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ANALYSIS FOR THE QUALITY CONTROL OF LUPINE SEEDS

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INTRODUCTION

The success of lupines as a commercial crop depends on the species and the variety use, which need to be the most suitable for the cropping area, but also on the quality of the seed sowed. Low seed quality never has a good crop performance and does not reach high yields. Before sowing the farmer must be sure that the seeds are viable and with good physiological properties that guarantee the germination and seedling establishment in the field. The international rules for seed testing of the International Seed Testing Association, known as ISTA Rules, establish and provide definitions and standardized methods for testing seed lots, that helps the farmer to know the quality of his own seeds, and to establish parameters in national and international seed trades. It is well known that seed deterioration processes can start immediately after the seed reaches the physiological maturity. One of the most common causes of seed deterioration is the loss of cell membrane integrity. As part of a research projects several seed coat studies and physiological tests in species of *Lupinus* were conducted to establish the best methods to evaluated seed quality. The seed coat plays an important role in seed longevity since it is the first barrier against adverse environmental conditions, providing the embryo and other seed components (endosperm remnants layers) with physical and chemical protection against cellular rupture during imbibitions; since it also regulates water uptake rate.

MATERIALS & METHODS

The quality of six lots of *Lupinus albus* seeds were evaluated by the tests of standard germination percentage (GP), the topographic tetrazolium test (TT) and the electrical conductivity (EC), following ISTA Rules. Field assays were carried out in order to correlate the laboraory tests with the field performance of the different seed lots. Besides, Tetrazolium Test (TT) was used to seek the water entrance during imbibition.

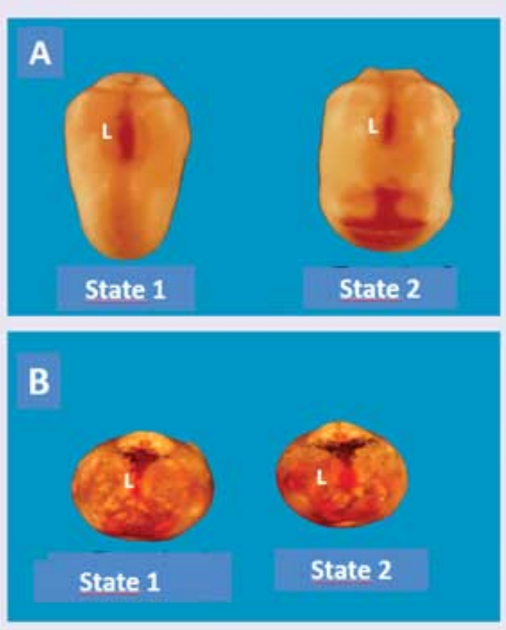

Figure1: Tetrazolium Test showing water pathway during imbibition.
A, *L. albus*; B, *L. angustifolius*; L=lens

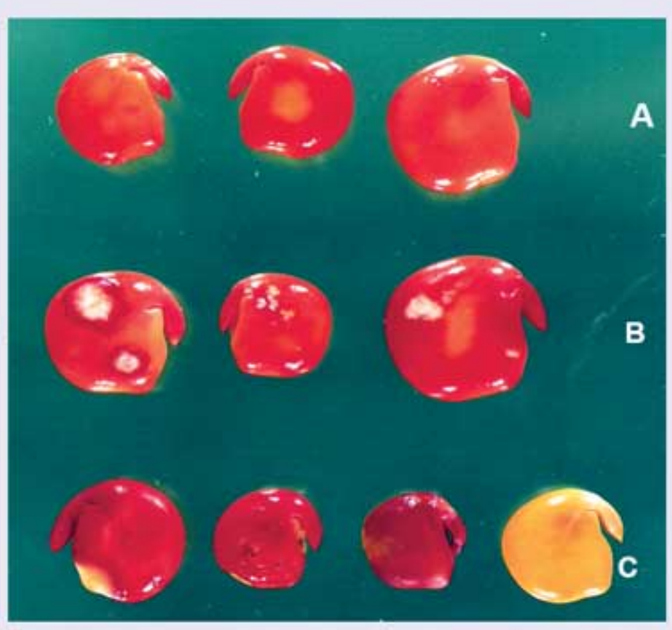

Figure 2: Vigor categories according with Topographic Tetrazolium Test.
A, high vigor; B, medium vigor; C, inviable

RESULTS & CONCLUSION

The Tetrazolium Test (TT) shows that the water entrance during imbibition is throught the hilar area and the pores in the lens (Fig. 1), and the seed vigor confirmation following the ISTA rules, which establish that the tissues stained carmine red were considered alive and vigorous, the tissues stained deep carmine red were considered to be deteriorated and the ones that remained colorless or milky white were regarded as dead (Fig. 2). The GP test revealed significant quality differences between seed lots in relation with the year in which the seeds were harvested and the way they were storaged. The EC values correlated negatively with field emergence and correlate better than the GP test. Seed lots of white lupines with high EC values ranging between 112.7-307.5 S cm^{-1} showed lower GP than the ones with EC values between 67 and 73.5 S cm^{-1}. The higher EC values could be explain as a consequence of the deterioration process of the embryo membranes that result in a poor seed lot quality. The results shows that between the different vigor tests evaluated, the EC test did provide consistent advantages in the discrimination between seed lots with similar GP values, but different physiological qualities, consequently it showed to be reliable to predict field performance, in a quick way and at low-cost.

Relation between: Electrical Conductivity (EC), Germination Percentage (GP), and Field Emergence (FE) for six seed lots of *Lupinus albus*

Cultivar	EC (µS.cm^{-1})	GP (%)	FE (%)
Lolita 1999	307.5 ± 2.4 e	1 a	0 a
Rumbo 1999	224.5 ± 1.5 d	37 b	2 a
Typ Top 1999	67 ± 3.2 a	85 cd	78 b
Lolita 2000	112.7 ± 0.7 b	91 d	87 b
Rumbo 2000	162.5 ± 1.5 c	79 c	81 b
Typ Top 2000	73.5 ± 4 a	92 d	81 b

Values with the same letter do not differ significantly (p<= 0.0001) *

CONCLUSION

The research allowed to establish that a value of 162.5 ±1.5 mS cm^{-1}, is the highest accepted in order to identify high performance seed lots. The pores in the lens regulate the water pathway during imbibition.

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