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Barley ideotyping for the adaptation to heat stress in the Mediterranean basin. A bibliometric search approach

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Barley is a widespread crop in the Mediterranean area and in temperate climates. Barley impact in the food chain is very important for its value as food and feed. The societal demand is for more productive varieties, which can be able to cope with the current and future climate scenarios. Change in climate is expected to result in more adverse conditions for the barley growth and alter land suitability in its growing regions, such as the Mediterranean basin. In this context, laboratory and modelling activities for the so-called “in silico ideotyping” can be effectively carried out to design new germplasms and to define optimal field management practices. As a first step to reach this objective, we collate the available scientific research about the identification of optimal phenotypic traits for the adaptation to harsh environments. In the framework of the GENDIBAR project (Utilization of local genetic diversity for studying barley adaptation to harsh environments and for pre-breeding; PRIMA European Funding Programme), a bibliometric analysis was carried out in the SCOPUS database with the aim to find published papers about barley adaptation in relation to changing climate. The initial query was (barley AND climate AND adaptation); it contained few keywords and resulted in less than 200 publications. By adding (barley AND ideotyping OR barley AND phenotyping), the search reached 450 records. The most comprehensive search was achieved by adding another OR condition (Barley AND future climate OR climate change) that yielded more than 1000 results. Although these records seemed relevant, a deeper analysis showed that less than 5% of these studies are of real interest and moreover the manual screening of the abstracts of all records will require around a month of work. The second query represents a compromise between the simplest query (barley AND climate AND adaptation) and the last query made by three conditions bonded together. This literature search approach highlighted the results of manipulative experiments and modelling studies for deriving phenotyping and agronomic traits to address in-silico ideotyping design. However, the search outcome suggests that there is a gap of knowledge about the barley phenotypic traits needed to cope with climate change in the semi-arid and arid regions of the Mediterranean basin. This approach is expected to further provide useful information for the development of land suitability models, as well as for barley breeding.