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Identification and characterization of Winter cereal cultivars tolerant to the stress conditions of the Mediterranean climate

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In a recent and interesting publication of CIMMYT and ICARDA, Morris *et al.* [1] indicate that in rainfed marginal environments of West Asia and North Africa, about 15 million ha are located in zones receiving less than 500 mm annual rainfall. Moreover an additional 12 million ha are planted with barley in lower rainfall zones. Reading this paper may lead to the conclusion that marginal environments are confined to the African and Asian countries bordering the Mediterranean sea. On the contrary drought and heat stress are a recurrent phenomenon throughout the Mediterranean basin and thus also in Southern European countries such as Italy, Spain, France, Yugoslavia, Greece.

In recent years we have become aware of the fact that the yield potential of modern Italian cultivars largely depends on their better adaptation to drought and heat stress conditions. This hypothesis was confirmed when we established a network of variety trials throughout the Italian peninsula, from the fertile zones of the Po Valley, where annual rainfall is around 800 mm, to the semi-arid zones in Apulia and Sicily with less than 300 mm of rain. In spite of the remarkable differences in climatic conditions, the best cultivars bred in the Po valley performed equally well all over Italy, including the extreme South (figure 1). The results of the durum trials likewise indicate that a variety bred in Rome gives positive results in all environmental conditions (figure 2) and similar conclusions have been reached with regard to barley [2].

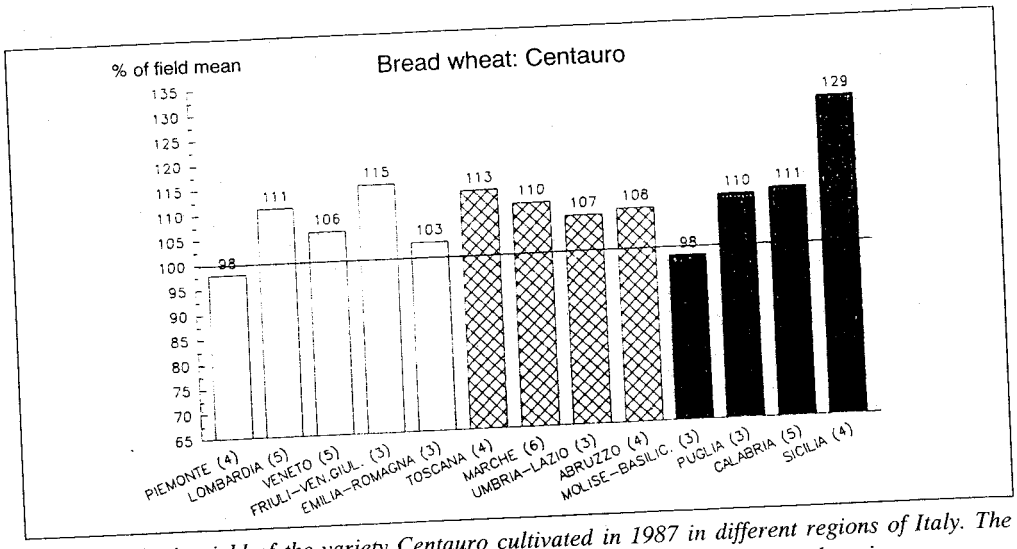

Figure 1. *Grain yield of the variety Centauro cultivated in 1987 in different regions of Italy. The regions are listed from North to South. In brackets the number of locations in each region.*

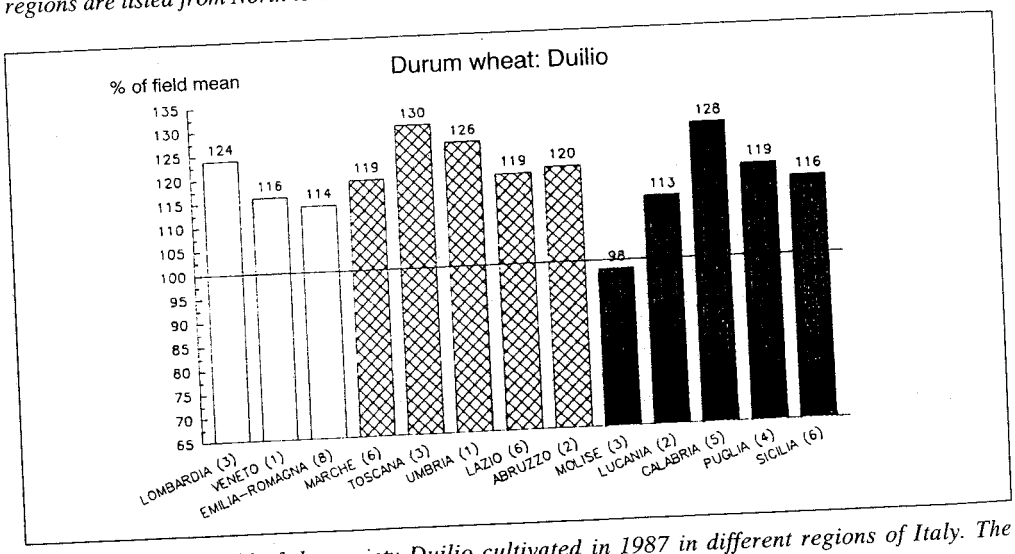

Figure 2. *Grain yield of the variety Duilio cultivated in 1987 in different regions of Italy. The regions are listed from North to South. In brackets the number of locations in each region.*

The evaluation of yield under stress is rendered difficult, however, by the extensive genotype X environment interactions. This calls for a larger number of trials repeated in time and space than in more fertile areas [3-6]. A complementary approach is to calculate susceptibility indices based on the comparison of yield performance in the presence and absence of events causing stress, as suggested by Fischer and Maurer [7]. We have therefore calculated susceptibility indices for the varieties of bread wheat, durum wheat