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林分 代表値 測定을 위한 플롯크기에 關한 硏究(II)[1]

-6年生 잣나무 人工林을 對象으로-

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Studies on Research Plot Size for Some Characters (II)[1]

-Application to the 6-year-old Korean Pine Plantation-

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要 約

6年生 잣나무 造林地에 있어서 林分의 代表値 測定을 위한 適正 플롯의 크기를 調査分析하였는 바, 樹高에 대하여는 0.04 ha 크기의 플롯이, 胸高直徑에 대하여는 0.08ha 크기의 플롯이 적합하였다.

ABSTRACTS

The analysis of data about the 6-year-old Korean pine plantation was done in order to decide the suitable plot size for the survey on several stand characters. The plot size of at least 0.04 ha was recommendable for the investigation of height; but the size of 0.08ha for D.B.H. and for crown width.

Key words: plot size; Korean pine; stand characters.

INTRODUCTION

When it comes to forest inventories or research execution in forest science, we are usually at a loss for what size of plot is the most adequate one statistically and logically as well as economically. Plots must be large enough to represent the real stand characters. They should be made so small enough to minimize cost, in addition to acquiring the research objectives proposed.

As introduced by Yi and Woo (1983), the minimum adequate plot size was investigated for some stand characters of about 12-year-old Korean pine stands.

It is assumed that age and species, of a certain forest are really related to the plot size of research for that forest. It is natural that the older age class is needed the bigger plot size. Research on even-aged stand definitely requires smaller plots than on uneven-aged stand, if they are of the same species. Also the size of plot depends upon whether or not the stand is pure. Even if both stands are of an age class, the researcher is to establish the plots of different size for each stand when they are different from each other in the composition of species.

This study was to determine the most adequate

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plot size before the forest investigation in even-aged Korean pine plantation.

METHODS

The plantation surveyed was composed of 6-year-old Korean pine and located in the Experiment Forest, College of Forestry, Kangweon National University. The quadrat size and arrangement were shown in Fig. 1. The quadrat was divided into 25 subplots, so that one subplot was composed of 0.01 hectare (Fig. 1). The data used in this paper was collected from the information of all subplot which was measured by Han & Yi (1982). The plot sizes in data analysis were randomly ranged from 0.01 to 0.12 hectare within 25 subplots. The 0.01-ha quadrat was used for 25 subplots. The 0.02-ha plot was chosen by randomly selecting two contiguous subplots. The 0.04-ha plot was chosen by randomly selecting of four adjoining subplots. This procedure was repeated in 0.02 hectare interval, so that the subplots were neighboring or non-neighboring.

The data used in statistical analysis was the diameter at breast height (D.B.H.), height (H), crown width both wide (W) and narrow (N), and sum of basal area per hectare (B.A.). In this paper, the most adequate plot size in stand investigation was only determined by the values of coefficient of variation approached first steady state as the methods of Freese (1961), Murpy & Farrar (1981), and Yi & Woo (1983).

RESULTS AND DISCUSSION

Means and standard deviations were shown for each character by plot size in Table 1. There is small difference in each mean by plot size. The coefficient of variation (CV) is also calculated for every character as shown in figures 2, 3, and 4. The trends in the CV showed differences according to the variable being measured. The CV for D.B.H. varied from 33 to 48 percent (Fig. 2). It showed the minimum at 0.01 ha plot size. And abrupt increase or decrease in plot sizes, 0.02 to 0.06 ha, resulted in a stabilization at the CV of about 37 percent. Variation of CV in height was nearly stable over the entire range of plot sizes (Fig. 2). Crown width stabilized over 0.08 ha plot sizes both in narrow (N) and wide (W) width (Fig. 3). . Unlike the variables mentioned before, sum of basal area per ha was not possible to recognize the reasonable trend up to the plot size of 0.12 ha (Fig. 4). This is much different from the CV's of the three previous variables, in that

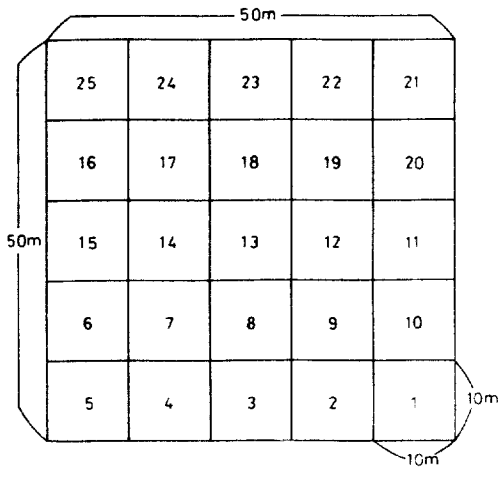

Fig. 1. Quadrat size and arrangement.

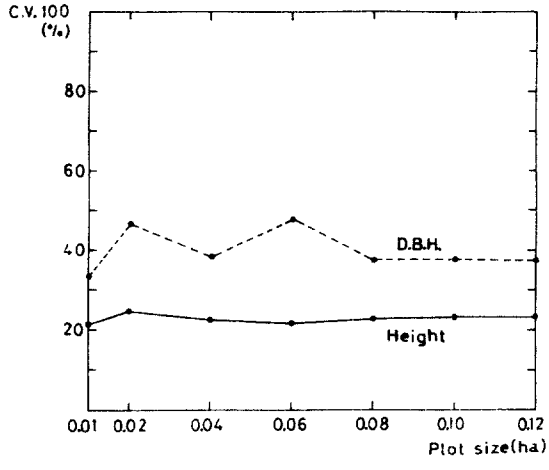

Fig. 2. The coefficients of variation for the D. B. H. and height by plot size.

Table 1. Means, standard deviations, and standard errors of the variables by plot size in Korean pine plantation.

Variable	Plot size (ha)						
	0.01	0.02	0.04	0.06	0.08	0.10	0.12
Calculated plots	25	40	36	24	16	8	12
Calculated trees	546	1600	2890	2960	2604	1591	2950
			Means				
D. B. H. (cm)	2.02	2.05	2.00	2.00	1.98	2.01	1.97
Height (m)	1.87	1.89	1.85	1.90	1.85	1.86	1.84
Crown width (W) (m)	1.44	1.44	1.43	1.43	1.46	1.44	1.42
Crown width (N) (m)	1.45	1.45	1.44	1.44	1.42	1.44	1.42
Basal area (m^2/ha)	)3.68	3.64	3.60	3.48	3.56	3.65	3.52
			Standard deviations				
D. B. H. (cm)	0.67	0.96	0.76	0.96	0.74	0.76	0.74
Height (m)	0.40	0.47	0.42	0.41	0.42	0.43	0.43
Crown width (W) (m)	0.37	0.42	0.39	0.44	0.42	0.40	0.40
Crown width (N) (m)	0.36	0.45	0.41	0.50	0.38	0.39	0.38
Basal area (m^2/ha)	2.35	2.47	2.57	2.53	2.65	2.83	2.79
			Standard errors				
D. B. H. (cm)	0.029	0.024	0.014	0.018	0.015	0.019	0.014
Height (m)	0.017	0.012	0.008	0.008	0.008	0.011	0.008
Crown width (W) (m)	0.016	0.011	0.007	0.008	0.008	0.010	0.007
Crown width (N) (m)	0.015	0.011	0.008	0.009	0.007	0.010	0.007
Basal area (m^2/ha)	0.100	0.062	0.048	0.047	0.052	0.071	0.051

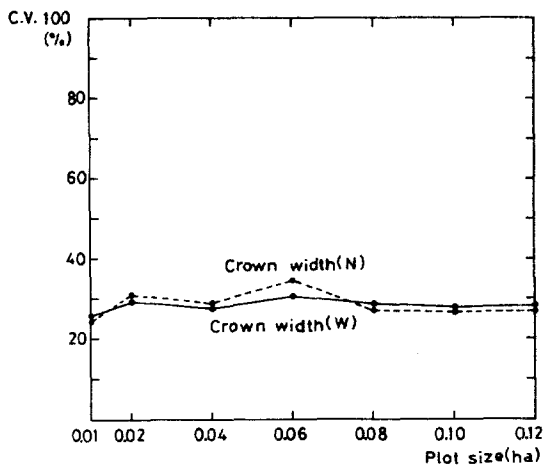

Fig. 3. The coefficients of variation for the crown width both wide (W) and narrow (N) by plot size.

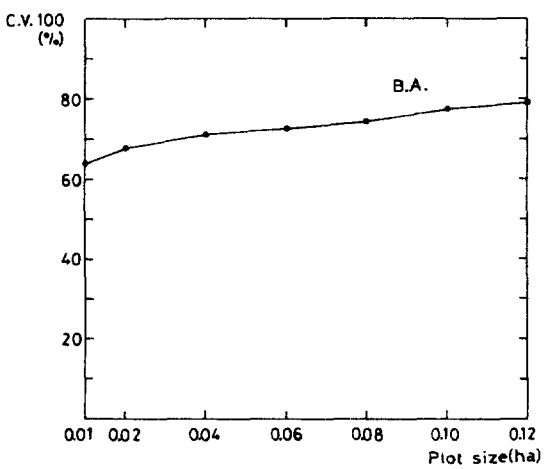

Fig. 4. The coefficients of variation for the sum of basal area per ha by plot size.

they stabilized in the plot sizes of 0.04 and 0.08 ha.

Murphy and Farrar (1981) indicated that a plot size of 0.75 to 1 acres (about 0.30 to 0.41 ha) in size is recommendable for studies in uneven-aged loblolly-shortleaf pine stands. They also said that this is well agreed with result of G. B. Wood, that plot sizes of 0.75 to 1 acres are needed in well-designed thinning experiments in heterogeneous tropical forests. But it is also pointed

out that in even-aged stands plot sizes of 0.1 to 0.25 acres (0.04 to 0.10 ha) have been regarded sufficiently large, if following G. B. Wood.

In the former study (Yi and Woo, 1983) the plots of 0.04 and 0.06 ha were recommended for some stand characters. It was investigated on the 12-year-old Korean pine plantation. According to that result, the plot of 0.06 ha was recommended for sum of basal area per ha in the 12-year-old stand. But this study does not show the recognizable trend in this trait. The further study is needed about the survey on it.

In summary, if we are required to investigate the characters of Korean pine stand whose age is 6 or so, it is advisable to set up a plot of at least 0.04 ha in size for height. But when it comes to the investigation of d.b.h. or crown width, it is rather reasonable to set up a plot of 0.08 ha in size. Thus the investgation of larger plot size than above mentioned is regarded as timesaving and economical loss.

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