

USE OF A SIMPLE METHOD FOR FROST TOLERANCE SCREENING IN LARGE POPULATIONS OF CEREALS

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Phenotype of a given crop genotype can vary markedly according to its interaction with the environment. The availability of screens that powerfully discriminate between genotypes for important traits such as stress tolerance and that can be applied to a large population has been emphasized by Miflin (*J. Exp.Bot* 51: 1-8, 2000), together with the need to develop a “phenocentric” approach necessary to balance the massive progress that is being made in genomics. During the last decade we have analysed frost tolerance in barley materials of different origin using survival, electrolyte leakage method, and chlorophyll fluorescence. In the present work, we have grouped 55 genotypes of different origin and winter survival capacity, previously tested in several distinct laboratory experiments and field trials. The set of genotypes selected here represents a sample of the diversity of frost tolerance existing in Europe and includes cultivars released in Northern Italy, and in Northern and Eastern Europe, i.e. in zones prone to more severe stress conditions; and new breeding materials. The experimental conditions and measurements for testing a large number of genotypes have been optimized in the simultaneous comparison of these materials. The first analysis of frost tolerance and their components was performed by changing environmental conditions (temperature, light intensity) during hardening. The genotype-environment interaction under natural conditions was taken into account by comparing our laboratory experiments with preliminary common field trials conducted in Italy and Poland. The analysis presented here may be applied to larger populations and exploited for breeding purposes and mapping association studies. Further investigation is in progress to elucidate the diversity of strategies contributing to survival at low temperature.