

Late blight: 2021 Population change and fungicide sensitivity update

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POTATOES

2021 season weather conditions



- Cold dry April, cold wet May, delayed season
- Outbreaks highly localized in SE England
- Outbreaks in Scotland later than average





Rainfall















Temperature

GB Fight Against Blight outbreaks - 2021



- 67 (41 in 2020) active blight scouts
- First +ve samples 26 May (Kent) & 15 July (Angus)
- 210 (94) outbreaks reported
- 86 (43) varieties (top 3 Maris Piper, King Edward, Melody)
- 1700 (681) samples to James Hutton Institute
- 1170 (432) genotyped
- Within-season results provided from FTA cards





Hutton Criteria & blight risk variation - July 2021

AHDB Blight Spy tool

https://ahdb.org.uk/blightspy



• East of England

- Almost every day with a Hutton Criteria
- High blight risk
- Many reported FAB blight outbreaks
- East Midlands
 - Fewer days with Hutton Criteria
 - Lower blight risk
 - Fewer reported FAB samples

Blight (FAB) • Hutton periods • Near misses • No alerts July 2021 East of England July 2021 East Midlands

2021 points of interest

- Cases of blight on weeds (e.g. hairy nightshade & thorn apple) and volunteers continual concern as inoculum source
- Most samples from cultivars of moderate blight resistance (rating 4)





GB *P. infestans* population change





□Other

∎33_A2

■3_A2

□10_A2

■13_A2

■39_A1

□23_A1

■8_A1

□1_A1

■6_A1

■2_A1

∎5_A1

□12_A1

■4_A1

- ■41_A2 36_A2 29 to 40% ■44_A1
- 37_A2 10 to 9% ■42_A2 • ■37_A2
- 6_A1 35 to 24% □36_A2
 - $13_A2 = 1\%$
- ■22_A2 'Other' 14 to 18%





Regional *P. infestans* genotype mapping 2021



- England (n=657)
 - Highest proportion of 36_A2 64%
 - Lowest proportion of 'Other' 7%
- Wales (n=99)
 - Highest proportion of 37_A2 41%
 - Highest proportion of 39_A1 tomato strain 13%
 - No re-appearance of 42_A2 lineage present for past 4 seasons
- Scotland (n=403)

EU 2 A1

EU_6_A1

EU_12_A1

EU_23_A1 EU_35_A2

EU_37_A2

EU_41_A2

EU 22 A2

EU_42_A2

- Relatively low proportion of 36_A2 and 37_A2
- EU_41_A2 reported in Fife late Aug 2021. One crop Maris Piper. Emerged in Denmark 2013 – by 2020 spread to 6 countries in NE Europe. No indication of source for 2021 GB outbreak. Import or 700km airborne spread against prevailing winds?
- Highest proportion of 'Other' types 41%





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GB P. infestans genotype mapping 2021





- 36_A2 prevalent across all but west England.
 Dominant in east England
- 37_A2 decline in east England
- Clone 8_A1 higher prevalence in Scotland
- 6_A1 remains widespread but lower frequency
- 'Other' widespread but most commonly sampled in Scotland





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Europe-wide P. infestans genotype change

2020

N=725





- Mainland Europe data (excluding GB)
- Lower blight risk season
- 10% fewer 36_A2 samples.
- Increase in 43_A1 and stable 37_A2 & 41_A2
- Increase in 13_A2
- Increase in tomato samples 23_A1, 2_A1 & 39_A1
- Data sharing remains valuable
- Thanks to many commercial and research sponsors







Late blight: fungicide sensitivity update 2021

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Background



- The range of fungicides currently available enables management strategies that mix or alternate active ingredients across the season to minimise the risks of resistance developing in the population of *P. infestans*.
- Due to the changing nature of the *Phytophthora infestans* population fungicide resistance problems have occurred in the past.
 - Problems with insensitivity to metalaxyl and Metalaxyl-M/mefenoxam were reported from as early as 1979 and full resistance of isolates of the 13_A2 lineage (also known as Blue-13) resulted in a marked decline in the use of this active ingredient in the UK.
 - Resistance to fluazinam has been reported in isolates of the 33_A2 and 37_A2 genotypes that first emerged in the Netherlands in 2009 and 2013 and were later found in the UK
- Given the recent emergence of new genotypes of *P. infestans,* AHDB commissioned work (2019-2021) to monitor the efficacy of fungicides belonging to a range of FRAC groups in controlling common genotypes over time

Fungicides tested and isolate information



FRAC Group	Active ingredient	Product	Full dose (ppm)*	Year Tested
Qil (21)	Cyazofamid 160g/I	Ranman	400	19,20,21
Qil (21)	Amisulbrom 200g/l	Shinkon	200	19,20,21
CAA (40)	Mandipropamid 250g/l	Revus	750	19,20,21
Carbamates (28)	Propamocarb 720g/l (625g as Infinito)	Promess	5000	19,20,21
Benzamides (43)	Fluopicolide 5mg/ml (62.5g/l as Infinito)	Pure active (Sigma Aldrich)	500	19,20,21
OSBPI (49)	Oxathiapiprolin 100g/l	Zorvec	75	19,20,21
Dithiocarbamates (M03)	Mancozeb 750g/kg	Penncozeb	6375	19,20,21

5 isolates each of *P. infestans* genotypes 6_A1, 36_A2 and 37_A2 tested against each active in each year

Isolates obtained from FAB monitoring in the same year as testing

 $1mg/l = 1\mu g/ml = 1 ppm$



- Detached leaf protectant assay
- Inoculated using zoospore suspensions
- Six leaves inoculated per concentration
- Tests conducted according to standardised protocols and concentrations
- Zoospore motility assay for fluopicolide in addition
- Disease incidence (number of infected leaves) and lesion area (mm²) measured
- **EC50** value calculated from lesion area data: the concentration of the **fungicide** that reduces growth by 50% relative to a non-fungicide treated control



Cyazofamid





- Highest dose 2.5% field rate
- Higher incidence of 36_A2 and 37_A2 at most concentrations which reflects differences between genotypes for EC50
- Differences were not observed in previous years
- This test should be repeated in 2022

Genotype	Mean EC50
6_A1	0.35 ª
36_A2	1.94 ^b
37_A2	1.21 ^b

Amisulbrom





- Highest dose 5% field rate
- No difference in EC50 between genotypes

Genotype	Mean EC50
6_A1	0.62 ^a
36_A2	0.84 ^a
37_A2	0.75 ª

Mandipropamid



AHDB

- Highest dose 1.3% field rate
- No difference in incidence or EC50

Genotype	Mean EC50
6_A1	0.31 ^a
36_A2	0.29 ^a
37_A2	0.27 ^a

Propamocarb





- Highest dose 20% field rate
- No difference in incidence or EC50

Genotype	Mean EC50
6_A1	18.14 ^a
36_A2	17.1 ^a
37_A2	17.21 ^a

Fluopicolide





- Highest dose 20% field rate
- EC50 values vary between genotypes due to differences in lesion incidence
- Difference in zoospore motility assay (MIC)

Genotype	Mean EC50	MIC value* (ppm)
6_A1	2.27 ^a	0.07 ^a
36_A2	3.69 ^b	0.32 ^b
37_A2	3.33 ^{ab}	0.06ª

*zoospore motility

Oxathiopiprolin





- Highest dose 0.4% field rate
- No difference in incidence or EC50

Genotype	Mean EC50
6_A1	0.15 ^a
36_A2	0.13 ^a
37_A2	0.15 ^a

Mancozeb





- Highest dose 16% field rate
- Control product multisite
- No difference in incidence or EC50

Genotype	Mean EC50
6_A1	95.18 ª
36_A2	84.99 ^a
37_A2	54.96 ^a



- Clonal populations are exposed to active ingredients over several years
- Examined 2019-2021 data for trends in sensitivity
- No evidence of any erosion of sensitivity in any a.i. in these tests
 - 2021 result for Cyazofamid should be checked in 2022 variation between years is common
- Strong evidence against cross resistance & supports benefit of growers following the FRAG guidelines





EC50 values over time (2019-21) for products tested



Error bars = average s.e.d



EC50 values over time (2019-21) for products tested



Error bars = average s.e.d



Mancozeb tests were conducted late in the season in 2021 and showed some variability

EC50 values over time (2019-21) for products tested



Error bars = average s.e.d



MIC is significantly higher for 36_A2 in zoospore motility tests in all years.

Conclusions



- *P. infestans* population continues to change
- New clones putting pressure on blight management – mistakes may be costly
- Clonal dominance = most inoculum surviving in tubers (seed, volunteers, dumps)
- Soil-borne oospores still a threat (keep rotations long)







- No changes in sensitivity for 7 active ingredients tested in this specific assay
- Control issues proved related to product choice and spray interval
- 37_A2 still prevalent don't forget advice on fluazinam use
- Does reduction in 13_A2 mean more confidence in metalaxyl?
- Protect actives follow FRAG







Fight Against Blight Scouts for collecting samples



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