

Methodology and procedures for the official registration to the national catalogue and for the assessment of quality requirements of new durum wheat varieties in Italy

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Introduction

Listing of varieties of agricultural species of major economical importance, including durum wheat, is mandatory in the EU to market seed. The official registration of new durum wheat varieties is based on a defined procedure described in Decree of Ministry of Agriculture n° 182 of 8 May 2001. The aim of registration is to verify whether the candidate variety meets the requirements prescribed by EU directives in respect of its identification characteristics (distinctness, uniformity and stability - DUS) and its value for cultivation and use (VCU). Within this process, the durum varieties assessed parameters aim to check the suitability of the candidate variety to the specific use of production of "pasta". For this important use the evaluation concerns Quality Global Index (QGI) calculation. Just varieties reaching a minimum level for QGI, in comparison with a panel of reference varieties selected within the most diffused varieties at national level, are listed. Side to the listing procedure, on a voluntary basis upon request of the breeder, durum wheat varieties may also be assessed for their quality characteristics in order to enter a special list of quality varieties. The current legislation related to the admissions to specific aid is EU Regulations 2237/2003 and 1973/2004. QGI is also assessed for applicant variety in a national network in comparison with a panel of the top five diffused varieties.

This poster is focused on the assessment of quality characteristics of durum wheat varieties as the main component of the "value for use".

Registration procedure: tests and participants

The registration procedure (Figure 1) is structured in descriptive, agronomic and qualitative tests. These tests allow a variety technical examination. The overall responsibility for registration activities in Italy is up to the Ministry of Agriculture (MIPAAF). The coordination of technical activity has been mandated to Ente Nazionale Sementi Elette (E.N.S.E.), the National Seed Certification Agency. Its role concerns the scientific management of the procedure (tests planning, preparation and distribution of the seeds sample to the participants, design of the experimental protocol, realization of the descriptive and electrophoresis tests) and also the verification of technical parameters. The network of participants to official registration and to qualitative analysis for specific aid is illustrated in Figure 2. In Table 1 the number of locations related to different scope, test and position on Italian territory is specified.

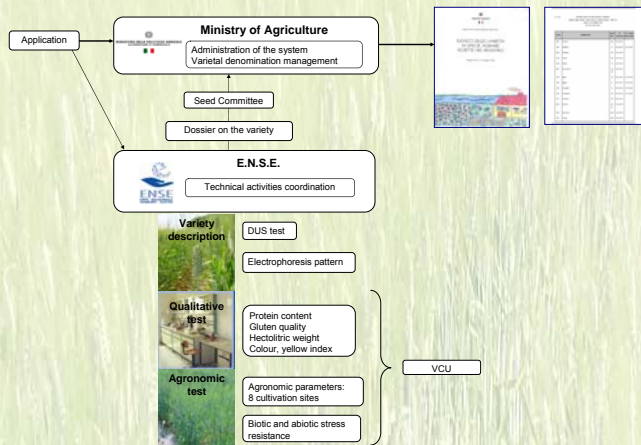


Figure 1: Registration procedure

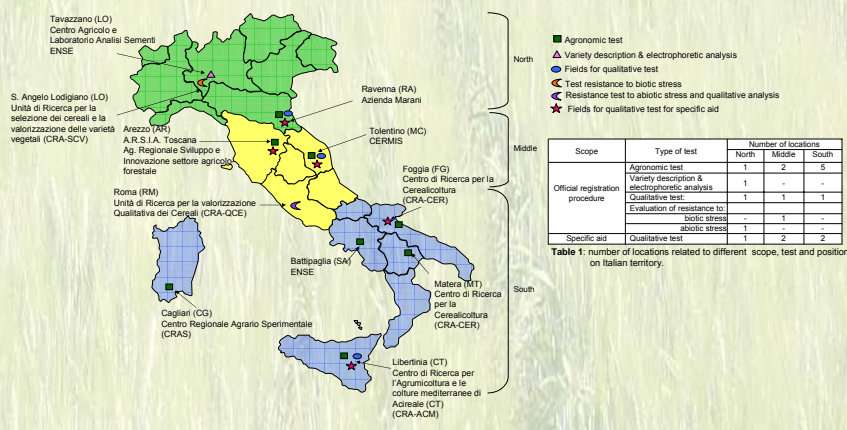
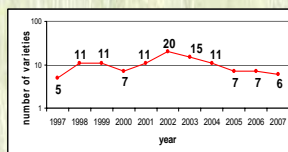


Figure 2: Network of tests locations

| Scope | Type of test | Number of locations | | |
|---------------------------------|--|---------------------|--------|-------|
| | | North | Middle | South |
| Official registration procedure | Agronomic test | 1 | 2 | 5 |
| | Variety description & electrophoretic analysis | 1 | - | - |
| | Qualitative test | 1 | 1 | 1 |
| | Evaluation of resistance to: biotic stress | 1 | 1 | - |
| Specific aid | Qualitative test | 1 | 2 | 2 |

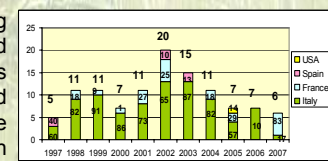
Table 1: number of locations related to different scope, test and position on Italian territory.

The trend of Italian listed varieties in the last decade is shown in Graphic 1. The number of listed varieties showed a positive trend from 2002 to 2005, then it can be note a decreasing one. The total number of varieties listed in the national catalogue on 31 December 2007 is 179.



Graphic 1: varieties listed in national catalogue from 1997 to 2007

The listed varieties come from different breeding countries: Italy and France are the most represented (Graphic 2). While Italy is the main, in 2007, it shows a reversal condition: only 1 of the 6 listed varieties came from national breeding. During the examined period other breeding countries are Spain and USA (1 variety in 2005).



Graphic 2: Breeding countries and their relative contribution to the number of listed varieties

Quality characteristics

During the registration procedure, an electrophoretic analysis related to seed storage proteins is carried out. This analysis is performed to obtain variety pattern with reference to its glutenin high molecular weight (Glutenin HMW) subunits composition. The content of glutenin subunits is closely related to dough quality. In Figure 3, electrophoregrams of Glutenin HMW referred to some durum wheat varieties is shown. It is important to note the presence of 2* and 7+8 subunits, codified from loci *Glu-A1* and *Glu-B1* respectively, that are coupled with gluten strength.

QGI calculation

Quality global index (QGI) results from four qualitative parameters linked to specific different weights. The quality parameters considered and their relevant weighting are: protein content (40%), gluten quality (30%), hectolitic weight (10%) and colour or yellow index (20%). QGI value, compared to production indexes, based on the yields obtained in different cultivation areas, highlights a ratio between quality and production (Table 2). There is an inverse relation between quality and production: as quality increase it is acceptable a lower production level and viceversa. In case of production indexes lower than 85 or QGI value lower than 95 the examined variety is not listed. All the tests needed to calculate QGI are carried out by CRA-Centro di Ricerca per la Cerealicoltura (CRA-CER).

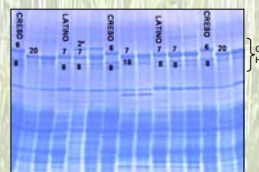


Figure 3: electrophoregram of durum wheat varieties in comparison with reference varieties (Creso and Latino)

| QGI | Production indexes | | | |
|--------|--------------------|-------|-------|---|
| | 85-94 | 95-99 | ≥ 100 | |
| 95-100 | R | L | L | L |
| > 100 | L | L | L | L |

Table 2: relationships between production indexes and QGI (for R-combination the variety is rejected while for L-combination the variety is listed)

Specific aid

QGI is also the key parameter to enter the list of quality varieties having the right to receive the specific aid as to EU regulation 2237/2003. The network for the evaluation include 5 locations (Figure 2, Table 1). QGI of the candidate varieties is compared with a panel of top five diffused varieties. In the aim to enter the list of quality, variety has to provide QGI ≥ 98. The evaluation have to be repeated every third year. The variety is kept on the list for five years. The activity started in the season 2004/05. The first list, that was established in 2006 by Ministerial decree, admitted 152 varieties. For the sowing season 2007/08, 117 varieties have been admitted in the list.

Conclusion

Quality requirements are key issues for listing of durum wheat varieties in Italy (Directives 2002/53 and 2003/90). The Quality Global Index (QGI) is an experimental index which showed to reach the target to identify quality varieties for "pasta". The index is also recognized by EU for specific aid to durum wheat produced in traditional areas.

References

- Decree of Ministry of Agriculture n° 182 of 8 May 2001.
- EU Regulation 2237/2003,
- EU Regulation 1973/2004,
- Directive 2002/53/EC
- Directive 2003/90/EC