**Supporting Information A.1: Further details on model parameterisation**

Model parameterisation is described in brief in Sections 2.3 and 3.1 of the main paper. Sections A.1.1 to A.1.4 give further details on the data and methods used to parameterise the model.

**A.1.1 Parameterisation of wheat canopy growth and senescence**

Figure A.1.1 shows the relationship between thermal time (base 0°C) and photo-thermal-vernal time (base 1°C), . The fitted regression was used to convert to the average thermal time in zero-degree days, , for each observed time point. The observed green leaf area index (GLAI) over time was compared for 12 site-years. The average thermal time estimated from gave a more consistent profile for the timings of upper canopy growth and senescence than the thermal time (base 0°C) calculated without adjusting for the effects of daylength and vernalisation (Figure A.1.2).

The starting values used for fitting parameter values for , , , , , *,* and were based on values used in previous models and averages derived from the experimental dataset (Table A.1.1). The fits to individual site-year data are shown in Table A.1.2.

TABLE A.1.1: Initial values used in parameterisation of wheat canopy growth and senescence.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** |  |  |  |  |  |  |  |  |
| Initial value | 1380 | 2066 | 2500 | 4.1 | 0.0126 | 0.005 | 0.1 | 0.02 |
| Source | a, b, c | c | b | a, b | a | a | a | a |

aHobbelen et al., 2011; bEstimate based on ‘Data set 1’ from Milne et al., 2003; cvan den Berg et al., 2013

The average number of zero-degree days per day was estimated by using the fitted model values of (leaf 3 emergence) and (complete senescence of upper canopy) (Table 2, main paper) and the dates of the corresponding observed photo-thermal-vernal time to estimate the number of days between emergence and senescence for each site-year (Table A.1.3). The model estimate of the total number of zero-degree days between upper canopy emergence and senescence was adjusted for any mismatch between , and the observed photo-thermal-vernal time at the start and end of the emergence and senescence dates respectively (to account for ‘overshooting’ the required photo-thermal-vernal time due to using daily average weather data). Then the estimated total number of zero-degree days between upper canopy emergence and senescence was divided by the total number of days, to estimate for each site-year. The mean value of was calculated across eleven site-years, excluding one site-year for which the model fit was relatively poor.

A graph with black dots and red line

Description automatically generated  
FIGURE A.1.1: Linear regression between photo-thermal-vernal time (base 1°C), , and thermal time (base 0°C), . Round black points show the time points used to fit the regression, corresponding to time points at which observations of wheat green leaf area index (GLAI) were made for 12 site-years. Dashed line shows the fitted regression line: . n=179, R2 = 84.8%, RMSE = 149 degree days (base 0°C).

A diagram of a graph

Description automatically generated with medium confidenceFIGURE A.1.2: Comparison between the profile of the Green Leaf Area Index growth and senescence of upper wheat canopy for (a) thermal time (base 0°C) calculated without adjusting for daylength and vernalisation, and (b) thermal time (base 0°C) calculated from photo-thermal-vernal time, , using the equation derived through simple linear regression (Equation 20, main paper). Using the average thermal time calculated from gives more consistent timings of upper canopy growth and senescence for use in model parameterisation. Round points (black) show data from the six sites included in the pooled dataset used for parameterisation of the model. Square points (red) show data from the eight sites not included in the pooled dataset.

TABLE A.1.2: Fitted parameter values for the wheat canopy model for individual site-years, number of observation time points for each site-year (n), and R2 for the model fit to each site-year. Data used to fit the model comprised the mean GLAI of the top three leaves at each observation time point, averaged all four cultivars and replicates in Dataset 1. The values used for model simulations (Table 2, main paper) were fitted to the ‘Pooled’ dataset, comprised of the first six site-years listed below.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Site and year** | **Maximum Observed GLAI** | **Parameter** | | | | | | | | | **n** | **R2** |
|  |  |  |  |  |  |  |  | |
| Pooled dataset (6 sites) | 4.898 | 1396 | 1891 | 2567 | 4.438 | 0.0082 | 0.0028 | 0.704 | | 0.314 | 76 | 76.9 |
| Devon, 1995 | 3.758 | 1413 | 1947 | 2482 | 3.704 | 0.0096 | 0.0070 | 0.251 | | 0.017 | 13 | 98.8 |
| Boxworth, Cambridgeshire, 1994 | 4.270 | 1454 | 1645 | 2461 | 4.166 | 0.0167 | 0.0016 | 0.326 | | 0.056 | 10 | 98.9 |
| Kent, 1995 | 4.351 | 1357 | 2074 | 2617 | 4.440 | 0.0067 | 0.0036 | 0.076 | | 0.748 | 14 | 96.8 |
| Devon, 1994 | 4.615 | 1460 | 1709 | 2537 | 4.535 | 0.0154 | 0.0017 | 0.157 | | 0.024 | 12 | 94.8 |
| Norfolk, 1995 | 4.733 | 1334 | 2022 | 2748 | 4.793 | 0.0080 | 0.0012 | 0.060 | | 0.810 | 14 | 97.2 |
| Norfolk, 1994 | 4.898 | 1364 | 2040 | 2608 | 5.183 | 0.0047 | 0.0042 | 0.085 | | 0.251 | 13 | 96.1 |
| Ely, Cambridgeshire, 1995 | 1.706 | 1437 | 1864 | 2543 | 1.556 | 0.0309 | 0.0065 | 0.642 | | 0.013 | 11 | 66.7 |
| Boxworth, Cambridgeshire, 1995 | 2.668 | 1479 | 1500 | 2631 | 2.622 | 0.0191 | 0.0004 | 0.054 | | 0.010 | 13 | 99.6 |
| Hampshire, 1995 | 2.761 | 1424 | 1931 | 2655 | 2.744 | 0.0076 | 0.0046 | 0.073 | | 0.847 | 14 | 94.5 |
| Yorkshire, 1995 | 2.882 | 1426 | 1868 | 2491 | 2.709 | 0.0218 | 0.0061 | 0.266 | | 0.023 | 13 | 94.2 |
| Herefordshire, 1995 | 3.558 | 1456 | 1803 | 2686 | 3.368 | 0.0108 | 0.0062 | 0.103 | | 1.205 | 11 | 95.8 |
| Ely, Cambridgeshire, 1994 | 5.137 | 1449 | 1888 | 2510 | 4.621 | 0.0119 | 0.0026 | 0.235 | | 0.362 | 10 | 81.8 |
| Herefordshire, 1994 | 6.080 | 1433 | 1912 | 2532 | 5.814 | 0.0130 | 0.0036 | 0.065 | | 0.973 | 13 | 97.2 |
| Kent, 1994 | 7.773 | 1425 | 1736 | 2535 | 7.764 | 0.0124 | 0.0024 | 0.207 | | 0.230 | 14 | 98.7 |

TABLE A.1.3: Comparison of model estimation of dates of leaf 3 emergence and complete senescence of upper canopy with recorded dates for 12 site-years (Dataset 1), and estimation of the average number of zero-degree days per day, , based on model estimates of the number of days between emergence and senescence at each site. Model estimates for each site based on the dates of observed photo-thermal-vernal time corresponding to the fitted parameter values of (leaf 3 emergence) and (complete senescence of upper canopy) (Table 2, main paper; as fitted to pooled dataset of six sites). Data from Ely, Cambridgeshire, 1995 were not used in the final estimate of .

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Site and year** | **Date leaf 3 emergence recorded** | **Date of final observation** | **Model estimate of leaf 3 emergence date** | **Model estimate of date of complete senescence** | **Model estimate of number of days between upper canopy emergence and senescence** | **Model estimate: Average number of zero-degree days per day,** |
| Devon, 1995 | 29/04/95 | 12/07/95 | 23/04/95 | 17/07/95 | 86 | 13.7 |
| Boxworth, Cambridgeshire, 1994 | 14/05/94 | 13/07/94 | 06/05/94 | 21/07/94 | 77 | 15.4 |
| Kent, 1995 | 25/04/95 | 17/07/95 | 26/04/95 | 19/07/95 | 85 | 13.8 |
| Devon, 1994 | 10/05/94 | 20/07/94 | 01/05/94 | 21/07/94 | 82 | 14.4 |
| Norfolk, 1995 | 01/05/95 | 17/07/95 | 29/04/95 | 21/07/95 | 84 | 14.1 |
| Norfolk, 1994 | 17/05/94 | 19/07/94 | 12/05/94 | 25/07/94 | 75 | 15.7 |
| Boxworth, Cambridgeshire, 1995 | 03/05/95 | 19/07/95 | 01/05/95 | 20/07/95 | 81 | 14.7 |
| Hampshire, 1995 | 28/04/95 | 18/07/95 | 24/04/95 | 19/07/95 | 87 | 13.7 |
| Yorkshire, 1995 | 20/05/95 | 26/07/95 | 09/05/95 | 03/08/95 | 87 | 13.5 |
| Herefordshire, 1995 | 28/04/95 | 14/07/95 | 24/04/95 | 19/07/95 | 87 | 13.5 |
| Herefordshire, 1994 | 13/05/94 | 29/07/94 | 10/05/94 | 27/07/94 | 79 | 15.0 |
| Kent, 1994 | 12/05/94 | 21/07/94 | 06/05/94 | 23/07/94 | 79 | 14.9 |
| Ely, Cambridgeshire, 1994 | 19/05/94 | 07/07/94 | 02/05/94 | 21/07/94 | 81 | 14.7 |
| Ely, Cambridgeshire, 1995 | 11/05/95 | 20/07/95 | 09/05/95 | 19/08/95 | 103 | 11.5 |

Model zero-degree days were mapped to growth stages on Zadoks’ scale (AHDB, 2023; Zadoks et al., 1974).The fitted values of , , indicate the timings of GS31 (start of growth of leaf 3), GS61 (anthesis) and GS87 (end of grainfill) respectively. We estimated the timing of GS39 (flag leaf fully emerged) as 1653 zero-degree days, the median time at which the flag leaf was first observed to have reached at least 90% of its maximum observed size, for the six site-years included in the pooled dataset from Dataset 1 (Table A.1.4).

We followed the approach of Milne et al. (2003) in using phyllochron length, , to estimate the timings of other growth stages before GS39. The phyllochron is the accumulated thermal time between the emergence of consecutive leaves. There is approximately one phyllochron between GS32 (leaf 3 fully emerged) and GS37 (leaf 2 fully emerged), and between GS37 and GS39, so the timing of GS37 can be estimated as GS39 , and the timing of GS32 as GS39 . There are approximately three phyllochrons between GS39 and GS61 (Milne et al., 2003), so can be estimated as:

Our estimated value of was 79.3 zero-degree days. We assumed that the timings (in zero-degree days) of growth stages could be linearly interpolated between GS32 and GS37, GS37 and GS39, GS39 and GS61, and GS61 and GS87.The estimated timings of GS32 (1495 zero-degree days) and GS37 (1574 zero-degree days) were very similar to the average observed timings of leaf 3 and leaf 2 full emergence across the twelve site-years in Dataset 1 (Table A.1.4). The mapped growth stages were used to determine the timing of fungicide applications in model simulations (Section 2.4, main paper).

TABLE A.1.4: Observed timing (in zero-degree days, converted from ) of leaf emergence across 12 site-years.

|  |  |  |  |
| --- | --- | --- | --- |
| **Site and year** | **Leaf 3**  **>90% emerged** | **Leaf 2**  **>90% emerged** | **Leaf 1**  **>90% emerged** |
| Devon, 1995 | 1483 | 1558 | 1669 |
| Boxworth, Cambridgeshire, 1994 | 1528 | 1528 | 1667 |
| Kent, 1995 | 1527 | 1574 | 1639 |
| Devon, 1994 | 1488 | 1633 | 1633 |
| Norfolk, 1995 | 1418 | 1511 | 1714 |
| Norfolk, 1994 | 1529 | 1529 | 1605 |
| Boxworth, Cambridgeshire, 1995 | 1510 | 1553 | 1717 |
| Hampshire, 1995 | 1542 | 1589 | 1751 |
| Yorkshire, 1995 | 1431 | 1564 | 1564 |
| Herefordshire, 1995 | 1493 | 1552 | 1675 |
| Herefordshire, 1994 | 1495 | 1559 | 1639 |
| Kent, 1994 | 1457 | 1527 | 1600 |
| Ely, Cambridgeshire, 1994 | 1479 | 1623 | 1623 |
| Ely, Cambridgeshire, 1995 | 1460 | 1633 | 1719 |

A.1.2. Contribution of individual leaves to total upper canopy area

In addition to the overall model fit described in Section A.1.1, which describes the total GLAI of the upper canopy (top three leaves), we also fitted the growth and senescence model parameters individually for each leaf 1–3. This was necessary to obtain an estimate of the proportional contribution of each leaf to the overall non-senesced LAI of the upper wheat canopy, which is useful for the parameterisation of fungicide dose response parameters, as it can be used to weight estimates of average disease severity (Section A.1.4). Fungicide dose response data on disease severity does not always include data on the LAI of each leaf, and an unweighted average of disease severity on each leaf 1–3 may give a biased estimate of the overall percentage severity on the upper canopy: for example, *Z. tritici* severity is often higher on leaf 3 than on leaf 1 and 2, whilst the LAI of leaf 3 is typically smaller than leaves 1 and 2 (van den Berg et al., 2013).

We assumed that the values of and for Leaf 3 and for Leaf 1 corresponded to the fitted values of , and for the entire upper canopy (Table 2, main paper) respectively. We assumed that the growth rate, , was the same for all leaves (Milne et al., 2003), and so could be estimated from the timings of GS31 and GS32 in degree days:

The values of for leaf 2 and leaf 1 were estimated as GS37 and GS39 respectively. The onset of senescence, , of leaves 2 and 1 was assumed to occur 7 and 6 after GS37 and GS39 respectively, based on their relative leaf area (van den Berg 2013).

Data on the GLAI of each of leaves 3, 2 and 1 at the six site-years included in the ‘pooled’ dataset (Table A.1.2) were used to fit individual values of for each leaf, for leaves 3 and 2, and values of *,* and common to all leaves.

The fitted parameter values for leaves 1,2 and 3 are shown in Table A.1.5. The fitted and observed proportional contribution of each leaf to the total GLAI of the upper canopy is compared in Figure A.1.3. The sum of the simulated GLAI of all three leaves was very similar to the GLAI simulated by the fit to the total GLAI of the upper canopy (Figure A.1.4).

TABLE A.1.5: Fitted parameter values for growth and senescence of individual leaves in the upper wheat canopy.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Leaf** | **Parameter** | | | | | | | |
|  |  |  |  |  |  |  |  |
| 3 | 1396 | 1891 | 2443 | 1.350 | 0.2219 | 0.0038 | 0.0909 | 1.466 |
| 2 | 1475 | 2127 | 2534 | 1.555 |
| 1 | 1554 | 2127 | 2567 | 1.410 |

A graph of a degree

Description automatically generated with medium confidenceFIGURE A.1.3: Observed (black points) and fitted (purple lines) proportional contribution of each leaf 1-3 to the overall green leaf area index (GLAI) of the upper wheat canopy. Observed data (black points) from six site-years included in the ‘pooled’ dataset (Table A.1.2).

A graph of a green leaf area

Description automatically generated

FIGURE A.1.4: Model simulation of the overall upper wheat canopy green leaf area index (GLAI) in the absence of disease, comparing the model fitted to total upper canopy GLAI (solid black line) with the model simulation summing the fitted GLAI of individual leaves 1–3 (dashed purple line), and with observed total GLAI measurements used for parameterisation of wheat canopy (points) (n=76, from 6 sites from Dataset 1).

**A.1.3 Parameterisation of *Zymoseptoria tritici* life cycle parameters**

The value of (Equation 4, main paper)estimated by Hobbelen et al. (2011) was recalculated based on the fitted value of .

We estimated values for and using data on *Z. tritici* epidemic progress (% severity) (Dataset 1) on untreated plots on which the maximum severity of the Z. tritici epidemic exceeded 5% and the maximum cumulative severity of yellow rust, brown rust and powdery mildew did not exceed 15% (Table A.1.6). Data on *Z. tritici* severity and LAI for each leaf 1-3 were available, so the average severity over all three leaves was calculated using the LAI of each leaf as a weighting factor.

As an increase in the value of either or can increase disease severity, an increase in one parameter can be counteracted by a decrease in the other, so a two-stage fitting process was used. Firstly, and were fitted simultaneously for each site-year-cultivar combination using least squares optimisation (lsqcurvefit, MATLAB 2022), assuming canopy growth and senescence as fitted to the ‘pooled’ dataset (parameters shown in Table 2, main paper). The median value of was calculated across all site-year-cultivar combinations, and refitted for each site-year-cultivar using the fixed value of . The mean value of from cultivars that were considered moderately resistant at the time the trials were carried out was used for model simulations.

In the absence of a fungicide, using the fitted values of and (Table 2, main paper) the model predicts septoria severity of 9.5% at GS75, which is approximately equivalent to the expected average severity on a cultivar with an AHDB resistance rating of 6 (AHDB, 2024b).

Riband at the time of the trials was highly susceptible to septoria. We fitted a separate value of for Riband: this could be used to represent susceptible cultivars in future model simulations. For the susceptible cultivar (Riband), values of ranged from 0.0183 to 0.0800, with a mean value of 0.0357, corresponding to a prediction of 24.1% septoria severity at GS75, equivalent to an AHDB resistance rating of approximately 3–4 (AHDB, 2024b).

TABLE A.1.6: Site-year-cultivar combinations used (✓) and excluded (🗶) from parameterisation of septoria infection model, and reasons for exclusion where relevant (‘LS’ denotes exclusion because the maximum severity of the septoria epidemic was ≤5%; ‘OD’ denotes exclusion because the maximum cumulative severity of diseases other than *Z. tritici* exceeded 15%. All 4 replicates were used for each site-year-cultivar combination, unless one replicate did not meet the criteria for inclusion (these cases are noted as ‘3 reps’, indicating data from 3 replicates was used). The value of used for model simulations was fitted to data from cultivars Apollo, Slejpner and Haven.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Site and year** | **Cultivar** | | | |
| **Riband** | **Apollo** | **Slejpner** | **Haven** |
| Devon, 1994 | ✓ | 🗶 LS | ✓ (3 reps) | ✓ |
| Devon, 1995 | ✓ | 🗶 LS | ✓ (3 reps) | 🗶 LS |
| Hampshire, 1995 | ✓ | ✓ | 🗶 OD | ✓ |
| Herefordshire, 1994 | ✓ | 🗶 LS | ✓ | ✓ (3 reps) |
| Herefordshire, 1995 | ✓ | 🗶 LS | ✓ | ✓ |
| Kent, 1994 | ✓ | 🗶OD | 🗶OD | ✓ |
| Kent, 1995 | ✓ (3 reps) | 🗶 LS | 🗶 LS | 🗶 LS |
| Boxworth, Cambridgeshire, 1994 | 🗶 LS | 🗶 LS | 🗶 LS | 🗶 LS |
| Boxworth, Cambridgeshire, 1995 | 🗶 LS | 🗶 LS | 🗶 LS | 🗶 LS |
| Ely, Cambridgeshire, 1994 | 🗶 LS | 🗶LS | 🗶 LS | 🗶 LS |
| Ely, Cambridgeshire, 1995 | 🗶OD | 🗶OD | 🗶 OD | 🗶 LS |
| Norfolk, 1994 | 🗶 LS | 🗶 LS | 🗶 LS | 🗶 LS |
| Norfolk, 1995 | 🗶 LS | 🗶 LS | 🗶 LS | 🗶 LS |
| Yorkshire, 1995 | 🗶 LS | 🗶 LS | 🗶 LS | 🗶 LS |

**A.1.4 Parameterisation of fungicide dose response parameters for SDHI fungicides**

We used a literature search to estimate an average decay rate, , for SDHI fungicides, and data from AHDB Fungicide Performance Trials (AHDB, 2024a) on the observed dose response of *Z. tritici* severity to fluxapyroxad and isopyrazam from 2011-2012 to fit indicative values of and (Section 2.2.3, main paper). The dose response data consisted of the *Z. tritici* severity, averaged over three replicates for each site-year, on leaves 1, 2 and 3 following a single application of fluxapyroxad or isopyrazam at 0.25, 0.5,1 or 2 times the full label dose, and on untreated plots (note that applying more than the full label dose is not recommended in practice, but is included in the experimental protocol for the AHDB Fungicide Performance trials to enable a better estimation of the fungicide dose response).

We sourced gridded weather data were sourced via the Agri4cast Resources Portal (JRC, 2024) to estimate the thermal time (base 0°C) between treatment and assessment timings. We calculated the average severity over all three leaves, weighted by the average contribution of each leaf to the overall canopy at the assessment timing. Data were included in the parameterisation if the average severity on the corresponding untreated plots was >5% and ≤70% (Table A.1.7).

TABLE A.1.7: Data used in parameterisation of SDHI fungicide dose response parameters.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fungicide** | **Number of sites** | | | **Number of datapoints** | | |
| **2011** | **2012** | **Total** | **2011** | **2012** | **Total** |
| Isopyrazam | 3 | 3 | 6 | 17 | 18 | 35 |
| Fluxapyroxad | 0 | 3 | 3 | 0 | 18 | 18 |
| Both | 3 | 3 | 6 | 17 | 36 | 53 |

An individual value of was fitted for each site-year based on the severity on the untreated plots. Cross-site values of and for each SDHI fungicide (Table A.1.8) were then fitted to the observed severity data for fluxapyroxad (n=18) and isopyrazam (n=35) using least-squares optimisation (lsqcurvefit, MATLAB 2022). The model achieved a very good fit to the observed disease severity data (n=53, R2=91.3%, RMSE=5.6 % severity). The cross-site observed and fitted dose response for fluxapyroxad in 2012 is shown in Figure A.1.5. The averages of the fitted values of and for fluxapyroxad and isopyrazam were used as indicative parameter values for an SDHI fungicide for the purpose of interpreting model simulation results (Table 2, main paper).

As an additional check to ensure that the parameterisation was robust to our assumptions around the average contribution of each leaf to the overall canopy over time, we also fitted and using the unweighted average severity over all three leaves. The results were similar, but with slightly lower values of and slightly higher values of (Table A.1.8).

TABLE A.1.8:Fitted doseresponse parameters and for SDHI fungicides.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Fungicide** | **Fitted parameters: weighted average severity** | | **Fitted parameters: unweighted average severity** | |
|  |  |  |  |
| Isopyrazam | 0.5280 | 10.0 | 0.5076 | 10.9 |
| Fluxapyroxad | 0.6091 | 9.7 | 0.5804 | 10.5 |
| Average | 0.5686 | 9.9 | 0.5440 | 10.7 |

A graph of a disease

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FIGURE A.1.5 Observed and fitted fungicide dose response for fluxapyroxad and Isopyrazam. Average disease severity for each fungicide dose rate expressed as a proportion of the untreated severity. Points (isopyrazam – black, round; fluxapyroxad – red, square) show the average observed dose response in 2012 (n=36 across 3 sites). Lines show the average fitted dose response at the same three (2012) sites for isopyrazam (black solid line, parameters fitted to 6 site-years, 2011-2012) and fluxapyroxad (red dashed line, parameters fitted to 3 site-years, 2012). Note that applying more than the full label dose is not recommended in practice, but a higher dose rate is included in the experimental protocol for the AHDB Fungicide Performance trials to enable a better estimation of the fungicide dose response.

**A.1.5 References**

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**Supporting Information A.2: Further details on model results**

This section provides further illustration of some of the results described in Section 3.2.2 of the main paper. Figure A.2.1 shows that the asymptote parameter, , has very little impact on for a curvature shift. Figure A.2.2 shows how curvature parameter, , asymptote shift, , and curvature shift, , affect the fungicide concentration, , that maximises the difference in growth rates of the sensitive and resistant strain, demonstrating the driver of the results shown in Figure 6 of the main paper.

A graph of a number of numbers

Description automatically generated with medium confidenceFIGURE A.2.1 Negligible variation in , the percentage change in selection due to dose splitting with asymptote parameter for strains with a curvature shift, (see Section 3.2.2, main paper). For the example shown here, 50% and 0.008 .

*A graph of different types of curves

Description automatically generated with medium confidence*FIGURE A.2.2Effect of curvature parameter, , and sensitivity shift, or , on the fungicide concentration that maximises , the difference in the fractional reduction of pathogen life cycle parameters of the sensitive strain compared to a resistant strain. (a), (b) and (c) show for different levels of asymptote shift, , for 2, 10 and 20 respectively. (d), (e) and (f) show for different levels of curvature shift, , for 2, 10 and 20 respectively. For a curvature shift, the smaller the value of and the larger the value of , the smaller the concentration at which is at a maximum. Dashed black line: sensitivity shift = 90%. Dashed purple line: sensitivity shift = 50%. Solid orange line: sensitivity shift = 10%.