

Estimation of the genetic progress in oats (*Avena sativa* L.) in a set of historic cultivars in Chile

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The breeding program of INIA has developed the main cultivars of oats sown in southern Chile, with an average release of one cultivar every four years. In parallel, the national average oat yield has steadily increased during the past four decades from around 1.5 to 5.0 t · ha⁻¹, but it is unknown which proportion of this improvement can be ascribed to genetic progress. The hypothesis of this research was that there has been a significant effect of plant breeding in the last 45 years on grain yield (GY), hectoliter weight (HW), plant height (PH), lodging (LG), days to panicle emission (DPE), and disease reaction to crown rust (CR), Barley Yellow Dwarf Virus (BYDV), and halo blight (HB). A trial including 13 cultivars released during the past 45 years was sown at the INIA Carillanca Research Station (La Araucanía, Chile), using a completely randomized block design with four replicates during the 2016/17 and 2017/18 seasons (SN), and with two sowing dates (SD) in each season. Responses were modeled as a function of release year (RY) as quantitative predictor, and SN, SD and block as categorical regressors. A separate analysis of variance was conducted to estimate the interactions between genotype (G) and SD and SN (random). There was no relationship between RY and GY ($p=0.23$). There was a positive relationship between RY and HW ($p<0.001$). On the other hand, here were negative relationships ($p<0.001$) between RY and DPE, PH, LG, HB, and CR. There were random interactions ($p<0.05$) between G and SN for GY, HB, LG, and CR. These results suggest a genetic progress in most of oat's productive traits in the latest 45 years of INIA oat breeding program in Chile, with an important proportion of environmental variation in HW, LG, and HB. The lack of genetic progress in GY might be due, at least partly, to historical changes in agronomic managements used during the different breeding periods.