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12. The leaf demography of trampled and untrampled plants of *Plantago major* ssp. *major* (J. van Heeswijk and C.W.P.M. Blom)

**INTRODUCTION AND METHODS**

In 1980, the leaf demography of *Plantago major* was studied in experimental plots. Trampling was carried out by means of a trampling machine (see Blom 1979). The plants were four years old when the measurements described below were started, and the trampling treatments had been applied since 1976. Ten untrampled plants on a loose soil and ten heavily trampled plants on a strongly compacted soil were selected. The leaves of each plant were marked in order of appearance. This method made it possible to follow the fate of individual leaves. Each fortnight, the number of living leaves, the length of the longest leaf, and the age of the leaves of each plant were determined.

**RESULTS AND DISCUSSION**

The effects of trampling on the number of living leaves in the course of the year are shown in Fig. 12.1 (left). From May to September the heavily trampled plants formed considerably more leaves than the untrampled individuals did. Fig. 12.1 (right) shows that *P. major* plants react to trampling: trampled plants had a considerably greater length of the longest leaf than untrampled individuals. The product of the number of leaves and the length of the longest leaf gives a good measure of the shoot biomass (Noé and Blom 1981). Trampled plants produced considerably more shoot biomass than untrampled *P. major* plants did.

The mean age of the successive leaves is shown in Fig. 12.2. Few differences in leaf age were observed between the two treatments. It is clear, however, that the turn-over rate of leaves of trampled plants is considerably higher than that of untrampled individuals: during the growing season, trampled plants formed more leaves than untrampled individuals did. *P. major* ssp. *major* reacts to trampling both by forming a greater standing crop and by the formation of many spikes and heavy seeds (Blom 1979). Since the ability of the roots to penetrate a trampled, compact soil is also high, the species is well adapted to these conditions. For purpose of comparison, a similar experiment will be carried out with young single-rosetted *P. lanceolata* plants in 1981.

![Graph](image-url)

**Fig. 12.1.** Mean number of living leaves (left) and mean length of longest leaf (right) per *Plantago major* plant growing in an experimental plot. Crosses: strongly compacted soil, heavily trampled. Dots: loose soil, untrampled. Vertical bars: two standard errors.
Fig. 12.2. The mean age (length of lines) with 95 per cent confidence outer limits (marks) of successive leaves per Plantago major plant on strongly compacted soil (left) and on loose soil (right).

REFERENCES


13. Effect of the supply of water and nutrients on vegetative regeneration in Plantago species (R. Soekarjo)

INTRODUCTION
The importance of the vegetative regeneration of Plantago species in relation to the ability of a species maintaining itself in areas that are heavily trodden upon, has been put forward earlier (Soekarjo 1979, 1980). However, no difference in regeneration potential was found between the species investigated. Vegetative regeneration proved to be strong, but similar in the four species studied. The