Annual Forest Administration Report of the Bombay Presidency including Sind

For the Year 1926-27

Part I

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List of trees and shrubs mentioned in the Report and their scientific names

Vernacular name	Scientific name
Anjan	Hardwickia binata.
Babul	Acacia arabica.
Bahan	Populus euphratica.
Bio, honne	Pterocarpus Marsupium.
Bor, ber	Zizyphus jujuba.
Charoli	Buchanania latifolia.
Chinch	Tamarindus indica.
Dhaman	Grewia tiliæfolia.
Dividivi	Cæsalpinia Coriaria.
Ghatbor	Zizyphus Xylopyra.
Hirda	Terminalia Chebula.
Jamba	Xylia xylocarpa.
Jambul	Eugenia jambolana.
Kandi	Prosopis spicigera.
Khair	Acacia catechu.
Kinjal, kindal	Terminalia paniculata.
Lai	Tamarix species.
Lantana	Lantana Camara.
Manvel	Dendrocalamus strictus.
Mhowra	Bassia latifolia.
Nim	Azadirachta indica.
Palas	Buteau fondosa.
Prickly pear	Opuntia dillenii.
Rosha	Andropogon Martinii.
Sadada, ain, matti	Terminalia tomentosa.
Sagdi	Schleichera trijuga.
Sandal	Santalum album.
Shigekai	Acacia concinna.
Shivan	Gmelina arborea.
Simul	Bombax malabaricum.
Sissum	Dalbergia latifolia.
Tali	Dalbergia sissoo.
Teak	Tectona grandis.
Tiwas	Ougenia dalbergioides.

FOREST ADMINISTRATION REPORT OF THE BOMBAY PRESIDENCY INCLUDING SIND FOR THE YEAR 1926-27

CHAPTER I

CONSTITUTION OF STATE FORESTS

1. Alteration in Area (Forms 51 to 51D)

The changes in forest area were as follows :—

Class of forest	Area on 1st April 1926	Added during the year	Excluded during the year	Area on 31st March 1927
	Sq. miles	Sq. miles	Sq. miles	Sq. miles
Reserved	13,773	45	81	13,737
Protected	1,229	23	32	1,220
Total ..	15,002	68	113	14,957

The areas added and excluded comprise :—

	Square miles	
	Gain	Loss
Afforestments and disforestments in favour of cultivation	6	52
Alluvial accretions and erosions in Sind ..	13	20
New Kachas in Sind first included in Reserved Forest and subsequently declared Protected Forest	18	18
Corrections in areas in accordance with the new Working Plan of the Dangs Forests in the Northern Circle	31	23
Total ..	68	113
Net loss ..	45 square miles.	

The forest area in charge of the Forest and Revenue Departments stood as follows :—

	On 1st April 1926			On 31st March 1927		
	Reserved	Protected	Total	Reserved	Protected	Total
	Sq. miles	Sq. miles	Sq. miles	Sq. miles	Sq. miles	Sq. miles
In charge of the Forest Department	11,718	574	12,292	11,750	591	12,341
In charge of the Revenue Department	2,055	655	2,710	1,987	629	2,616
Total ..	13,773	1,229	15,002	13,737	1,220	14,957

The forest area in the various Circles at the end of the year was :—

	Sq. miles
Northern Circle	3,833
Central Circle	5,341
Southern Circle	4,625
Sind Circle	1,158

2. Forest Settlements (Form 52)

The settlement of areas aggregating 100 square miles (104 square miles *minus* 4 square miles which were eroded before settlement), chiefly in the Northern Circle, was in hand at the beginning of the year, and additional areas aggregating 34 square miles, chiefly in Sind, were taken during the year. The settlement of 29 square miles, chiefly in Sind, was completed and 105 square miles are still in hand. Rs. 1,298 were incurred on settlement during the year.

Government Resolution, Revenue Department, No. 9871 of 23rd June 1926 dealt with Mr. Perry's proposals regarding the distribution and administration of the Gurcharans. Four thousand four hundred and ten acres of Gurcharan were included in reserved forest, but the proposal to create 37,606 acres of "minor forest" was negatived. The questions of administration and a scheme for the working of the Gurcharans on a more scientific basis than in the past have not been decided; these have been referred back to the Conservator and the Collector for further consideration and report. The scheme regarding the constitution of Rabi lands as Reserved Forest in Peint in the West Nasik Division was sanctioned after the close of the year, *vide* Government Resolution, Revenue Department, No. 3842 of 1st June 1927.

3. Demarcation

Fifty-eight miles of boundary line were newly demarcated during the year in the Central, Southern and Sind Circles and 57 miles in the Southern Circle still remain to be demarcated. The work of demarcation will never be quite completed, owing to alterations in area from year to year due to accretion, erosion, disforestments and afforestments. The total length of boundary line is estimated at 40,982 miles. Rs. 756 were spent on new work and Rs. 3,170 on repairs to old boundary marks.

4. Forest Surveys

No. 8 Party, Survey of India, continued the survey of the Rabi lands in Peint in the West Nasik Division on the scale 4″=1 mile and completed 36 square miles at a cost of Rs. 10,952 during the year. One hundred and fifty-one square miles of forest in Sind were surveyed by No. 4 Party, Survey of India, without any cost to the Forest Department. Two hundred and seventy-six square miles in Dharwar-Bijapur and 1,007 square miles in Sind still remain to be surveyed out of the total area of 14,957 square miles.

The expenditure on constitution of State forests was as follows :—

Circle	1926-27	1925-26
	Rs.	Rs.
Northern	13,167	8,355
Central	3,738	1,315
Southern	407	1,084
Sind	....	12
Total ..	17,312	10,766

CHAPTER II

MANAGEMENT OF STATE FORESTS

1. Regulation of Management

(*a*) *Preparation and control of Regular Working Plans*

Preparation (*Form No. 55*).—Except in Sind where the preparation of Working Plans is up-to-date, there was great activity in the preparation and revision of Working Plans throughout the Presidency.

The following Working Plans received the sanction of Government :—

(*i*) A revised Working Plan for the whole of the Dangs forests including the Western Baragaon Dangs.

(*ii*) A revised Working Plan for the whole of the Kolaba forests.

(*iii*) A new Working Plan for the Navapur and Nandurbar forests in West Khandesh.

(*iv*) A new Working Plan for the Dharwar-Kod Scrub forests in Dharwar-Bijapur Division.

(*v*) A revised Working Plan for the Nagargali High forests in Belgaum Division.

(*vi*) A new Working Plan for the North Kanara Coast fuel forests of the Kanara Coast Division.

The following Working Plans received the approval of the Chief Conservator of Forests and have been or will shortly be submitted to Government for sanction :—

(*i*) A revised Working Plan for the whole of the Panch Mahals forests.

(*ii*) A revised Working Plan for Series I to VII of the teak high forests in Kanara, N. D.

(*iii*) A revised Working Plan for the Ankola and Ramanguli High forests, Blocks XXIV and XXV in Kanara, S. D.

(*iv*) Working Plan for Compartment 32A of Block XXVI, Kalanadi slopes in Kanara, W. D.

Progress was made with the following Working Plan which received the approval of the Chief Conservator after the close of the year and will be submitted to Government in due course :—

A revised Working Plan for the Bulsar-Chikhli forests in Surat Division.

Work was also in progress in respect of the following Working Plans which did not reach the Chief Conservator before the close of the year :—

(*i*) A Working Plan for the reserved and protected forests in Peint including the below-ghat forests of Nasik and Dindori Ranges.

(*ii*) A revised Working Plan for the Khanapur fuel area in Belgaum Division.

Preliminary Reports were submitted to the Chief Conservator for the following areas :—

(*i*) Scrub jungle and Jamner teak pole in East Khandesh (approved).

(*ii*) Umarpata teak in West Khandesh (approved).

(*iii*) Satpuda (Taloda) teak timber and inexploitable Working Circles in North Khandesh (approved).

(*iv*) A revised Working Plan for the teak pole and fuel forests of Khanapur taluka and Sandalwood forests of Nagargali, Khanapur and Gujnal Ranges (approved).

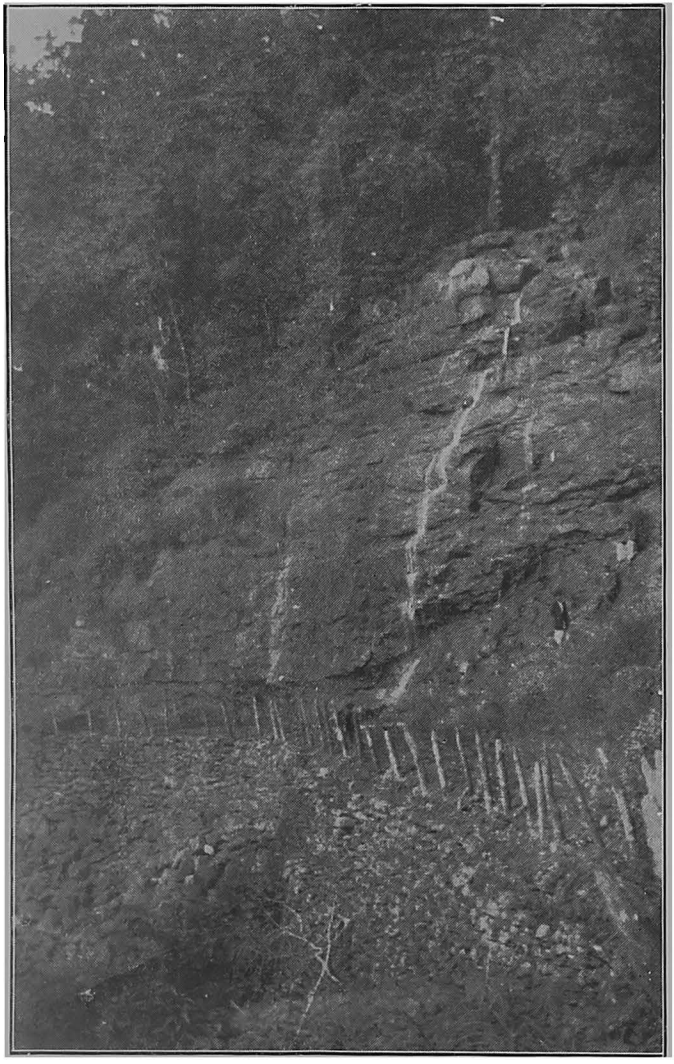
There was a net addition of 500 square miles to the area under Working Plans during the year which now amounts to 8,409 square miles, out of a total of 9,413 square miles for which working plans are considered necessary, and new plans are now under preparation for 388 square miles out of the 1,004 square miles for which plans are still required, in addition to which old plans are under revision for an area of 1,050 square miles.

On the whole it may be claimed that very good progress was made during the year with the preparation and revision of Working Plans. With such a heavy programme of work to get through annually, the necessity for appointing a special officer to supervise the preparation of Working Plans and watch subsequent working is apparent. The Forest Conference held in 1926 unanimously urged the appointment of a Working Plans Conservator. Such a post has already been sanctioned ; it only remains to be filled.

This important matter is being reported on separately, and it is hoped that Government will fill up the post at the earliest possible date.

Control of Working Plans (*Form No. 55A*).—The prescriptions of the various Working Plans were carried out as far as possible, but lack of funds and scarcity of labour were responsible for arrears of work in several cases. The grant for the year under report was appreciably below the demand for funds, with the result that regeneration and thinnings could not be carried out according to prescriptions. These works though not immediately remunerative cannot be neglected without serious detriment to future revenue, and it is important to make full provision for the prescriptions regarding regeneration, thinnings, etc.

No. 1



ROAD BLASTED ACROSS PRECIPITOUS ROCK

Length of road in this part is 120 feet with approaches of 100 feet each side. Total cost about Rs. 1,000 (on Ahwa-Borkhal Road, Dangs)—*V. A. N. Sausman.*

2. Communications and Buildings (Form No. 56)

(a) *Roads and Bridges*

Construction work was in progress on 117 miles of new roads and repairs were carried out on 935 miles of old roads. The total expenditure under this head was Rs. 2,11,763 of which Rs. 1,00,934 was for new works and Rs. 1,10,829 for repairs, as against a total of Rs. 2,42,004 (Rs. 1,16,858 for new works and Rs. 1,25,146 for repairs) in the previous year. The amount charged to repairs includes maintenance charges on the Alnawar-Dandeli Railway, *viz.*, Rs. 47,761 and subsidy to the District Local Boards, Kanara (Rs. 25,000) and Nasik (Rs. 1,100). Owing to insufficient budget provision some forest roads are fast deteriorating under the heavy timber traffic to which they are subjected. If not kept in good repair the cost of exploitation will rise and the revenue will, in consequence, fall.

More export roads are urgently needed to tap the valuable teak forests of the Dangs and Peint where much good timber is locked up and going to waste. Metalled roads are needed to stand heavy timber traffic.

The intervening Baroda Section on the Waghai-Navapur Road, one of the main outlet roads of the Dangs, has not been started by the Baroda Durbar. This causes some loss of revenue. The Portuguese authorities have not commenced work on their section of the road from the Peint forests to the Thana coast. It is hoped that they will commence work in the fair season of 1927-28 as they have recently sent their estimates to this office for suggestions.

(b) *Buildings*

The total expenditure on buildings was Rs. 1,04,989 (Rs. 61,512 on new works and Rs. 43,477 on repairs) as against Rs. 97,016 (Rs. 59,961 on new works and Rs. 37,055 on repairs) in the previous year. The expenditure on new works was for the most part incurred on quarters for subordinates. Of the three rest houses two in Northern Circle and one in Southern Circle mentioned in the 1925-26 report only one at Borkhal in the Dangs was completed during the year. The funds provided for repairs to buildings were also inadequate. The state of some rest houses in the Southern Circle is now so bad that they will require special repairs. Failure to supply sufficient funds is not economy. More quarters for subordinates are urgently required all over the Presidency. More rest houses are also required. Some Divisions do not boast a single one.

(c) *Miscellaneous*

Rs. 6,383 were spent on new works and Rs. 14,530 on repairs, as against Rs. 8,406 and Rs. 13,414 in the previous year. The expenditure under this head is incurred chiefly on wells, fencing of compounds, cattle pounds in Thana, telephone rent, charges for regular water supply paid to the Public Works Department in Sind, construction of and repairs to sluices, bunds and karias in Sind and the improvement of water supply for men and cattle in the Satpuda Forests.

Major Pogson, Water Diviner, visited East and North Khandesh Divisions with a view to locating new well sites. He pointed out some sites but no water has yet been struck at any of the places indicated, though in one place the estimated depth has been greatly exceeded. At Bhamburda Forest in Poona Division, however, a copious supply of water was discovered at the point indicated.

3. Protection of Forests (Form No. 57)

(a) General Protection

The following statement compares the number of forest offences of the year with those of 1925-26 and the average of the last three years :—

Class of offence	1926-27					1925-26	Average of 1923-24 to 1925-26
	Northern Circle	Central Circle	Southern Circle	Sind Circle	Total		
I—Injury to forest by fire ..	617	532	606	189	1,944	1,959	1,800
II—Unauthorized felling or removal of produce	3,168	3,782	1,455	1,471	9,876	8,143	7,883
III—Unauthorized grazing ..	2,254	2,816	832	1,708	7,110	6,495	6,231
IV—Other offences	396	1,172	268	75	1,911	1,697	1,460
Total for 1926-27 ..	6,435	7,802	3,161	3,443	20,841	..	..
Total for 1925-26 ..	5,244	6,076	3,063	3,011	..	18,294	..
Average of 1923-24 to 1925-26 ..	5,075	6,452	3,060	2,787	..	..	17,374

On the whole there was an increase in all Circles under each class of offence except under injury by fire in the Northern, Central and Southern Circles and except under " other offences " in the Sind Circle.

The increase under I, which was only in the Sind Circle, was due to intentional burning of old rank grass in order to produce fresh pasturage for cattle and to the careless firing of branchwood by coupe contractors.

The increase under II, III and IV in all the Circles except Sind is ascribed to increased vigilance on the part of the staff.

The enormous total damage done in these offences is astonishing. With tentative and conservative figures the loss works out as follows :—

Injury by fire.—Excluding the areas early burnt departmentally or overrun by fires caused accidentally while fire tracing 272,962 acres were burnt. Taking Rs. 10 per acre as the average damage done by each fire, a low figure indeed, the damage by fire alone works out to about Rs. 27,30,000. In the case of important sandalwood areas the injury from fire may amount to over Rs. 600 per acre.

Illicit grazing.—It is estimated that only one out of every five grazing offences is reported. 133,809 cattle were impounded for unauthorised grazing. Assuming average damage at only 4 annas per head, the loss from detected illicit grazing works out to Rs. 33,450.

Unauthorised felling.—It is probable that not more than one in ten of the cutting offences are reported. 98,760 illicit felling offences were reported during the year. Taking the average damage at the very low estimate of Rs. 2 per detected offence, the amount of damage amounts to about Rs. 1,97,500.

Other offences.—Damage under this head is not appreciable when compared to the damage done under the above three heads; hence it is disregarded in the following calculations.

The total damage under the first three heads thus amounts to Rs. 29,60,950. This estimate of the loss the country sustains from forest offences is a low one.

This damage was done mainly by the villagers living in the vicinity of the forests who are given free and concession grants to the extent of Rs. 10,18,000. Such a huge annual loss proves the necessity for stricter protection. It is no exaggeration to state that in some places the forests are in grave danger of disappearing. On the other hand there are tracts in which protection is excellent. The attention of Government is drawn to the following facts :—

(*a*) that the forests are mainly injured by the local people,

(*b*) that these local people enjoy very substantial concessions,

(*c*) that the injury done to the forests causes a considerable loss of revenue to the country, which loss presumably has to be made good by taxation, and by raising the price of forest produce generally penalizes the general public.

The Conservator of Forests, Northern Circle, remarks that forests along the coast are much looted and some punitive measures are necessary to prevent the total destruction of these forests. Communal punishment, the only effective means of dealing with wholesale looting, has recently been withheld by Government. The Collector of Thana has been addressed in order to devise some means of coping with this evil. The Conservator further remarks that in forest cultivators, who are bound to protect forest, do much damage to the forests around their fields, and for this reason the practice of giving out forest lands for cultivation has had to be stopped in West Nasik Forest Division.

Five hundred and ninety-three new cases were taken into court during the year. Six hundred and nineteen cases including 186 pending from the previous year were decided and of these 561 or 91 per cent. resulted in convictions. 17,048 cases were compounded and compensation amounting to Rs. 1,56,990 was recovered in 16,512 cases, the average per case being Rs. 9·5 as compared with Rs. 9·6 in the previous year. Offenders in 536 cases were let off with a warning and in 3,167 or 14·2 of the total of new and pending cases the offenders were not detected.

In Sind in two cases ten offenders were tried three under section 332 of the Indian Penal Code for voluntarily causing hurt to deter a public servant from his duty and seven under section 332 of the Indian Penal Code, section 25 of the Indian Forest Act and section 24 of the Cattle Trespass Act for forcibly rescuing 108 camels found illicitly grazing in forest from the Forest Guard who was taking them to the pound. All resulted in convictions. One dismissed Guard was tried under sections 381 and 167 of the Indian Penal Code for criminal breach of trust and conniving at damage done to forest in his charge. He was awarded two months' imprisonment and a fine of Rs. 100.

It will be seen from the increase in offences under unauthorized felling and grazing that the efficient protection of the forests is becoming more and more difficult. In this connection local aggitators do a great deal of harm. The Bombay Presidency forests form about 15 per cent. only of the total land area, and even if intensively worked and excellently protected are too small to ever satisfy the full demand for timber, fuel and minor produce. The more they are abused, therefore, the more the necessity for imports and the greater the loss to the country.

(b) Protection from fire

The figures in the sub-joined statement compare the results of the two fire seasons, *viz.*, 1st June 1925 to 31st May 1926 and 1st June 1926 to 31st May 1927; whereas those given in appendices Nos. 58 and 59 are for the financial year. Here again the figures of failures in these two appendices are bound to differ as those given in the former are from areas specially protected and those given in the latter are from all areas in charge of the Forest Department.

Circle	Fire season of	Area attempted to be protected	Failures	Area actually protected	Percentage of area actually protected	Cost	Cost per square mile protected
		Square miles	Square miles	Square miles		Rs.	Rs.
Northern	1926-27	3,349	73	3,276	98	13,960	4·2
	1925-26	3,345	119	3,226	95	14,125	4·2
Central	1926-27	2,643	108	2,534	96	8,900	3·5
	1925-26	2,749	127	2,622	95	8,333	3·2
Southern	1926-27	1,517	122	1,395	92	5,268	3·8
	1925-26	2,092	156	1,936	92	6,082	3·1
Sind	1926-27	493	6	487	99	744	1·5
	1925-26	493	4	489	99	733	1·5
Total ..	1926-27	8,002	309	7,692	96	28,872	3·8
	1925-26	8,679	406	8,273	95	29,273	3·5

Protection from fire was better than last year. The area burnt has decreased from 406 to 309 square miles. In the Northern Circle the

early burning of closed areas was discontinued as it was proved to be harmful to the coppice growth and young seedlings. In certain parts of the Central Circle and in the Southern Circle early burning was done with a fair degree of success. In the Satpudas in East Khandesh (Central Circle) and in the Sandalwood areas in the Southern Circle there is now no doubt that true early burning is both beneficial and needful.

Punitive measures were as usual enforced against such villagers as were responsible for bad fire protection, good protection being rewarded by remission of or reduction in grazing fees, by making small free grants and by granting rewards in cash or in some other suitable manner at the Durbars held by the Revenue and Forest authorities.

The following table compares the number and origin of fires for the past two years as shown in appendix 59 :—

Origin	No. of fires		Area burnt in acres	
	1926-27	1925-26	1926-27	1925-26
A.—Originated in Departmental fire conservancy operations ..	136	73	16,994	5,852
B.—Crossing exterior fire lines ..	182	196	21,898	29,087
C.—Accidents (persons in forests) ..	505	553	53,362	70,824
D.—Intentional (do.) ..	134	161	12,714	13,551
E.—Railway Engines	22	23	1,577	1,893
F.—Lightning	1	..	40	..
G.—Causes unknown	964	951	1,84,988	1,59,035
Total ..	1,944	1,957	2,91,573	2,80,242

(c) *Protection from cattle* (Forms Nos. 60 and 61)

The forest areas open and closed to grazing were as follows :—

	Sq. miles	Per cent.
Closed to all animals for the whole year ..	2,096	14·01
Closed to all animals for part of the year ..	304	2·03
Open to all animals except browsers for the whole year	8,489	56·76
Open to all animals except browsers for part of the year	..	..
Open to all animals for the whole year ..	4,068	27·20
Open to all animals for part of the year ..	..	..
Total ..	14,957	

The area open to grazing was nearly everywhere sufficient and closure was relaxed as usual in cases of real hardship.

The number of cattle admitted to grazing were as under :—

Circle	Horned Cattle		Sheep and goats		Camels
	1926-27	1925-26	1926-27	1925-26	1926-27
Northern Circle	644,799	618,686	123,477	133,518	2
Central Circle	817,440	704,060	255,443	271,526	....
Southern Circle	389,530	388,914	91,787	82,821	....
Sind Circle	51,565	43,690	46,953	49,506	1,574
Total ..	1903,334	1,845,350	517,660	537,371	1,576

Circle	Camels	Other animals		Total	
	1925-26	1926-27	1925-26	1926-27	1925-26
Northern Circle	....	1,225	1,177	769,503	753,381
Central Circle	....	6,443	9,839	1,079,326	1,075,425
Southern Circle	....	507	226	481,824	471,961
Sind Circle	1,072	2,362	2,361	102,454	97,529
Total ..	1,972	10,537	13,603	2,433,107	2,398,296

The increase is shared by all the Circles.

The grazing fees collected during the year were Rs. 5,30,691 as compared with Rs. 5,11,056 last year, the value at so-called " full rates " being Rs. 21,37,182 and 21,04,068 for the two years respectively. These " full rates " have no connection with the normal market rates which are much higher.

The rate of grazing fee per cattle per annum is extremely low when compared with the value of the fodder grazed by each animal. It is reported that the owners of the Malki or private lands recover at least Rs. 4 per animal in the four months of the rainy season alone. Some of the Revenue Officers are of opinion that the present rates are very low and that they should be enhanced to allow sufficient grazing for really useful animals. It is doubtful if free or cheap grazing as now prevailing in the Presidency tends to economical cattle breeding. On the contrary, in the opinion of the people well conversant with this problem, the main reason for the inferior quality of the cattle is to be found in free or cheap grazing offered to the villagers. Grazing fees are so low that owners of the most worthless cattle do not mind paying the nominal fees. This reduces the available grazing for useful animals and no improvement in the cattle will be possible till the fees are raised to a reasonable figure. This was prominently brought forth at the inauguration of the " Presidency Cattle Breeding and Dairy Farming Association " by His Excellency the Governor of Bombay who remarked that it had been demonstrated that the cattle were best where free grazing was least and by the Honourable Minister for Forests and Excise, Bombay Presidency, who pointed out that whereas in the parts of the Presidency where there was ample monsoon grazing and plenty of cheap

hay, the cattle were the worst, while the finest breeds were to be found in Sind and Dharwar where there was very little good grazing. This point has also been emphasized by the Livestock expert to the Government of Bombay in his note on problems of cattle improvement recently read by him before the Provincial Board of Agriculture in which he says "the cheaper and easier you make grazing the longer you are going to perpetuate the keeping of inferior cattle which are for nothing other than manure producing and in a bad season for the butcher". The Forest Officers who attended the Forest Conference held in September 1927 were unanimously of opinion that free grazing, or grazing at purely nominal rates, is detrimental to cattle improvement. The writer of the report fully concurs with the opinions expressed above and thinks that the first and most necessary step that should be taken in the matter is to enhance the present rates of grazing fees. The concession of reduced grazing fees should be given as a reward only in cases of really satisfactory all round protection. The Collector of Satara remarks :—"The surplus of revenue over expenditure is small. It is a question whether the grazing fees should not be considerably raised, or the grazing in a larger area auctioned to contractors who would let it out on the fee system. I have never been able to see why Government should take only nominal fees for grazing."

The number of cattle impounded for unauthorized grazing in open and closed forest is given below :—

Circle	Horned cattle		Sheep and goats		Other animals
	Open	Closed	Open	Closed	Open
Northern	1,676	25,512	14,282	4,290	4
Central	4,226	25,778	16,035	5,995	41
Southern	14	6,304	434	10,523	....
Sind	1,005	837	721	3,668	221
Total ..	7,821	68,431	32,072	24,476	266
Average for 1923-24 to 1925-26 ..	5,934	66,233	29,559	22,155	258

Circle	Other animals	Total		Total of open and closed	
	Closed	Open	Closed	1926-27	1925-26
Northern	301	15,962	30,103	46,065	43,825
Central	201	20,902	41,974	62,876	68,220
Southern	....	448	16,827	17,275	13,828
Sind	241	2,847	4,746	7,593	9,829
Total ..	743	40,159	93,650	133,809	135,712
Average for 1923-24 to 1925-26 ..	1,071	35,751	90,059	125,810	121,159

On the whole there is a decrease in the number of cattle impounded. There is, however, an increase in the Northern and Southern Circles. The increase in the Northern Circle was due to stricter vigilance on the part of forest subordinates. The Conservator of Forests, Southern Circle, is of opinion that it was due to insufficient areas assigned for grazing of sheep and goats in Dharwar-Bijapur Division. This is under inquiry. There was a decrease in the Central and Sind Circles. The Conservator of Forests, Central Circle, attributes this to the fact that there was no scarcity of fodder similar to last year's and to neglect of duty on the part of some subordinates in the West Khandesh Division. The Conservator of Forests, Sind, remarks that owners of cattle found grazing illicitly prefer to compound (legally) the offence rather than allow their cattle to be impounded.

(*d*) *Protection against injuries by natural causes*

Vegetable pests.—Climbers, lantana, prickly pear and loranthus are common and a certain amount of eradication was carried out by the forest staff; but owing to the cost and want of funds it was impossible to organise a regular campaign against them.

Animal pests.—Elephants, Bison, Sambhur, Nilgai, Porcupine, Hares and Rats did as usual much damage to young trees in plantations. Various measures were tried in vain in several Divisions to keep them off. Locusts did a lot of damage in several localities in Sind.

Insect pests.—The larvae of *Phassus malabaricum*, a grass hopper, and moths did much damage as usual. Teak defoliators were at work in Taloda (North Khandesh) and the Conservator of Forests, Central Circle, remarks that there is no practical remedy against this.

Other causes of injury.—In Sind frost was severe and did the usual damage in young babul plantations.

Erosions.—In Sind 19·3 square miles were eroded, including 2 square miles growing valuable timber, about 1 square mile of coupes under regeneration and about 4 miles of new alluvium with young trees. 1,341 acres exploited before erosion realized Rs. 29,237 and 2,846 acres exploited in anticipation of erosion realized Rs. 62,785. 73 acres containing growth valued at Rs. 1,110 were eroded before exploitation was possible.

CHAPTER III

SYLVICULTURE

1. Formation and Regeneration of Forests

(*i*) *General Progress of areas under regeneration*

Northern Circle.—The remarks of last year under this head need little amplification.

In Thana the excellent artificial regeneration in the rab patches suffers frequent set-backs on account of fires, and where these occur year after year, as in some parts of North and East Thana, the prospects of a full

crop of seedling trees are very remote. The roots of the seedling survive, but the shoots are destroyed to the ground level. Efforts are being made to reduce the danger of fire by more efficient fire protection, and by encouraging the villagers to remove grass from the closed areas. Where fire protection is almost perfect, as in Peint and the Dangs, very fine forests of seedling trees mixed with coppice have resulted.

In the Panch Mahals and the above ghat forests of West Nasik and in East Nasik, regeneration is dependent on a fitful rainfall and frequent periods of draught. Very good plantations have been established in the Panch Mahals in the coupes felled in the past two years. The soil is fruitful enough when the rainfall is sufficient. In the Igatpuri Range of the East Thana Division, Dindori and Nasik of West Nasik and in the East Nasik Division, the soil is, on the whole, much poorer than elsewhere in the Circle, and attempts to regenerate cut areas have met with little success. Yet it is certain that efforts in that direction have not been distinguished by any vigour in the past and that very fair results would be obtained if greater attention were paid to this subject.

Central Circle.—Regeneration by seed was very poor except in the West Khandesh and Kolaba Divisions. In other Divisions owing to the short monsoon and scarcity of rain the seedlings that sprang up died during the following dry season. Coppice growth was good throughout the Circle. The problem of regeneration in the Khandesh Divisions is essentially one of continuous successful fire protection. Without such protection the canopy tends to become more and more open, and the area to be covered more and more with a rank growth of coarse grass every year, thus increasing the fire danger, while effectively smothering any seedlings that come up in the rains. Where the grass is kept down by moderate grazing, seedlings are established, though a few are no doubt damaged by animals that graze. In the East and North Khandesh Divisions, on account of the prolonged dry season, most of the teak seedlings that germinated from sown seed succumbed, and in some places 2 year old teak seedlings also died. In the West Khandesh the seed sown germinated early, and the seedlings were in consequence so forward that the failure of the late rains had very little bad effect on them. Reproduction from coppice was good in all the Divisions and in some places excellent.

Southern Circle.—The progress of plantations in the Haliyal Teak Pole area varied considerably in the different Blocks. The plants do well in Blocks I, IX and X in the 1st year and continue to do well afterwards on account of good soil, whereas in other Blocks although at the end of one monsoon there are thousands of apparently healthy plants showing, in the 2nd and succeeding years they grow but slowly. The progress of the five teak plantations in High Forest in Kanara Northern Division is on the whole very fair, but it is as yet too early to give an opinion as to their ultimate success or failure. In Kanara Eastern Division most of the plantations put on good increment during the growing season. Particularly good progress was made in Kumries 6 and 7 (1924 and 1925) at Ganeshgudi. Wadehukli Kumri 1 (1924) which was at first considered a failure is now flourishing. Heavy fires seriously retarded the progress of the Kirwatti plantations.

Most of the old plantations in Kanara Southern Division are in very good condition and promise to be a property of considerable value to the State. The coppice growth was on the whole satisfactory. Teak, *Sissum* (*Dalbergia latifolia*) and *jamba* (*Xylia xylocarpa*) in many places have given shoots of 10′, 6′ and 5′ respectively. In many of the younger plantations it is not unusual to see good patches of *sagdi* (*Schleichera trijuga*) *jamba* (*Xylia xylocarpa*) etc. growing interspersed with and established under young teak. In the Belgaum Division, the general progress of areas under regeneration is satisfactory and little damage is reported during the year. Nagargali regeneration areas were again successfully protected and are doing well, including the area sown up and planted during the year.

The regeneration by coppice was good in the forests of Dharwar-Bijapur Division.

Sind Circle.—The inundation of the year was normal. The area flooded was 431,175 acres compared with 442,489 acres last year and 558,945 the year before. On irrigated areas the condition of regeneration of both the current and past years is good. Frost and locusts did considerable damage to young seedlings and the former also killed off *babul* (*Acacia arabica*) plants of several years growth in the forests of Upper Sind, but taken as a whole regeneration areas are in a very flourishing condition. The percentage of *babul* to other species is very much higher now than it was 10 or even 5 years ago.

(ii) Establishment of reproduction under Working Plans or Schemes

(a) Mainly natural

Northern Circle.—Coppice regeneration throughout the Circle is reported to be very satisfactory and the growth normal.

In the Panch Mahals especially in Jhalod, natural regeneration of teak from seed was good. In the Thana Divisions the short heavy monsoon was unfavourable to the natural regeneration and seedlings which survived were choked with grass and weeds. In Peint natural regeneration, as a supplement to the plantations, was good and in the absence of fires, a full stocking is assured. The same remarks apply to the Dangs, where, however, the proportion of valuable species reproduced is greater than in Peint.

In the above-ghat forests of Nasik regeneration of teak on the murum soils is very poor indeed, as the soil is too hard for the seedling root to penetrate. With a working of the soil it should be possible to obtain seedlings.

Regeneration of *babul* (*Acacia arabica*) on black soils is fairly good.

Central Circle

East Khandesh Division.—Coppice growth was very good. There was profuse natural regeneration of *anjan* (*Hardwickia binata*) wherever this species predominates. 5,03,084 natural seedlings were stoned. A good

TEAK SOWN ON A "RAB" (BURNT PATCH) IN A CLEAR CUT COUPE IN KOLABA DIVISION (6 MONTHS OLD)

No. 2

percentage of *anjan* seedlings survived and *sadada* (*Terminalia tomentosa*) where sown, also did well.

North Khandesh Division.—There was a total failure of teak seed. Germinations from seed on the ground were fairly numerous, but led to no great results owing to the subsequent prolonged absence of rain. In *anjan* areas, natural reproduction was practically nil though curiously *anjan* seedlings were met with in great abundance in places where there are comparatively much fewer *anjan* seed bearers. Reproduction by coppice was good, in spite of a somewhat low rainfall. The older stools, however, either failed to send up coppice shoots or threw up weak ones which will never come to much.

West Khandesh Division.—In the improvement felling coupes in Deomogra and Umarpata the more open forests are filling up with fine young seedling growth. This is particularly noticeable in Deomogra. It is in the main due to increased efficiency in fire-protection but also to the fact that increased grazing had kept down the grass and allowed the seedlings a chance to develop. Increased grazing too has probably a good effect in reducing the likelihood of fires.

In the Dhulia Range *anjan* reproduction from coppice was very poor, probably due to the fact that the trees marked for felling were old and the majority had coppiced at least once before.

Poona Division.—Numerous seedlings of teak and other raiwal species came up in the exploited areas, but their development was, as usual, retarded, owing to the poor soil coupled with adverse climatic conditions. In the Ghat areas of evergreen forests, where rainfall is heavy, the regeneration of raiwal species from seed was satisfactory.

Kolaba Division.—The rainfall of the year was normal. There was, however, a long break following the first outburst with the result that the germination of teak seed was much interfered with. The monsoon period terminated rather late, thereby giving a distinct advantage to the growth of the established seedlings. The coppice growth was everywhere satisfactory and at places it was noticed to have reached over 10 feet.

Satara Division.—In the deciduous forests natural reproduction of teak was not satisfactory, except in a few areas in the Patan and Dhebewadi Ranges. The forests being situated on steep hill slopes most of the seed that falls on the ground is generally carried away by the first heavy showers of the monsoon, and hardly any is left on the slopes to germinate. Besides this was a bad year for seed. Natural regeneration of sandal (*Santalum album*) was fairly good. In the evergreen forests the natural regeneration was satisfactory. Regeneration by coppice was fairly good in certain exploited areas in the Patan and Dhebewadi Ranges.

Southern Circle.—In the Haliyal Teak Pole area reproduction is mainly by coppice. This is supplemented by patch planting. The spread of sandal in the lantana areas east of Haliyal is very noticeable. The normal amount of natural teak regeneration occurred but as usual little of this has survived and teak seeded rather badly throughout E. D. Kanara.

In Kanara Southern Division the natural regeneration from coppice was confined to the coupes of the Ankola-Kumta Coast Plan but was very largely supplemented by patch sowing and planting of teak and *sissu* (*Dalbergia sisoo*). The average height attained by teak was about 2 feet and maximum about 5 feet. In Kanara W. D. natural reproduction from seed was good on the whole. There was no damage caused to the teak plantations this year by fire. Reproduction by coppice in Karwar, Kadra and Supa Fuel was on the whole satisfactory.

In the Belgaum Division, reproduction by coppice was good in all parts of the Division from the scrub jungles of Gokak to the teak pole coupes of Nagargali. Sandal regeneration has also done well, and the conclusion of the 10 per cent. enumeration of this tree showed the growing stock now present in the Division to be considerably larger than had been anticipated.

The natural regeneration from coppice was good both in Dharwar and Bijapur Districts. It was supplemented by dibbling seeds of sandal and injaili species and transplanting teak plants from dry nurseries and open forests. In Dharwar, Kalghatgi and Hangal coupes, regeneration was successful but in Kod and Badami, owing to the rocky nature of the soil, it was very poor.

Sind Circle.—Natural reproduction from *babul* (*Acacia arabica*) and *kandi* (*Prosopis spicigera*) seed and from coppice was normal and satisfactory. In certain *kandi* (*Prosopis Spicigera*) areas in the Hyderabad Division, where there was a mixture of *babul* included in the crop, judicious thinnings were carried out with a view to introduce young *babul*. The results have been very successful and a second story of *babul* has been established in many places.

(*b*) *Mainly artificial*

Northern Circle.—The sowing and planting of teak on rab patches and charcoal kilns in the newly exploited coupes was undertaken in the Thana Divisions as prescribed in the Plan. The results are as follows :—

Division	No. of patches prepared and dibbled with seed	No. of germinations	Survivals	Patches planted	Plants put out	Survivals	Total area of cut coupes
North Thana ..	21,739	368,664	Not available.	Not available.	1,235,134	359,702	2,826
West Thana ..	5,017	417,592	Do. ..	5,017	717,076	592,602	2,015
East Thana ..	11,363	393,663	Do. ..	11,363	1,083,781	395,340	2,880
Total ..	48,119	1,169,919	..	16,380	3,035,991	1,347,644	7,721

In the Panch Mahals teak seeds from the Dangs were treated by exposure to the rains of 1925. The rainfall was favourable and the seeds were planted in loosened patches on rabbed soil. Besides teak, seeds of *mhowra* (*Bassia latifolia*), *bio* (*Pterocarpus marsupium*), *shivan* (*Gmelina arborea*), *sissu* (*Dalbergia latifolia*) and *nim* (*Azadirachta indica*) were sown.

Very fair results were obtained; far better than with local seed.

The experiment of planting *Bombax* cuttings is reported to have been unsuccessful, but it will be repeated again in the year 1927-28 and if again there is no success the method of regeneration by seed alone will be adopted.

In North Thana the conditions were not good for artificial regeneration. Yet there were few coupes where it really failed and most coupes contain a good number of healthy plants. In the coastal areas a difficulty is experienced in getting sufficient rab for a good burn as the privilege of removing material of 6 inches and under is so fully exercised.

In West Thana the poor seedling regeneration had to be supplemented by transplanting on a very large scale. Where this work was carried out early in the rains the results have been satisfactory, particularly where rab material was in sufficient quantity to give a good burning. Rats, hares and cattle did considerable harm later in the season.

In East Thana the results varied in a most extraordinary way; in some blocks of East Wada and Vihigaon and Vashala most excellent regeneration was obtained. In other areas poor results could, in great measure, be traced to negligence on the part of the staff.

In the above-ghat Nasik forests efforts to produce artificial regeneration met with little success and keener attention, and a greater expenditure of money is required if any success is to be achieved.

In the Panch Mahals the result was :—

Total number as per enumeration taken in January 1927	432,667
Total number from the year 1920-21 to 1925-26 ..	204,928
Survivals of the year under report ..	2 7,239

In Surat the number of teak seedlings produced and surviving after sowing on burnt patches was :—

Mandvi.—100,000 mostly from direct sowings.

West Nasik.—The plantations attempted in the above-ghat forests were too small and the results very poor. Very much more could be done in these forests. The attempts to re-stock artificially have never been very seriously made in Nasik and Dindori and no funds are provided.

East Nasik.—Sowings were done by guards. Out of 7,894 only 344 seedlings survived. In cut coupes of Sinnar, Kalwan and Baglan 16,090 pits were made and 300 rabs burnt at a cost of Rs. 138.

Central Circle

East Khandesh.—Two *babul* coupes in Edlabad and one in Jamner Range were sown with *babul* on the Agricum-forestry system. *Nim* was also tried in Edlabad. Germination in Edlabad coupes was fair, but in Jamner in spite of two sowings, very little resulted. Sandal sowings were carried out in all Ranges and some seedlings survived along shady nallas and under shady bushes. Teak germination was poor, owing to the seed not being properly treated. *Khair* (*Acacia catechu*) and *bor* (*Zizyphus jujuba*) seedlings also did badly. The germination of babul was not good. With regard to the future it would seem that the sowing of seed on mounds should be adopted as the chief artificial method of regeneration.

North Khandesh.—Rabs were prepared in the current teak timber coupes, and in all 55,773 teak, and 1,703 *tiwas* (*Ougenia dalbergioides*) seedlings were raised. Some rabs showed a good stocking while in others the stocking was poorer, but there were fine seedlings with broad leaves and sturdy stems. The fewer germinations on these rabs were due to the insufficiency of old seed and to the new seed not germinating or where it did germinate, germinating late, and the tiny seedlings were killed by the subsequent failure of rain. Transplanting, to make up the deficiency, did not yield encouraging results, owing to long breaks and the lack of rain. At the end of the hot season about 50 per cent. of the seedlings survived. Hares did much damage on many promising rabs, and in some cases hardly left a single teak seedling standing. An experimental beginning was made in some of the better teak pole coupes with a few rabs but the results, excepting in a few cases, were disappointing; much damage was done by hares in these rabs also. The mortality was much higher than in the "Teak Timber" coupes owing to comparative poverty of soil.

West Khandesh.—Artificial regeneration was undertaken over the whole of the clear felled coupes, and the results were good everywhere and in some excellent, where the germination was over 75 per cent. The seedlings were strong and healthy and the majority averaged 6 inches, and some over 1 foot high on the south of the Railway. Although the germination was good, the seedlings were not robust, and had mostly lost their leaves before the hot weather, on account of the poor soil and dryness of the area. On the rabs, chillies, and in some cases, castor were planted between the seedlings. Chillies did not give as much protection to the seedlings as the castor did, but were chiefly beneficial from the fact that the people tending the rabs weed more thoroughly so as to get a good crop. Stump planting, done early, appears to give much better result than transplanting seedlings. In the coupes felled in F. S. III in 1924-25 germination entirely failed, and stump planting was done promptly with excellent results.

In Deomogra and Umarpata, artificial regeneration was also undertaken on rabs in suitable places opened out in the improvement fellings. The results in Deomogra were very poor, and in Umarpata satisfactory.

Poona.—Artificial regeneration was carried out mainly in the exploited *babul* coupes by ploughing in strips. Seed of *babul, bor* (*Zizyphus jujuba*), *Chinch* (*Tamarindus indica*), etc., was sown and the regeneration was fairly successful. Seed of Mysore sandal was sown in Dhond, and Wadgaon Ranges, but it did not germinate in the former Range. In its place, Junnar Range sandal seed was sown, with the result that 50 plants have grown to a height of 2 feet. In the Vadgaon Range 100 seedlings were grown, but were destroyed by fire. In Ghoda and Wadgaon Ranges, special hirda (*Terminalia chebula*) plantations were made, and 437 plants are well established. Also " treated teak " and *ain* (*Terminalia tomentosa*) seeds were sown on rab beds and patches in almost all the Ranges. Teak, *chandan* (*Santalum album*), *jambuld* (*Eugenia jambolana*), ain, etc., seeds were also sown on patches in the exploited areas.

Kolaba.—In this Division re-stocking of the annually exploited areas by teak seedlings has become a well established routine work. Every year the progress is improving. The results of the year show that the seedlings are even better established than in previous years. Great attention was paid to make the rab beds larger than usual and to select the sites of the rab in advance of felling operations, so as to get the best soil. It was noticed that the tiny seedlings transplanted from outside the forests are backward in their growth, probably due to damaged rootlets. In the pure teak areas, attempts were made to introduce injaili species. The seed of *ain, khair, hirda, kinjal* (*Terminalia paniculata*) and *shivan* (*Gmelina arborea*) was sown. The shivan gave the best results and seedlings upto 7′ — 8′ in height were well established in one year. *Hirda, ain,* and *kinjal,* came up all right, but the height growth was poor.

Another successful item of regeneration in this Division is that of *manvel* (*Dendrocalamus strictus*) bamboos. The only precaution necessary appears to be to secure one year old culms and to transplant them in the first monsoon showers. Mr. Patkar's efforts of the past six years in establishing bamboos in the Kolaba Division have been crowned with success. Now well established clumps can be seen in the forests of the Division, which previously did not possess a single bamboo. If the operation is continued as at present the forests will eventually contain a valuable supply of bamboos.

Satara.—Fairly good plantation work was done on rabs in all the exploited coupes and the germination was fair. Where the seed failed transplants were introduced, and the patches in August and September were stated to be well covered with seedlings, but a large number disappeared with the setting in of the hot weather. The planting of aloe along the boundary of all the exploited coupes was continued. A large quantity of sandal seed was collected, and the work of dibbling the seed under the shelter of bushes and shrubs in the areas where it is absent, was started.

Southern Circle.—Two hundred and nine acres of clear felled area in High Forest situated at Bhagwati, Amga, Kanshirda and Shiroli in Kanara Northern Division, were planted with teak 6′ × 6′. The area at Amga (85 acres) was a complete failure, that at Bhagwati (57 acres)

was successful over 70 per cent. of the area, and that at Kanshirda over 60 per cent. of the area. It is reported that the failures were due to the unfavourable monsoon.

In Kanara Eastern Division, additional areas (101 acres) were clear-felled, burnt and artificially regenerated with teak at Ganeshgudi, Wadehukli and Kirwatti. In the coupes of the Yellapur and Mundgod Teak High Forest Working Plan, Mundgod Teak Pole Plan and in some coupes of the Bankapur-Hangal Plan, 25 per cent. of the area of the exploited coupes was similarly treated. Just as the dibbled seed had succeeded in germinating, a break in the rains and much sunshine came and killed off the tender plants. At Kirwatti, most of the plants survived; at Ganeshgudi and Wadehukli, especially the latter, results were deplorable. The casualties were immediately replaced, and at the end of the monsoon, generally speaking the results were good.

The number of seedlings transplanted from nurseries was 3,18,775 and 86 bags of teak seed was dibbled. The area planted up was 1,808 acres.

In Kanara Southern Division, an area of 31 acres in Kasarkod and Haldipur was planted 6′ × 6′ with casuarina in July 1926. The plants were not watered during the dry season and consequently the results were not satisfactory. Intensive sowing and planting of teak in 504 acres of High Forests and of the Ankola-Kumta Plan was carried out with success. The maximum and average height growths have been noted to be 14′ and 5′ respectively. Advantage was also taken to regenerate with teak large areas of dead bamboo burnt in the High forests of Ramanguli and Ankola and to a small extent in Soppinhosalli and forests of Hattikeri Round. The number of plants put out was 1,26,400 teak, 9,000 *honne* and 5,000 *sissum*. The results achieved particularly in Block XXV-45 opposite Ramanguli Rest House are reported to be very satisfactory.

In Kanara Western Division, 132 acres of *Casuarina* plantation at Arge were added to the 349·7 acres already existing in the Division. The new area is doing well.

In the fuel coupes of Karwar, Kadra and Supa Ranges, 28·5 acres were planted with teak seedlings. This plantation work, which is an attempt to increase the value of the junglewood fuel coupes, was a partial success and should be persevered with.

A further area of 25 acres was clear felled in Gund Range Series X compartment 13, and regenerated with teak by dibbling and planting.

In the Teak Pole area of the Belgaum Division, burnt patches in exploited coupes (Nos. 31 of Blocks I and II) were planted up with nursery seedlings. In a few cases, seed was dibbled. In all, 30,200 seedlings were put out, of which a fair proportion were surviving at the end of the year. Some small attempts at teak planting were also made in fuel coupe 21 of Block VI and 22 of Block III in Khanapur Range and in 14 of Block XI Gujnal. In these cases, a reasonable degree of success was attained, as though small, many of the plants were living and healthy at the end of the year.

No. 3

SAME AS No. 2 FACING PAGE 14 BUT 4½ YEARS OLD. AVERAGE HEIGHT 15 FEET

In the Dharwar-Bijapur Division, sowing and planting of teak was carried out over an area of 2,269 acres in the Dharwar, Kalghatgi, Hangal and Dhundshi Range forests. The area not considered fit for teak was dibbled with seeds of injaili and sandal. The results in both cases were satisfactory, the average height of teak seedlings being from 4 to 6 feet and injaili 3 to 4 feet. The area planted during the previous year was tended and blanks were filled in as far as possible. Artificial regeneration by dibbling seeds of *nim* and other useful trees was attempted in the blanks in the exploited coupes of Badami and Bagalkot Ranges. The dibbling of sandalwood seed under the shade of thickets was also tried. The results in neither case were encouraging, the survivals being 2 and 8 per cent. respectively. The failure of the rains in the latter part of the monsoon counts much towards the poor results.

Sind Circle.—Intensive regeneration works as now practised throughout Sind and detailed in last year's report were continued during the year 22,866 acres of exploited coupes, kachas and blanks being sown up with 4,616 maunds of *babul, kandi* (*Prosopis spicigera*) and *ber* (*Zizyphus jujuba*) seed.

The area given out for temporary cultivation with a view to afforestation during the next or subsequent years amounted to 11,625 acres. Most of these areas are either kacha lands on which the water level still remains too high for the introduction of tree growth pending the deposit of more silt, or comprise recently felled coupes, which are grass bound and which are given over for a year's cultivation before sowing up with *babul*. Blanks which have failed to respond to direct methods are also treated in this way.

(*iii*) *Plantations and other forms of regeneration not under Working Plans and Schemes*

Northern Circle.—The 50-acre plantation of *simal* (*Bombax malabaricum*) for matchwood begun in 1925-26 in Kalol Range of Panch Mahals was a success during this year. There were 16,847 seedlings alive of which 9,039 survived in March and the remaining 7,808 which were not seen then are likely to take fresh root and throw out fresh leaves. The expenditure on this plantation was Rs. 150.

The area of the *Casuarina* plantation in North Thana is now 126 acres 20 gunthas. Rs. 367 only were spent on upkeep, nothing on creation. Thinnings were undertaken in Chikhla and Deheri plantations which realised Rs. 690.

In West Nasik the results of the plantations under the Badgi and Haste Felling Schemes were :—

——	Area of coupes	Area sown	Germinations	Transplants	Cost	Cost per acre
	A	A			Rs.	Rs. a. p.
Badgi	246	181	118,776	..	1,034	5 10 6
Haste	266	206	38,141	4,734	1,426	7 6 0

Plantations continue to be formed under the Badgi and Haste Felling Schemes.

The new areas taken in hand were :—

	Block	Coupe	Acres
Badgi	XVI	18, 19, 20	945
Haste	XX	26, 27, 28, 29 part.	380
			1,325

The total area planted from the commencement of the scheme is now—

	A.	g.
Badgi	1,296	24
Haste	596	16
	1,893	0

Though the success of these plantations has not been uniformly good very valuable woods have been established, especially after the first 2 years at Badgi, when experience had been acquired in the preparation of the seeds and seed beds.

The older plantations have now reached the first thinning stage and it will be possible to judge whether a more economic spacing of the seedlings is safe or advisable. In conjunction with these early thinnings Research Subject No. 5 was started at Badgi to ascertain the degree of thinning necessary in teak plantations of different ages and Research No. 17, started at Haste, to determine the effect of cutting back superfluous shoots of teak seedlings.

It is too early to draw conclusions and experiments will continue for some years.

Germination was generally good in all plantations, about 80 per cent. being shown as successful.

In coupes 21 and 22 of Block XV of the Badgi scheme a fair quantity of *tiwas* (*ougenia dalbergioides*), *sissum* and khair was sown with the teak and all these species did very well.

The total cost of regeneration of actual area sown was :—

	Total Rs.	a.	p.	Per acre Rs.	a.	p.	
Badgi ..	345	4	6	5	10	6	
Haste ..	828	5	6	6	9	8	for C. 25 and
	598	2	0	7	8	0	for C. 24 of Blk. XIX.

In anticipation of the proposed new Working Plan for the Dangs the areas shown in form 62-A have been clear cut (except for valuable advance growth, such as groups of young teak poles) and rab patches up to 100′ square, or even more, have been burned over and dibbled with about 5 seeds at loosened patches 6′ × 6′ (and in some cases 3′ × 3′). In Bardipada Range sowing teak seeds every 2 inches in lines 3′ apart was tried and seems to be preferable to patches, being quicker and better for weeding where the soil is not too rocky. Germination was so excellent that it appears that seeds can be safely sown every 6″ apart in lines 4′ apart. Mulching was done in October, and in many plantations the seedlings never entirely shed their leaves but kept green, putting forth

new leaves early so that by the end of May (2 months after the close of the year under report) the new height-growth was considerable.

The number of teak seedlings produced and surviving at the end of the monsoon after such sowing on burnt patches was as follows :—

Dangs : 180,000 plants from seed supplemented by 40,000 transplants in failed areas.

Central Circle.—In the West Khandesh Division, about 225 acres were given out on the agri-cum-forestry system for a period of 5 years on annual renewal. Similarly in the Paud and Poona Ranges of the Poona Division, 158 acres of forest land was given to the villagers on a 5 year lease, on a rental of Re. 1 per acre per annum and some 10 acres, in addition to the 22 acres of last year were given in Junnar Range. About 5,000 *hirda* (*Terminalia Chebula*) seedlings are alive in this plantation.

The match industry is now an established fact, and as the existing supply of soft wood timbers is known to be both scattered and inadequate the necessity for preserving the existing supply and of increasing the future supply is receiving attention.

With the object of increasing the future supply, an area of 205 acres was selected near the Railway line in the Kolaba Division and sown with *Mango* seed. The protection of the seedlings from damage by wild pigs is a very difficult problem.

Southern Circle.—In Kanara Eastern Division, teak seed was dibbled in places where bamboo clumps had burnt and very good results were obtained especially in the Yellapur Range around Kannigeri.

In Kanara Southern Division an area of 546 acres, clear felled through the agency of contractors in the unorganised forests of Honavar-Bhatkal was burnt, sown and planted with teak, *sissum* and *honne*. The plantations in 346 acres were raised through the agency of Kumriwalas who reaped ragi for themselves and gave the department teak spaced 12′ × 6′ for a nominal reward of Rs. 1-8-0 per acre or 4 annas per 100 teak plants. The remaining 200 acres were planted up departmentally mainly with teak 6′ × 6′, but interspersed with *sissum* and *honne* (*Pterocarpus marsupium*). The resulting plantations were excellent.

A fresh area of 29 acres was clear cut and regenerated with teak at Nagargali. A successful burning was made at the end of March. The more level areas were dibbled at the end of May with seed that had been alternately soaked with water and dried beforehand. The remaining area was planted up as soon as the monsoon started at the beginning of July with 3 different types of plant. Seedlings of about 1 month old were used, also plants which had spent one year in the nursery beds and finally a few patches were stocked with the stumps of 2 or 3 year old nursery plants, which previous to planting were both root and shoot pruned. Careful note was kept of the various patches but at the end of the growing season there was little to choose between them. The one year old plants were if anything rather more leggy and less sturdy than the remainder. On the other hand for filling in casualties in August

or at the beginning of September it was found that the one or two year old plants were very much better than the seedlings. Sandalwood sowings were again made in Khanapur Range in Block I-29. Germination was poor, but the greater part of the seedlings that did result were healthy and in good condition. Some 600 seedlings were also transplanted here and of these 25 per cent. came through successfully. A few isolated sowings were also made in coupes round Patne. Germination here also was poor. Of the seedlings many have died.

Sind Circle.—To the existing area of 530 acres of *Dalbergia sissoo* (*tali* plantation) 15 acres were added in Kot Sultan forest, Shikarpur division, making a total of 545 acres. From this, 5 acres were excluded owing to failures in Hyderabad Division, leaving a net area of 540 acres at the close of the year. The total expenditure on creation and upkeep was Rs. 1,423 against Rs. 1,135 in 1925-26.

Direct sowings of *tali* (*Dalbergia sissoo*) along trenches on 15 acres of Kot Sultan forest, Shikarpur Division, gave excellent results, but the condition of the other trees from 2 to 7 years old in the Newman plantation was very disappointing. They appeared to be drying up either from insufficiency of water or from the unsuitable nature of the soil.

Details of sowing operations carried out in kachas, blanks, erosion strips and cultivations are given below :—

Sowings	Methods of sowing adopted	Quantity of seed sown in maunds	Area in acres	Cost if any	Results
				Rs.	
Kachas . ..	Broadcast, dibbling and drilling .	1,007	5,167	286	
Blanks	Do. trenches, patches and sowing after ploughing.	522	2,726	538	
Erosion strips ..	Do. and patches ..	52	205	6	
Along cultivations ..	Strips in cereals and broadcast .	599	3,195	317	
	Total .	2,180	11,293	1,097	

(iv) Tending

Northern Circle.—Panch Mahals : The usual mulching and weeding was done.

Surat and West Nasik.—The existing plantations were weeded and inferior coppice interfering with regeneration of more valuable species was slashed back.

North Thana.—Fifty-six coupes were weeded at a cost of Rs. 1,817 and 67 five-year old coupes cleaned at a cost of Rs. 1,189.

West Thana.—All the coupes of last year were weeded at a cost of Rs. 727 and cleaning operations in five-year old coupes carried out at a cost of Rs. 315.

East Thana.—Ninety-seven coupes were weeded and 46 cleaned at a cost of Rs. 848 and Rs. 378, respectively.

Central Circle.—The operations of weeding, mulching, stoning and transplanting in suitable places to relieve congestion, were carried out in almost all the Divisions.

No. 4

TYPICAL YOUNG BABUL FOREST 3 YEARS OLD IN HYDERABAD DIVISION (SIND)

Twice the height of a man. This area has been closed entirely to browsing by goats and camels, but open to cattle grazing.

Compare with the next photo No. 5 facing page 30.

Southern Circle.—Where money was available, cleanings were carried out in two and three-year old plantations in Kanara Northern Division. In the Kanara Eastern Division, the usual cleaning and weeding operations were carried out in all Kumries and coupes. In Kanara Southern Division, some work was carried out in 1919 plantations of Nisalnir and Taltot. In the Belgaum Division, tending operations in plantations were carried out in plantations Nos. 1, 2 and 3 where a continued cleaning and thinning was made and in plantation 7 where the operation was mainly confined to creeper cutting. The usual cleaning operations were carried out in all the Divisions, badly shaped seedlings were cut back and leading shoots were freed from creepers.

Sind Circle.—These operations include (1) cleaning and spacing of stems in dense young *babul* growth in regenerated areas. This work which has an important effect on the future development of the trees, has been largely extended during the past few years and in Karachi division alone during the year under report no less than 4,745 acres of young *babul* forest were subjected to this treatment. (2) Freeing of young *babul* from interference by inferior species such as *kandi* (*Prosopis spicigera*) and *lai* (*Tamarix species*). (3) Cutting back malformed *kandi* stems for the production of new and vigorous shoots, and (4) weeding and stubbing of grass in *tali* plantations.

Tending of the growing stock

Thinnings were carried out in all divisions and included the removal of suppressed, dead, and fallen stems and branchwood the removal of which was silviculturally desirable. Thinnings and cleanings were also made in the *tali* plantation of the Sukkur and Shikarpur Divisions. Thinnings in *tali* plantations gave a net profit of Rs. 171 only.

The area dealt with, material obtained and value realised from thinnings of all divisions are given below :—

Division	Area included	Material Extracted		Material sold	
		Timber	Fuel	Timber	Fuel
	Acres	Cft.	Cft.	Cft.	Cft.
Sukkur	569	2,210	227,210	2,210	227,210
Shikarpur	137	....	53,137	....	53,137
Larkana	385	....	335,248	....	335,248
Hyderabad	3,543	....	1,181,725	....	1,167,537
Karachi	4,245	....	981,455	....	981,455
Total ..	8,879	2,210	2,778,775	2,210	2,764,587

Division	Material in hand		Expenditure	Gross revenue	Net revenue
	Timber	Fuel			
	Cft.	Cft.	Rs.	Rs.	Rs.
Sukkur	....	....	7,015	15,247	8,232
Shikarpur	....	....	2,204	4,619	2,415
Larkana	....	....	....	9,008	9,008
Hyderabad	....	14,188	3,127	18,959	15,832
Karachi	....	....	....	29,354	29,354
Total ..	....	14,188	12,346	77,187	64,841

The revenue under this head during the past seven years is given below :—

Year	Net revenue from thinnings
	Rs.
1920-21	17,257
1921-22	21,652
1922-23	24,517
1923-24	34,346
1924-25	60,136
1925-26	76,822
1926-27	64,841

Work under this head brings in a very welcome addition of revenue but it is questionable whether it should be extended in lower Sind much beyond its present scope until the fuel market is in a stronger position. Towards the close of the year contractors had considerable difficulty in unloading their stocks and the surplus wood available from thinnings tended to lower the value of the firewood from coupes, which fact is reflected by lower prices at the annual sales.

(v) General

Northern Circle.—The year has not been a very favourable one for regeneration, natural or artificial, yet the results are very fair despite the difficulties encountered. Over natural cause we have no control, but much of the damage done to regeneration is by fire and by illicit grazing which is avoidable. Where the fire control is effective, as in the Dangs, Mandvi Range and Peint and portions of the Thana District, very valuable forests, in which teak is the principal species, have been established. Too pure a growth of teak is avoided firstly by the regrowth of injaili in the unrabbed portions of the coupes, and secondly by a judicious mixing of the seed of valuable species such as *sissu* (*Dalbergia sissu*), *khair* (*Acacia catechu*) and *tiwas* (*Ongenia dalbergioides*) on the rab patches themselves.

Central Circle.—The plantation work was, on the whole, most satisfactory in both the West Khandesh and Kolaba Divisions, and the former Division showed a marked improvement on the results obtained in the previous year, due to advantage being taken of the experience gained in the previous work. The proper treatment of the seed before sowing was also better understood. The plantation work undertaken in the heavy black soil in the felled portion in F. S. IV in the West Khandesh Division was most successful. In the Kolaba Division, it is reported that the successful regeneration is coming to the notice of the public, who are not only making themselves acquainted with the operations, but are making sporadic demand for good seasoned teak seed, as well as for seedlings, which are pleasing indications of the popularity which it is gaining. In the rest of the Divisions strenuous attempts are being made to make artificial regeneration a success, but scanty rain and poor soil combined with a long dry season, adversely affect the

results. Generally speaking, germination is good in all places but survivals during the dry season are monotonously few.

Southern Circle.—For the more important species, the year under report was a very bad seed year. The absence of good rain from the end of September onwards possibly affected the formation of seed as the flowering was normal. The hirda crop was similarly affected. Further progress has been made in the formation of plantations and regeneration. Yearly the potential value of the jungles of the Southern Circle is being increased by successful work of this kind.

The total expenditure incurred under the head A VIII*e* during the year was Rs. 34,349 as against Rs. 36,582 in the preceding year.

2. Tending of the Growing Stock

Northern Circle.—In the Dangs trees of inferior species interfering with teak and more valuable junglewood species were cut or girdled departmentally ahead of the main improvement fellings and creeper cutting was systematically carried out at a cost of Rs. 1,015.

Thinnings were carried out in the Thana Divisions according to the Working Plan.

Division	No. of coupes thinned	Expenditure incurred	Revenue realised	Remarks
		Rs.	Rs.	
North Thana ..	183	18,427	32,672	Worked Departmentally.
West Thana ..	22	517	834	Do. do.
	123	....	19,065	Worked by Purchasers.
East Thana ..	61	1,239	3,898	Departmentally.
	76			By Purchashers.

In Peint teak poles reserved in the older plantations were cut out as they were not sound having been damaged by the rab burning and were interfering with the young growth beneath them.

The total expenditure incurred on sylviculture was :—

Division	A III*e*	A VIII*g*
Panch Mahals	3,782	260
Surat	4,742	1,015
North Thana	7,228	1,516
West Thana	4,031	608
East Thana	5,665	378
West Nasik	7,113	....
East Nasik	138	100
Total ..	32,699	3,877

Central Circle.—Thinnings in the Kolaba Division and improvement fellings in the West Khandesh and Kolaba Divisions, creeper cutting,

cutting back operations and freeing teak and other more valuable species from the operation of inferior species in all the Divisions were carried out, as far as possible. In the North and West Khandesh Divisions, trees infected with loranthus were either cut or girdled. In the Kolaba Division, 183 coupes in all were marked for thinning operations, but for want of demand 109 coupes remained unsold. Thirty-three coupes were worked departmentally at a cost of Rs. 2,322. It seems certain that this operation can hardly be made to pay. A special provision of funds must be made, or the operations will have to be given up and much future revenue will be lost.

Southern Circle.—In Kanara Northern Division, improvement fellings were carried out in 19 compartments of the High Forest area and 9 compartments were marked for felling next season. In the Teak Pole area of Haliyal, 13 coupes were thinned during the year. Attempts were made to underplant three teak plantations with blackwood, but the experiment was not a success. The height of teak plants varied from 10 feet to 15. Under planting does not seem to be necessary as suitable junglewood will come up naturally when the teak plantations are thinned.

In Kanara Eastern Division, thinnings were carried out in Kumri I (1919) at Ganeshgudi. In the Mundgod area, Block V-2, and coupes 1, 2 and 3 of Blocks VI, VII and VIII were cleared. Sylvicultural improvement work was carried out in coupes 4-B of Blocks VIII and XI and 5-B of Block X of the Kirwatti Range and 4-B of Blocks XII and XIV of Gunjawati and in the unplanted portion of the "A" coupes worked. Improvement marking was made in compartment 13 near Kirwatti. The Dowginalla improvement fellings were continued slowly. Kumri II will be thinned in the current year. Paucity of trained staff prevents this important work of tending the growing stock being carried out on a larger scale, and it is difficult to teach unintelligent guards even the simple work of freeing teak from creepers and overhead cover. Owing to labour difficulty no improvement fellings could be carried out in the Soppinhosalli High forests of Southern Division, Kanara. Climber cutting and teak freeing operations were carried out on a fairly large scale in all the unorganized forests of the Division through the agency of guards and through paid labour in the High Forest areas of Ankola and Ramanguli Ranges. In Kanara Western Division the plants put out in the old patches in Karwar Range and all teak poles and saplings in the plantations of the last 6 years in Kadra, Supa and Gund Ranges were freed from obstructive growth in addition to cutting of creepers in fuel coupes of Karwar, Kadra and Supa Ranges.

In the greater part of the Belgaum Division, the only tending work carried out was creeper cutting. A thinning previously marked in coupes 10 and 11 of Teak Pole Block II was sold standing and successfully carried out by the contractor. Cultural work in freeing sandal (*Santalum album*) trees was continued in the four Ranges concerned and in all 13 coupes were dealt with, care being taken not to open up small trees and expose them to animal grazing. In the Dharwar-Bijapur

Division, thinning work was carried out in the Dharwar Range in coupe No. 2 of Blocks I to VII

CHAPTER IV

EXPLOITATION

(*a*) System of Management

(*i*) *Major Forest Produce* (Form No. 63)

Form No. 55-B in Appendix shews the area in which the various systems are in force.

Clear fellings.—Were carried out in the Panch Mahals, the 3 Thana Divisions, parts of Ahwa, Subir, Waghai and Bardipada Ranges of the Dangs, the Babul areas in the East Nasik Division, the Babul areas in the East Khandesh and Poona Divisions, Kolaba, Nawapur—Nandurbar forests, Teak Pole areas of the Southern Circle generally, areas selected for regeneration in the High forests of Kanara and Belgaum, Babul forests in Dharwar-Bijapur Division, Casuarina plantations and throughout Sind forests.

Coppice with standards.—In the forests of Bulsar-Chikhli in Surat, Igatpuri in East Thana, the above-ghat parts of Nasik, Satpuda forests in East and North Khandesh Divisions, the Edlabad 'Anjan scrub' area in East Khandesh and in the teak pole and evergreen forests of Poona Division and in Satara and Patan Ranges in Satara Division.

Improvement fellings.—Were carried out in Mandvi (Surat), in Baragaon Dangs and parts of North, South and Central Dangs, in 14 coupes in North Khandesh, in Scrub jungles of East and West Khandesh, in Matheran plateau and terrace forests in Kolaba and in Mahableshwar forests in Satara and in some of the High forests of Kanara and Belgaum.

Selection fellings.—In the Dangs Protected forests, in Peint, in 22 coupes in Blocks I to III of the Working Circle I of the Satmala plan in East Khandesh and in certain High Forest areas of Kanara and Belgaum.

Simple coppice fellings.—Were carried out under regular and provisional plans in fuel coupes in Kanara, Belgaum and Dharwar-Bijapur Divisions.

Unregulated fellings.—Include fellings for cultivation in Taloda and for extension of inforest settlement in West Shirpur, removal of teak standing on plots on certain settlements in Khandesh, concession fellings of match-wood species in the Panch Mahals, Thana, Dangs and Kolaba, removal of dead and wind fallen trees, exploitation of dead and dying and mature sandalwood trees in the Central and Southern Circles, clearing of grazing grounds in Kanara E. D.; exploitation of erosion strips in Sind; felling of royalty trees in Malki lands and of reserved trees from Revenue Waste lands in parts of the Northern, Central and Southern Circles and small fellings for free grants on permits, etc.

(*ii*) *Minor Forest Produce* (Form No. 64)

As usual, minor produce was mainly farmed out or sold on permits except in the case of bamboos in Thana, Mandvi, Dangs and Peint which are sold according to the prescriptions of the Working Plans.

2,700,115, 1,708,820 and 2,500,014 lbs. of grass were baled and stored at Godhra, Dohad and Palghar under the famine fodder schemes financed from famine funds bringing the amount stored at these three depôts upto 159¼ lakhs lbs. In the beginning of the year a good demand for grass arose and most of the old grass was sold. The famine grass stores in West Khandesh were also sold off during the year. The famine grass operations in the Central Circle have been stopped but it has been settled that those in the Northern Circle should be continued to the end of the present nine years contract period, *i.e.*, till and including the year 1929-30.

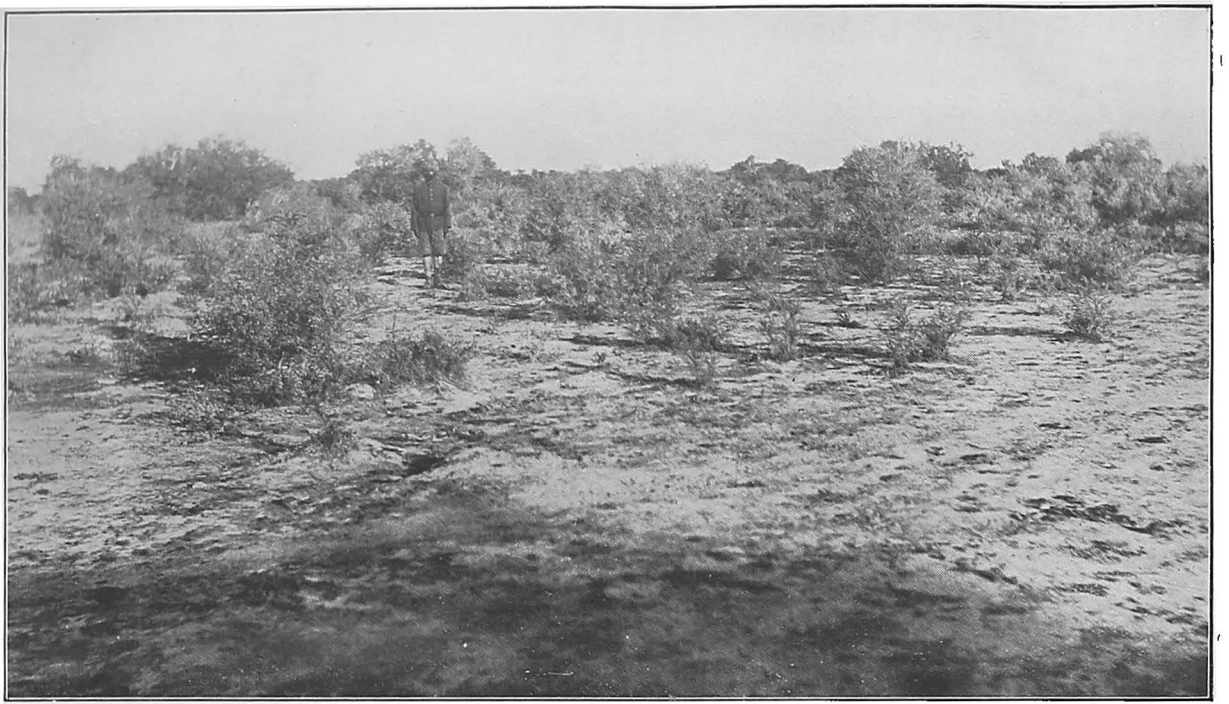
Hirda was collected departmentally in the Poona Division and was sold by tender at Rs. 56 per khandy of 20 Bengali maunds as against Rs. 41 per khandy in the previous year. In Sind lac sold to contractors fetched Rs. 14,771 as against Rs. 15,546 in the previous year and that collected departmentally in the Miani Range of the Hyderabad Division fetched Rs. 4,661 at a cost of Rs. 1,808.

(*b*) Agency of Exploitation

(*i*) *Departmental Agency*

The following is a comparative statement of major and minor produce extracted departmentally during the two years 1926-27 and 1925-26 :—

Circle	Year	Major Forest Produce				Minor Forest Produce			
		Timber cft. in thousands	Fuel cft. in thousands	Total cft. in thousands	Sandalwood value	Bamboos value	Grass and grazing value	Other value	Total value
					Rs.	Rs.	Rs.	Rs.	Rs.
Northern ..	1926-27	462	616	1,078	..	75	6,959	219	7,253
	1925-26	563	724	1,287	..	..	9,322	362	9,684
Central ..	1926-27	12	490	502	2,505	..	..	6,687	6,687
	1925-26	14	241	255	2,513	..	..	5,051	5,051
Southern ..	1926-27	869	26	895	1,17,584	..	..	42	42
	1925-26	1,086	195	1,281	82,794	..	8	14,275	14,283
Sind ..	1926-27	49	2,114	2,163	..	..	..	6,090	6,090
	1925-26	9	2,064	2,073	..	..	..	5,374	5,374
Total ..	1926-27	1,392	3,246	4,638	1,20,089	75	6,959	12,038	20,072
	1925-26	1,672	3,224	4,896	85,307	..	9,330	25,062	34,392
Difference ..		—280	+ 22	—258	+34,782	+75	—2,371	—12,024	—14,320
Percentage of total outturn from all sources ..		25	6	8	100	..	·5	5	1



No. 5

YOUNG BABUL FOREST 3 YEARS OLD, BUT OPEN TO BROWSING BY CAMELS AND GOATS IN HYDERABAD (SIND)

Compare with the preceding photo No. 4 facing page 24.

In the Northern Circle the decrease both under timber and fuel was due to the closing down of fellings at Karanjara and Bardipada and also to fewer arrear thinnings in Thana. The decrease in the royalty on famine grass was due to less storage of grass during the year.

In the Central Circle the decrease under timber was due to no unusual clearance of land for cultivation having been done during the year. The increase under fuel was due to increased exploitation of dead and fallen babul trees in Poona and of fuel coupes in the Mahableshwar Range in which the exploitation had been suspended in the previous year on account of surplus stock on hand. The increase under minor produce was due to the higher rate obtained for *hirda* in Poona.

In the Southern Circle the decrease under timber was due to failure of logging contractors to finish work in time. The increase under sandalwood was due to increased exploitation of sandalwood trees during the year. The decrease under minor produce was due to departmental collection of *hirda* having not been undertaken during the year.

In Sind the increase under timber was due to a demand for *babul* timber from the Jabulpore Gun Carriage Factory and from the Karachi Port Trust and that under fuel was due to extensive departmental operations. The increase in the value of minor produce was due to better revenue having been realised owing to part of the lac crop in Hyderabad Division having been collected departmentally.

Timber Depôts.—The prices obtained at the sale depôts in the Southern Circle were better but in the Northern Circle worse than those realised last year.

Firewood Depôts.—The fuel depôts in North and West Thana and at Trimbak in West Nasik were run by contractors, while the Igatpuri depôt was worked departmentally and the expenditure was Rs. 2,034, the receipts Rs. 3,857, showing an apparent profit Rs. 1,823. But apart from the help afforded to forest protection, the result is a loss on the sale of the coupes concerned. The depôts at Matheran and Mahableshwar were worked departmentally and that at Panchgani through a contractor.

All the 13 depôts in the Kanara District were worked by contractors.

Mechanical extraction of timber.—Exploitation was carried out in the Nagzari Valley as previously, but this year two Fordson Tractors with Huston Winch attachment and the Buffalo Winch, were employed. It was found practicable to work the additional out-fit with more or less the same supervision as for one, *i.e.*, one Overseer looked after them both, with a Maistry working under him. It was not considered advisable to commence working the new out-fit until the two out-fits could be worked close together and so the 2nd tractor did not commence until after X'mas,

The skidding costs and figures cannot be well compared with those of previous years owing to the very different nature of the work. At the end of the previous working season, it was reported that there were a number of logs and sleeper pieces still lying in the jungle and it was ordered that these should all be skidded before any fresh work was undertaken irrespective of the cost.

The logs being very scattered the work was naturally difficult and irksome as the setting of the tractor had to be changed very frequently. This work in consequence proved rather more expensive than for previous years—*i.e.*, Rs. 9 per ton against Rs. 7-12-0, entirely due to the lower out-put during the period.

By the middle of April, the normal work for the year was completed and both tractors were available then for the special long hauling work, which is dealt with separately.

The work went on quite satisfactorily and the tractors did all that was expected. Except for the reasons given, the work was cheaply done and with normal conditions we may expect a much cheaper rate.

All costs are shown as considerably higher than previous reports as this year half the pay of the Forest Engineer, has been shown against the skidding operations.

The new Huston Winch attachment is much bigger and heavier than the original one but in every way was found to be superior, its greater wire capacity being a great advantage.

The quantity extracted during the year by Fordson and Animal Winches was 732·8 and 424 tons respectively with average lengths of haul of 820′ and 541′ as against 919 and 433 tons with average lengths of haul of 720′ and 600′ last year.

The cost of extraction including depreciation, interest and supervision charges and establishment and maintenance charges during the year including the period the out-fit was idle worked out to Rs. 11-10-6 and Rs. 11-4-6 per ton during the year as against Rs. 7-12-0 and Rs. 6-14-0 per ton last year.

Bullock winch in Gund.—Extraction by means of a bullock winch similar to that used in the Nagzari was commenced this season in Gund. This was worked departmentally by a Ranger on Special Duty, but as this was his first experience of such work, the progress was somewhat slow. The use of this appliance was however clearly demonstrated, as the logs hauled had been left in this Compartment for many years by a contractor who was unable to make the work pay by the use of elephants.

The work was interrupted somewhat as one or two accidents occurred to the winch owing to a faulty casting. This was repaired at Hubli but finally was replaced by a new one from America.

AUCTION SALE OF TIMBER LOGS IN PROGRESS AT DANDELI DEPOT (N. D., KANARA)

No. 6

In all 579 logs were extracted and the figures for this work are as follows :—

Total number of days that skidding was done.	90
Number of logs hauled	579 (176 timber tons).
Number of hauls	334
Mean length of haul	484 feet.

	Rs.	a.	p.
Total expenditure including pay of drivers and cost of feed for animal	1,373	0	0
Cost per ton for labour As. 104 or Rs. 6-8-0 ..	7	14	0
Cost for feed of animals As. 21·6 or Re. 1-6-0 ..			
Cost of interest at 6 per cent. As. 14·86 or Re. 0-15-0	7	7	0
Cost of depreciation As. 46·5 or Rs. 2-14-0 ..			
Cost of supervision As. 58·2 or Rs. 3-10-0 ..			
Cost per ton with all charges	15	5	0
Cost per khandy with all charges	3	13	0

Long Hauling.—This work formed almost half the season's work this season and was carried out as an experiment in continuation of that which was begun last season.

To further exploit the Nagzari Valley, it is a case of either continuing the present Nagzari Valley road, and working timber out as at present, or by working with very long hauls to the top of the ridges thus eliminating the road. The cost of this road was estimated to be very high, about Rs. 16,000 per mile and so it was decided to work a test area with the most difficult conditions to see whether the costs were prohibitive or whether they allowed this method to be considered feasible.

The length of haul to be tackled was somewhere from 2,500′—4,500′ considerably in excess of anything ever handled before—and the slopes were also very steep.

The job was first done by one tractor alone, working from the logs which hauled 32 logs for an average haul of 2,700′ at a working cost of Rs. 13·4 per khandy.

Next, 77 logs were hauled by two tractors working in combination. A special track was built so that one tractor was taken some 1,200′ below the top one—and the total haul was divided up between them.

This method proved far more economical than using one unwieldy very long length of wire from one tractor.

The double tractor method worked out at about Rs. 9 per khandy.

The actual costs are not of very much guide, unless very carefully studied—as all the various incidental expenses of getting the machinery to the site, cost of making the tractor tracks have to be shown against a comparatively small number of logs—which were all that could be hauled there this season. The progress was slow—as this was entirely new work to everybody concerned. But much experience has been gained and from carefully analysing the actual expenses of this

experiment, I think the following may be considered fair costs for such long hauling work :—

Length of haul — 3 — 4,000'.

Actual working costs	Per khandi Rs. a. p.
Labour and Stores	8 0 0
Interest and Depreciation	2 8 0
Supervision	2 8 0
	13 0 0

One tractor had a breakdown, which meant working uneconomically with a single tractor just to get the timber out. This would be guarded against by having a third tractor as spare so that one could always be idle and overhauled regularly.

For this kind of work involving two tractors, I regard the use of a third as spare to be essential.

We have gained great experience from this experiment and from it I think we can safely say, this is a feasible method of extracting logs and will be more economical than by continuing the road. The conditions chosen, *were the worst* possible so that *average* skidding costs for a big area should be considerably less.

Mechanical Transport.—Foden Steam Tractor and Trailer and Super-Sentinel Tractor worked on the transport of sleepers and logs in N. D. Kanara. The inclusive running costs for this transport are shown in the table under.

Figures for the financial year are as follows :—

Description	Foden	Sentinel
	Rs.	Rs.
Running charges (Labour Stores, repair) ..	1,743	3,293
Interest 6 per cent. and depreciation	2,400	1,757
Total ..	4,143	5,050
Total number of sleepers carted	4,270 Nos.	340 Nos.
Total tons of timber carted	99·65 Tons	339·38 Tons
Cost per sleeper	Pies 4·2 per mile each for Kirwatti-Hubli run.	
	Pies 15 per mile for Bomanhalli-Dandeli run.	Pies 8·5 per mile for Bomanhalli-Dandeli run.
Cost per khandi	As. 8·21 per mile for Bomanhalli-Dandeli run.	As. 5·59 per mile for Bomanhalli-Dandeli run.
	As. 15·09 per mile for Kulgi-Dandeli run.	As. 7·7 per mile for Kulgi-Dandeli run.

KODIBAG TIMBER DEPOT (W. D., KANARA)

No. 7

Both steam tractors were again run this year—and from the figures given it will be seen that the rates are higher than the prevailing cart rates. For a variety of reasons, it is found difficult to keep these tractors running consistently throughout the fair season in the jungle and long periods of idleness due to mechanical breakdown or rains or state of the roads account for these high rates.

Apart from this, this year it was difficult to arrange the work to keep the tractors fully employed; as most of the Nagzari logs had to be taken to Phansoli instead of to Kulgi. The tractors accordingly had to be worked from Bomanhalli to Dandeli which road was in very bad condition, and so very hard on the tractors in wear and tear—Running on this road was interrupted while some new bridges were constructed. The Foden finally had a rather serious mechanical breakdown involving the supply of new parts from home.

The Sentinel gave very good service on the whole throughout the year, but there were a lot of small breakdowns and sickness of the driver which resulted in irregular running. In spite of this the rates by this tractor worked out at only slightly more than the cart rates and so with a better driver, and if repair facilities can be improved somewhat, there is no reason why the cart rates should not actually be reached; when the trouble in running these tractors may be considered worthwhile, as these tractors are very useful to the Department for keeping cart rates in check and as part of the Nagzari Valley Exploitation Scheme.

The figures in this report are for the financial year ending in February. Since then the work done by the tractors has been comparatively little—as the Foden was idle waiting for spare parts—and there was not much work for the Sentinel owing to bridge work in progress on the Bomanhalli Road.

Saw Mills.—Seven saw mills worked during the year at Karanjara and Chikhalda in the Dangs, at Badgi and Haste in Peint and at Dandeli, Bomanhalli and Kirwatti in Kanara. The outturn in the Northern and Southern Circle mills during the year under report was 157,718 and 192,790 as against 107,433 and 166,197 Cft. last year. There was an increase in outturn in both Circles. In the Northern Circle it was due to a fourth mill working during the year and in the Southern Circle to very good work. The Forest Engineering Branch continued to attend to technical matters connected with the maintenance and running of the mills. The condition of machinery, equipment and mills stores, etc., has been improved. All stores have now been standardized and a systematic system of accounts for stores introduced. As a result of efficient working and management the sawing costs have been brought down from 6·12 annas per cubic foot last year to 5·82 annas per cubic foot during the year under report. This represents a large saving. The standard of sawing has greatly improved and there is no doubt that there have been improvements all round.

The Trading accounts of the 7 Government saw mills stand as below:—

Trading Account of the Karanjara Saw Mill for the year 1926-27

Capital Cost : Rs. 42,592 + 50 — 34,851 = 7,791

Expenditure	Rs. a. p.	Rs. a. p.	Income	Rs. a. p.	Rs. a. p.
1. Timber (unconverted). ..		42,193 9 1	1. Sales ..		57,970 10 3
(*a*) Stock at the end of the previous year (1,136 pieces, 46,508 cft. at As. 10 per cft.	29,067 8 0		Sale of sawn material during the year 31,917 cft. ..	58,546 1 9	
(*b*) Taken over during the year for conversion. 3,915 pieces, 21,001·71 cft.	13,126 1 1		*Less*— Stock of sawn timber at the end of the previous year, 6,063 cft. ..	13,557 6 0	
Total ..	42,193 9 1			44,989 1 9	
Less— (*c*) Stock on hand at the end of the year ..	....		*Add*— Stock of sawn timber at the end of the year, 11,395 cft. ..	12,981 8 6	
2. General Stores		8,701 5 6	Miscellaneous receipts ..		1,184 4 6
(*a*) Stock at the end of the previous year ..	3,550 0 0		Loss ..		17,208 4 9
(*b*) Expenditure during the year.	5,251 5 6				
Total ..	8,801 5 6				
Less— (*c*) Stock at the end of the year.	100 0 0				
3. Establishment..		9,301 13 3			
4. Labour ..		4,629 14 0			
5. Depreciation at 8 per cent. on Capital expenditure ..		2,133 0 0			
6. Repairs to Buildings ..		4 11 0			
7. Miscellaneous ..					
(*a*) General ..	243 8 6				
(*b*) Carting sawn material ..	9,155 5 6	9,398 14 0			
Total ..		76,363 3 6	Total ..		76,363 3 6

Trading Account of the Chikhalda Saw Mill for the year 1926-27

Capital Cost : Rs. 60,601 + 416 — 18,301 = 42,716

Expenditure	Rs. a. p.	Rs. a. p.	Income	Rs. a. p.	Rs. a. p.
1. Timber (unconverted) ..		69,598 2 0			
(*a*) Stock at the end of the previous year, 11,500 pieces, 86,424 cft. at As. 10 per cft. *minus* 4,09 pieces, 42,104 cft. written off (Cons.' No. 3708 of 30th December 1926, Rs. 54,015—Rs. 26,315) ..	27,700 0 0		1. Sales—		68,170 14 3
			Sale of sawn material during the year 44,869 cft. ..	73,488 9 0	
			Less—		
			Stock of sawn timber at the end of the previous year, 55,891 cft. ..	94,289 8 0	
				—20,800 15 0	
(*b*) Taken over during the year for conversion 15,110 pieces, 90,649 cft. at As. 10 per cft.	56,655 10 0				
			Add—		
Total ..	84,355 10 0		Stock of sawn timber at the end of the year, 46,260 cft. ..	88,971 13 3	
Less—					
(*c*) Stock on hand at the end of the year 3,711 pieces, 23,612 cft. at As. 10 per cft...	14,757 8 0		Miscellaneous receipts ..		398 9 0
2. General Stores..		7,255 14 0	Loss for the year..		43,065 6 0
(*a*) Stock at the end of the previous year ..	2,250 0 0				
(*b*) Expenditure during the year.	7,505 14 0				
Total ..	9,755 14 0				
Less—					
(*c*) Stock at the end of the year.	2 500 0 0				
3. Establishment..		9,829 6 0			
4. Labour ..		6,692 9 6			
5. Depreciation at 8 per cent. on capital expenditure ..		4,848 0 0			
6. Repairs to Buildings ..		258 6 6			
7. Miscellaneous ..					
(*a*) General ..	135 2 6				
(*b*) Carting sawn material to depot ..	13,017 4 9	13,152 7 3			
Total ..		1,11,634 13 3	Total ..		1,11,634 13 3

Trading Account of the Badgi Saw Mill for the year 1926-27
Capital Cost : Rs. 24,850 — 7,006 = 17,844 — 3,949 = 13,895

Expenditure	Rs.	Rs.	Income	Rs.	Rs.
1. Timber unconverted ..		42,107	1. Sales ..		61,098
(*a*) Stock at the beginning of the year, *viz.*, 20,592 cft. at 8 annas each	10,296		Sale of sawn timber during the year ..	42,781	
			Less—		
(*b*) Taken over during the year for conversion, *viz.*, 84,156 cft. at 8 annas each ..	42,078		Stock of sawn timber at the end of the previous year, *viz.*, 9,390 cft. at Rs. 2-0-7 per cft. (sale price for 1925-26) ..	19,122	
Total ..	52,374			23,659	
Less—			*Add*—		
Stock on hand at the end of the year, *viz.*, 20,535 cft. at 8 annas each ..	10,267		Stock of sawn timber at the end of the year, *viz.*, 22,255 cft. at Rs. 1-10-11 each (sale price for 1926-27) ..	37,439	
2. General Stores		4,659			
(*a*) Stock at the end of the prevous year	5,494		2. Miscellaneous receipts ..		401
Expenditure during the year ..	4,659		Loss for the year ..		9,642
Total ..	10,153				
Less—					
Stock on hand at the end of the year	5,494				
3. Establishment					
(*a*) Temporary	2,289				
(*b*) Permanent	1,212				
		3,501			
4. Labour		9,314			
5. Depreciation on capital expenditure of Rs. 17,844 ..		1,417			
6. Repairs to buildings ..		245			
7. Miscellaneous		1,017			
For carting sawn material ..		8,871			
Total ..		71,141	Total ..		71,141

Trading Account of the Haste Saw Mill for the year 1926-27.

Capital Cost: Rs. 27,344 + 24 — 2,188 = 25,180

Expenditure			Income		
	Rs.	Rs.		Rs.	Rs.
1. Timber unconverted ..		27,922	1. Sale ..		54,457
(*a*) Stock at the end of the previous year, *viz.*, 66,561 cft. at 8 annas per cft. ..	32,780		Sales of sawn material during the year ..	40,929	
(*b*) Taken over during the year for conversion, *viz.*, 82,422 cft. at 8 annas per cft. ..	41,211		*Less*— Stock of sawn timber at the end of the previous year ..	..	
Total ..	73,991			40,929	
Less—			*Add*—		
Stock on hand at the end of the year, *viz.*, 92,138 cft. at 8 annas a cft.	46,069		Stock of sawn timber at the end of the year, *viz.*, 7,379 cft. at Rs. 1-13-4 a cft. (Sale price of 1926-27) ..	13,528	
2. General Stores		2,864			
(*a*) Stock at the end of the previous year	*Nil*		2. Miscellaneous receipts ..		439
(*b*) Expenditure during the year.	11,191				
Total ..	11,191				
Less—					
Stock on hand at the end of the year	8,327				
3. Establishment					
(*a*) Temporary	1,864				
(*b*) Permanent	720				
		2,584			
4. Labour		6,419			
5. Depreciation on capital expenditure of Rs. 27,344 at 8 per cent.		2,188			
6. Repairs to buildings ..		1,935			
7. Miscellaneous		414			
For carting sawn material to the sale depot ..		6,948			
Profit for the year ..		3,622			
Total ..		54,896	Total ..		54,896

Trading Account of the Bomanhalli Saw Mill for the year 1926-27

Capital Cost Rs. (25,068 + 141 = 25,209 — 7,365) = 17,844

Expenditure	Rs.	Rs.	Income	Rs.	Rs.
1. Timber unconverted ..		32,867	1. Sales ..		1,56,879
(*a*) Stock at end of previous year	4,404		Sale of sawn material during the year ..	2,03,056	
(*b*) Taken over during the year for conversion ..	31,363		*Less*—		
Total ..	35,767		Stock of sawn material at the end of previous year.	1,02,722	
				1,00,334	
Less—					
(*c*) Stock on hand at end of the year	2,900				
			Add—		
2. General Stores		4,007	Stock of sawn timber at the end of the year ..	56,545	
(*a*) Stock at the end of previous year	..				
(*b*) Expenditure during the year	4,007		2. Miscellaneous receipts ..		386
Total ..	4,007				
Less—					
(*c*) Stock at end of the year ..	..				
3. Establishment		19,238			
4. Labour		601			
5. Depreciation at 8 per cent. on Capital expenditure, Rs. 25,068		2,005			
6. Repairs to buildings ..		182			
7. Miscellaneous		13,204			
Profit for the year		85,161			
Total ..		1,57,265	Total ..		1,57,265

The net profit during the year was Rs. 85,161 as against Rs. 1,04,523 in the previous year.

Trading Account of Dandeli Saw Mill for the year 1926-27

Capital Cost Rs. (95,813 + 7,278 = 1,03,091 — 30,660) = 72,431

Expenditure			Income		
	Rs.	Rs.		Rs.	Rs.
1. Timber unconverted ..		3,66,696	1. Sales ..		4,96,527
(*a*) Stock at end of previous year	..		Sale of sawn material during the year ..	5,57,405	
(*b*) Taken over during the year for conversion	3,66,696		*Less*—		
Total ..	3,66,696		Stock of sawn material at the end of the previous year.	1,10,353	
				4,47,052	
Less—					
(*c*) Stock on hand at the end of the year ..	..				
2 General Stores		11,028	*Add*—		
(*a*) Stock at the end of the previous year	..		Stock of sawn material at the end of the year ..	49,475	
(*b*) Expenditure during the year	11,028		2. Miscellaneous ..		6,165
Total ..	11,028				
Less—					
(*c*) Stock at the end of the year	..				
3. Establishment		28,274			
4. Labour		5,318			
5. Depreciation on Capital expenditure at 8 per cent. on Rs. 95,813		7,665			
6. Repairs to buildings ..		124			
7. Miscellaneous		3,373			
Profit for the year		80,214			
Total ..		5,02,692	Total ..		5,02,692

The net profit during the year was Rs. 80,214 as against Rs. 10,739 in the previous year.

Trading Account of the Kirwatti Saw Mill for the year 1926-27

Capital Cost Rs. 9,840

Expenditure	Rs.	Rs.	Income	Rs.	Rs.
1. Timber unconverted ..		38,640	1. Sales ..		92,012
(a) Stock at the end of previous year at rates now fixed.	33,527		Sale of sawn material during the year ..	36,873	
(b) Taken over during the year for conversion	28,980		Sleepers delivered to Railway Company, deducting carting charges ..	78,845	
Total ..	62,507		Total ..	1,15,718	
Less—					
Stock on hand at the end of the year ..	23,867		*Less*—		
			Stock of sawn material at the end of the previous year	61,831	
				53,887	
2. General Stores		3,802			
(a) Stock at the end of the previous year ..	...		*Add*—		
(b) Expenditure during the year including the value of stores supplied by the Forest Engineer	3,802		Stock of sawn material at the end of the year ..	38,125	
Total ..	3,802		2. Miscellaneous ..		
Less—					
(c) Stock at end of the year ..	..				
3. Establishment		} 7,058			
4. Labour					
5. Depreciation on Capital expenditure at 8 per cent. on Rs. 9,840 ..		787			
6. Repairs to buildings ..		6			
7. Miscellaneous	..				
Profit for the year		41,719			
Total ..		92,012	Total ..		92,012

The net profit during the year was Rs. 41,719 as against Rs. 21,366 in the previous year.

The mills on the whole show a net profit of Rs. 1,40,800 as against Rs. 1,83,543 last year. The decrease is due to the fact that the three mills in the Northern Circle showed a loss of Rs. 69,916 instead of a profit of Rs. 35,530 in the previous year. The Conservator states that the unsatisfactory return of the mills is partly due to the decline in the market rate of sawn material. Another reason for the loss on paper is the method adopted in accounting, a very slight reduction on the royalty charged on the timber in-put would make a great difference in the final balance. The Dandeli and Kirwatti mills in the Southern Circle showed more profit than last year on account of increase in outturn of sawn material and sleepers in the former and of sleepers in the latter. The saw mill at Karanjara in the Northern Circle has already been closed as it is old and worn out and standing coupes are expected to give more revenue in the Dangs than sawn wood.

Mr. Mantri's profit sharing mill at Gunjawati was not in use during the year. Mr. Sayad Nasrodin's mill at Hanmapur turned out 1,736 sleepers (6') and 1,316 cubic feet of other sawn material: a very poor result for a whole year's work.

Cart Depots.—The only Government cart depot at Kirwatti (E. D. Kanara) was continued and was in charge of the Range Forest Officer, Kirwatti. It was worked at a loss of Rs. 826 as compared with a surplus of Rs. 29 during the previous year. The loss is on account of (*a*) casualties among the Live Stock and (*b*) lack of suitable work for carts when not employed on moving touring officers' kit. It has been decided to employ the carts on removal of material from a small felling contract undertaken on piece work near Kirwatti with a view to examine the possibilities of making the depot self-supporting. It has also since been decided to reduce the number of carts from 12 to 6.

Messrs. Howard Brothers' Timber Agency

The account with this firm to the end of the financial year is given in the statement below :—

Description of timber	Receipts	Disposals	Balance in stock	Sale proceeds	All charges on sales	Other charges freight, prime charges, etc.	Net proceeds
1	2	3	4	5	6	7	8
	C.ft.	C.ft.	C.ft.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Teak ..	22,616	5,366	17,250				
Matti ..	11,419	7,149	4,270				
	T. cwt. q. lbs.	T. cwt. q. lbs.		8,191 19 8	1,585 4 0	5,412 2 0	1,194 13 8
Blackwood or Rosewood.	20 4 3 3	29 4 3 3	..				
Honne	76	....	76				
Total ..	34,111	12,515	21,596	8,191 19 8	1,585 4 0	5,412 2 0	1,194 13 8

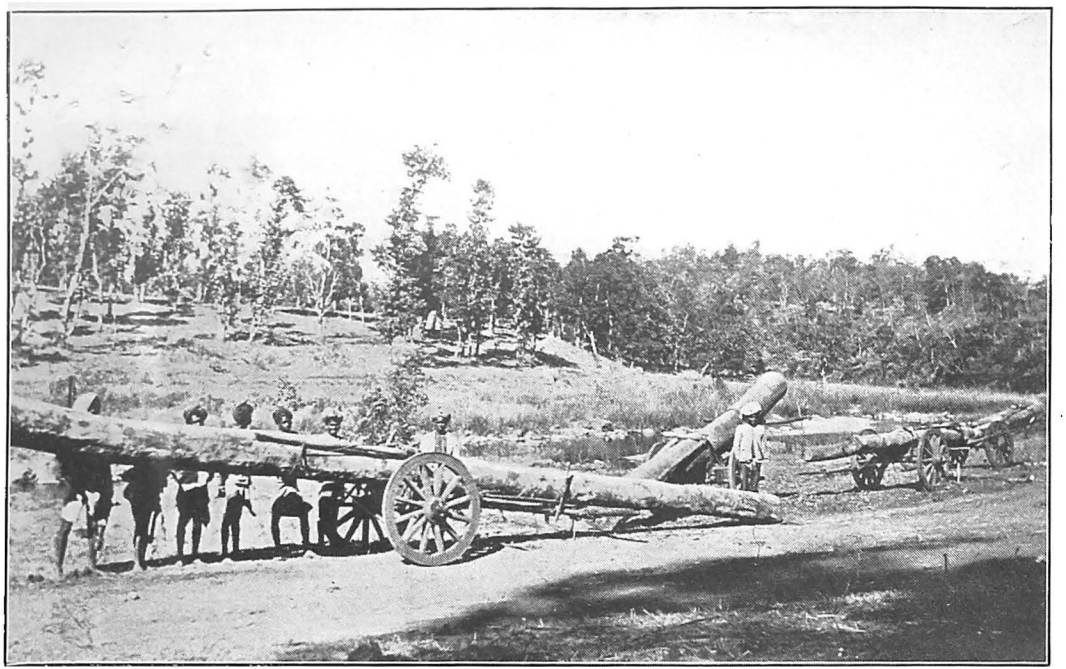
Note.—Figures shown in columns 2 and 4 are as communicated by the firm; considerable difficulty is found in checking the figures at this end. The balance is being disposed of by the High Commissioner with the help of Sir Peter Clutterbuck and Mr. A. G. Edye,

(ii) *Purchasers.*

The following table compares the outturn of major and minor produce removed by consumers and purchaser during the years 1926-27 and 1925-26

Circle	Year	Major Forest Produce			
		Timber		Fuel	
		Cubic feet in thousands	Value	Cubic feet in thousands	Value
			Rs.		Rs.
Northern ..	1926-27 ..	2,222	18,03,682	5,512	42,062
	1925-26 ..	2,169	20,03,126	6,318	42,284
Central ..	1926-27 ..	586	2,84,516	4,844	55,519
	1925-26 ..	536	3,55,279	4,124	1,02,054
Southern ..	1926-27 ..	853	3,16,940	6,832	2,02,904
	1925-26 ..	1,096	2,67,226	6,234	2,28,074
Sind ..	1926-27 ..	105	82,722	19,415	3,72,765
	1925-26 ..	140	86,490	15,999	3,25,623
Total ..	1926-27 ..	3,766	24,87,860	36,603	6,73,320
	1925-26 ..	3,041	27,12,121	32,685	6,98,035
Difference ..	....	—175	— 2,24,261	+3,918	— 24,715

Circle	Year	Major Forest Produce	Minor Forest Produce			
		Sandal wood	Bamboos	Grass and grazing	Other minor produce	Total
		Value	Value	Value	Value	Value
		Rs.	Rs.	Rs.	Rs.	Rs.
Northern ..	1926-27 ..	61	45,250	1,32,776	54,679	2,32,705
	1925-26 ..	211	55,736	1,26,636	77,643	2,60,015
Central ..	1926-27 ..	..	13,114	5,07,950	67,608	5,88,672
	1925-26 ..	..	10,105	5,80,683	64,653	6,55,441
Southern ..	1926-27 ..	..	81,802	88,177	62,082	2,32,061
	1925-26 ..	..	80,750	83,070	48,626	2,12,446
Sind ..	1926-27 ..	..	..	39,663	37,690	77,353
	1925-26 ..	..	..	38,331	41,605	79,936
Total ..	1926-27 ..	61	1,40,166	7,68,566	2,22,059	11,30,791
	1925-26 ..	211	1,46,591	8,28,720	2,32,527	12,07,838
Difference ..	....	—150	—6,425	—60,154	—10,468	—77,047



No. 8

CARTING TEAK LOGS TO NAWAPUR

The large log is 47 feet in length and 33 cubic feet in volume. The art of balance enables *one* pair of bullocks to haul this to Nawapur 24 miles in one day. Scene river bed behind Mill at Karanjara Dangs.—*V. A. N. Sausman.*

Northern Circle.—The big drop in the value of timber is due partly to more outstandings of revenue and partly to fewer thinning coupes to be sold standing during the year under report. The decrease in the quantity and value of fuel is due to the reduction of acreage worked in consequence of the revision of the working plans of the Panch Mahals Division. Demands for bamboos declined greatly during the year. Grass and grazing receipts rose slightly owing to levy of grazing fees in certain Divisions as a punitive measure. The fall in the value of other minor produce was due to non-recovery of royalty on manganese in the Panch Mahals for the second half year before the close of the year.

Central Circle.—The decrease in the value of both timber and fuel was due mainly to the general slump in the timber and fuel markets throughout the Circle and to the poor agricultural season in the North and West Khandesh Divisions. The increase in the value of bamboos was due to an increase in the demand in East Khandesh, North Khandesh and Poona Divisions. The fall in the revenue from grass and grazing was due to decreased demand for kurans in East and West Khandesh Divisions, to the discontinuance of the system of collection of grazing fees by contract in the East Khandesh and to 27 Kurans closure of which was not sanctioned by the Collector having remained unsold, in Satara Division. The increase in the revenue under other minor produce was due to the credit of part of the Rosha grass revenue of the last year during this year.

Southern Circle.—The increase in the value of timber was due to better prices. The decrease in the value of fuel was due to the fact that there was no demand for fuel coupes in Belgaum as the fuel contractors had a large quantity of cut and uncut material on hand with a poor and limited market. The increase in the value of bamboos was due to the increase in the permit rates in some areas in the Circle. The increase under grass and grazing was due to (1) increase in the number of animals grazed on permits, (2) the fact that normal rates were levied in some of the villages where free grazing was allowed last year and (3) to the levying of grazing fees on all cattle in forest villages under rule VII-*b* of the grazing rules. The increase under other minor produce was due partly to the sale of hirda by contract and partly to increased realizations as royalty on manganese.

Sind Circle.—The decrease in the value of timber was due to contractors having converted most of their material into fuel and charcoal owing to lack of demand for timber. The increase in the value of fuel was due to better prices having been realized by the sale of coupes and erosion strips. The decrease in minor produce is due to the low prices realised from the lac and kanh grass contracts.

Manganese.—The Shiroli manganese mine in the Kanara District was worked by the lessee throughout the year and 6,732 tons of ore were extracted as compared with 1,743 tons in the previous year. The royalty rate of annas 3¼ per ton ruling at the beginning of the year was reduced to annas 2¼ per ton from October 1926 owing to reduction in the selling rate of the ore. In the Belgaum Division 5,106 tons of

manganese ore were removed. The royalty on this was Rs. 1,100 which works out on an average to annas 3 and pies 5 per ton. The royalty realized by Government seems extremely small because from the gross value of the product at port it comes to a little more than one per cent.

(iii) *Rights, Privileges and Free Grants*

Circle	Agency	Major Forest Produce			
		Timber		Fuel	
		Cubic feet in thousands	Value	Cubic feet in thousands	Value
			Rs.		Rs.
Northern	C	....	....	5,427	1,39,424
	F	4	4,009	62	740
Central	C	1	271	1,787	44,098
	F	7	3,436	5	103
Southern	C	300	72,000	3,000	37,500
	F	19	5,639	15	245
Sind	C	....	....	10	150
	F	43	3,465	....	3
Total of 1926-27 ..	C	301	72,271	10,224	2,32,972
	F	73	16,549	82	1,097
Total of 1925-26 ..	C	300	72,000	9,021	2,04,033
	F	86	18,192	70	783

Circle	Agency	Minor Forest Produce			
		Bamboos	Grass and grazing	Other minor produce	Total
		Value	Value	Value	Value
		Rs.	Rs.	Rs.	Rs.
Northern	C	7,143	2,08,759	15,900	2,31,802
	F	119	....	326	445
Central	C	....	71,142	3,127	74,269
	F	220	5	1,717	1,942
Southern	C	45,000	2,84,339	20,000	3,49,339
	F	168	25,055	1,096	26,319
Sind	C	....	3,829	....	3,829
	F	....	7,338	40	7,378
Total of 1926-27 ..	C	52,143	5,68,069	39,027	6,59,239
	F	507	32,378	3,179	36,084
Total of 1925-26 ..	C	53,009	5,90,961	38,754	6,82,724
	F	346	44,204	3,183	47,733

C=Concessionists F=Free grantees.

The figures under concessionists are rough estimates.

The decrease under Free grantees was due to a smaller demand.

* It is estimated that 2,20,000 persons earn their livelihood by employment on forest operations of any sort or on manufacturing articles made from forest produce.

(c) Outturn and Sources of Forest Produce

The outturn from all sources of forest produce during the two years 1926-27 and 1925-26 compares as follows :—

Circle	Year	Major Forest Produce			Minor Forest Produce		
		Timber in Cubic feet in thousands	Fuel in in Cubic feet in thousands	Sandal wood	Bamboos	Grass and grazing	Other minor produce
				Rs.	Rs.	Rs.	Rs.
Northern ..	1926-27	2,688	11,616	11	52,587	3,48,494	71,124
	1925-26	2,747	12,564	211	63,837	4,31,345	94,327
Central ..	1926-27	606	7,126	2,505	13,334	5,79,097	79,139
	1925-26	561	4,920	2,513	10,227	5,88,442	74,336
Southern ..	1926-27	2,041	9,873	1,17,584	1,26,070	3,97,571	83,220
	1925-26	2,513	9,440	82,794	1,25,882	4,05,436	83,867
Sind ..	1926-27	197	21,539	..	..	50,830	43,820
	1925-26	178	18,076	..	..	47,992	46,996
Total ..	1926-27	5,532	50,155	1,20,150	1,92,891	13,75,992	2,77,303
	1925-26	5,999	45,000	85,518	1,99,946	14,73,215	2,99,526
Difference ..		—467	+5,155	+34,631	—7,055	—97,223	—22,223

Of 2,433,107 animals admitted to grazing in the forest 540,633 were allowed free. Corresponding numbers for the last year are 2,398,296 and 545,789.

The total expenditure on management of state forests was :—

Circle	1926-27	1925-26
	Rs.	Rs.
Northern	5,01,122	4,82,984
Central	95,942	91,248
Southern	10,72,386	10,56,141
Sind	1,07,588	1,00,092
Total ..	17,77,038	17,30,465

The increase was due to more expenditure on roads and buildings in the Northern and Southern Circles.

CHAPTER

FINANCIAL

(Forms 68, 68-A,

The revenue and expenditure of the year compare with those of the (1921-22 to

Circle	Year	Revenue	Conservancy and works
		Rs.	Rs.
Northern	1926-27	26,65,140	4,40,866
	1925-26	28,69,214	4,26,606
	Average	24,96,616	4,05,308
Central	1926-27	11,60,828	1,07,369
	1925-26	13,42,389	95,905
	Average	13,06,053	1,13,108
Southern	1926-27	30,63,591	10,02,495
	1925-26	25,67,126	9,93,704
	Average	27,58,920	11,87,943
Sind	1926-27	7,63,234	99,754
	1925-26	7,44,583	97,233
	Average	6,97,677	1,05,847
General Direction including Bombay Forest College.	1926-27	25	(a) 44,356
	1925-26	6	210
	Average	2,681	12,575
Utilization Circle	1926-27	....	....
	1925-26	....	....
	Average	1	1,189
Engineering	1926-27	3,602	63,468
	1925-26	3,124	50,615
	Average	1,862	27,086
Total, Presidency ..	1926-27	76,56,420	17,58,308
	1925-26	75,26,442	16,64,363
	Average	72,63,810	18,53,056
Difference between ..	1926-27 .. .. and 1925-26	+1,29,978	+93,945

N.B.—The above figures are exclusive of expenditure
(*a*) Includes Rs 44,225 on account of interest on past
(*b*) Includes Rs. 45,922 on account of loss by exchange.

V

RESULTS

69 and 70)

last year and the average of the previous quinquennium as follows.
1925-26)

Expenditure			Surplus or Deficit	Percentage of surplus to gross revenue
Forest Capital outlay charged to Revenue	Establishment	Total		
Rs.	Rs.	Rs.	Rs.	
1,03,447	6,69,179	12,13,492	14,51,648	54·5
92,960	6,65,254	11,84,820	16,84,394	58·7
18,592	6,52,994	10,76,894	14,19,722	56·9
20,568	5,89,220	7,17,157	4,43,671	38·2
14,229	5,69,969	6,80,103	6,62,286	49·3
2,846	5,80,084	6,96,038	6,10,015	46·7
70,668	6,35,852	17,09,015	13,54,576	44·2
63,471	6,16,066	16,73,331	8,93,795	34·8
12,694	6,79,019	18,79,656	8,79,264	31·9
7,835	2,92,868	4,00,457	3,62,777	47·5
2,871	2,81,359	3,81,463	3,63,120	48·8
574	2,78,662	3,85,083	3,12,594	44·8
13	(b) 1,33,578	1,77,947	−1,77,922	....
379	95,338	95,927	−95,921	....
76	1,08,859	1,21,510	−1,18,829	....
....	....	....	....	....
....	....	....	....	....
....	2,325	3,514	−3,513	....
18,338	86,138	1,67,944	−1,64,342	....
31,327	99,167	1,81,109	−177,985	....
6,266	65,738	99,090	−97,228	....
2,20,869	24,06,835	43,86,012	32,70,408	42·7
2,05,237	23,27,153	41,96,753	33,29,689	44·2
41,048	23,67,681	42,61,785	30,02,025	41·4
+15,632	+79,682	+1,89,259	−59,281	....

under BX—Work Advances which are recoverable.
capital expenditure not charged to Revenue

The gross revenue of the year rose by Rs. 1,29,978 over the figure of the previous year and by Rs. 3,92,610 over the average of the preceding five years. The rise was mainly in the Southern Circle. There was a fall in the Northern and Central Circles. The surplus of the year fell by Rs. 59,281 due to two new items of expenditure, *viz.*, Rs. 45,922 on account of loss by exchange and Rs. 44,225 on account of interest on capital expenditure not charged to Revenue having been adjusted in the accounts. As regards the first item, it was shown by the Accountant General in the annual summary for the first time during the year under report; and as regards the second item, it was shown by the Accountant General, for the first time in the accounts for the year 1925-26 but it could not be shown in that year's report, the figures having been received after the submission of the report. Yet the surplus was more by Rs. 2,66,502 than the average of the previous quinquennium.

The increase in revenue in the Southern Circle was chiefly due to—

(1) A greater number of sleepers and larger quantity of sawn material supplied to the M. & S. M. Railway.

(2) Better prices realised for teak pole coupes and for timber at sale depôts.

(3) Increased output of sandalwood sold at a higher rate.

(4) Increased earnings on the Alnawar-Dandeli Railway on account of freight and coaching traffic.

The decrease in revenue in the Northern and Central Circles was chiefly due to—

(1) Large revenue outstandings in the Panch Mahals.

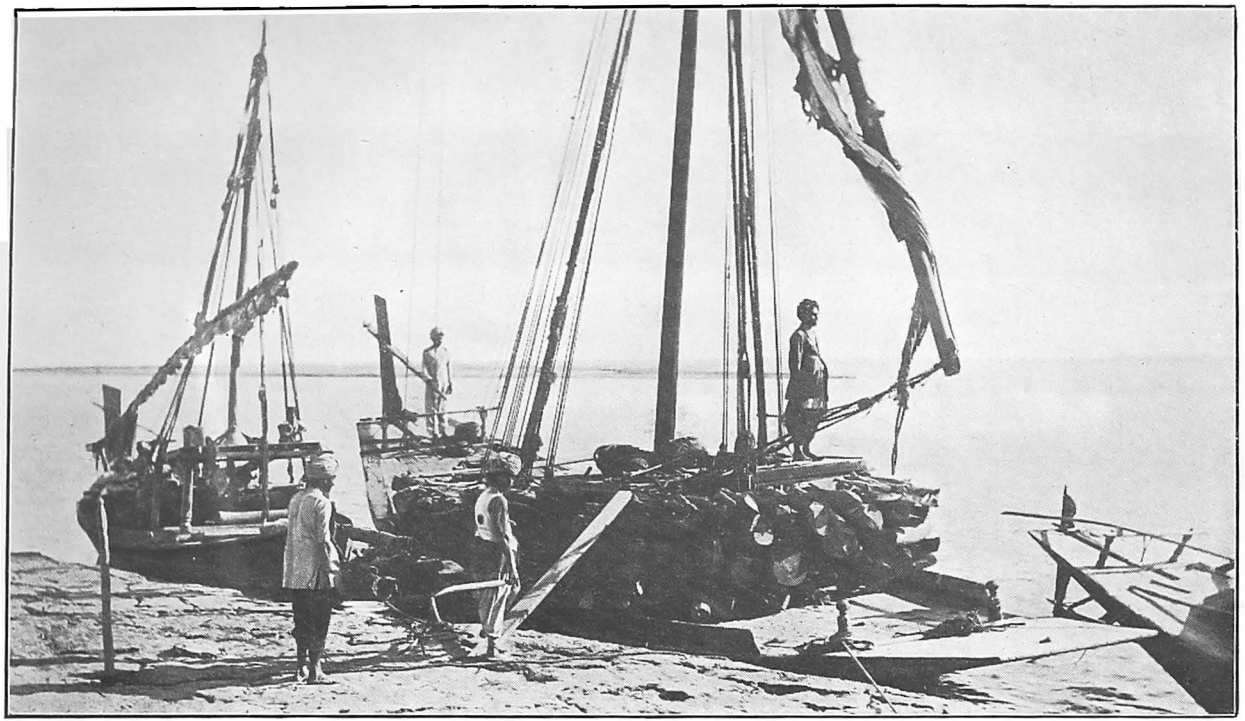
(2) Stoppage of departmental extraction of material at Karanjara and Bardipada in the Dangs.

(3) Owing to an all round slump in the timber and fuel markets there was no demand for coupes in all Divisions of the Central Circle.

The expenditure under "Conservancy and Works" rose by Rs. 93,945 on account of extensive departmental operations, payments of rent for leased forest and interest on capital expenditure not charged to Revenue.

The expenditure under capital expenditure rose by Rs. 15,679 on account of more works having been undertaken during the year than before.

The expenditure under establishment rose by Rs. 81,516 on account of payment of permanent travelling allowance to Guards in charge of rounds and to loss by exchange adjusted by the Accountant General to the General Direction Division this year for the first time.



No. 9

LOADING FIREWOOD BILLETS ON THE BANK OF THE RIVER INDUS
Each boat carries from 600 to 2,000 cubic feet according to size (Hyderabad Division, Sind).

The sources of revenue and the heads of expenditure are analysed and compared below :—

Sources and heads	General Direction and Forest Engineering branch	Northern Circle	Central Circle	Southern Circle
Receipts	Rs.	Rs.	Rs.	Rs.
I*a* & II*a* Timber	....	22,60,486	2,94,026	23,64,621
I*b* & II*b* Firewood	....	47,897	95,748	2,08,772
I*c* & II*c* Bamboos	....	45,325	13,114	81,806
I*d* Sandalwood	....	61	2,457	1,18,500
II*d* Grazing and fodder grass ..	....	1,32,843	5,07,950	88,178
I*e* & II*e* Other produce	....	61,572	74,342	77,217
II*g* Commutation fees	....	....	....	....
III Drift and confiscated forest produce	....	511	1,871	8,234
IV Forest not managed by Government	....	5,872	31,489	12
V Miscellaneous	3,993	1,15,708	1,44,512	1,19,589
Refunds	−366	−5,135	−4,681	−3,338
Total ..	3,627	26,65,140	11,60,828	30,63,591

Sources and heads	Sind Circle	Total		Increase or decrease
		1926-27	1925-26	
Receipts	Rs.	Rs.	Rs.	Rs.
I*a* & II*a* Timber	98,940	50,18,073	48,44,700	+1,73,373
I*b* & II*b* Firewood	4,98,798	8,51,215	9,07,577	−56,362
I*c* & II*c* Bamboos	....	1,40,245	1,46,858	−6,613
I*d* Sandalwood	....	1,21,018	97,936	+23,082
II*d* Grazing and fodder grass ..	39,663	7,68,634	8,28,666	−60,032
I*e* & II*e* Other produce	42,371	2,55,502	2,57,377	−1,875
II*g* Commutation fees	....	....	5,360	−5,360
III Drift and confiscated forest produce	1,463	12,079	3,967	+8,112
IV Forest not managed by Government	....	37,373	28,444	+8,929
V Miscellaneous	82,659	4,66,461	4,35,110	+31,351
Refunds	−660	−14,180	−29,553	+15,373
Total ..	7,63,234	76,56,420	75,26,442	+1,29,978

Heads	General Direction	Forest Engineering branch	Northern Circle	Central Circle
	Rs.	Rs.	Rs.	Rs.
EXPENDITURE				
Conservancy and works				
I.—Timber extracted by Government agency	....	18,196	2,63,030	17,501
II.—Timber, etc., extracted by consumers or purchasers	....	....	34,446	13,445
III.—Drift and confiscated forest produce	....	....	45	56
IV.—Forest not managed by Government	....	....	....	....
V.—Rent of leased forests ..	....	....	30,025	28,258
VI and 52A-I.—Stores, Tools and Plant	13	60,467	5,213	2,886
VII and 52A-II.—Communications and Buildings	....	2,875	1,34,537	25,841
VIII and 52A-III.—Organization, Improvement and Extension of Forest	....	....	64,816	22,181
IX.—Miscellaneous	131	268	11,601	17,769
Interest	44,225	....	....	....
Total ..	44,369	81,806	5,44,313	1,27,937
ESTABLISHMENT				
I.—Pay of Officers	40,281	27,552	1,19,169	1,02,176
II.—Pay of Establishments ..	12,851	32,913	4,32,451	3,81,443
III.—Allowances, Honoraria, etc. ..	23,327	21,181	94,567	89,810
IV.—Contingencies	2,431	4,492	22,992	15,791
Establishment charges payable to Central Government	8,766	....	....	....
Loss due to exchange	45,922	....	....	....
Total ..	1,33,578	86,138	6,69,179	5,89,220
Grand Total ..	1,77,947	1,67,944	12,13,492	7,17,157
Surplus, 1926-27 ..	−1,77,922	−1,64,342	+14,51,648	+4,43,671
Surplus, 1925-26 ..	−95,921	−1,77,985	+16,84,394	+6,62,286
Difference ..	−82,001	+13,643	−2,32,746	−2,18,615

Southern Circle	Sind Circle	Total		Increase or decrease
		1926-27	1925-26	
Rs.	Rs.	Rs.	Rs.	Rs.
8,39,710	77,587	12,16,624	11,57,202	+59,422
4,506	865	53,262	55,479	−2,217
233	....	3,344	327	+7
....	....	....	....	....
70	....	58,353	45,838	+12,515
8,771	941	78,291	80,851	−2,560
1,59,121	15,289	3,37,663	3,23,529	+14,134
48,609	6,950	1,42,556	1,33,037	+9,519
12,143	5,957	47,869	73,337	−25,468
....	....	44,225	....	+44,225
10,73,163	1,07,589	19,79,177	18,69,600	+1,09,577
1,29,929	69,424	4,88,521	5,18,595	−30,064
3,98,493	1,59,172	14,17,323	13,94,282	+23,041
87,821	48,500	3,65,206	3,23,892	+41,314
19,609	15,772	81,087	84,784	−3,697
....	....	8,766	5,600	+3,166
....	....	45,922	....	+45,922
6,35,852	2,92,868	24,06,835	23,27,153	+79,682
17,09,015	4,00,457	43,86,012	41,96,753	+1,89,259
+13,54,576	+3,62,777	+32,70,408	....	....
+8,93,795	+3,63,120	....	+33,29,689	....
+4,60,781	−343	....	....	−59,281

The Revenue and Expenditure are

Class	General Direction and Forest Engineering Branch		Northern Circle	
	——	Percentage	——	Percentage
	Rs.		Rs.	
Revenue				
Major produce	....	..	23,08,443	87
Minor produce	....	..	2,39,741	9
Miscellaneous	3,993	100	1,22,091	4
Refunds	—366	..	—5,135	..
Total ..	3,627	..	26,65,140	..
EXPENDITURE				
(*Conservancy and works*)				
Extension and Constitution	....	..	13,166	2
Improvement	2,875	4	1,85,074	34
Exploitation	78,676	96	3,34,472	62
Miscellaneous	399	..	11,601	2
Interest	44,225	..	....	..
Total ..	81,950 44,225	..	5,44,313	..
Establishment				
Administrative	1,18,095	89	44,615	7
Executive	....	..	2,09,106	31
Protective	14,583	11	4,15,458	62
Total ..	1,33,578	..	6,69,179	..
Forest Engineering Branch	....	..	....	..
Grand Total ..	....	..	....	..

further analysed as follows :—

Central Circle		Southern Circle		Sind Circle		Total	
——	Percentage	——	Percentage	——	Percentage	——	Percentage
3,92,231	34	26,91,893	88	5,97,738	78	59,90,305	78
5,95,406	51	2,47,201	8	82,034	11	11,64,382	15
1,77,872	15	1,27,835	4	84,122	11	5,15,913	7
—4,681	..	—3,338	..	—660	..	—14,180	..
11,60,828	..	30,63,591	..	7,63,234	..	76,56,420	..
3,738	3	407	..	....	..	17,311	1
43,336	34	2,00,489	19	22,239	21	4,54,013	23
63,094	49	8,60,124	80	79,393	74	14,15,759	73
17,769	14	12,143	1	5,957	5	47,869	3
....	..	....	..	....	..	44,225	..
1,27,937	..	10,73,163	..	1,07,589	..	19,34,952	..
						44,225	
47,272	8	53,435	8	48,198	16	3,12,515	13
1,51,171	26	2,13,317	34	1,34,932	47	7,08,526	29
3,90,777	66	3,69,100	58	1,09,738	37	12,99,656	54
5,89,220	..	6,35,852	..	2,92,868	..	23,20,697	96
....	..	....	..	....	..	86,138	4
....	..	....	..	....	..	24,06,835	..

The expenditure incurred during the year from the provision under 52-A Forest Capital Outlay and subsequently charged to Revenue is as shown below :—

Heads	General Direction	Northern Circle	Central Circle	Southern Circle	Sind Circle	Forest Engineering Branch	Total
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
I.—Live stock, Stores, etc. ..	13	5,213	2,886	3,860	807	16,656	29,435
II.—Communications and Buildings	..	86,207	14,300	59,612	7,028	1,682	1,68,829
III.—Organization, etc. ..	..	12,027	3,382	7,196	..	..	22,605
Total ..	13	1,03,447	20,568	70,668	7,835	18,338	2,20,869

The outstandings on account of revenue at the commencement and close of the year were :—

	On 1st April 1926	On 31st March 1927
	Rs.	Rs.
Northern Circle	1,60,087	1,90,146
Central Circle	12,844	6,267
Southern Circle	2,56,846	1,87,378
Sind Circle	1,50,713	1,80,552
Total ..	5,80,490	5,64,343

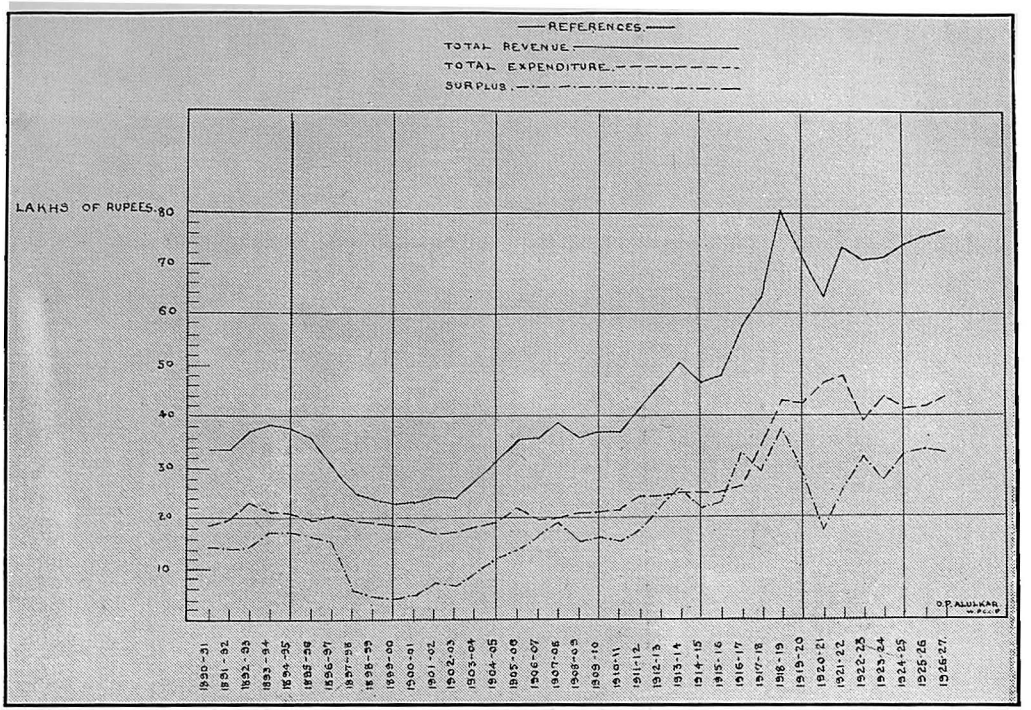
During the year irrecoverable amount of Rs. 12,904 was written off in the Southern Circle under proper authority.

More than three-fourths of the outstanding in the Northern Circle was in Panch Mahals and Surat, in the former mostly due to the depression in trade and in the latter timber sales having been held at the end of the financial year.

The outstandings on account of contractors and disbursers were as follows :—

	On 1st April 1926	On 31st March 1927
	Rs.	Rs.
Northern Circle	30,118	35,335
Central Circle	305	232
Southern Circle	61,290	56,249
Sind Circle	6,219	1,720
General Direction ..	3,431	53,255
Total ..	1,01,363	1,46,791

The accompanying diagram shows revenue, expenditure and surplus for thirty-seven years.



A diagram showing the Revenue, Expenditure and Surplus for the last 37 years.

No. 10

CHAPTER VI

Research and Experiments

Research

The research work is at present under the control of the Chief Conservator who supervises operations in addition to his own duties which are already very heavy, and the additional work demands much of his time and attention which he can ill-afford to spare. It is, therefore, hoped that the necessity for the early appointment of a Conservator to supervise the preparation and control of working plans and the control of research work will be seriously considered by Government.

Inquiries into the 20 subjects mentioned in the last year's report progressed to some extent during the year under report. In few cases, however, have conclusive results been obtained, the data collected in most cases being either indefinite or conflicting, necessitating repetition of the experiments.

Research was started on twenty subjects as shown below :—

Serial No.	Subject	Divisions where research was carried out
1	Reasons for variation in results of teak regeneration work.	North Thana. East Thana. West Thana.
2	Germination tests of teak seeds. ..	Surat, Kolaba, West Khandesh, Belgaum, S. D. Kanara, Panch Mahals.
3	Comparative results in teak plantations of— (*a*) dibbling of seed, (*b*) use of seedlings a few weeks old, (*c*) use of one year old transplants.	E. D. Kanara.
4	Effect of thinning of teak coppice of different ages.	East Thana.
5	Effect of different degrees of thinning in teak plantations of different ages; and of under planting with shade-bearers.	West Nasik. West Thana. N. D. Kanara. E. D. Kanara. S. D. Kanara. W. D. Kanara, Belgaum.
6	Effect of (1) reduction, and (2) abolition of watering in casuarina plantations.	W. D. Kanara. S. D. Kanara.
7	Annual Girth Increment of *sandal* (*Santalum album*).	Belgaum. Dharwar.
8	Increment of *babul* (*Acacia arabica*) under different degrees of thinning.	Hyderabad.
9	Propagation of Lac.	Karachi. (Also in other parts of the Presidency).
10	Economic age for cutting *bahan* (*Populus euphratica*) coppice and degree of thinning required.	Shikarpur.
11	"Stoning" of teak seedlings as a protection against animals and an aid to their growth.	East Khandesh. Poona. West Thana.

Serial No.	Subject	Divisions where research was carried out
12	Artificial propagation of *rosha* (*Andropogon Martinii*) grass.	North Khandesh. West Khandesh.
13	Propagation of *hirda* (*Terminalia chebula*).	Satara. Poona.
14	Propagation of *bamboos* (*Dendrocalamus strictus*).	Kolaba.
15	Relative value of different species for making charcoal.	Satara.
16	Effect of improvement fellings on diameter growth.	Surat.
17	Effect of cutting back superfluous shoots of two-year old teak seedlings.	West Nasik.
18	Investigation into the effect of shade on *lantana*.	Belgaum.
19	Coppicing of *anjan* (*Hardwickia binata*). ..	East Nasik. East Khandesh. West Khandesh.
20	Preservation of natural *anjan* seedlings. ..	East Nasik. East Khandesh. West Khandesh.

The work done and the results observed up to date are briefly described below.

Subject No. 1—Reasons for variation in results of teak regeneration work

An inspection of the teak seedling regeneration in a number of coupes in Thana reveals an extraordinary variation in the number and size of plants. In some patches there are numerous thriving seedlings, measuring some of them as much as 7½ feet in height in the first year; and side by side with these are patches with only a few small stunted seedlings, none of which are likely to survive. In each Range of the three Thana Divisions one coupe has been put under observation, and the Ranger in each case is maintaining an accurate record of all work done and results obtained. Up to now it is not possible to say clearly what are all the factors making for success or failure, and observations are to be continued for another year in one coupe in each Range coming under regeneration during the hot weather and rains of 1927. One thing is clear, *i.e.*, that the personal attention of the Ranger has a great deal to do with the success of regeneration work; in nearly every Range regeneration work in the coupe kept under special observation excelled that in the other coupes of that Range.

Subject No. 2—Germination tests of teak seed

These have been carried out in Surat, West Khandesh, Kolaba and Belgaum Divisions. In Surat and Belgaum Divisions the best results have been obtained by the alternate drying and soaking of large *new* seeds, and the most successful method seems to be to soak the seeds for a fortnight and dry them for a fortnight, carrying out the process three

times in all, *i.e.*, over a period of 12 weeks and to sow the seed just at the beginning of the monsoon. In Surat Division 45 per cent. of the seeds germinated by 31st July, and in Belgaum Division 34 per cent. In Kolaba Division on the other hand the best results were obtained from large seeds which had been exposed to the weather during the previous monsoon and then stored and dried during the fair weather; the best result obtained here out of a large number of experiments was 26 per cent. of germination, and the average was much less. In Surat it was found that the percentage of germination was rather higher on unburnt seed beds than on beds which had been burnt over, but the subsequent growth of the seedlings was better on the burnt beds.

On the whole therefore it seems at present that the soaking and drying method with large new seeds gives the best results. The whole experiment is to be repeated in each of the four Divisions this season, and will also be carried out in Panch Mahals and Kanara Southern Division.

Subject No. 3—Comparative results of dibbling, Wet Nursery Planting and Dry Nursery Planting of teak (E. D. Kanara)

An experiment in connection with this was carried out in Kirwatti Range of Kanara E. D. Five acres were regenerated by each method and a careful record kept of the cost incurred and of the growth of the plants. The cost per acre, including weeding, was—

Rs.	as.	p.	
10	9	0	for regeneration by dibbling,
17	14	0	by wet nursery planting,
13	15	0	by dry nursery planting.

There is not much to choose in size and condition between the plants resulting from dibbling and those raised in the wet nursery (about six weeks old when planted). Plants from the dry nursery, one year old when planted, are not at present so vigorous as those in the other plots. It is clear that dibbling is the most economical and satisfactory method of the three, but further research is necessary to find out the best method of treating teak seed, so as to ensure a high percentage of germination of the dibbled seeds.

Subject No 4—Effect of thinning of teak coppice at different ages

Thinning has been carried out in teak coppice coupes aged 9, 15 and 25 years. The clumps of coppice have been so thinned that only one or two of the best shoots are left, and the future growth of these will be compared with that of the unthinned clumps in the same plots.

Subject No. 5—Effect of different degrees of thinning in teak plantations of different ages

Thinnings of different degrees of intensity have been carried out in teak plantations from three to eight years old, and notes will

be made on the subsequent rate of growth and quality of the stocking.

Subject No. 6—Effects of (1) reduction and (2) abolition of watering in casuarina (Casuarina equisetifolia) plantations

The result of reducing and even of abolishing the watering of casuarina plants during their first year in the plantations was watched during the dry season of 1926-27. Up to now the results in the Arghe plantations in Kanara W. D. show that watering cannot be entirely dispensed with in ordinary situations but that watering on alternate days gives excellent results, whilst watering at longer intervals results in numerous casualties.

Subject No. 7—Annual girth increment of sandal (Santalum album)

All sandal trees over 9″ girth have been numbered and measured in two test plots in each Division, and fresh measurements will be taken each year.

Subject No. 8—Increment of babul (Acacia arabica) under different degrees of thinning

Inland forests.—12½ acre plots have been laid out in Budhapur forest of Manjhand Range in Sind. Six of these are of first quality growth and six are of second quality.

Each plot has been surveyed and a map prepared. The plots have been properly fenced with brushwood and care taken to keep the perimeter clear of the fence.

To ensure that future measurements are always taken at the same height wooden pegs, on which scales have been engraved, have been fixed in each plot.

Registers have been prepared for the record of all data.

Thinning will commmence from the fourth year and will be repeated at different intervals for each plot. The plots vary in age but the oldest will be in its fourth year next season.

Certain of the plots will be subjected to cleanings and others to spacing 2′ × 2′ or 4′ × 4′ before regular thinnings take place. This work will commence from March 1927 after the trees have recovered from their leafless condition due to injury by frost.

Riverain forests.—Two plots only have been selected in Miani forests of the Miani Range in Sind. Others are now in the course of selection.

Subject No. 9.—Propagation of lac

Sind Circle.—Three groups of ten "ber" (*Ziziphus jujuba*) trees each have been selected in compartment 8 of Khathar forest of the Katiar Range (Karachi Division). Each tree has been given a separate number. The trees of group A have been pruned for infection in July 1927.

All infected branches will be cut back and used to infect the trees of group B which will have previously been pruned.

After infection the Phunki lac will be removed, then scraped and weighed (and sold or valued). The trees of group A will then be re-infected with brood lac from the trees of group B, or if the small branches of the trees of group A have not yet sufficiently developed for the second time the third group C will be necessary to complete the rotation.

This experiment will show among other things what quantity of lac can be produced from 20 (or 30) trees.

A record of each tree will be kept and a register has been prepared for this purpose, to show the date of lopping and infection, source of infection, number of sticks used, result of infection, date of removal of Phunki lac, quantity obtained and date of removal of brood lac.

While this experiment is in progress a small area of six to ten acres is being regenerated entirely with *ber* with a belt of pure *babul* as a perimeter to protect the trees from the devastating March winds. This area will then be treated for lac in the light of the results of the experiment given above.

Experimental work conducted in connection with propagation of lac in all the four Circles of the Presidency is described below :—

Sind Circle (*Karachi Division*).—Hot weather swarming commenced on 23rd July 1926 and continued until 10th August. 383 *ber* trees were infected in Kathar and Khatro forests of Katiar Range. The brood sticks were tied to succulent branches resulting from the lopping of the trees in November 1925. The swarming was not very effective as the rains washed away the lac and killed most of the insects, rain being detrimental to their life at the time of swarming.

The cold weather swarming commenced on December 1st, 1926 and continued until the end of the month. 789 Babul trees which had previously been lopped in March 1926 were infected by the basket and joori methods in Kathur, Khatro and Khokhar forests.

The swarming season commenced about a month later this year. Frost caused little harm but locusts did very heavy damage with the result that the insects did not move about freely and the lac was eaten away to such an extent that even the bark of most of the trees was scraped off. Thus the cold weather crop was very poor.

It is an established fact that the " Chauwao " damages the lac crop and in order to provide protection against these winds an experimental area of 10 acres which is surrounded by heavy protective belts of babul growth has been selected and cleared in compartment 4 of Khathur forest ready for sowing with " *ber* " seed this abkalani.

The trees of group A—A 1 to A 10 in compartment 8 of Khathur forest—were lopped on 15th November 1926 in order to provide succulent shoots for the lac infection due to be done in July 1927.

The success of the artificial lac crop is now about 60 per cent.

Below are shown the particulars in regard to *ber* trees lopped in November 1926 and March 1927 in preparation for July 1927 and November 1927 infections respectively :—

Forest	Compartment No.	Lopped in November 1926	Lopped in March 1927
Khathur	8	52	....
	9	....	283
	15	145	....
Khatro	1 to 5	116	105
Khokhar	6	42	....
Total ..	....	355	388

All the lac bearing area of some 20 acres in compartment No. 9 of Khokhar forest has been reserved for brood lac.

Hyderabad Division.—Lac infection was carried out as usual but with small success.

About 8,000 joories were tied in Shah Makai, Kacho Ghalee, Mohomed Khan, Matiāri and Ghag forests. The result was practically nil. Lac did succeed to some extent in Mohomed Khan and Ghalee and Miani forests but squirrels and adverse winds in the following spring destroyed it.

Northern Circle.—Two centres were chosen for experimental work, which was carried out under the direction of the Assistant Professor of Entomology, College of Agriculture, Poona :—

(1) *Sakora in Nandgaon Range of East Nasik.*—Area wire-fenced, containing *bor* and *palas*. Forest thin and poor. Climate hot in summer, temperature going up to 113° ; rainfall 12″ — 15″. 27 *palas* (*Butea frondosa*), 10 *bor* (*Zizyphus jujuba*) and 1 *ghatbor* (*Zizyphus xylopyra*) were pruned in May, but the shoots obtained were not satisfactory and in the 2nd week of July about 200 brood-lac sticks from the C. P. were tied on to 41 *palas* 11 *bor* and 1 *ghatbor*, pruned and unpruned. Of these the *palas* alone were successfully inoculated ; the amount of incrustation was fair and in November the crop was cut and again put out on the trees. Subsequently it was decided that though the experiment had not failed altogether in this locality it would be better to concentrate on a more favourable locality.

(2) *Mandvi Forests, Surat division.*—Here the maximum temperature is the same or rather less with a less hot sun and a rainfall of 53 inches. Inoculation was done in July, in a plot in Pipalwada, Block XIX coupes 15, 16, on 26 *palas* and 4 *ghatbor* trees which had been pollarded to 2′ high in January 1926 and have sent out long succulent shoots. Seven hundred and thirty-five sticks from the C. P. were tied, and the outturn on 23rd November 1926, 4 months after the date of inoculation, was 1,738 sticks, *i.e.*, 2½ fold.

It was then decided to utilise all the brood lac from the Sakora and Pipalwada plots in cultivating lac in some place where *palas* trees are numerous and easy of access. Hence the site for winter inoculation was chosen at Balethi, about 3 miles from the terminus of the Kosamba-Zankwao Railway. Sixty trees were inoculated on 24th November 1926 and another 200 trees were pruned for further work in the ensuing year. The final results of the winter inoculation are awaited in July 1927. The incrustation was quite satisfactory when the Conservator and the Working Plan Officer visited the area at the end of December 1926.

Work at Balethi will be continued, and a site near Godhra in the Panch Mahals has also been selected and trees pruned for inoculation in July 1927, as it is known that considerable revenue is made from lac in the adjoining Native States.

So far the experiments made are encouraging and the following points need to be emphasised :—

(1) Timely pruning of trees in January and July for production of long succulent shoots.

(2) Pruning is best at 4' height from the ground as this facilitates tying of brood lac sticks.

(3) Knowledge of the exact date of emergence of the insects for each locality is of importance.

(4) Timely untying of the brood-lac sticks after about half the insects have settled up on the shoots, and re-tying them to fresh shoots so that with the same number of sticks more inoculation can be done.

The amount spent was Rs. 81-1-0 for purchase of brood lac.

Central Circle.—Experiments on the propagation of lac from brood lac were carried out on *palas* trees in Block II of the Deomogra reserve, West Khandesh, with the help of the Agricultural Department.

From the inspection of the infected trees in the area, it appeared that only about 50 per cent. of the brood lac actually swarmed, and there was very little increase. Ants were found all over the lac and were thought to be causing damage. The trees were therefore ringed with a mixture of tar and oil, but this soon dried and appeared to have little effect in stopping the ants. From enquiries made, however, it appears that the ants do not do any actual harm. The experiments are being continued.

In the North Khandesh Division a fresh attempt was made to introduce lac in the Akrani. The brood lac this time was obtained from the Central Provinces and gave good results. 31 *palas* trees were infected and the infection on most of the twigs to which " Joris " were tied (from 4 to 6 twigs according to the size of the tree) was successful. Unfortunately it was noticed that some of the most promising twigs were broken by mischievous village boys. If sufficient brood lac is available, an attempt to infect trees on a much more extensive scale will be made this year in the Akrani.

It appears necessary that the whole operation from the infection of trees to the collection of the ripe lac should be a departmental concern, since farming of the lac, as in the past, inevitably leads to the removal of even the essential brood lac that has to be left on the trees as the seed of the future crop.

Southern Circle.—With a view to increase the value of the forests of Siddapur Range (S. D. Kanara) lac inoculation was carried out on 22 trees of *Shorea talura* in July 1926 with brood lac obtained from Mysore. The experiment was a partial success; the delay in receiving the brood lac parcel resulted in the loss of a large number of larvæ which were at the time swarming. In the Badami Range, lac has been found to exist naturally in the Kamatgi forests. This is being watched by the Range Forest Officer and efforts are being made to cultivate it.

Subject No. 10.—Economic age for cutting bahan (Populus euphratica) coppice and degree of thinning required

Four sample plots of ½ an acre each have been laid out in compartment B-2 of Keti Bagerji forest (Alipur) in the Ruk Range, Sind.

The age of these plots is 4 years. Plot 10-A was cut over during the year under report (at the age of 4 years). Plot 10-B will be cut during the year 1927-28 (at 5 years) and the other 2 at 6 and 7 years respectively.

The measurement of all stems (according to girth classes) is taken each year, and the actual yield in poles (according to girth classes), cost of extraction, and income derived, is ascertained for each plot as it comes under working.

The enumeration for the first year has already been carried out and results recorded.

The area felled showed an outturn at 4 years of 1924 poles to the acre, yielding a net profit of Rs. 106-10-0 representing an excellent return of Rs. 26 per acre per annum.

Subsequent enumerations will show whether this return can be exceeded by extending the rotation to 5, 6 and 7 years, and whether after coppicing, the stools and root suckers of plot 10-A are unimpaired in vigour and capable of yielding an equally good return 4 years hence.

Subject 11.—"Stoning" of teak seedlings as a protection against animals and an aid to their growth

The special tests carried out in most of the Divisions of the Central Circle appear to show fairly conclusively that where large flat stones are employed, their use enables a larger number of seedlings to survive the hot weather than would be the case if no stones had been used. This is more particularly noticeable with natural seedlings in the Khandesh Divisions where the forests are drier and subject to great heat.

"Stoning" on steep hill slopes has also proved beneficial as a check on erosion, though some observers maintain that these stones harbour insects and small animals which damage the plants.

On the whole it may be said that in places where stones are easily available, their use to protect teak seedlings is beneficial.

Stoned anjan seedlings were said to put on new leaves earlier than the unstoned anjan seedlings when the rain started, thereby giving the former a considerably longer growing period.

Subject No. 12.—Artificial propagation of rosha grass (Andropogon Martinii)

Experiments have been started to try to find out the best method of preparing the soil and whether sowing or transplanting gives the better results. No definite conclusions have been reached and the experiment is to be continued. It however appears that the grass does better on soil other than black cotton soil, that grazing is beneficial after the grass has become fully established and that if seed can be obtained as good if not better results are obtained and more cheaply from broad-casting it than by transplanting root stocks.

Subject No. 13.—Propagation of hirda (Terminalia chebula)

Experiments are being carried out in (i) tending of natural seedlings, (ii) dibbling seed in the forest, and (iii) establishing nurseries and planting out seedlings. The results up to now show a very low percentage of germination, and a heavy mortality amongst the young plants, chiefly due to damage done by wild animals. The experiments are to be continued for another year, at least.

Subject No. 14.—Propagation of bamboos (Dendrocalamus strictus)

Bamboos are scarce in the Kolaba forests, and attempts are being made to introduce them. Fair results have been obtained from seed, but seed is not always available and the growth of the seedlings is slow. The method of planting sections of stems horizontally has given poor results. The best method tried up to now seems to be to plant 2′ to 3′ long cuttings of one year old stems with part of the root attached; some of these cuttings have put on strong and rapid growth. The experiments are being continued. A good many bamboos have been established.

Subject No. 15.—The relative value of different species for making charcoal

This experiment was carried out on a small scale in Satara Division and the results which are not conclusive are tabulated below :—

Kind of wood	Weight of wood in lbs.	Weight of charcoal in lbs.	Cost incurred	Price obtained	Per cent. of charcoal to wood used
			Rs. a. p.	Rs. a. p.	
Anjan (*Hardwickia binata*) ..	4,299	790	7 8 11	16 4 9	18·84
Ain (*Terminalia tomentosa*)..	3,266	596	5 11 3	12 4 9	18·25
Jambul (*Eugenia jambolana*).	2,340	392	3 12 0	8 1 3	16·75
Mixed species (*Bridelia retusa*) and the like.	3,982	535	5 2 3	11 0 6	13·45

The figures shown under column "cost incurred" are exclusive of price of firewood.

Subject No. 16.—Effect of improvement fellings on diameter growth

The subject is to be taken up in the year 1927-28.

Subject No. 17.—Effect of cutting back superfluous shoots of teak seedlings

A large number of the transplants in this plot had two or three shoots. In half of the area these plants were left untouched, whilst in the other half all shoots except the best from each root were cut back. When the plants are far apart this cutting back has done no good, as fresh shoots have come up: but where the plants are growing close together the cutting back has stimulated the growth of the shoots left and the fresh shoots which have come up have made no headway, and have in many cases died back. Observations are being continued.

Subject No. 18.—Investigation into the effect of shade on lantana

It is not known whether overhead shade has much effect on the growth of lantana. Four half acre plots with varying degrees of over-head shade have been selected and the number of lantana stems over 1″ girth at 9″ from the ground have been counted. Counting will be done each year and results noted. The results so far obtained are not conclusive.

Subject No. 19.—Coppicing of Anjan (Hardwickia binata)

It is desirable to ascertain the most suitable season of the year and the most suitable height above ground level for cutting *anjan* trees for coppice. Experiments are being made of cutting at four periods, *i.e.*, May to July, August to October, November to January and February to April; and three heights, *i.e.*, at ground level and 6″ and 12″ above ground level. The results will be noted.

Subject No. 20.—Preservation of natural anjan seedlings

It is found that a large proportion of the *anjan* seedlings which come up early in the rains die off towards the end of the rains or during the ensuing dry weather. It is desirable to find out the reasons for this and what can be done to prevent it. Several reasons have been suggested, the chief of which are:—

(i) Damage from grazing.
(ii) Suppression by grass.
(iii) Drought.

Two sample plots each of one acre have been selected with a fair growth of small *anjan* seedlings. One of these plots has been fenced and closed to grazing and the other left open. Each of these plots has been sub-divided into 4 equal sub-plots, as follows:—

20A 1 open to grazing, seedlings weeded and "stoned".
20A 2 „ „ „ not „
20A 3 „ not „ but „
20A 4 „ „ „ not „
20B 1 Closed to grazing, seedlings weeded and "stoned".
20B 2 „ „ „ „ not „
20B 3 „ „ not „ but „
20B 4 „ „ „ „ not „

The plots and sub-plots have been demarcated by small cairns and numbered pegs.

The seedlings in each plot and sub-plot will be inspected frequently and a report on their condition made annually.

Experiments

Sandalwood (*Santalum album*).—Sandalwood seed was sown in patches under bushes and between stones along a few shady nallas in all Ranges in East Khandesh. The seed took about a month to germinate. Though most of the seedlings died, some survived, even though the season was a specially trying one. In the Satara Division experiments were made with dibbling sandalwood seed on 3 kinds of patches, (1) on ridges formed of soil, (2) on soil dug up and loosened and (3) on burnt soil. The percentage of germination was very low. The best germination was on the 2nd and 3rd kinds of patches in which 7·5 per cent. and 6·4 per cent. of the seed germinated respectively, though almost all the seedlings died in the hot weather.

Further experimental sowing of sandalwood seed putting in host plants with them was not a success in Kanara N. D. as all the sandalwood plants and most of the host plants died. Experiments with dibbling sandalwood seed in various localities of the Sirsi Range (Kanara E. D.), at Nisalnir (Kanara S. D.) and in both the Districts of Dharwar-Bijapur Division were also carried out during the year. The result of this is watched in Kanara E. D. In Kanara S. D. about 250 sandal plants are alive; maximum height attained during the year is 2 feet. The work of raising this valuable tree has been undertaken in this Division with a view to stock the poorer parts of the annual coupes where teak may not do well. Recently some sandal trees were exploited in the Coast Division, Kanara, and the wood was found to have considerable scent. The experiment to propagate sandalwood in both the Districts of the Dharwar-Bijapur Division by artificial means was not encouraging. Natural regeneration is splendid in Dharwar taluka.

Eucalyptus (*rudis and betradeum*).—Attempts were made to grow eucalyptus in the coastal tracts to see if it is possible to substitute eucalyptus (without watering or with reduced watering) for casuarina but it appears that eucalyptus will want as much watering during the first dry season as casuarina—besides it is not as fast growing. The surviving plants of 1925 and 1926 have attained a height of 10′ and 5′ respectively.

Mahogany (*Spanish*).—The surviving Honduras Mahogany plants put out in Nisalnir (S. D. Kanara) in 1924 rains have attained an average height of 8′ and out of 121 plants from Hulegar nursery put out in Kabbinhakkal coupe 1-B, 110 plants are alive, maximum height attained is 3′. All these plants are in good condition.

Sissoo (*Dalbergia sissoo*).—Three thousand five hundred and seventy-five plants both from cuttings and seed were put out in conjunction with teak plants in coupe 1-B of Kabbinhakkal (S. D. Kanara). Two thousand and nine hundred plants are now alive and in a flourishing condition;

maximum height 7'. *Sissoo* plants put out in the previous year in coupe 15-B of Nisalnir and in coupe 1-A of Kabbinhakkal were damaged or destroyed by porcupines. About 200 plants are alive but in a moribund condition.

Fodder trees.—An area of about 1½ acres of newly disforested land in Honavar town, at the foot of the hill on which the Divisional Forest Officer's bungalow stands, was allotted by the Collector of Kanara, for growing fodder trees. On this area, *honne* (*Pterocarpus marsupium*) was planted in lines 12' apart and *anjan* (*Hardwickia binata*) 12'×12' in between the lines of *honne*. The *honne* seedlings all survived ; about 50 per cent. of the *anjan* seedlings died, but the casualties were replaced by fresh sowings in the rains (June 1927). *Anjan* appears to grow well here. All the seedlings of fodder trees grown in the nurseries (Coast Division, Kanara) were distributed to the villagers for planting in malki lands and over 60,000 *honne* seedlings were planted with the help of the villagers in the Minor forest of Belambar near Ankola. More *anjan* and *honne* seed was collected this year for next year's planting.

Tobacco as a catch crop in teak regeneration area in the 2nd year's plantation was tried on a small scale by Mr. Tuggarse, Divisional Forest Officer, Kanara Coast Division. The seedlings did not grow well where the area was covered with weeds. Where the soil was well burnt, they grew to a height of 5' to 6', the topped plants giving 10 to 12 good leaves. The *tobacco* obtained from such leaves was reported to be good and a lb. was valued at 3½ annas by Messrs. Spencer and Co. of Dindigal.

Improvement of grazing areas.—The Agricultural Department has continued carrying out experiments in Meharun, in East Khandesh, and Bhamburda in Poona, with fenced sample plots in forest. The system of grazing here was altered this year. It is too early yet to record any results.

A system of rotational grazing has been definitely accepted in connection with the new plan for the scrub jungle and Jamner Teak areas in East Khandesh. It has been decided not to allow goats in forest proper, but to organize pasture forests and waste areas into separate blocks, on lines similar to those laid down for the other blocks, and to allow sheep and goat grazing in the open portions.

Charcoal.—One hundred and nine maunds of charcoal were prepared departmentally by settlers in East Khandesh at a fixed rate of Re. 1 per maund delivered at Raver or one of the adjacent forest depôts. There was little demand for this charcoal at the Forest Depots at the Rs. 2 rate, so the rate was reduced to Rs. 1-8-0. Even then very little was sold. A certain amount was sold in Jalgaon both in the Bazar and to District Officers at Rs. 2 per maund.

The forest contractors are willing to prepare charcoal, but the public demand for the same has still to be created. In fact, two contractors prepared charcoal on a large scale (one in Jalgaon and one in Jamner), but both aver there is no profit in the operation. It is, however, hoped that when villagers begin to realize the advantages of charcoal as

compared with firewood, and the contractors get more expert at making it, a local demand may arise, as the saving in transport charges is fairly certain to outweigh the charges incurred in making.

The experiment of selling charcoal in Mahad, Kolaba division, from Satara Division was tried this year. 30 bags of charcoal were brought and sold for Rs. 43 ; but it was found that this experiment was not worth the trouble and cost and hence stopped. One local contractor has started manufacturing charcoal and he can afford to sell it at a cheaper rate in Mahad.

To ascertain the actual proportion of charcoal yield to material used from Casuarina fuel, an experiment was carried out departmentally in Alibag Range, and the results obtained are given below :—

Total casuarina fuel used	Total yield of charcoal
90 khandies.	480 maunds.
(equal to 80,640 lbs.)	(equal to 13,440 lbs.)

Experimental charcoal operations were carried on at several places in the Satara Division and most of the charcoal prepared was disposed of at a profit varying from Rs. 10 to Rs. 27 per khandi.

CHAPTER VII

Administration

The office of the Chief Conservator of Forests was held throughout the year by Mr. A. G. Edie, C.I.E.

The territorial circles were held by the following officers :—

Northern Circle	..	Mr. G. E. Marjoribanks throughout the year.
Central Circle	..	Mr. E. M. Hodgson throughout the year.
Southern Circle	..	Mr. H. L. Newman from 1st April 1926 to 10th March 1927 and Mr. G. S. Butterworth from 11th to 31st March 1927.
Sind Circle	..	Mr. P. E. Aitchison throughout the year.

The following officers worked in the Engineering Branch.—Mr. T. S. Pipe as Superintending Engineer, Forest Department, Bombay Presidency, from 1st April 1926 to 27th July 1926, when he went on leave. Mr. H. C. Holmes, Forest Engineer, Southern Division, was in charge of the Office of the Superintending Engineer in addition to his own from 28th July 1926 to 28th March 1927 from which date the post of the Superintending Engineer, Forest Department, was abolished. Mr. R. V. Alexander was Forest Engineer, Northern division, from 1st April 1926 to 30th September 1926 when he went on leave and the Office of the Forest Engineer, Northern Division, was closed during his absence.

Mr. H. C. Holmes was Forest Engineer, Southern division, through out the year.

Mr. T. K. Mirchandani, Extra Assistant Conservator of Forests was under the Superintending Engineer, throughout the year.

Changes among Divisional Forest Officers were frequent chiefly owing to absence of officers on leave, as many as 13 out of the total number of 28 Divisions having changed hands during the year. Seventeen divisions were held wholly by Imperial Officers, three for part of the year by Imperial and for part of the year by Provincial officers and eight wholly by Provincial officers.

At the close of the year the number of officers attached to Divisions as Assistant Divisional Forest Officers or sub-divisional Forest Officers was one Imperial and seven Provincial.

No new recruits were added to either service during the year.

Subordinate and clerical establishments—Out of six students who were sent for training at the Madras Forest College at Coimbatore in 1924 five were appointed as Rangers, having obtained higher Standard certificates and one with a lower standard certificate as Forester second grade. Out of eight candidates selected for the 1927-29 course two resigned, one was found unfit while under practical training and five were sent to the College for training.

The Foresters training class was held as usual in the Northern Circle under the supervision of Mr. A. S. Nachan, Ranger. Thirty-two subordinates of the Northern and Central Circles were admitted to the class of whom seven were sent back as unfit or on account of illness. Of the remaining twenty-five students twenty-three passed the final examination. In the Southern Circle no regular class was held. Six promising guards were placed for training under experienced Rangers. A set course of training was gone through, ending with a written examination. Of the six guards deputed during the year five came through the test successfully.

Casualties and punishments

Particulars	Northern Circle	Central Circle	Southern Circle	Sind	Total	
					1926-27	1925-26
1. Retirements	19	17	9	4	49	53
2. Deaths	9	8	16	4	37	45
3. Resignations	12	15	9	9	45	59
4. Prosecutions	2	3	..	1	6	3
5. Degradations	10	8	6	8	32	23
6. Dismissals, removals, etc.	29	32	13	10	84	93
Total, 1926-27 ..	81	83	53	36	253	..
Total, 1925-26 ..	72	91	65	48	..	276

The health of the Forest staff was on the whole fairly good. The premature death from black water fever of Mr. R. G. Sahasrabudhe, a very good Ranger in the Northern Circle, while on felling work in Peint and of Mr. N. C. M. Saldanah, a Ranger in the Southern Circle, are much

regretted. Government have recently sanctioned the appointment of a special medical officer to attend to the large felling staff in Peint from November to the end of April.

In the Northern Circle two Foresters in North Thana are under trial in the Criminal court in connection with extensive illicit cuttings in thinning coupes.

In the Central Circle there were three cases of defalcation of Government money one in North Khandesh by a depôt officer, one in West Khandesh by a Range Office clerk, Dhulia and one in Kolaba by a guard. The accused in all cases were prosecuted and convicted and sentenced by the Magistrates to various terms of imprisonment and to fines.

The work of the Rangers and other subordinate protective staff and Office Establishment has been reported to be satisfactory with only few exceptions.

Civil suits.—The Civil suit against thinning contractors in East Thana division in the Northern Circle which was pending in the Thana Court was decided in favour of Government. Some timber merchants in East Khandesh Division of the Central Circle have lodged suits against Government for having levied foreign duty on their imported timber. All suits are pending. In the Southern Circle of seven suits filed for recovery of revenue outstandings and advances six are pending and one was decided against Government. An appeal against this has been filed in the District Court of Kanara. Of the three suits filed last year two were won with costs and the third is still pending in the Belgaum Court. Of the six cases filed against Government five are pending. In one case the plaintiff was refunded the amount as instructed by the Remembrancer of Legal Affairs and the case was withdrawn by him. As remarked last year this circle continues to be burdened with litigation most of which has reference to default cases of some years standing. Measures have been taken to remedy this unsatisfactory feature.

Inspection and Tours

The Chief Conservator toured in the four Circles of the Presidency. Divisional and other offices were inspected as usual during the year. No irregularities of a serious nature were disclosed by the inspection. A serious defalcation of Rs. 2,504-11-1 by a clerk of the Forest Engineer, Southern Division, having come to light, a detailed and thorough inspection of that office was conducted by the Conservator of Forests, Southern Circle, shortly after the close of the year.

Land Revenue Administration

The Divisional Forest Officer, West Nasik, continued the Land Revenue and Excise Administration of Peint Taluka. The Divisional Forest Officer, Surat, continued to be ex-officio Assistant Political Agent, Dangs.

The Revenue management, by the Forest Department, of the seven villages in East Khandesh was satisfactory.

The Revenue administration of the Akrani Mahal was managed as usual by the Forest Department with the Range Forest Officer Mr. B. R. Alekar as Mahalkari.

No progress was made with the Dhadgaon-Shahada Road during the year as Government did not sanction any funds for the work pending a complete revised estimate for the project as a whole. Rs. 10,000 have however been provided this year and work is now in progress.

The Raisingpur Estate continued to be managed by the Forest Department under the Court of Wards a Forester being incharge throughout the year.

The three forest Mahals of Dandeli, Kulgi and Virnoli in Kanara, N. D. and Kirwatti and Bilki in Kanara, E. D. continued to be under the administration of the Forest Department. The inhabitants of these mahals appeared contented and their relations with the Forest Department continued to be satisfactory.

The whole of the forest land assigned for Kumris in the Supa Peta was relinquished voluntarily by the Kumriwallas. The case of the Kumri holders in Belgaum has been disposed of in Government Resolution, Revenue Department, No. 4755 of 28th March 1927, and it is hoped that this settlement will be final or will at any rate endure for a number of years. The people seemed reasonably contented—it hardly appears possible to make a Kumri villager wholly so—and no genuine grievances were noted.

The nine villages in the Kanara Coast Division continued to manage their village forests under the Panchayat system. This experiment is being watched with interest and it is too soon to criticize.

The relations between this Department and other Government Departments continued to be cordial during the year.

CHAPTER VIII

General Remarks

The year was a successful one financially and good progress was made with works of development and improvement. More money is necessary for such works as will bring in increased revenue directly or indirectly.

The control of royalty teak trees in malki lands in Kolaba has been transferred from the Revenue Department to the Forest Department for systematic wholesale felling and sale to the trade, *vide* Government Resolution, Revenue Department, No. 8581 dated 2nd May 1927. This is a distinct improvement over the previous system by which trees remained unfelled until long past maturity and too old to coppice.

The management of Revenue Jungles in eight Revenue Numbers of the Rohri Taluka in Sind comprising an area of 3,655 acres and 31 gunthas was ordered by the Commissioner in Sind to be made over to the Forest Department. Their demarcation jointly by the

Mukhtiarkar and the Range Forest Officer is being carried out, on conclusion of which the gradual disposal of the jungles will be undertaken either departmentally or by contract as found suitable.

The proposals for the better management of the Thana Gurcharans or Protected forests have received the sanction of Government, *vide* Government Resolution, Revenue Department, No. 9811 of 23rd June 1926.

In West Nasik of the Northern Circle all further assignments of Forest land for cultivation have been temporarily held in abeyance as it has become difficult to control and to prevent encroachments and damage to the forest around the plots. The assessment on 39,457 acres already under cultivation amounted to Rs. 40,434.

In the Central Circle forest settlements continued to increase and the majority of settlers did good work in all the three Khandesh Divisions. Two thousand five hundred and five acres of forest were cleared of tree growth in North Khandesh with a view to establishing seven new inforest settlements.

Areas suitable for extending Chillaria, Umradawakwad and Panakhed settlements have also been inspected and plots will be laid out next season. It appears however necessary to consider more carefully what this policy is tending towards. The settlements were originally started with the object of supplying labour for forest works and an 8-acre allotment was given to each selected settler. This allotment was considered as insufficient by the Collector of Khandesh who advocated a 15-acre allotment as the "minimum economic holding."

Owing to the poor season, the inforest settlers made repeated demands for tagai. In the North Khandesh Division Rs. 4,750 were advanced as tagai for the purchase of bullocks and seed in the plains, while Rs. 4,152 were recovered from outstandings of old loans, leaving a balance of Rs. 2,862.

In the West Khandesh Division a sum of Rs. 1,890 was given out as tagai for the purchase of bullocks and seed. Owing to the poorness of the season recovery of old loans had to be postponed.

In the Southern Circle in continuation of the grants made in previous years 660 acres of forest land were given out for cultivation in Gokak and Gujnal Ranges as communal holdings. The grantees were mostly Berads. These Berads are contented with what has been done for them and they rendered good help to the Protective Establishment during the year. The Berad Settlement at Dandeli did useful work as in the past and there were no complaints of any kind.

One hundred and nineteen acres of Betta at the rate of four acres of forest to one acre of new garden were demarcated during the year in the Southern Circle.

About 2,000 acres of reserved forest near Boradi and Khambala in North Khandesh have been disforested in favour of cultivation, in addition to the land given out to forest settlers, and there is now danger

of the fodder reserves being depleted, which, in the case of famine, will be a very serious calamity. It must now definitely be laid down whether the extent to which forest lands are to be opened to cultivation to appease the ceaseless land hunger, is to be limited merely by the fact that the land is capable of being cultivated, or whether other principles are to be considered. It will never be possible to satisfy entirely the ever-increasing demand for land, and apart from the danger of honey-combing the whole forest and thus increasing the difficulty of forest protection, there is the possibility of this Department being left with the hills only growing *salai* (*Boswellia serrata*), as the predominant crop, and the district being deprived of its fodder and fuel reserves.

At present the Divisional Forest Officer, North Khandesh, is inundated with petitions for land, necessitating a lot of extra work for him and his subordinates, and creating an impression in the minds of the petitioners that land is to be had for the asking. The hordes of disappointed petitioners thereafter consider they have a grievance against the department, which is thus getting unnecessarily unpopular.

It is suggested that instead of treating this question piecemeal, a special officer be appointed to go into the question of disforestments in North Khandesh, and to decide what areas can be safely thrown out of forest for cultivation and the rate and manner in which such disforestment should be made. Thereafter no further disforestments should be allowed and the flood of applications for land would gradually subside.

The demands of the Accountant General's Office on the accounts of this Department continued to the same extent as in the last year.

The Forest Grievances Committee finished their investigations and submitted reports to Government during the year and Government orders on their recommendations were received after the close of the year under report.

The earnings of the Alnavar-Dandeli Railway during the year amounted to Rs. 71,259 with an expenditure of Rs. 47,461. There was therefore a net profit of Rs. 23,798. This is the first time the Railway has given a profit and it was due to increased export from Dandeli of more timber and manganese than before.

In the Kolaba Division practically all the forest contractors have to remove their coupe material through private lands before reaching the public roads. For the use of such private lands the contractors were in the habit of being forced to pay some rent annually to the landlords. Recently, however, the landlords demanded such exhorbitant rents that the contractors objected to pay and it appeared for a time that these demands would adversely affect coupe sales. This problem has been satisfactorily solved by the present Collector who turned the tables on the avaricious land owners by declaring their demands for hire of their lands as putting them to a non-agricultural purpose. This has greatly simplified matters but is not an absolute solution as it is still open to

these land owners to object *in toto* to the removal of forest produce over their lands.

At the Agricultural Exhibition which was held on the grounds of the Poona Agricultural College from 20th to 31st October 1926, the Forest Department exhibited a model to indicate in a manner intelligible to the public the beneficial effects which tree growth on hill sides have on the water supply, and conversely, by a second model the evil effects resulting from rain water rushing down steep treeless slopes, causing floods, eroding field and covering them with sand and gravel, and eventually resulting in a diminution of the water supply.

In addition, examples of the several kinds of preventable damage trees suffer from were shown, together with the consequent deterioration of the timber produced by such damage. Cross sections, pamphlets and notices explained the meanings of and the deductions to be drawn from such exhibits and were distributed and displayed conspicuously. Lastly in order to explain matters to interested spectators, the voluntary services of Mr. V. G. Bhalerao, a retired Extra Assistant Conservator, were obtained. The burden of these duties fell on Mr. C. E. L. Gilbert (Divisional Forest Officer, Poona), Mr. M. L. Khanna (Sub-divisional Forest Officer, Poona), Mr. W. E. Pereira (Divisional Forest Officer, Working Plans) and Messrs. Panse (Range Forest Officer, Poona) and T. N. Thakar (Ranger Surveyor, Working Plans), who worked whole-heartedly and continuously in preparing the exhibits, etc.

The Bombay Forest Department needs a museum of Forest Products.

The remarks of the Divisional Commissioners on the Circle Reports are printed below as Appendix A.

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

Report.

Forest Department.

Administration — of, in the Bombay Presidency, including Sind, for the year 1926-27.

GOVERNMENT OF BOMBAY

REVENUE DEPARTMENT

Resolution No. P.—57/6215

Bombay Castle, 5th May 1928

Letter from the Chief Conservator of Forests, No. 2938, dated 15th October 1927—Submitting the Forest Administration Report of the Bombay Presidency, including Sind, for the year 1926-27.

RESOLUTION.—The total revenue of the Department during the year under report amounted to Rs. 76·56 lakhs and the expenditure to Rs. 43·86 lakhs as against Rs. 75·26 and 41·97 lakhs respectively for the previous year. The surplus of Rs. 32·70 lakhs represents 42·7 per cent. of the gross revenue as against 44·2 per cent. in the previous year and 41·4 per cent., the average of the preceding five years. The gross revenue is higher than that of last year but the surplus fell partly on account of loss by exchange and partly on account of the interest on capital expenditure not charged to revenue being adjusted in the accounts for the first time. In view of the continued slump in the timber trade however the financial results of the year's working must be considered to be satisfactory. The increase in revenue occurred in the Southern Circle.

2. The net profit from the working of the seven Government saw-mills is Rs. 1,40,800 as against Rs. 1,83,543 for the preceding year. The decrease is due to the fact that three mills in the Northern Circle showed a loss of Rs. 69,916 instead of a profit of Rs. 35,530 in the previous year. The unsatisfactory return of the mills is due partly to the decline in the market rate of sawn material and partly to a paper loss owing to the new method of accounting. The saw-mill at Karanjara in the Northern Circle has already been closed as it has become old and worn out.

3. The value of the major and minor produce removed by purchasers was Rs. 31,61,241 and Rs. 11,30,791 respectively as against Rs. 34,10,367 and Rs. 12,07,838 in the preceding year. Major and minor produce removed by concessionists and free grantees amounted to Rs. 10,18,212 as against Rs. 10,25,465. The grazing fees collected during the year were Rs. 5,30,691 as compared with Rs. 5,11,056 last year. The value at "full rates" amounted to Rs. 21,37,182 and Rs. 21,04,068 respectively. The rate of grazing fee per cattle per annum is extremely low when compared with the value of the fodder grazed by each animal.

4. Government realize the importance of communications and buildings but regret that owing to the continued financial

stringency it has not again been possible to allot larger funds for these objects.

5. Government are glad to note the successful experiments in the more extensive use of mechanical methods of transport and extraction. With greater experience and the return to more normal conditions the cost of these experiments is bound to become much cheaper.

6. Orders have been passed on Mr. Perry's report on Gurchara lands and on the recommendations of the Forest Grievance Enquiry Committee. Government trust that as a result of the decisions taken upon the latter report, all grounds for complaint in regard to Forest Administration will soon vanish and a new era of harmonious co-operation between the public and the Forest officers opened.

7. This is the last administration report to be submitted by the Chief Conservator, Mr. A. G. Edie, who has now retired. Mr. Edie's record was one of faithful and devoted service to Government, and they are pleased that some recognition of this has since been bestowed upon him in the form of a Companionship of the Order of the Indian Empire. The example of Mr. Edie's devotion to duty is to be seen in this report which contains the record of a year's efficient work on the part of officers of all ranks.

By order of the Government of Bombay
(Transferred Departments),

G. K. JOSHI,
Under Secretary to Government.

To

The Commissioner in Sind,
The Commissioners of Divisions,
The Commissioner of Settlements and Director of Land Records,
All Collectors, including the Deputy Commissioner, Upper Sind Frontier,
The Chief Conservator of Forests,
The Conservators of Forests, Northern, Central, Southern and Sind Circles,
The Director of Agriculture,
The Accountant General,
The Collector of Bombay (Department of Industries),
The Compiler, General Administration Report,
The Director of Information and Labour Intelligence,
The Oriental Translator to Government,
The Secretary, Legislative Council (for the Reading Room for the members of the Legislative Council),
The General Department,
The Finance Department,
The Public Works Department,
The Editors' Tables,
Editors of Newspapers,
A. G. Edie, Esquire, C.I.E.,
The Secretary to the High Commissioner for India, London.