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Grain oil concentration of rapeseed under different source-sink ratios affecting grain weight

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The sensitivity of grain oil concentration under different source-sink ratios affecting grain weight and yield is central for breeding and management strategies of rapeseed. The objectives of this study were (i) to evaluate the response of grain oil concentration to source-sink reduction during grain filling and (ii) to assess the association between oil concentration and grain weight under different source-sink rates in rapeseed.

To meet the objectives 3 experiments were carried out in plots at field conditions in Valdivia, Chile (39°47´S). Experiment 1 assessed two winter rapeseeds: Trust and Mercedes (NPZ-Lembke, Germany) under two nitrogen fertilization rates (100 and 200 kg N ha-1) and three source-sink treatments (S-S): control without manipulation, reduced S-S ratio from the beginning of flowering to 15 DAF and reduced S-S ratio from 15 to 30 DAF. In Experiment 2 two spring genotypes: Lumen and Solar (NPZ-Lembke, Germany), were evaluated under two sowing dates and the same three S-S ratios than Exp. 1. The same treatments were set up in Exp. 3. Experiments 2 and 3 were sown after the two most used rotations in southern Chile, i.e. potato production (Exp. 2) and pastures for livestock production (Exp. 3). The S-S ratio was decreased by shading with black nets intercepting 75% of solar radiation assuring air circulation and pollinators access. The experiments were fertilized, irrigated when necessary and diseases, plagues and weeds prevented or controlled according with at the rates recommended by their manufacturers. At harvest, grain yield (GY), grain number (GN), thousand grain weight (TGW) and grain oil concentration were measured. Data were evaluated by ANOVA.

S-S treatments affected ($p<0.05$) GY, GN and TGW across the three experiments. Significant reductions were found in GN ($p<0.05$) by source reduction. On the contrary, TGW was increased ($p<0.05$) depending on the timing of S-S reduction showing differences in this behavior between winter and spring genotypes. Grain oil concentration showed more conservative than yield components and even increases ($p<0.05$) of this quality trait was found depending on the experiment and sowing date. Dilution effect of oil concentration and oil content of grains were not found in these experiments.