

Result of Sample Tree Enumeration of Usmanabad Forest Division

Osmanabad forest division is one of the forest divisions of Aurangabad circle. The forest extends over an area of 90.658 sq. kms. Most of the areas lie on the north eastern part of Marathwada adjoining Vidarbha region. The track is bounded as follows :-

North :- Beed District.

East :- Latur District.

South East :- Karnataka State.

South West :- Solapur District.

North West.:-Ahmadnagar District.

Osmanabad division is situated between N - 17⁰37' to N - 18⁰50' north latitude and E-75⁰ 17' to E- 77⁰ 18' east longitude.

Configuration of the ground:- Most of the districts lies on the Balaghat plateau. The plateau region rises rather steeply from the plain in the West and slopes towards the east.

Soil of the district can broadly be classified shallow soils, deep soil and medium deep soil. Mostly colour of these soil vary from dark grey brown to vary dark brown. All soils are alkaline in action.

Climate:- The climate of the district is generally dry except during the monsoon. December is the coldest month while May is generally the hottest month of the year. Average annual rain fall in district is about 800 mm.

Forest Area:- According to Management & Legal Status, as per Annual Administration Report, the details of forest area of Osmanabad Division as on dated 31/3/2015 are as follows.

Table No-1
Classification of Forest area according to Management & Legal status
(Area in Sq. km.)

Sr. No.	Controlling Agency	Reserved forest	Protected forest	Un-classed forest	Total forest
1.	Area in charge of Forest Department	14.74	26.61	48.95	90.30
2.	Area in charge of F.D.C.M.	---	---	---	---
3.	Private Forest brought under possession of Forest Department	---	---	---	---
4	Area in charge of Revenue department	---	---	---	---
Total		14.74	26.61	48.95	90.30
% to total forest area		16.32	29.47	54.21	100

The area under Scientific Management as recorded in Working Plan (2008-09 to 2017-18) by Shri Samir Sahai, I.F.S. Conservator of Forests, Working Plan Division, Aurangabad is as under.

Table No.2

Sr. No	Name of Ranges	Total area in (ha)
1.	(1) Tuljapur (2) Bhoom (3) Umarga (4) Latur (5) Ahmedpur	9030.00

Now Conservator of Forest, Working Plan Aurangabad, has proposed following working circlewise forest area, for sample tree enumeration.

Table No.3
Working Circle wise Area proposed for tree enumeration

Sr. No.	Name of working circle	Population area in ha
1	Afforestation Working Circle	4137.497
2	Plantation Management Working Circle	4864.662
Total		9002.159

Sampling plan of Tree Enumeration

Actually the tree enumeration work was done by Divisional forest officer, Usmanabad Division in 2013-14. The entire forest division's area was considered for sampling enumeration plan. The trees are enumerated in girth classes started from 15-30 cms to Above 150 cms. The girth is measured at breast height (g.b.h.).

The statistical sampling method namely "Systematic Line Plot Sampling with Random Start" was used for tree enumeration. The plot size 60 meters x 60 meters, was found to be suitable with the least standard error. The complete enumeration of trees, Natural regeneration, Grass and Medicinal species were carried out in these plots. Similarly qualitative measurements were also carried out.

On scrutiny of data and preparation of results i.e. (1) Stock per hectare was calculated and the result are being reported in the form of following statements.

Statement I : Estimated growing stock- No. of Sound trees in population area.

Statement II : Estimated growing stock- No. of Sound trees per ha.

Statement III : Percentage distribution of total stock of species over all girth classes.

Statement IV : Percentage of stock of species in a girth class to the total stock in that particular girth class.

Statement V : Estimated growing stock - volume in cum./ha.

Some noteworthy result on current enumeration is described in following Table No. 4(a)

Table No. 4 (a)
Statement showing estimated No. of trees per ha. for Previous (2005-06) and Current (2013-14) tree enumeration

Sr. No	Name of Working Circle/Range (Previous enumeration)	Past enumeration (2005-06) No. of trees per ha.	Sr. No.	Name of Working Circle (Current enumeration)	Current enumeration (2013-14) No. of trees per ha.		
					Glyricidia	Other species	Total
1	Tuljapur range	885.00	1	Afforestation Working Circle	204.223	126.097	330.320
2	Bhoom range	775.70	2	Plantation Management W.C.	504.891	135.323	640.214
3	Umaraga range	886.67					
4	Latur range	800.64					
5	Ahmadpur range	580.36					
6	Nilanga range	507.29					
Weighted Average		766.69	Weighted Average		331.700	131.083	497.783

It is observed that the total estimated number of trees per hectare is decreased by 35.08 percent in current enumeration (2013-14) as compared to previous enumeration (2005-06)

Table 4 (b)
Estimated percentage of trees in 15 U 30 and 31 U 45 girth class.

Working Circle	Girth class-wise estimated percentage of number of trees (%)			
	15U30	31U45	Remaining Girth Classes	Total estimated No. of trees
Afforestation Working Circle	72.683	20.336	6.981	100
Plantation Management working circle	71.186	21.980	6.834	100
Weighted Average	71.874	21.224	6.902	100

Table No.5**Working Circlewise estimated No. of sound trees per ha.**

Sr. No.	Name of Working Circle	Total	General utility species	Special utility species	Minor forest produce species	Glyricidia	Other species
1	2	3	4	5	6	7	8
1	Afforestation Working Circle	330.320	1.656	11.125	48.654	204.223	64.662
	% of stock to total stock	100	0.50	3.37	14.73	61.82	19.58
2	Plantation Management Working Circle	640.214	1.738	15.207	49.468	504.891	68.91
	% of stock to total stock	100	0.27	2.38	7.73	78.86	10.76
Total weighted average		497.783	1.70	13.33	49.09	366.700	66.95
% of stock to total stock		100	0.34	2.68	9.86	73.67	13.45

Obviously, it is observed that approximately 74% of tree is only Glyricidia species found out of total growing stock of sound trees per Ha. i.e. in Osmanabad division, plantation of Glyricidia species is the predominant species other than natural species like Teak, Hiwar, Shivan, Neem, Sitafal, Tendu, Babhul, Henkal, Karai, Kashid, Sisoo etc.

Table No.5A**Working Circlewise estimated Volume in cum. per ha**

Sr. No.	Name of Working Circle	Total	General utility species	Special utility species	Minor forest produce species	Glyricidia	Other species
1	2	3	4	5	6	7	8
1	Afforestation Working Circle	12.782	0.045	0.604	2.895	5.260	3.978
	% of stock to total stock	100	0.35	4.730	22.650	41.15	31.12
2	Plantation Management Working Circle	21.375	0.108	0.931	3.413	12.600	4.323
	% of stock to total stock	100	0.510	4.360	15.970	58.95	20.20
Total weighted average		17.426	0.079	0.78	3.18	9.23	4.16
% of stock to total stock		100	0.45	4.48	18.22	52.97	23.88

Due to main species of Glyricidia plantation in Osmanabad division it is observedsd that, approximately 53 % of volume in cum/Ha. Of Glyricidia species is found out of total growing stock per Ha.

Highlights from the results of tree enumeration as given in table No.5, are summarised below:

1) Afforestaion Working Circle:-

Categorywise percentage of Species of estimated No. of sound trees to total growing stock in this working circle is as given below.

Sr. No.	Category of Species	Name of Species	% to total growing stock
1	A:- Species of General Utility	Lendia, Teak, Shisam	0.50
2	B:-Species of Special Utility	Dhawada, Haldu, Hiwar, Khair, Shivan	3.37
3	C:-Species of Minor Forest Produce	Apta, Awala, Behada, Bor, Chandan, Charoli, Chinch, Neem, Nilgiri, Palas, Siras, Sitafal, Tendu	14.73
4	D:-Other Species	Glyricidia	61.82
		Accasia, Anjan, Babhul, Bit, Fulari etc.	19.58

2) Plantation Management Working Circle:-

Categorywise percentage of Species of estimated volume in cum. per ha. to total growing stock in this working circle is as given below

Sr. No.	Category of Species	Name of Species	% to total growing stock
1	A:- Species of General Utility	Lendia, Teak	0.27
2	B:-Species of Special Utility	Dhawada, Haldu, Hiwar, Khair, Salai, Shiwan	2.38
3	C:-Species of Minor Forest Produce.	Apta, Awala, Behada, Bel, Biba, Bor, Chandan, Char, Chinch, Moha. Neem, Nilgiri, Palas, Shiras. Sitafal, Tendu.	7.73
4	D:-Other Species	Glyricidia	78.86
		Accasia, Anjan, Babhul, Bahawa, Dikamali etc.	10.76

Table No.6**Availability of Teak in Previous Enumeration (No. of sound trees per ha.)**

Sr. No	Name Working Circle	Total growing Stock	Teak/Ha	% of stock of trees to the total stock
1	2	3	4	5
1	Tuljapur range	885	0	0
2	Bhoom range	775.70	0	0
3	Umaraga range	886.67	0	0
4	Latur range	800.64	0	0
5	Ahmadpur range	580.36	8.036	1.364
6	Nilanga range	507.29	2.083	0.411
	Weighted average	766.69	1.277	0.167

Table No.6 (A)**Availability of Teak in Current (2013-14) enumeration.
(No. of sound trees per ha.)**

Sr. No	Name Working Circle	Total growing Stock	Teak/Ha	Glyricidia / Ha.	% of stock of Teak trees to the total stock	% of stock of Glyricidia to the total stock
1	2	3	4	5	6	7
1	Afforestation Working Circle	330.320	1.600	204.223	0.48	61.83
2	Plantation Management Working Circle	640.214	1.334	504.891	0.21	78.86
Total (Weighted Average)		497.783	1.456	336.700	0.29	67.64

Estimated growing stock of Medicinal plant, Natural regeneration and grass per Ha.**Table No. 7****A) Medicinal plant, per ha (Sample plot size 5 Mtr.X 5 Mtr.)**

Sr. No.	Working Circle	Population area (Ha.)	No. of sample plots	Sample area (Ha.)	No. of Medicinal Plants in sample area	No. of Medicinal Plants per Ha.
1	2	3	4	5	6	7
1	Afforestation W.C.	4137.497	198	0.495	775	1566
2	Plantation Management W.C.	4864.662	227	0.568	710	1250
	Total	9002.159	425	1.063	1485	1397

Working Circle wise name of species of **Medicinal Plants** found in sample plot are as follows.

Sr. No.	Working Circle	Name of species of Medicinal Plants
1	2	3
1	Afforestation W.C.	Dudhani, Dudhi, Garsul, Jakhamjudi, Kawalamuli, Kawaliwel, Neem, Rankarala, Tanatani, Unali, Waghatiwel, Wasanwel.
2	Plantation Management W.C.	Anjawel, Awala, Bilait, Chimukhkata, Dagadipala, Dagadwel, Dudhani, Fulari, Garsul, Ghavmari, Gondhan, Hemati, Jakhamjudi, Karanj, lajalu, marwel, Neem, Rankarla, Rantulas, Tantani, Unali, Vichaka, Wasanwel.

B) Natural Regeneration plant, per ha (Sample plot size 5 Mtr. X 5 Mtr.)

Sr. No.	Working Circle	Population area (Ha.)	No. of sample plots	Sample area (Ha.)	No. of Regenerated Plants in sample area	No. of Regenerated Plants per Ha.
1	2	3	4	5	6	7
1	Afforestation W.C.	4137.497	198	0.495	1438	2905
2	Plantation Management W.C.	4864.662	227	0.568	1123	1979
	Total	9002.159	425	1.063	2561	2409

Working Circle wise name of species of **Natural regeneration** found in sample plot are as follows.

Sr. No.	Working Circle	Name of species of Natural Regeneration
1	2	3
1	Afforestation W.C.	Anjan, Apta, Aratti, Babhul, Beedkari, Bahawa, Bor, Chinch, Dhamoda, Dhawada, Dikamali, Dudhi, Fulari, Gharsuliwel, Glyricidia, Hasi, Hemati, Henkal, Hiwar, Kanchana, Karanj, Kari, Kashid, Khair, Lokhandi, Maharukh, Medsing, Neem, Nilgiri, Palas, Pandharfali, Plotoform, Raimuni, Ranratala, Rantulas, Ritha, Salai, Shirad, Shivan, Sisoo, Sitafal, Subabhul, Tanatani, Tarota, Teak, Tembhurni, Unhali, Waghatiwel.

2	Plantation Management W.C.	Aratti, Awala, Babhul, Bad, Bahawa, Biba, Bor, Chinch, Dhamoda, Dikamali, Dudhi, Fulari, Gharsuliwel, Glyricidia, Hasi, Henkal, Hiwar, Karanj, Kari, Kashid, Khair, Korati, Lokhandi, Moha, Neem, Nilgiri, Nilwant, Palas, Pandharfali, Raimuni, Ranratala, Rantulas, Salai, Saundad, Shirad, Shivan, Sisoo, Sitafal, Subabhul, Tanatani, Tarota, Tembhorni, Tugali, Ujali, Unhali, Waghatiwel.
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C) Grass Species, per ha (Sample plot size 1 Mtr.X 1 Mtr.)

Sr. No.	Working Circle	Population area (Ha.)	No. of sample plots	Sample area (Ha.)	No. of Grass roots in sample area	No. of Grass roots per Ha.
1	2	3	4	5	6	7
1	Afforestation W.C.	4137.497	198	0.0198	18480	933333
2	Plantation Management W.C.	4864.662	227	0.0227	8940	393833
	Total	9002.159	425	0.0425	27420	645176

Working Circle wise name of species of **Grass Species** found in sample plot are as follows.

Sr. No.	Working Circle	Name of Grass Species
1	2	3
1	Afforestation W.C.	Bhuigatta, Bodmagawat, Chimanigawat, Chimukatagawat, Chirkagawat, Dagadi, Dhasadi, Dhobdi, Dhobgawat, Dudhani, Futfuti, Godwa, Gondali, Haral, Karikata, Kunda, Khavmadigawat, Kurdu, Kusali, Lonya, Marwel, Shadu, Nagarmotya, Pandharikusali, Pawanya, Roshagawat, Shirpat, Surya, Tambadikusali, Thobdigawat, Unhali.
2	Plantation Management W.C.	Bhailing, Bhuigatta, Chika, Chimangawat, Chimukatta, Chirkagawat, Dhagad, Dhobadgawat, Gondali, Haral, Hematta, Kadimod, Khavmadigawat, Kunda, Kusali, Lalkusali, Lona, Marwel, Nagarmodi, Pandharikusali, Pawayna, Rantulas, Sarata, Sheda, Sheda, Surya, Tambadikusali, Tomgawat.

D) Expected No. of Bamboo per ha. (Sample plot size 60 Mtr. X 60 Mtr.)

Sr. No.	Working Circle	Population area (Ha.)	No. of sample plots	Sample area (Ha.)	No. of Bamboo in sample area	No. of bamboo per Ha.
1	2	3	4	5	6	7
1	Afforestation W.C.	4137.497	198	71.280	0	0
2	Plantation Management W.C.	4864.662	227	81.720	140	1.71
	Total	9002.159	425	153.00	140	0.91

Statistical Analysis: -

The Statistical personnel of the office of the Chief Forest Statistician, Maharashtra State, Nagpur has carried out the statistical analysis of the data. The percentage standard error is calculated for each Working Circle is given in the following table No. 8

Table No.8
Working circlewise standard error

Sr. No.	Name of working circle	Population area in ha	Sample area in ha	Intensity of sampling %	% Standard Error
1	Afforestation W.C.	4137.497	71.28	1.72 %	8.14 %
2	Plantation Management W.C.	4864.662	81.72	1.68 %	6.35 %
	Total	9002.159	153	1.70	-----

**Chief Forest Statistician,
Maharashtra State, Nagpur.**

