

The feasibility of autoclave-assisted water soluble carbohydrate extraction to distinguish annual ryegrass genotypes at the seedling stage

L.P. Passos, F.B. de Sousa, A. Mittelman, M.C. Vidigal, I.G. Perry, L.O. Cruz and J.R. Magalhães
Embrapa Dairy Cattle, The National Dairy Cattle Research Centre, Juiz de Fora, 36016-210 MG, Brazil, Email: lpassos@cnpqgl.embrapa.br

Keywords: carbohydrate, forage, *Lolium multiflorum*, selection

Introduction Annual ryegrass (*Lolium multiflorum*) swards are being used increasingly in Southern Brazil as animal forage (Carvalho *et al.*, 2001). As observed elsewhere, reduced forage availability and quality during dry or cold seasons often limits the efficacy of pasture utilisation. As reported by Meissner *et al.* (1992), this demands breeding efforts to improve forage nutritive value. However, lack of concurrent examination of large number of samples for important nutritional parameters, like water-soluble carbohydrate (WSC) levels, which could lead to more precise selection strategies, is a common constraint of those programs. This study aimed to verify the suitability of using autoclave-assisted WSC extraction for concurrent screening of seedlings of annual ryegrass genotypes, aiming to establish early selection criteria.

Materials and methods Field-grown seedlings of 24 annual ryegrass genotypes (Table 1) were sampled at cutting 1, following 60 days after germination, and evaluated for dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), in vitro digestible dry matter (IVDDM), and in vitro digestibility of organic matter (IVDOM). Also, WSC contents of stem samples were determined by the autoclave-based extraction procedure of Passos *et al.* (2003). The trial was conducted as completely randomized block design with 2 replicates. The data were analyzed statistically through ANOVA and WSC mean contrasts among treatments compared by the Tukey test.

Results WSC levels were correlated positively to DM ($r=0.45$, $p<0.001$), and negatively to CP ($r=-0.60$, $p<0.001$) and IVDOM ($r=-0.31$, $p<0.01$). WSC did not relate with NDF or IVDDM. There were WSC genotypic differences (Table 1), with cv. Zorro yielding higher contents than cv. ETB AZ 096. No other significant contrast was observed among the studied genotypes, despite a consistent tendency of decreasing values apparently related to DM production. A possible association of that trend with physiological or morphological attributes needs research. Further comparisons are to be conducted during forage production.

Table 1 Mean WSC levels (mg/g DM) of annual ryegrass seedlings following 60 days after germination #

| Genotype | WSC | Genotype | WSC | Genotype | WSC | Genotype | WSC |
|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| Zorro | 353.77 a | ETB AZ 003 | 336.92 ab | ETB AZ 022 | 328.12 ab | ETB AZ 055 | 320.28 ab |
| Jeanne | 343.43 ab | Riga | 335.64 ab | Tetragold | 327.76 ab | ETB AZ 085 | 318.24 ab |
| ETB AZ 007 | 339.59 ab | INIA Titan | 331.87 ab | ETB AZ 080 | 322.41 ab | CPPSUL1 | 317.44 ab |
| INIA Cetus | 338.40 ab | ETB AZ 089 | 330.97 ab | ETB AZ 011 | 321.06 ab | ETB AZ 078 | 317.13 ab |
| Kemal | 338.32 ab | ETB AZ 071 | 330.19 ab | ETB AZ 079 | 320.97 ab | ETB AZ 077 | 309.44 ab |
| ETB AZ 049 | 337.08 ab | Hercules | 328.57 ab | ETB AZ 097 | 320.49 ab | ETB AZ 096 | 301.38 b |

Means followed by the same letter are not significantly different ($p<0.001$) by the Tukey test

Conclusions Autoclave-assisted WSC extraction is suitable for concurrent evaluation of large numbers of annual ryegrass genotypes. It may be possible to use WSC content to predict annual ryegrass behaviour and forage production. However, confirmation of this applicability needs verification, by comparing the reported results with profiles of plants undergoing simple forage production.

References

- Carvalho, P. C. F., L. S. Pontes, E. O. Silveira, C. H. E. C. Poli, C. Nabinger & O. A. Pereira Neto (2001). Sheep performance in Italian ryegrass swards at contrasting sward height In: International Grassland Congress, XIX. Proceedings. São Pedro, USP-ESALQ, 845-846.
- Meissner, H. H., M. M. Du Preez, A. D. Enslin & E. B. Spreeth (1992). Utilization of *Lolium multiflorum* by sheep. 1. Influence of dry matter content and correlated factors on voluntary intake. *Journal of the Grassland Society of Southern Africa*, 9, 11-17.
- Passos, L. P., M. C. Vidigal, F. B. de Sousa, H. S. Barud, A. F. C. Paiva & A. R. Santos (2003). Comparative efficacy of autoclave-based extraction of soluble carbohydrates in various forage grasses. *Proceedings of the World Conference in Animal Production*, 9, Porto Alegre, World Association of Animal Production, CD-ROM.