

data_exploration

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Data import

Background information

This is the data of the whitefly development bioassay on hydroponically grown *S. chmielewskii* LA1840. Control plants were grown on standard hydroponics solution, inhibitor treated plants were grown on hydroponics solution with riboflavin synthase inhibitor. The raw data also contains the data of a simultaneously performed bioassay on MM. This data should be removed before analysis. After the fourth instar stage, whiteflies develop into adults, leaving behind the larval skin called exuviae. Nymphs in the last phase of fourth instar stage and exuviae were removed from the leaf after each count to prevent a whitefly outbreak in the greenhouse.

See metadata file for more information.

The raw data

id	genotype	treatment	date	day	stage	number	eggs_start
LA1840_c_1	LA1840	control	10/02/2022	2	0_egg	117	117
LA1840_c_1	LA1840	control	10/02/2022	2	1_first_instar	0	117
LA1840_c_1	LA1840	control	10/02/2022	2	2_second_instar	0	117
LA1840_c_1	LA1840	control	10/02/2022	2	3_third_instar	0	117
LA1840_c_1	LA1840	control	10/02/2022	2	4_early_fourth_instar	0	117
LA1840_c_1	LA1840	control	10/02/2022	2	5_late_fourth_instar	0	117
LA1840_c_1	LA1840	control	10/02/2022	2	6_exuviea	0	117
LA1840_c_2	LA1840	control	10/02/2022	2	0_egg	106	106
LA1840_c_2	LA1840	control	10/02/2022	2	1_first_instar	0	106
LA1840_c_2	LA1840	control	10/02/2022	2	2_second_instar	0	106

Preparing the data for analysis

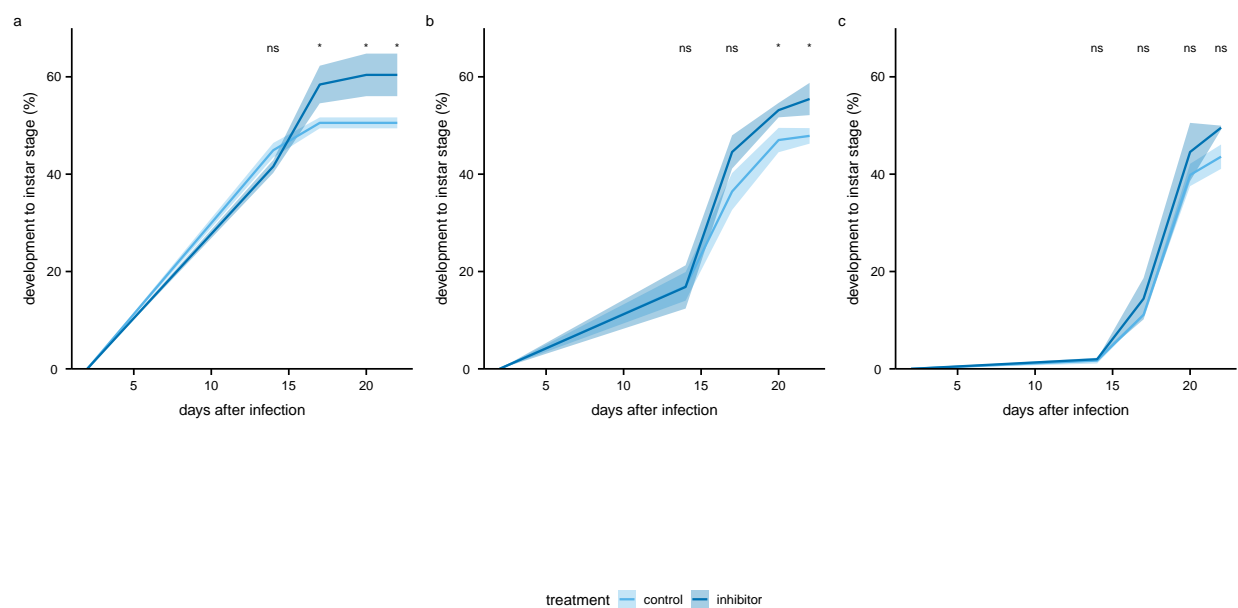
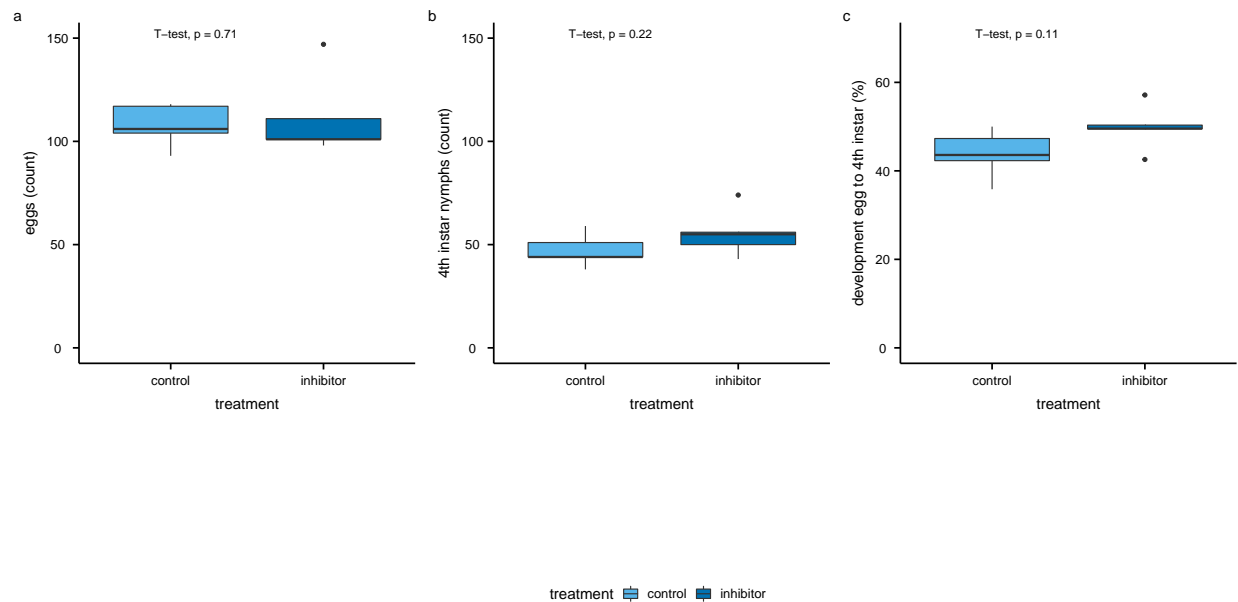
A few improvements to the data should be made before analysis.

First, the MM data must be removed.

Next, I make data wide for access to separate life stages.

Because the fourth instars are the end point and taken of after counting, combine fourth instars and exuviae and make their numbers cumulative over time.

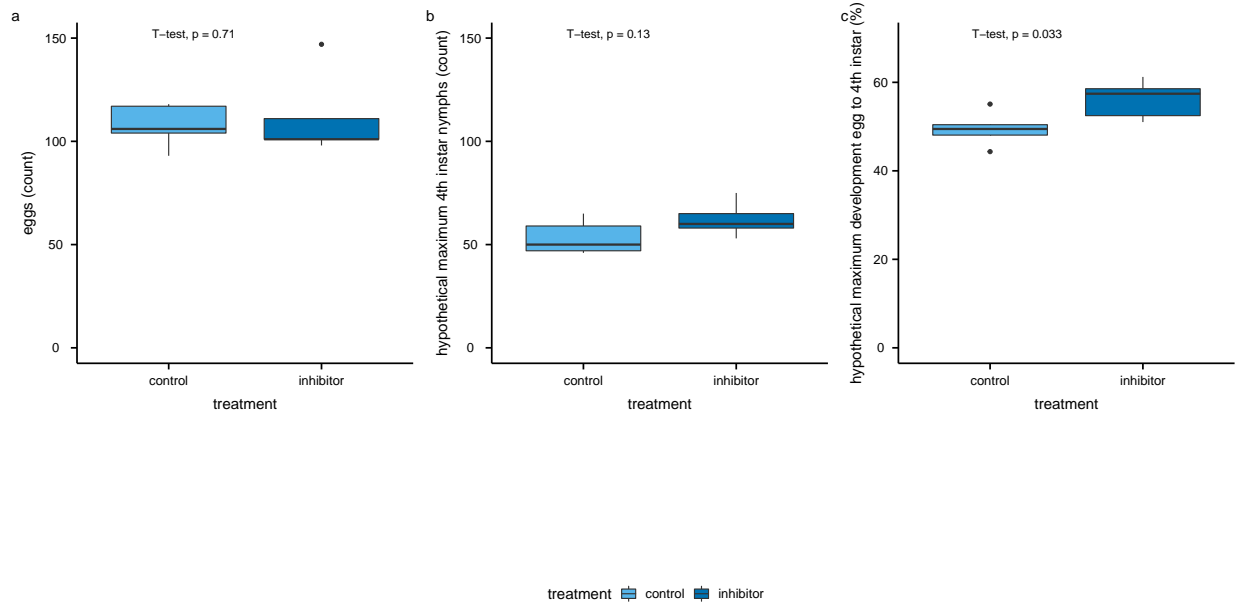
Remove separate and non-cumulative late fourth instar and exuviae columns.

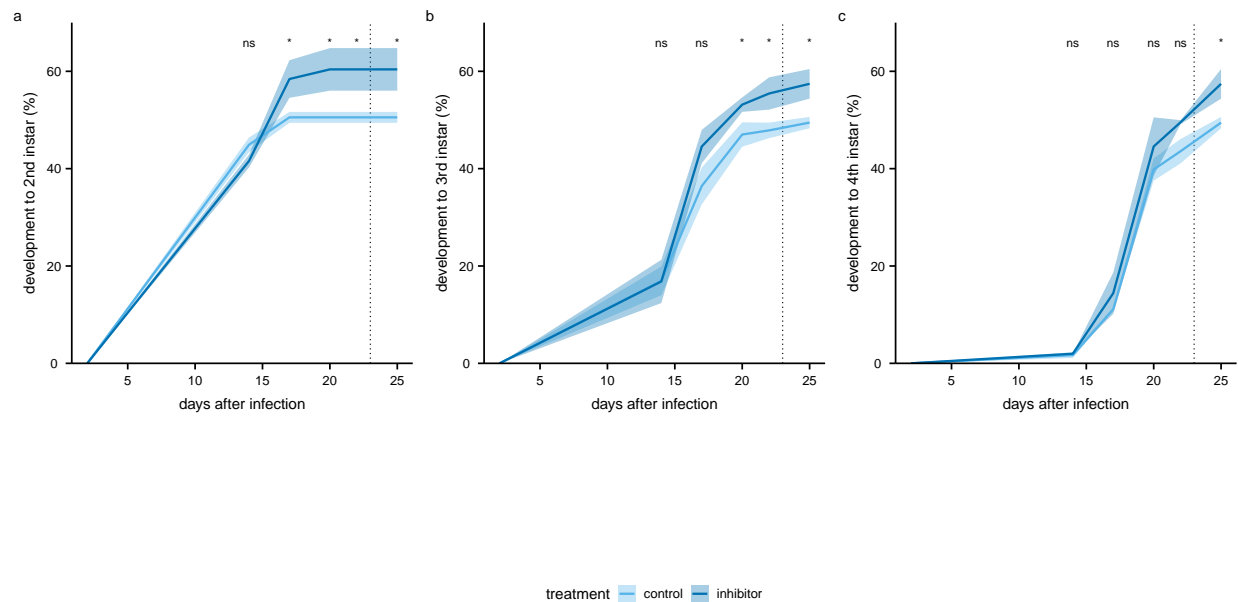


The development to 2nd and 3rd instars is significantly increased on the inhibitor treated plants, but not to 4th instar. From the shape of the graph it is clear that the maximum of nymphs developing to 4th instar stage was not yet reached. I will try to correct for this by calculating the hypothetical maximum number

still to develop to each instar stage (nymphs in instar stage at day 22 + nymphs of earlier stages still alive at day 22).

use all living nymphs at last count to calculate possible future maximum





The dashed line represents the end of the bioassay. Numbers at day 25 are the hypothetical maximum number of nymphs that could have developed to each stage.

The hypothetical maximum development to 4th instar nymphs is higher on inhibitor treated plants than on control plants.