

Tracking the 2016 Diamondback moth outbreak



Charlotte Wainwright

AgroEcology Department, Rothamsted Research

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Data sources – Citizen science data



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- Several portals exist where people can report sightings of moths, with times and dates
- Some countries also record light trap data via these portals as well
- Many of these portals connect with mobile phone apps so people can report their sightings in real time



Waarneming.nl

Artsobservasjoner
Rapportsystem for arter



ARTPORTALEN
Swedish Species Observation System

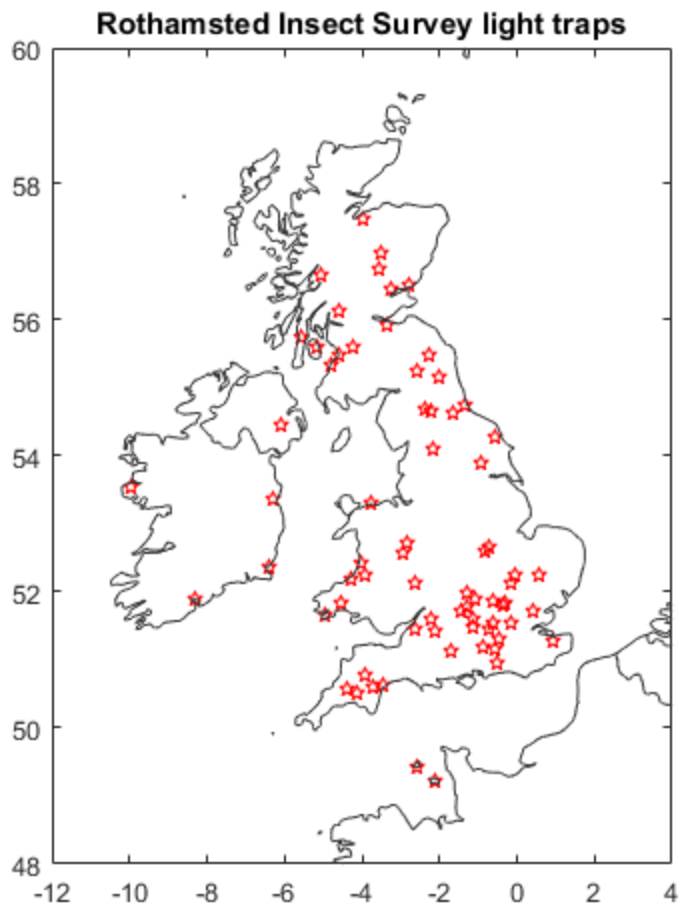


Observation.org

Data sources – RIS light trap network



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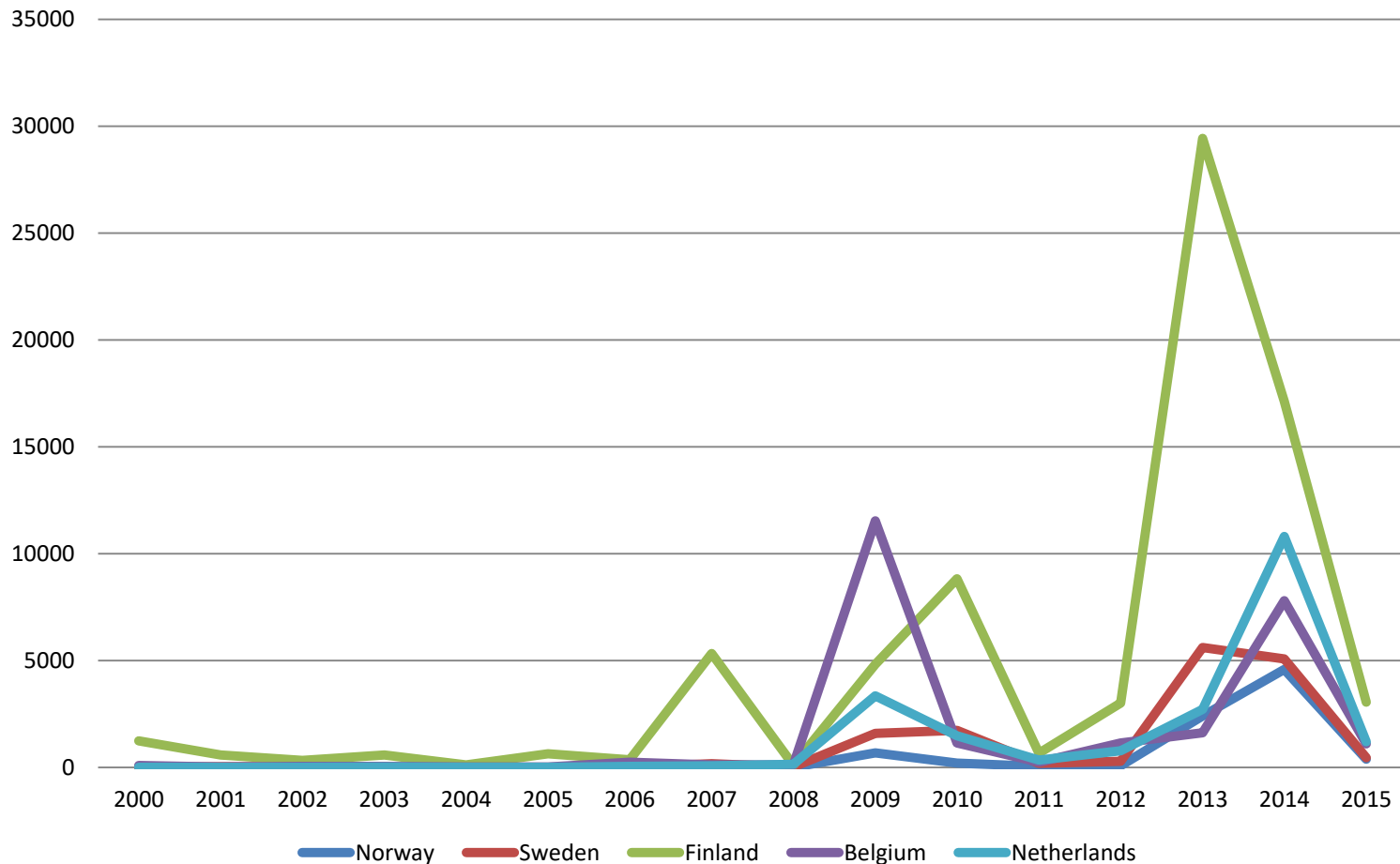
- Rothamsted Insect Survey collects data from a network of 84 light traps spread across the UK (and a few further afield)
- The light traps are operated by volunteers and are usually checked each day. The moths species are identified and numbers recorded
- Data from the light trap network is typically collated at the end of each calendar year

2016 in numbers from citizen science



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Diamondback moth numbers from citizen science 2000-2015

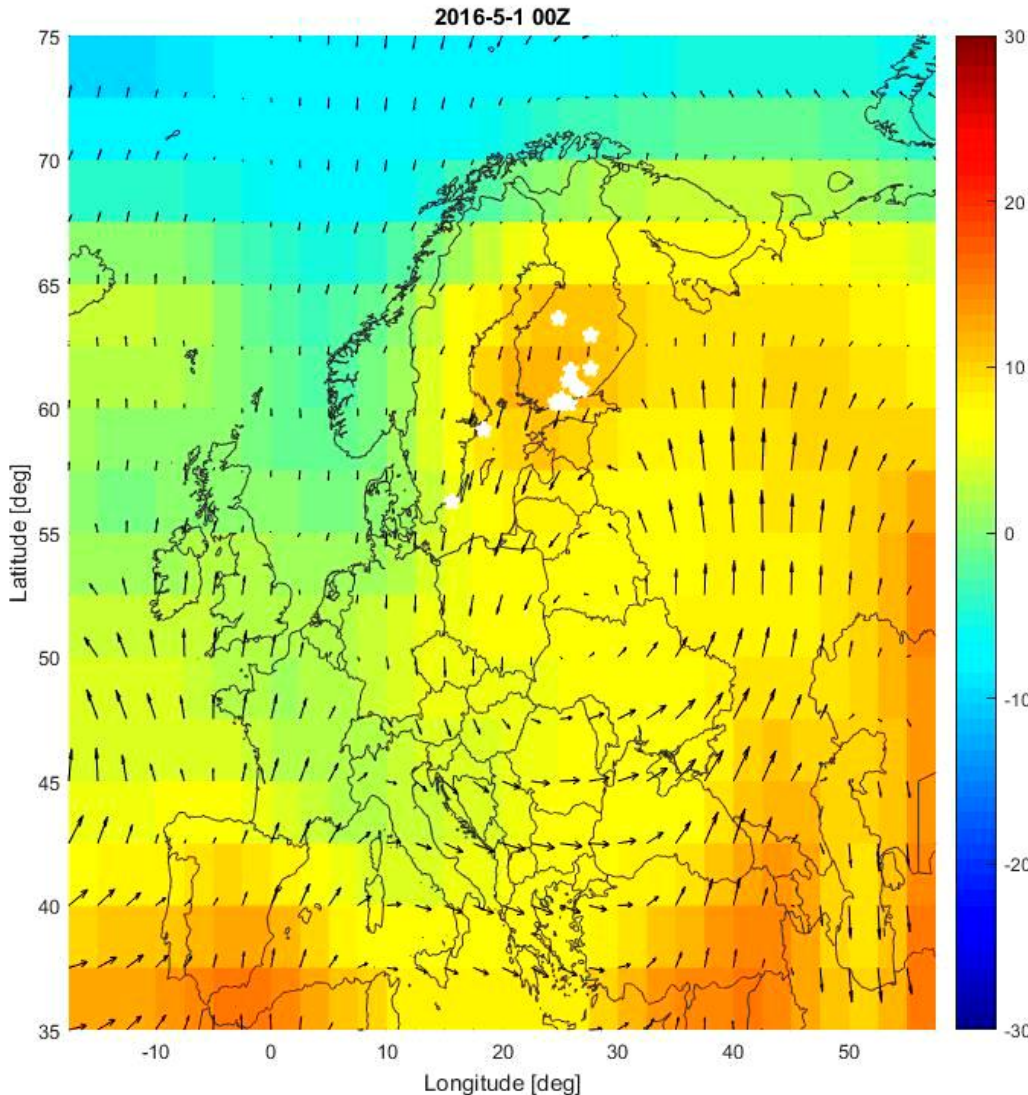


In 2016 more than 1.2 million Diamondback moths were reported in Belgium alone

Tracking the 2016 Outbreak



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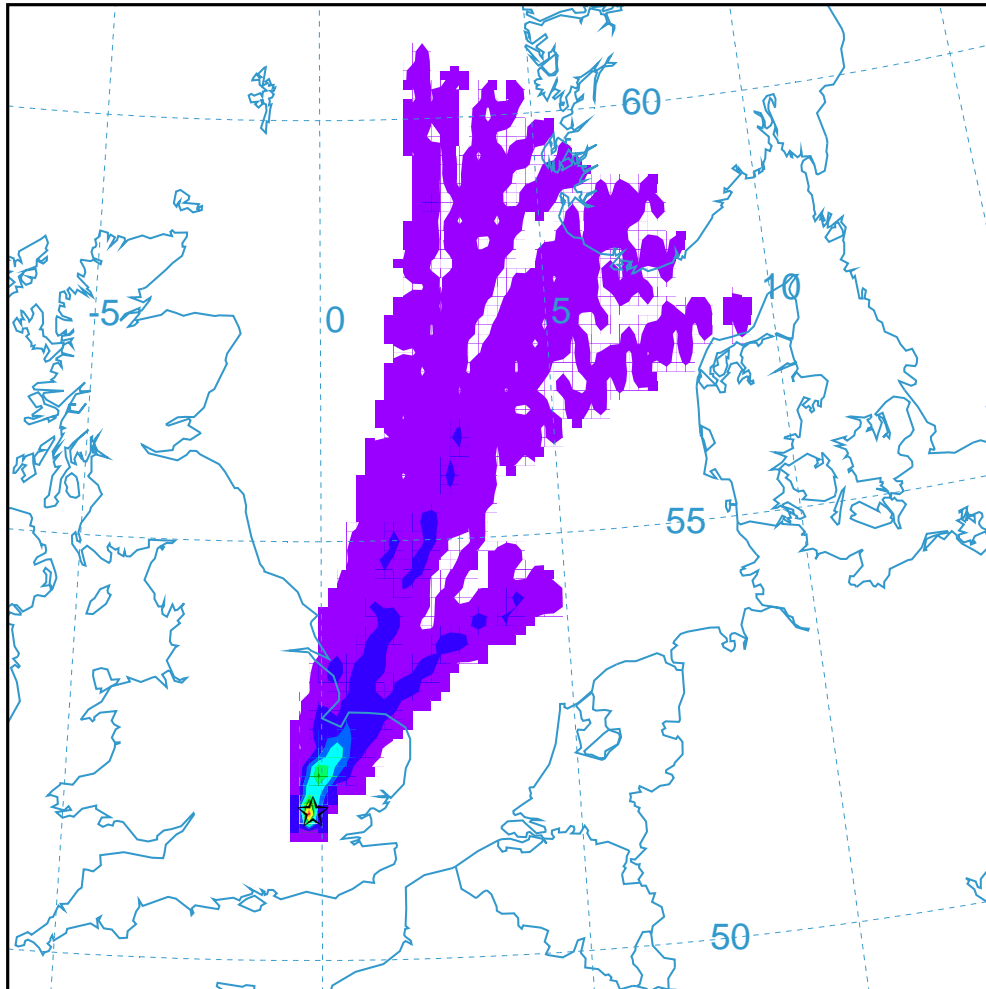


- Background colour is the 925-mb temperature from NCEP reanalysis data
- Arrows indicate wind speed and direction at 925 mb
- White stars show the timing and location of Diamondback moths records from citizen science observations and the Rothamsted Insect Survey UK light trap network

Tracing the UK arrivals backwards



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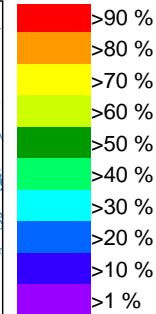
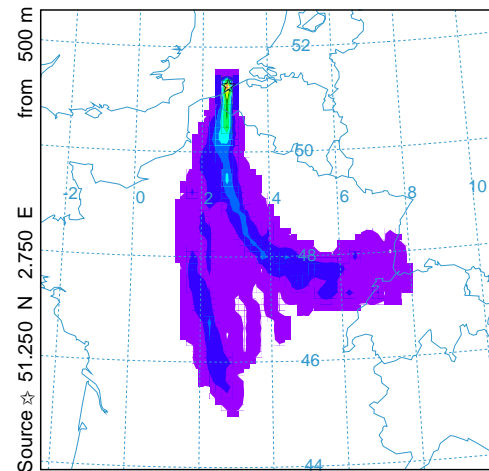
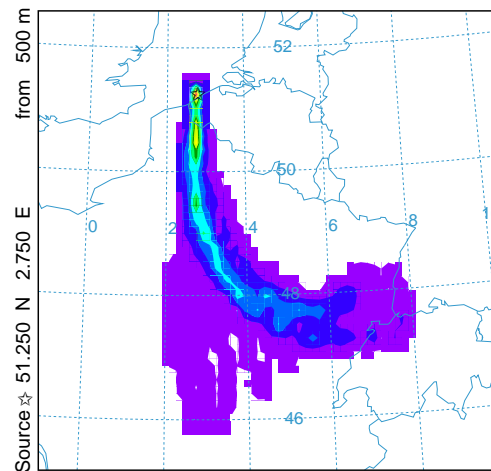
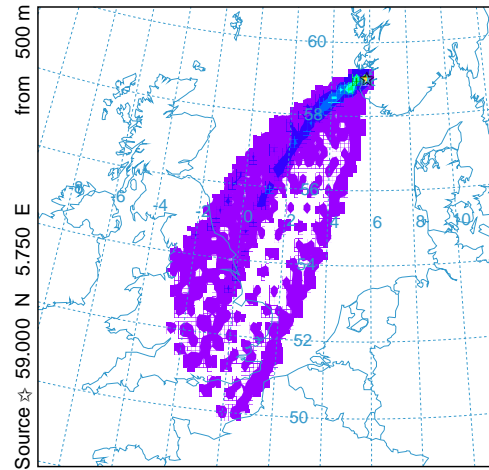
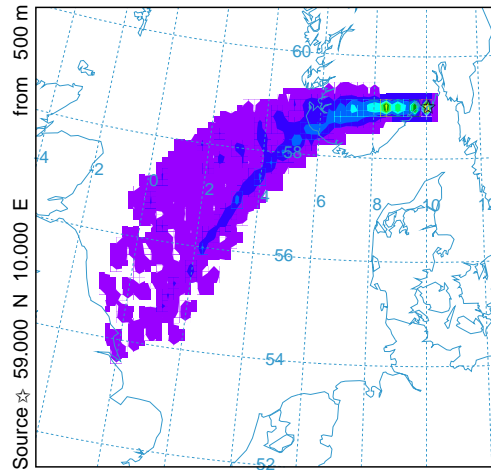


- Frequencies calculated using the HYSPLIT dispersion model
- 24-hour backwards trajectories started every 3 hours from 7am on 4 June back to 10am on 30 May 2016
- Migration heights are assumed to be at 500 metres above ground level
- Strong indication that the first wave of arrivals (1-4 June) originated from Norwegian coast, rather than the Netherlands or France

Predicting arrival in the UK



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- Forward trajectories started every 3 hours from 7pm on 29 May to 7pm on 31 May 2016

- Starting points from citizen science observations
- Migration heights at 500 m
- From these trajectories we can see which populations present a chance of arriving in the UK
- With further work this data could possibly be developed into an early warning system for mass migrations

Remaining open questions



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- What were the meteorological conditions that caused the initial population explosion in wintering areas?
- What is the maximum flight endurance and flight height of the Diamondback moth?
- What were the early warning signs for the outbreak reaching the UK coast?
- Can we use citizen science and light trap data to forecast the probability of Diamondback moth movements reaching the UK in real time?