SELECTION DIFFERENTIAL AND PREDICTED GENETIC GAIN IN *TECTONA GRANDIS*

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Introduction

Individual selection on the basis phenotypic superiority forms the basis of any tree improvement programme. The success of any individual tree selection largely depends on the magnitude of genetic variation. Where the magnitude of variation is high, the realised gain estimated from the difference between the progeny of the selected tree and the random sample of any base population will be high. In teak, the base population is highly variable and the estimations are made between the selected tree and the mean of five codominant trees. The higher selection differential thus obtained are indicative of higher gain. The choice of characters are need based and may depend upon their genetic control (heritability), their variability and also on the economic value. Here the stem quality was taken into consideration, which consists of plant height, clear bole length (cbl) and diameter at breast height (dbh). These characters are highly variable and reported to have sufficient genetic control (White, 1991). The search for superior trees was confined to the class-I sites, with uniform site conditions having stable and minimum microclimatic variations and expected to have greater phenotypic-genotypic ratios. The age group in this study was 25-109 years.

Materials and Methods

Plus trees and comparison trees of teak were selected from the southern zone of India. The comparison tree method was used for selection. The trees were measured quantitatively, e.g. height in meters, clear bole length in meters and dbh in centimeters. The investigation consists of 80 batches of trees (Table 1). Six tree data composed a batch. Out of the six trees, one was the plus tree and the rest comparison trees. Batches were considered to be the superior representatives of that particular plantation/location, and the locations were randomly spaced in a geographical locality covering three States of Karnataka, Tamil Nadu and Kerala.

The trees were more than 25 years of age and out of several characters three important traits, characteristic for growth and greater volume of wood production were measured. Those were total height (ht), clear bole length (cbl) and diameter at breast height (dbh). Batch numbers of Table 3 corresponds with that of the Table 1.

Statistical analysis : The Table 2 gives the one way analysis of variance showing significance of mean-squares of individual traits. Table 3 includes batch numbers, plus tree data, mean of comparison tree data,

Table 1

List of locations (batches) for selected trees.

Sl. No.	State	Forest Division	Range	Year of Planting	Age
1	2	3	4	5	6
1.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	40
2.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	40
3.	Tamil Nadu	Coimbatore South	Tunacadavu	1916	54
4.	Tamil Nadu	Coimbatore South	Tunacadavu	1930	41
5.	Tamil Nadu	Coimbatore South	Tunacadavu	1932	40
6.	Tamil Nadu	Coimbatore South	Tunacadavu	1932	40
7.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	40
8.	Tamil Nadu	Coimbatore South	Tunacadavu	1934	38
9.	Tamil Nadu	Coimbatore South	Tunacadavu	1934	38
10.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	41
11.	Tamil Nadu	Coimbatore South	Tunacadavu	1930	42
12.	Tamil Nadu	Coimbatore South	Tunacadavu	1934	38
13.	Tamil Nadu	Coimbatore South	Tunacadavu	1934	38
14.	Tamil Nadu	Coimbatore South	Tunacadavu	1934	38
15.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	41
16.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	41
17.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	41
18.	Tamil Nadu	Coimbatore South	Tunacadavu	1931	41
19.	Tamil Nadu	Coimbatore South	Tunacadavu	1930	42
20.	Tamil Nadu	Coimbatore South	Tunacadavu	1930	42
21.	Tamil Nadu	Mudumalai	Kargudi	1925	56
22.	Tamil Nadu	Mudumalai	Kargudi	1925	56
23.	Tamil Nadu	Mudumalai	Kargudi	1925	56
24.	Tamil Nadu	Mudumalai	Kargudi	1925	56
25.	Kerala	Nemmara	Tunacadavu	1944	36
26.	Kerala	Nemmara	Tunacadavu	1925	55
27.	Kerala	Nemmara	Tunacadavu	1944	36
28.	Kerala	Nemmara	Tunacadavu	1925	55
29.	Kerala	Nemmara	Tunacadavu	1944	36
30.	Kerala	Nemmara	Tunacadavu	1944	36
31.	Kerala	Nilambur	Nilambur	1925	54
32.	Kerala	Nilambur	Nilambur	1928	51
33.	Kerala	Nilambur	Nilambur	1911	68
34.	Kerala	Nilambur	Nilambur	1930	41
35.	Kerala	Nilambur	Nilambur	1943	36
36.	Kerala	Nilambur	Nilambur	1919	60

(Contd...)

1	2	3	4	5	6
37.	Kerala	Nilambur	Nilambur	1943	36
38.	Kerala	Nilambur	Nilambur	1943	36
39.	Kerala	Nilambur	Nilambur	1930	49
40.	Kerala	Nilambur	Nilambur	1930	49
41.	Kerala	Nilambur	Nilambur	1932	47
42.	Kerala	Nilambur	Nilambur	1930	49
43.	Kerala	Nilambur	Nilambur	1928	51
44.	Kerala	Nilambur	Karulai	1931	48
45.	Kerala	Nilambur	Karulai	1920	59
46.	Kerala	North Wynad	Begur	1930	49
47.	Kerala	North Wynad	Begur	1895	85
48.	Kerala	North Wynad	Begur	1917	63
49.	Kerala	North Wynad	Begur	1923	57
50.	Kerala	North Wynad	Begur	1923	57
51.	Karnataka	Haliyal	Dandeli	1871	109
52.	Karnataka	Haliyal	Dandeli	1871	109
53.	Karnataka	Haliyal	Dandeli	1871	109
54.	Karnataka	Haliyal	Dandeli	1871	109
55.	Karnataka	Haliyal	Virnoli	1928	52
56.	Karnataka	Haliyal	Virnoli	1928	52
57.	Karnataka	Haliyal	Virnoli	1928	52
58.	Karnataka	Haliyal	Virnoli	1928	52
59.	Karnataka	Haliyal	Virnoli	1952	28
60.	Karnataka	Haliyal	Virnoli	1952	28
61.	Karnataka	Haliyal	Virnoli	1952	28
62.	Karnataka	Haliyal	Virnoli	1952	28
63.	Karnataka	Haliyal	Kulgi	1928	52
64.	Karnataka	Haliyal	Kulgi	1929	51
65.	Karnataka	Haliyal	Kulgi	1929	51
66.	Karnataka	Shimoga	Arasalu	1926	54
67.	Karnataka	Shimoga	Arasalu	1926	54
68.	Karnataka	Shimoga	Sacrebyle	1936	44
69.	Karnataka	Shimoga	Sacrebyle	1936	44
70.	Karnataka	Chikmagalur	Balehonnur	1935	45
71.	Karnataka	Chikmagalur	Balehonnur	1937	43
72.	Karnataka	Chikmagalur	Balehonnur	1939	41
73.	Karnataka	Chikmagalur	Balehonnur	1939	41
74.	Karanataka	Bhadravati	Lakolli	1926	54
75.	Karnataka	Mysore	Kakankote	1927	53
76.	Karnataka	Mysore	Kakankote	1928	52
77.	Karnataka	Mysore	Kakankote	1942	38
78.	Karnataka	Mysore	Kakankote	1941	39
79.	Karnataka	Mysore	Kakankote	1942	38
80.	Karnataka	Mysore	Kakankote	1942	38

selection differential, phenotypic standard deviation and predicted genetic gain values.

Table 2
Mean-squares of three characters

Source of variation	df	Plant height	Bole height	DBH
Bn batches	79	4.853***	3.129**	4.581***
wn batches	400	0.239	0.579	0.293

, * significant at 1% and 0.1% levels respectively

Selection differentials were calculated by the formula $Xi\text{-}\bar{X}o$, where Xi is the plus tree value and $\bar{X}o$ is the mean of five comparison trees. The overall selection differential (at the end of the Table 3) was estimated by the same formula, $\bar{X}i\text{-}\bar{X}o$; where $\bar{X}i$ represents the mean of plus trees and $\bar{X}o$ the pooled mean of the comparison trees.

Phenotypic standard deviations were estimated as the standard deviations of six trees per batch and the pooled estimation, gave the overall standard deviation.

Heritability was estimated by the usual formula of $h^2 = \sigma^2g/\sigma^2p$,

where $\sigma^2p = \sigma^2g + \sigma^2e$.

Predicted genetic gain was estimated using the following formula (Singh and Chowdhary, 1979),

$R = i.h^2.\sigma p$, where,

i - is the standardised selection differential (some use the term 'k' instead of 'i' for the standardised selection differential).

h^2 - is the heritability, i.e. σ^2g/σ^2p

σ^2p being the phenotypic variance.

σp - is the phenotypic standard deviation.

The standardised selection differential values were obtained from Singh and Chowdhary (1979) as follows. In a single batch there were six trees and one out of six trees works out to be 16.66% or approximately 20% selection intensity. The standardised selection differential at 20% selection intensity was found to be 1.40.

The negative selection differentials in certain batches were due to the presence of water-holes or some such defects, when a codominant tree was selected for better growth and form.

It may be mentioned here that though the plus trees were originally selected on the basis of 1:500 to 1:1000, with a selection intensity of 0.2 to 0.1%, but the proportionate standardised selection differential was not used as the actual comparison is made with the five comparison tree values which formed the base population. Restricting the value of actual base population to the value of comparison trees not only allows us to select really superior phenotypes but also protects us from any overestimation of heritability. In fact, the population variability is so high that if we had used the value of actual base population, the predicted gain values would have been unrealistic. The values of comparison trees are superior than the base population and is therefore expected that a rigorous screening would give a sound footing to the estimated predicted gain for fulfilling the underlying promise.

Results and Discussion

The data on stem quality characters of

Table 3

Selection differential and predicted gain values.

Batch No.	Selected trees			Comparison tree mean			Selection differentia			Phenotypic Std. deviation			Predicted genetic gain		
	Ht	Cbl	Dbh	Ht	Cbl	Dbh	Ht	Cbl	Dbh	Ht	Cbl	Dbh	Ht	Cbl	Dbh
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	30.0	22.0	58.0	24.8	14.4	52.12	5.2	7.6	5.88	2.6246	3.8816	2.5605	3.4936	4.4289	3.3553
2	28.0	20.0	51.2	27.0	13.2	44.92	1.0	6.8	6.28	1.1690	4.1312	3.5781	1.5561	4.7137	4.6887
3	31.0	20.0	32.0	25.4	15.2	55.92	5.6	4.8	3.52	3.2659	3.0332	12.9373	4.3472	3.4609	16.9530
4	32.0	20.0	47.5	25.8	14.2	45.50	6.2	5.8	2.00	2.9269	3.0605	1.4052	3.8959	3.4920	1.8414
5	27.0	18.0	42.0	24.9	11.3	54.56	0.9	6.7	-12.56	1.2145	3.1530	7.2207	1.6166	3.5975	9.4620
6	29.0	18.0	47.2	24.8	12.8	47.58	4.2	5.2	-0.36	2.3452	3.2042	4.9278	3.1217	3.6559	6.4574
7	27.5	19.0	42.4	27.1	9.1	49.08	0.4	7.9	-6.68	0.8756	4.4017	5.8779	1.1655	5.0223	7.7024
8	27.5	16.0	40.2	26.2	9.3	43.28	1.3	6.7	-3.08	0.6646	3.0400	2.8994	0.8846	3.4686	3.7994
9	27.0	16.0	48.6	28.0	9.4	49.56	-1.0	6.6	-0.96	0.7528	3.4496	3.1699	1.0021	3.9355	4.1539
10	29.0	20.0	41.2	24.2	11.8	35.64	4.6	8.2	5.56	2.3664	3.8166	3.5223	3.1499	4.3547	4.6156
11	31.0	15.0	42.2	28.2	13.4	41.92	2.8	2.1	0.28	2.2509	2.8592	5.1059	2.9962	3.2623	5.6908
12	26.0	18.0	43.2	25.9	10.1	47.08	-0.1	8.0	-3.88	1.4972	4.7793	3.1328	1.9929	5.4532	4.1052
13	29.5	18.0	40.0	28.6	13.0	45.92	0.9	5.0	-5.92	1.4053	2.6394	4.2552	1.8706	3.0116	5.5760
14	28.0	19.5	40.0	25.11	13.2	38.80	2.9	11.3	1.20	1.8552	3.9969	5.9168	2.4695	4.5605	7.7534
15	33.0	22.5	54.2	29.6	11.0	47.36	3.4	11.5	6.84	2.4833	4.9032	4.0924	3.3055	5.5946	5.3627
16	32.0	20.0	51.6	27.8	11.4	45.48	4.2	8.6	6.12	2.8107	4.1673	5.7156	3.7413	4.7549	7.4897
17	32.0	18.0	55.5	30.8	11.2	45.20	1.2	6.0	10.48	2.0976	3.0111	5.8987	2.7921	3.4357	7.7297
18	30.0	16.5	53.0	27.4	12.2	39.48	2.6	4.3	13.52	1.4719	2.2895	6.9012	1.9592	2.6123	9.0433
19	31.0	20.0	49.4	28.6	14.0	46.28	2.4	6.0	3.12	2.0976	2.9665	5.3126	2.7921	3.3048	6.9616
20	28.0	19.0	36.0	26.4	12.4	41.68	1.6	6.6	-5.68	1.6329	3.5071	5.7336	2.1736	4.0016	7.5133
21	18.8	7.5	44.7	18.5	6.7	38.96	0.3	0.8	5.74	0.9607	2.2286	3.7403	1.2788	2.5428	4.9013
22	25.5	12.5	45.2	19.1	5.1	40.92	6.4	7.4	4.28	4.1118	3.7372	3.7745	5.4732	4.2641	4.9461
23	22.0	11.0	43.3	19.2	8.4	33.90	2.8	2.6	9.40	1.3292	1.6329	6.3181	1.7693	1.8631	8.2792
24	26.0	13.0	48.1	21.8	9.4	38.00	4.2	3.6	10.10	2.1679	3.1464	6.1927	2.8857	3.5900	8.1149
25	28.5	15.5	46.8	21.2	9.6	40.36	7.3	5.9	6.44	3.8002	2.5183	2.8161	5.0584	2.8734	3.6902
26	26.5	15.0	57.3	21.0	8.7	49.60	5.5	6.3	7.70	2.5183	3.8955	5.1990	3.3521	4.4448	6.8128
27	24.5	13.0	48.7	22.6	10.5	45.26	1.5	2.5	3.44	1.8819	2.5380	4.9444	2.5050	2.8959	6.4791

(Contd...)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
28	27.5	13.5	58.6	21.5	9.5	54.12	5.7	4.0	4.48	2.5642	3.1252	7.1115	3.4132	3.8659	9.3193
29	30.0	17.0	42.7	22.6	11.2	39.80	7.4	5.8	2.90	4.2269	2.6882	6.4914	5.6264	3.0672	8.5063
30	26.3	15.5	44.4	23.2	12.1	41.02	3.1	3.4	3.38	2.1785	2.6957	3.5533	2.8998	3.0758	4.6562
31	35.0	20.0	64.4	26.5	12.2	56.38	8.5	7.8	8.02	8.0400	3.3912	11.2339	10.7020	2.2820	14.7209
32	34.0	22.0	50.8	32.1	15.3	53.60	1.9	6.8	-2.80	1.7600	2.9053	7.1006	2.6089	3.3152	9.3046
33	36.5	22.0	56.3	31.0	20.4	70.18	5.5	3.6	16.12	3.7204	3.0332	9.5897	4.9522	3.4609	12.5663
34	35.0	20.0	73.9	35.1	14.8	56.96	-0.1	5.2	16.94	1.6253	2.4221	8.9276	2.1634	2.7636	11.6987
35	27.5	15.0	49.5	28.3	9.6	40.92	-0.8	5.4	8.58	2.7325	3.8842	7.6967	3.6372	4.4319	10.0858
36	36.0	19.0	73.8	30.8	13.4	65.26	5.2	5.6	8.54	4.4572	3.5023	7.5414	5.9329	3.9961	9.8826
37	28.0	13.0	46.0	26.1	10.5	37.10	1.5	2.5	8.90	1.6568	1.2813	6.9617	2.2054	1.4619	9.1226
38	35.0	20.0	54.9	28.0	15.2	40.16	7.0	4.8	14.74	2.9439	3.0166	7.3592	3.9186	3.4419	9.6435
39	36.5	19.0	67.1	36.1	13.9	56.96	0.4	5.1	10.14	0.4083	2.5249	6.7043	0.5435	2.8809	8.7853
40	38.0	22.0	50.4	34.4	15.0	54.82	3.6	7.0	-4.42	3.5777	4.7924	8.4530	4.7623	5.4681	11.0768
41	32.0	18.0	43.3	35.4	14.7	51.86	-3.4	3.3	-8.56	1.7512	1.6658	6.7444	2.3310	1.9007	8.8379
42	35.5	22.0	47.4	33.0	14.2	45.16	2.5	7.8	2.24	1.3934	4.0373	5.4928	1.8548	4.6066	7.1978
43	30.5	18.5	55.4	31.9	13.6	46.24	-1.4	4.9	9.16	1.9916	3.7339	4.4392	2.6510	4.2604	5.8171
44	33.5	17.0	54.8	23.6	14.0	39.72	5.1	3.0	15.08	2.7157	3.1464	7.0780	3.6149	3.5900	9.2750
45	35.0	23.0	70.6	33.4	15.1	66.80	1.6	7.9	3.80	1.5055	4.3407	3.5007	2.0033	4.9527	4.5673
46	27.0	10.6	51.7	22.7	9.4	42.66	4.9	1.2	9.04	2.8729	3.1023	6.1896	3.8241	3.9399	8.1109
47	36.9	15.0	82.7	32.8	15.4	67.74	4.1	-0.4	14.96	2.0894	2.4771	9.6854	2.7012	2.8264	12.6917
48	27.0	14.4	52.3	22.9	8.8	58.86	4.1	5.6	-6.56	2.4441	2.6440	12.0740	3.2533	3.0168	15.8218
49	25.4	10.5	51.4	22.4	6.7	46.28	3.0	3.8	5.12	2.0363	2.7235	5.7451	2.7105	3.1075	7.5284
50	25.6	15.0	52.5	22.9	9.6	46.08	2.7	5.4	6.42	2.1554	2.6676	9.4949	2.8691	3.0437	12.4421
51	25.0	11.5	43.9	19.9	8.2	36.62	5.1	3.3	7.28	3.2673	2.5049	6.8225	4.3491	2.8581	8.9402
52	25.0	15.0	39.2	22.3	10.4	40.88	2.7	4.6	-1.68	1.7209	4.5240	11.2239	2.2907	5.1619	14.7078
53	20.0	12.5	30.2	17.8	7.3	34.96	2.2	5.2	-4.76	1.9149	2.6164	6.2089	2.5489	2.9853	8.1361
54	23.2	15.5	35.0	20.8	8.6	36.94	2.4	6.9	-1.94	1.2728	3.1741	5.7839	1.6942	3.6216	7.5792
55	24.5	10.5	43.6	21.5	8.6	32.54	3.0	1.9	11.06	2.1679	1.4634	8.4388	2.8857	2.8033	11.0582
56	28.0	14.0	35.7	22.6	9.1	33.44	5.4	4.9	2.26	3.1937	2.5577	5.9294	4.2511	2.9183	7.7699
57	31.0	14.0	41.0	26.8	12.0	38.00	4.2	2.0	3.00	3.0984	1.5381	5.3318	4.1243	1.7553	8.2972
58	27.0	13.0	40.1	24.1	11.3	32.58	2.9	1.7	7.52	2.4983	1.9093	5.4268	3.3255	2.1773	7.1113
59	21.5	13.8	30.2	18.1	9.6	27.54	3.4	4.2	2.66	1.8641	2.2518	2.1904	2.4813	2.5693	2.8703
60	23.0	17.0	33.4	18.6	10.2	30.02	4.4	6.8	3.38	1.8601	3.5099	5.1406	2.4759	4.0050	6.7362
61	22.5	13.5	35.0	20.1	11.2	29.80	2.4	2.3	5.20	1.6473	1.5540	3.8182	2.1927	1.7731	5.0034

(Contd...)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
62	20.8	12.5	31.8	17.7	11.7	27.50	3.1	0.5	4.34	2.2284	1.7111	2.7462	2.9662	1.3519	3.5986
63	24.0	13.0	32.5	18.3	8.7	24.26	5.7	4.3	8.24	3.0290	4.1954	3.9006	4.0319	4.7870	5.1113
64	21.0	14.0	31.8	19.4	9.1	29.94	1.6	4.9	1.86	2.3805	2.6157	1.3248	3.1687	2.9845	1.7360
65	25.0	8.5	36.6	20.8	7.0	29.42	4.2	1.5	7.18	2.4495	3.0455	7.7414	3.2605	3.4749	10.1443
66	26.5	14.8	46.2	19.6	7.0	37.12	6.9	7.8	9.08	3.0024	3.4409	6.9724	3.9965	3.9261	9.1366
67	25.8	12.3	54.1	21.7	7.7	48.62	4.1	4.6	5.48	2.2319	3.5375	9.7140	2.9709	4.0363	12.7292
68	19.6	11.8	33.4	16.3	8.4	29.22	3.3	3.4	4.18	3.6779	3.1653	9.8242	4.8956	3.6116	7.6320
69	19.5	12.3	39.8	20.2	9.9	29.56	-0.7	2.4	10.24	1.7694	2.9620	5.2496	2.3552	3.3796	6.8791
70	25.0	12.5	38.2	22.7	7.1	36.04	2.3	5.4	2.16	2.8358	2.8983	5.8784	3.7747	3.3070	7.7031
71	29.0	16.5	43.0	25.1	11.7	41.44	3.9	4.8	1.56	6.4323	4.0125	3.8647	8.5620	4.5783	5.0643
72	23.8	15.0	34.4	23.1	4.2	28.80	0.7	10.8	5.60	2.3097	4.5897	8.2102	3.0744	5.2368	10.7586
73	27.5	11.0	38.2	24.8	9.3	30.26	2.7	1.7	7.94	1.6956	1.1143	4.6910	2.2570	1.2714	6.1471
74	31.3	12.8	57.6	24.6	12.0	47.88	6.7	0.6	9.72	3.1758	2.1550	10.0102	4.2273	2.4589	13.1174
75	21.5	13.2	40.4	19.6	8.4	33.26	1.9	4.8	7.14	1.0968	2.3401	3.3261	1.4599	2.6701	4.3585
76	17.6	8.8	38.2	14.8	6.1	25.30	2.8	2.7	12.90	3.2396	1.8651	7.0975	4.3122	2.1281	9.3006
77	23.6	11.8	44.6	18.0	6.6	31.18	5.6	5.2	13.42	3.5399	2.8640	8.5326	4.7119	3.2678	11.1811
78	25.0	11.8	31.8	15.5	7.4	23.12	9.5	4.4	8.68	5.3635	2.9084	8.3217	7.1394	3.3185	10.9048
79	20.6	13.2	33.4	17.7	9.8	25.72	2.9	3.4	7.68	2.2196	1.5118	4.0728	2.9545	1.7250	5.3370
80	19.1	8.8	43.0	14.6	7.0	23.42	4.5	1.8	17.58	2.8247	2.1509	8.0579	3.7599	2.4542	10.5591
Mean	27.64	15.0	46.88	24.3	10.77	42.0	3.3	4.23	4.88	1.1999	0.8901	2.4204	1.5972	1.0156	3.1717

plus trees and comparison trees and the predicted gain values are given in Table 3. The selection differentials between plus trees and the mean of comparison trees of 80 batches are also given in the same table, owing to the separate nature of data in each plantation area. Plus trees from Nemmara, Kerala, 1944 plantation, and, plus trees from Arasalu, Shimoga, Karnataka, 1926 plantation show much promise. Their batch numbers as per Table 1, are 25, 31 and 66. In these three cases, the selection differentials for the three characters are more or less of similar magnitudes and quite a good amount of gain can also be predicted over the other superior types. The highest selection differential for individual tree here was observed to be 8.5 for height, 11.5 for cbl and 17.58 for dbh, for batch numbers 31, 15 and 80 respectively. The varying magnitudes of selection differentials among different characters clearly defines the variable genetic control inspite of reported correlations among the characters. Similarly, the maximum predicted gain for height was observed to be 10.7, 5.59 for cbl and 16.95 for dbh. In view of the above an effective selection may therefore improve the stem quality. This supposition is based on the results from the top 5% of the batches where the height ranges from 38.0 m to 36.0 m, for cbl 24.0 m to 22.0 m and for dbh it ranged from 86.3 cm to 73.8 cm. It is evident that values of the upper 5% lot for the three characters are far superior and the expected genetic value from the best 5% of the batches are likely to exceed the general mean.

It is essential to know the selection differential and genetic gain concepts before exercising selection in commercial tree species; and genetic gain is simply the product of selection differential and heritability. Therefore, the rate of tree improvement can be increased or decreased by influencing the selection differential or heritability, or by reducing the total variance. The gain thus achieved from plus trees can immediately be realised through mass scale clonal propagation by vegetative means for general plantation purposes and further gains can be achieved subsequently by progeny selections and selective breeding.

It may be concluded that, (1) the stem quality character variabilities were high; (2) heritabilities of individual traits were high; and with a selection intensity of 20%, the genetic gain as estimated, is expected to be realised on selection.

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SUMMARY

In a study of 80 batches of teak trees, selection differential and predicted genetic gain values were estimated. This involved individual character variation analysis, estimation of heritability and computation of predicted gain values. Predicted gain values were estimated for individual batches along with an overall estimate. Some individual batch values (predicted gain) were found to be higher and the upper 5% values of overall batches were substantially high than the overall mean-estimate of the predicted gain values. This along with 20% selection intensity, significantly different mean-square values and high heritability assure shifting of the mean towards the direction of selection. The batches with higher predicted gain values were indicated for use in the mass clonal multiplication programme and also for further selective breeding and improvement.

चयन भेद और *टैक्टोना ग्रांडिस* के पूर्व कथित आनुवंशिकीय लाभ

एस०के० बाग्ची

सारांश

सागौन वृक्षों की 80 टोलियों के अध्ययन से चयन भेद और पूर्व कथित आनुवंशिक लाभ अर्हाओं का आकलन किया गया। अध्ययन में व्यष्टिगत चरित विभिन्नता का विश्लेषण, पित्रागति का अनुमान और पूर्व कथित लाभ अर्हाओं का संगणन करना पड़ा। समग्र आकलन के साथ-साथ प्रत्येक टोली की पूर्व कथित लाभ अर्हाओं का आकलन करना पड़ा। व्यष्टिगत टोलियों की कुछ (पूर्व कथित लाभ) अर्हाएं तो काफी अधिक पाई गई और समग्र टोलियों की 5% से ऊपर की अर्हाएँ तो पूर्व कथित लाभ अर्हाओं के समग्र माध्य अनुमान से काफी ज्यादा थी। यह 20% चयन चण्डता, काफी भिन्न माध्य वर्ग अर्हाओं और अधिक पित्रागति साथ लेने पर माध्य का चयन की दिशा में हटते जाना सुनिश्चित बना देता है। अधिक पूर्व कथित लाभ अर्हाओं वाली टोलियाँ विस्तृत कृन्तकीय बहुलन कार्यक्रम में व्यवहार करने तथा आगे के चयन प्रजनन और परिष्कार कार्यों में उपयोग के लिए सूचित की गई हैं।

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Snippets DATA BASE

A new database, a Forest of Choices : The guide to sustainable use of Forests, contains reference information including articles, papers, proceedings, books, news items, photographs, and video. The database holds 3,000 pages of information and 2 hours of video on current issues including forest management, wood certification, green business, non-timber forest products, tropical forests and sustainable design. Cost is $ 150 for CD or diskette versions. For more information contact Tree Talk, Inc. P.O. Box. 426, 431 Pine St., Burlington, VT 05402 (USA). Fax 8002-863-4344.

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