A BREEDING APPROACH TO DISCRIMINATE BARLEY FOR MALTING APTITUDE

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In Italy most of the malting barley varieties are north European spring malting genotypes sowed in November-December in Central and Southern regions. In the Mediterranean conditions, the cultivation of winter malting barley should be preferred. Selecting for highly productive winter malting genotypes, which can compete economically and qualitatively with winter feeding barley, is a major aim of our breeding programs. However, the Mediterranean climate renders it difficult to evaluate the malting aptitude of a breeding line as warm summers and erratic rains make quality dependent upon location and year of harvest. Therefore, it is specifically necessary to rely on a malting quality evaluation system which is the least sensitive to erratic weather events over the growing seasons, and which should be able to compare results from different location and sowing times. In fact, comparison of malting aptitude of the new winter genotypes with the popular spring varieties is an essential task for the successful spread of the formers. Simultaneous determination of different variables can give a more reliable picture of substantial differences between populations when observations from diverse conditions are reported. Indeed, considerable overlapping between malting and feeding barley over contrasting environments may occur in univariate analysis; instead, the use of two parameters at a time improves the differentiation of the two populations. Aim of this work was to find out the best set of parameters to select for malting quality in the variable Mediterranean conditions. We considered varieties with contrasting (malting vs. feeding) quality and used Discriminant Analysis (a technique used to identify the best function discriminating groups in a multivariate space), to find out minimal set of parameters with optimised capability in distinguish malting aptitude. This task was performed by: 1- choice of the best parameters, on a representative core of samples (pre-calibration), 2- re-modulation of coefficient on an extended set of samples (calibration), and 3- validation on a new set.

A discriminant function combining hot water extract, wort viscosity, and acrospire growth, produced a score that was only slightly less able to discriminate malting quality than if all the measured parameters were included. The score worked out by Discriminant Analysis permitted to define a threshold above which 95% of the samples of good quality malting barleys, and only 11-15% of poor quality feed barleys, scored.

Although more extended quality evaluation is still necessary in characterizing advanced lines before release, this approach can be useful in optimising quality evaluation in breeding programs by defining the minimal core of parameters to be used. It is useful especially when values obtained from different locations or years have to be compared.