EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

leben.natur.vielfalt
das Bundesprogramm

DIY insect flushing bar 2.0

Design and implementation in the InsectMow project

Jonas Frank · University of Hohenheim · Institute for Agricultural Engineering · Faculty for Agricultural Sciences

Gefördert durch:

Bundesministerium
für Umwelt, Naturschutz, nukleare Sicherheit
und Verbraucherschutz

BfN Bundesamt für Naturschutz

aufgrund eines Beschlusses
des Deutschen Bundestages

What is an insect flushing bar?

- Installed in front of the mower
- Moves the grass and causes insects to escape
- Depending on the escape mechanism of the different insect groups
- Use of chains, brackets or tarpaulins

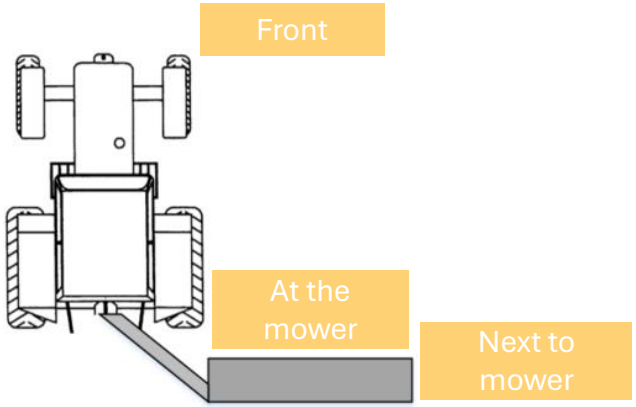
Requirements

1. Flushing effect
   - Time to contact with mower
2. Safety
   - Stability
   - Installation without damaging the mower's load-bearing components
   - Risk of collision during operation => visibility for driver
   - Be aware that lost parts are immediately caught by the mower
3. Ease of operation
   - Transport position
   - Height adjustment (do not press down on grass)
   - Retrofit solution?

Insect flushing bar:
InsectMow prototype made from truck tarp

Evaluation of possible installation areas

	Front	At the mower	Next to mower
Time to contact with mower	+	0	++
Collision risk	-	++	--
Installation	-	+	-
Transport position	+	0	0



Evaluation of possible installation areas

- Installation at the mower

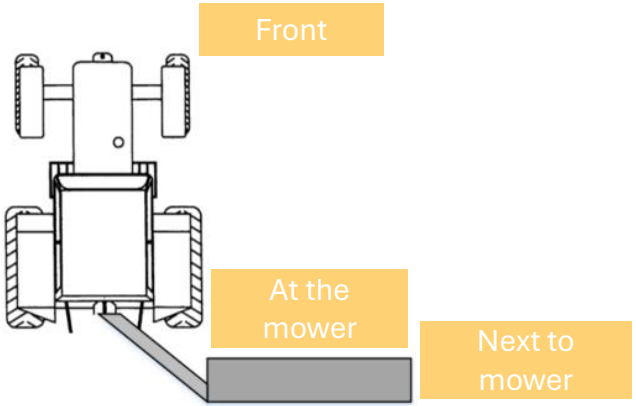
  + Very good visibility

  + Not exposed in the field, no increased risk of collision

  + Flushing bar is connected to the mower at two points from the rear
    => increased stability

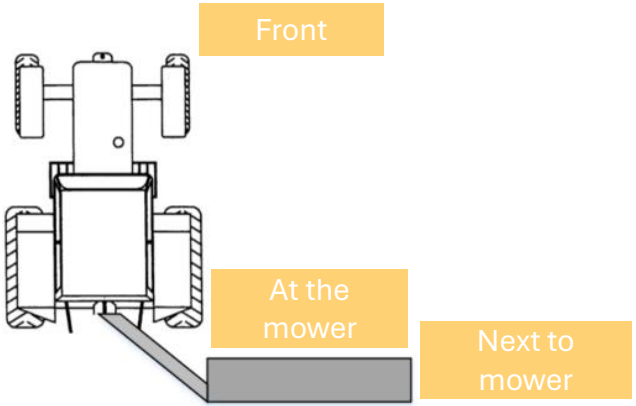
  - Relatively small distance between flushing bar and mower

  - Transport must take place on the mower



Evaluation of possible installation areas

- Installation in the front of the tractor
  - + Large distance to the mower
  - + Good visibility
  - - Exposed in the field
  - - Lateral attachment => less stability



Calculation reaction times

- Reaction time results from the driving speed and the distance between the flushing bar and mower

Colors	
< 1 s	=> purple
> 1 s < 2 s	=> blue
> 2 s	=> green

			Distance between flushing bar and mower in m					
Driving speed			1	2	3	4	5	5.5
km/h	m/s	s/m	Time from contact flushing bar to mower in s					
5	1.39	0.72	0.72	1.44	2.16	2.88	3.60	3.96
6	1.67	0.60	0.60	1.20	1.80	2.40	3.00	3.30
7	1.94	0.51	0.51	1.03	1.54	2.06	2.57	2.83
8	2.22	0.45	0.45	0.90	1.35	1.80	2.25	2.48
9	2.50	0.40	0.40	0.80	1.20	1.60	2.00	2.20
10	2.78	0.36	0.36	0.72	1.08	1.44	1.80	1.98
11	3.06	0.33	0.33	0.65	0.98	1.31	1.64	1.80
12	3.33	0.30	0.30	0.60	0.90	1.20	1.50	1.65

Flushing bar from the „InsectMow“ project

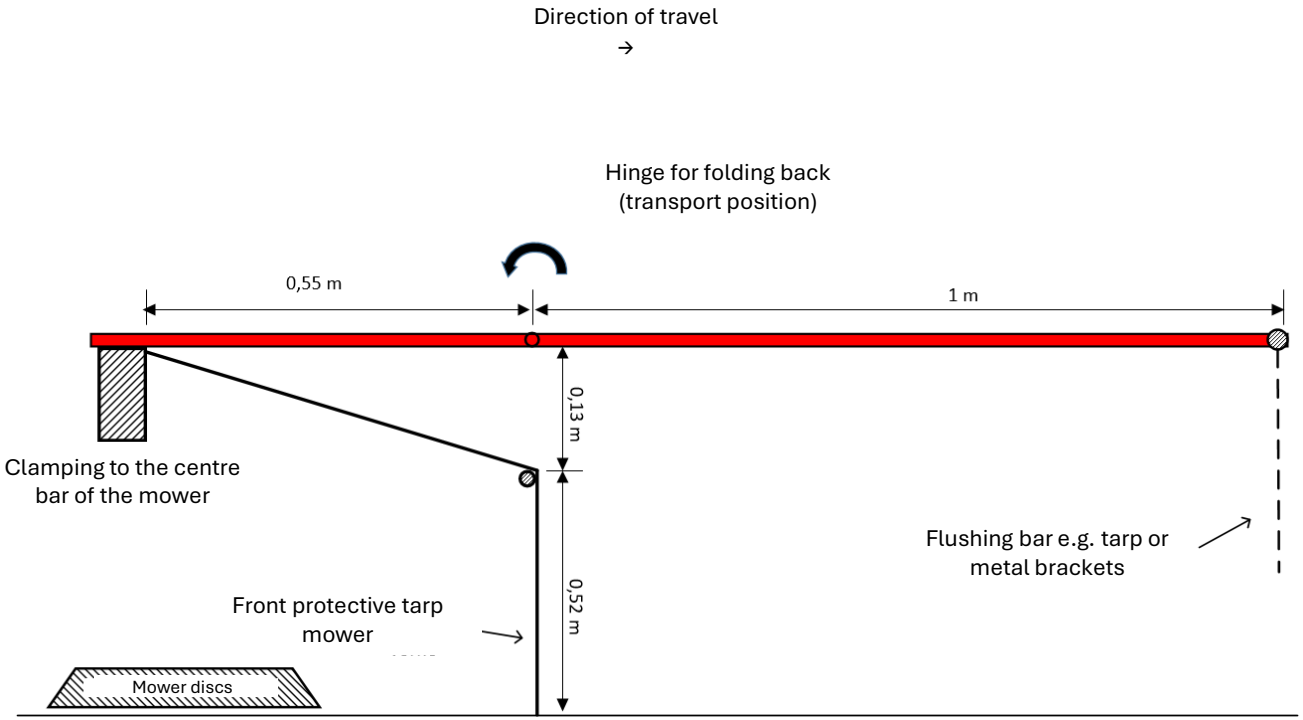
- Installation directly on the mower or on the front linkage of the tractor
- Flushing bar made from truck tarp or metal brackets

Installation at mower

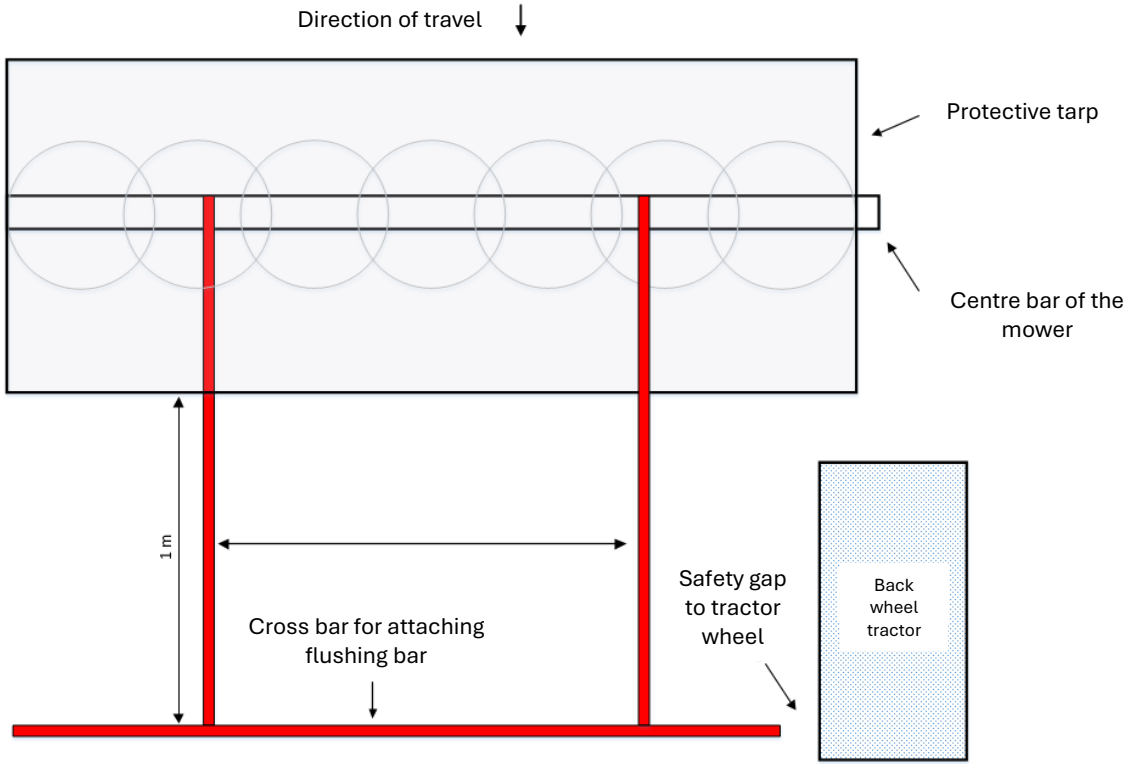
Installation at front linkage

Installation at the mower

Installation at the mower - side view



Installation at the mower - top view



Installation at the mower - Attachment to the mower

- Clamping to the centre bar of the mower
- No damage to the mower's load-bearing parts

Top side

Under side

Installation at the mower - Hinge for folding

- U-profile closed at the bottom at the height of the front protective tarpaulin
- Remaining length of the flushing bar is folded backwards

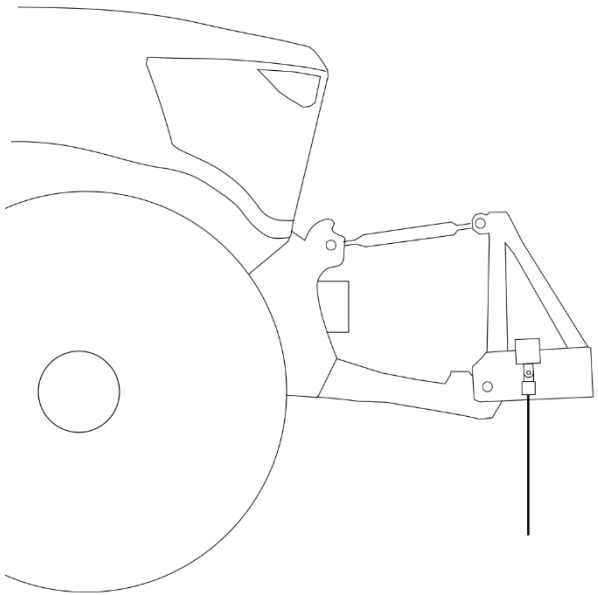
Installation at the mower - transport position

- Hinge enables folding to the rear
- Locking by pin
- Road transport possible without restrictions

Crossbar

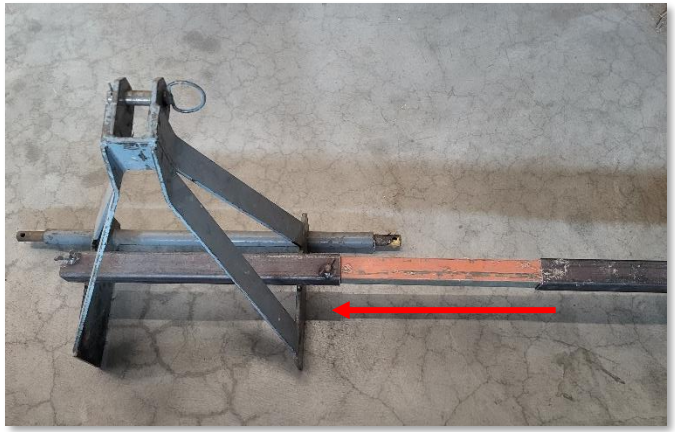
- Pivoting suspension
- Tarpaulin clamped to crossbar with bolted metal plate
- In addition to the tarpaulin, other attachments to the crossbar are also possible

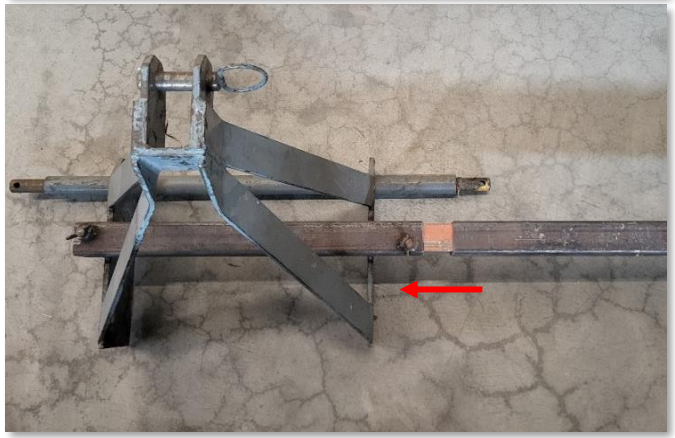
Installation at the front linkage



Installation at the front linkage

- Plug-in joint
  - Dismantling for road transport
  - secured with two wing screws

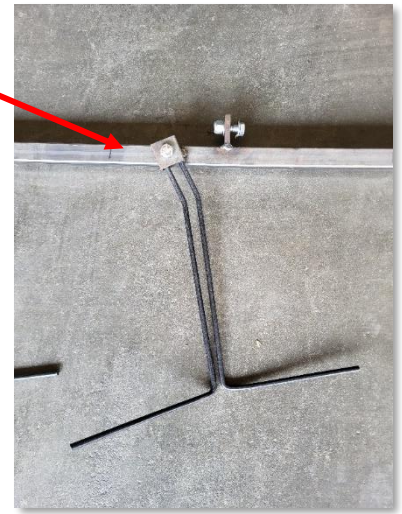


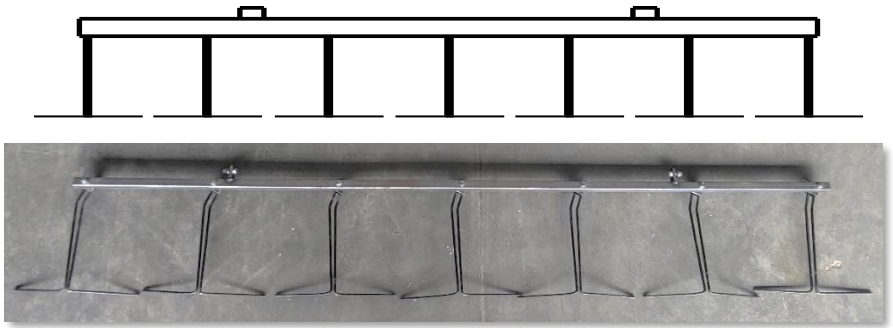


Flushing bars - metal brackets

- Brackets from seed drill
- Pivoting suspension

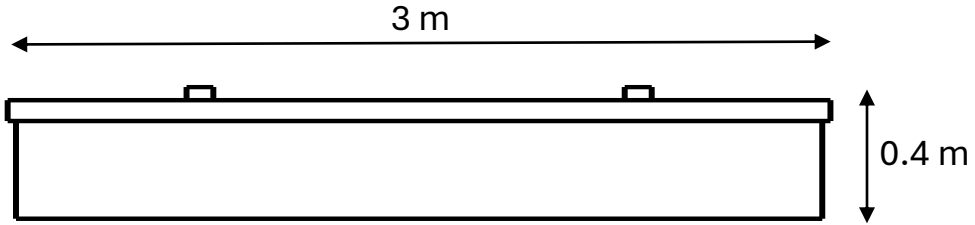
Bolted to the cross bar





Flushing bars - tarpaulin

- Truck tarp
- Pivoting suspension



Tarp is clamped to cross bar

Tarp and bracket flushing bars both can be installed at the mower or at the front linkage

Experimental results

- The flushing bars were tested in 2022, 2023 and 2024 for their effectiveness:
- The effectiveness of mechanical flushing bars is based on the escape behaviour of insects, which is why only mobile insect groups can be induced to escape.
- Less mobile arthropod groups such as spiders and insect larvae (e.g. caterpillars) cannot be saved by the use of a mechanical flushing bar

Experimental results

Tarp flushing bar

- The tarp flushing bar works very well at low driving speeds and when mounted directly on the mower (tests were carried out at 5 km/h): depending on the group, around 30 - 50 % of individuals can be induced to escape.
- At a driving speed of 12 km/h, the tarp flushing bar showed no effect regardless of the installation area (mower or front linkage): this is due to the short escape time (when mounted on the mower) and the floating of the tarpaulin on the vegetation (especially when mounted on the front linkage) at high driving speeds.

Experimental results

Metal bracket flushing bar

- The metal bracket flushing bar is also effective at a driving speed of 12 km/h and when attached to the front linkage, although not for all insect groups tested.
- In the case of flies, grasshoppers and beetles, an average of around 50% of individuals were scared away.
- No effect could be demonstrated for cicadas, true bugs and hymenoptera.

The complete results, the methodology used and a detailed discussion of the test results can be found in our scientific publication: https://doi.org/10.1111/icad.12854

Technical Issues

- The tarpaulin flushing bar floats on dense vegetation
- Contour adaptation of the front flushing bar is not sufficient
- Height adjustment of the flushing bars is currently difficult

Note: Unauthorized modifications to the mower may constitute misuse within the meaning of the EU Machinery Directive and may result in the loss of warranty and liability claims against the manufacturer.

Whatever the weather... :)

Contact

Jonas Frank

University of Hohenheim
Institute for Agricultural Engineering
Department Fundamentals of Agricultural Engineering

Garbenstraße 9
70599 Stuttgart

jonas_frank@uni-hohenheim.de

https://insectmow.uni-hohenheim.de/

Publication 06/2025

Have fun making your own!

@InsectMow @InsectMow@ecoevo.social

Gefördert durch:

Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz

Bundesamt für Naturschutz

aufgrund eines Beschlusses des Deutschen Bundestages

The project "InsectMow" is funded in the Federal Program Biodiversity by the Federal Agency for Nature Conservation with funds from the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection.

This presentation reflects the view and opinion of the grantee of the Federal Biological Diversity Program and does not necessarily agree with the view of the funding agency.

Project partners:

DLG CLAAS