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WARWICK



**CUTWORM (TURNIP MOTH) 29th October 2019**

Numbers of moths captured in pheromone traps at Wellesbourne in 2019.

<b>Date</b>	<b>Number of moths captured (2 pheromone traps)</b>
10 May	0
14 May	4
17 May	1
21 May	0
24 May	0
28 May	9
31 May	5
4 June	2
7 June	0
11 June	2
14 June	0
18 June	1
21 June	1
25 June	1



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Date	Number of moths captured (2 pheromone traps)
28 June	3
2 July	1
5 July	2
9 July	8
12 July	1
16 July	1
19 July	0
23 July	1
26 July	0
30 July	1
2 August	3
6 August	2
9 August	2
13 August	2
16 August	0
20 August	0
23 August	0
27 August	0



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Date	Number of moths captured (2 pheromone traps)
30 August	2
3 September	2
6 September	2
10 September	3
13 September	0
17 September	2
20 September	0
24 September	1
27 September	0
1 October	1
4 October	0
7 October	1
11 October	0
15 October	4
18 October	0
22 October	1



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Date	Number of moths captured (2 pheromone traps)
30 August	0
3 September	1



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### The 'Cutworm Risk Model'

The cutworm model is a computer program that uses weather data to predict the rate of development of turnip moth eggs and caterpillars. It also predicts the level of rain-induced mortality among the early-instar caterpillars. The cutworm model published by Bowden *et al* (1983) has been programmed into the MORPH decision-support software. This version will be used to produce cutworm forecasts in 2018, with the weather data used to produce the cabbage root fly and carrot fly forecasts.

Reference: Bowden, J., Cochrane, J., Emmett, B. J., Minall, T. E. & Sherlock, P. L. (1983). A survey of cutworm attacks in England and Wales, and a descriptive population model for *Agrotis segetum* (Lepidoptera: Noctuidae). *Annals of Applied Biology* 102 29-47.

### Cutworm forecasts

The model has been run from 14th May – based on the capture of the first turnip moth at Wellesbourne (using weather data provided by Plantsystems and funded by Syngenta). The forecasts indicate that eggs will be hatching from about 1<sup>st</sup> June. Once eggs start to hatch then rainfall becomes important for the forecast. The table below shows the predicted **percentage survival by 6 August** of caterpillars from eggs hatching each day from 1st June onwards. If there has been no rain at all then 100% of caterpillars are predicted to survive. The caterpillars are likely to become invulnerable to rainfall and insecticides after about 20 days (when they enter the third instar and burrow in the soil). **This is the last forecast for 2019 as the threat from the first generation of turnip moth is over. There is usually a second generation of turnip moth but this generation does not appear to be a threat to crops.**



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	Cornwall	Kent	Suffolk	Wellesbourne	Norfolk	South Lincs	Nottingham	Lancashire	York	Scotland	Estimated date when no longer affected by rainfall or insecticides
Percentage survival for each hatching date on left hand side											
01-Jun	0	0	0	0	0	0	0	0	0	0	21-Jun
02-Jun	0	0	0	0	0	0	0	0	0	0	22-Jun
03-Jun	0	0	0	0	0	0	0	0	0	0	23-Jun
04-Jun	0	0	0	0	0	0	0	0	0	0	24-Jun
05-Jun	0	0	0	0	0	0	0	0	0	0	25-Jun
06-Jun	0	0	0	0	0	0	0	0	0	0	26-Jun
07-Jun	0	0	0	0	0	0	0	0	0	0	27-Jun
08-Jun	0	0	0	0	0	0	0	0	0	0	28-Jun
09-Jun	0	0	0	0	0	0	0	0	0	0	29-Jun
10-Jun	0	0	0	0	0	0	0	0	0	0	30-Jun
11-Jun	0	0	0	0	0	0	0	0	0	0	01-Jul
12-Jun	0	0	0	0	0	8	0	0	0	0	02-Jul
13-Jun	0	0	0	0	0	56	0	0	0	0	03-Jul
14-Jun	0	0	0	0	0	64	0	0	0	0	04-Jul
15-Jun	0	0	0	0	0	74	0	0	0	0	05-Jul
16-Jun	0	0	0	0	0	80	0	0	0	0	06-Jul
17-Jun	0	0	0	0	0	84	0	0	0	0	07-Jul
18-Jun	0	0	0	0	0	82	0	0	0	0	08-Jul
19-Jun	0	0	0	0	0	86	0	0	0	0	09-Jul
20-Jun	44	0	0	0	0	88	0	0	0	0	10-Jul









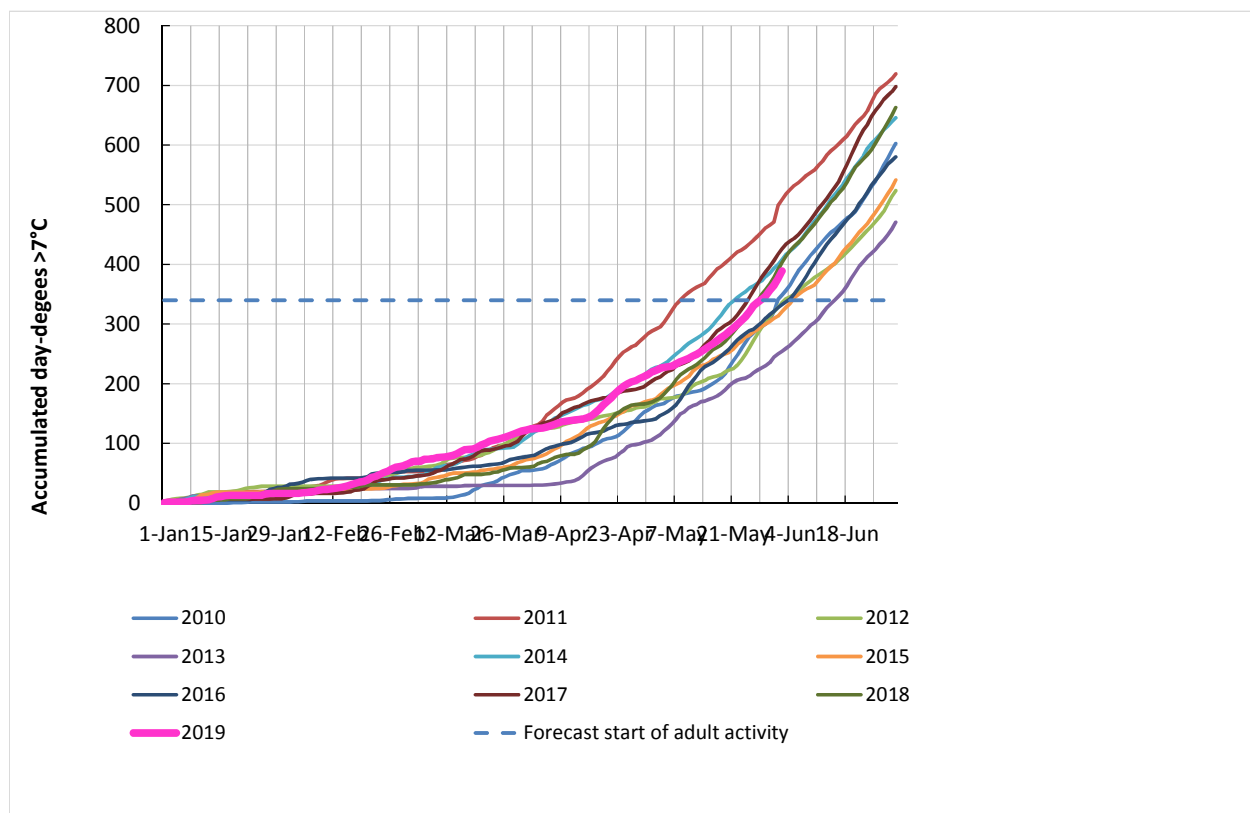


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### Day-degree sum to start of flight activity 2019

Several years ago, data on trap captures in 2005-7 were used to estimate a day-degree ( $D^{\circ}$ ) sum for the start of flight activity at Wellesbourne. This was 340  $D^{\circ}$  above a base of 7°C from 1 January. The graph below shows accumulated day-degrees for 2019 at Wellesbourne compared with previous years.





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Numbers of moths captured in pheromone traps at Wellesbourne in 2018.

Date	Number of moths captured (2 pheromone traps)	Date	Number of moths captured (2 pheromone traps)
22 May	0	6 <sup>th</sup> July	0
25 May	1	10 <sup>th</sup> July	1
29 May	3	13 <sup>th</sup> July	0
1 June	3	17 <sup>th</sup> July	0
5 June	4	19 <sup>th</sup> July	0
8 June	4	24 <sup>th</sup> July	5
12 June	0	27 <sup>th</sup> July	4
15 June	2	31 <sup>st</sup> July	1
19 June	1	3 <sup>rd</sup> August	0
22 June	1	7 <sup>th</sup> August	1
26 June	0	10 <sup>th</sup> August	10
29 June	0	14 <sup>th</sup> August	7
3 <sup>rd</sup> July	1	17 <sup>th</sup> August	4



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Date (2018)	Number of moths captured (2 pheromone traps)
21 <sup>st</sup> August	4
24 <sup>th</sup> August	10
28 <sup>th</sup> August	19
31 <sup>st</sup> August	2
4 <sup>th</sup> September	8
7 <sup>th</sup> September	3
11 <sup>th</sup> September	3
14 <sup>th</sup> September	5
18 <sup>th</sup> September	7
21 <sup>st</sup> September	1
25 <sup>th</sup> September	1
28 <sup>th</sup> September	0
2 <sup>nd</sup> October	0
9 <sup>th</sup> October	1
16 <sup>th</sup> October	7
23 <sup>rd</sup> October	1
30 <sup>th</sup> October	1



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## Background

“Cutworm” is the name given to caterpillars of certain Noctuid moths, in particular those of the turnip moth *Agrotis segetum*. The name derives from the habit of the older caterpillars of feeding underground, damaging plant roots and stems (including the storage organs that we use for food), sometimes so badly that the plant topples.

The adult moths lay eggs on plants or on pieces of litter and debris in the soil, usually from the end of May or early June. These hatch in around 8-24 days, depending on temperature. The young caterpillars seek out and feed on the aerial parts of plants. In a further 10-20 days, again depending on temperature, the caterpillars go through their second moult, becoming “third instar” caterpillars. It is at this point that they adopt the cutworm habit, becoming subterranean and feeding on roots etc.

Unhatched turnip moth eggs and the older, subterranean cutworms are largely invulnerable to the effects of the weather and insecticides. The two early caterpillar instars differ, however. If there is substantial rainfall (defined as 10 mm or more of rain falling in showers of moderate intensity over a 24-hour period) whilst these caterpillars are feeding above ground then this causes high mortality among them. They are also vulnerable to insecticides and irrigation whilst feeding on the foliage.

## Crop Susceptibility

Crops differ in their susceptibility to cutworm damage. The most vulnerable are lettuce, leek and red beet. Young lettuce and leek plants are easily bitten through by cutworms, and though beet plants may survive an attack the bulbous root is rendered unmarketable by cutworm feeding. Moderately-susceptible crops include brassicas, carrot, celery, parsnip and sugar beet. The least susceptible of those vulnerable to damage are onion, potato, swede and turnip.