

BLACK BEAN APHID (*Aphis fabae*) monitoring and forecasts – 29th October 2019

The table below lists the black bean aphids that have been captured in the network of suction traps this year.

Aphis fabae	Inverness	Dundee	Edinburgh	Ayr	Newcastle	FERA, York	Preston	Kirton	Broom's Barn	Wellesbourne	Hereford	Rothamsted	Writtle	Ascot	East Malling	Starcross	Total
Week ending																	
31-Mar																	0
07-Apr																	0
14-Apr																	0
21-Apr		1	1										1	1			4
28-Apr		1									1		1	1			4
05-May			1						1			1	10	12			25
12-May								3	2	1	1		9			1	17
19-May			2					1	6	6		4		8		3	30
26-May			3					1	6		4	34		10		1	59
02-Jun	1	2	1	3					2	1		2		4		3	19
09-Jun	1	1		1					2				3	2			15
16-Jun			1	1				2	2	6		7	13	35		8	75
23-Jun			1				2	6	18	30	32	78	58	40		15	280
30-Jun		1	1					3	1	44	36	24	14	14		182	320
07-Jul		2				2		15	3	15	51	14	11	12		12	137
14-Jul		2					6	8		34	8	6	2	7		16	89
21-Jul		2		2		2		2		2	1	1	4	1		21	38
28-Jul	2	4		4	1						3	2		1		3	20
04-Aug	4										1						5
11-Aug				1													1
18-Aug				1													1
25-Aug	1		4														5
01-Sep			1	1													2
08-Sep		1	1	3	1		1							1		1	9
15-Sep					1		1	1	1	1			1			1	7
22-Sep	2	4	13		9	4	1	3	2	3				1			42
29-Sep		3	5		3	1	14	3	2		1		2	2		2	38
06-Oct			1				8	15	2				2			2	30
13-Oct								5			1		1		1		8
20-Oct		1				1		4	12	2	1				3	1	25

Forecasts

The timing of the migration of *Aphis fabae* at any location can be predicted using the mean air temperature and the site's latitude and longitude. A range of equations were produced in Project FV 407a describing the relationships between the dates of first, 10% and 50% capture of aphids in suction traps and the mean air temperature over different periods and site latitude and longitude. These are the first predictions for 2019 based on the mean temperature during January to April.

	First	10% aphids	50% aphids
Cornwall	17-May	12-Jun	9-Jul
Kent	10-May	20-Jun	8-Jul
Suffolk	13-May	24-Jun	11-Jul
Wellesbourne	21-May	25-Jun	15-Jul
Norfolk	15-May	27-Jun	13-Jul
South Lincs	16-May	25-Jun	14-Jul
Nottingham	26-May	1-Jul	20-Jul
Lancashire	3-Jun	4-Jul	25-Jul
York	29-May	5-Jul	23-Jul
Scotland	6-Jun	19-Jul	1-Aug

These are the second predictions for 2019 based on the mean temperature during January to May.

	10% aphids	50% aphids
Cornwall	12-Jun	10-Jul
Kent	19-Jun	8-Jul
Suffolk	24-Jun	11-Jul
Wellesbourne	24-Jun	15-Jul
Norfolk	28-Jun	14-Jul
South Lincs	24-Jun	14-Jul
Nottingham	30-Jun	20-Jul
Lancashire	4-Jul	25-Jul
York	4-Jul	23-Jul
Scotland	21-Jul	3-Aug

These are the equations on which the predictions are based:

Measure of timing of aphid activity	Mean temperature during	Fitted equation (Time in days from 1 January)
First	Jan-Apr	$\text{Time} = 64 - 9.70 * \text{mean temp} + 2.67 * \text{latitude} - 4.19 * \text{longitude}$
10%	Jan-Apr	$\text{Time} = 60 - 7.78 * \text{mean temp} + 3.24 * \text{latitude} - 1.21 * \text{longitude}$
10%	Jan-May	$\text{Time} = 96 - 9.11 * \text{mean temp} + 2.88 * \text{latitude} - 1.04 * \text{longitude}$
50%	Jan-Apr	$\text{Time} = 57 - 5.23 * \text{mean temp} + 3.32 * \text{latitude} - 2.15 * \text{longitude}$
50%	Jan-May	$\text{Time} = 82 - 6.15 * \text{mean temp} + 3.07 * \text{latitude} - 2.04 * \text{longitude}$
50%	Jan-Jun	$\text{Time} = 110 - 7.07 * \text{mean temp} + 2.81 * \text{latitude} - 1.93 * \text{longitude}$

N.B. This assumes that longitude east is a positive value and longitude west is a negative value.

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The first black bean aphids of 2018 were captured in the Rothamsted suction trap network in the week ending 13 May – see table summarizing weekly captures below. Some of these counts are not for a full week – more information is on the Insect Survey web site <http://resources.rothamsted.ac.uk/insect-survey/bulletins>.

Aphis fabae	Elgin	Dundee	Edinburgh	Ayr	Newcastle	FERA, York	Preston	Kirton	Broom's Barn	Wellesbourne	Hereford	Rothamsted	Writtle	Ascot	Wye	Starcross
Week ending																
22-Apr																
29-Apr																
06-May																
13-May									4						1	
20-May									4							1
27-May									3			1				1
03-Jun		1	1				2		2	1			1	4		2
10-Jun									4	2			2	4		2
17-Jun			1			2			6		1	1	7	3	4	18
24-Jun								5	11	4		18	15	8	11	11
01-Jul		1	1			1	3	5	2	11	12	22	25	25	3	6
08-Jul		6	1					3	28	10	3	34	46	22	3	7
15-Jul		4	6			22	4	30	4	12	6		13	56	3	2
22-Jul		122	5		1	20	4	46	28	2		8	12	4	8	
29-Jul		108	20	2	6	8	4	8	2		4	3			1	1
05-Aug		18	3	2	1		2				2					
12-Aug		4	11			1										
19-Aug		4	1	1			1									
26-Aug		9	3	2							1					
02-Sep		8		2	1					1		1				
09-Sep			2					1					1			
16-Sep						1			1							
23-Sep			2			1		1	1							1
30-Sep		4		3			4	2	10				5			1
07-Oct								17	16				5			4
14-Oct			4						24		4	1	4			
21-Oct					2	16	8	78	22		5		8	10		1

Background

The black bean aphid (*Aphis fabae*) has a very large range of summer hosts, of which spinach is one. *Aphis fabae* overwinters mainly as eggs on spindle bushes (*Euonymus europaeus*), and a few other shrub species, and occasionally, in warmer locations, as mobile stages on members of the pea/bean family (wild hosts or winter beans). The eggs hatch from late February to early April and colonies develop on young leaves and shoots of the winter host. Winged forms are produced in May/June and these migrate to summer hosts. Reproduction continues throughout the summer, further winged forms are produced in response to crowding and these spread within crops and invade new crops. Populations usually peak in July/August. In autumn *A. fabae* migrates back to spindle and winter eggs are laid. Winged forms of *A. fabae* are captured in the suction traps operated by the Rothamsted Insect Survey. Figure 1 shows the weekly total numbers of *A. fabae* captured in the suction trap at Broom's Barn in Suffolk in 1973.

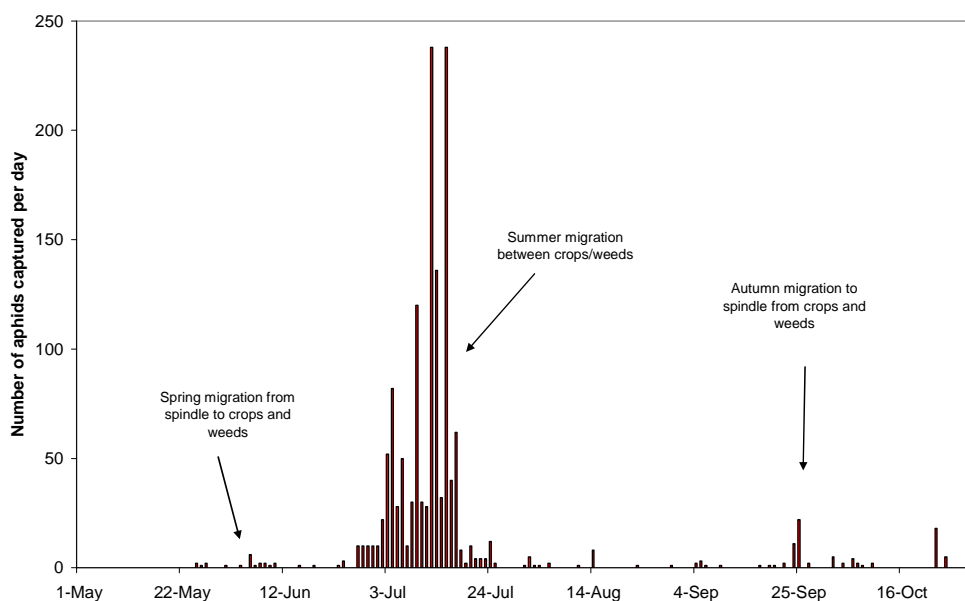


Figure 1 Typical pattern of aphid migration as indicated by suction trap samples (for data from Broom's Barn in 1973). The three phases of migration are indicated.

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Figure 2 shows the total numbers of female *A. fabae* caught at Broom's Barn from 1966 to 2006, presented as cumulative numbers on each date (from FV 407). A small number of male aphids were captured in the autumn as the winged aphids were returning to spindle to overwinter. These data are not shown. In project FV 407, the date used to separate the summer and autumn flights was 31 August.

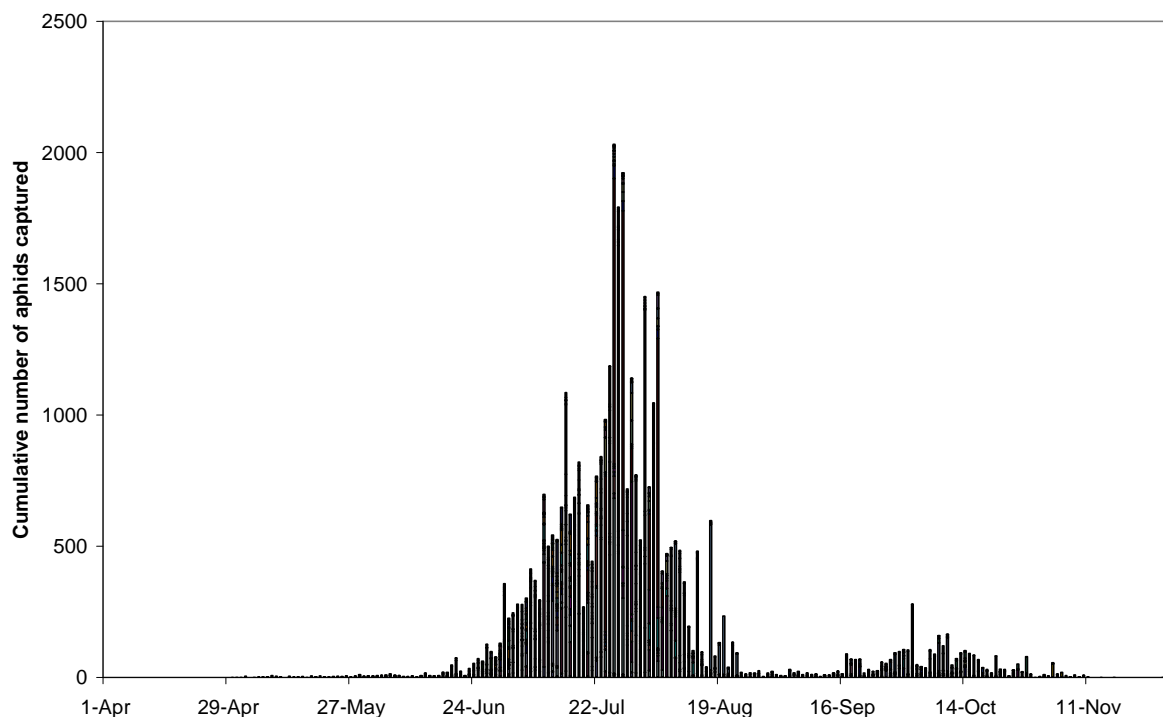


Figure.2

Cumulative numbers of female *A. fabae* caught at Broom's Barn between 1966 and 2006.