

MULTI-POPULATIONS QTL MAPPING FOR FIVE MORPHO-PHYSIOLOGICAL TRAITS RELATED TO WEED COMPETITIVE ABILITY IN BREAD WHEAT (*TRITICUM AESTIVUM* L.)

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Wheat (*Triticum aestivum* L.) weeds represent one of the most harmful agronomic concern, impacting on yield by inducing losses up to 92%, particularly in low-input, organic systems. It is becoming evident how increasing wheat ability to rapidly cover the soil, being directly related to both yield and competitiveness against weeds, may represent a breeding target to improve the yield performances of bread wheat. For these reasons we investigated the genetic control of five morpho-physiological traits (Heading Date, Plant Height, Juvenile Growth Habit, Total number of tillers and Total number of fertile tillers), chosen among the most important for wheat productivity, in F2:F3 and F6:F7 generations derived from a cross between the cultivars Lankaodali and Rebelde. A total of 176 F2:3 and 178 F6:7 lines were phenotyped during four growing seasons and samples from the early and late (F2 and F6) generations were genotyped with an Illumina Infinium 15K SNP array. The genetic map resulted in 39 and 38 linkage groups in the F2 and F6, respectively, with a coverage of 2,486.78 (F2) and 3,732.83 (F6) cM. A total of 50 QTLs were found in both populations, of which 38 were detected only in the F2:3, suggesting their dominance effect. QTLs explaining the highest phenotypic variation were found on chromosomes 2B, 2B, 5A and 7D for heading date and juvenile growth habit, whereas those for plant height were found on chromosomes 4B and 4D. Some of them were found in the same regions of photoperiod-responsive (Ppd-1), vernalization requirement (Vrn-1) and dwarfing (Rht-1) genes, confirming their role for controlling the morpho-physiological traits. In addition, more than one trait co-mapped in the same genomic regions, indicating linked and/or pleiotropic effects. Overall, our work showed the potential of F2-derived population to identify major QTLs in bread wheat, as well as their dominance effects.