



Number of Trees per Acre by Spacing Distance

Dr. Kim D. Coder, Professor of Tree Biology & Health Care / University Hill Fellow
University of Georgia Warnell School of Forestry & Natural Resources

Many components of natural resource management, site and stand assessments, and community forest / tree density control all utilize the number of tree stems per acre as a quantitative measure. The number of trees per acre (tree density) depend upon distances between individual tree stems. To estimate the number of trees per acre, trees are assumed to be roughly on a grid spacing lay-out. Trees per acre are determined by measuring distance between trees averaged for the site. The distance between tree rows and the distance between trees within a row are estimated. In greenways, cemeteries, parks, and across landscapes tree numbers per acre can be estimated in a similar way as estimating plantation trees in grid lay-out.

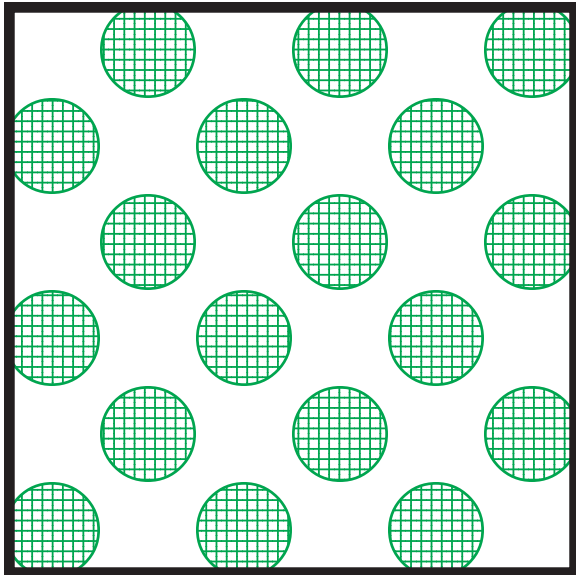
When planting a plantation or forest area, initial number of trees per acre are estimated by seedling spacing. With time, general forest management can use spacing between trees and number of trees per acre to estimate standing timber volume and value, help prescribe silvicultural treatments, and provide simple concepts of tracking forest growth dynamics. Figure 1 provides simple examples.

Below are presented two tables which show the number of trees per acre based upon tree spacing in two directions. The spacing distances are measured in feet. Table 1 provides the number of trees per acre when trees are planted, or are growing, in a grid, square, or at equal spacings. Table 2 is a large table broken into several parts which determine trees per acre for many combinations of spacings when distances between trees within rows and between rows vary. The formula for calculating trees per acre values within these tables is:

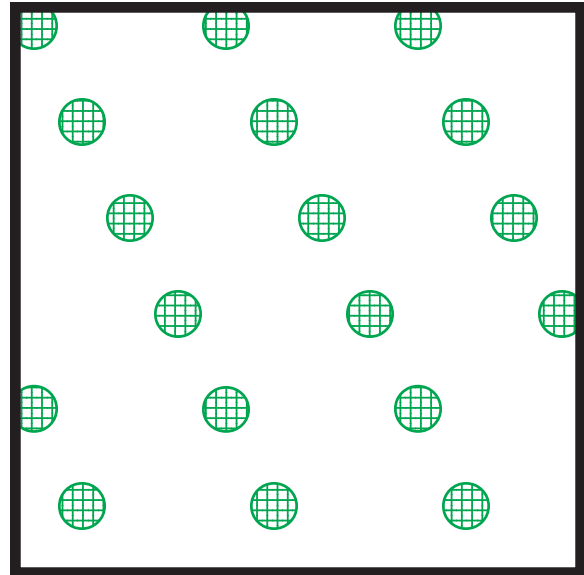
Estimated Number of Trees per Acre =

$43,560 / [(\text{spacing of trees in feet for direction 1}) \times (\text{spacing of trees in feet for direction 2})]$.

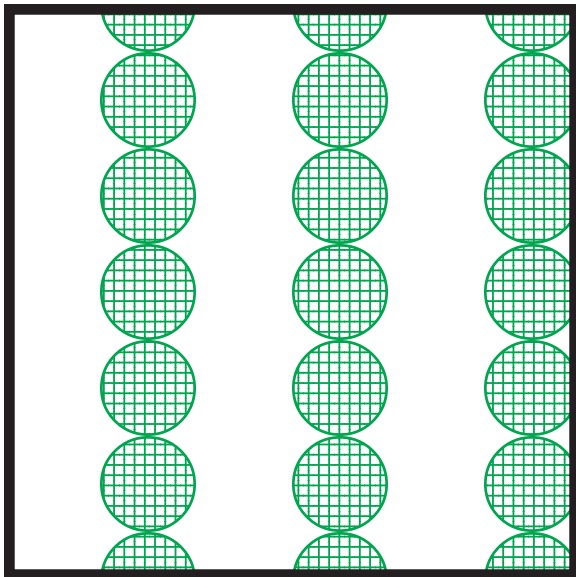
For example: If trees growing within a row are 9 feet apart and rows of trees are 9 feet apart, trees are growing at a 9 feet by 9 feet spacing (9 X 9), yielding approximately 538 trees per acre, if the spacing is consistent across the site (Table 1). If trees within a row are 20 feet apart and rows are 12 feet apart (12 X 20 or 20 X 12), trees are growing at a density of roughly 182 trees per acre (Table 2). Tree density on a site can be used to estimate interference / competition, reactions to site development and construction damage, shade management, and/or stem planting and removal estimates.



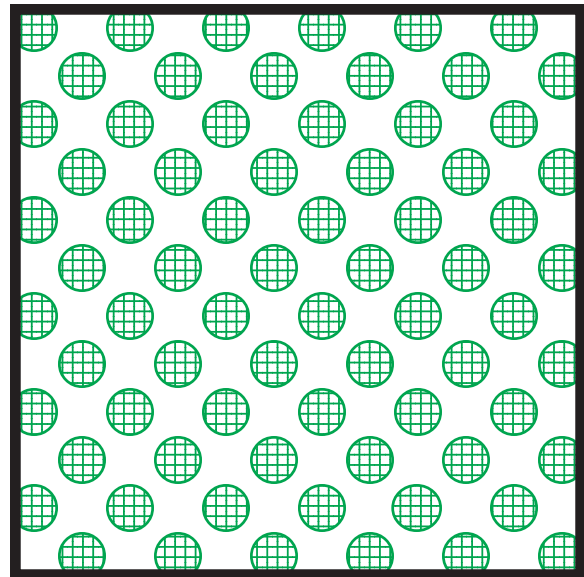
18 trees at ~49 X 49 ft spacing



18 trees at ~70 X 35 ft spacing



18 trees at ~70 X 35 ft spacing



72 trees at ~26 X 26 ft spacing

Figure 1: Simple examples of inter-tree spacing measured in feet as seen from above per acre..

Table 1: Approximate number of trees per acre based upon the distance in feet between stems in a square grid pattern.

spacing (feet)	number of trees / acre	spacing (feet)	number of trees / acre
1 X 1	43,560	30 X 30	48
2 X 2	10,890	35 X 35	36
3 X 3	4,840	40 X 40	27
4 X 4	2,723	45 X 45	22
5 X 5	1,742	50 X 50	17
6 X 6	1,210	55 X 55	14
7 X 7	889	60 X 60	12
8 X 8	681	65 X 65	10
9 X 9	538	70 X 70	9
10 X 10	436	75 X 75	8
11 X 11	360	80 X 80	7
12 X 12	303	85 X 85	6
13 X 13	258	90 X 90	5
14 X 14	222	95 X 95	5
15 X 15	194	100 X 100	4
16 X 16	170	110 X 110	4
17 X 17	151	120 X 120	3
18 X 18	134	130 X 130	3
19 X 19	121	140 X 140	2
20 X 20	109	150 X 150	2
21 X 21	99	160 X 160	2
22 X 22	90	170 X 170	2
23 X 23	82	180 X 180	1
24 X 24	76	190 X 190	1
25 X 25	70	200 X 200	1

Table 2: Approximate number of trees per acre based upon distance between trees in feet.

	1ft	2ft	3ft	4ft	5ft	6ft	7ft	8ft	9ft	10ft	11ft	12ft
1ft	43,560	21,780	14,520	10,890	8,712	7,260	6,223	5,445	4,840	4,356	3,960	3,630
2ft	---	10,890	7,260	5,445	4,356	3,630	3,111	2,723	2,420	2,178	1,980	1,815
3ft	---	---	4,840	3,630	2,904	2,420	2,074	1,815	1,613	1,452	1,320	1,210
4ft	---	---	---	2,723	2,178	1,815	1,556	1,361	1,210	1,089	990	908
5ft	---	---	---	---	1,742	1,452	1,245	1,089	968	871	792	726
6ft	---	---	---	---	---	1,210	1,037	908	807	726	660	605
7ft	---	---	---	---	---	---	889	778	691	622	566	519
8ft	---	---	---	---	---	---	---	681	605	545	495	454
9ft	---	---	---	---	---	---	---	---	538	484	440	403
10ft	---	---	---	---	---	---	---	---	---	436	396	363
11ft	---	---	---	---	---	---	---	---	---	---	360	330
12ft	---	---	---	---	---	---	---	---	---	---	---	303

	13ft	14ft	15ft	16ft	17ft	18ft	19ft	20ft	21ft	22ft	23ft	24ft
1ft	3,351	3,111	2,904	2,723	2,562	2,420	2,293	2,178	2,074	1,980	1,894	1,815
2ft	1,675	1,556	1,452	1,361	1,281	1,210	1,146	1,089	1,037	990	947	908
3ft	1,117	1,037	968	908	854	807	764	726	691	660	631	605
4ft	838	778	726	681	641	605	573	545	519	495	474	454
5ft	670	622	581	545	513	484	459	436	415	396	379	363
6ft	559	519	484	454	427	403	382	363	346	330	316	303
7ft	479	445	415	389	366	346	328	311	296	283	271	259
8ft	419	389	363	340	320	302	287	272	259	248	237	227
9ft	372	346	323	303	285	269	255	242	231	220	210	202
10ft	335	311	290	272	256	242	229	218	207	198	189	182
11ft	305	283	264	248	233	220	208	198	189	180	172	165
12ft	279	259	242	227	214	202	191	182	173	165	158	151
13ft	258	239	223	209	197	186	176	168	160	152	146	140
14ft	---	222	207	195	183	173	164	156	148	141	135	130
15ft	---	---	194	182	171	161	153	145	138	132	126	121
16ft	---	---	---	170	160	151	143	136	130	124	118	113
17ft	---	---	---	---	151	142	135	128	122	117	111	107
18ft	---	---	---	---	---	134	127	121	115	110	105	101
19ft	---	---	---	---	---	---	121	115	109	104	100	96
20ft	---	---	---	---	---	---	---	109	104	99	95	91

Table 2: Approximate number of trees per acre based upon distance between trees in feet. (continued)

	25ft	30ft	35ft	40ft	45ft	50ft	55ft	60ft	65ft	70ft	75ft	80ft
10ft	174	145	125	109	97	87	79	73	67	62	58	55
11ft	158	132	113	99	88	79	72	66	61	57	53	50
12ft	145	121	104	91	81	73	66	61	56	52	48	45
13ft	134	111	96	84	75	67	61	56	52	48	45	42
14ft	125	104	89	78	69	62	57	52	48	45	42	39
15ft	116	97	83	73	65	58	53	48	45	42	39	36
16ft	109	91	78	68	61	55	50	45	42	39	36	34
17ft	103	85	73	64	57	51	47	43	39	37	34	32
18ft	97	81	69	61	54	48	44	40	37	35	32	30
19ft	92	76	66	57	51	46	42	38	35	33	31	29
20ft	87	73	62	55	48	44	40	36	34	31	29	27
25ft	70	58	50	44	39	35	32	29	27	25	23	22
30ft	—	48	42	36	32	29	26	24	22	21	19	18
35ft	—	—	36	31	28	25	23	21	19	18	17	16
40ft	—	—	—	27	24	22	20	18	17	16	15	14
45ft	—	—	—	—	22	19	18	16	15	14	13	12
50ft	—	—	—	—	—	17	16	15	13	13	12	11
55ft	—	—	—	—	—	—	14	13	12	11	11	10
60ft	—	—	—	—	—	—	—	12	11	10	10	9
65ft	—	—	—	—	—	—	—	—	10	10	9	8
70ft	—	—	—	—	—	—	—	—	—	9	8	8
75ft	—	—	—	—	—	—	—	—	—	—	8	7
80ft	—	—	—	—	—	—	—	—	—	—	—	7

Table 2: Approximate number of trees per acre based upon distance between trees in feet. (continued)

	85ft	90ft	95ft	100ft	125ft	150ft	175ft	200ft
25ft	21	19	18	17	14	12	10	9
30ft	17	16	15	15	12	10	8	7
35ft	15	14	13	12	10	8	7	6
40ft	13	12	12	11	9	7	6	6
45ft	11	11	10	10	8	7	6	5
50ft	10	10	9	9	7	6	5	4
55ft	9	9	8	8	6	5	5	4
60ft	9	8	8	7	6	5	4	4
65ft	8	7	7	7	5	5	4	3
70ft	7	7	7	6	5	4	4	3
75ft	7	6	6	6	5	4	3	3
80ft	6	6	6	6	4	4	3	3
85ft	6	6	5	5	4	3	3	3
90ft	—	5	5	5	4	3	3	2

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