SITE INDEX CURVES FOR CHIR PINE (*PINUS ROXBURGHII*)

by

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INTRODUCTION

Growth or yield is a function of age, stand density and site quality. Foresters working in the field require data on site quality as a measure of productivity to aid in planning and management. Site quality, being the net result of the complex interaction of environmental factors finds its expression in the volume increment of the stands supported by the area. An easier and quicker index for expressing the site quality is the raltive height growth as a function of age. This is closely related with the ultimate measure of site quality i. e. volume and is only slightly affected by the stand density (5,10). *In over stocked and stagnated young stands height may not be the proper measure of the index but still it is generally accepted for the sake of convenience. It is also considered to be a reasonable numerical expression for the productive capacity of the site and remains almost unaffected by minor variations in the past treatments* (3,9,12, 15).

METHOD AND PROCEDURE

The basic data utilized in this study were collected during 1970-71 from 73 yield plots of chir pine (*Pinus roxburghii*) laid in Hazara and Swat chir forests. The plots were selected in accordance with the standards laid down for the purpose (5, 7) representing various localities and age classes. Thus the data utilized for this study fairly cover variations in these forests.

One tallest tree per plot growing within a width of 50'-60' from the periphery of the plot representing the average age and diameter was felled and cut at 10' intervals from breast height upwards. The age at each section was determined and corrected for the ground age through seedling age—height relationship for the localities involved.

The stem analysis method was adopted for determining site index in preference to the old method (11) of constructing the site curves on the basis of age and total height of 5 to 8 dominant/codominant trees in each plot because the means in that case do not represent

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the same trees at different ages (5). The stem analysis method does not require a pre-established height age relationship for a particular site and this can be taken as an other advantage of the method. Although this method of data collection is more laborious, the better reliability expected in the values of site index would fairly compensate for the concerted efforts made in this regard (5, 16). Because of its obvious advantages Carron (3) and Heger (8) have favoured this method.

The guiding or directing curve method as described by Bruce and Schumacher (2) and termed as 'harmonized or anamorphic site index technique' by Carron (3) was followed for the preparation of site index curves. Average heights for 10 year age classes were plotted against mean age and a 'master curve' called average site index curve was fitted. Then using curved height coefficient of variation and 50 years base age (Fig. 1) a family site index curves (Fig. 2) were prepared.

RESULTS AND DISCUSSIONS

The guiding curves represent site index in intervals of 10 site index units from 50 to 100. To determine the site index of a place first calculate the mean age and height of 10 to 15 evenly distributed dominant trees per compartment and then plot the values on the site curves (Fig. 2). If the mark lies on one of the lines the locality has the site index represented by the line. When the mark falls in between two guiding lines the site index would be in between the indices represented by the lines and can be established by proportion.

The site index established in this way will be the average site index of the stand since it is based on the average values of heights of dominant trees. The curves were constructed on the basis of the individual tallest trees thus some negative bias is likely to occur in the index values.

Though the data utilized in the preparation of these curves come from all the ages and sites it is not evenly distributed since the number of plots in various age classes is unequal as indicated in Table 1.

Notwithstanding these limitations, these curves in the absence of any other standard would serve as a good indicator for differentiating site qualities in the chir zone. Sample plots have been classified according to their site indices in the light of results obtained from the investigation and their distribution by site index is given in Table 1.

For the convenience of field workers Table 2 has been prepared to get the site index values readily available for various age-height and diameter-height classes.

TABLE-I

Distribution of sample plots by age and site index.

Age (Class) (years)	Site Index over 100	91-100	81-90	71-80	61-70	51-60	Total
			Number of plots				
11-20				1	2	1	4
21-30					1		1
31-40	2	4	9	2	1		18
41-50		4	9	3	2	1	19
51-60			5	2			7
61-70		2	2	4	2		10
71-80				3	2		5
81-90			2	1	2	2	7
91-100			1	1			2
Total :	2	10	28	17	12	4	73

TABLE 2.

Site index by age (with corresponding diameter class) and height classes.

Height class (feet)	Age class (years) with diameter class in inches in brackets								
	10—20 (3.1—6.0)	21—30 (6.1—9.0)	31—40 (9.1—12.0)	41—50 12.1—14.6)	51—60 (14.7—17.2)	61—70 (17.3—19.8)	71—80 (19.9—22.0)	81—90 (22.1—24.0)	91—100 (24.1—26.0)
	Site Index								
10—15	50								
16—20	60								
21—25	60	50							
26—30	70	50							
31—35	80	60	50						
36—40	80	70	50						
41—45	90	70	60	50					
46—50	100	80	60	50					
51—55	100	80	70	60	50				
56—60		90	70	60	50				
61—65		100	80	70	60	50			
66—70		100	90	70	60	50	50		
71—75			90	80	70	60	50	50	
76—80			100	80	70	60	60	50	50
81—85			100	90	80	70	60	60	50
86—90				90	80	70	70	60	60
91—95				100	90	80	70	70	60
96—100					90	80	80	70	60
101—105					100	90	80	70	70
106—110					100	90	80	80	70
111—115						100	90	80	80
116—120						100	90	90	80
121—125							10	90	80
126—130							100	90	90
131—135								100	90
136—140								100	100
141—145									100

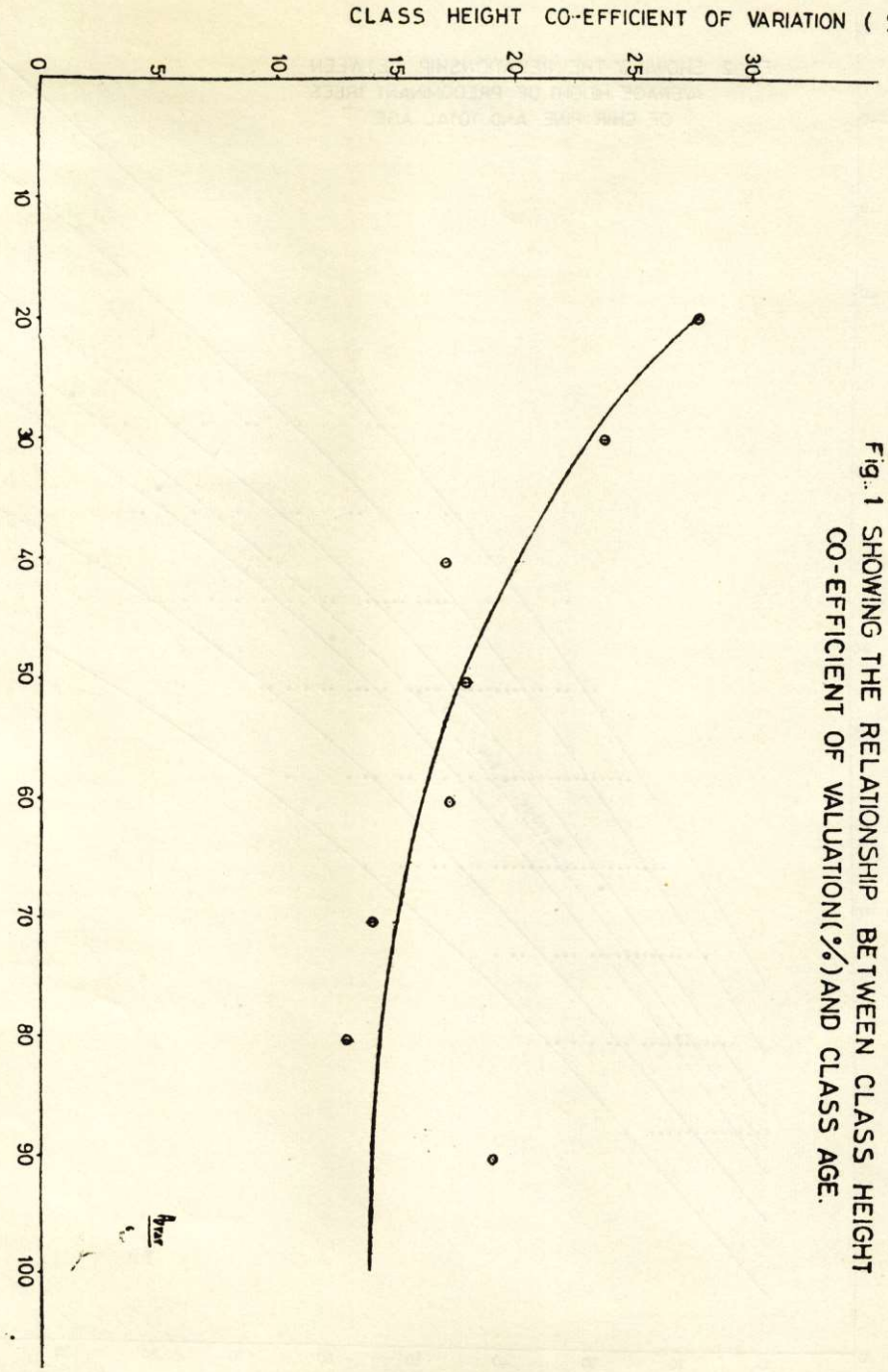

Fig. 1 SHOWING THE RELATIONSHIP BETWEEN CLASS HEIGHT CO-EFFICIENT OF VALUATION(%) AND CLASS AGE.

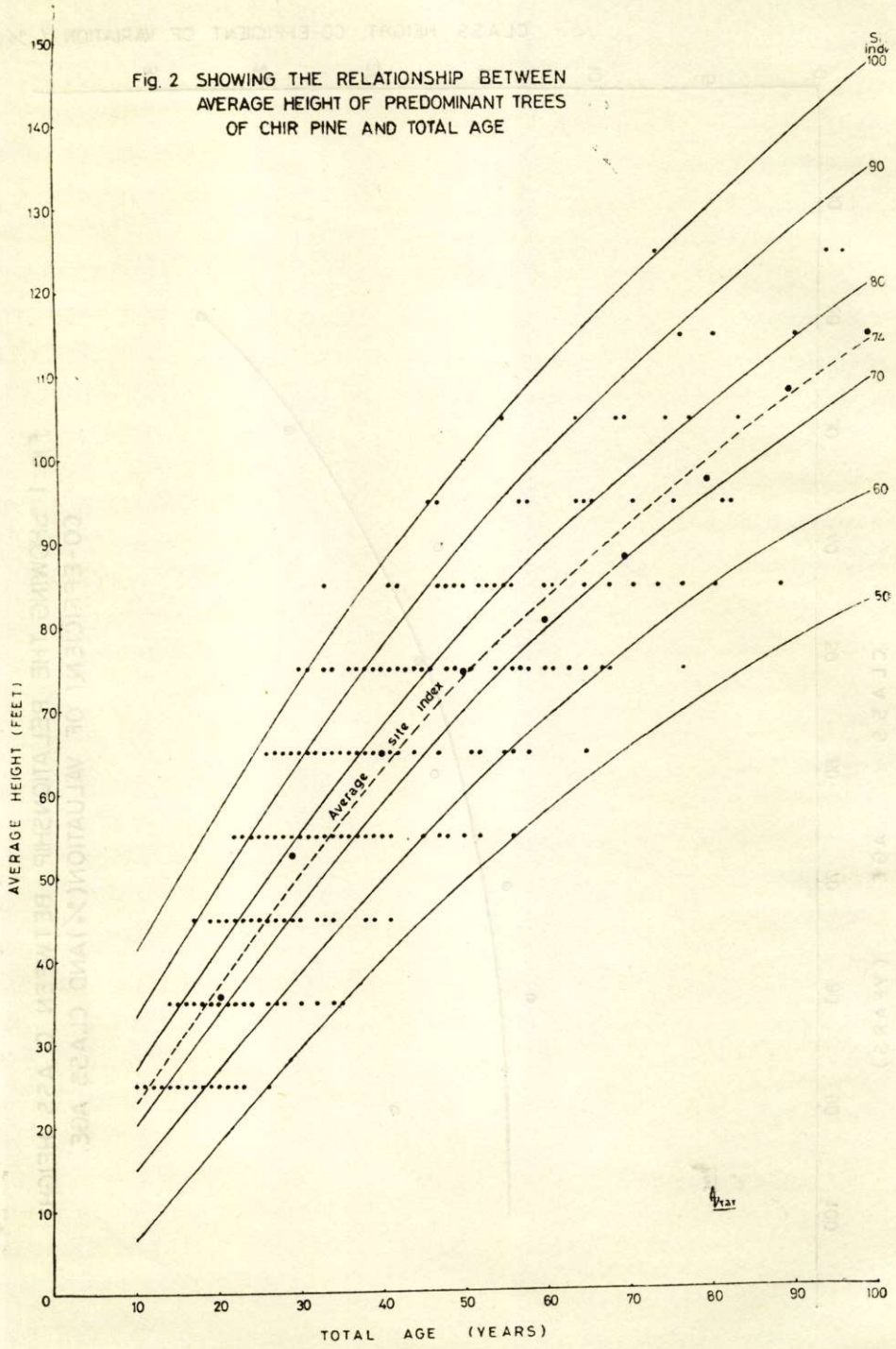
Fig. 2 SHOWING THE RELATIONSHIP BETWEEN AVERAGE HEIGHT OF PREDOMINANT TREES OF CHIR PINE AND TOTAL AGE
AVERAGE HEIGHT (FEET)
TOTAL AGE (YEARS)
Average site index
S. indv
100
90
80
70
60
50
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

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