

Old *Taxus Baccata* specimens at Kingley Vale near Chichester

An investigation into the growth rates of the large yews at Kingley Vale made possible by Peter Norton's survey of 2012

Toby Hindson 2012

Reviewed by Peter Norton May 2012

The excellent field work carried out by Peter Norton at Kingley Vale (1) is ground breaking because it is the first field study we are aware of that properly enumerates and locates the old yews in that forest, despite the fact the trees there have been written about for well over a century. Richard Williamson (*The Great Yew Forest* 1978) (2) gave us the best historic evidence regarding them, listing the ten highest yew girths in the wood in 1977. As forest ranger there for many years his expertise and knowledge of the site are invaluable in giving a good level of certainty to his data.

This study examines and compares all of the known yew girth measurements recorded at Kingley Vale in order to understand which measures can be said to relate to individual known yews. A useful by-product of the exercise is the estimation of a site growth rate for the largest trees which leads to a clarification of the likely ages of these hitherto mysterious yews, and the debunking of some erroneous ideas regarding the growth rates of *Taxus baccata* L. promulgated by John Lowe (*Yew Trees of Great Britain and Ireland* 1896) (3), and the otherwise excellent Richard Williamson.

Further work is needed to track down the reference that Williamson (p. 172) makes to Loudon “(in Loudon, *Arb. Brit.*) 1838” (4); I can't find it in this or any other of Loudon's works at present, nor can I find it by following Williamson's reference to Loudon in Lowe found in the index of *The Great Yew Forest* on p.205. This reference is important because it is supposed to relate to Loudon's measurements for Kingley Vale yews (below) which Williamson used to estimate ages for the yews on the site on the assumption that these were the highest yew girths in 1838 and that they were taken from the same yews that he measured.

Summary and analysis of previous measures of the ten highest girth old yews after Peter Norton 2012

Kingley Vale Samples which included KV1 Table 1						AYG	Kingley Vale Samples which did not include KV1 Table 2					
Williamson 1977 <i>The Great Yew Forest</i> (1978)	34 year Increment cm. 1977 -2012. n=10.	Norton 2012 <i>Report to the AYG</i> Girth, m/@ ht.	Recent rate- Annual girth increase in mm	N1 AYG Tree ref.	Identification Grid ref: Norton 2012	Ancient Veteran Notable		N2 non-continuous	Loudon 1838 <i>Arboretum et fruticetum Britannicum</i> Cited by Williamson	Lowe 1896 <i>The Yew Trees of Great Britain and Ireland</i>	Mitchell 1962 <i>TROBI data</i> (5)	Tabbush and White 1996 (6) <i>Estimation of tree age in ancient yew woodland at Kingley Vale.</i> QJF, V90, No. 3, p.p. 197-205
6.20	15	(7.14) 6.35	4.4	KV1	SU8227010517	A-bm		0	0	0	0	0
5.53	18	5.71	5.3	KV2	SU8227910505	V-g		1	2.87	4.67	5.56	5.55
5.43	26	5.69	7.6	KV3	SU8224310419	V-g		2	2.87	4.57	5.56	4.20
5.28	21	5.49	6.2	KV4	SU8229310334	V-g		3	2.55	4.19	5.09	4.10
5.18	20	5.38	5.9	KV5	SU8226810508	V-g		4	2.39	3.48	4.58	2.10
5.10	8	5.18	2.4	KV6	SU8226610373	V-g		5	2.31	3.35	4.05	2.05
4.90	21	5.11	6.2	KV7	SU8221310475	V-g		6	1.91			1.70
4.78	30	5.08	8.8	KV8	SU8238010065	V-g		7	1.91			7.90 (root level stump)
4.60	35	4.95	10.3	KV9	SU8236510271	V-g		8	1.59			
4.57	23	4.80	6.8	KV10	SU8226410423	V-wild		9	1.59			
								10	0.96			
			63.9/10									
Sample: Largest 10 yews in 1977	Mean 21.7	KV1 lost girth, was 7.01m+ well before 1978 rc= root crown	Mean Rate 6.4mm						Reported in Williamson p172, data not yet found in Loudon or Lowe as per ref.? Girths calculated too low to be part of upper KV series.	Lowe's 1896 assertion that no yew exceeded 15'4" girth was erroneous. 1 & 2 may be KV2 & 3	1 & 2 are probably KV2 & 3, the rest are out of series.	7.9m stump- see Williamson p21 destruction of old yews by army mortar target practice during WW2.
<p>Bole girths are given in metres.</p> <p>KV1: Most researchers fail to find KV1, only Richard Williamson and Peter Norton have documented it. Tabbush and White mention it but failed to locate it. KV1 has lost girth as evidenced on the bole by exposed internal roots starting to fill a flat plane facing a dead but related buttress remnant. All extant material is measurable to include the buttress remnant: 701m. Not including dead or detached material the girth is 6.35m. Ignoring the buttress remnant, additional girth extrapolated from remaining curve of missing bole is calculated to be a further 79cm (See AYG protocols V3.4; chapter 3, missing girth estimated at 12.4%). (7). KV1 is probably one of a mainly lost 800+ year old cohort – other possible examples include Tabbush and White's 7.9m stump, and potentially some of the large badly damaged yews still extant.</p> <p>Table 2. None of the measures in Table 2 can yet be confirmed as belonging to particular yews in Table 1, and each sample does not form a coherent series or "highest girth" census.</p> <p>AYG: The Ancient Yew Group classification of old yews- see <i>Classification Codes</i> (8).</p>												Data table T. Hindson 2012

The comparison that Williamson made between his data and the data that he reports finding in Loudon (Measurements of yew trees at Kingley Vale" table on page 172 of *The Great Yew Forest*) produces what appears to be an alarmingly unrealistic growth rate. Can this be right? The answer can be inferred by taking the Norton – Williamson/ Williamson - Loudon data, and making a comparison with known growth rates found on other sites. Column "WL" in Table 3 shows the girth difference in metres between Williamson's and Loudon's measures of the largest yews on site, a difference that was supposed to have arisen over 139 or 138 years between 1838 and 1976. The "Rate 1" column shows how these girth differences translate into growth rates over the period, and yields a mean annual girth increase of 22mm. This is of the order of a 1 inch annual increase. However, when Norton's girths are compared with Williamson's a mean rate of only 6.4mm is calculated (column "Rate 2"). The "Diff. Ratio" column shows the ratios between the two sets of rates and gives a mean of 4:1, so compared with Williamson, Loudon's data gives a result 4 times higher than Norton's.

Table 3 Comparison of growth rates									
Norton	Williamson	Loudon	WL	Rate 1	Rate 2	Diff. Ratio	Churchyard yews (9)		Newlands (10)
Girth m 2012	Girth m 1976	Girth m 1838	difference m 139 years	rate mm W-L/139	rate mm W-N/36	R1/R2	Matched similar girth yews in Hants (H)	Known rate (H) mm*	27 yews in a forest situation
6.35	6.20	2.87	3.33	24	4.4	5.5	Bedhampton	3.2	Girth range: 150 cm-760cm Span: 12 years
5.71	5.53	2.87	2.66	19	5.3	3.6	Farringdon 2	8.8	
5.69	5.43	2.55	2.88	21	7.6	2.7	Hound	10	
5.49	5.28	2.39	2.89	21	6.2	3.4	Hurstbourne Priors	11	
5.38	5.18	2.31	2.87	21	5.9	3.6	Long Sutton 2	4.6	
5.18	5.10	1.91	3.19	23	2.4	9.6	Merdon Castle 2	7.4	
5.11	4.90	1.91	2.99	22	6.2	3.6	Priors Dean Rd 1	15	
5.08	4.78	1.59	3.19	23	8.8	2.6	Priors Dean Rd 2	7.6	
4.95	4.60	1.59	3.10	22	10.3	2.1	Stoke Charity	9.1	
4.80	4.57	0.96	3.61	26	6.8	3.8	Steep (lost)	7.6	
Reported top ten girths in Kingley Vale				Mean= 22	Mean= 6.4	Mean= 4:1		Mean= 8.4	Growth rate. Mean= 6.9 mm/yr

*This growth rate data is unpublished at present; it is generated from re-measures by this researcher of historic measurements. The data will be published on the AYG site when complete as *Regional Reference Stream Data Sets*.

A comparison is then made with churchyard yew data from yews of known recent growth rate. The churchyard yews are each selected to be the closest available girth match with each corresponding Kingley Vale specimen. Yews grown in churchyards are likely to have better access to light and nutrients than forest grown yews (Tabbush & White *Estimations of tree age in ancient woodland at Kingley Vale* 1996) (6) and should yield a slightly higher mean growth rate. The rate of the 10 selected churchyard yews gives a mean of 8.4mm, which is most in keeping with the result found by comparing Norton's data with Williamson's.

A second comparison was made, this time with 27 forest yews measured for 12 years from 1996 at Newlands Corner and Merrow Down near Guildford in Surrey (T. Hindson (1996->) on-going AYG study). These yews vary in size more than the above sample of 10 at Kingley Vale, ranging from 150cm girth to 760 cm, the mean being 4 metres. The interim mean growth rate found here in 2009 was 6.9mm, very close to the figure generated by Williamson and Norton's data of 6.4mm.

These comparative figures make it abundantly evident that the data purportedly found in Loudon does not refer to the largest yews extant in Kingley Vale in 1838, and Williamson's idea of basing an aging attempt on this data was flawed. On the other hand Williamson's actual fieldwork and data were clearly very good, and together with Peter Norton's survey give us a strong insight into the ages of the yews at Kingley Vale.

Growth rates and age.

A very broad idea of the Age of the oldest Kingley Vale yews can be deduced from the growth rates found. The bole increase appears comparable with yews found in the woodland at Newlands Corner and other woods in the South of England, and we can assume a mean rate of about 10 mm per year as the yew grows to 3 metres girth, a higher rate earlier and lower as the 3 metre mark is approached.

After 3 metres girth the Kingley Vale woodland growth rate found above probably applies, so the yews in the 5.5 metre bracket are around 650 years old. The largest yew, KV1 with a notional girth of 7.14 metres and a low recent growth rate is probably in the region of 900 years old assuming an average rate of slightly over 5mm after the 5.5 metre stage.

A weakness in this report is that although one suspects that he seems to have tried to find minimum girths, Williamson did not specify measuring height above ground. The exact measures cannot therefore be reproduced and there is probably some inaccuracy as a result. Norton does give measuring heights however, and an improved growth rate study will be possible in ten years or so. Norton tends towards minimum bole girth measures.

Peter Norton's Kingley Vale data

Below is a census of the largest yews, those above 3 metres in girth. Data and field work by Peter Norton, arranged here by girth instead of location by Toby Hindson for present and future analysis purposes. Additions to Peter Norton's data are the "AVN" category, the Ancient Veteran and Notable status used by the Ancient Yew Group; also the KV column which is intended simply for ease of reference and is allocated in current order of girth. The KV reference is intended to be durable, and may show growth rate differences between individuals in the future. Peter Norton uses the GPS system SATMAP Active 10 loaded with the complete 1:50,000 OS map of the British Isles to generate the 10 figure grid references. His report also includes photographs of the individual yews and a description of his route, making it that rare and useful thing: a genuinely repeatable study of woodland yews. Those attempting to repeat the study in the field are advised to follow Norton's report rather than this analysis document for the above reasons as well as the fact that his work contains his measuring heights and good photographic confirmation for identification of individual yews.

Ref	ft	ins	Metric	AYG AVN	sex	Grid	Notes
KV1	20	10	6.35 (7.01)	A-bm,ins	f	SU8227010517	Much rotted and evidence of some of the outer shell to the front of the tree which allowed a measurement of 23'. Note all the new growth.
KV2	18	9	5.71	V-g	f	SU8227910505	-
KV3	18	8	5.69	V-g	m	SU8224310419	4 embedded nails mark the height.
KV4	18	0	5.49	V-g	m	SU8229310334	Much rot
KV5	17	8	5.38	V-g	f	SU8226810508	Much rotted but a nice internal root
KV6	17	0	5.18	V-g	m	SU8226610373	5 embedded nails mark the height
KV7	16	9	5.11	V-g	m	SU8221310475	2 trees with the largest (hollowing) having 4 embedded nails
KV8	16	8	5.08	V-g	f	SU8238010065	Note the small horse shoe shape nearby, was this a layer?
KV9	16	3	4.95	V-g	m	SU8236510271	4 embedded nails mark the height. May have been 2 trees
KV10	15	9	4.80	V-g	m	SU8226410423	-
KV11	15	6	4.72	V-wild	f	SU8221310475	Grows close to the above
KV12	15	3	4.65	V-wild	f	SU8226010410	Must be two trees
KV13	15	2	4.62	V-wild	m	SU8220210603	Probably the most spectacular display of layering
KV14	15	0	4.57	V-wild	f	SU8224710496	-
KV15	15	0	4.57	V-wild	m	SU8220610555	4 embedded nails mark the height
KV16	14	9	4.50	V-wild	m	SU8221110577	Joined at the root, Tree to the left in the photo
KV17	14	7	4.44	V-wild	m	SU8240810297	Having a bulging bole, measurement was just above this large burr.

KV18	14	7	4.44	V-wild	f	SU8222010431	Measured just above the root bulge
KV19	14	5	4.39	V-wild	m	SU8230110349	Joined at the root, Tree to the right in the photo
KV20	14	1	4.29	V-wild	m	SU8220710560	Tree to the right in the photo
KV21	14	0	4.27	V-wild	m	SU8239310011	Close to the office, One of the tallest yew seen on this site
KV22	13	11	4.24	N	f	SU8225510501	Nice example of a successful layer
KV23	13	10	4.22	N	f	SU8229410351	A large internal stem.
KV24	13	9	4.19	N		SU8223410372	Large area of rot
KV25	13	9	4.19	N	f	SU8220810539	Tape was undulating to get the least girth
KV26	13	7	4.14	N	m	SU8220710560	-
KV27	13	4	4.06	N	f	SU8226010455	-
KV28	13	4	4.06	N	m	SU8218310494	Sparse foliage, may even be two trees
KV29	13	2	4.01	N	f	SU8229710342	-
KV30	13	0	3.96	N	f	SU8226810434	
KV31	12	11	3.94	N	f	SU8222910538	3 trees appear to share the same root stock; only the centre yew was measured.
KV32	12	9	3.89	N	m	SU8223410414	4 embedded nails mark the height.
KV33	12	9	3.89	N	m	SU8229710337	Hollow with aerial roots
KV34	12	8	3.86	N	f	SU8228410367	-
KV35	12	4	3.76	N	m	SU8221210583	Undulating tape at about 1', completely hollow
KV36	12	3	3.73	N		SU8229410351	Close to the above, tea lights evident plus flowers.
	11	10	3.61		m	SU8227310345	Totally hollow but outer shell still intact apart from 2 small cavities
	11	10	3.61		f	SU8232710299	-
	11	7	3.53		f	SU8225010398	3 embedded nails mark the height
	11	6	3.51		m	SU8208010520	Debarking evident
	11	5	3.48		m	SU8211210505	Sparse foliage
	11	4	3.45		f	SU8232910321	Hollowing, 2 large layers -
	11	4	3.45		f	SU8202610566	-
	11	3	3.43		f	SU8208010501	
	11	0	3.35		f	SU8228710375	Loss of side limb
	11	0	3.35		f	SU8209210544	Debarking evident
	10	8	3.25		m	SU8228010326	Below the large burr
	10	7	3.23		f	SU8231510310	-
	10	2	3.10		f	SU8231410338	May have been greater than 12'. Note young roots
	10	0	3.05		m	-	Tree to the left in the photo
	10	0	3.05		m	-	The smaller has 2 embedded nails.

References

- (1) Norton P. (2012) *Kingley Vale West Sussex- a Survey of its Oldest Yews*, Report to the Ancient Yew Group <http://www.ancient-yew.org/userfiles/file/Kingley%20Vale%20Survey.pdf>
- (2) Williamson R. (1978) *The Great Yew Forest*, Readers Union by arrangement with Macmillan, London.
- (3) Lowe J. (1896) *The Yew Trees of Great Britain and Ireland*, Macmillan.
- (4) Loudon J. (1838) *Arboretum et fruticetum Britannicum*.
- (5) Mitchell A. (1962) Tree Register of the British Isles, TROBI data set index cards.
- (6) Tabbush P. and White J. (1996) *Estimation of tree age in ancient yew woodland at Kingley Vale*. QJF, V90, No. 3, p.p. 197-205.
- (7) Hindson T. (2011) *AYG Protocols 2 V3.4*; chapter 3, <http://www.ancient-yew.org/s.php/ancient-veteran-notable-a-new-yew-classification-by-toby-hindson/3/39>
- (8) Hindson T. (2011) *Classification Codes* at <http://www.ancient-yew.org/s.php/classification-codes/3/41>
- (9) Hindson T. (unpublished) *Taxus baccata L. Regional Reference Stream Data Sets*, Ancient Yew Group data collection in progress.
- (10) Hindson T. (unpublished) *Taxus baccata L. at Newlands Corner and Merrow Down*, Ancient Yew Group study in progress.