INTRODUCTION

When the mineral supply of the ruminant on pasture is considered the sodium element (even as Mg) deserves special attention because some existing grass varieties and species may not provide enough sodium for the needs of the animal. Frens and Kemp give as minimum available Na-contents of respectively 7.4 (= 0.17%) and 6.5 (= 0.15%) mg equivalents per 100 g dry matter.

The Na-content of grass is influenced by both the Na and K content of the soil and also by the grass species. The Na-uptake by different fodder grasses, grown on the same nutrient medium, was studied by von Hasler by de Vries and Dijkshoorn and also by ap Griffith and Cooper.

In pot experiments von Hasler found the following order of uptake: perennial ryegrass (0.149%) > cocksfoot > Italian ryegrass > meadow fescue > smooth-stalked meadowgrass and timothy (= 0.043%).

The Na-content and K/Na ratio of perennial ryegrass and cocksfoot were influenced much more by fertilization and the K/Na ratio of both soil and fertilizer than were the same values for timothy. The Na- and K-contents of smooth-stalked meadow grass were not influenced by fertilization and change in the K/Na ratio. In samples from 36 different pastures the same author found the following gradation: perennial ryegrass (0.158%) > cocksfoot > Italian ryegrass (0.056%) > timothy > meadow fescue > smooth-stalked meadow grass.
Ap Griffith also found a wide variation in the sodium content of species and varieties. In primary cuts from early spring to the hay stage, the following order in sodium uptake was found: - cocksfoot (= 0.3%) > perennial ryegrass ≫ italian ryegrass (± 0.1%) ≫ meadow fescue ~ timothy (= ± 0.03%). Progressive increase of nitrogen fertilizer (nitrochalk, 125 to 1000 kg per ha) markedly increased the sodium content of perennial ryegrass. The sodium content was greater in early spring than in summer and when grown in growth rooms was greater at 5°C than at 20°C 1.

Summarizing the available evidence we may conclude that the species timothy (Phleum pratense) and meadow fescue (Festuca pratensis) are low in sodium content whilst perennial ryegrass (Lolium perenne) is high. The question then arises as to whether a variation in sodium content will be found between the different clones of either timothy or meadow fescue. We have tried to solve this question for the R.v.P. varieties with the aid of Na\textsuperscript{22}.

EXPERIMENTAL METHODS

Plant material

Open-pollination seed from 20 different clones composing the varieties R.v.P. of timothy and meadow fescue was used. In an inter-species test use was made of perennial ryegrass, italian ryegrass, cocksfoot, meadow fescue, timothy, and smooth stalked meadowgrass foundation seed.

Culture

The seeds were sown in trays (eight 30 cm-rows per tray, containing about 4 kg air dry soil) placed on benches in the greenhouse. The soil was a mixture of sandy loam and peat with the following chemical characteristics:

\[ pH_{H_2O} = 5.35 \]

\[ P_{2}O_{5}: 20.1 \text{mg/100 g (rich)} \]

\[ K: 0.75 \text{ mg equivalents/100 g} \]

\[ Na: 0.49 \text{ mg equivalents/100 g} \]

\[ Ca + Mg: 14.4 \text{ mg equivalents/100 g} \]

Extraction with double Calactate. (Egner-K\textsubscript{2}O : 49.4 mg/100 g (rich) \textsubscript{Riehm}).

Percolation with neutral NH\textsubscript{4}-acetate (Peech).

In a first experiment 23 trays were sown as follows:

a) 3 for the inter-species test on sodium uptake: 4 replication rows per species sown at random (6 species × 4 replications = 24 rows).

b) 10 for the inter-clonal test on sodium uptake with timothy (20 clones × 4 replication rows = 80 rows sown at random).