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https://doi.org/10.16886/IAS.2019.02
ICEL. AGRIC. SCI. 32 (2019), 17-20

Supplement

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Effects of reduced water availability and insecticide on damage caused by cabbage root fly larvae

Icelandic Agricultural Sciences 32, 17 - 20

SUPPLEMENTARY FIGURES

Figure S1. Summer precipitation (June-Aug) between 1961 and 2018 for the weather station in Hella, near the experimental site. The horizontal dashed red line indicates the long-term average. The vertical grey line indicates 2017, the year when the experiment was conducted. Our reduced water treatment (50.7 mm over 37 days) is comparable to the dry summer experienced in 2009, when summer precipitation was 115 mm over 92 days. (IMO [Icelandic Meteorological Office] 2017).

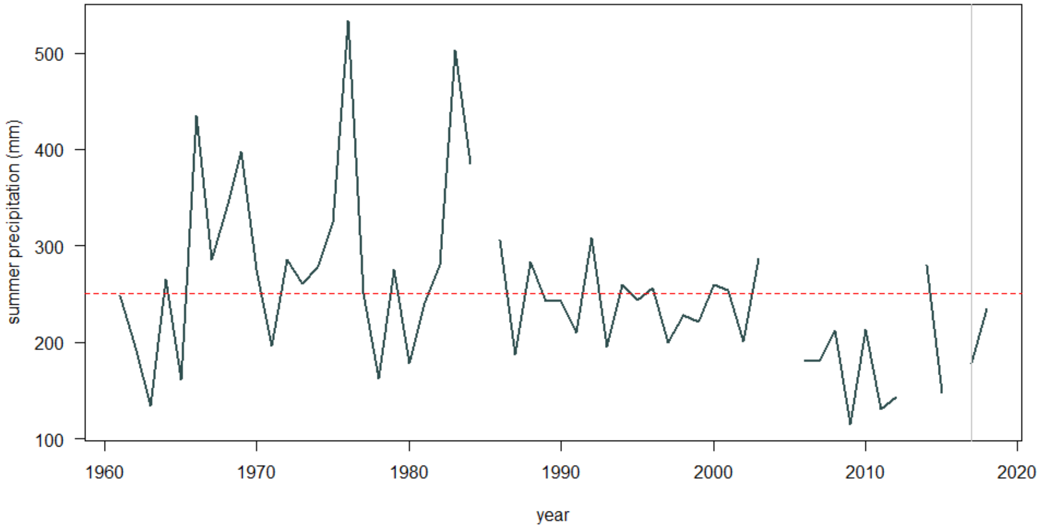
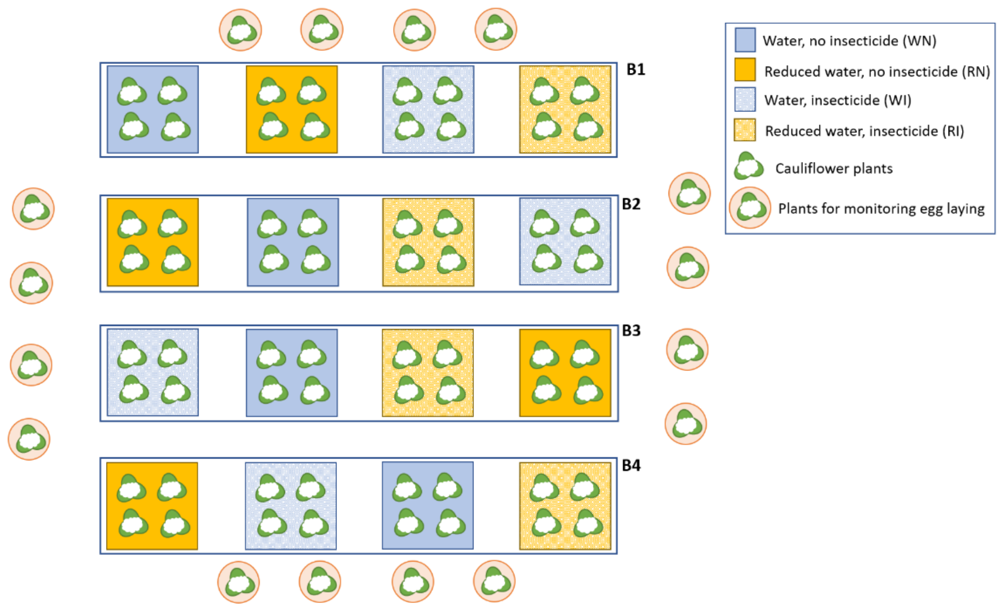


Figure S2. Experimental design. The experimental field was divided into four blocks (B1 to B4), each consisting of four 1x1 m plots, 0.5 m apart. Each of the plots within a block was randomly assigned to an experimental treatment: water and no insecticide (WN), reduced water and no insecticide (RN), water and pesticide (WP) or reduced water and insecticide (RI). Within each of the plots, four cauliflower seedlings were planted. In addition, four cauliflower seedlings were planted to each side of the experimental field to monitor egg laying by cabbage root flies.

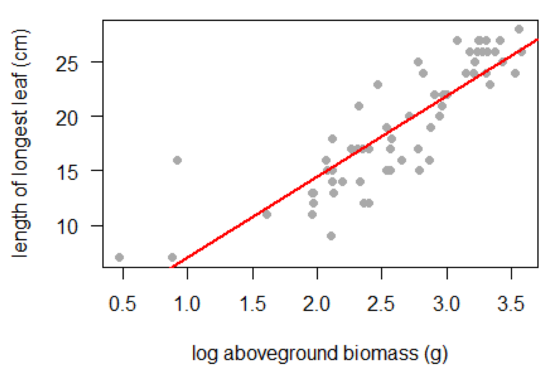


SUPPLEMENTARY MATERIALS S3.

Assessing differences in plant size at the beginning of the experiment

The length of the longest leaf of each plant was measured at the beginning (4 July) and the end (2 August) of the experiment, from the tip of the leaf blade to the beginning of the petiole. The measurement at the end of the experiment was used to establish the relationship between the length of the longest leaf and plant biomass (Figure S2). These two measurements were positively correlated ($r=0.86$, $df=61$, $p<0.001$), thus allowing the measurements of the length of the longest leaf to be used to confirm the lack of differences in plant size at the beginning of the experiment (Chi-square=1.38, $p=0.71$).

Figure S3. Relationship between length of the longest leaf at harvest and total plant biomass (log-transformed).



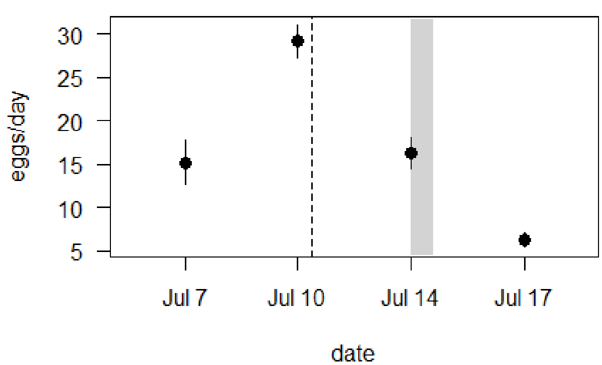
SUPPLEMENTARY MATERIALS S4.

Monitoring of egg laying by cabbage root flies

Egg laying by cabbage root flies was monitored between 4-17 July on 16 cauliflower seedlings planted to the sides of the experimental field (Figure S1a). Most egg laying for cabbage root flies occurs during this period in Iceland (Halldorsson 1989). Clean black sand (30 ml) was placed on the ground around the stem of the egg monitoring plants. After 3-4 days the sand was removed with a small spoon and stored in a 250 ml plastic cup and replaced with new sand. Egg laying was monitored on 7, 10, 14 and 17 July. In the laboratory, cabbage root fly eggs were extracted from the sand by flotation in water. Egg numbers were scored under a 5x magnification glass into the following classes: 0-20, 21-40, 41-60, and more than 60. Eggs were also observed under a compound microscope (Olympus SZ-CTV) for confirmation of species identification. Hatched eggs were already detected in the second egg count (10 July).

The rate of egg-laying was calculated as the number of eggs counted on each of the egg-laying monitoring plants (i.e. the median of each scored class: 10, 30, 50, or 100 eggs), divided by the number of days elapsed. To assess the spatial homogeneity in egg laying at the four sides of the experimental field, we used a linear model with the total number of eggs laid on each plant as the response variable and side of the plot (1-4) as a predictor. The relationship between the number of eggs laid on plants and leaf length on the first visit was explored using Pearson's linear correlation tests.

Figure S4. Rates of egg-laying by cabbage root flies between 4-17 July 2017 on cabbage seedlings planted around the experimental field. The number of eggs was counted on four occasions (date). The vertical dashed line indicates when the insecticide was applied (11 July) and the shaded box indicates the period when water availability was manipulated (17-26 July).



The average number of eggs laid on each plant per day during the monitoring period was highest between 7 and 10 July (mean ± SE = 29.17 ± 1.86 eggs/day) and decreased thereafter (Figure S3). The total number of eggs laid on each plant from 4 July to 17 July ranged between 140 and 310 eggs (mean ± SE = 216.88 ± 15.62 eggs). Egg laying was similar at the four sides of the experimental field ($t=1.099$, $p=0.290$), and data collected in the first visit indicated no correlation between the length of the longest leaf and the number of eggs laid on a plant (Pearson's linear correlation, $r=0.327$, $t = 1.295$, $df = 14$, p-value = 0.216), indicating that egg laying in the field was random and affected neither by plant placement within the field nor plant size.