

## **Trial report**

### **Onion oil to control carrot flies in organic carrot production**

#### **Purpose:**

To test if the product UienOlie (onion oil) from Naturim and Agrifirm in Holland can control carrot root flies in organic carrot fields.

#### **Background:**

The carrot flies (*Psila rosae*) are attracted by the scent of umbellifers, when they seek out host plants for egg-laying. This odor can be masked with strong smelling onion oil. New products approved for use in organic production has been developed by Naturim and Agrifirm. According to Naturim four years experiments has been conducted by PPO in Holland with onion oil (Naturim) to control carrot fly in carrot and celeriac. Tests showed that the crop close to the smell of onion oil was much less affected than far from the oil. This usually reduced the carrot fly infected carrots by 50 %. The effect was statistically reliable.

<http://www.uienolie.nl/>

#### **Trial plan Agrifirm onion oil:**

For control of second generation of carrot flies onion oil dispensers were set up in a carrot field on the 6<sup>th</sup> of August just at the beginning of the carrot fly egg-laying period.

The dispensers are constructed so the scent the onion oil can be placed around the field with 50 meter distance. The dispensers are filled with 2 ml of onion oil. And attached to a stick before placed in the field.





*Onion oil dispensers in the field*

Field 41-0 Birkjær, GPS: 56.472460, 8.945956, autumn carrots harvested in October



*Field plan in Birkjær: 30 onion oil dispensers (red) placed in the field, with a distance at 50 meters apart. 8 yellow squares are yellow sticky traps – 4 in the control area, 4 in the area where the onion oil is.*



### **Trial plan Naturim onion oil:**

For control of first generation of carrot flies Naturim “rockets” were set up in two carrot fields on the 29<sup>th</sup> of May just at the beginning of the carrot fly egg-laying period.

The “rockets” are constructed so the scent the onion oil can be placed around the field with 50 meter distance.



*Onion pillets in a rocket, filled up just beneath the upper hole.*

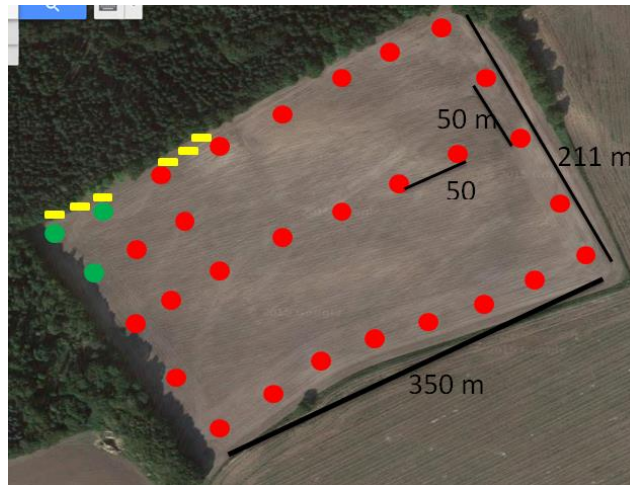


*Naturim “rockets” in carrot field.*



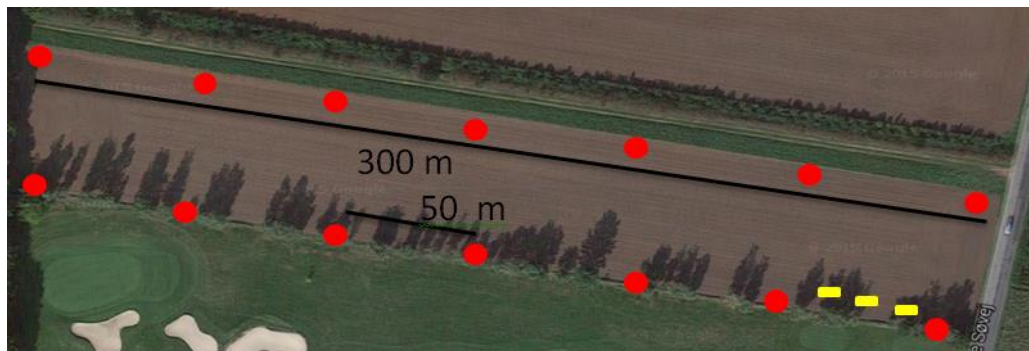
*Naturim “rockets” and yellow traps in background for control of effect.*

Field 51-0 Himmestrup, GPS: 56.427433, 9.633973. Early carrots.



*Field plan in Himmestrup: 27 Naturim “roquettes” with onion oil (red) placed in the field, with a distance at 50 meters apart. The 3 green dots are control “roquettes” without onion oil. 6 yellow squares are yellow sticky traps – 3 in the control area, 3 in the area where the onion oil is.*

Field 52-0 at Tange Søvej, GPS: 56.333690, 9.572435. Early carrots.



*Field plan on Tange Søvej, 14 “roquettes” 50 meter apart and 3 yellow sticky traps for control of carrot fly activity.*

Field 32-0 and 33-0 in Himmestrup, GPS: 56.424768, 9.626697. Winter parsnip, parsley and carrots.



*Field plan in Himmestrup: 66 Naturim “rockets” with onion oil (red) placed in the field, with a distance at 50 meters apart. The 3 green dots are control “rockets” without onion oil. 6 yellow squares are yellow sticky traps – 3 in the control area, 3 in the area where the onion oil is.*

## Results:

### Agrifirm onion oil:

Field 41-0: Birkjær, late carrots

Carrot flies on the yellow traps

Date	13-aug	20-aug	27-aug	03-sep	10-sep	17-sep
Onion oil	0	0	0	0	0	0
Control	0	0	3	2	1	1

The quality manager reported no problems with the carrot root fly in this field (90-95 % of the carrots from the field was salable).

This field was next to a big field which had carrots in 2014, so it was expected to see a lot of carrot flies in the field.



## Naturim onion oil:

Field 52-0: Golfbanen, early carrots

Carrot flies on yellow traps

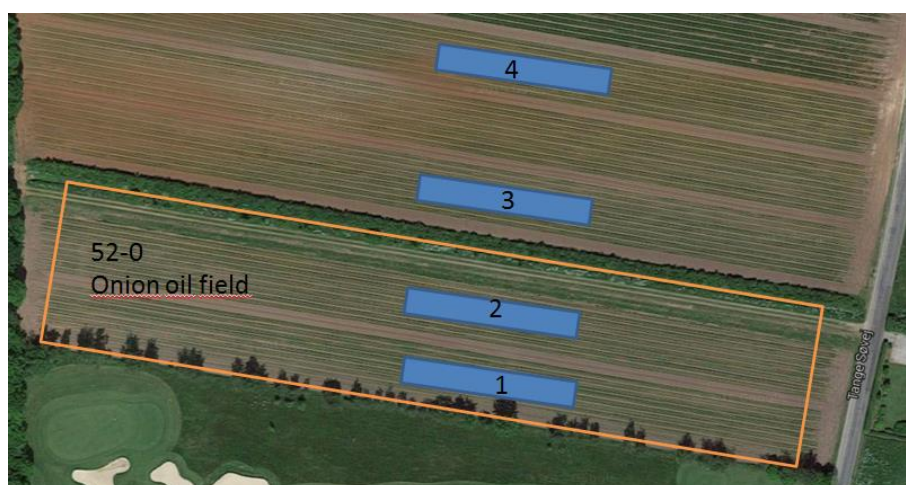
01-maj	07-maj	13-maj	20-maj	28-maj	02-jun	09-jun	18-jun	25-jun
TS 56, 403-0, 6 traps	0	0	0	2	1	1	2	0
TS 60, 403-0, 6 traps	0	0	0	2	1	2	1	0
Golf- field, 52-0, 3 traps					2	0	0	0



The traps in TS 60 was 500 meters from the onion oil, the traps in TS 56 was 1 km from the onion oil.

Damage on roots:

	Total carrots counted	Number of damaged carrots by carrot root fly	% damaged
1. Golfbanen from left, bed 1 (1 on the picture)	50	4	8
2. Golfbanen from right, bed 1 (2 on the picture)	59	3	5
3. Next field, just after the fence (3 on the picture)	61	6	10
4. Next field, 100 m from the oil rockets (4 on the picture)	60	3	5



Sampling of carrots for testing quality according to damage from carrot flies

Field 51-0: Himmestrup, early carrots

Carrot flies on yellow traps

Date	03-jun	12-jun	19-jun	26-jun
Control	0	0	0	3
Onion oil	0	0	0	2

Root damage

11. Sep.	% root weight with damage
Control plot	4 %
Onion oil	0 %

Field 32-0 and 33-0: Himmestrup, winter carrots, parsley root and parsnip

Carrot flies on the yellow traps

Date	30-jul	13-aug	19-aug	25-aug	02-sep	09-sep
Onion oil	0	0	0	0	5	5
Control	0	0	0	0	0	0

Root damage:

	Total parsnip roots counted	Number of damaged parsnip roots by carrot fly larvae	% damaged
Onion oil (2 on the map below)	55	3	5,5 %
Control (1 on the map below)	62	3	4,8 %
Middle of the field, besides the parsley (3 on the map below)	61	2	3,3 %



*Very hard to find carrot fly damages in parsnip, and in general very few and small (superficial) damages.*



*Locations of sampling of parsnips counting damage by carrot root flies, 1: Control, 2: Onion oil, 3: In the middle of the field, just besides the parsley.*

#### **Preliminary conclusions and discussion:**

##### **Carrot fly generation 1:**

Field 52-0: It looks like the onion oil has an effect seeing on the yellow traps, but there were not many flies in the other two fields as well. According to the damages on the roots there is no difference between the field with and without traps.

Field 51-0: It looks like the onion oil had an effect for a period of time, because we did see carrot flies on the traps in other fields before the 26. June. It looks like the effect of the oil disappears after a while, maybe the flies are getting used to the aroma from the oil. There was no difference between the control and the onion oil in this field in the number of flies on the traps, but 4 % damaged root weight in the control compared to 0 % in the onion oil parcel. Maybe the oil aroma works more than 50 meters.

##### **Carrot fly generation 2:**

###### **Field 41-0:**

Results from this year from the yellow traps shows that the onion oil did work to keep the carrot root flies away. The amount of flies in on the control plot is smaller than expected (because there was carrots in the "neighbor" field last year), the reason for this might be, that the onion oil also kept some of the flies away in the control area. There was no count of damage on the carrots from this field, but the quality manager reported no damage by carrot root fly in this field.

###### **Field 32-0 and 33-0:**

In general in 2015 there is caught between 30 and 2 flies in the second generation, so 10 flies caught in this field is not unusually high or low. As in field 51 maybe the onion oil worked for a period of time, or maybe it is just randomly. There was very few damages from carrot root fly larvae in the parsnips from this field. And no difference between control, onion oil and in the middle of the field.



Thoughts about the design:

- This year the control plot has been in the same field as the onion oil, - if the smell works more than 50 meters away, this is a problem, because also the control plot is “protected” by the smell.
- When we put onion oil dispensers only in some fields, the amount of flies will be higher on the not protected fields, because the flies are not killed, just moved around.
- It will be best to try the onion oil in fields which have a great chance of a big attack of carrot flies.
- It was hard to find damages in parsnips when it is only small attacks, much easier in the carrots.
- The onion oil only works one season, so you have to buy new every year.
- The oil from Naturim is more expensive than from Agrifirm, but it is easier to handle.

### **Conclusion:**

We do not have a clear conclusion from the project this year. There is a tendency that the onion oil works to reduce the amount of damaged roots by carrot flies. And a tendency, that the flies are frightened away more than 50 meters from the onion oil dispensers.

One field had the onion oil liquid from Agrifirm, three fields had the onion oil pellets from Naturim. It looked like the Agrifirm onion oil had an effect, the Naturim product also showed a tendency. There is no clear conclusion, that one of the products is better than the other.

This year has been a pilot study and a more intelligent study design is needed in 2016, where we try the onion oil experiments again.

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