

A survey of European regional adaptation in Italian ryegrass varieties

T.J. Gilliland¹ and A.J.P. van Wijk²

¹Department of Agriculture for Northern Ireland, Plant Testing Station, Crossnacreevy, Belfast BT6 9SH, UK, Email: trevor.gilliland@dardni.gov.uk, ²Centre for Genetic Resources the Netherlands, P.P. Box 16, 6700 AA Wageningen, The Netherlands

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Introduction Ryegrass is widely adapted to cool temperate eco-zones and breeders often submit individual varieties for testing in a number of EU countries. National testing programmes often combine data from several trial sites that may differ climatically, but not from sites in other member states, despite the possibility of high ecological similarity. Given increasing interest in ‘animal value’ characters (soluble sugars, lipids, sward geometry), additional testing for these would be valuable but is prohibited by capped or declining funding. Data sharing between EU national authorities could be advantageous but is inhibited by the lack of statistically valid data on the sensitivity of each performance parameter to agro-climatic conditions across the EU. This paper, reports the preliminary stages of the ‘EuroVCU’ (herbage) desktop study of ryegrass variety performances across an extensive range of EU national test centres. Analysis of the resulting data sets quantifies the genotype by environment responses of current varieties and could provide a validated protocol for future data sharing.

Materials and methods Due to its wide use and similarity in management, Italian ryegrass (*Lolium multiflorum* LAM.) was chosen as the model grass species for this pilot study. In 2003, the scientists responsible for conducting official grass variety tests in each of the current member states of the EU were contacted. They were invited to join the EuroVCU (herbage) consortium and asked to compile information on the testing history, test decisions and availability of data for each of the 169 varieties listed on the 22nd EU Common Catalogue. This constituted Phase I of the study and the data were summarised and processes with the aim of deriving a core set of varieties that would provide 10 pair-wise variety-links between each of the contributing member states. Phase II of the study involved gathering performance, management and metrological data for the core varieties from each site. This constituted the full data set from which analyses of the consistency/inconsistency of individual varieties across management and climatic variation could be measured, of stability/instability of individual performance characteristics across varieties and protocols and climatic variants, and finally the similarity/dissimilarity of test centres for common variety performance results on a character-by-character basis.

Results Twenty EU regions responded to the Phase I call (Austria, Belgium, Croatia, England & Wales, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Netherlands, N. Ireland, Norway, Republic Ireland, Scotland, Slovenia, Slovakia, Sweden, Switzerland), which generated a total of 679 variety x country reports. The pattern of variety testing appeared disjointed and impossible to interpret prior to Phase II data being gathered. For example, of the 169 EU registered varieties, only three were tested in half or more of the countries surveyed (Ajax, Danergo and Mondora). Conversely, 22 varieties were tested in only a single country and a further 18 were not tested by any contributors (AM1, Bella Bionda, Califa, Classic, EF486 Dasas, Kitil, Locobelo, Marvel, Menichetti, Multisolc AX9, Primadonna, Ralino, Rouky, Sultano, Tauro, Teanna, 110DE, 111DE). The average number of varieties tested per country was 35, but there were big differences, with some having tested more than 70 varieties, while others having only tested a few. This probably indicates the different importance of Italian ryegrass in each region, which may be linked to climatic differences. In total, Phase I generated over 2,600 data entries on variety test history, current status and results availability, from which 44 varieties were selected to provide the pair-wise comparisons in Phase II (Abercomo, Adin, Ajax, Atalja, Atos, Baresi, Barextra, Barmultra, Bartolini, Bartoluchi, Bofur, Danergo, Exalta, Fabio, Fenil, Fredrik, Gemini, Gisel, Gordo, Lemtal, Ligrande, Lolita, Lubina, Malmi, Meroa, Minaret, Mondora, Montblanc, Multimo, Rio, Sabalan, Sikem, Sultan, Taurus, Tetraflorum, Tonic, Total, Tribune, Tur, Turgo Pajbjerg, Urbana, Zarastro, Zenith, Zorro). Phase II was sent to all contributors plus the authorities in the remaining countries (Bulgaria, Cyprus, Czech Republic, Denmark, Greece, Luxembourg, Poland, Romania and Spain). It is anticipated that the participant numbers in Phase II may increase by the October 2004 deadline, which has been set to allow for final report completion by Spring 2005.

Conclusions The concept of this study is to use common varieties as replicates of each national site. This strategy makes it possible to compare how each performance characteristic varies between different locations and to identify common agri-climatic zones on a character-by-character basis. The EuroVCU (herbage) study, therefore, provides the necessary knowledge to validate future data sharing between variety testing authorities.

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