

Phenotyping and an exploratory genome-wide association study for oat seed and seedling vigor at subtropical temperature

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Seed and seedling vigor are both crucial for crop establishment and are especially important for forage production. However, published studies of oat seed and seedling vigor are relatively few. Therefore, the objective of this study is to investigate the genetic architecture of traits related to seed and seedling vigor using a diverse oat panel. We phenotyped 126 oat lines, consisting of 103 lines selected from the Collaborative Oat Research Enterprise (CORE) association mapping panel and 15 landraces selected from the National Small Grains Collection (NSGC). Experiments were conducted in a growth chamber at 25°C to simulate a subtropical environment. For each line, ten seeds were set in a germination bag and photos were taken every 24 hours for 6 days to record their growth. The six traits evaluated were germination rate, percentage of germination, total root area, root growth rate, shoot length, and shoot growth rate. We performed an exploratory genome-wide association analysis using a mixed linear model approach. Loci identified in this study could be candidates for further investigation in order to better understand the genetics of seed and seedling vigor.