**Supplementary material**

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**Supplementary Figure S1.** A small sample of the preliminary scenarios that were trialled in the initial stages of this study, providing an example of how random outbreaks of multiple HR can occur, even with relatively good weed control. Fig. A-D show genetic changes in weeds (plants at harvest) over 25 years, when undestroyed seeds were not dispersed. The probability of inadvertent seed collection into the harvester changes, from left (50% collected) to the fourth frame (90% collected). The fifth (far right) frame includes all 4 x 25 replicates, and shows the growth in weed numbers that occurred once, because of a random occurrence of multiple gene HR evolution in the third frame, when 80% of seed was collected. These simulations were run with the ‘Longer&Post’ herbicides. The lines represent the proportion of the weeds present at harvest that are herbicide-susceptible (SS), resistant to the longer acting pre-emergence herbicide (Rpre), resistant to the post-emergence herbicide (Rpost), or multiple-resistant to both herbicides (M). Fig. A-D each includes 25 replicates.