

THE DRY DECIDUOUS SCRUB VEGETATION OF POONA DISTRICT

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ABSTRACT

The scrub vegetation is not a natural type in Poona district. It is biotic community.¹ The vegetation somewhat resembles a savannah. Bawdhan hills about 7 km. west and Walhe 60 km. south-east of Poona are described. Percentage occurrence of different species of trees, shrubs, climbers, herbs and grasses are given. The vegetation on different slopes of the hill has been compared. The herbaceous flora is seasonal, appearing mainly in the monsoons.

INTRODUCTION

Scrub vegetation is not a natural type in the Poona district and occurs under the same climatic, geological and soil conditions under which good dry deciduous forest occurs in the adjoining areas. The scrub vegetation somewhat resembles the Savannah type but differs from it in one important feature, that is in a natural Savannah trees are found scattered all over the country and this tree-growth is more or less natural in origin while in the scrub vegetation which is described in the present paper, trees are very greatly malformed and lopped and may not be occurring scattered in the area. There is a clear evidence that the scrub vegetation is a biotically controlled community, which, if closed to the human factor would most probably return to dry deciduous forest of somewhat similar composition and physiognomy from which the scrub has originally degraded.

The present study was made in the Bawdhan Hill on the Poona-Khadakvasla Road and at Walhe which is 60 km. south-east of Poona on Baramati road. The altitude of both these places is about 500 m. above sea-level. The vegetation was studied by running a number of transects on the hills on different slopes and records were made in quadrats of 5 meters radius according to the methods given by Misra and Puri (1957).

VEGETATION

A summary of the data on vegetation is presented in Table I and a brief description of different localities is given below:—

Bawdhan Hills : The Bawdhan Hills are a series of hillocks to the west of Poona on the Poona-Khadakvasla road forming part of the Sahyadari ranges. Towards the

west they join the branch of Sahyadari which starts from Sinhadadh and extends east-wards more or less terminating in the neighbourhood of Poona.

The area was visited a number of times in different seasons, plants were collected and recorded in quadrats. Some plants which were less frequent were also collected and since they did not fall in any of the quadrats they have been given in a separate list.

The general topography at Bawdhan and its neighbourhood is of plain country with small hillocks covered with a degraded type of scrub and open grasslands. For the most part the hillocks are formed of the strata of amygdaloid that decomposes to form a coarse gravelly type of shallow soil, which is chocolate brown or sometimes black in colour with basaltic boulders scattered on the surface or partially embedded. Such conditions of soil are aggravated by erosion resulting from adverse practices.

Similar types of hills occur all along the Poona-Paud road and are covered with similar vegetation.

Annual rainfall is about 60 cms. Cultivation is confined to shallow valleys where soil is deeper. The slopes on the east, south-east and particularly west show traces of abandoned cultivation with terraced fields.

Bawdhan Hill—East slope : The dominant vegetation on this slope is formed by *Acacia chundra* which occurs in 45% of the quadrats studied. *Boswellia serrata* and *Grewia tiliaefolia* are its other associates. *Tectona grandis* trees are heavily lopped and malformed. *Flacourtia indica*, *Grewia pilosa* and *Schrebera swietenioides* are fairly common. *Lagerstroemia* spp., *Terminalia tomentosa* and *Acacia arabica* are found scattered here and there. *Gymnosporia spinosa* and *Zizyphus xylopyrus* shrubs occur at some places. Climbers in general are few.

The grasses and other ground flora species form a more conspicuous feature of the vegetation than trees and shrubs. The commonest is *Apluda mutica* var. *aristata* occurring in 50% of the quadrats studied. Its more common associates are *Heteropogon contortus*,

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TABLE I
BAWDHAN HILLS

I. Area	Bawdhan Hill— East slope	Bawdhan—West slope	Bawdhan— North slope	Bawdhan— South slope	Bawdhan—top of hill
II. Rock and Geology	Trap basaltic	Trap basaltic	Trap basaltic	Trap basaltic	Trap basaltic
III. Soil	Grey or black- ish; Murum, shallow.	Lower part of slope has deep- er soil and Murum.	Soil deeper than other three slopes. Moist.	Soil grey, shal- low; at places very shallow dry.	Soil grey, dry, shallow, rocky.
IV. Aspect	Eastern slope.	Western slope scarp.	North dip slope.	South slope, scarp.	Almost flat small top.
V. Biota	Base of hill open to grazing. Upper portion closed.	Grazing in lower part. Cultivation of Jowar in mid- dle terrace.	Grazing open in lower part of the hill.	Grazing evident only in lower part. Upper terraces are closed for graz- ing.	Top is closed for seasonal grass. So are the slopes in upper half.
VI. Quadrats :—percentage presence	25 of five meter radius. %	10 of 5 meter radius. %	24 of five meter radius. %	10 of five meter radius. %	10 of five meter radius. %
VII. Trees and Shrubs					
<i>Acacia arabica</i> Willd.	9	30	19	40	—
<i>A. chundra</i> Willd.	45	30	29	20	10
<i>Bauhinia racemosa</i> Lam.	5	—	—	10	—
<i>Boswellia serrata</i> Roxb.	24	10	21	40	30
<i>Butea monosperma</i> Kuntze	—	—	8	—	—
<i>Cassia auriculata</i> L.	5	—	4	10	—
<i>C. fistula</i> L.	—	—	5	—	10
<i>Carissa congesta</i> Wight	4	10	—	—	—
<i>Dalbergia lanceolaria</i> L.f.	—	—	17	20	—
<i>Diospyros melanoxylon</i> Roxb.	—	—	5	—	—
<i>Elaeodendron glaucum</i> Pers.	15	—	28	—	—
<i>Erythrina variegata</i> var. <i>orientalis</i> Merr.	—	—	15	—	30
<i>Ficus</i> sp.	9	—	12	—	10
<i>Flacourtia indica</i> Merr.	19	—	17	20	10
<i>Gardenia turgida</i> Roxb.	—	10	—	—	—
<i>Gmelina arborea</i> L.	—	10	—	—	—
<i>Grewia tilaefolia</i> Vahl	28	—	17	20	50
<i>G. pilosa</i> Lam.	17	—	—	20	—
<i>Gymnosporia spinosa</i> Fiori	7	10	—	30	—
<i>Jatropha curcas</i> L.	10	—	4	—	—
<i>Lagerstroemia lanceolata</i> Wall.	4	10	—	10	—
<i>L. parviflora</i> Roxb.	11	—	—	10	10
<i>Lantana camara</i> L. var. <i>aculeata</i> Moldenke	24	50	24	10	—
<i>Leea</i> sp.	—	10	7	—	—
<i>Morinda tinctoria</i> Roxb.	7	—	—	—	—
<i>Pongamia pinnata</i> Pierre	—	—	4	—	—
<i>Schrebera swietenioides</i> Roxb.	14	—	—	—	10
<i>Securinega leucopyrus</i> Muell.-Arg.	—	10	—	10	—
<i>Tectona grandis</i> L.	22	—	38	10	40
<i>Terminalia chebula</i> Retz.	—	10	15	20	—
<i>T. tomentosa</i> Clarke	7	20	25	20	—
<i>Woodfordia fruticosa</i> Kurz	—	20	4	—	—
<i>Zizyphus mauritiana</i> Lam.	—	10	—	10	—
<i>Z. oenoplia</i> Lam.	—	—	4	—	—
<i>Z. xylopyrus</i> Willd.	9	—	14	10	—
Climbers					
<i>Argyrea setosa</i> Choisy	—	—	—	20	—
<i>Asparagus racemosus</i> L.	—	—	10	10	—
<i>Cardiospermum halicacabum</i> L.	7	—	—	—	—
<i>Celastrus paniculata</i> Willd.	5	—	4	—	—
<i>Cocculus hirsutus</i> Diels	—	—	10	—	—
<i>Cryptolepis buechanani</i> Roem. & Schult.	5	—	4	—	—
<i>Rivea hypocrateriformis</i> Choisy	16	—	—	20	—
<i>Cissus</i> sp.	12	—	17	—	—

Herbs and Grasses

<i>Alysicarpus pubescens</i> Laws.	—	—	—	20	—
<i>A. tetragonolobus</i> Edgew.	4	—	5	—	—
<i>Andropogon pumilus</i> Roxb.	—	10	—	—	—
<i>Apluda mutica</i> L. var. <i>aristata</i> (L.) Pilger	50	60	58	80	70
<i>Argyrea cuneata</i> Ker.	—	20	9	—	—
<i>Aristida depressa</i> Retz.	—	—	—	10	—
<i>A. funiculata</i> Trin.	—	—	—	10	—
<i>Arthraxon serrulatus</i> Hochst.	—	—	—	30	—
<i>Arundinella tuberculata</i> Munro	—	10	—	—	—
<i>Barleria gibsoni</i> Dalzell	18	—	20	—	—
<i>Bothriochloa pertusa</i> Camus	12	—	5	—	—
<i>Chloris dolichostachya</i> Lag.	5	—	—	—	—
<i>Chrysopogon fulvus</i> Chiov.	26	10	15	30	10
<i>Clerodendrum serratum</i> Moon.	7	—	29	10	—
<i>Crotalaria juncea</i> L.	4	—	5	30	—
<i>Curculigo orchioideus</i> Gaertn.	—	—	—	10	—
<i>Cymbopogon martinii</i> Wats.	35	30	24	30	60
<i>Dichanthium</i> sp.	—	—	—	10	—
<i>Echinops echinatus</i> DC.	5	10	—	10	—
<i>Exacum pumilum</i> Griseb.	—	10	—	—	—
<i>Goniocaulon glabrum</i> Cass.	—	—	—	10	—
<i>Heteropogon contortus</i> Beauv.	37	40	17	20	40
<i>Indigofera cordifolia</i> Heyne	—	—	—	20	—
<i>I. linifolia</i> Retz.	—	—	—	10	—
<i>Lavandula bipinnata</i> Kuntze	10	—	—	40	—
<i>Lagascea mollis</i> Cav.	9	20	—	10	—
<i>Lepidagathis cristata</i> Willd.	—	—	—	30	—
<i>Lophopogon tridentatus</i> Hack.	5	—	—	—	—
<i>Ophiuros exaltatus</i> Kuntze	7	—	27	—	10
<i>Plumbago zeylanica</i> L.	—	10	—	—	—
<i>Polygala persicariaefolia</i> DC.	—	—	—	—	10
<i>Pseudanthistiria heteroclita</i> Hook. f.	28	30	71	40	10
<i>Rungia elegans</i> Dalzell & Gibson	9	—	—	20	—
<i>Sehima sulcatum</i> Camus	21	—	15	—	30
<i>Setaria intermedia</i> Roem. & Schult.	—	10	—	—	—
<i>S. pallidifusca</i> Hubbard.	—	10	—	20	—
<i>Sporobolus diander</i> Beauv.	5	—	—	—	—
<i>Themeda quadrivalvis</i> Kuntze	7	—	5	10	30
<i>Tridax procumbens</i> Stapf	—	10	—	—	—
<i>Xanthium strumarium</i> L.	10	—	—	—	—

Cymbopogon martinii, *Pseudanthistiria heteroclita* and *Chrysopogon fulvus*. *Barleria gibsoni*, *Clerodendrum serratum*, *Lavandula bipinnata*, *Lagascea mollis*, *Rungia elegans* and *Xanthium strumarium* are the only common dicotyledonous plants.

The area is heavily grazed and grasses are cut during the months of October and November. Sometimes the slopes are burnt for getting abundant growth of grasses during the following year. When fully grown the grasses attain a height of 2 or even 2.5 meters and conceal all herbs and most of the shrubs.

The lower parts of the slope have abundance of *Lantana* bushes which gradually decrease with the up slope and disappear at the top. At the foot of the hill *Sehima sulcatum* is very abundant. In some shallow pits near the base of the hill *Caesulia axillaris* has colonized areas with higher moisture content.

West slope : The upper part of the western slope has terraces of abandoned cultivations. The lower part is under cultivation. The major crop is *Sorghum halepense* Pers. (Jowar). The lower slopes have mainly murrum and gravel. *Lantana camara* var. *aculeata* is the commonest shrub on this slope being recorded in 50% of the quadrats and is more abundant on the lower parts.

It is rare or absent in upper half of this slope. *Acacia arabica* is less common on eastern slope, whereas *Acacia chundra* is nearly uniformly present on all slopes. Seedlings of *Terminalia tomentosa* and shrubs of *Woodfordia fruticosa* are common. Small plants of *Boswellia serrata*, *Carissa congesta*, *Gardenia turgida*, *Terminalia chebula*, *Zizyphus mauritiana* and *Securinega leucopyrus* are present scattered at distances. The only climber seen on this slope was *Argyrea setosa*.

On the western slope also the most abundant grass was *Apluda mutica* var. *aristata*. Its commonest associates are *Heteropogon contortus*, *Cymbopogon martinii* and *Pseudanthistiria heteroclita*. *Andropogon pumilus*, *Arundinella tuberculata*, *Chrysopogon fulvus*, *Setaria intermedia* and *Setaria pallidifusca* are other less common grasses. Some plants of *Echinops echinatus* and *Tridax procumbens* occur scattered here and there.

North slope : The northern slope is more steep than all the other slopes of the hill but it is shaded and more moist. The vegetation on this slope is denser than other slopes and soil is also deeper and richer. *Tectona grandis* is the commonest tree in this area. The trees are small or of medium height. Teak seedlings are also present. Small trees and saplings of *Dalbergia lanceolaria* and

Boswellia serrata are present. The shrub layer is chiefly constituted of small trees of *Acacia chundra*, *Elaeodendron glaucum*, *Lantana camara* var. *aculeata*, *Grewia tiliaefolia*, *Flacourtia indica*, *Acacia arabica* and seedlings of trees.

The northern slope is apparently clearly divisible into three broad parts viz. upper, middle and lower.

The upper part has predominance of tall grasses viz. *Apluda mutica* var. *aristata* and *Pseudanthistiria heteroclita*. Shrubs are only few in this part. Some plants of *Polygala persicariaefolia*, *Alysicarpus tetragonolobus*, *Rungia elegans*, *Argyrea cuneata* and *Crotalaria juncea* were seen.

The middle part of the slope is richest in vegetation with small trees and saplings of Teak, *Boswellia serrata*, *Dalbergia lanceolaria*, *Terminalia* spp., *Elaeodendron*, *Erythrina*, *Acacia* spp. and *Zizyphus* species. *Clerodendrum serratum* and *Barleria gibsoni*, are frequently present in the ground flora. Grasses are present in this part of the slope also but the area being more easily accessible to cattle, they are neither so tall nor so profuse in growth as on upper part of the slope. The presence of more dense growth of shrubs and small trees keeps the middle part of the slope moist and shady and thus unfavourable for grasses.

The lower part of the slope has few small trees of *Erythrina* and dominance of *Lantana camara*, *Acacia* and saplings of *Terminalia*. Seedlings of *Lagerstroemia* spp. are also present. Grasses are frequent in this area. *Themeda quadrivalvis* is the tallest grass. Other common grasses in this community are *Ophiuros exaltatus*, *Cymbopogon martinii*, *Heteropogon contortus*, *Chrysopogon fulvus* and *Sehima sulcatum*.

Along the roadside on the north slope (as also sometimes on other slopes) the moister localities are densely covered by numerous sedges and the small beautiful grass *Lophopogon tridentatus*.

South slope : The southern slope of the hill is more gentle than the other three slopes. The upper portion of the slope and terraces are closed to grazing for seasonal auction of grass. Terraces of abandoned cultivation are clearly seen. The commonest plants on this slope are shrubs of *Acacia arabica* and small trees or saplings of *Boswellia serrata*. Trees of *Boswellia serrata* are generally not more than 3 meters high. In the months of September and October when the slopes and terraces are densely covered with tall grasses saplings of *Boswellia serrata* alone stand above them in the upper parts. *Gymnosporia spinosa*, *Acacia chundra*, *Dalbergia lanceolaria*, *Flacourtia indica*, *Grewia tiliaefolia*, *Grewia pilosa* and *Terminalia* species are the commonest associates of *Acacia* and *Boswellia*. All these small trees and shrubs show marked malformation. *Lagerstroemia* seedlings occur scattered on the slope but are not frequent. There is a large tree of *Schrebera swietenoides* on the base of the slope. Grasses are present all over the slope. During the season of dense grass growth, communities of *Bothriochloa pertusa* and *Sehima sulcatum*

are prominent. *Celosia argentea* is seen growing on freshly exposed soil.

The commonest grasses on the south slope are *Apluda mutica* var. *aristata*, *Pseudanthistiria heteroclita*, *Arthraxon serrulatus*, *Chrysopogon fulvus* and *Cymbopogon martinii*. *Chrysopogon fulvus* is a tall grass and its golden yellow spikelets become conspicuous above other grasses.

Several dicotyledonous herbs occur mixed with grasses. *Alysicarpus pubescens*, *Rungia elegans*, *Rhamphicarpa longiflora*, *Heylandia latebrosa* and species of *Polygala*, *Indigofera* and *Crotalaria* are frequently present. *Lepidagathis cristata* is present on rocky hard soil.

As described above, the hill has several terraces of abandoned cultivation on all its slopes. At least two or three terraces are clearly seen. The vegetation at the top of the hill resembles the vegetation that is present on the flat terraces. The soil is deeper on the top. The commonest trees here are *Tectona grandis*, *Boswellia serrata* and *Erythrina variegata* var. *orientalis*. These are usually only 2-3 meters high. The number of saplings of *Boswellia serrata* is highest at the top of the hill. Shrubs of *Acacia chundra*, *Flacourtia indica* and *Grewia tiliaefolia* occur scattered.

The grass growth is very dense at the top. They grow up to about 2 meters high. The commonest grasses at the top are *Apluda mutica* var. *aristata* and *Cymbopogon martinii*. *Heteropogon contortus*, *Sehima sulcatum* and *Themeda quadrivalvis* are the associate species. There is a small temple at the top of the hill where a few trees of *Ficus religiosa*, *Ficus bengalensis* and *Cassia fistula* are growing.

The degraded scrub vegetation as described above is found on several hills and other places in the district. The degree of destruction varies from place to place. The hills which have been subjected to more intense human interference do not support any shrubs but only small grasses such as species of *Aristida* and *Heteropogon*. *Bothriochloa pertusa* grows scattered at places where little more favourable soil and moisture conditions exist. This grass is the first to be grazed by cattle. *Aristida* species grow on comparatively drier soil and are usually grazed only by goat.

Planted trees of *Syzygium cumini*, *Mangifera indica* and *Psidium guajava* etc. flourish well in moister situations in valleys.

The following plants were also collected from these hills:—*Acacia leucophloea* Willd., *Aspidopterys cordata* Juss., *Arthraxon inermis* Hook. f., *Arundinella ciliata* Nees, *Atylosia scarabeoides* Benth., *Cephalostigma flexuosum* Hook. f., *Chionachne semiters* Fischer, *Chloris virgata* Sw., *Clematis triloba* Heyne, *Crotalaria calycina* Schr., *Crotalaria orixensis* Roth, *Digitaria royleana* Prain, *Digitaria ternata* Stapf, *Echinochloa colona* Link, *Eleusine indica* Gaertn., *Eragrostis poaeoides* Beauv., *Fimbristylis monostachya* Hassk., *Gloriosa superba* L., *Heylandia latebrosa* DC., *Indigofera glandulosa* Willd., *Melanocenchris jacquemontii*

TABLE II

WALHE

I. AREA	Rocky Plateau near Walhe village	Barren hillock near Walhe village
II. ROCK AND GEOLOGY	Trap basaltic	Trap basaltic with amygdaloid
III. SOIL	Weathered trap rock shallow dry, gravelly	Shallow, gravelly, dry
IV. ASPECT	Flat	Southern slope
V. BIOTA	Heavily grazed	Heavily grazed
VI. QUADRAT:—PERCENTAGE OCCURRENCE	15 of 50 cm. radius %	15 of 50 cm. radius %
VII. SHRUBS		
<i>Cassia tora</i> L.	13	7
<i>Tephrosia purpurea</i> Pers.	93	—
HERBS AND GRASSES		
<i>Andropogon pumilus</i> Roxb.	—	7
<i>Aristida funiculata</i> Trin. & Rupr.	46	46
<i>Boerhaavia diffusa</i> L.	—	20
<i>Bothriochloa pertusa</i> Camus	20	—
<i>Chrysopogon fulvus</i> Chiov.	13	13
<i>Cyanotis fasciculata</i> Schult. f.	100	100
<i>Euphorbia hirta</i> L.	40	74
<i>Evolvulus alsinoides</i> L.	20	13
<i>Fimbristylis digitata</i> Boec.	40	13
<i>Glossocardia bosvallea</i> DC.	—	20
<i>Heteropogon contortus</i> Beauv.	7	20
<i>Indigofera cordifolia</i> Heyne	26	33
<i>Lepidagathis cristata</i> Willd.	7	—
<i>Leucas longifolia</i> Benth.	7	7
<i>Melanocenchris jacquemontii</i> Jaub. & Spach.	80	74
<i>Phaseolus trilobatus</i> Ait.	40	74
<i>Polygala erioptera</i> DC.	7	—
<i>Tridax procumbens</i> L.	13	54
<i>Zornia diphylla</i> Pers.	33	20

Jaub. & Spach, *Phaseolus aconitifolius* Jacq., *Phaseolus trilobus* Ait., *Polygala chinensis* L., *Rhamphicarpa longiflora* Benth., *Scleria biflora* Roxb., *Sclerocarpus africanus* Jacq., *Spodiopogon rhizophorus* Pilger, *Teramnus labialis* Spr., *Thelepogon elegans* Roth, *Tripogon purpurescens* Duthie and *Urochloa panicoides* Beauv.

Walhe: Another spot typical of degraded scrub vegetation was studied at Walhe 60 km. south-east of Poona. This area is a flat rocky plateau with small hillocks all round. There is no high hill in the vicinity. The substratum is hard weathered rock. The area is open to grazing. Effects of grazing are very evident. The plants are poor in growth, stunted and the number of prostrate plants is great. A summary of the data is presented in Table II. The first spot studied is a rocky plateau, near village.

It is a patch of *Tephrosia purpurea* community in which few *Cassia* shrubs are also present. The whole area is covered with *Tephrosia* plants; their percentage

occurrence in the quadrats being 93. *Phaseolus trilobus*, *Euphorbia hirta*, *Indigofera cordifolia* and *Zornia diphylla* are prostrate or decumbent herbs common all over the area. *Cyanotis fasciculata*, *Aristida funiculata* and *Melanocenchris jacquemontii* are the most common among monocotyledonous plants.

Another spot was studied on a hill adjacent to this rocky plateau. The vegetation on the hill is poorer than the Bawdhan hills. Grazing is very heavy rendering the hill almost barren. *Cassia auriculata* is the only shrub on this hill. The ground flora too is very poor. *Cyanotis fasciculata* is the most abundant plant. Its frequency in one meter quadrats, taken on the hill slope and top is 100%. The purplish blue flowers of this plant give a characteristic colour to the hill side, which is conspicuous from a distance. *Melanocenchris jacquemontii*, *Phaseolus trilobus*, *Euphorbia hirta*, *Tridax procumbens*, *Aristida funiculata* and *Indigofera cordifolia* are other associates of *Cyanotis*. *Indigofera cordifolia* and *Tridax procumbens* are present in between the boulders and

rocks. Other commoner herbs present at this place are *Zornia diphylla*, *Glossocardia bosvallia*, *Evolvulus alsinoides*, *Boerhaavia diffusa*, *Heteropogon contortus*, *Andropogon pumilus* and *Chrysopogon fulvus*.

The vegetation of this hill is almost on the verge of extinction. Few grasses and *Cassia* bushes are the only perennial species and if left open to grazing, as it is now, complete denudation of the hill of any permanent vegetation within a few years is a certainty.

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