LEAF-LITTER PRODUCTION IN PLANTATIONS OF CHAMAECYPARIS OBTUSA NEAR AN ELECTRIC POWER PLANT IN OWASE, MIE

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Synopsis


In the previous paper, it was reported that the leaf mass of the two sample plots (A and B) located within the same basin as a power plant, was much smaller not only than the control plot (C) located outside of the basin, but also smaller than the values so far available of leaf mass of plantations of the same tree species. As a possible explanation, a smaller production of leaf and/or premature shedding of leaf can be considered. To find out which of them is more important, the leaf-fall was measured for 17 successive months on the three plots. There was hardly any difference in the seasonal pattern of leaf-fall among the three plots, while the amount of leaf-fall-in the plots A and B were much smaller not only than the plot C but also than the values of leaf-fall in plantations of this tree species so far available. The reason for the very small leaf mass of the plots in Owase Basin may be attributed to a smaller production of leaf, but not to a premature leaf-fall.

Results

Seasonal change of leaf-fall

As seen from Fig. 1, in 1972, most of the leaf-fall occurred in November and December. Of the annual leaf-fall from July 1972 through June 1973, about eight tenths were recovered in these two months. For 1973, as the recovering of litter ended on December 8 and 9 when sample trees were cut for the harvest method to estimate standing crop and increment of bole (SATOO 1972), data are not complete, but more than seven tenth of leaf-fall for the period from December 23, 1972, to December 8, 1973, occurred in these two months (Table 1). In September, 1972, 10, 5, and 9% of annual leaf-fall occurred in the plots A, B, and C, respectively. In this month, as shown by Table 2, a large quantity of green leaves was recovered together with dry leaves and the fall of twigs and branches was more than half of the annual fall. In 1973, this phenomenon did not occur. So, it was supposed to have been
caused by a windstorm in mid-September. In both 1972 and 1973, percentages of leaf-fall before November were slightly greater in the plots A and B than in the plot C (Table 1). Percentages of the fall of green leaves were also slightly greater in the plot A than in the plots B and C for both year (Table 3). However, these differences were too slight to suggest the occurrence of premature shedding of leaves to cause the difference in leaf mass

Table 1. Leaf-fall in November and December in percentage of total annual leaf-fall.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 23–Dec. 23, 1972 in the year</td>
<td>77</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>June 23, 1972 to June 23, 1973</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 23–Dec. 8, 1973 in the year</td>
<td>73</td>
<td>73</td>
<td>87</td>
</tr>
</tbody>
</table>

Table 2. Peculiarity of litter recovered in September 1972.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of green leaf in total leaf-fall, Sept. 1972</td>
<td>44</td>
<td>44</td>
<td>63</td>
</tr>
<tr>
<td>Percentage of litter recovered in Sept. 1972 in annual fall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>twig</td>
<td>67</td>
<td>69</td>
<td>62</td>
</tr>
<tr>
<td>bark</td>
<td>58</td>
<td>68</td>
<td>48</td>
</tr>
<tr>
<td>green leaf</td>
<td>39</td>
<td>30</td>
<td>54</td>
</tr>
<tr>
<td>dry leaf</td>
<td>6.6</td>
<td>3.3</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Table 3. Percentage of green leaf in annual leaf-fall.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1972–June 1973</td>
<td>12</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

among the plots as was reported in the previous paper (Sato 1979).

Annual leaf fall
As seen from Table 4, the amount of annual leaf-fall was greatest in the plot C and smallest in the plot A for both 1972 and 1973. In the plots A and B, the leaf-fall in 1973 was much smaller than in 1972, while in the plot C it was rather greater in 1973 than in 1972. In Fig. 2, the amount of annual leaf-fall in these plots are compared with the values so far available for plantations of this tree species. The values for the plots A and B, especially the values for the period from December 1972 through November 1973, were much smaller than the values

Table 4. Annual leaf-fall (t/ha-yr)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.71</td>
<td>0.83</td>
</tr>
<tr>
<td>B</td>
<td>2.05</td>
<td>1.09</td>
</tr>
<tr>
<td>C</td>
<td>2.46</td>
<td>2.74</td>
</tr>
</tbody>
</table>

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so far available while the value for the plot C was within the range of variation of the existing data, for both 1972 and 1973. The values of the plots A and B for 1973 was statistically considered as belonging to a different population.

Discussion

In the previous report (Satoo 1979), it was found that leaf mass of the plots A and B was much smaller than the plot C and were outside of the range of variation of the values so far available for plantations of this species, in both the values for summer and for winter. As possible reasons for the smaller leaf mass, smaller production of leaf and conspicuous premature shedding of leaf may be considered. As seen from Fig. 1, no clear difference in the pattern of seasonal change of leaf-fall was recognized and the percentage of leaf shed before the autumn was not much different between the two groups, the plots A and B and the plot C. Total annual leaf-fall in the plots A and B was not only smaller than the plot C, but also much smaller than the values so far available. From these findings, the smaller leaf mass in the plots A and B may be attributed to the smaller production of leaf, supposing that the leaf-fall is nearly equivalent to the annual production of leaf.

In this study, the difference between the two year was not great in the plot C but it was very large in the plots A and B. However, from this result, production of leaf in the plots A and B can not be said to be decreasing; fluctuation by year of leaf-fall is known to be rather large. According to Saito (1974), who measured litter-fall of a 40-year-old plantation of this tree species for six successive years, the values ranged from 1.97 to 4.06 t/ha.yr for leaf litter, and the number of years necessary for obtaining a reliable estimate of leaf-fall was five.

Kabaya et al. (unpublished) who observed leaf-fall on four plots within a 65-year-old plantation of this tree species with varying growth rate and leaf mass for three successive years, obtained a maximum spatial variation from 2.09 to 2.75 t/ha.yr in one of the years but for other two years it range from 2.32 to 2.45 and 2.02 to 2.12 t/ha.yr, respectively, and there was no significant difference by plot and by year. In another similar set of measurement it ranged from 2.86 to 3.59 t/ha.yr for six plots. These spatial variation are far smaller than the difference between the two groups of plots reported here.

In this study, the number of plots is not large enough since measuring the leaf-fall every month with many funnels is vary laborious. However, almost eight tenth of leaf-litter were produced in November and December. If only the comparison among the plots is desired, measurement could be simplified by collecting only leaf-litter in November and December together, though there is a possibility of loss of weight before collection (Kiritia & Hozumi 1969). The coefficients of variation of the amount of litter recovered by the twenty funnels for the period from September through December were so small (0.06 to 0.13) that the number of funnels necessary for an accurate estimation of leaf-fall is not large. More useful informations will be collected by using many plots with smaller number of funnels.

References


Tadaki, Y. & Kagawa, T. 1968. Studies on the production structure of forest. 13. Seasonal change of litter-fall in some evergreen stands, J. Jap. For. Soc. 50:
摘   要

前報（SATO 1979）で，大きな火力発電所のある三重県尾鷲の盆地のなかのヒノキ造林地の調査区（AとB）の葉の量が，山をへだたた海山町の同様な調査区（C）よりも，いちじるしくすくなかったのでなく，ほかのこれらまでに知られている値にくらべてもいちじるしくすくな

ことを報告した。葉の量がいちじるしくすくな理由として，葉の生産量がすくなかったため，葉が早く落ちるかの，いずれかあるいは両者が考えられるので，それをた

しかめるために，これらの調査区の落葉量をしらべた。落葉の季節変化のもとは区の間にめだった差はみられず，落葉の約8割は11月と12月におこった。年間の落

葉量はA，B両区ともにC区とくらべていちじるしくすくなかった。これまでに知られているヒノキ造林地の落葉量にくらべてもはなれてすくなかった。これらのことから，尾鷲にあ

る両区の葉の量がすくなないので，葉が早く落ちるためではなく，葉の生産量がすくな

いためであると考えた。