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Genetic variability between adapted populations of annual ryegrass (*Lolium multiflorum* Lam) in Argentina

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Introduction Italian ryegrass (*Lolium multiflorum* Lam.) is one of the most important annual grasses used in Argentina because it adapts better to the intensive animal system of the Humid Pampas than other annual forage grass. Although much research has been done to study its productive potential and management technologies, little work has focused on breeding and selection. There is ample evidence that genetic variability occurs within grass species (Snaydon, 1987; Andrés and Barufaldi, 1997) both in morphology and physiology. As a result the variation of attributes related with yield potential, quality and adaptation to different management systems, is often used in plant breeding to develop new varieties. The objective of this work was to evaluate the genetic variability between 32 populations of annual ryegrass adapted to different grassland environments in the Humid Pampas Region of Argentina as an introductory part of a breeding programme at INTA. The final aim of this programme is to provide new varieties of annual ryegrass adapted to different management systems.

Materials and methods 32 adapted populations of annual ryegrass were grown from seeds in a cool greenhouse during summer 2004. At the stage of 8 tillers, forty five plants were randomly sampled from each population and transplanted 0.60 m apart in a randomized block design with three replicates, at the experimental grounds of INTA Pergamino. (Buenos Aires). All plants were measured or scored for a range of vegetative attributes related with winter dry matter production and herbage quality: tiller number (TN); growth habit (GH); leaf width (LW); vigour (V); dry matter yield (DMY) (24/8; 14/09; 25/10); and *in vitro* dry matter digestibility (IVDDM). Statistical analysis was performed on each attribute by using the SAS programme. The genetic parameters estimated were: genetic variance (GV); environmental variance (EV) and broad sense heritability (H).

Results and conclusions Annual ryegrass is naturalized and established in several environments of the “pampa” grasslands which have resulted in the formation of ecotypes with differences in their morphology and physiology. The results of this study showed that there were significant differences ($P < 0.01$) between natural populations of annual ryegrass for the attributes related with winter growth (Table 1). There were also important differences between plants within populations. The evidence for high broad sense heritability values given by the present study may have an important applicability to the current breeding programme.

Table 1. Mean, range, variance components and broad sense heritability on phenotypic mean basis for attributes related with winter dry matter in annual ryegrass populations evaluated at Pergamino

| Variable | Mean | Range | Genetic variance | Heritability |
|---------------------------------|-------|-------------|------------------|--------------|
| Growth habit (GH) (1..4)* | 1.83 | 1.00-3.85 | 0.62 | 0.53 |
| Leaf width (LW) (1...3)* | 1.84 | 1.00-2.95 | 0.43 | 0.55 |
| Vigor (V) (1...3)* | 1.83 | 1.00-3.00 | 0.40 | 0.56 |
| Dry matter yield (24/8) (g/pl) | 13.08 | 8.87-16.65 | 49.65 | 0.65 |
| Dry matter yield (14/9) (g/pl) | 12.93 | 9.47-17.68 | 45.27 | 0.64 |
| Dry matter yield (25/10) (g/pl) | 28.07 | 17.81-33.29 | 91.59 | 0.52 |
| Digestibility (IVDDM) (24/8) | 71.47 | 61.71-79.78 | 14.39 | 0.41 |

*Scale: GH: 1 (prostrate) to 4 (erect); LW: 1 (narrow) to 3 (broad); V: 1 (low) to 3 (high)

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