.
32.	Mankan	Naraingarh	178.00	53	B/14
36.	Babiyal	Ambala	322.00	53	B/15
37.	Jandheri	Ambala	546.32	53	B/12
38.	Pumuwala	Naraingarh	340.00	53	F/7-
44.	Aludin Majra	Ambala	160.25	53	B/12
45.	Raipur	Jagadhari	168.00	53	B/8
51.	Chhaur	Jagadhari	260.00	53	F/7
54.	Main Majra	Ambala	89.84	53	B/12
55.	Kurawala	Jagadhari	108.00	53	F/7
59.	Katgarh	Jagadhari	637.00	53	F/7
60.	Alapur	Ambala	167.00	53	B/15

## 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**

# 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 DISTRICT	TOTAL AREA OF THE VILLAGES IN THE DISTRICT. (Km <sup>2</sup> )	SAMPLE VILLAGE	Geographical AREA OF THE SAMPLE VILLAGE (Hact)	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 FORESTRY	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

DATE ..... 199 .....

Page No. ....

Sign of Crew Leader .....

Total No. of Pages .....

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 Village
6. Area of the Village
7. Crew Leader (Name)
8. Date of commence 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
- 16. B.T. and other measurements taken by
- 17. Quadrant-wise summary of enumeration

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 संख्या Card Design		राज्य State		ज़िला District		प्रतिरक्षित गाँव Sample Vill.		भूगोलिक क्षेत्र Geographical Area of Sample Village (Hact.)		प्रतिरक्षित गाँव का भौगोलिक क्षेत्र संकेत		कुल वृक्ष संख्या Total No. of Trees																			
1-3		4-6		7-8		9-10		11-15		16-19				42-47																			
शीशी/जाति SPECIES नाम Name		कोड Code		DBH OB (CM)		वृक्ष ऊँचाई Tree Height (Mt.)		(शुद्ध) वृक्ष Clear Bole (Mt.)		शीशी/जाति SPECIES नाम Name		कोड Code		DBH OB (CM)		वृक्ष ऊँचाई Tree Height (Mt.)		(शुद्ध) वृक्ष Clear Bole (Mt.)		शीशी/जाति SPECIES नाम Name		कोड Code		DBH OB (CM)		वृक्ष ऊँचाई Tree Height (Mt.)		(शुद्ध) वृक्ष Clear Bole (Mt.)		शीशी/जाति SPECIES नाम Name			
		20-22		23-25		26-27		28-29		30		31-33		34-36		37-38		39-40		41													

दिनांक . . . . . 19 . . . . . वर्ष १  
 DATE . . . . . 19 . . . . . Sign of Crew Leader  
 कुल पृष्ठ सं . . . . . नाम वरत गाँवक  
 Total No. of Pages . . . . . Name of Crew Leader