RESULTS AND DISCUSSION

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GENERAL PATTERN OF FOREST VEGETATION

The forests of Chhota-udepur forest division fall under the category of dry deciduous forests **PLATE 1**. In general, the vegetation is of dry deciduous type but at many places like Ghantoli-Songir of Naswadi range, some members of scrub forest type are also met with. The vegetation of the area is divided under the following heads.

- Vegetation of deciduous forests.
- Vegetation along roadsides and railway lines.
- Vegetation of ponds and ditches.
- Vegetation of riverbeds and riverbanks.

VEGETATION PATTERN – A GENERAL VIEW

The vegetation of the area can be divided into two distinct regions separated by river Orsang. In the Northern region, major area is plain and is under cultivation. Biotic factors are also quiet dominant here. Forests are restricted to the northern most parts adjoining the Baria forest division (District Panchmahals). The important forests here are those of Kevdi, Dolariya, Mithibor, Sigla, Dhola-dungar, Kaladungar, Tundva, jetpur-pavi etc **PLATE 2 and 3**. Biotic interferences are comparatively less here. All the forests are of Tropical dry deciduous type with Tectona grandis L. f., as the most dominant species. Other tree species available are Terminalia crenulata Roth., Butea monosperma (Lamk.) Taub., Wrightia tinctoria R. Br., Morinda pubescens Sm., Buchanania lanzan Spr., Holarrhena pubescens R. Br., Alangium salvifolium (L. f.) Wang., Madhuca indica Muell.-Arg., and Anogeissus latifolia Guill. The order of dominance of these species is different in various forest areas. The middle storey of these forests consists of Helicteres isora Linn., Woodfordia fruticosa (Linn.) Retz., Diospyros melanoxylon Roxb., etc. In addition to this permanent aspect of vegetation, a temporary herb layer mainly consisting of Impatiens balsamina Linn., Curculigo orchioides Gaertn., Chlorophytum tuberosum Baker., Leea macrophylla Roxb., Curcuma inodora Blatter., Cleome gynandra Linn., Cassia tora Linn., Cassia occidentalis Linn., and Cassia absus Linn., is noted during monsoon and post-monsoon periods. At times the common roadside weeds such as Cassia tora Linn., Xanthium strumarium Linn., Parthenium hysterophorus Linn., etc are noted as undergrowth of these

PLATE 1

Dry deciduous forests with Acacia chundra Willd., and Diospyros melanoxylon Roxb. Rangpur range.

Dry deciduous forests: Kevdi round- Range Chhota-udepur.

Dry deciduous forests in March & April with Acacia nilotica Del. and Tectona grandis Linn. Pavi-jetpur range.

forests especially on the fringes and near foot tracks in the forests. In open grassy places Cyperus spp, Indigofera cordifolia Linn., etc were usually noted. The common climbers are Tinospora cordifolia Miers., Ventilago denticulata Willd., Combretum ovalifolium Roxb., Dioscorea bulbifera Linn., and occasionally Gloriosa superba Linn.

The entire area has been brought under cultivation thereby facilitating entry of a number of weeds. The common agricultural weeds met within the area are Vernonia cinerea (Linn.) Less., Ocimum canum Sims., Acalypha ciliata Forsk., Euphorbia hirta Linn., Digera muricata (Linn.) Mart., Commelina benghalensis Linn., etc.

The vegetation along the banks of river Orsang is very much affected by biotic factors. On the elevated banks Ailanthus excelsa Roxb., Pongamia pinnata (Linn.) Pierre., Butea monosperma (Lamk.) Taub., and Acacia nilotica Linn., ssp. indica (Bth.) Brenan., were observed with stunted growth. Argemone mexicana Linn., Solanum xanthocarpum Linn., Xanthium strumarium Linn., etc., occupy or almost monopolize the sloping banks. On the wet banks, along with pure stands of Tamarix ericoides Rottl., or Vitex negundo Linn., typical plants like Bacopa monnieri (Linn.) Pennell., and Phyla nodiflora (Linn.) Greene., are usually found.

PLATE 2

View of mixed deciduous forests. Range Chhota-udepur of Chhota-udepur forests division.

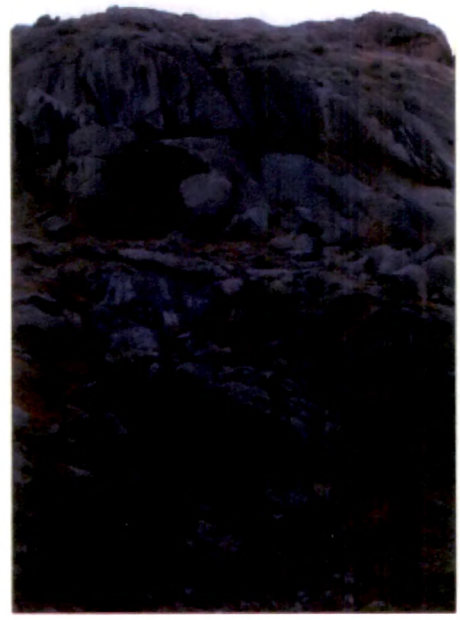
Mixed deciduous forests. Range Dolariya of Chhota-udepur forests division.

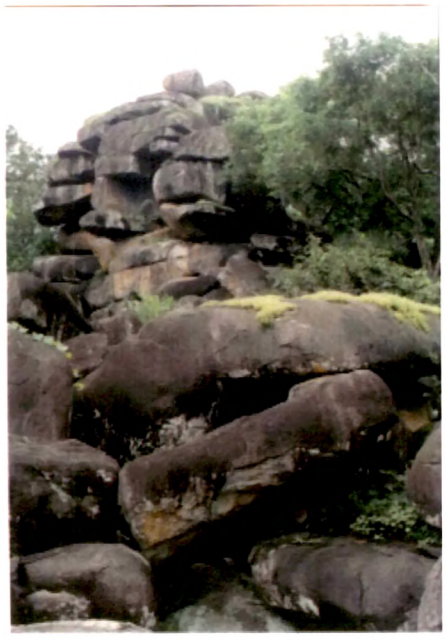
Forests immediately after rains. Round Kevdi of range Chhota-udepur.

PLATE 3

View of forests around Vagasthal hills. Chhota-udepur range of Chhota-udepur forests division.

Rock hills in Pavi-jetpur range: Chhota-udepur forests division supporting xerophytic Euphorbia scrub.





Geomorphology of forests at Mithibor. Range Dolariya: Chhota-udepur forests division.

VEGETATION OF FORESTS- IN DETAIL

For the sake of convenience the forest flora is divided into trees, shrub and herbs or undershrubs.

Trees:

COMMON- trees met with are Acacia leucophloea (Roxb.) Willd., Acacia nilotica (L.) Del subsp. indica (Bth.) Brenan., Azadirachta indica Juss., Butea monosperma (Lamk.) Taub., Dolichandrone falcata Seem., Prosopis cineraria Linn. and Zizyphus xylopyra (Retz.) Willd.

OCCASIONAL- trees observed are Ailanthus excelsa Roxb., Capparis grandis L. f., Madhuca indica Muell.-Arg. and Tectona grandis L. f.

RARE- species found are Ficus benghalensis Linn., Holoptelea integrifolia (Roxb.). Planch., Lagerstroemia lanceolata Wt. and Am., Phyllanthus emblica Linn., Santalum album Linn. and Salvadora persica Linn.

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Shrubs:

COMMON- shrubs met with are Alangium salvifolium (L. f.) Wang., Calotropis procera (Ait.) R. Br., Capparis decidua (Forsk.) Edgew., Cassia auriculata Linn., Maytenus emarginatus (Willd.) Dinghou and Zizyphus glabrata Heyne ex. Roth.

OCCASIONAL- shrubs found growing are Balanites aegyptiaca Planch., and Flacourtia indica (Burm. f.) Merill.

RARE- species found are Mimosa hamata Willd., Salvadora oleoides Decne., Vitex negundo Linn.

Herbs and Undershrubs:

COMMON (OFTEN IN PATCHES)- are Cassia tora Linn., Tephrosia purpurea (L.) Pers., Triumfetta rotundifolia Lam., and Xanthium strumarium Linn.

OCCASIONAL- species found are Echinops echinatus Roxb., Indigofera trita Linn., and Catunaregum spinosa (Thunb.) Tiruv.

RARE- species met with are Barleria prionitis Linn., Corchorus olitorius Linn., Corchorus capsularis Linn., Lepidagathis trinervis Nees., and Solanum surratense Burm. f.

Generally the forests stratification is divided into three categories as given below.

Top Layer- Tree species more than 8 m tall.

Middle Layer- Small trees and shrubs between 3-7 m tall.

Forest undergrowth- Herbs and undershrubs less than 2 m tall.

TOP LAYER

COMMON- trees met with are Acacia chundra Willd., Haldinia cordifolia (Roxb.) Rids., Anogeissus latifolia Guill., Borassus flabellifer Linn., Butea monosperma (Lamk.) Taub., Dalbergia latifolia Roxb., Garuga pinnata Roxb., Mitragyna parviflora (Roxb.) Korth., Morinda pubescens Sm., Tectona grandis L. f., Terminalia arjuna (Roxb. ex DC) Wt. and Arn., Terminalia crenulata Roth., and Wrightia tinctoria (Roxb.) R. Br.

OCCASIONAL- trees observed are Acacia leucophloea (Roxb.) Willd., Aegle marmelos Linn., Albizzia odoratissima (L.) Willd., Albizia procera (Roxb.) Benth., Bauhinia purpurea Linn., Bombax ceiba Linn., Boswellia serrata Colebr., Bridelia retusa (L.) Spreng., Bridelia squamosa (Lam.) Gaertn., Buchanania lanzan Spr., Cassia fistula Linn., Cassine glauca (Rottb.) Kuntze., Dalbergia paniculata Roxb., Diospyros melanoxylon Roxb., Dolichandrone falcata Seem., Phyllanthus emblica Linn., Ficus racemosa Linn., Holoptelea integrifolia (Roxb.) Planch., Lagerstroemia lanceolata Wt. and Arn., Lagerstroemia parviflora Roxb., Lannea coromandelica (Houtt.) Merr., Madhuca indica Muell.-Arg., Pongamia pinnata (L.) Pierre., Syzygium cumini (L.) Merr. and Perry.

RARE- species found are Acacia ferruginea DC., Acacia nilotica (L.) Del subsp. indica (Bth.) Brenan., Ailanthus indica Roxb., Albizia lebbeck (L.) Willd.,

Azadirachta indica Juss., Cordia domestica Roth., Crateava magna (Lour.) DC., Dalbergia lanceolaria L. f., Dalbergia sissoo Roxb., Dillenia pentagyna Roxb., Ehretia leavis Roxb., Ficus amplissima Linn., Gmelina arborea Roxb., Grewia tiliaefolia Vahl., Gauzuma ulmifolia Lamk., Hardwickia binata Roxb., Hymenodictyon excelsum (Roxb.) Wall., Kydia calycina Roxb., Miliusa tomentosa (Roxb.) Sinclair., Moringa concanensis Nimmo ex. Dalz. and Gibs., Ougeinia oojeinensis (Roxb.) Hochr., Oroxylum indicum (Linn.) Vent., Pterocarpus marsupium Roxb., Radermachera xylocarpa Decne., Sterculia urens Roxb., Tamarindus indica Linn., Terminalia bellirica (Gaertn.) Roxb., Terminalia chebula (Gaertn.) Retz., and Thespesia populnea (L.) Sol. ex Correa.

MIDDLE LAYER

COMMON- plants in this layer are Bauhinia racemosa Lamk., Carvia callosa (Nees.) Bremek., Ficus hispida Linn., Helicteres isora Linn., Holarrhena pubescens Wall., Maytenus emarginatus (Willd.) Dinghou, Wrightia tinctoria (Roxb.) R. Br., Catunaregum spinosa (Thunb.) Tiruv., Catunaergum uliginosa / Xeromphis uliginosa (Retz.) Mahesh., Zizyphus xylopyra (Retz.) Willd.

OCCASIONAL- plants are Alangium salvifolium (L. f.) Wang., Annona squamosa Linn., Nyctanthes arbor-tristis Linn., Woodfordia fruticosa (Linn.) Retz., Wrightia tomentosa R. and G.

RARE- species found are Eriolaena hookeriana Wt. and Arn., Ficus asperrima Roxb., Flacourtia indica (Burm. f.) Merill., Gardenia resinifera Roth., Mallotus philippensis (Koen.) MacBr., Santalum album Linn., Sapindus laurifolius Vahl., Spermadictyon suaveolens Roxb., Zizyphus glabrata Heyne ex. Roth., Zizyphus mauritiana Lamk.

FORESTS UNDERGROWTH

COMMON- plants met with are Anisomeles indica (Linn.) O. Kuntze., Blumea eriantha DC., Blumea membranacea (Wall.) DC., Borerria articularis (Linn. f.) F. N. Will., Cassia tora Linn., Cassia occidentalis Linn., Curculigo orchioides Gaertn., Dioscorea bulbifera Linn., Enicostemma hyssopifolium (Willd.) Verd., Eranthemum roseum (Vahl.) R. Br., Hemidesmus indicus (Linn.) R. Br., Justicia simplex D. Don., Leea spp., Neuracanthus sphaerostachyus (Nees.) Dalz., Rungia pectinata (Linn.) Nees., Vicoa indica (Willd.) DC.

OCCASIONAL- species found growing are Baliospermum montanum (Willd.) Muell., Barleria prattensis Santapau., Clitoria biflora Dalz., Curcuma inodora Blatter., Sida acuta Burm. f., Sida retusa Linn., Tacca leontopetaloides (Linn.) O. Kuntze.

RARE- plants found are Asparagus racemosus Willd. var. javanicus Baker., Costus speciosus (Koenig.) Smith., Corchorus capsularis Linn., Crotalaria retusa Linn., Euphorbia hirta Linn., Hibiscus lobatus (Murr.) O. Kuntze., Indigofera cordifolia Heyne ex. Roth., Indigofera trita Linn., Leucas urticaefolia R. Br., Leucas aspera Willd., Pavonia zeylanica Cav., Peristrophe bicalyculata (Retz.) Nees.

CLIMBERS IN THE FORESTS

COMMON- climbers met with are Cardiospermum halicacabum Linn., Combretum ovalifolium Roxb., Dioscorea bulbifera Linn., Dioscorea pentaphylla Linn.

OCCASIONAL- climbers found are Acacia pennata (Linn.) Willd., Argyeia nervosa (Burm. f.) Boj., Argyeia strigosa (Roth.) Roberty., Celastrus paniculata Willd.

RARE- climbers are Carissa congesta Wt., Cryptolepis buchanani Roem and Schult., Dregea volubilis (L. f.) Benth., Marsdenia tenacissima (Roxb.) Moon., Pueraria tuberosa DC., Ventilago denticulata Willd.

VEGETATION ALONG ROADSIDES AND RAILWAY LINES

The vegetation along roadsides and railway lines is very poorly represented by few trees and shrubs as listed below.

Acacia chundra Willd., Ailanthus excelsa Roxb., Azadirachta indica Juss., Cassia auriculata Linn., Calotropis gigantea (L.) R. Br., Calotropis procera (Ait.) R. Br., Diospyros melanoxylon Roxb., Ficus benghalensis Linn., Ficus racemosa Linn., Indigofera tinctoria Linn., Madhuca indica Muell.-Arg., Mangifera indica Linn., Mitragyna parviflora (Roxb.) Korth., Parkinsonia aculeata Linn., Pithecellobium dulce (Roxb.) Benth., and Prosopis cineraria Linn.

Along roadsides a number of herbs such as, Acanthospermum hispidum DC., Argemone mexicana Linn., Anisomeles indica (Linn.) O. Kuntze., Martynia annua Linn., and Xanthium strumarium Linn., are found growing gregariously during postmonsoon period. Some of the weeds that are usually found growing along railway line and roadsides are listed below.

COMMON- plants observed are Acanthospermum hispidum DC., Aerva lanata (Linn.) Juss., Alysicarpus longifolius Wight and Arn., Amaranthus spinosus Linn.,

Amaranthus viridis Linn., Anisomeles indica (Linn.) O. Kuntze., Argemone mexicana Linn., Bergia odorata Edgew., Blumea eriantha DC., Boerhavia diffusa Linn., Cassia occidentalis Linn., Cleome gynandra Linn., Cleome viscosa Linn., Corchorus olitorius Linn., Jatropha gossypifolia Linn., Launaea procumbens (Roxb.) Ramayya and Rajgopal., Physalis minima Linn., Sesamum indicum Linn., Sida alba Linn., Triumfetta rotundifolia Lam., Verbascum chinensis (Linn.) Santapau., Vernonia cinerea (Linn.) Less.

OCCASIONAL- species found are Amaranthus tricolor Linn., Blumea lacera (Burm. f.) DC., Indigofera linifolia Linn., Indigofera trita Linn., Martynia annua Linn., Phyllantus fraternus Webst., Portulaca oleracea Linn., Ruellia tuberosa Linn., Sida acuta Burm. f., Solanum nigrum Linn., Solanum surattense Burm. f., Tephrosia villosa (L.) Pers., Urena lobata Linn.

RARE- species met with are Abelmoschus esculentus (Linn.) Moench., Abelmoshcus manihot (Linn.) Medic., Alysicarpus pubescens Linn., Anethum graveolens Linn., Anisomeles heyneanus Bth., Arachis hypogea Linn., Biophytum sensitivum (Linn.) DC., Brassica juncea (Linn.) Czem and Coss., Cassia tora Linn., Crotalaria retusa Linn., Echinops echinatus Roxb., Medicago sativa Linn., Mimosa hamata Willd., Raphnus sativus Linn., Solanum indicum Linn., Trianthema portulacastrum Linn., Tribulus terrestris Linn., Trigonella foenum-graceum Linn., Withania somnifera (Linn.) Dunal.

VEGETATION OF HEDGES ALONG ROADSIDES AND CULTIVATED FIELDS

The plant species listed below are cultivated as hedges by the locals of Chhota-udepur forest division.

Agave cantula Roxb., Euphorbia ligularia Roxb., Euphorbia tirucalli Linn., Jatropha curcas Linn., Lawsonia inermis Linn., dry twigs of Capparis grandis L. f., Zizyphus mauritiana Lamk.

The following plants by the virtue of their habit also form natural hedges at few places:

Barleria prionitis Linn., Caesalpinia crista Linn., Capparis decidua (Forsk.) Edgew., Maytenus emarginatus (Willd.) Dinghou., Parkinsonia aculeata Linn., Peristrophe bicalyculata (Retz.) Nees.

During the explorations few plants are found growing among the agricultural and roadsides hedges. They are as follows.

TREES- Ailanthus excelsa Roxb., Albizzia lebbeck (Linn.) Willd., Boswellia serrata Colebr., Butea monosperma (Lamk.) Taub.

SHRUBS- Alangium salvifolium (L. f.) Wang., Annona squamosa Linn., Balanites aegyptiaca Roxb., Clerodendrum multiflorum Baker., Ficus hispida Linn., Flacourtia indica (Burm. f.) Merill., Lantana camara Linn.

HERBS- Achyranthes aspera Linn., Aerva lanata (Linn.) Juss., Ageratum conyzoides Linn., Boerhaavia diffusa Linn., Evolvulus alsinoides (Linn.) Linn., Launaea procumbens (Roxb.) Ramayya and Rajgopal., Leucas biflora R. Br., Sida acuta Linn., Sida cordata (Burm. f.) Borss., Tridax procumbens Linn.

A number of climbers belonging to the families Menispermaceae, Sapindaceae, Rhamnaceae, Fabaceae, Caesalpiniaceae, Cucurbitaceae, Convolvulaceae, Dioscoreaceae, Liliaceae etc are found. Some of the twiners of climbers are quite distinct either by their foliage or the flowers. Some of such plants are Abrus precatorius Linn., Canavalia gladiata (Jacq.) DC., Cardiospermum halicacabum Linn., Dioscorea bulbifera Linn., Gloriosa superba Linn., and Mucuna prurita Hook. f.

VEGETATION OF PONDS AND DITCHES

The area covered by the thesis is full of temporary ditches and a few permanent ponds one each at Chhota-udepur town, Pavi-jetpur and Jamlidam **PLATE 4**. In general the hydrophytic vegetation is poor throughout the forest division. It is as given below.

SUBMERGED HYDROPHYTES- Hydrilla verticillata (L. f.) Royle., and Vallisneria spiralis Linn.

FLOATING HYDROPHYTES- Nymphoides cristata (Roxb.) O. Kuntze., N. indicus (Linn.) O. Kuntze., and Limnophyton obtusifolium (L.) Miq.

Most of the ditches begin to dry up by November and are almost dry by January. From these ditches a number of amphibious plants have been collected. They are as follows.

COMMON- Ageratum conyzoides Linn., Ammannia baccifera Linn., Bacopa monnieri (Linn.) Pennell., Biophytum sensitivum (Linn.) DC., Commelina

PLATE 4

A view of Jamli dam with dense forests. Range Dolariya of Chhota-udepur forests division.

Sukhi dam on river Sukhi: Range Pavi-jetpur of Chhota-udepur forests division.

A View of lake in middle of Chhota-udepur town with Vagasthal hills in background: Lake vegetation.

benghalensis Linn., Cyperus iria Linn., Eclipta alba Linn., Hygrophila auriculata (Schum.) Heine., Ipomoea aquatica Forsk., Xanthium strumarium Linn.

OCCASIONAL- Coldenia procumbens Linn., Merremia gangetica (Linn.) Cufod., Polygonum glabrum Willd.

RARE- Hoppea dichotoma Willd., Hydrolea zeylanica Vahl., Limnophila indica (Linn.) Druce., Ludwigia octavalvis (Jacq.) Raven., Nothosaerva brachiata (Linn.) Wight., Typha angustata Bory and Chaub.

During the advance of hot season, most of these weeds disappear and only few hardy plants such as Argemone mexicana Linn., Coldenia procumbens Linn., etc., survive and they too disappear after the first few showers of rain.

VEGETATION OF RIVER BEDS/RIVER BANKS

The forest division is traversed by the two main rivers; Narmada and Orsang and their seasonal tributaries. Most of the tributaries are temporary and dry up with the advance of dry season. The soil of or along this rivers at many places is sandy loam with varying proportions of sand at different places., seldom they are pebbly or gravelly. At a few places e.g. Chhota-udepur the river bed of Orsang is stony or rocky and the spaces between rocks are filled up with alluvial soil.

In general the vegetation of river beds is poor due to draught conditions and also due to biotic interferences like cultivation along and within the dry riverbeds and riverbanks **PLATE 5**. Hence most of the plants found in moist ground along ditches and ponds described above are also found here, but the vegetation in a way is interesting due to some rare plants like Mecardonia procumbens (Mill.) Sm. At times during dry season these riverbeds are the main site for cultivation by the tribals. The shrubs are very few, the common ones being Tamarix ericoides Rottl., and Vitex negundo Linn., which occur in pure or mixed but scattered patches. The following is the list of the plants collected from riverbeds.

COMMON- Ageratum conyzoides Linn., Ammannia baccifera Linn., Canscora diffusa R. Br., Eclipta prostrata Linn., Glinus oppositifolius (Linn.) DC., Verbascum chinense (Linn.) Santapau.

OCCASIONAL- Polygonum glabrum Willd.

RARE- Bergia suffruticosa Edgew., Crinum latifolium Linn., Mecardonia procumbens (Mill.) Sm., Rumex dentatus Linn., Woodfordia fruticosa (Linn.) Retz., Syzygium heyneanum (Wall.) Gamble.

PLATE 5

A view of river Orsang after rains: Vagasthal hills in background- Chhota-udepur.

Cultivation within dry orsang river at Chalamali village: Pavi-jetpur range of Chhota-udepur forests division.

Cultivation in dry Narmada riverbeds: Kawant range of Chhota-udepur forests division.

CHANGES IN VEGETATION DUE TO SEASONAL VARIATIONS

After few showers by about the middle of June, the ground is covered by a variety of sprouting grasses which gives the soil a vivid green appearance. From these grasses a number of plants have been noted. By about the middle of rainy season the graminaceous plants have become fairly tall covering large areas. The common poaceae members are Apluda mutica Linn., Heteropogon contortus (Linn.) Beauv ex. R. and S., Saccharum spontanuem Linn., Themeda quadrivalvis (Linn.) O. Kuntze., Sorghum halepense (Linn.) Pers., etc. Some of these grasses are quite conspicuous by their habit and/or the inflorescence. For example Sorghum halepense (Linn.) Pers., is quite distinct by its height and large, laxly paniculate inflorescence. Saccharum spontaneum Linn., can be identified even from a considerable distance by the silvery-white silky spike. The gregarious nature of Apluda mutica Linn., Themeda quadrivalvis (Linn.) O. Kuntze., Cymbopogon martinii (Roxb.) Wats., and Heteropogon contortus (Linn.) Beauv ex. R. and S., are distinctive. Some of the other common grasses of area are Dactyloctenium aegyptium (Linn.) Beauv., Dichanthium annulatum (Forsk.) Stapf., and Eragrostis ciliaris (Linn.) R. Br., often forming loose mats. Some of the noteworthy Cyperaceous plants found among open grasslands are Bulbostylis barbata (Rottb.) Clarke., Cyperus iria Linn., Cyperus triceps (Rottb.) Endl., and Fimbristylis dichotoma (Linn.) Vahl.

From the grassland number of plants collected are given below.

COMMON- Aerva lanata (Linn.) Juss., Alysicarpus procumbens Linn., Alysicarpus vaginalis (Linn.) DC., Amaranthus spinosus Linn., Boerhavia diffusa Linn., Borreria articularis (Linn. f.) Will., Bulbostylis barbata (Rottb.) Clarke., Chlorophytum tuberosum Baker., Cleome monophylla Linn., Curculigo orchioides Gaertn., Cyperus iria Linn., Cyperus triceps (Rottb.) Endl., Emilia sonchifolia (Linn.) DC., Enicostema hyssopifolium (Willd.) Verd., Hemidesmus indicus (Linn.) R. Br., Indigofera astragalina DC., Indigofera cordifolia Heyne ex. Roth., Justicia simplex D. Don., Lepidagathis trinervis Nees., Launaea procumbens (Roxb.) Ramayya and Rajgopal., Merremia tridentata (Linn.) Hall. f., Rungia repens (Linn.) Nees., Sopubia delphinifolium (Roxb.) G. Don., Trichodesma amplexicaule Roth., Xanthium strumarium Linn.

OCCASIONAL- Amaranthus tricolor Linn., Crotalaria juncea Linn., Heliotropium marifolium Retz., Urginea indica Linn.

RARE- Alternanthera paronychoides St. Hill., Alysicarpus monilifer (Linn.) DC., Habenaria marginata Colebr., Indigofera linifolia Linn., Leucas cephalotes Spreng., Lindernia ciliata (Colsmn.)-Pennell., Rhynchosia minima (Linn.) DC., Tricholepis glaberrima (Burm. f.) R. Br., Tylophora fasciculata Ham., Vigna trilobata (Linn.) Verdcourt.

Some of the twiners on these grasses are the members of the families Fabaceae, Convolvulaceae, Cucurbitaceae etc. By the end of monsoon or a little earlier most of the grasses dry up. As a result the ground becomes exposed, showing the near barreness of ground vegetation. By the beginning of the hot season the ground cover has almost disappear but for a few hardy grasses like Dactyloctenium aegypticum (Linn.) Beauv. Many trees such as Ailanthus excelsa Roxb., Bombax ceiba Linn., Butea monosperma (Lamk.) Taub., Diospyros melanoxylon Roxb., Garuga pinnata Roxb., Holoptelea integrifolia (Roxb.) Planch., Lannea coromandelica (Houtt.) Merr., Madhuca indica Muell.-Arg., Miliusa tomentosa (Roxb.) Sinclair., Tectona grandis L. f., etc shade their leaves and forests look more open. In very hot season large areas of lands are barren in the scrub forests and are almost without any vegetation except for a few hardy plants such as Acacia nilotica (Linn.) Del. subsp. indica (Bth.) Brenan., Balanites roxburghii Planch., Calotropis procera (Ait.) R. Br., Capparis grandis L. f., Maytenus emarginatus (Willd.) Dinghou., etc. One of the remarkable features of the hot season is conspicuousness of certain trees e.g. Bombax ceiba Linn., Butea monosperma (Lamk.) Taub., Sterculia urens Roxb., Lannea coromendelica (Houtt.) Merr., Madhuca indica Muell.-Arg., etc due to their bright reddish-purple fresh foliage or by the color of the flowers.

FORESTS

The forests of Chhota-udepur forest division is mostly confined to the Eastern and Southern hilly region of the district. According to the revised classification of Champion and Seth (1968), the forests in this area can be divided into two types, North East region and South East region. Forest in the South East region fall under the type $5A/C_3$, Southern dry mixed deciduous forests. These forests are found on dry and shallow soil, well-drained hillsides and on undulating terrains and are subjected to annual fires and occurrence of teak is sporadic. The forests towards the North East region fall under $5A/C_1b$-Dry deciduous forests with teak (Tectona grandis L. f.) as the dominant species of the vegetation **PLATE 6 and 7**.

TABLE # 3 A: FOREST AREAS AS PER RANGE, ROUND AND BEETS IN CHHOTA-UDEPUR FOREST DIVISION

Range	Round	Total Beet	Unclass forests	Reserve forests	Protected	Total
Chhota-udepur	Chhota-udepur	4	0.00	43.3446	0.00	43.3446
	Tejgadh	3	0.00	30.2240	1.2257	31.4497
	Kevadi	3	0.00	31.6799	0.00	31.6799
Total		**10**	**0.00**	**105.2485**	**1.2257**	**106.4742**
Dolariya	Dolariya	4	0.00	32.2323	0.00	32.2323
	Mithibor	2	0.00	22.6891	0.00	22.6891
	Dhadagam	5	0.00	25.8047	0.00	25.8047
Total		**11**	**0.00**	**80.7261**	**0.00**	**80.7261**
Rangpur	Rangpur	3	0.00	24.2680	0.3959	24.6639
	Balawant	3	0.00	27.1272	1.0923	28.2195
	Ambala	3	11.8641	24.9301	0.00	36.7942
Total		**9**	**11.8641**	**76.3253**	**1.4882**	**89.6776**
Kawant	Kawant	2	0.00	16.6756	0.00	16.6756
	Mogra	3	2.4050	27.1761	0.00	29.5811
	Turkheda	2	0.00	24.0613	0.00	24.0613
	Hanfeswar	2	0.00	34.3696	0.00	34.3696
Total		**9**	**2.4050**	**102.2826**	**0.00**	**104.6876**
Panvad	Panvad	4	0.00	24.1519	1.6515	25.8034
	Saidivasan	2	0.00	20.9154	0.00	20.9154
	Raising-pura	3	0.00	20.3049	1.1805	21.4854
Total		**9**	**0.00**	**65.3722**	**2.8320**	**68.2042**
Jetpur	Jetpur	4	0.00	19.8811	0.00	19.8811
	Dungerwa nt	3	0.00	25.5412	0.00	25.5412
	Kadwal	2	1.2957	16.8319	0.00	18.1276

PLATE 6

Dry mixed deciduous forests after rains: Range Dolariya of Chhota-udepur forests division.

A view of dry mixed deciduous forests after rains: Range Rangpur.

Dense forest of Dun, Mal and Richhvel: Range Dolariya- Chhota-udepur forests.

	Kalarani	3	0.00	23.6294	0.00	23.6294
	Sajawa	5	0.00	45.9892	0.00	45.9892
Total		**17**	**1.2957**	**131.8728**	**0.00**	**133.1685**
Boriyad	Boriyad	4	7.9291	9.9813	0.00	17.9104
	Tarol	3	16.5850	5.3972	0.00	21.9822
	Dharsimal	3	4.0744	27.3482	0.00	31.4226
Total		**10**	**28.5885**	**42.7267**	**0.00**	**71.3152**
Naswadi	Naswadi	3	4.0525	6.9249	0.00	10.9774
	Dabba	4	19.4407	27.9208	0.00	47.3615
	Antras	3	32.1612	1.1255	0.00	33.2867
Total		**10**	**55.6544**	**35.9712**	**0.00**	**91.6256**

The shaded portion indicates that Jetpur-Pavi range has more reserve forests compared to that of other ranges as far as area is concerned.

The areas under the three categories of forests presented above are in Sq.kms.

Conversion: 100 hectares = 1 sq. km (km^2).

Source: The working plan of the forest division 1999-2000., Chhota-udepur.

Total Forest Area of Chhota-udepur division = 745.8790 sq.kms (As per Working plan of Forest department)

Total Forest Area of Chhota-udepur division = 746.6898 sq.kms (As per Remote sensing data, GEER foundation, Gandhinagar).

Total Geographical area of Gujarat State = 1,96,024 sq.kms.

Total forest area of Gujarat State = 19,392 sq.kms.

Total forest area of Chhota-udepur forest division = 746.6898 sq.kms.

% Forest area of Gujarat State against that of the Country = 9.89 %

% Forest area of C-udepur division against that of Gujarat State = 3.85 %

Total geographical area of Vadodara district = 7,778 sq.kms.

Total forest area of Vadodara district = 807 sq.kms.

% Forest area of Vadodara district to that of Gujarat state = 4.16 %

% Forest area of C-udepur division to that of Vadodara district = 92.52 %

Source: Forests of Gujarat. (1998). Forest Department. Publication Unit, Gandhinagar.

PLATE 7

View of deciduous forests at Fangiyo dungar-Kevdi. Range Chhota-udepur.

Vegetation on hilltop. Kawant range of Chhota-udepur forests division. Most degraded range in Chhota-udepur forests.

Forests vegetation showing Butea monosperma (Lamk.) Taub., and Tectona grandis Linn., at Dolariya range- dense & floristically rich range of Chhota-udepur forests division.

TABLE # 3 (B): COMPARATIVE ASPECT OF FORESTS- CHHOTA-UDEPUR

Area	Total. Area (Sq. kms). (A)	Total Forest Area (Sq.kms) (B)	% Forest Area to Country (C)	% Forest Area to State (D)	% Forest Area to District. (E)	% Forest Area to Total Geographical Area (F)
India	32,87,263 **(A_1)**	7,53,005 **(B_1)**	---	---	---	22.90 % **(B_1 / A_1)**
Gujarat State	1,96,024 **(A_2)**	19,392 **(B_2)**	2.57 % **(B_2 / B_1)**	---	---	9.89 % **(B_2 / A_2)**
Vadodara district	7,778 **(A_3)**	807 **(B_3)**	0.10 % **(B_3 / B_1)**	4.16 % **(B_3 / B_2)**	---	10.37 % **(B_3 / A_3)**
Chhota-udepur division	3,390 **(A_4)**	746.689 **(B_4)**	0.09 % **(B_4 / B_1)**	3.85 % **(B_4 / B_2)**	92.52 % **(B_4 / B_3)**	22.02 % **(B_4 / A_4)**

FOREST CATEGORIES –CHHOTA-UDEPUR FOREST DIVISION

The entire forest area of Chhota-udepur forest division is classified under five main classes viz., dense forest areas, open forests, degraded forests, highly degraded forests/grass cover and areas under cultivation. Each is mentioned in detail in the following paragraphs.

DENSE FOREST

The data reveal that 21.93 % area of Vadodara district is under dense forest cover. The highest percentage (44 %) of dense forest is observed in Dolariya range. The area wise highest area (45.2196 sq. kms) is in Pavi-jetpur range.

AREAS UNDER DENSE FOREST

The dense forest cover in the range of 300-500ha has been observed in the Kevdi village of Chhota-udepur range, Jamli, Marchipani, Gadola and Dhadagam villages of Dolariya range, Tundava village of Rangpur range, Ambadungar village of Kawant range and Raipur, Kundal, Ghata and Degala villages of Jetpur-pavi range. There are 8 villages in Chhota-udepur, 7 villages in Dolariya, 3 villages in Rangpur, 1 village in Panvad, 1 village in Kawant, 11 villages in Jetpur-pavi, 2 villages in Boriyad and 3 villages in Naswadi ranges which have the dense forest cover in the range of 100-300 ha.

OPEN FOREST

The open forest area constitutes 36.7 % of the total study area. Kawant range has the highest open forest area covering 45 % of the total area of the range.

AREAS UNDER OPEN FOREST

The dominant forest areas under the open forests category have been found in Kevdi, Piplej, Ganthia Gabadia, Singla, Malu and Chokdi villages of Chhota-udepur range. Jamli, Dhadagam, Kolee and Ghogade villages of Dolariya range. Tundava, Kakadpa, Jadiana, Ambala, Zer and Kanawant villages of Rangpur range. Chhodwani, Bhundmaria, Tadkachla villages of Panvad range. Manka, Nakhal, Ambadungar, Kotbi, Padwani, Turkheda and Hanfeshwar villages of Kawant range. Kundal, Satun, Pandhara, Bordha and Degala villages in Jetpurpavi range. Dharisamal, Nisana, Kumetha and Talava villages in Boriyad range. Khokhara, Khendra, Sankdibari, Jitnagar, Antras, Kadada, Kunda and Budha Jalduni villages of Naswadi range. In all total 92 villages have more than 100 ha under open forests. Table No. 3 (C) shows the lists of villages having open forests (Area in hectares).

TABLE # 3 (C): NUMBER OF VILLAGES HAVING DIFFERENT RANGE OF OPEN FOREST AREA

Range	Number of villages with open forest				Total
	Upto 25 ha.	26 to 50 ha	51 to 100 ha	> than 100 ha	
C-udepur	16	08	10	12	**46**
Dolariya	06	07	08	07	**28**
Rangpur	17	10	09	09	**45**
Panvad	20	09	12	09	**50**
Kawant	06	04	01	09	**20**
Jetpur-Pavi	36	19	08	13	**76**
Boriyad	21	19	13	11	**64**
Naswadi	09	11	09	15	**44**
Total	**131**	**87**	**70**	**85**	**373**

DEGRADED FOREST

The data reveal that 21.8 % of the study area is under degraded forests. The highest area under this class is seen in Kawant range. Hanfeshwar (East and West) village in Kawant has the highest area of degraded forests.

AREAS UNDER DEGRADED FOREST

The area under this category has been observed in Kevdi, Piplej, Singla, Bhilpur and Bhensa of Chhota-udepur range; Bodgam, Tundava and Zer of Rangpur range; Raisingpura and Umthi of Panvad range; Manka, Ambadungar, Turkheda and Hanfeshwar of Kawant range; Bordha and Degala villages of Pavi-jetpur range; Talav of Boriyad range and Kukadada, Antras, Kadada and Kunda of Naswadi range. Table No. 3 (D) shows the lists of villages having degraded forests.

TABLE # 3 (D): NUMBER OF VILLAGES HAVING DIFFERENT RANGE OF DEGRADED FOREST AREA

Range	Number of villages with degraded forest				Total
	Upto 25 ha.	26 to 50 ha	51 to 100 ha	> than 100 ha	
Chhota-udepur	22	13	05	06	**46**
Dolariya	16	05	04	03	**28**
Rangpur	19	09	11	06	**45**
Panvad	24	11	11	04	**50**
Kawant	08	01	06	05	**20**
Jetpur-Pavi	49	13	09	05	**76**
Boriyad	40	14	08	02	**64**
Naswadi	20	12	06	06	**44**
Total	**198**	**78**	**60**	**37**	**373**

HIGHLY DEGRADED FOREST

The area under this category is erosion prone and with primitive cultivation. This type of forest has been observed in Singla, Gondaria, Bhensa and Achhala Jitpur of Chhota-udepur range; Vadhavan and Kumbhani of Dolariya range; Zer and Dhadigam of Rangpur range; Baglia and Umthi of Panvad range; Manka, Turkheda and Hanfeshwar of Kawant range; Pandharva and Lunaja of Jetpur-pavi range; Ferkada of Boriyad range; Kadada and Kukad-dada of Naswadi range.

CULTIVATION

Out of the total forest area of the Chhota-udepur division; i.e. 746.68 sq. kms, 55.5897 sq. kms of the area is under cultivation, which accounts for 7.44 % of the total forest area. Out of all the ranges in the division, Rangpur range has highest area of the cultivation. The total forested area of Rangpur range is 89.6776 sq. kms; out of which 10.4516 sq. kms of the area is under cultivation (11.65 %). There are some features that have emerged out while compiling this class of forests.

It is observed that in some areas the cultivation is scattered and each cultivated patch has very less area ranging from 0.5 ha to 5 ha. In some cases

cultivations are on the slopes of the hills and they have periphery with irregular shapes due to existence of trees on periphery or irregular shapes of cultivation patch.

According to information from the local gam panchayats, forest working plans as well as Taluka panchayats the cultivation practice was in existence in the areas along Narmada river. These areas have gone under submergence due to Sardar Sarovar Project. It was informed that the cultivated area has reduced remarkably since last couple of years due to shifting of villagers from submergence area.

The Table No. 3(E) gives the remote sensing data on forest cover of different ranges of Chhota-udepur forest division.

TABLE # 3E: RANGE WISE FOREST COVER USING REMOTE SENSING DATA (CHHOTA-UDEPUR FOREST DIVISION)

Range	Dense forests	Open forests	Degraded forests	Highly degraded forest /grass cover	Cultivation	Blank	Water Body	Total
C-udepur	25.3359	34.1429	21.0609	**13.2479**	8.4814	**1.1787**	**3.0265**	106.4742
Dolariya	35.2676	23.7558	9.8893	4.7513	6.4737	0.2065	0.3819	80.7261
Rangpur	16.4028	27.8711	22.5418	12.0260	**10.4516**	0.1823	0.2020	89.6776
Panvad	6.4241	25.5976	19.5638	7.4686	8.4672	0.0656	0.2443	67.8312
Kawant	9.8646	**47.4077**	**30.8964**	8.9579	6.1169	0.3966	1.0475	104.6876
Jetpur-Pavi	**45.2196**	40.1840	25.2782	12.1540	7.0208	1.0096	2.3013	**133.1675**
Boriyad	11.5720	34.2846	16.2235	6.2126	4.5837	0.00	0.3010	73.1774
Naswadi	13.6789	41.7517	21.9875	7.9738	3.9944	0.00	1.5619	90.9482
Total	**163.7655**	**274.9954**	**167.4414**	**72.7921**	**55.5897**	**3.0393**	**9.0664**	**746.6898**
%	**21.93**	**36.76**	**22.42**	**9.74**	**7.44**	**0.40**	**1.21**	**99.9**

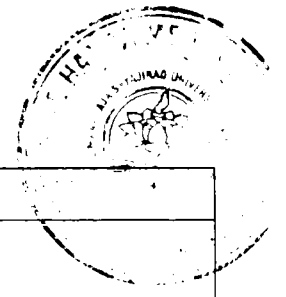
Source: Anon. GEER foundation, Gandhinagar, 1997-98. (100 hectares = 1 sq. km. All the data in the columns are in Sq. kms.

- Jetpur range has maximum dense forest as far as area is concerned.
- Kawant range has more open forests as far as area is concerned.
- Kawant range has more degraded forests as far as area is concerned.
- Chhota-udepur range has highly degraded forests/grass cover as far as area is concerned.
- Rangpur range has maximum area under cultivation.
- Chhota-udepur has more blank area than other ranges.
- Chhota-udepur range has more area of Water bodies than other ranges.
- Pavi-Jetpur range has more area of Forests in comparison to other ranges.

As mentioned above the entire forest division falls under two main forest types 5A/C_1b-Dry teak forests on Northeastern boundary and 5A/C_3 –Mixed dry deciduous forests towards Southern sides. Table No. 3 (F) and 3 (G) shows the dominant species in dry teak and dry mixed deciduous forests of Chhota-udepur forest division.

TABLE 3 (F): DOMINANT SPECIES IN DRY TEAK FORESTS

No.	BOTANICAL NAME	FAMILY	LOCAL NAME
(A) Top Storey			
1.	Aegle marmelos Linn.	Rutaceae	Bila, Bili
2.	Anogeissus latifolia Guill.	Combretaceae	Safed-Dhavado
3.	Bridelia retusa (L.) Spreng.	Euphorbiaceae	Akal kanto
4.	Butea monosperma (Lamk.) Taub.	Fabaceae	Khakara, kesudo
5.	Cassia fistula Linn.	Caesalpiniaceae	Garmalo
6.	Dalbergia latifolia Roxb.	Fabaceae	Sisam
7.	Diospyros melanoxylon Roxb.	Ebenaceae	Timru, Timbervo
8.	Haldinia cordifolia (Roxb.) Ridsd.	Rubiaceae	Haldu
9.	Lagerstroemia parviflora Roxb.	Lythraceae	Mota-Bandara
10.	Mitragyna parvifolia (Roxb.) Korth.	Rubiaceae	Kalam
11.	Tectona grandis L. f.	Verbenaceae	Sag
12.	Wrightia tinctoria (Roxb.) R. Br.	Apocynaceae	Dudhio kadi
(B) Under Storey			
1.	Flacourtia indica (Burm. f.) Merrill.	Flacourtiaceae	Lodri
2.	Helicteres isora Linn.	Sterculiaceae	Marda-sing
3.	Holarrhena pubescens (Buch.-Ham) Wallich ex G. Don.	Apocynaceae	Kudo
4.	Catunaregam spinosa (Thunb.) Tiruv.	Rubiaceae	Mindhol
(C) Ground Cover			
1.	Apluda mutica Linn.	Poaceae	Bhangoru



2.	Cassia tora Linn.	Caesalpiniaceae	Puwadio
3.	Dicanthium annulatum (Forsk.) Stapf.	Poaceae	Zinzvo
4.	Heteropogon contortus (L.) Beauv. ex. R. and S.	Poaceae	Sukli
5.	Themeda quadrivalvis (L.) O. Kuntze.	Poaceae	Bhatdu
6.	Xanthium strumarium Linn.	Asteraceae	

TABLE 3 (G): DOMINANT SPECIES IN DRY MIXED DECIDUOUS FORESTS

No.	BOTANICAL NAME	FAMILY	LOCAL NAME
(A) Top Storey			
1.	Acacia chundra (L. f.) Willd.	Mimosaceae	Khair
2.	Aegle marmelos Linn.	Rutaceae	Bili
3.	Albizia lebbeck (L.) Willd.	Mimosaceae	Siras
4.	Anogeissus latifolia Guill.	Combretaceae	Dhavado
5.	Boswellia serrata Colebr.	Burseraceae	Gar-guggal
6.	Buchanania lanzan Spr.	Anacardiaceae	Charoli
7.	Butea monosperma (Lamk.) Taub.	Fabaceae	Kesudo
8.	Cassia fistula Linn.	Caesalpiniaceae	Garmalo
9.	Diospyros melanoxylon Roxb.	Ebenaceae	Timbervo
10.	Lagerstroemia parviflora Roxb.	Lythraceae	Bandaro
11.	Mitragyna parvifolia (Roxb.) Korth.	Rubiaceae	Kalam
12.	Phyllanthus emblica Linn.	Euphorbiaceae	Amala
13.	Terminalia crenulata Roth.	Combretaceae	Sadad
(B) Under Storey			
1.	Bauhinia racemosa Lamk.	Caesalpiniaceae	Ashitro
2.	Flacourtia indica (Burm. f.) Merrill.	Flacourtiaceae	Lodri
3.	Helicteres isora Linn.	Sterculiaceae	Marda-sing

4.	Holarrhena pubescens (Buch-Ham) Wall. ex G. Don.	Apocynaceae	Kudo
5.	Nyctanthes arbor-tristis Linn.	Oleaceae	Parijat
6.	Catunaregam spinosa (Thunb.) Tiruv.	Rubiaceae	Mindhol
7.	Wrightia tinctoria R. Br.	Apocynaceae	Kudi
8.	Zizyphus xylopyra Willd.	Rhamnaceae	Ghatbor
(C) Ground Cover			
1.	Achyrnathus aspera Linn.	Amaranthaceae	Aghedo
2.	Apluda mutica Linn.	Poaceae	Bhangaru
3.	Cassia tora Linn.	Caesalpiniaceae	Puwadio
4.	Heteropogon contortus (L.) Beauv. ex. R. and S.	Poaceae	Sukhli
5.	Themeda quadrivalvis (L.) O. Kuntze.	Poaceae	Bhatdu

PAST SYSTEM OF MANAGEMENT OF FORESTS IN CHHOTA-UDEPUR DIVISION

Prior to 1907, the felling was purely governed by considerations of revenue. Only the good utilizable trees were exploited leaving behind unsound trees.

From 1907 to 1943 also the revenue considerations continued to guide the exploitation of the forests. However, as the forests were worked on short rotation of 15 years most of the large size trees and the non-coppicing trees came to be removed thus resulting in depletion of such species and increasing the percentage of teak in the growing stock. Further this also resulted in creation of open places in the forests. From 1943 to 1979 the same procedure existed resulting in further depletion of sound trees and creation of larger open places within the forested areas.

From 1979 to 1991 no attempt was made to divide the areas into regular felling series, as maps showing forest areas were not available. The oldest coupes were taken up for exploitation without any consideration of distribution of exploitation areas in all rounds. This resulted in irregular exploitation and depletion of the growing stock. The protection tended to be ineffective and the areas were heavily grazed and burnt by fires, destroying whatever seedlings or coppice crop came up.

VARIOUS CATEGORIES OF PLANTS

This chapter deals with different categories of plants found in the area viz., cultivated, parasites, economically important plants, plants found as an escapes, new additions to the flora of the area, rare plants, exotic weeds, plants that are found only in one range of the forest division, plants with restricted distribution in Gujarat but found in the area explored, important vegetative characters of plants and brief note on nomenclature of few plants.

CULTIVATED PLANTS IN THE AREA

Since major occupation of the tribals of Chhota-udepur is agriculture, the following table provides names of cultivated plants **PLATE 8**.

TABLE 4 (A): CULTIVATED PLANTS IN THE AREA

No.	BOTANICAL NAME	FAMILY	LOCAL NAME
Cereals			
1.	Amaranthus paniculatus (L.) Thell.	Amaranthaceae	Rajgaro
2.	Oryza sativa Linn.	Poaceae	Bhat, Chokha
3.	Pennisetum typhoides (Burm. f.) Stapf and Hubb.	Poaceae	Bajri, Bajro
4.	Sorghum vulgare Linn.	Poaceae	Jowar, Juwar
5.	Triticum aestivum Linn.	Poaceae	Ghahu
6.	Zea mays Linn.	Poaceae	Makai
Pulses			
1.	Cajanus cajan (L.) Millsp.	Fabaceae	Tuver
2.	Cicer arientinum Linn.	do	Chana
3.	Pisum sativum Linn.	do	Vatana
4.	Vigna trilobata (Linn.) Verdcourt.	do	Math
Spices and Condiments			
1.	Capsicum annuum Linn.	Solanaceae	Lela-marcha
2.	Coriandrum sativum Linn.	Apiaceae	Dhana
3.	Cuminum cyminum Linn.	Apiaceae	-
4.	Foeniculum vulgare Gaertn.	Apiaceae	-

5.	Murraya koenigii (L.) Spr.	Rutaceae	Mitho-limbdo
6.	Trigonella foenum-graecum Linn.	Fabaceae	Methi
Oil yielding plants			
1.	Arachis hypogea Linn.	Fabaceae	Mang-phali
2.	Eucalyptus globulus Labill.	Myrtaceae	Niligiri
3.	Ricinus communis Linn.	Euphrobiaceae	Divalo, Dival, Divali
4.	Sesamum indicum Linn.	Pedaliaceae	Til, Tal
Fibre Plants			
1.	Crotalaria juncea Linn.	Fabaceae	Shaniyu
2.	Gossypium herbaceum Linn.	Malvaceae	Desi kapas
Other crop plants			
1.	Hibiscus sabdariffa Linn.	Malvaceae	---
2.	Musa paradisiaca Linn.	Musaceae	Kela
3.	Nicotiana tabacum Linn.	Solanaceae	Tamaku
Vegetables			
1.	Abelmoschus esculentus (L.) Moench.	Malvaceae	Jangli-Bhinda
2.	Allium cepa Linn.	Liliaceae	Dungri, Kando
3.	Coccinia grandis (L.) Voigt	Cucurbitaceae	Ghiloda, Tindora
4.	Cucurbita maxima Duch.	Cucurbitaceae	Lal-kodu
5.	Cyamopsis tetragonoloba (L.) Taub.	Fabaceae	Guvar, Guar, Gwar
6.	Hibiscus esculentus Linn.	Malvaceae	Bhinda.
7.	Lagenaria leucantha (Duch.) Rusby.	Cucurbitaceae	Dudhi, Kadvi-tumdi
8.	Luffa cylindrica (L.) M. J. Roem.	Cucurbitaceae	Galku, Galka
9.	Lycopersicon lycopersicum (L.) Karst. ex Farwell.	Solanaceae	Tamata
10.	Rapahnus sativus Linn.	Brassicaceae	Mudo
11.	Solanum melongena Linn.	Solanaceae	Ringana, Ringan

PLATE 8

Cultivation of Hibiscus esculentus Linn. Bhinda at Malu village near Tejgadh- Chhota-udepur.

Cajanus cajan (L.) Huth. Tuvar: cultivation at Limbani village near Zoz. Chhota-udepur forests.

Zea mays Linn. Makai cultivation one of the most popular sites throughout Chhota-udepur forests division

Fruits			
1.	Manilkara zapota (L.) P. Royen	Sapotaceae	Chikoo
2.	Annona squamosa Linn.	Annonaceae	Sitaphal
3.	Carica papaya Linn.	Caricaceae	Papaya, Papayu
4.	Phyllanthus emblica Linn.	Euphorbiaceae	Amla
5.	Psidium guajava Linn.	Myrtaceae	Jamphal
6.	Tamarindus indica Linn.	Caesalpiniaceae	Amli
7.	Terminalia catappa Linn.	Combretaceae	Deshi-badam

During the course of botanical excursions to different forest areas the following parasites were recorded. A detailed account of them is given in the text.

TABLE 4 (B): PARASITES FOUND IN THE AREA

No.	BOTANICAL NAME	FAMILY	LOCAL NAME
1.	Cuscuta chinensis Lam.	Cuscutaceae	Amarvel
2.	Cuscuta reflexa Roxb.	Cuscutaceae	Amarvel
3.	Dendrophthoe falcata Seem.	Loranthaceae	Mat-sing
4.	Orobanche aegyptiaca Pers.	Orobanchaceae	Vak-umbho
5.	Striga angustifolia (D. Don) Saldhana.	Scrophulariaceae	Safed-agio
6.	Viscum articulatum Burm. f.	Loranthaceae	---

The forest department earns a good amount of revenue mainly by the selling of timber trees and a high percentage of revenue by the sale of minor forest products. The information given here is collected from the forest department, forest co-operative society, Chhota-udepur forest division. The detailed information regarding the NTFP's collection is given under the heading of depedence of tribal people on the forests of Chhota-udepur forest division.

TABLE 4(C): ECONOMICALLY IMPORTANT PLANTS

No.	BOTANICAL NAME	FAMILY	LOCAL NAME
Timber trees-best quality			
1.	Acacia chundra Willd.	Mimosaceae	Khair
2.	Dalbergia latifolia Roxb.	Fabaceae	Sisam
3.	Gmelina arborea Roxb.	Verbenaceae	Sivan, Sevan
4.	Haldina cordifolia (Roxb.) Rids.	Rubiaceae	Haldwan
5.	Ougeinia oojeinensis (Roxb.) Hochr.	Fabaceae	Tanach
6.	Pterocarpus marsupium Roxb. var. acuminatus Prain.	Fabaceae	Biyo
7.	Tectona grandis L. f.	Verbenaceae	Sag
Timber trees-inferior quality			
1.	Albizzia lebbeck (L.) Willd.	Mimosaceae	Harhadi
2.	Albizzia procera (Roxb.) Benth.	Mimosaceae	---
3.	Anogeissus latifolia Guill.	Combretaceae	Dhamdo
4.	Lagerstroemia lanceolata Wt. and Arn.	Lythraceae	Kakdo
5.	Lagerstroemia parviflora Roxb.	Lythraceae	--
6.	Terminalia bellirica (Gaertn.) Roxb.	Combretaceae	Baheda
Timber used in Matchwood Industry			
1.	Ailanthus excelsa Roxb.	Simaroubaceae	Moti-ardusi
2.	Bombax ceiba Linn.	Bombacaceae	Shimdo
3.	Garuga pinnata Roxb.	Burseraceae	Kakad
4.	Holoptelea integrifolia (Roxb.) Planch.	Ulmaceae	Audo
5.	Hymenodictyon excelsum (Roxb.) Wall.	Rubiaceae	Kokadio
6.	Kydia calycina Roxb.	Malvaceae	Warang

7.	Lannea coromandelica (Houtt.) Merr.	Anacardiaceae	Moyno
8.	Wrightia tinctoria R. Br.	Apocynaceae	Kadi
Dye yielding plants			
1.	Acacia chundra (L. f.) Willd.	Mimosaceae	Khair
2.	Butea monosperma (Lamk.) Taub.	Fabaceae	Kesudo
3.	Cassia fistula Linn.	Caesalpiniaceae	Garmalo
4.	Zizyphus xylopyra (Retz.) Willd.	Rhamnaceae	Ghat-bor
Resin, gum and tannin yielding plants			
1.	Acacia nilotica (L.) Del subsp. indica (Bth.) Brenan.	Mimosaceae	Baval
2.	Azadirachta indica A. Juss.	Meliaceae	Limbdo
3.	Butea monosperma (Lamk.) Taub.	Fabaceae	Kesudo
4.	Boswellia serrata Colebr.	Burseraceae	Gar-guggal
5.	Garuga pinnata Roxb.	Burseraceae	Kakad
6.	Sterculia urens Roxb.	Sterculiaceae	Kadayo
7.	Terminalia crenulata Roth.	Combretaceae	Sadad

CULTIVATED PLANTS MET AS ESCAPES FROM STUDY AREA

During botanical exploration some cultivated plants were found as escapes in waste places. There are also some plants, though not cultivated in the area but are found under cultivation in many other parts of the state of Gujarat. They are also sparingly met with as escapes. In such instances the human and biotic factor is the source of distribution. In all there are 22 plants as given below.

Abelmoschus esculentens (Linn.) Moench., Adhatoda vasica Nees., Amaranthus hybridus Linn., Anacardium occidentale Linn., Anethum graveolens Linn., Arachis hypogea Linn., Brassica juncea (Linn.) Czern. and Coss., Cajanus cajan (Linn.) Huth., Cicer arietinum Linn., Citrullus lanatus (Thunb.) Mansf., Coccinia grandis Wt. et Arn., Crotalaria juncea Linn., Cucumis sativus Linn., Cucurbita maxima Buch., Cuminum cyminum Linn., Ipomoea batatus (Linn.) Lamk., Ipomoea fistulosa Mart ex.

Choisy., Lycopersicon lycopersicum (Linn.) Karst., Ocimum tenuiflorum Linn., Raphnus sativus Linn., Ricinus communis Linn., Sesamum indicum Linn.

ADDITIONS TO THE FLORA OF CHHOTA-UDEPUR FOREST DIVISION

As already mentioned earlier the area was previously explored by Thaker et al., (1968-69); Karatela (1973) and Thaker (1974). It means that there was a fairly large gap between the present study and previous floristic explorations. The present study was conducted after nearly 30 years and it is likely that with latest trends of development and increasing human population the forest shows change in its vegetation pattern and also increase or decrease in floristic components. Hence the lists below gives the list of the plant species which were not recorded by any of the other workers from the study area explored. In all there are 42 plants that are addition to the flora of Chhota-udepur forest division. This plants are also reported from other parts of Gujarat state, and also some of them are self sown or planted and also an escape. In such instances they can be considered for having new range of distribution in Gujarat.

TABLE 4 (D): LIST OFADDITIONS TO THE FLORA OF CHHOTA-UDEPUR FOREST DIVISION

No.	BOTANICAL NAME	FAMILY	HABITAT
1.	Adansonia digitata Linn.	Bombacaceae	Probably planted
2.	Alhagi psuedalhagi (M. Bieb.) Deav.	Fabaceae	Wild
3.	Alstonia scholaris (Linn.) R. Br.	Apocynaceae	Planted
4.	Argyreia nervosa (Burm. f.) Boj.	Convolvulaceae	Wild
5.	Argyreia strigosa (Roth.) Roberty.	Do	Wild
6.	Basella rubra Linn.	Basellaceae	Escape
7.	Bougainvillea spectabilis Willd.	Nyctaginaceae	Planted
8.	Buchnera hispida Bth.	Scrophulariaceae	Wild
9.	Capsicum annuum Linn.	Solanaceae	Cultivated seldom an

			escape
10.	Careya arborea Roxb.	Lecythidaceae	Wild
11.	Casuarina equisetifolia Linn.	Casuarinaceae	Wild
12.	Cissus quandrangulare Linn.	Vitaceae	Planted
13.	Corallocarpus epigeus (Arn.) Clarke.	Cucurbitaceae	Wild
14.	Coriandrum sativum Linn.	Apiaceae	Escape
15.	Crotalaria hirsuta Willd.	Fabaceae	Wild
16.	Cucumis melo Linn.	Cucurbitaceae	Planted/cultivated
17.	Datura metel Linn.	Solanaceae	Wild
18.	Ficus tsiela Linn.	Moraceae	Planted
19.	Foeniculum vulgare Gaertn.	Apiaceae	Escape
20.	Ipomoea quamoclit Linn.	Convolvulaceae	Planted as hedge
21.	Lepidagathis cristata Willd.	Acanthaceae	Wild
22.	Lycopersicon lycopersicum (L.) Karst.	Solanaceae	Escape
23.	Mangifera indica Linn.	Anacardiaceae	Planted/rarely wild
24.	Manilkara zapota (Linn.) P. Royen.	Sapotaceae	Planted
25.	Manilkara hexandra (Roxb.) Dubard.	Do	Wild
26.	Melia azedarach Linn.	Meliaceae	Planted
27.	Nerium indicum Mill.	Apocynaceae	Planted
28.	Nervilia aragoana Gaudich.	Orchidaceae	Wild
29.	Nervilia discolor (Bl.) Schult.	Do	Wild
30.	Nicotiana tabacum Linn.	Solanaceae	Escape
31.	Oldenlandia dichotoma Linn.	Rubiaceae	Wild
32.	Opuntia elatior Mill.	Cactaceae	Planted as hedge
33.	Parthenium hysterophorus Linn.	Asteraceae	Escape/weed
34.	Peltophorum pterocarpum (DC.) Baker.	Caesalpiniaceae	Planted
35.	Phaseolus vulgaris Linn.	Fabaceae	Escape/cultivated

36.	Pimpinella heyneana Wall.	Apiaceae	Wild
37.	Pisum sativum Linn.	Fabaceae	Cultivated
38.	Plumeria rubra Linn.	Apocynaceae	Planted
39.	Punica granatum Linn.	Punicaceae	Planted
40.	Solanum melongena Linn.	Solanaceae	Cultivated
41.	Terminalia catappa Linn.	Combretaceae	Planted
42.	Thevetia peruviana (Pers.) Merr.	Apocynaceae	Planted

RARE PLANTS OF CHHOTA-UDEPUR FOREST DIVISION

The plants mentioned below are those that were occasionally met within the areas explored during the present study. In all there are 57 plants species that were found rare in the forest division.

Abelmoschus manihot (Linn.) Medic., Albizia lebbeck (Linn.) Willd., Alternanthera paronychioides St. Hill., Amorphophallus sylvaticus Linn., Anethum graveolens Linn., Anisomeles heyneana Bth., Begonia crenata Dryand., Blumea oblique (Linn.) Druce., Caesalpinia crista Linn., Canavalia gladiata (Jacq.) DC., Capparis grandis L. f., Ceropegia bulbosa Roxb., Convolvulus microphyllus (Roth.) Seib. ex Spr., Costus speciosus (Koenig.) Smith., Crateava magna DC., Crinum latifolium Linn., Cuminum cyminum Linn., Dillenia pentagyna Roxb., Dioscorea pentaphylla Linn., Gardenia resinifera Roth., Gardenia turgida Roxb., Gauzuma ulmifolia Lamk., Gloriosa superba Linn., Gymnema sylvestre (Retz.) Schult., Hardwickia binata Roxb., Hydrolea zeylanica Vahl., Hymenodicyton excelsum (Roxb.) Wall., Kickxia incana (Wall.) Pennell., Limnophila indica (Linn.) Druce., Luffa tuberosa (Linn.) Roem., Indigofera tinctoria Linn., Leucas cephalotes Spreng., Leucas stricta Benth., Lindernia oppositifolia (Retz.) Mukerjee., Lindernia parviflora (Roxb.) Haines., Marsdenia tenacissima (Roxb.) Moon., Mecardonia procumbens (Mill.) Sm., Mimosa hamata Willd., Nervilia aragoana Gaudich., Nervilia discolor (Bl.) Schltr., Nothosaerva brachiata (Linn.) Wight., Ocimum gratissimum Linn., Orobanche aegyptica Pers., Oroxylum indicum (Linn.) Vent., Radermachera xylocarpa Decne., Santalum album Linn., Solanum incanum Linn., Sterculia urens Roxb., Terminalia arjuna (Roxb. ex DC.) Wt. and Arn., Terminalia bellirica (Gaertn.) Roxb., Tricholepis glaberrima DC., Tribulus terrestris Linn., Triumfetta annua Linn., Tylophora dalzellii

Hk. f., Typha angustata Bory and Chaub., Vanda testacea (Lindl.) Reich. f., Vernonia anthelmintica (Linn.) Willd.

EXOTIC WEEDS OF THE AREA

The following list gives exotic weeds which are naturalized or escaped.

TABLE 4 (E): LIST OF EXOTIC WEEDS FOUND IN THE AREA

NAME OF THE PLANT	NATIVE COUNTRY
Anacardium occidentale Linn.	Tropical America
Annona squamosa Linn.	Central America
Acanthospermum hispidum DC.	Central America
Ageratum conyzoides Linn.	Mexico
Arachis hypogea Linn.	South America
Argemone mexicana Linn.	Mexico
Cassia occidentalis Linn.	South America
Cissampelos pariera Linn.	Central America
Cryptostegia grandiflora R. Br.	Tropical Africa
Datura innoxia Mill.	Tropical America
Gauzuma ulmifolia Lamk.	Tropical America
Ipomoea fistulosa Mart ex. Choisy.	Tropical Africa
Ipomoea quamoclit Linn.	Tropical America
Lantana camara Linn.	Tropical America
Lawsonia inermis Linn.	Egypt
Lycopersicon lycopersicum (Linn.) Karst.	South America
Martynia annua Linn.	Mexico
Mecardonia procumbens (Mill.) Sm.	Tropical America
Parkinsonia aculeata Linn.	Mexico and Southern United States
Pithecellobium dulce (Roxb.) Benth.	Mexico
Prosopis cinereria Linn.	Central America and Mexico
Rueilla tuberosa Linn.	Tropical America
Tamarindus indica Linn.	South and Tropical Africa
Tridex procumbens Linn.	Central America
Xanthium strumarium Linn.	Tropical America

LIST OF PLANTS FOUND IN ONLY ONE RANGE

During the botanical explorations in Chhota-udepur forest division, there are few plants which are found only in one range or rather restricted to few localities. Such plants are listed below.

KAWANT RANGE- Anisomeles heyneana Bth., Acacia ferruginea DC., Didymocarpus pygmaea Clarke., Erioleana hookeriana Wt. and Arn., Hardwickia binata Roxb., Hibiscus punctatus Dalz., Kickxia incana (Wall.) Pennell., Leucas martinicensis R. Br., Limnophila indica (Linn.) Druce., Mecardonia procumbens (Mill.) Sm., Sida ovata Forsk., Sida retusa Linn., Vernonia anthelmintica (Linn.) Willd.

CHHOTA-UDEPUR RANGE- Crinum latifolium Linn., Hydrolea zeylanica Vahl., Oroxylum indicum (Linn.) Vent., Sterculia urens Roxb.

DOLARIYA RANGE- Habenaria marginata var. marginata Colebr., Hymenodictyon excelsum (Roxb.) Wall.

PAVI-JETPUR RANGE- Crateava magna (Lour.) DC., Cuscuta chinensis Linn., Dillenia pentagyna Roxb., Gardenia resinifera Roth., Terminalia arjuna (Roxb. ex DC) Wt. and Arn.

NASWADI RANGE- Coix lachryma-jobi Linn., Corchorus capsularis Linn., Guazuma ulmifolia Lamk., Gymnema sylvestre (Retz.) Schult., Hardwickia binata Roxb., Salvadora oleoides Decne., Salvadora persica Linn.

Thus this information gives the restricted distribution of plant species in the area. In all 14 plants are restricted only to Kawant range, 04 to Chhota-udepur range, 02 to Dolariya range, 05 to Pavi-jetpur range and 07 to Naswadi range. These plants are also listed by Thaker (1974) but only from Kawant range. Hence the plants found in range other than the Kawant range are certainly new localities within the forest division from where they are located.

PLANTS WITH RESTRICTED DISTRIBUTION IN GUJARAT BUT FOUND IN AREA EXPLORED

Following is the list of plants which are restricted in distribution in Gujarat state, but found in localities explored under present study. From the list it will be seen that some plants so far were known to occur in one area in Gujarat, but their distribution in the present area is therefore interesting. It can be seen that some of the plants that are restricted in their distribution, are in the forests of Rajpipla, Chhota-udepur and Panchmahals. These forests are quite adjacent to each other on Eastern boundary of the state. These plants are Eriolaena hookeriana Wt. and Arn., Dillenia pentagyna Roxb., Amorphophallus sylvaticus Linn., and Kickxia incana (Wall.) Pennell.

TABLE 4 (F): LIST OF PLANTS WITH RESTRICTED DISTRIBUTION

BOTANICAL NAME	FAMILY	LOCALITY
Alternanthera paronychoides St. Hill.	Amaranthaceae	Rajpipla, Bharuch and Chhota-udepur.
Amorphophallus sylvaticus Linn.	Araceae	Rajpipla, Chhota-udepur, Panchmahals.
Cordia domestica Roth.	Cordiaceae	Chhota-udepur and Saurashtra.
Cordia wallichii D. Don.	Do	Chhota-udepur and Kachchh.
Didymocarpus pygmaea Clarke.	Gesneriaceae	Chhota-udepur, Pavagadh, North Gujarat.
Dillenia pentagyna Roxb.	Dilleniaceae	Dangs, Chhota-udepur, Rajpipla and Ratanmahals.
Dolichos trilobatus Linn.	Fabaceae	Dangs, Chhota-udepur and Saurashtra.
Erioleana hookeriana Wt. and Arn.	Sterculiaceae	Chhota-udepur, Pavagadh and Panchmahals.
Ficus amplissima Linn.	Moraceae	Dangs, Chhota-udepur, North Gujarat.
Gymnema sylvestre (Retz.) Schult.	Asclepiadaceae	Saurashtra and Chhota-udepur.
Hardwickia binata Roxb.	Caesalpiniaceae	Saurashtra, Chhota-udepur and Bulsar.

Indigofera linifolia Linn.	Do	Ankleshwar, Bharuch and Chhota-udepur.
Kickxia incana (Wall.) Pennell.	Scrophulariaceae	Pavagadh, Chhota-udepur.
Lagerstroemia parviflora Roxb.	Lythraceae	Bulsar, Dangs, Rajpipla and Chhota-udepur.
Leucas stricta Benth.	Lamiaceae	Chhota-udepur, Bharuch, North Gujarat.
Mecardonia procumbens (Mill.) Sm.	Do	Rajpipla, Chhota-udepur, Bharuch.
Nervilia aragoana Gaudich.	Orchidaceae	Dangs, Songadh-Vyara, Bansda, Gir National Park and Wildlife Sanctuary.
Nervilia discolor (Bl.) Schltr.	Orchidaceae	Dangs, Songadh-Vyara, Bansda.
Orobanche aegyptiaca Pers.	Orobranchaceae	Chhota-udepur, Kachchh, Saurashtra, North Gujarat.
Oroxylum indicum (Linn.) Vent.	Bignoniaceae	Dangs, Chhota-udepur, Rajpipla and Panchmahals.
Radermachera xylocarpa Decne.	Do	Dangs, Rajpipla, Chhota-udepur and Ratanmahals.
Triumfetta annua Linn.	Tiliaceae	Dangs, Chhota-udepur, Rajpipla and Pavagadh.
Tylophora dalzellii Hk. f.	Do	Dangs, Chhota-udepur and Saurashtra.
Vanda tessellata Hook. f.	Orchidaceae	Dangs, Rajpipla, Chhota-udepur.
Vanda testacea (Lindl.) Reich. f.	Do	Dangs, Bulsar, Chhota-udepur.

NOTE ⟶The area North of Ahmedabad is considered as North Gujarat. This area is made up of Ahmedabad, Mehsana, Patan, Banaskantha and Sabarkantha districts. Central Gujarat comprises of Vadodara, Panchmahals, Dahod, Kheda, Anand and Narmada districts. South Gujarat consists of the area South of river Narmada., i.e. Navsari, Surat, Dangs, Bharuch and Bulsar districts.

From the data given above it can be seen that the range of distribution of some plants is discontinuous but they are also represented in the forest division explored during present study. The exploration is thus meaningful in bringing out the information on plants occurring there to serve as connecting links of distribution. Such an information also indicates a line of distribution of plants when they are very much restricted in nearby forests areas. However, it should be noted or taken into consideration that the information of this type have to be modified by the study of unexplored areas and also underexplored areas.

IDENTIFICATION OF PLANTS BY MEANS OF VEGETATIVE CHARACTERS

This data deals with the identification of some plants by means of vegetative characters. In many a cases it happens that flowering and fruiting are missed or are not observed even after repeating excursion. In such circumstances this key is certainly useful. There are many species in plant kingdom that are typical of its bark, leaves, stem etc. Hence this data was prepared carefully after critical study to add to the knowledge in identification of plants atleast by the means of vegetative characters **PLATE 9**.

TABLE 4 (G): VEGETATIVE FEATURES AS IDENTIFICATION KEY

PLANT NAME	FAMILY	DISTINCT VEGETATIVE CHARACTERS
Adansonia digitata Linn.	Bombacaceae	Typical tapering bark and digitate leaves.
Albizzia procera (Roxb.) Benth.	Mimosaceae	Bark greenish white, smooth, coupled with characteristic leaves of Albizzia, the leaflets in general are smaller in this species.
Amorphophallus sylvaticus Linn.	Araceae	Much lobed leaves and relatively much narrow segments as compared to Amorphophallus campanulatus.
Anogeissus latifolia Guill.	Combretaceae	Bark dirty white or ash colored, smooth, peeling off in scales.
Bauhinia sp.	Caesalpiniaceae	Bilobed leaves
Blumea spp.	Asteraceae	Smell of turpentine when leaves bruised.
Bombax ceiba Linn.	Bombacaceae	Ash colored bark, studded black conical prickles and digitately 3-7 foliate leaves.
Borassus flabellifer Linn.	Arecaceae	Dark black, annulated bark; massive root suckers, terminal crown of fan-shaped leaves.
Boswellia serrata Colebr.	Burseraceae	Bark pinkish to reddish, smooth, peeling off in papery scales.
Bridelia retusa (L.) Spreng.	Euphorbiaceae	Typical spiny bark becoming short on maturity.
Centella asiatica (L.) Urban.	Apiaceae	Likely to be confused with Merremia gangetica but can be differentiated by aromatic smell of leaves when bruised.
Cissus quadrangulare	Vitaceae	Quadrangular stem.

PLATE 9

Mature bark- Bombax ceiba Linn.

Spiny bark- Bridelia retusa (L.) Spreng.

Bark- Adansonia digitata Linn.

Linn.		
Costus speciosus Blatter.	Zingiberaceae	Spirally twisted or strongly flexous stem.
Crateava magna DC.	Capparaceae	Shape of the leaflet and venation pattern.
Curcuma inodora Blatter.	Zingiberaceae	Root tubers that are in odorous rosette of broad, petiolate leaves.
Dalbergia lanceleolaria Linn. f.	Fabaceae	Bark pale greyish white, smooth.
Dillenia pentagyna Roxb.	Dilleniaceae	Large oblong-lanceolate leaves, distinctive venation and sheathing petiole.
Dioscorea pentaphylla Linn.	Dioscoreaceae	3-5 foliate leaves and prickly stem, twining habit.
Erythrina suberosa Roxb.	Fabaceae	Bark corky, yellowish brown, longitudinally fissured.
Eucalyptus sp.	Myrtaceae	Smell of leaves when bruised. Bark ash colored.
Gardenia turgida Roxb.	Rubiaceae	Intra petiolar stipules; size and shape of the leaves, a character by which it can be distinguished from Catunaregum (Xeromphis sp.); leaves glabrous above in Xeromphis uliginosa but hairy on both surfaces in Gardenia turgida.
Garuga pinnata Roxb.	Burseraceae	Leafgalls, compound leaves crowded at the ends of branches; leaflets serrate.
Hardwickia binata Roxb.	Caesalpiniaceae	Leaflets pair one.
Hymenodictyon excelsum (Roxb.) Wall.	Rubiaceae	Ash colored, smooth bark and prominently nerved leaves;interpetiolar stipules.
Ipomoea batatus (L.)	Convolvulaceae	Pinkish red or pale violet tuberous

Lam.		roots.
Lannea coromandelica (Houtt.) Merr.	Anacardiaceae	Ash colored or greyish white bark; leaves crowded at ends of branches but leaflets entire or very shallowly serrate.
Momordica charantia Linn.	Cucurbitaceae	Leaves very much lobed, lobes membranous but stipules not fimbriate.
Moringa concanensis Nimmo ex. Dalz. and Gibs.	Moringaceae	Bipinnate leaves.
Nervilia aragoana Gaudich.	Orchidaceae	Leaves petiolate with wavy margin. Veins on the leaf 18. Greenish-yellow in color.
Nervilia discolor (Bl.) Schltr.	Orchidaceae	Leaves sub-sessile, number of veins less than 18, violet in color.
Sterculia urens Roxb.	Sterculiaceae	Bark greyish-white tinged pink or completely pink, peeling off in very thin papery scales, exudation of white gum.
Syzygium sp.	Myrtaceae	Smell distinctive on bruising of leaves.
Tacca leontopetaloides (Linn.) O. Kuntze.	Taccaceae	Variously complicately lobed leaves; segments bullate on upper surface.
Terminalia arjuna (Roxb. ex DC.) Wt. and Arn.	Combretaceae	Bark sandy-brown smooth peeling off in large pieces.
Terminalia crenulata Roth.	Do	Bark greyish white slightly greyish black tessellated, peeling off in rectangular scales, leaves with two glands one on either side of the mid rib at base beneath.
Urginea indica Linn.	Liliaceae	Tunicated bulb like (Onion) and strap shaped, long, radical leaves spreading on the ground in the form of rosette.
Woodfordia fruticosa (Linn.) Retz.	Lythraceae	Nigro-punctate leaves beneath.

NOMENCLATURE NOTES ON PLANTS OF CHHOTA-UDEPUR FOREST DIVISION

Nomenclature is an important aspect in floristic and taxonomical works for the correct identification of a plant (with its local name as and when available). The botanical nomenclature is governed by the ICBN and it should be employed in any floristic, ethnobotanical and biodiversity work that is claimed to follow modern lines. After a critical study of all such rules and checking the names to find them consistent with the rules, few plants have been discussed here for their correct and authentic nomenclature. Baseline information on such nomenclatural work have been gathered from the work by Naqshi (1993). An attempt therefore is made to put forward precise, accepted or legible botanical names for the plants collected in present study. Corrections are also made on the nomenclature of the floristic work on Chhota-udepur forest division in the year 1968, 1973 and 1974.

Name adopted by Thaker et al., (**1968-69**), Karatela (**1973**) and Thaker (**1974**).	Present study (**1998-2001**).
MALVACEAE	
Gossypium herbaceum Linn. (17-18: 87 and 12: 115).	G. herbaceum L. var. acerifolium (Guill. and Perr.) Chevalier. See Hutchinson et al., in Evolution of Gossypium p. 36. t. 5. 1947; See also Chavan and Oza 66.
FABACEAE	
Cajanus cajan (L.) Huth. (17-18: 89 and 12: 117).	Cajanus cajan (L.) Millsp. See International Code of Botanical Nomenclature (1966) nomina generica conservanda no. 3892 on page no. 301; Naqshi (1993).
Dolichos falcatus Linn. (12: 117).	Dolichos trilobus L. (See Verdcourt, Taxon 17: 170. (1968).
Tephrosia hirta Linn. (17-18: 90 and 12: 118).	Tephrosia villosa (L.) Pers. See All in Biologia 10(1): 26. 1964.
CUCURBITACEAE	
Citrullus lanatus (Thunb.) Mansf. (1963) (17-18: 91 and 12: 119).	Citrullus lanatus (Thunb.) Masumara and Nakai (1920).

Colocynthis citrullus (Linn.) O. Kuntze (19-20: 39).	Citrullus colocynthis (L.) Schrad. (See Oza, Taxon, 11 (8): 254-255 (1962).
Thaker, D. N., have listed this plant as Colocynthis citrullus O. Kuntze in his thesis (1974) from Kawant range. But this is certainly an error because the generic name Citrullus Schrad., is conserved over Colocynthis. Further Thaker et al., (19-20: 39) consider Colocynthis citrullus O. Kuntze and Citrullus vulgaris Schrad., as distinct. Santapau (FL. Saurashtra, P. 251, 1962) considers the correct name for the plant locally known in many parts of Gujarat as "Kalinger or Tarbuch (Watermelon)" to be Colocynthis citrullus (L.) O. Kuntze., and he treats Citrullus vulgaris Schr., as a synonym for Colocynthis citrullus (L.) O. Kuntze. This is a very correct position as also supported by Oza (1962) and Bhandari (1990). Therefore the name adopted by Thaker and co-workers is wrong as Colocynthis citrullus and Citrullus vulgaris are conspecific. There is another Citrullus known in many parts of Gujarat as "Indravarna" is Colocynthis vulgaris Schr., for which the correct botanical name as per ICBN code is Citrullus colocynthis (L.) Schrad.	
Lagenaria siceraria (Molin) Standl. (17-18: 91 and 12: 119).	Lagenaria leucantha (Duch.) Rusby., as per rule of priority.
RUBIACEAE	
Hamiltonia suaveolens Roxb. (12: 119).	Spermadictyon suaveolens Roxb.
For the nomenclature of the generic name see Santapau and Merchant (BOBSI, 3: 110. 1961), Santapau (1967) and Rau (1969). The genus Spermadictyon Roxb. Pl. Cor. 3: 32. t. 236. 1815 has priority over Hamiltonia Roxb. Hort. Beng. 15. 1814 nom. nud. and Fl. Ind. 2: 224. 1824. Further Hamiltonia Roxb. (1814) is a latter homonym of Hamiltonia Muhl. ex Willd. 1805.	
ASTERACEAE	
Blumea solidaginoides (Poir.) DC. (12: 120).	Blumea mollis (Don) Merr.

Thaker, D. N. (1974) lists this plant as Blumea solidaginoides (Poir.) DC., which is conspecific with Blumea mollis (Don) Merr. This name is not taken up in present work because Randeria in monograph on Blumea considers that B. solidaginoides (Poir.) DC., is imperfectly known and Thaker et al., (19-20: 40) have themselves adopted the name B. mollis (D. Don.) Merill in their review paper thereby implying that they have rejected the name B. solidaginoides (Poir.) DC. I have therefore adopted B. mollis according to latest flora by Shetty and Singh (1991); Samvatsar (1996) and Mudgal, Khanna and Hajra (1997).	
Launaea fallax (J. and S.) O. Kuntze (12: 120).	Launaea procumbens (Roxb.) Ram. and Raj.
SAPOTACEAE	
Manilkara achras (Mill.) Fosberg (17-18: 93 and 12: 120).	Achras sapota Linn.
This plant is cultivated at Chhota-udepur forest division, but it is one of the most exciting plant from the view point of nomenclature. Wood and Channell (Jour. Arn. Arbor. 41: 15. 1960) have shown that Gilly has fused the two genera on the strength of transitional forms occurring between Achras Linn., and Manilkara Adans. These authors, however, remark that though the union has been generally accepted, the correct name for the genus as constituted has been a matter of controversy that is settled by conservation of Manilkara Adans., and rejection of Achras L. In fact the name Manilkara Adans., was not conserved against Achras Linn., uptill the ICBN code of 1966. However, Lundwell (Phytologia 16: 445. 1968) states with a clarification by W. T. Stearn (Taxon 16: 382. 1967) on the status of the genus Achras L., that the Linnean genus should be retained. Hence in the view of the above points, the name Manilkara achras (Mill.) Fosberg as used by Thaker et al., (1968-69); Karatela (1973) and Thaker (1974) is not valid. But reviewing the recent literature by Samvatsar (1996) and Mudgal, Khanna and Hajra (1997), I have adopted the name Manilkara zapota (L.) P. Royen.	
Madhuca longifolia Macbr. var. latifolia (Roxb.) Cheavlier	Madhuca indica Gmel.

Thaker et al., (1968-69) lists Madhuca longifolia var. latifolia from Chhota-udepur and Karatela (1973) from Kawant range. The same nomenclature has been adopted by PradeepKumar (1993) from SWLS, but Oza (Ind. For. 97: 651-653. 1971) specifically states that the variety latifolia is not found in Western India. In light of Oza's detailed and critical study the nomenclaure adopted by Thaker (1974) and Karatela (1973) has to be cautiously adopted. It is interesting to note however that it is little doubtful to adopt the name Bassia longifolia Macbr., and Bassia latifolia as they are treated distinct in most of our Indian floras (Bhandari, 1990; Shetty and Singh, 1991). I have therefore adopted the name Madhuca indica Gmel., as adopted by Samvatsar (1996); Mudgal, Khanna and Hajra (1997); Singh, et al., (2001).	
SCROPHULARIACEAE	
Bacopa procumbens (Mill.) Greenm. (19-20: 43).	Mecardonia procumbens (Mill.) Small.
The nomenclature adopted by Thaker et al., (1968-69; 19-20: 43) for the present plant is Bacopa procumbens (Mill.) Greenm. However, it is not certain if the latter name should replace the former, since Bacopa procumbens Greenm., seems new to replace Mecardonia procumbens (Mill.) Small., because the author i.e. Thaker himself has adopted the name Mecardonia procumbens (Indian Forester, 1971). Morever, Dr. Philcox who has an authority on Scrophulariaceae has adopted the name Mecardonia procumbens (Mill.) Small., citing Bacopa procumbens (Mill.) Greenm., as a synonym or otherwise some of the recent floras of Bhandari (1990); Shetty and Singh (1991); Samvatsar (1996); Mudgal, Khanna and Hajra (1997); Singh, et al., (2000) have also adopted Mecardonia procumbens (Mill.) Sm., and therefore I have adopted the same name in my present study.	
EUPHORBIACEAE	
Phyllanthus asperulatus Hutch (Thaker et al., 12: 124, 1968-69).	Phyllanthus fraternus Webst.
MORACEAE	
Ficus tsiela Roxb. (Thaker et al., 17-18: 98; 1968-69).	Ficus amplissima Sm.
PANDANACEAE	
Pandanus tectorius Soland ex Parkins (Thaker et al., 1968-69; Karatela,	Pandanus odoratissima L. f. I have cited a patch of 5-6 plants of this species near the

1973).	river Orsang bridge at Bodeli in Pavi-jetpur range of Chhota-udepur forest division.

COMMENTS ON THE NOMENCLATURE PUBLISHED

Zizyphus xylopyrus (Rhamnaceae)-------The specific epithet in our Indian flora is spelt xylopyra. However, Santapau in Fl. Saurashtra 94. 1962 and Santapau and Janardhan (Check list Fl. Saurashtra. Page 15) spell it as xylopyrus; Rau (BOBSI, Suppl. 2. 21. 1969 also spells similarly. However it should be noted that in the genus Zizyphus the species listed by all these authors (except Z. xylopyra) bear the specific names which do not end in "us". Therefore the correct species under consideration should be xylopyra as mentioned by Verma, Balakrishnan and Dixit (1993) and Singh, et al., (2000).

Albizzia (Mimosaceae)-------Santapau (1962, 1967) and Santapau and Janardhan (1967) considently spelt the genus Albizia as also the other authors like Shah (1978); Shetty and Singh (1991); Verma, Balakrishnan and Dixit (1993) and Jain (1991, 1999) though it is spelt by other authors as Albizzia (See Index Kewensis 1: 71; Cooke 1: 48, 1958 (Repr. ed).; Maheshwari, J. K. P. 151. 1963 etc). Ali and Qureishi (Pakistan J. For. 17: 365. 1967) also consider Albizzia as the correct spelling for this genus. The generic name is based on the name of Italian Botanist F. Del Albizzi (See Cornar, Wayside trees of Malaya, 1951). Santapau does not advance reasons for accepting the spelling Albizia though in his Khandala flora ed. 2. 77. 1967 he has used the conventional spelling Albizzia. Therefore I have also adopted the conventional spellings Albizzia, though it is open for correction.

Acacia (Mimosaceae)-------In our Indian floras the generic name Acacia is attributed to Willdenow (1806) but the authority should correctly go to P. H. Miller (Garden dictionary Abbrev. Ed. 4. Vol. 1. 754 on the rule of priority (See Isely in Rhodora 59: 118. 1957).

Alangium salvifolium (Alangiaceae)-------The spelling of specific epithet in most of our Indian floras is Salvifolium as mentioned by Santapau (1962); Chavan and Oza (1966); Mukerjee (1968); Rau (1969); Shah (1978); Shetty and Singh (1991); Mudgal, Khanna and Hajra (1997) etc. However the spelling as given in Index Kewensis Suppl. 4. P. 7. is Salviifolium and this spelling is also used by Bor in (Man. Ind. For. Bot. 101. 1953). The latter spelling is adopted by Wangerin in Engl. Pfreich, based on synonym Grewia salviifolia Linn. According to the rule of nomenclature the specific epithet should be accordingly spelt in the genus Alangium and therefore, the spelling salviifolium seems to be correct. Rau (1969, P. 39) considers Alangium chinensis (Lour.) Harms to be correct name for Alangium lamarkii Thw. Mukerjee in BOBSI 10: 330. 1968 recognises two sub species of Alangium salvifolium. The subsp salviifolium is conspecific with lamarckii Thw. Mukerjee in his revision (p. 331) also gives Alangium chinensis (Lour.) Harm., but does not cite A. lamarckii as a synonym of A. chinensis (Lour.) Harms, as considered by Rau.
Holarrhena pubescens (Apocynaceae)-------Maheshwari (Fl. Delhi 216. 1963), Puri et al., (Fl. Rajasthan 82. 1964), Shah (Fl. Gujarat. 1978), Shetty and Singh (1991), Samvatsar (Fl. Western M. P., 1996), Mudgal, Khanna and Hajra (1997) etc seems to have wrongly based the present name on the Linnean species Nerium antidysentricum Linn., which is altogether a different plant, it being Wrightia zeylanica. From the rule of priority the correct authority of the nomenclatural combination of Holarrhena pubescens should be attributed to G. Don (1837) and not to DC (1844) as done by Santapau (1967), Santapau and Janardhan (1967) and Rau (1969). The latest or current taxonomic work of Singh, et al., (2000) mentions the plant as Holarrhena pubescens (Buch.-Ham) Wall. ex G. Don.
Sopubia delphinifolia (L.) G. Don. (Scrophulariaceae)-------Santapua (Fl. Khandala P. 164. 1960), and Fl. Saurashtra Check list P. 37. 1965), Shetty and Singh (1991), Samvatsar (1996), Mudgal, Khanna and Hajra (1997) cites Gerardia delphinifolia Roxb. Pl. Cor. 1. t. 90. 1795 for this plant and is followed so by many taxonomists in Western India; however Index Kewensis 2: 1022. 1895 refers to Gerardia delphinifolia Linn. Cent. Pl. 2: 21. 1756, which is equal to Sopubia delphinifolia D. Don. Therefore, the author of Linneaus for G. delphinifolia has priority over that of Roxburgh and the present plant should be called Sopubia delphinifolia (Linn.) G. Don as correctly cited by Singh, et al., (2000).

Clerodendrum multiflorum (Verbenaceae)-------The nomenclature adopted here is the one given by Santapau and Janardhan (P. 40, 1967). However, C. multiflorum G. Don., in Edinb. Phil. Journ. 11: 350. 1834 (See Index Kewensis Part I. 561, 1895) has piority over C. multiflorum O. Kuntze (1893). If C. multiflorum of G. Don (Clerodendrum volubilis Beauv.) and that of O. Kuntze were to be different, C. multiflorum O. Kuntze becomes a later homonym and it will not be valid according to Art. 64 of the code. The nomenclature therefore needs attention though Mudgal, Khanna and Hajra (1997) etc cites Clerodendrum multiflorum (Burm. f.) O. Kuntze and I have followed the same as cited by the above authors.

LIST OF NAME CHANGES IN FEW PLANTS AS ADOPTED IN PRESENT WORK

Previous Botanical Names	New Nomenclature adopted during present work
Acacia catechu (L. f.) Willd.	Acacia chundra (Roxb. ex Rottl.) Willd.
Adina cordifolia (Roxb.) Hk. f. ex Brandis	Haldinia cordifolia (Roxb.) Rids.
Agave americana auct. nom. Linn.	Agave cantula Roxb.
Alangium salvifolium (L. f.) Wang. (Alangiaceae).	Alangium salvifolium (L. f.) Wang. (Cornaceae).
Ammania Linn.	Ammannia Linn.
Bergia odorata Edgew.	Bergia suffruticosa (Del.) Fenzel.
Careya arborea Roxb. (Barringtoniaceae).	Careya arborea Roxb. (Lecythidaceae).
Crateava nurvula Buch.-Ham.	Crateava magna (Lour.) DC.
Derris indica Bennet.	Pongamia pinnata (L.) Pierre.
Emblica officinalis Gaertn.	Phyllanthus emblica Linn.
Euphorbia neriifolia Linn.	Euphorbia ligularia Roxb.
Hymenodictyon excelsum (Roxb.) Wall.	Hymenodictyon orixense (Roxb.) Mabb.
Morinda tomentosa Heyne ex. Roth.	Morinda pubescens Sm.
Nyctanthes arbor-tristis Linn. (Nyctaginaceae).	Nyctanthes arbor-tristis Linn. (Oleaceae).
Ocimum sanctum Linn.	Ocimum tenuiflorum Linn.
Phyllanthus niruri auct. non. Linn.	Phyllanthus fraternus Webst.
Thevetia peruviana (Pers.) K. Schum.	Thevetia neriifolia Juss. ex Steud.
Xeromphis spinosa (Thunb.) Keay.	Catunaregam spinosa (Thunb.) Tiruvengadum.
Xeromphis uliginosa (Retz.) Maheshw.	Catunaregam nilotica (Stapf.) Tiruvengadum.

New names adopted as per Naqshi (1993); Verma, Balakrishnan and Dixit (1993); Samvatsar (1996); Mudgal, Khanna and Hajra (1997) and Singh, et al., (2000).