Leaf Fragment Identification of Subtropical Native Grass Species

C. H. E. C. Poli
Universidade Federal do Rio Grande do Sul, Brazil

J. M. Rosito
Universidade Federal de Santa Maria, Brazil

A. G. Schirmer
Universidade Federal de Santa Maria, Brazil

P. R. Boggiano
Universidade Federal do Rio Grande do Sul, Brazil

P. C. de F. Carvalho
Universidade Federal do Rio Grande do Sul, Brazil

ID # 07-14

LEAF FRAGMENT IDENTIFICATION OF SUBTROPICAL NATIVE GRASS SPECIES

C.H.E.C. Poli[1], J.M. Rosito[2], A.G. Schirmer[2], P.R. Boggiano[1] and P.C.de F.Carvalho[1]

[1]Departamento de Plantas Forrageiras e Agrometeorologia (DPFA) – UFRGS C.P. 776, Porto Alegre, RS, Brasil, , 90012-970. cpoli@pro.via-rs.com.br

[2]Departamento de Biologia , Centro de Ciências Naturais e Exatas, UFSM

Abstract

The present study was carried out to characterise leaf fragments of important plant species of a subtropical native sward in the southernmost state of Brazil. Thirteen important grass species were collected from April to May 1999. Both sides of the leaves were observed using a stereomicroscope. In addition, two approaches were tested to provide a clearer characterisation of the leaves of each species: the leaves were either dried or frozen. The kind and number of veins, the kind and number of hair, and the arrangements and number of stomates on both sides of each leaf are the most useful characteristics to differentiate fragments of native grass species' leaves. These characteristics can be more easily observed when the plant material is dried.

Keywords: diet selection, fistulated animals, native sward, plant characterisation, stereomicroscope

Introduction

The knowledge of the diet selection in complex swards can provide information in terms of plant species preservation, sward management and supplementation programs (Holechek et al., 1982). The use of samples from esophageal-fistulated animals is one of the most representative techniques to know about diet selection (Mcinnis et al., 1983). An important step to determine the diet selection using esophageal-fistulated animals is having adequate standards to characterise the material present in the extrusa (Sanchez et al. 1993). The objective of this study is to characterise the leaf fragment of the main grass species that are present in the native sward of Rio Grande do Sul in order to facilitate the use of esophageal-fistulated animals on diet selection studies.

Material and Methods

Thirteen main plant species (see Table 1) of the native sward of the research station of Universidade Federal do Rio Grande do Sul (UFRGS), Eldorado do Sul, RS, were collected from April to May 1999. In order to obtain material with morphological variation, the plants were collected from different areas of the sward, taking into account mainly the kind of soil, topography and light. One half of each plant species collected was frozen to -20 ^{o}C and the other half was dried in a forced air oven (60 ^{o}C) for 24 hours. The main species were defined by previous experiments in this area (Boldrini, 1993; P.R. Boggiano, *personal communication*).

Both sides of a leaf of each species were observed using a stereomicroscope with incident light when the leaf was defrosted or dried. The species were characterized in relation to the number and kind of veins, presence and kind of hairs, stomata arrangements and characteristics, kind of leaf border, leaf tip feature, leaf colour and general appearance. The characterization was

compared with the standard developed in Santa Maria University for some native sward species (Nogueira et al., 1999; J.M. Rosito, *personal communication*).

The standards were calibrated by analyses of hand-chopped leaves. The materials were hand-chopped to small pieces of about 2 to 5 mm and placed on paper. The pieces of leaf were then randomly analysed and compared with the standards.

Results and Discussion

The dried material was more easily characterised than the defrosted material. The leave's veins were more obvious and the species could be compared when the material collected was dried. In addition, more variation was observed within each species when the material was defrosted than when the material was dried. Therefore, the species were characterised using dried plant material.

It is possible to differentiate most of the thirteen species studied, associating a group of characteristics with the leaf side (abaxial and adaxial). The important characteristics which differentiate species are venation pattern (Table 1), the kind and number of hairs and the arrangement and number of stomates. This agrees with the observations of Nogueira et al. (1999) working with similar native sward species.

Characteristics as colour or leaf size are not very important. Comparing the leaves when they were defrosted or dried, it was observed that colour could easily change. However, the colour was important for the characterisation of *Andropogon lateralis, Hypoginium virgatum* and *Paspalum nicorae*. In this case, the bluish and whitish green colours in *P. nicorae,* and in *Andropogon lateralis and Hypoginium virgatum,* respectively, is consistent even across different

treatments (dried or defrosted). In the same way, the analysis of the hand-chopped leaves demonstrated that the leaf size could not always be assessed.

Although Nogueira et al. (1999) warn that there are different morphological types of the same species of *Paspalum notatum*, their description is similar to the one found in this study. It demonstrates that the characteristics found in this experiment can probably cover, within each species, a variety of plants of different morphological characteristics. Nevertheless, it is important to clarify that a standard characterisation for each species needs to be done for each particular region and sward.

It can be concluded that dried plant material can be more easily identified in the analyses of the leaves fragments using stereomicroscopy than can defrosted plant material. In addition, it also can be concluded that type and number of veins, type and number of hairs, and arrangements and number of stomates on both sides of each leaf are important characteristics to differentiate grass species of the native sward of Rio Grande do Sul.

References

Boldrini, I.I. (1993). Dinâmica de vegetação de uma pastagem natural sobre diferentes níveis de oferta de forragem e tipos de solo, Depressão Central do RS. D.Sc. Thesis, Universidade Federal do Rio Grande do Sul, Porto Alegre.

Holechek, J.L., Vavra M. and Pierper R.D. (1982). Botanical composition determination of range herbivore diets: a review. Journal of Range Management. **35:** 309-315.

Mcinnis, M.L., Vavra M. and Krueger W.C. (1983). A comparison of four methods used to determine the diets of large herbivores. Journal of Range Management. **36:** 302-306.

Nogueira M.C.L., Rosito J.M. and Schirmer A.G. (1999). Identificação de *Paspalum notatum* Fluegge e *Axonopus affinis* Chase através da análise de fragmentos foliares. Ciência Rural. **29:**27-31.

Sanchez, L. de J.T., Nascimento Júnior D. do and Diogo J.M. da S. (1993). Composição botânica da dieta de novilhos esôfago-fistulados em pastagem natural de Viçosa. Revista da Sociedade Brasileira de Zootecnia. **22:**839-851.

Table 1 - Main venation pattern of both sides of plant leaves (adaxial and abaxial) to be used as standard to identify grass species in the extrusas of esophageal-fistulated animals

Species	Adaxial	Abaxial
Axonopus affinis	- Secondary veins are prominent. - The veins have, usually, lighter green color than the space between veins.	- Similar to adaxial side – the main difference is the presence of a thin and prominent main vein.
Aristida jubata	- Main vein and secondary veins are prominent and have similar width - 2 to 5 secondary veins in each side of the main vein.	- Secondary veins are similar to the main vein. - Prominent and large veins.
Aristida laevis	- The main vein is often formed by 3 to 4 veins – secondary veins have similar width, but a little wider close to the leaf border.	- Prominent veins and relatively wide - The main vein is usually formed by more than one vein.
Andropogon lateralis	- Secondary veins are slightly prominent – similar width of the tertiary veins – Secondary and tertiary veins are relatively thin.	- Secondary and tertiary veins can be easier visualized than in the adaxial side. - Secondary veins are not equidistant.
Hypogynium virgatum	- Secondary veins are relatively wide – the space between veins is narrow. - Secondary veins are slightly prominent.	- The main vein is prominent - It is difficult to observe the tertiary and quaternary veins
Piptochaetium montevidense	- There is a systematic line of small hairs on the veins - there are 3 to 4 veins relatively large.	-The four sides of the leaf are formed by prominent veins.
Sporobulus indicus	- Secondary veins are whitish and relatively wide - presence of tertiary veins. - The space between veins is narrow.	- Secondary veins are not prominent - Main vein is similar to secondary veins.
Schizachyrium microstachyum	- Secondary and tertiary veins are prominent - The space between veins have a spongeous aspect	- Secondary vein is less prominent than the adaxial side
Paspalum notatum	- Veins are prominent and apparently equidistant – the space between veins is usually narrower than the veins width.	- The veins (except the main vein) are usually not very prominent.
Paspalum urvillei	- Main vein is relatively large and fair. - 1 to 4 tertiary veins between secondary veins.	- Main vein and secondary are prominent. - Usually around 3 tertiary veins can be seem between secondary veins.
Paspalum pumilum	- Secondary and tertiary veins are similar, mainly close to the leaf apex - The veins are thin and prominent.	- Main vein is prominent and thin – secondary and tertiary veins are not very prominent.
Paspalum Nicorae	- Main vein is whitish and relatively wide – often formed by 2 to 3 veins.	- Main vein is prominent (green and thin).
Paspalum plicatulum	- Main vein is formed mainly by a spongeous parenchyma. - Prominent secondary veins	- Main and secondary veins are prominent.