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Presenter Information

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Criteria for the registration of *Medicago polymorpha* L. and *Lolium rigidum* Gaud. varieties in a Voluntary Register in Italy

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Introduction

Extensive and semi-extensive livestock systems in Southern Europe rely largely on permanent pastures, the productivity of which could be improved by sowing adapted species. Native forage species are a valuable tool for Mediterranean livestock production, owing to their specific adaptation to the harsh environment (featuring prolonged and severe spring-summer drought) and their generally good tolerance to grazing. Annual, self-reseeding species are able to cope with the prevailing drought stress by terminating the vegetative phase and setting seed before the onset of the stressful period, and enhance the durability of the sward by their self-reseeding capacity and subsequent seedling regeneration. Subterranean clover (*Trifolium subterraneum* L.) and medics (annual *Medicago* spp.) among the legumes, and annual ryegrass (*Lolium rigidum* Gaud.) among the grasses, are the most exploited self-reseeding species for pasture establishment.

Breeding of burr medic (*M. polymorpha* L.) and annual ryegrass began several decades ago in Australia, where they are presently widely cultivated. Although they originated in this region, deliberate cultivation of, and research work on, these species in the Mediterranean Basin are more recent. Breeding efforts in Southern Europe were driven by the possible lack of adaptation of germplasm bred elsewhere - due to different environmental characteristics (primarily soil type and winter temperatures) and different prevailing crop-livestock systems - and the concurrent awareness of the suitability of the local genetic resources for agronomic purposes (Porqueddu *et al.* 1996; Franca *et al.* 1998; Re *et al.* 2012).

The lack of a seed certification system, however, may hinder the seed-production chain and the spread of new, adapted varieties in Mediterranean countries. Seed certification is indeed a guarantee of high seed quality and enables a control of variety trading, with beneficial effects for both the end users and the breeders. Neither burr medic nor annual ryegrass are included among the species subjected to mandatory certification according to the Italian legislation for seed commercialization (Law 1096/1971 and

subsequent amendments, harmonized with the European Union legislation: Dir. 2002/53/CE and subsequent modifications). However, voluntary registers can be activated on request by the Ministry of Agriculture, Food and Forestry Policy for any species not entailing a mandatory register. To give proper recognition to new selection outcomes and favour their adoption by producers, a Voluntary Register has been recently approved by the Ministry for both burr medic and annual ryegrass. As for any other species, criteria of distinctness, uniformity and stability (DUS) on one side, and of agronomic value on the other side, were set.

Methods

Assessment of DUS

The procedures for DUS assessment of burr medic and annual ryegrass largely refer to the guidelines defined by the International Union for the Protection of New Varieties of Plants for medics and *Lolium* spp., respectively (UPOV 2006a, 2006b). For both species, autumn sowing in two consecutive years is required, with one cycle of data recording per sowing. Both a spaced-plant trial and a row-plot trial are sown in three field replications, with 20 plants per replication evaluated in the former trial, and two, 5-m-long rows per replication sown in the latter one. Characters are recorded either in both trials or just in the one considered to be the most appropriate for the specific trait. A few characters are recorded in laboratory tests.

Assessment of agronomic value

In each of three locations characterised by Mediterranean climatic conditions, one autumn sowing is required and the traits of interest are recorded in three consecutive growing years. Three replications of 8-m² plots are drill-sown, with eight rows 20 cm apart, at 30 kg/ha seed rate.

Selected criteria

Twenty-three morpho-physiological traits are required for the DUS assessment in both species. Table 1 reports a selected list of them, together with the plot type for their evaluation and the number of classes defined for each trait.

Table 1. Selected list of characters for assessment of the criteria of distinctness, uniformity and stability in burr medic (*Medicago polymorpha* L.) and annual ryegrass (*Lolium rigidum* Gaud.) varieties.

Burr medic			Annual ryegrass		
Character	Plot type	No. of trait classes	Character	Plot type	No. of trait classes
Presence of leaflet marks	A	4	Plant width	A, B	5
Type of leaflet marks	A	5	Growth habit at heading	A, B	5
Position of leaflet marks	A	6	Heading time	A, B	5
Flowering time	A, B	5	Alternativity	A	5
Pubescence on upper leaflet surface	A	2	Natural plant height at heading	A	5
Density of pod whorls	A	3	Flag-leaf length	A	5
Direction of pod whorls	A	2	Flag-leaf width	A	5
Texture of whorl edges	A	3	Length of main stem including head	A	5
Length of whorl spines	A	3	Head length	A	5
1000-seed weight	C	3	Head density	A	5

A: spaced-plant trial; B: row-plot trial; C: laboratory test

Table 2. Traits evaluated for assessment of the agronomic value in burr medic (*Medicago polymorpha* L.) and annual ryegrass (*Lolium rigidum* Gaud.) varieties.

Character	Calendar of recording
Dry-matter yield	In each of 3 growing years: sampling on 0.5 m ² at each grazing cycle (under actual grazing) or each cut (under simulated grazing) with vegetation ca. 15 cm high
Seed yield	In summer at the end of each growing year: count of seeds in a 30 × 30 cm sampling area
Autumn self-regeneration	At the beginning of second and third growing year: count of emerged seedlings in two 30 × 30 cm sampling areas

In both species the appraisal of the agronomic value is based on three pillars of paramount importance for self-reseeding pasture species, namely, dry-matter yield, seed yield and autumn self-regeneration (Table 2).

The establishment of a voluntary register for *M. polymorpha* and *L. rigidum* can contribute to safe-

guarding these self-regenerating forage species of the Mediterranean area in a continuing trend of genetic erosion.

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