Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Damage from the brassica pod midge *Dasyneura brassicae* in relation to landscape factors and abundance of the midge and the seed pod weevil *Ceutorhynchus obstrictus*

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Partnership Alnarp

Background

During the last decades, the Brassica Pod Midge (BPM) has not been a serious pest in Sweden, with very few exceptions.

During 2015, 2016 and 2017 serious and increasing damages from BPM have been observed in southern Sweden (province of Skåne), along with high populations of Seed Pod Weevils (SPW)

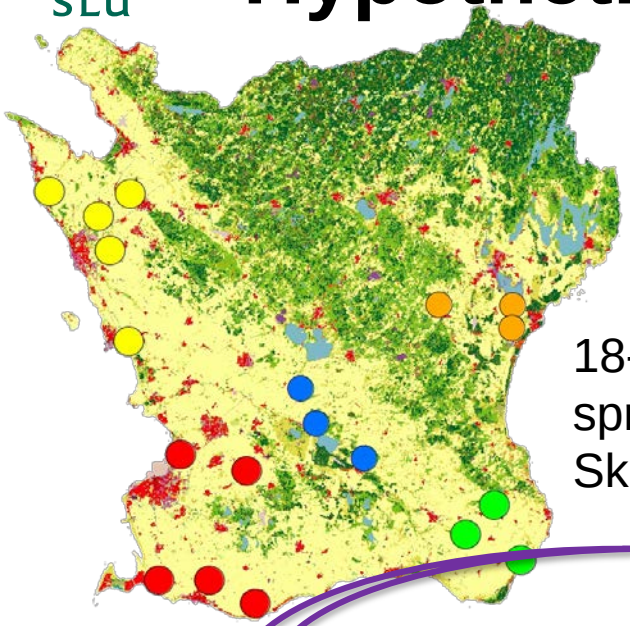
- Evidence-based management thresholds for the SPW are lacking

- No methods for population surveys of the PBM are implemented

- Effects of management actions are unclear and not systematically evaluated

- Which is the primary cause? Increase of BPM, increase of SPW, or a combination?

Hypothetical model of causal factors



18-19 sites
spread over
Skåne province

Chemical treatment levels
0-2 x (varying degrees against SPW)

Damages from
BPM

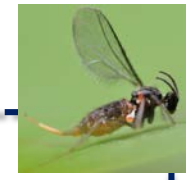
Distance to
last year's
OSR field

Landscape
complexity
(1000-4000 m)

Catch of SPW
Yellow Pan Trap,
Yellow Sticky Trap

Proportion of
OSR last year
(1000-4000m)

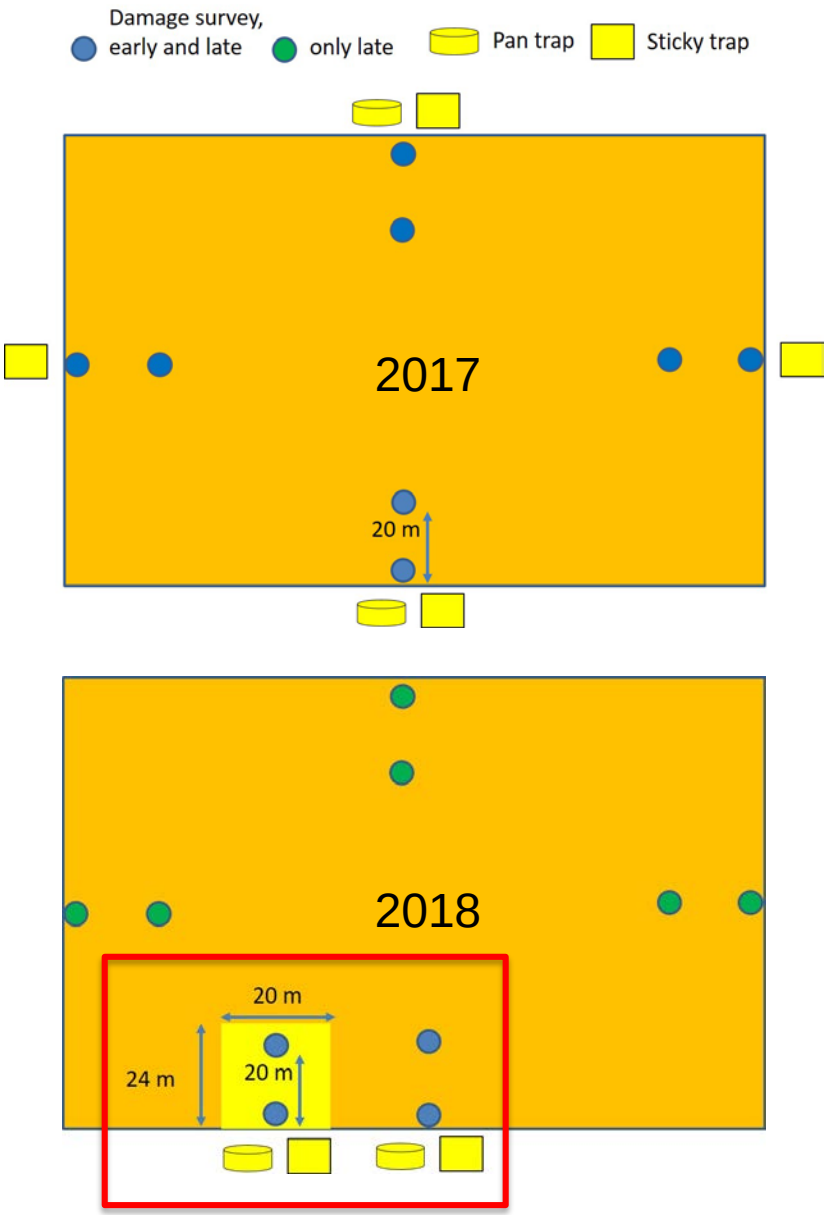
Catch BPM
Yellow Sticky Trap



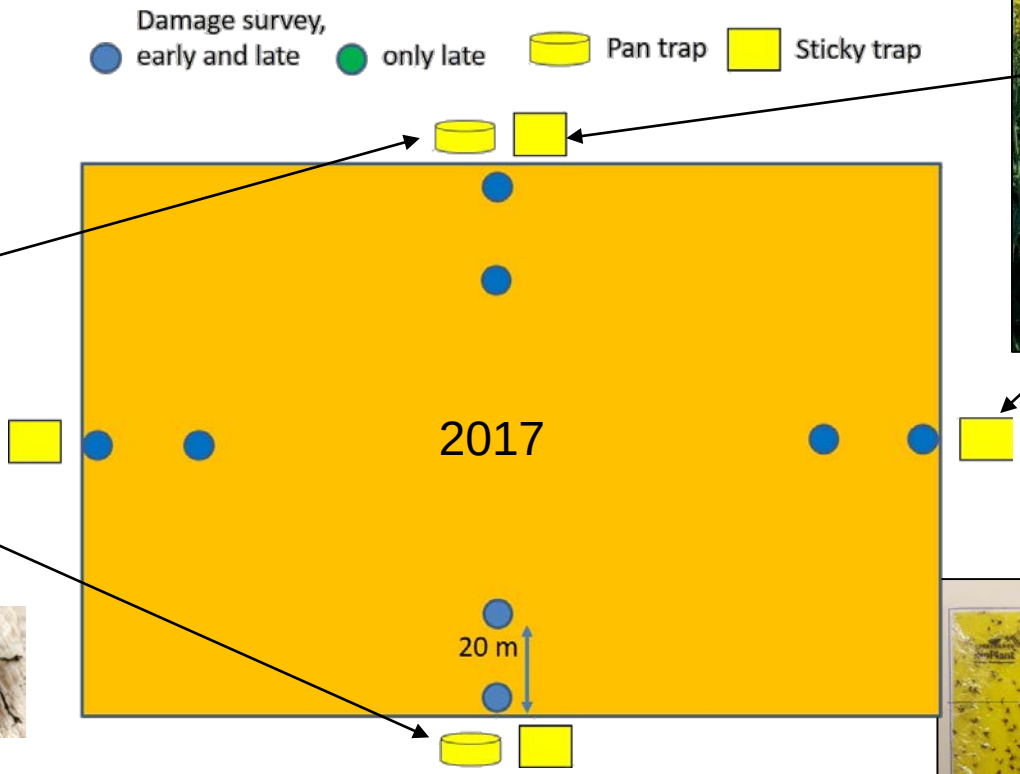
2018,
not yet for 2017

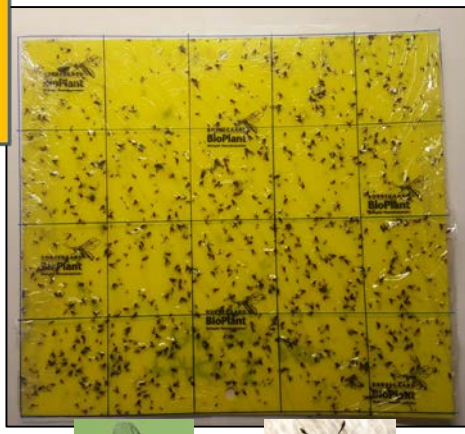
Surveys of damages from BPM

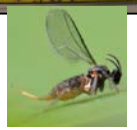
- 5-10-20 plants counted per point, at the edge and 20 m into the field.
- During early (June) and late pod maturation (July)
- Primary, secondary and third branches counted
- Proportion of damaged pods per plant
- Pesticide free control zone in 2018

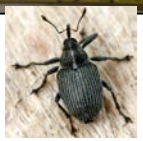


Field trapping (2017)









Two pan traps and four sticky traps per field
Emptied every week during
May-June

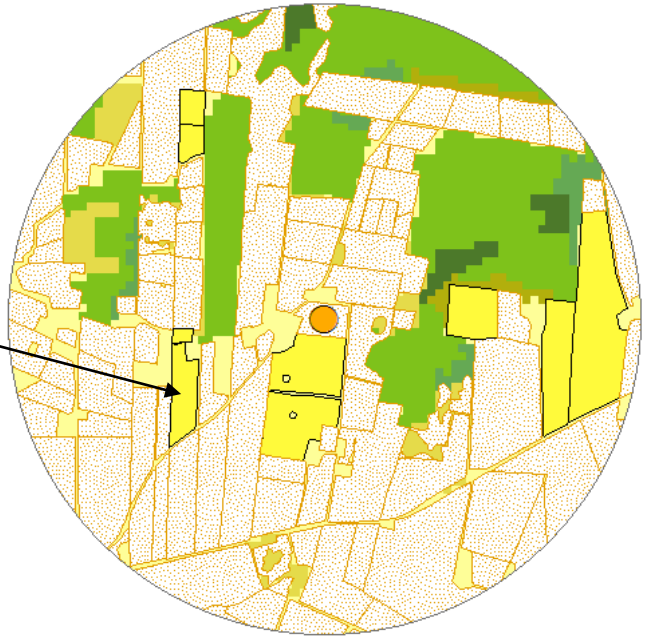
(2018)

Landscape variables

- Last year's proportion of OSR + distance to field
- Landscape complexity: forest, grassland and other land cover types
- Within radii 1000-4000m)
  - OSR area from Integrated Administration and Control System (IACS)
  - Ground cover from National Ground Cover / CORINE

Results from 2017

Landscape: OSR area from last year

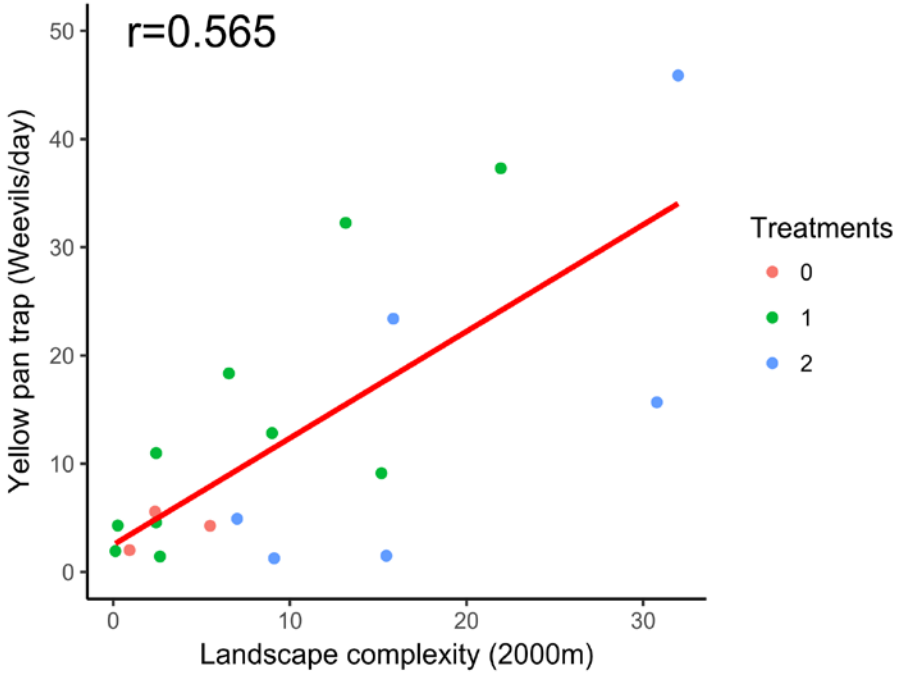


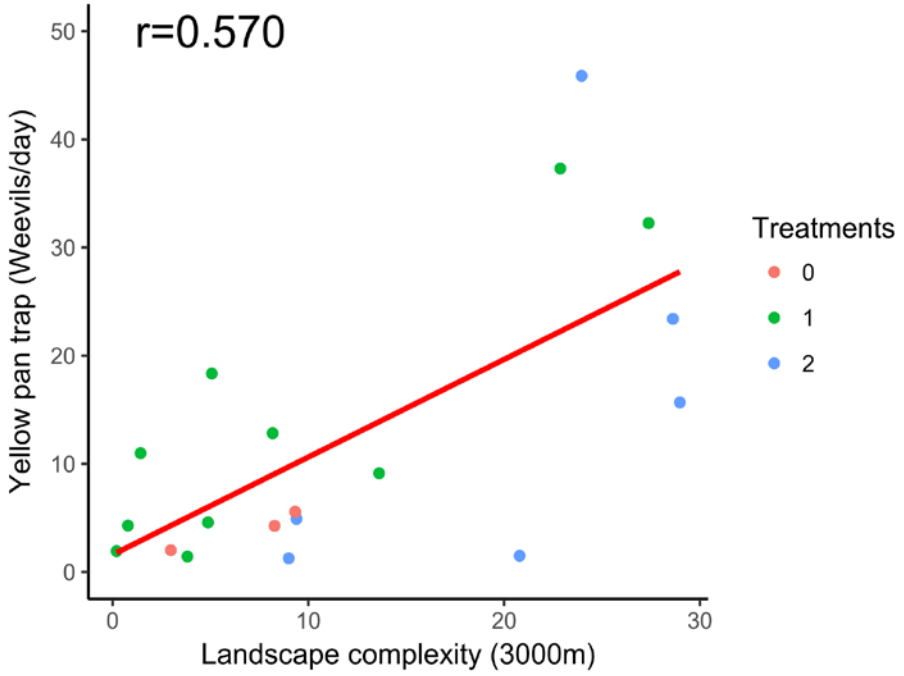
No (straight) correlation

Proportion area of OSR previous year 1000-4000 m from the field does not affect the number of weevils or the proportion of damaged pods

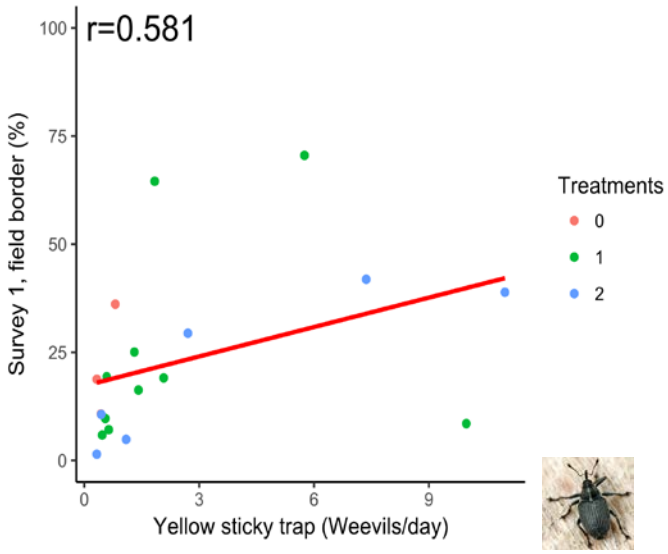
Landscape: Complexity and weevils

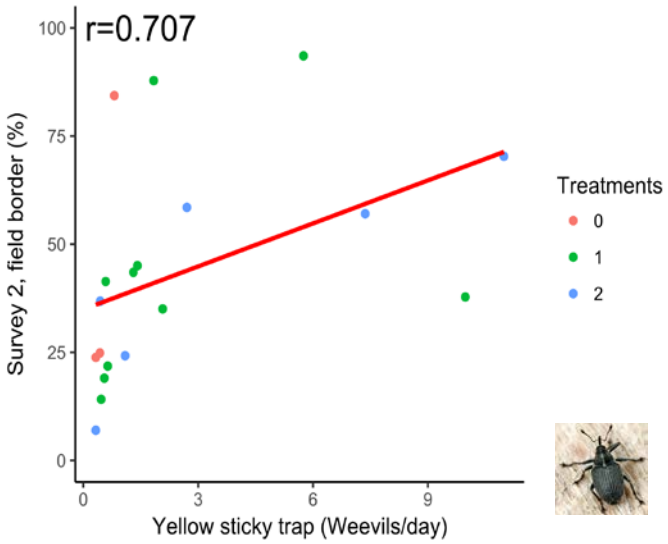
Complexity measures within 2000-3000m radius show statistically significant correlations to weevil abundance

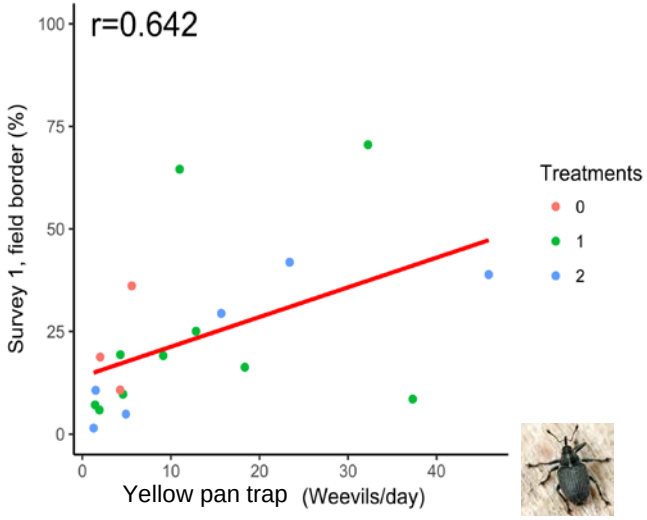


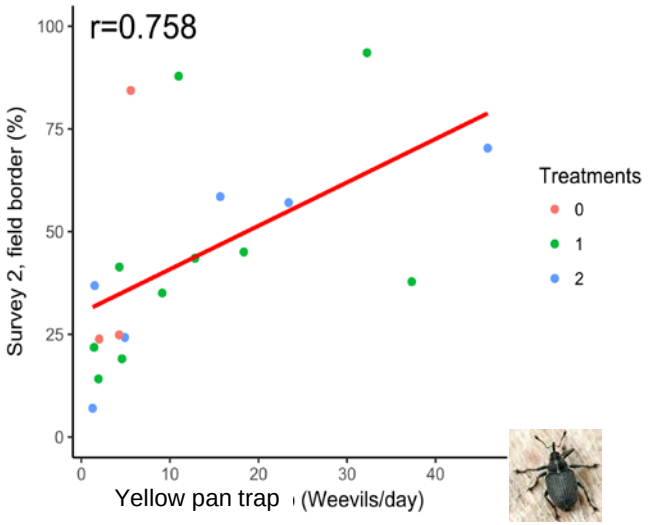


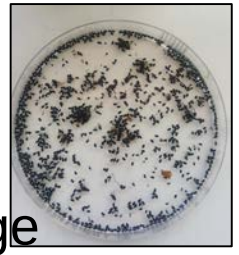
Abundance weevils – midge damage







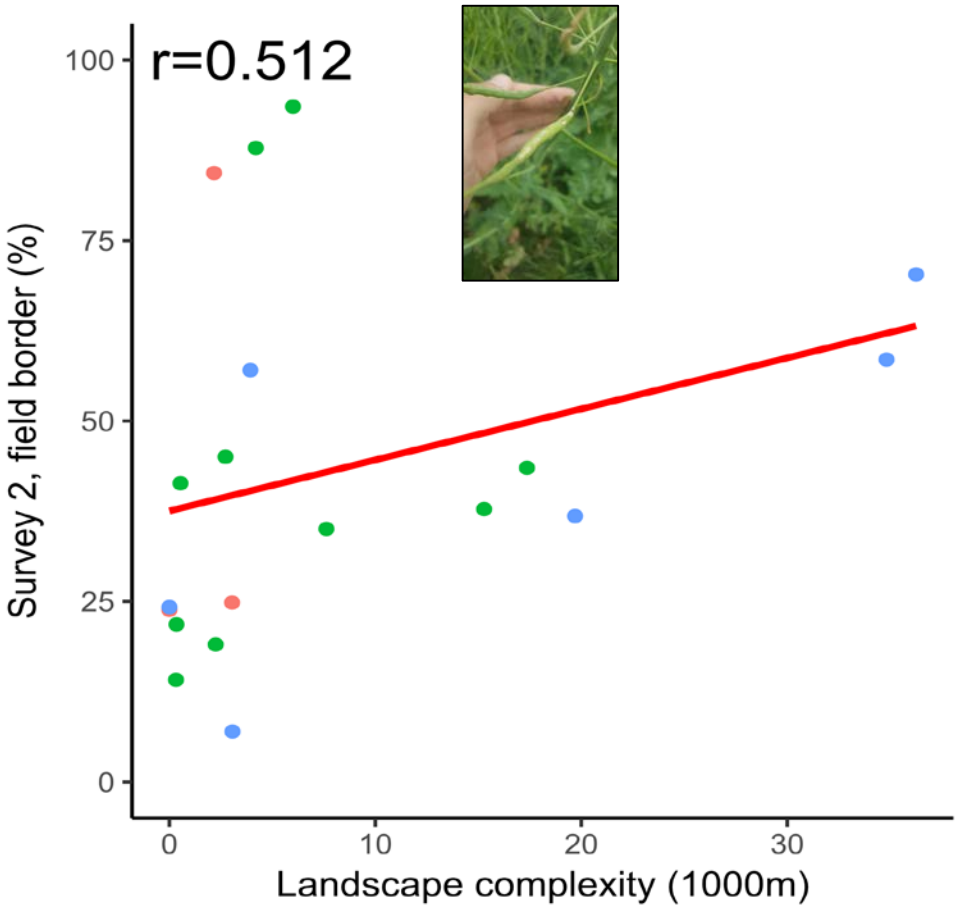


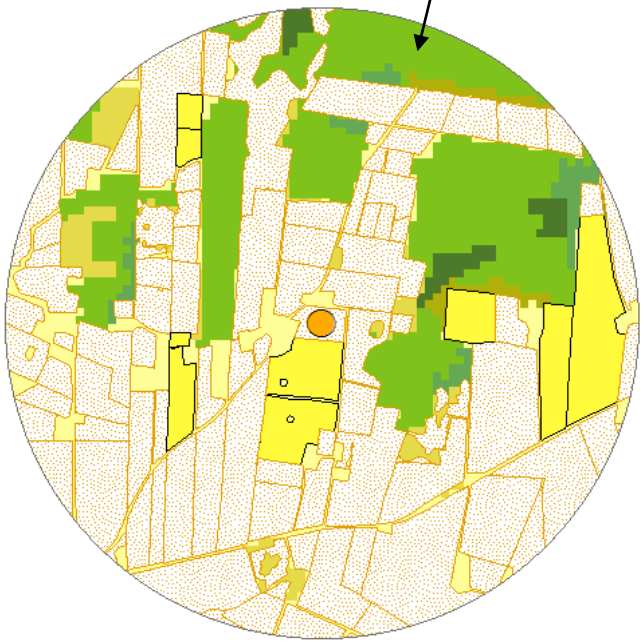


Direct correlation between abundance of weevils and midge damage

Landscape: Complexity and damage

Complexity measures within 1000m radius display weak but statistically significant correlation with midge damage





Multiple variables

Dependent variable:
Pod midge damage

Variables in final models:

- OSR_{-1}^{1000m}
- $COMPLEXITY^{3000m}$
- Yellow pan trap catch (weevils!)
- Chemical treatments
- Distance to last year's field

Survey	Place	F	DF	p-value	R^2	Adjusted R^2
Early	Field edge	5.133	4,14	0.009**	0.595	0.479
Early	Interior	2.55	4,14	0.086	0.422	0.256
Late	Field edge	6.347	3,14	0.005**	0.559	0.471
Late	Interior	3.976	3,15	0.029*	0.443	0.332

*p<0.05, **p<0.01

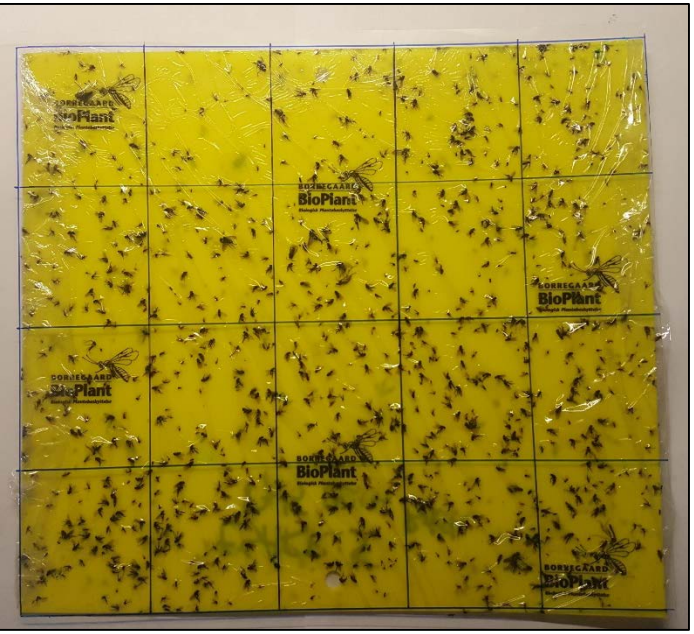
Individual surveys, independent variables

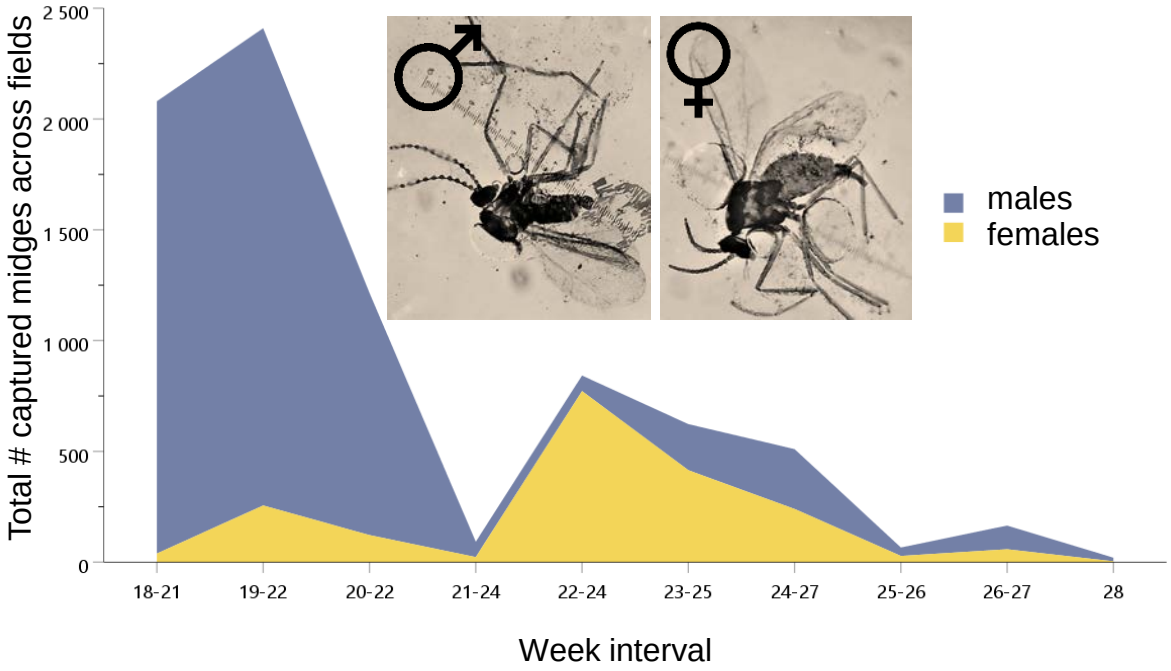
Survey	Place	Variable	t	p
Early	Field edge			
		Yellow pan trap catch	1.902	0.078
		$\mathrm{OSR}_{-1}^{1000m}$	2.812	0.014 *
		Chemical treatment	-2.294	0.038 *
		$\mathrm{COMPLEXITY}^{3000m}$	1.578	0.137
Early	Interior			
		$\mathrm{OSR}_{-1}^{1000m}$	1.816	0.091
		Chemical treatment	-2.126	0.052
		$\mathrm{COMPLEXITY}^{3000m}$	2.406	0.031 *
		$\mathrm{OSR}_{\mathrm{Distance}}$	1.357	0.196
Late	Field edge			
		Yellow pan trap catch	2.452	0.028 *
		$\mathrm{OSR}_{-1}^{1000m}$	3.578	0.003 **
		Chemical treatment	-2.113	0.053
		$\mathrm{COMPLEXITY}^{3000m}$	1.944	0.072
Late	Interior			
		Yellow pan trap catch	2.562	0.022 *
		$\mathrm{OSR}_{-1}^{1000m}$	2.967	0.010 **
		$\mathrm{OSR}_{\mathrm{Distance}}$	1.318	0.207

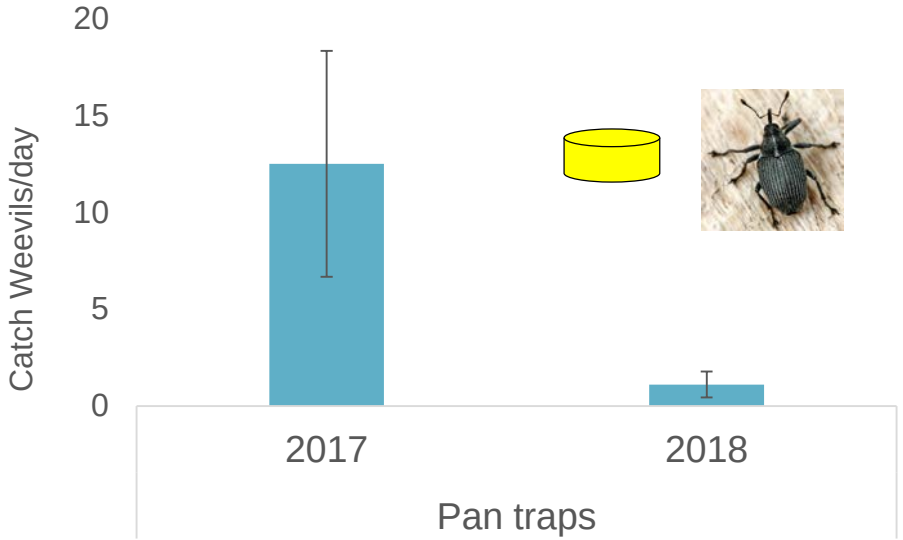
*p<0.05, **p<0.01

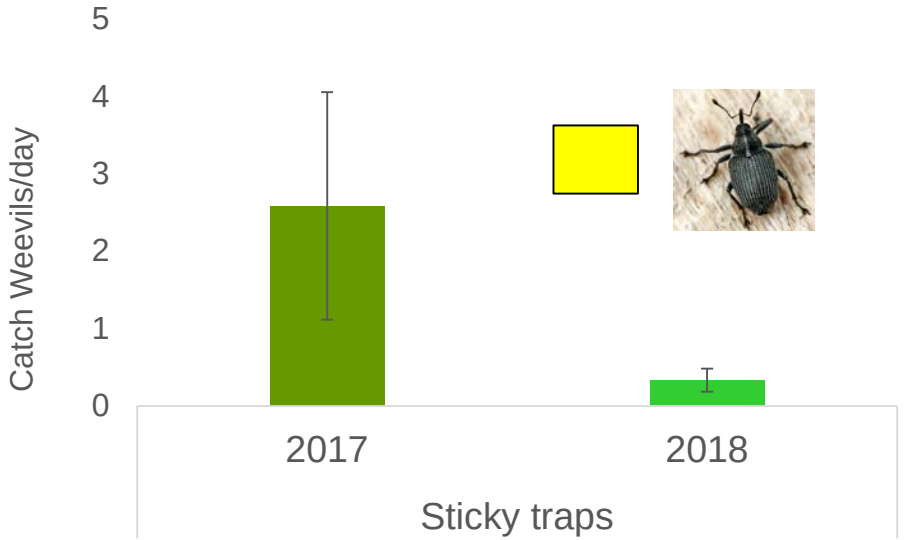
Results from 2018

Trap catches midges and weevils

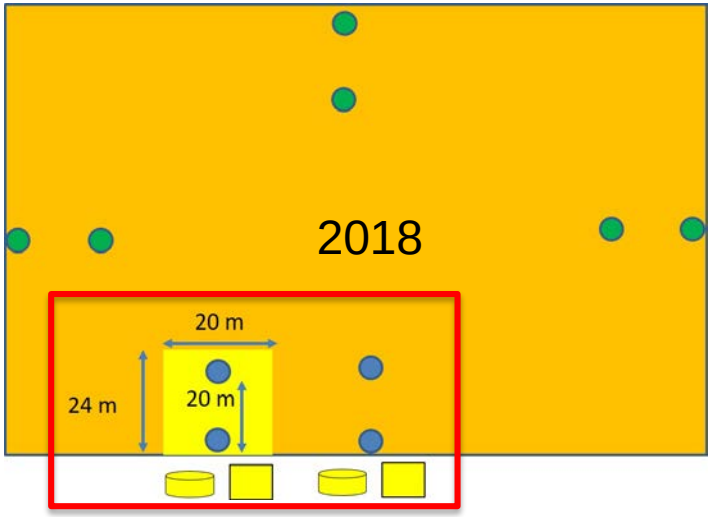


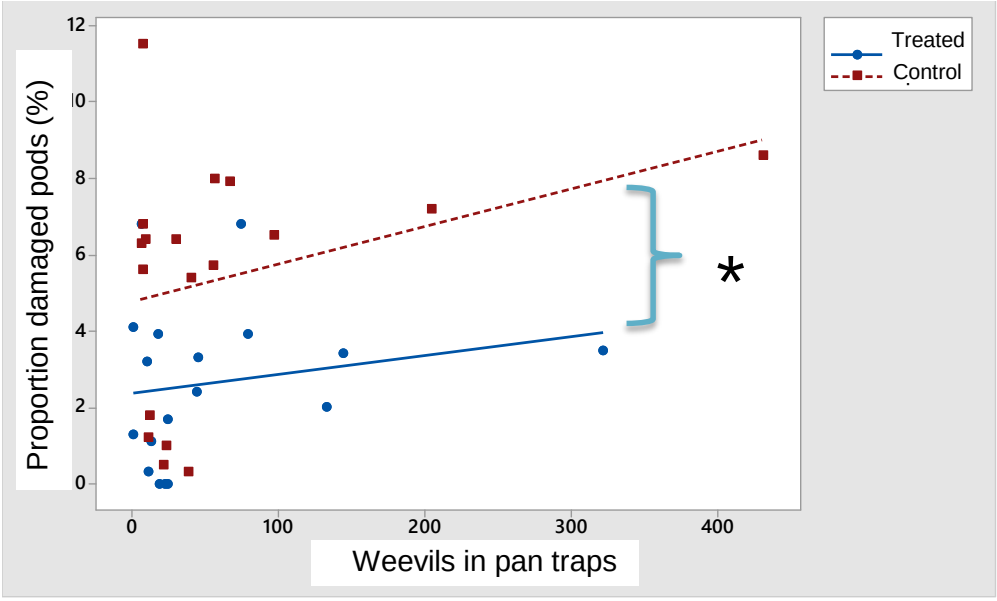


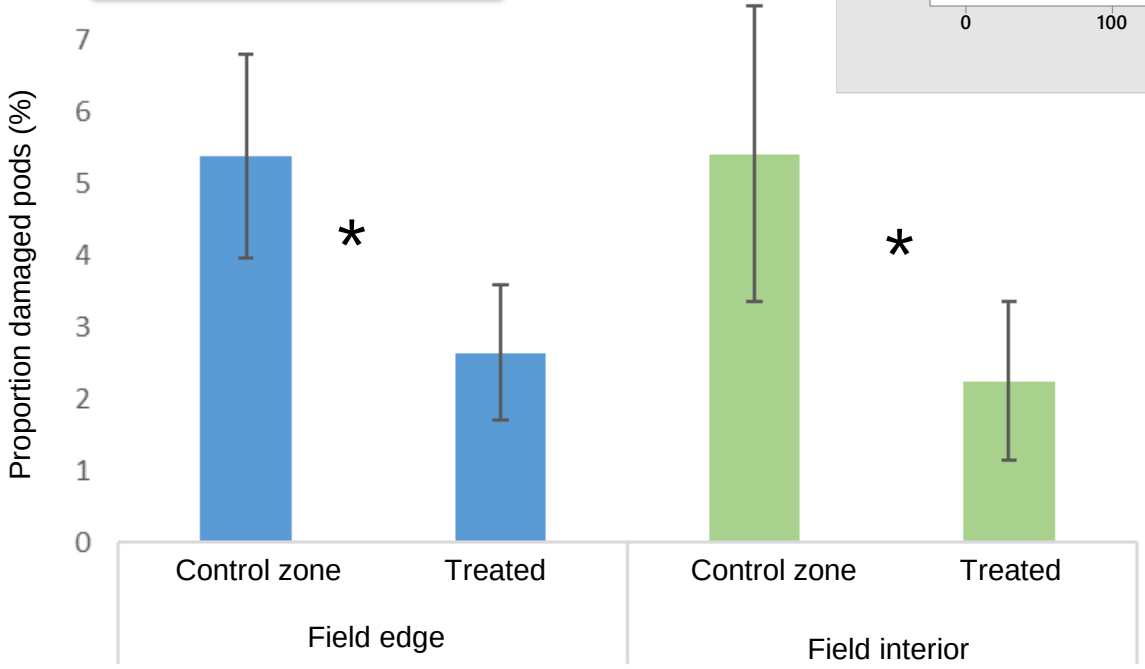




Damage in pesticide treated and control zones







Conclusions, Thanks

- Direct correlation between catch of weevils and damage, especially at the field edge
- Some direct correlations between landscape complexity, weevil abundance, and pod midge damage
- No direct correlations between the two variables previous year's area of OSR and presence of weevils or damape from pod midges.
- In complex models damages were primarily related to catch of weevils, OSR area within 1000m (midges?), and complexity measures (forest, bushes, grasslands) within 3000 m (weevils?)
- In 2018, lower damages from pod midges appear to coincide with lower amounts of weevils in traps compared to 2017.
- Low amounts of damages preclude correlations to various explanatory variables.
- Significant differences in damages beween control zones and treated field areas demonstrate effects of pestidice sprays on Pod Midge damage.

- **Thanks** to (among others): Gunilla Berg, Crop Protection Centre at Alnarp, and to Christer Nilsson