

8. Heartwood Formation

Estimations of heartwood formation help to define differences in durability and other wood characteristics of timber species (Bhat, 1995). The heartwood is the wooden portion inside the tree where the production of live cells has ceased and the materials of reserve have been removed or become more lasting substances (Miller, 1999). At present, heartwood is the key characteristic for high value product for teak end used.

Sapwood and heartwood were studied through the cross-sectional samples in Clone Bank, Uthai Thani. In the present study, the result showed that the average sapwood area ranged from 34.68 cm² (clone V86) to 366.42 cm² (clone V124) with the total sapwood area mean of 196.66 cm² (39.08%). The overall average heartwood area was 303.56 cm² (60.92%) ranging from 94.31 cm² (clone V85) to 524.81 cm² (clone V100). The top five clones with the high percentage of heartwood area were clones V119 (75.58%), V86 (74.43%), V85 (71.60%), V46 (71.01%) and V7 (70.67%). However, when considering to average of heartwood volume, it ranged from 0.05 m³ (clone V86) to 1.22 m³ (clone V100) with the total heartwood volume average of 0.52 m³. Clones with high value in heartwood volume were **V100** (1.22 m³), **V130** (1.03 m³), **V118** (0.95 m³), **V7** (0.92 m³), **V111** (87 m³), **V34** (0.85 m³), **V4** (0.81 m³) and **V39** (0.80 m³) as shown in Table 24.

In the present study, the changing of heartwood percentages of selected clone were also studied. The heartwood content within a tree decrease with height as shown in Figure 19. That means less heartwood area can be observed in the upper sections.

Nair and Chavan, 1995 studied wood parameter in some timber including teak and found that the ratio of heartwood area to sapwood area at the apex and base showed strong positive correlation with tree height. This confirmed that when tree height increases the cross-sectional area of heartwood showed a definite increment without a concomitant change in sapwood area.

Table 24 Sapwood and heartwood content of 19 years old teak, Clone bank, Uthai Thani

Clones	Average sapwood area (cm ³)	Average heartwood area (cm ³)	Heartwood percentage	Average heartwood volume (m ³)
v3	249.68	344.00	57.94	0.69
v4	207.75	379.09	64.60	0.63
v7	163.93	396.65	70.76	0.92
v22	194.58	297.25	60.44	0.46
v23	190.28	246.38	56.42	0.29
v24	236.49	326.96	58.03	0.53
v25	136.57	292.62	68.18	0.42
v26	182.59	307.53	62.75	0.43
v27	183.62	282.31	60.59	0.39
v28	215.59	265.81	55.22	0.45
v29	242.31	254.99	51.27	0.30
v30	165.10	236.96	58.94	0.40
v32	225.82	347.94	60.64	0.42
v33	204.35	354.37	63.42	0.69
v34	319.59	322.94	50.26	0.85
v35	153.82	265.19	63.29	0.25
v36	262.30	424.67	61.82	0.72
v37	189.87	277.02	59.33	0.37
v38	209.85	322.27	60.56	0.44
v39	241.23	385.94	61.54	0.80
v40	195.23	317.37	61.91	0.70
v41	216.45	371.69	63.20	0.81
v42	165.59	373.90	69.31	0.70
v43	129.08	272.75	67.88	0.47
v45	279.85	422.95	60.18	0.77
v46	138.91	340.33	71.01	0.57
v49	343.25	502.40	59.41	0.76
v69	170.19	271.83	61.50	0.47
v72	157.71	173.24	52.35	0.34
v73	162.66	204.63	55.71	0.35
v74	269.29	288.39	51.71	0.72
v76	277.01	425.77	60.58	0.55
v78	199.56	345.25	63.37	0.54
v79	-	-	-	-
v80	182.31	222.36	54.95	0.46
v81	264.58	272.96	50.78	0.41
v83	182.46	321.41	63.79	0.55
v84	250.65	296.67	54.20	0.67
v85	37.41	94.31	71.60	0.08

Table 24 (Continued)

Clones	Average sapwood area (cm ³)	Average heartwood area (cm ³)	Heartwood percentage	Average heartwood volume (m ³)
v86	34.68	100.97	74.43	0.05
v88	185.56	247.31	57.13	0.35
v89	95.82	140.08	59.38	0.15
v90	211.12	283.60	57.33	0.55
v92	205.71	249.71	54.83	0.33
v93	205.57	435.08	67.91	0.58
v95	150.63	205.54	57.71	0.35
v96	226.88	335.81	59.68	0.62
V97	-	-	-	-
v98	116.56	151.61	56.54	0.12
v99	69.22	113.15	62.04	0.08
v100	273.60	524.81	65.73	1.22
v110	59.51	97.79	62.17	0.05
v111	265.80	441.59	62.43	0.87
v112	188.69	350.23	64.99	0.58
v113	208.54	302.79	59.22	0.56
v114	154.57	216.22	58.31	0.36
v115	140.39	282.04	66.77	0.58
v116	202.23	381.57	65.36	0.70
v117	114.42	159.10	58.17	0.18
v118	211.22	376.21	64.04	0.95
v119	81.99	253.71	75.58	0.20
v120	126.26	265.99	67.81	0.44
v121	274.19	305.04	52.66	0.42
v122	230.41	386.46	62.65	0.56
v123	187.65	291.26	60.82	0.39
v124	366.42	393.65	51.79	0.76
v126	239.02	397.21	62.43	0.63
v127	207.95	240.39	53.62	0.67
v128	257.21	321.48	55.55	0.58
v129	199.35	404.52	66.99	0.69
v130	250.22	472.26	65.37	1.03
<i>Mean</i>	<i>196.66</i>	<i>303.56</i>	<i>60.92</i>	<i>0.52</i>

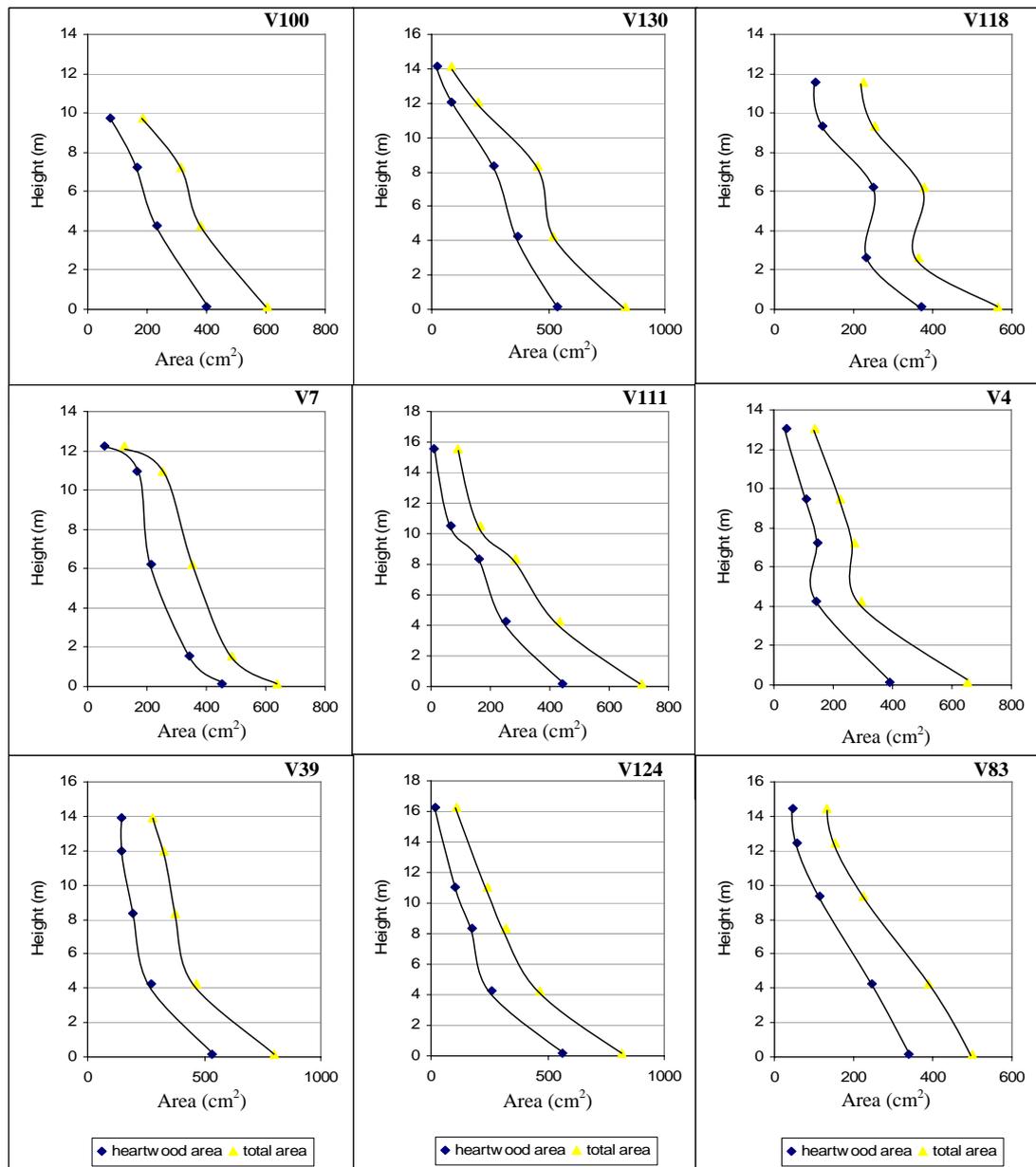


Figure 19 Sapwood and heartwood stem analysis of some selected 19 year-old teak clones at Clone Bank, Uthai Thani.