

Red sanders, *Pterocarpus santalinus* L. in Rajampet forest range, Rajampet forest division, Andhra Pradesh, India

N. Senthilkumar*, A. Mayavel, S. P. Subramani, K. Balaji and P. Deenathayalan

Institute of Forest Genetics and Tree Breeding, R. S. Puram, Coimbatore, Tamilnadu, India

ABSTRACT

*Red sanders, *Pterocarpus santalinus* Linn.f., is globally endangered, endemic tree to India, included in Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Geneva, Switzerland) Appendix II in 1995. Illegal harvest is a key threat to *P. santalinus* since legal felling of *P. santalinus* in natural stands is ceased in India. It was reported that the population of *P. santalinus* in its native range is diminishing in an exponential rate, hence a study has been conducted to understand the present status of red sanders in Rajampet Forest Division, Andhra Pradesh, India, where *P. santalinus* is thickly populated. The study revealed that the standing crops are pole crops, not suitable for harvesting.*

Key words: Red sanders, *Pterocarpus santalinus*, Andhra Pradesh, CITES

INTRODUCTION

Red sanders, *Pterocarpus santalinus* Linn.f., is a deciduous tree belongs to the family Fabaceae. It is endemic to India [1] and considered globally endangered (EN B1+2de, 1998, IUCN 2.3), with illegal harvest being a key threat. *P. santalinus* was included in Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Geneva, Switzerland) Appendix II in 1995 [2]. It is restricted to Tirupathi, Cuddapah, Rajampet, Venkatagiri and Podalkur forest areas of Cuddapah and Kurnool districts in Andhra Pradesh and Arcot and Chengelpet districts in Tamilnadu. It has been reported to be a native of Africa, but its entry into a restricted part of India remains a mystery [3]. *P. santalinus* is highly valued for its heavy, dark claret-red heartwood which yields 16% of red colouring matter to santalin [4]. In recent years, a variant in this species which has wavy-grained wood has driven into sudden prominence because it is highly valued in the export market. Trees with this variant character are rare in nature and they seem to show no apparent morphological differences to differentiate them from the normal-grained trees. The natural habitat of *P. santalinus* is a hilly region with hot dry climate. Natural stands of red sanders in Andhra Pradesh are listed in Table 1. It is a strong light demander and does not tolerate overhead shade. It grows on dry, hilly, often rocky ground; prefers lateritic and gravelly soil. It cannot withstand water-logged conditions. It is listed out as an endemic taxon of the Eastern Ghats because of its restricted occurrence. Further, it is now considered to be endangered because its natural habitat is constantly subjected to human pressure. Rajampet forest area in Andhra Pradesh is found to be thickly populated area of red sanders than other forest ranges (Table 1.), and human pressure is also found to be high, hence, Rajampet forest ranges is considered as vulnerable forest range. In this area red sanders occurs gregariously as pure patches. Hence a study was carried out to investigate the status of *P. santalinus* in natural stands in Rajampet forest areas of Andhra Pradesh from 11th May, 2011 to 25th July, 2011 to appreciate this species.

Table 1. Andhra Pradesh Red Sanders (*Pterocarpus Santalinus* .L) Natural Forest Information

Sl. No	Name of Circle	Location of Forest Area	Natural Forest Area (Ha)
1.	WLM Tirupathi	Tirupathi	2760.00
2.	Kurnool	Kadapa	79895.76
3.	WLM Tirupathi	Rajampet	84802.976
4.	Guntur	Venkatagiri	26676.38
5.	Guntur	Podalakur	25263.260
		Total	219398.376

Source: <http://iwst.icfre.gov.in/database/Redsanders/treeimprovement/plantation.htm>

Methodology

Twenty four (24) sample plots of 0.1ha (50x20m quadrates) were laid at twenty four different compartments in 9 beats of the Rajampet forest range (Map 1 & 2). The number of quadrates was decided based on the red sanders covering areas as per the record of Andhra Pradesh Forest Department as given in table 2. GPS information of the centre of the sample plot/ compartment is given in table 3.



Map 1 showing the study area, Rajampet (Cuddapah district), Andhra Pradesh, INDIA



Map 2 showing Rajampet forest range and various beats and compartments

Table 2. Sample plots laid in Rajampet range

Range	Section	Beats	Area (Ha)	Red sanders growing areas (Ha)	Plots	Compartments
Rajampet	S.R. Palem	S.R. Palem*	4291.63	2691.42	4	888,889,885,884
		Renuthala	4705.94	2799.38	3	867,874, 874
		Rollamadugu*	4020.00	3995.00	4	961,967,960,959
	T.Bailu	T.Bylu*	3450.00	1925.00	3	958,940,947
		C.C. Kuntha	2313.56	1489.80	2	965,964
		Vathalur	2420.00	1534.40	2	901,903
		Arimanipenta*	2300.00	2300.00	2	927,929
	B.D. Bavi	Annasamudram	2580.43	442.80	2	905,907
		B.D. Bavi*	2120.81	2120.81	2	922,925
	Total		28202.37	19298.61	24	

* Vulnerable beats

Source: Working plan, Rajampet Division, APFD

Table 3. GPS information of sample plots

Compartments	°E Longitude	° N Latitude	Altitude (m) msl
888	79.03	14.21	224.7
889	79.04	14.07	267
885	79.04	14.07	268.2
884	79.05	14.11	413.9
867	79.05	14.12	405.5
874	79.05	14.12	401
874	79.05	14.13	400.4
961	79.05	14.13	383.9
967	79.05	14.12	412.8
960	79.05	14.13	396.1
959	79.05	14.13	391.8
958	79.07	14.09	423.9
940	79.07	14.09	420.8
947	79.07	14.09	438.8
965	79.07	14.09	442.2
964	79.07	14.09	441.5
901	79.07	14.07	441
903	79.07	14.07	433.1
927	79.08	14.07	463.1
929	79.08	14.07	467.5
905	79.09	14.05	429.9
907	79.11	14.04	491
922	79.11	14.03	584.9
925	79.03	14.21	216.8

All red sanders (≥ 10 cm Girth at Breast Height) in a quadrat were enumerated. 24 such quadrats were laid and all trees were enumerated. Variables such as height, clear bole and GBH of all the trees in each plot were measured and data were maintained separately. The collected data were analysed statistically for mean height, mean GBH and mean clear bole height using statistical software SPSS version 16.0.

RESULTS AND DISCUSSION

A total of 488 red sanders trees were encountered from 24 compartments (24 sample plots) in 9 beats of Rajampet Forest Range, Andhra Pradesh during the survey period. Trees enumerated were classified in such a way that they should fall under ≤ 4 m, 4-8 m, 8-12 m, 12-16m height; ≤ 2 m, 2-4 m, 4-6 m, 6-8 m clear bole height; and ≤ 20 cm, 20-40 cm, 40-60 cm and 60-80 cm GBH and the results are tabulated in table 4. Mean height in m, mean clear bole height in m and mean GBH in cm of all the 24 sample plots is given in table 5. The average height ranges between 7.55 m and 13.11 m; the GBH ranges from 22.30 cm to 81.82 cm. Compartment number 961 of Rollamadugu beat in S.R. Palem section harboured trees with promising growth traits (table 4 and 5) which is considered to be one of the vulnerable beats in terms of human pressure.

Table 4. Height, GBH and Clear bole Ht class of red sanders sampled in Rajampet range

Height (m) class	≤ 4 (m)	4-8 (m)	8-12 (m)	12-16 (m)
Plots (24 plots)	3	4	16	1
Trees (488 trees)	9	170	269	40
Clear bole (m) class	≤ 2 (m)	2-4 (m)	4-6 (m)	6-8 (m)
Plots (24 plots)	3	6	13	2
Trees (488 trees)	76	258	125	29
GBH (cm) class	≤ 20 (cm)	20-40 (cm)	40-60 (cm)	60-80 (cm)
Plots (24 plots)	3	15	5	1
Trees (488 trees)	51	148	170	119

Of the 488 trees, 50 percent of individuals fall under the pole crop category (6-10 m height and 30-60 cm GBH), hence, needs further growth. Though Rajampet Forest Range of Rajampet Division is under protected area, human pressure in terms of illegal felling of trees by smugglers is experienced (personal discussion with DFO and Field Foresters). Since red sanders (*P. santalinus*) is endemic to Andhra Pradesh, India, it has been classified as endangered in 1997 in the International Union for Conservation of Nature [5] (IUCN) red-list. Its wood has lot of demand in International market including China, Japan and Gulf countries and there is large scale smuggling of this precious wood from Andhra Pradesh [6]. Hence, Andhra Pradesh forest department takes an initiative to promote red sanders cultivation in farmlands. There is a quota of export of 310 metric tonnes (MTs) of red-sanders every year for farmers. Such measures will help in bringing down illicit demand.

Table 5. Average Height, GBH and clear bole ht. of red sanders sampled in Rajampet range

S. No.	Sample plots in compartments	Total Ht.(m)	GBH(cm)	Clb ht.(m)
1	888	7.55 ± 1.73	34.14 ± 10.37	4.36 ± 1.38
2	889	8.01 ± 1.71	33.07 ± 11.37	5.04 ± 1.60
3	885	8.14 ± 1.20	36.05 ± 11.87	4.25 ± 1.79
4	884	7.79 ± 1.03	34.85 ± 14.24	4.73 ± 1.64
5	867	8.12 ± 1.01	47.97 ± 56.18	4.32 ± 1.30
6	874	7.99 ± 1.81	36.38 ± 9.50	3.90 ± 1.35
7	874	8.88 ± 6.42	38.40 ± 35.60	2.54 ± 1.03
8	961	13.11 ± 1.58	81.82 ± 29.52	4.44 ± 1.83
9	967	7.90 ± 1.66	32.65 ± 13.14	3.59 ± 1.44
10	960	8.95 ± 1.23	41.66 ± 17.21	3.71 ± 1.76
11	959	9.31 ± 1.47	36.11 ± 10.35	4.99 ± 1.93
12	958	9.46 ± 1.60	39.16 ± 10.25	4.67 ± 1.48
13	940	11.36 ± 2.37	46.12 ± 28.33	5.00 ± 1.99
14	947	10.30 ± 3.03	40.21 ± 10.66	4.59 ± 1.83
15	965	10.90 ± 2.29	45.75 ± 22.47	5.63 ± 1.63
16	964	8.43 ± 3.54	26.56 ± 15.66	4.38 ± 1.58
17	901	10.19 ± 1.98	31.14 ± 12.38	5.97 ± 2.81
18	903	8.34 ± 1.15	24.34 ± 8.90	4.62 ± 1.50
19	927	0 ± 0	0 ± 0	0 ± 0
20	929	8.16 ± 1.97 ±	48.00 ± 26.04	4.86 ± 2.29
21	905	0 ± 0	0 ± 0	0 ± 0
22	907	0 ± 0	0 ± 0	0 ± 0
23	922	8.65 ± 1.13	29.13 ± 14.47	2.96 ± 1.41
24	925	8.06 ± 0.73	22.30 ± 6.95	3.14 ± 1.55

Values are mean ± SE

CONCLUSION

The increased demand has placed a great strain on the natural populations of *P. santalinus*. Illicit felling of red sanders causes serious threat to the survival of the species. Repeated fire causes poor regeneration capacity of the species [7]. Cultivation in a substantially high scale is an alternate for illegal felling and trading. Therefore, given the need for conserving the *P. santalinus* of Andhra Pradesh with reference to economic and ecological importance of the species, the Rajampet forest range in Rajampet Division, Andhra Pradesh has to be protected with extra efforts.

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