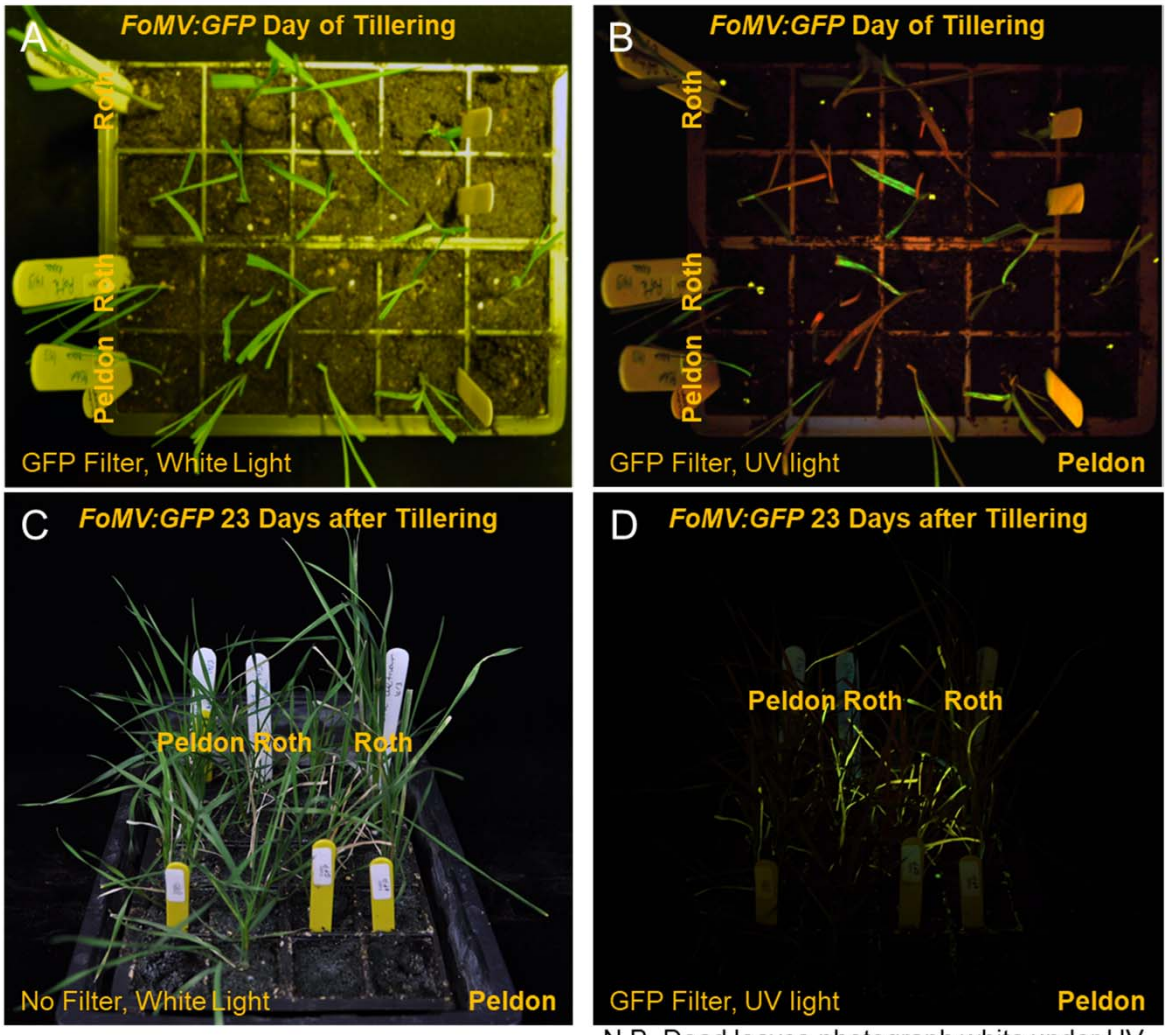
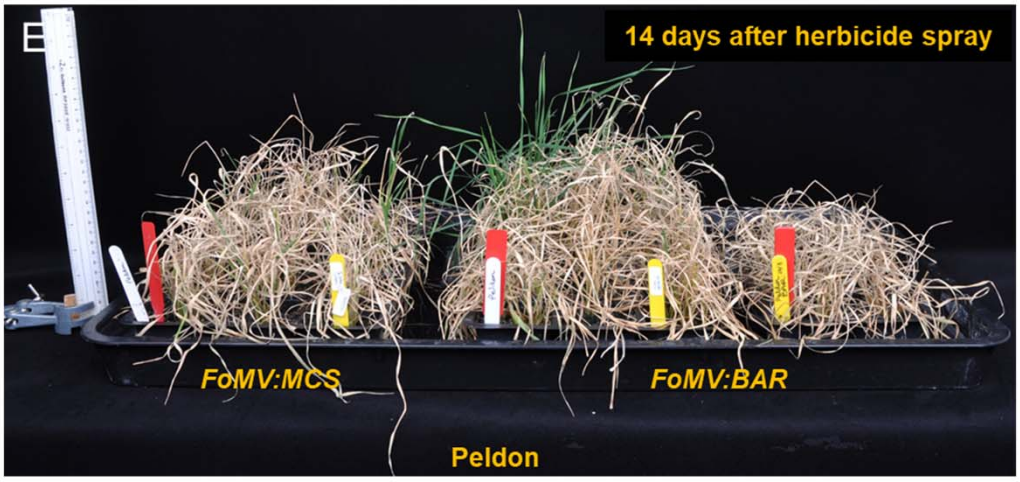
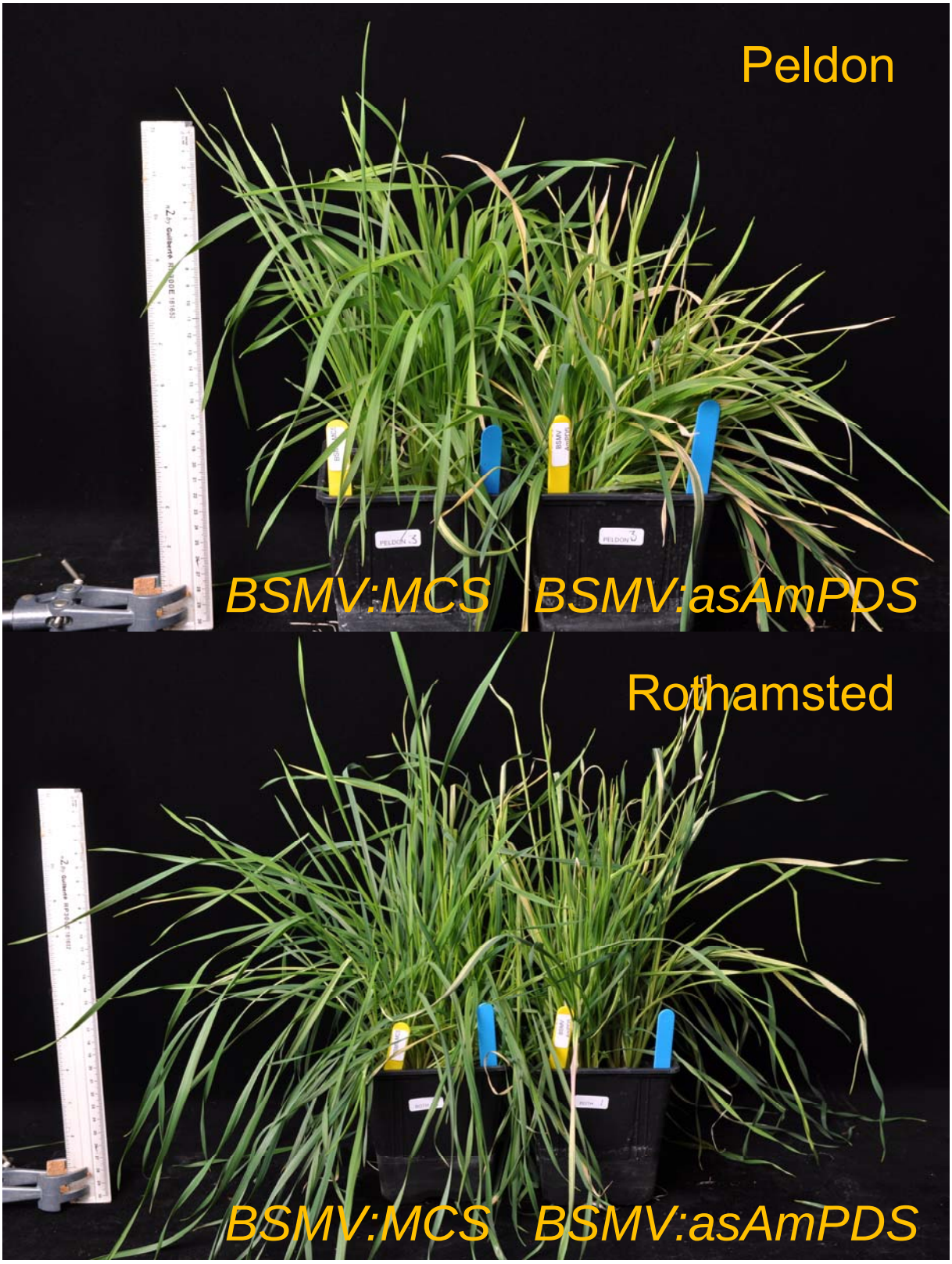
Supplemental Figure 1: The loss of green colour correlated to infection with *BSMV:asTaPDS* or *BSMV:asAmPDS* is stable through tillering. Phenotypes of black-grass (Peldon) leaves that have been infected with Barley Stripe Mosaic Virus (BSMV) carrying either an empty multiple cloning site (MCS), or the MCS with a 212 bp portion of *PHYTOENE DESATURASE* (*PDS*) in antisense from either wheat (*TaPDS*) or black-grass (*AmPDS*) 59 days after tillering.



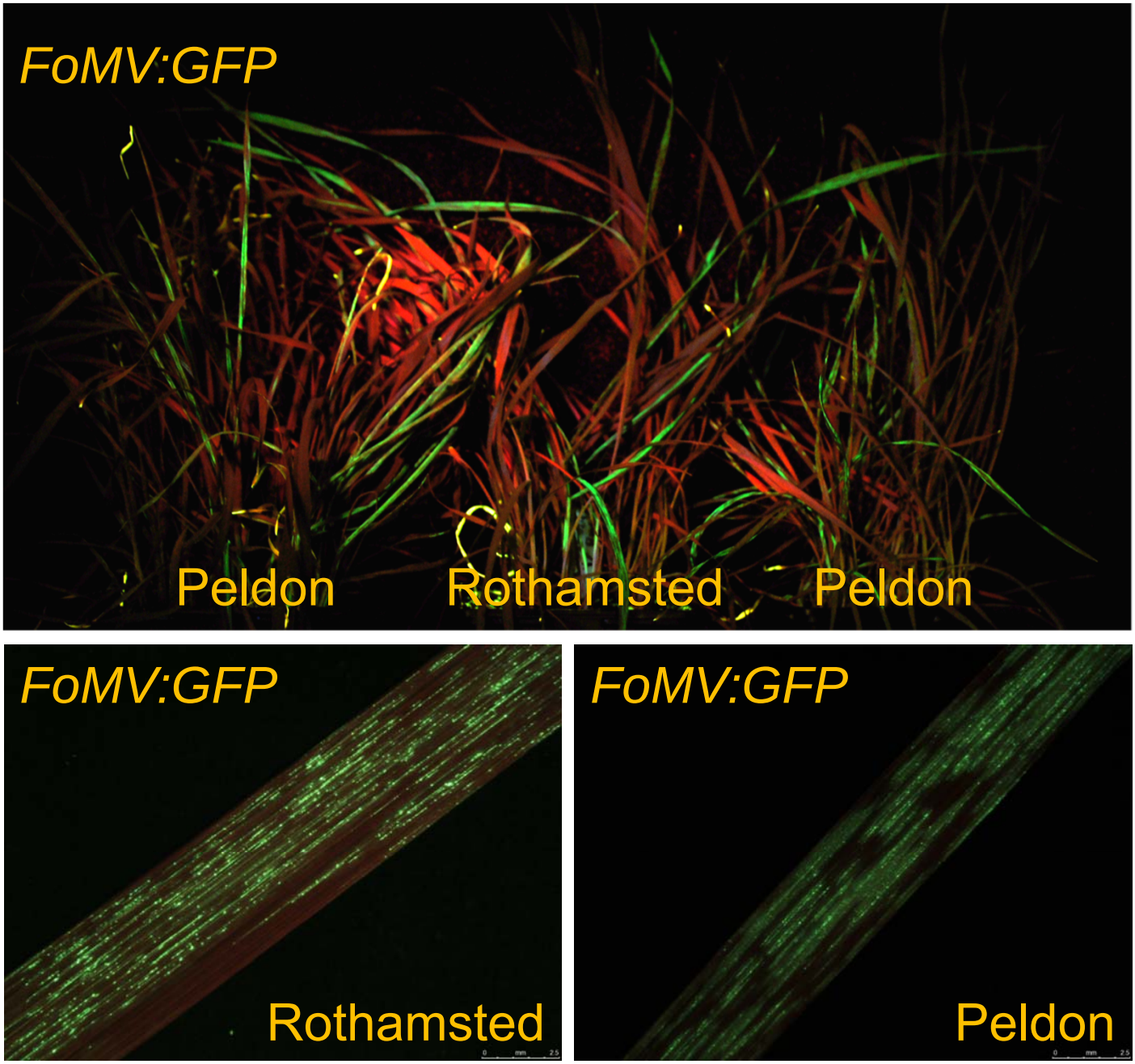
N.B. Dead leaves photograph white under UV



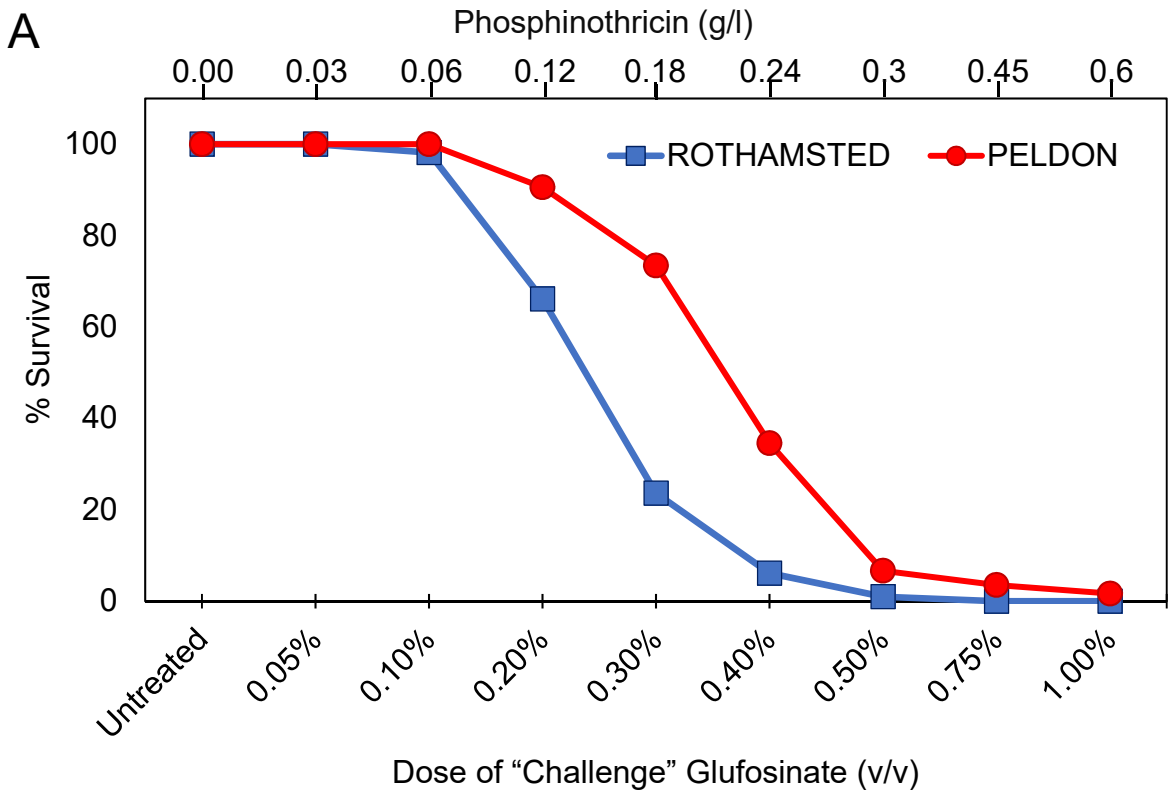
Supplemental Figure 2: FoMV phenotype is not stable through tillering. Peldon and Rothamsted plants that were treated with *FoMV:MCS*, *FoMV:GFP*, or *FoMV:*bar were tillered and the phenotype was challenged 14 days or 34 days after tillering. A-B) One Peldon plant and two Rothamsted plants treated with *FoMV:GFP* that exhibited high levels of GFP fluorescence under blue light (440-460 nm excitation) using a Dual Fluorescent Protein flashlight (Nightsea, Lexington, MA, USA) through a long pass (510 nm) filter (Midwest Optical Systems, Palatine, IL, USA) were tillered into 4, 9 and 4 tillers respectively. These plants were healthy tillers (A) and the GFP was visible after tillering (B). C-D) No evidence of GFP was observed at 12, 15, 19, or 23 days after tillering. Photographs were taken 23 days after tillering with C) white light and no filter to demonstrate the tillers had recovered and were accumulating biomass and D) with under blue light (440-460 nm excitation) using a Dual Fluorescent Protein flashlight (Nightsea, Lexington, MA, USA) through a long pass (510 nm) filter (Midwest Optical Systems, Palatine, IL, USA) to evidence the lack of fluorescence. N.B. The dead leaves show up white similar to the GFP green under blue light. E) Peldon and F) Rothamsted plants infected with *FoMV:MCS* or *FoMV:*bar were tillered. This gave *FoMV:MCS* 21 tillers, *FoMV:*bar 42 tillers, of Peldon and *FoMV:MCS* 20 tillers and *FoMV:*bar 30 tillers of Rothamsted. 34 days after tillering, plants were challenged with 0.5% Basta + 0.1% Tween. 14 days after herbicide application there were no obvious differences between *FoMV:MCS* and *FoMV:*bar for either biotype.

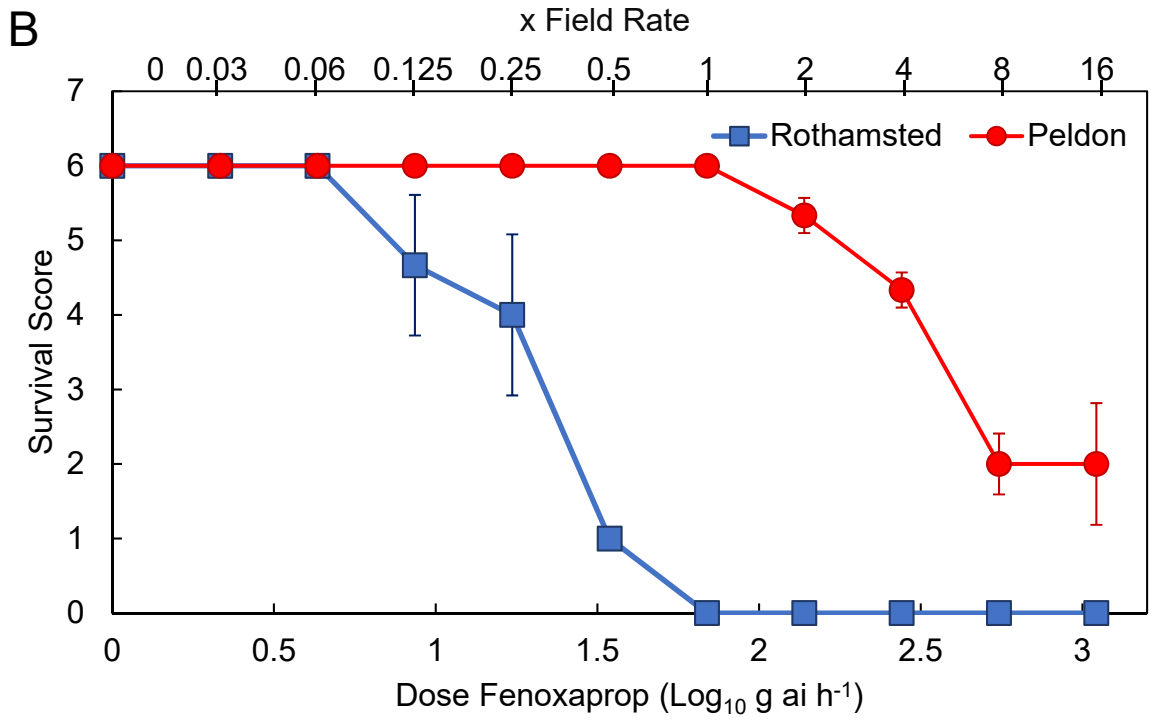


Supplemental Figure 3: Peldon and Rothamsted plants two weeks after inoculation with *BSMV:MCS* or BSMV:AmPDS. New leaves from both biotypes exhibit the loss of green colour when treated with *BSMV:AmPDS*.



Supplemental Figure 4: Peldon and Rothamsted plants two weeks after inoculation with *FoMV:GFP* exhibit clear GFP fluorescence two weeks after inoculation when observed through either blue light (440-460 nm excitation) using a Dual Fluorescent Protein flashlight (Nightsea, Lexington, MA, USA) through a long pass (510 nm) filter (Midwest Optical Systems, Palatine, IL, USA) or a dissecting microscope with UV lamps and a GFP3 filter set.


A
Phosphinothricin (g/l)
0.00
0.03
0.06
0.12
0.18
0.24
0.3
0.45
0.6
ROTHAMSTED
PELDON
% Survival
100
80
60
40
20
0
Untreated
0.05%
0.10%
0.20%
0.30%
0.40%
0.50%
0.75%
1.00%
Dose of “Challenge” Glufosinate (v/v)


B
x Field Rate
0
0.03
0.06
0.125
0.25
0.5
1
2
4
8
16
Rothamsted
Peldon
Survival Score
7
6
5
4
3
2
1
0
0
0.5
1
1.5
2
2.5
3
Dose Fenoxaprop (Log10 g ai h-1)

Supplemental Figure 5: Dose-response curves for Rothamsted and Peldon biotypes when challenged with A) glufosinate (Challenge) or B) fenoxaprop. A) For glufosinate treatment, 0.5 grams of seed were sown within the top 0.5 cm of Weed Mix (80% Sterilised Screened Loam, 20% Grit (3-6mm Screened, Lime Free), and 2.0kg Osmocote Exact 5-6 month per m3) into containers and allowed to establish. This produced on average 108.7±6.2 plants for Rothamsted and 148.2±13.9 for plants Peldon per container. Each container was treated at the three-leaf stage with the indicated percentage of glufosinate in the form of “Challenge 60®”. 14 days after herbicide application survivors were counted. B) Three replicates of six plants of each biotype were transplanted into individual pots of Weed Mix and allowed to reach three-leaf stage under standard glasshouse conditions. These were screened for survival 4 weeks after dosing with the indicated level of fenoxaprop. Plants were scored as dead or alive. Averages of the three replicates ± standard error are shown. B) For fenoxaprop treatment, seeds were germinated in Petri dishes with filter paper and wetted with 3-4mL of 0.02M potassium nitrate; excess liquid was removed. Dishes were placed in incubators (Sanyo, MLR-350) for seven days at 14/10-hour day/night cycles at 17°C and 11°C, respectively. Seedlings that had produced a shoot and radicle at day 7 were transplanted into larger pots and grown in a glasshouse set to maintain 16°C/10°C day/night temperatures with supplementary lighting provided over a 14-hour day length. Germinated seedlings were sown into 8 cm pots containing a Kettering loam soil mixed with 2 kg m-2 Osmocote fertiliser. Six seedlings were sown per pot, with three replicate pots of each population at each herbicide dose. Plants were maintained in a glasshouse at approximately 16/10°C until the plants had reached the three-leaf stage. For herbicide application, pots were removed from the glasshouse and sprayed using a fixed track sprayer with a Teejet 110015VK nozzle mounted 50cm above the plants. Boom speed was 0.33 m s-1, delivering herbicide at a volume of 199 L ha-1. Herbicide doses are shown. Three weeks after herbicide application, sprayed and unsprayed plants were assessed for mortality using a standard visual score.