

Alternative seed coatings against cabbage stem flea beetles (*Psylliodes chrysocephala* L.) in winter oilseed rape (*B. napus* L.)

Objectives: To assess the efficacy of alternative seed coatings (ASC) against CSFB attacking young winter oilseed rape plants in autumn. In laboratory biotests, we screened a total of 14 **Botanicals**, 11 **Biologicals** and a larger set of natural and synthetic **Elicitors** against CSFB feeding on plants in the cotyledon stage (BBCH 10) (no-choice tests). As the effects of biologicals and elicitors are expected to be indirect via induced changes in plant metabolites, we further analysed the metabolome of seed coated plants to detect biochemical polymorphism associated with a reduction in feeding damage (non-targeted approach).

Laboratory biotests

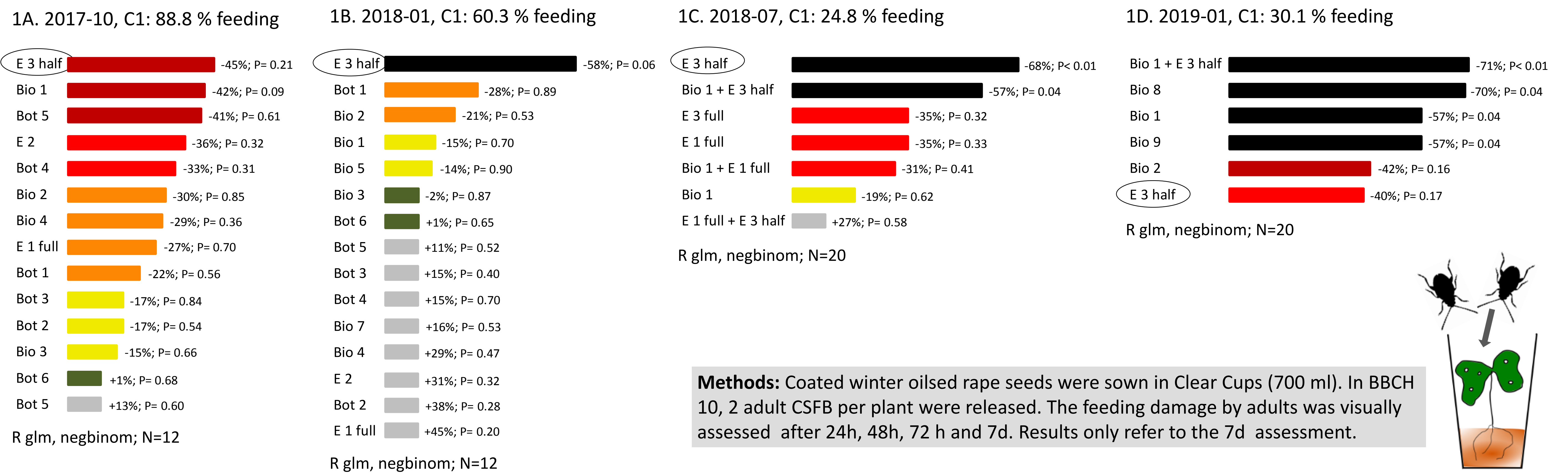


Figure 1 A.-D.: Reduction or increase of feeding (%) by adult CSFB for single alternative seed coatings (ASC) relative to the untreated Control (C1) 7d post release of 2 beetles per plant at BBCH 10. Reduction or increase of feeding by adult CSFB is classified into categories:

$\geq -51\%$
 $-41-50\%$
 $-31-40\%$
 $-21-30\%$
 $-11-20\%$
 $\pm 10\%$
 $\geq +11\%$

Biochemical analyses

Workflow non-targeted metabolome analyses: Plant material → Two-Phase Extraction → UPLC-TOF-MS → Data processing & Statistics → Clustering of markers with similar intensity profiles → Selection of clusters → Database query → Tentative identities for markers → Confirmation of chemical structure by MS-MS

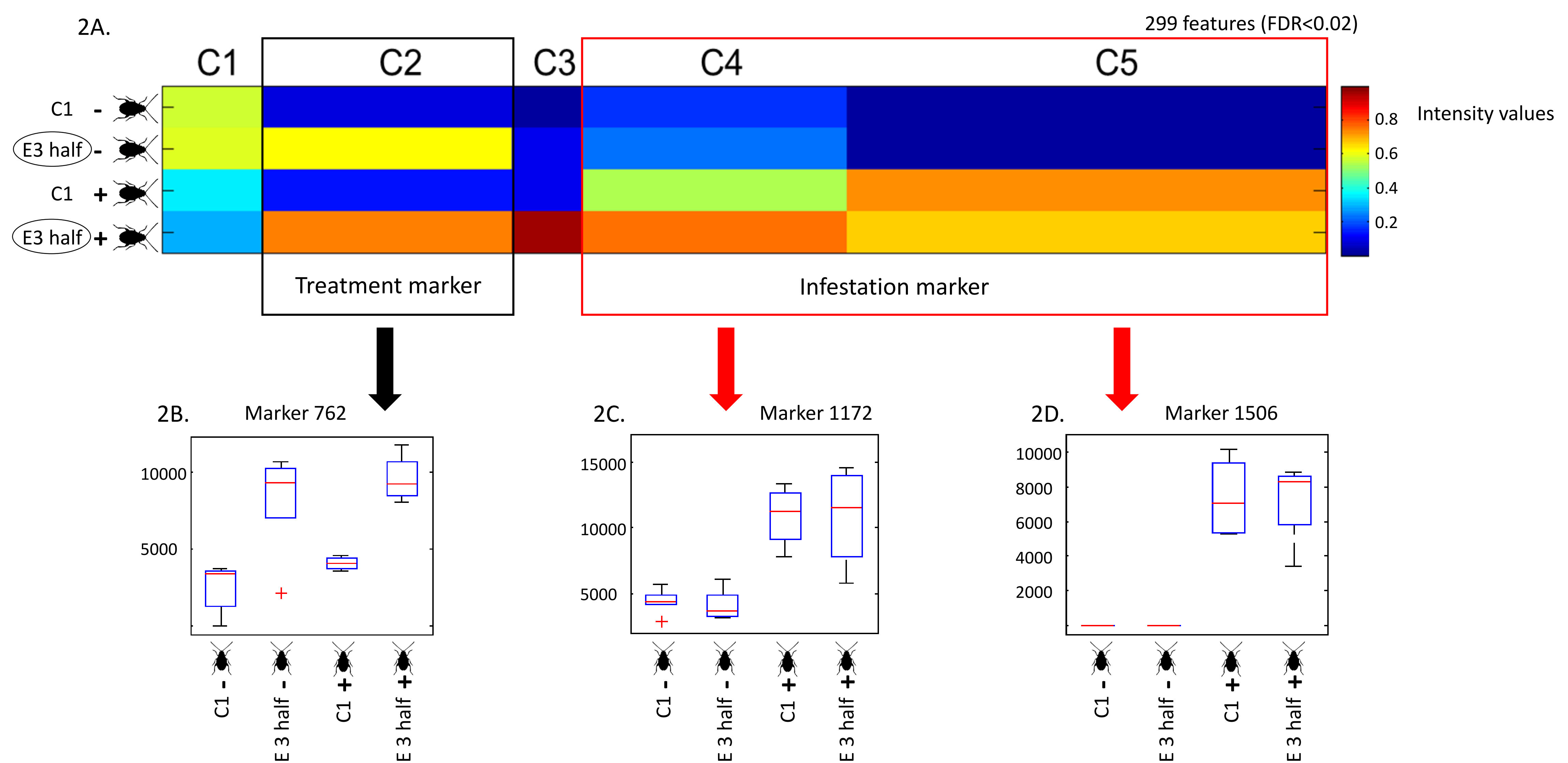


Figure 2.: Non-targeted metabolome analyses of winter oilseed rape plants (BBCH 10) with and without seed coating and infestation by adult CSFB. (A.) Clustering of 299 metabolite markers (FDR < 0.02) by means of one-dimensional self-organizing map (1D-SOM) within 5 clusters. Horizontal and vertical dimensions correspond to clusters and experimental conditions, respectively. Heat map colours represent average intensity values. Box plots refer to a prominent treatment marker (B.) and two infestation markers (C. and D.). For one sample 4 plants were pooled; N= 6 replicate samples for - plants and N= 4 replicate samples for + plants. + plants with homogenous feeding damage (20-25%). All samples were taken five hours after release of CSFB on + plants.

Conclusions

1. Single seed coatings with Biologicals, Elicitors and combinations of both clearly reduced the feeding damage of adult CSFB
2. High variability of data in laboratory biotests is due to the physiology of beetles
3. Metabolome analyses refer to biochemical polymorphism in terms of treatment as well as infestation markers
4. Treatment markers may lead to the identification of metabolites associated with an enhanced plant defence