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短 報

Measurement of Litterfall in a Sugi (*Cryptomeria japonica*) Plantation by the Cloth-Trap Method*

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I. Introduction

In the preceding papers (*4, 5*), we reported that we measured the rates of litterfall of individual hinoki (*Chamaecyparis obtusa* S. and Z.) and Japanese larch (*Larix leptolepis* GORD.) trees by the cloth-trap method and analyzed rate dependency on tree size. This paper deals with the same matters for individual sugi (*Cryptomeria japonica* D. DON) trees and furthermore, the effect of cloth-traps on the growth of trees.

II. Materials and Methods

Measurements were made in a 16-year-old sugi plantation (as of 1986) of the Nagoya University Forest at Inabu, Aichi Prefecture. The study site in the plantation had a slope, exposure, altitude, area, density, mean tree-height, and mean stem-diameter at breast height (1.3 m above the ground) of 11°, N, 940 m above sea level, 190 m^2, 2,160 trees/ha, 8.37 m, and 11.43 cm, respectively, in April 1986. The trees on the study site had received a light pruning in 1981.

Litterfall rates of individual trees were measured monthly from June 1984 to June 1987 by the cloth-trap method (*4, 5*). Figure 1 is a schematic representation of the equipment.

Five trees were selected as sample trees on the study site. The general features of the sample trees are given in Table 1.

Before the start of this study, a survey of the arboreal arthropods using the smoking method was made for these sample trees (*1*).

Aboveground parts of the sample trees were enclosed by a litter-trap. The upper part of the litter-trap was made of cotton netting (20 meshes), and the lower part was made of plastic netting (33 meshes) to catch fine litter. The litter-trap was supported by a rope joined to the steel frame. The trap was pulled outward by several plastic ropes to prevent it from touching the sample tree.

The light transmissibilities of the cotton netting and the plastic netting were 82 and 86 %, respectively, before using for this study and 74 and 73 %, respectively, on July 1987, about 3 years after the start of the study.

All organic materials accumulating in the traps were collected monthly, air-dried, and sorted into three fractions: leaves, branches, and other litter. Because it was difficult to distinguish dead leaves from dead branches in the case of sugi, the dead leaves were defined as shoots for convenience whose diameters were less than 5 mm (*3*). Sorted litter samples were oven-dried at 85°C for 24 h and then weighed.

Tree height (H [m]), stem diameter at breast height (D [cm]), height of trunk at which the lowest living-branch was connected (H_B [m]), and stem diameter at H_B (D_B [cm]) of all trees on the study site were measured annually in April from 1984 to 1987.

In the sugi plantation near the study site, six trees were felled, and their organ biomasses, such as leaves, branches, and attached dead leaves, and so forth, were weighed in August 1985 to estimate the quantities of these parts contained on the sample trees being subjected to the cloth-trap method. These six trees were selected so as to include the range of D_S found on the study site.

III. Results

Annual litterfall-rates of the sample trees are shown in Table 2.

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The relationships between the annual and daily litterfall-rates (l, g/tree•yr and g/tree•day, respectively) and D [cm] were approximated by the following power-form equation:

$$l=a\cdot D^{b}, \qquad (1)$$

where a and b are coefficients determined for each litter component. Several examples are shown in Fig. 2. The exponent b in Eq.(1) for the annual litterfall-rates of leaves, other litter, and the total litter ranged between 2.2~4.4, 2.2~3.4, and 2.2~4.3, respectively.

Figure 3 shows the dependency of the annual litterfall-rates of leaves (l_L) and other litter (l_O) on the estimated weight of leaves (w_L [g/tree]) and of attached dead-leaves (w_{DL} [g/tree]) of the sample trees. The values of l_L and l_O are the averages for three years of each sample tree. Values of w_L and w_{DL} of the sugi trees were estimated by the following allometric relationships obtained from the field survey described before:

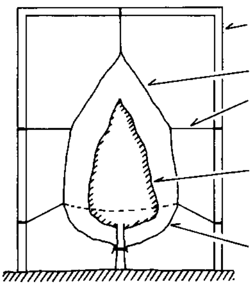

Fig. 1. Schematic representation of the cloth-trap method

Table 1. The general features of the sample trees in April 1986

Feature			Tree No. 1	2	3	4	5
DBH	(D)	[cm]	15.79	13.50	11.27	9.33	8.28
Stem diameter*	(D_B)	[cm]	14.67	13.02	10.35	8.09	7.67
Height**	(H_B)	[m]	1.76	1.72	1.87	2.38	1.67
Tree height	(H)	[m]	9.71	10.37	8.10	7.92	6.45

* At the height just below the lowest living-branch
** Of the lowest living-branch

Table 2. Annual litterfall-rates of the sample trees

[g(dry wt)/tree • yr]

Component	Tree No. 1	2	3	4	5
June 1984 to June 1985					
Leaves	335 (95%)	650 (92%)	147 (97%)	74 (95%)	21 (88%)
Branches	2 (1%)	4 (1%)	0 (0%)	0 (0%)	0 (0%)
Other	16 (5%)	54 (8%)	4 (3%)	4 (5%)	3 (13%)
Total	353 (101%)	708 (101%)	151 (100%)	78 (100%)	24 (101%)
June 1985 to June 1986					
Leaves	183 (91%)	368 (90%)	83 (90%)	57 (90%)	82 (92%)
Branches	0 (0%)	1 (0.2%)	0 (0%)	0 (0%)	0 (0%)
Other	18 (9%)	39 (10%)	9 (10%)	6 (10%)	7 (8%)
Total	201 (100%)	408 (100%)	92 (100%)	63 (100%)	89 (100%)
June 1986 to June 1987					
Leaves	366 (96%)	652 (90%)	448 (92%)	132 (93%)	67 (92%)
Branches	0 (0%)	27 (4%)	23 (5%)	0 (0%)	0 (0%)
Other	17 (4%)	43 (6%)	14 (3%)	10 (7%)	6 (8%)
Total	383 (100%)	722 (100%)	485 (100%)	142 (100%)	73 (100%)

Notes: Percentage of fall-rate of each component of the total litterfall-rate in parentheses.

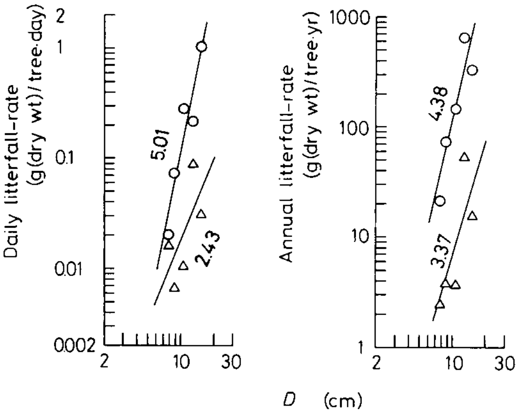

Fig. 2. Relationships between mean daily litterfall-rates and D during the period from Oct. 4, 1984 to Nov. 1, 1984 and between annual litterfall-rates and D during the period from Jun. 9, 1984 to Jun. 14, 1985

Notes: Figures in the diagram show gradient values of the regression lines. r^2 (coefficient of determination) values for leaves and other litter were 0.879 and 0.443, respectively, for the daily litterfall and 0.827 and 0.582, respectively, for the annual litterfall.
Legend: ○, leaves; △, other litter.

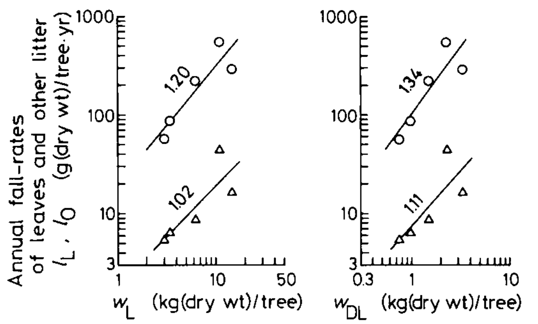

Fig. 3. Regressions of annual litterfall-rates of leaves (l_L) and other litter (l_O) on estimated dry-weights of leaves (w_L) and attached dead-leaves (w_{DL}) of the sample trees

Notes: Litterfall-rates of leaves and other litter are averages for the period from Jun.9, 1984 to Jun. 26, 1987. Figures in the diagram show gradient values of the regression lines. r^2-values for leaves and other litter regressions on w_L were 0.820 and 0.683, respectively; those on w_{DL} were 0.784 and 0.619, respectively.
Legend: ○, leaves; △, other litter.

$$w_L = 20.2 D_B^{2.45}, \quad w_{DL} = 5.40 D^{2.32}.$$

The values of D [cm] and D_B [cm] measured in April 1986 were used for the estimations.

Because the gradient values of the regression lines in Fig. 3 are larger than unity, large sugi trees have greater l_L in proportion to w_L or w_{DL} than do small trees. However, l_O is approximately in direct proportion to w_L or w_{DL}.

The values of l_L/w_L and l_L/w_{DL} calculated from the regression lines in Fig. 3 are 0.023～0.034 and 0.082～0.15 yr^{-1}, respectively, within the ranges of D (7.10～15.88 cm) and D_B(6.62～14.96 cm) on the study site.

The annual stand litterfall-rates (L, g/ha·yr) of leaves, other litter, and total litter were estimated as follows:

$$L = \sum_{i=1}^{N} a \cdot D_i^{b} / Q, \tag{2}$$

where the subscript i denotes the tree number, D_i the diameter at breast height of the individual tree, Q the area of the stand, N the number of the trees on the study site, which was 41 during this study, and a and b are coefficients of the l-D relationship, Eq.(1).

The estimated annual stand litterfall-rates of leaves, other litter, and total litter are, respectively, 0.36, 0.02, and 0.38 [t/ha·yr] for the period from June 1984 to June 1985, 0.28, 0.03, and 0.30 [t/ha·yr] for the period from June 1985 to June 1986, and 0.62, 0.03, and 0.66 [t/ha·yr] for the period from June 1986 to June 1987. These estimates of stand litterfall-rates are smaller than those of other sugi stands (*3, 6*).

IV. Discussion

The tree-size dependency of litterfall-rates was expressed approximately by the power-form equation, Eq.(1), as seen in Figs. 2 and 3. This fact assures that litterfall rates of a tree belong to a functional amount

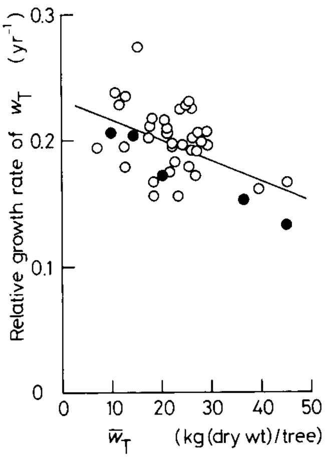

Fig. 4. Relationships between mean relative-growth rate of the aboveground tree dry weight (*RGR*) and mean aboveground tree dry weight ($\bar{w}_T$) during the period from April 1984 to April 1987

Legend : ●, sample trees for the cloth-trap method ; ○, trees on the study site not used for the cloth-trap method.

of the allometric tribe (*2*, *5*).

Dead leaves and branches tend to remain on sugi trees for a certain period after death. In the early growth stage, the delay in the fall of the leaves and branches after their death may result in a fall rate of leaves and branches that is smaller than the death rate, whose definition was given in the preceding paper (*5*). Low values of l_L/w_L and l_L/w_{DL} may have resulted from these conditions.

Figure 4 shows the relationships between the mean relative-growth rate of aboveground tree dry weights (*RGR*) during the period from April 1984 to April 1987 and mean aboveground tree dry weight ($\bar{w}_T$) for the successive years from 1984 to 1987. The values of $\bar{w}_T$ and *RGR* of each tree on the study site were calculated as follows:

$$\bar{w}_T = \frac{w_{T1} + w_{T2} + w_{T3} + w_{T4}}{4},$$

$$RGR = \frac{1}{3\,[\mathrm{yr}]}\,\frac{w_{T4} - w_{T1}}{\bar{w}_T},$$

where w_{T1}, w_{T2}, w_{T3}, and w_{T4} indicates the w_T in 1984, 1985, 1986, and 1987, respectively, which were estimated by using the w_T-D^2H relationship obtained in 1985:

$$w_T = 52.7(D^2H)^{0.873} \quad [\mathrm{g/tree,\ cm^2m}].$$

The values of D and H measured in April in 1984, 1985, 1986, and 1987 were used for the estimation.

As shown in Fig. 4, the sample trees for the cloth-trap method had relatively lower values of *RGR* than the other trees on the study site. Deviations of *RGR* of the sample trees from the regression line were $-3 \sim -17\,\%$. Enclosures by the litter traps may have affected the growth rates of the sample trees. Although the reduction in growth rate was small, the enclosure effect may become a serious problem in measurements over a long period. As pointed out in the previous report (*5*), it is necessary to improve the trap materials to minimize changes in the environmental conditions of sample trees.

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日本学術会議だより №11

第14期活動計画決まる

昭和63年11月　日本学術会議広報委員会

日本学術会議は，このたび開催した第106回総会において，第14期活動計画と新しい特別委員会の設置を決定しましたので，その概要をお知らせいたします。

日本学術会議第106回総会報告

日本学術会議第106回総会（第14期・第2回）は，10月19～21日の3日間開催された。

今回の総会の主な任務は，第14期日本学術会議の活動の指針となる第14期活動計画を審議し、決定することであった。そのために，「第14期活動計画（申合せ）」と「臨時（特別）委員会の設置について（申合せ）」の2つの総会提案が用意された。

この2つの提案の内容は，前回の臨時総会（本年7月）で設置された第14期活動計画委員会が，慎重に審議を重ねて作成したものであり，またその間に2回の連合部会及び各部会を開いて各会員の意見を聴取の上，調整したものである。

この2つの提案については，第1日目の午前中の総会で，近藤会長から，提案説明が行われるとともに，同日の午後の各部会で審議が行われた。

次いで，この2つの提案は，第2日目の午前中の総会の審議に付され，最終的推敲を期す質疑の後，採決が行われ，いずれも圧倒的多数の賛成で可決された（第14期活動計画及び設置された7特別委員会の名称は別掲参照）。

この総会決定により，新たに設置された7特別委員会については，第2日目の午後に開催された各部会で，各部ごとに割り当てられた委員定数により，委員の選出が行われた。

次いで，翌第3日目の午前中には，各特別委員会の第1回目の会議が開かれ，それぞれ委員長・幹事の選出が行われるとともに，今後の審議予定等について審議がなされるなど，早速その活動が開始された。

第2日目の午後には，1時から2時間半にわたって「総会中の自由討議」が行われた。これは，会員のための一種の勉強会で，総会行事の一環として行われてきたものである。今回は，第14期活動計画案を審議する過程で，会員間で特に討議が活発に行われ，関心が高かった課題を取り上げて行われた。まず，島袋嘉昌第3部会員（経営学）から「学術的・総合研究」について意見の発表の後，関連して，石井吉徳第5部会員（資源開発工学）から発言があり，続いて，井口潔第7部会員（外科系科学）から「人間の科学」について，川田侃第2部会員（政治学）から「紛争学・平和学」について，中川昭一郎第6部会員（農業総合科学）から「農業・農村問題」について，大島康行第4部会員（生物科学）から「IGBP（地球圏―生物圏国際協同研究計画）」について，それぞれ意見の発表が行われた。

第14期活動計画

我が国の科学・技術は戦後目覚しい発展をとげ，経済の高度成長とともに，国民生活の向上に多大の貢献をしてきた。しかしながら，近年世界的規模での経済・社会環境や地球生態系の激しい変化を背景に，科学・技術の在り方に様々な問題が生じている。その中には，科学・技術と人間との係わり方の根源を問い直すようなものや，学問諸分野の再編成を求めるものも含まれている。また，国際社会における我が国の地位の向上も加わって，学術の面での我が国の貢献に対する国際的期待はますます強まっている。

日本学術会議は，創設以来，科学者や学術研究団体との連携の下に，その目的・職務の遂行に努力し，我が国の学術研究体制の整備についての重要な勧告等を行い，研究所の設立などを含めて数々の業績をあげてきた。また，国際協力事業への参加を始めとして，世界の学界と提携しつつ学術の進展に貢献してきた。しかしながら，創設後40年を迎えた現在，学術を取り巻く状況は，国際的にも国内的にも著しい変化を生じた。このような状況を踏まえて，第14期日本学術会議は，本会議の創設以来の基本的精神を引き続き堅持しながら，なお一層の成果をあげるべく努力するものである。

日本学術会議は，我が国の学術に関する重要事項を自主的に調査審議し，その実現を図る機関としての使命と役割を確認した上で，会員の科学的知見を結集し，時代の要請に即応しつつ将来を見通した基本的理念を確立し，我が国における学術研究の一層の推進を図るために，本会議の本来の目的を，次の視点から実現することが必要であると認識した。

人文・社会及び自然科学を網羅した日本学術会議は，全学問的視野に立ち，学術研究団体を基盤とする科学者の代表機関であることを認識して，全科学者の参加と意見の集約を真摯に図らなければならない。さらに，本会議が集約した科学者の意見が政策に反映するよう，他の学術関係諸機関と協議の上，その役割分担を明確にしつつ，これらとの連携の強化を図る必要がある。

また，学術研究団体を基盤とする日本学術会議は，関係ある学術研究団体等から推薦された科学者を中心として構成される研究連絡委員会の重要性を認識し，その活動を強化するとともに，学術研究団体の活動を助長し，研究基盤の強化を図り，高度化する学術の発展に貢献する必要がある。

我が国の科学者を内外に代表する機関である日本学術会