JEE managing insecticide resistance by mass-release of engineered insects [Compatibility Mode] - Microsoft Excel

Home | Insert | Page Layout | Formulas | Data | Review | View | Acrobat

Normal | Page Layout | Page Break Preview | Custom Views | Full Screen | Workbook Views
Ruler | Gridlines | Message Bar | Formula Bar | Headings | Show/Hide
Zoom | 100% | Zoom to Selection | Zoom
New Window | Arrange All | Freeze Panes | Split | Hide | Unhide | View Side by Side | Synchronous Scrolling | Reset Window Position | Save Workspace | Switch Windows | Window
Macros | Macros

A4: ONLY CHANGE CELL HIGHLIGHTED YELLOW

Assumptions
1. All fitness costs (resistance costs, RIDL and *Bt*) only act at larval stage
2. Free mixing homogeneous population
ONLY CHANGE CELL HIGHLIGHTED YELLOW
OUTPUTS ARE HIGHLIGHTED IN PINK

Starting allele frequencies in emerging adults	
*f*s - susceptible allele	0.9
*f*r - resistant allele	0.1
Relative fitness of larvae on conventional crops	
ss (set at 0 in C & T paper)	1
sr (1 if recessive; =rr if dominant; mid way between rr and 1 if additive)	1
rr (either 0.7 [i.e. 30% cost] or 0.4 [i.e. 60% cost] in C & T paper)	0.7
Relative fitness of larvae on *Bt* crops	
ss (set at 0 in C & T paper)	0
sr (=ss if recessive; =rr if dominant; mid way between rr and ss if additive	0
rr (=1 if complete; <1 if non-complete; set at 0.1, 0.2 and 0.4 in C & T pape	0.4
Proportion refuge	
wildtype (set at 0.1, 0.3 and 0.5 in C & T paper)	0.1
Bt	0.9
RIDL relative fitness cost *per copy*: 1=complete lethality 0=no fitness cost	
male	0.1
female	1
RIDL release	
Release ratio: RIDL males per adult *male* in wild	2
Initial population size (n_c, index)	1
Offspring per female (=2xR_c) males & females before effects of RIDL & Bt	5.0

Overall average relative fitness of larvae

Genotype	male	female
wwss	0.100	0.100
wwsr	0.100	0.100
wwrr	0.430	0.430
Lwss	0.090	0.000
Lwsr	0.090	0.000
Lwrr	0.387	0.000
LLss	0.081	0.000
LLsr	0.081	0.000
LLrr	0.348	0.000

TABLES: PRESS F9 TO CALCULATE

Time to 50% *r* in RIDL system

Transgenic	Conventional	
10	0.7	0.4
0.1	1000	1000
0.2	1000	1000
0.4	10	12

RIDL equilibrium

Transgenic	Conventional	
0.87	0.7	0.4
0.1		
0.2		
0.4	0.871	0.859

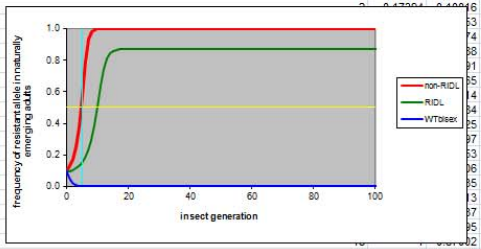
Generations: 100

Equilibrium: 1 | 0.87077

% reduction: 16.7%

Time to reach 50% resistance allele frequency: non-RIDL 5 | RIDL 10

Generation	non-RIDL	RIDL	Saving	non-RIDL	RIDL	50% line	Cross line	non-RIDL X generations	Phenotype Non-RIDL	Phenotype RIDL
0	0.1	0.1	0					0.1	0.01	0.01
1	0.128751	0.09208	0.03666637	-999	-999	0.5		0.12875121	0.0416263	0.022245215
2			0.0737763	-999	-999	0.5		0.173939749	0.0675835	0.022075359
3			0.13640275	-999	-999	0.5		0.248927995	0.1182867	0.026686573
4			0.24769315	-999	-999	0.5		0.376437221	0.221215	0.033573075
5			0.42424391	5	-999	0.5		0.575121595	0.4151815	0.043769221
6			0.61494713	-999	-999	0.5		0.796857027	0.6800251	0.059574752
7			0.70786865	-999	-999	0.5		0.934373425	0.8820784	0.085040377
8			0.69169281	-999	-999	0.5		0.983090629	0.967291	0.127199945
9			0.61196713	-999	-999	0.5		0.995963716	0.9919957	0.196615996
10			0.49380206	-999	10	0.5		0.99905549	0.9981148	0.302696891
11			0.36281123	-999	-999	0.5		0.999780028	0.9995603	0.437806385
12			0.25464456	-999	-999	0.5		0.999948826	0.9998977	0.567095786
13			0.18792528	-999	-999	0.5		0.999988098	0.9999762	0.657418809
14			0.15465069	-999	-999	0.5		0.999997232	0.9999945	0.706491417
15			0.13987242	-999	-999	0.5		0.999999356	0.9999987	0.729380587
16			0.13363355	-999	-999	0.5		0.99999985	0.9999997	0.739292742
17			0.13104727	-999	-999	0.5		0.999999965	0.9999999	0.743456756
18			0.1299799	-999	-999	0.5		0.999999992	1	0.745188221
19	1	0.87046	0.12953905	-999	-999	0.5		0.999999998	1	0.745906741
20	1	0.87064	0.12935652	-999	-999	0.5		1	1	0.746205205
21	1	0.87072	0.12928074	-999	-999	0.5		1	1	0.746329416
22	1	0.87075	0.1292492	-999	-999	0.5		1	1	0.746381209
23	1	0.87076	0.12923605	-999	-999	0.5		1	1	0.746402844
24	1	0.87077	0.12923055	-999	-999	0.5		1	1	0.746411895
25	1	0.87077	0.12922825	-999	-999	0.5		1	1	0.746415685
26	1	0.87077	0.12922729	-999	-999	0.5		1	1	0.746417275
27	1	0.87077	0.12922688	-999	-999	0.5		1	1	0.746417941
28	1	0.87077	0.12922671	-999	-999	0.5		1	1	0.746418221
29	1	0.87077	0.12922664	-999	-999	0.5		1	1	0.746418339
30	1	0.87077	0.12922661	-999	-999	0.5		1	1	0.746418388
31	1	0.87077	0.1292266	-999	-999	0.5		1	1	0.746418409
32	1	0.87077	0.12922659	-999	-999	0.5		1	1	0.746418418
33	1	0.87077	0.12922659	-999	-999	0.5		1	1	0.746418421
34	1	0.87077	0.12922659	-999	-999	0.5		1	1	0.746418423
35	1	0.87077	0.12922659	-999	-999	0.5		1	1	0.746418424



Time to 50% frequency of resistance allele for given values of RIDL release ratio and r

Proportion refuge	RIDL release ratio: 10	0	0.001	0.0015	0.0025	0.004	0.0065	0.01
	0	1	1	1	1	1	1	1
	0.001	1	1	1	1	1	1	1
	0.002	1	1	1	1	1	1	1
	0.003	1	1	1	1	1	1	1
	0.004	1	1	1	1	1	1	1
	0.005	2	2	2	2	2	2	2
	0.006	2	2	2	2	2	2	2
	0.007	2	2	2	2	2	2	2
	0.008	2	2	2	2	2	2	2
	0.009	2	2	2	2	2	2	2
	0.01	2	2	2	2	2	2	2
	0.011	2	2	2	2	2	2	2
	0.012	2	2	2	2	2	2	2
	0.013	2	2	2	2	2	2	2
	0.014	2	2	2	2	2	2	2
	0.015	2	2	2	2	2	2	2
	0.016	2	2	2	2	2	2	2
	0.017	2	2	2	2	2	2	2
	0.018	2	2	2	2	2	2	2
	0.019	2	2	2	2	2	2	2
	0.02	2	2	2	2	2	2	2
	0.021	2	2	2	2	2	2	2
	0.022	2	2	2	2	2	2	2
	0.023	2	2	2	2	2	2	2
	0.024	2	2	2	2	2	2	2
	0.025	2	2	2	2	2	2	2
	0.026	2	2	2	2	2	2	2
	0.027	2	2	2	2	2	2	2
	0.028	2	2	2	2	3	3	3
	0.029	3	3	3	3	3	3	3
	0.03	3	3	3	3	3	3	3
	0.031	3	3	3	3	3	3	3
	0.032	3	3	3	3	3	3	3
	0.033	3	3	3	3	3	3	3
	0.034	3	3	3	3	3	3	3
	0.035	3	3	3	3	3	3	3
	0.036	3	3	3	3	3	3	3
	0.037	3	3	3	3	3	3	3
	0.038	3	3	3	3	3	3	3
	0.039	3	3	3	3	3	3	3
	0.04	3	3	3	3	3	3	3
	0.041	3	3	3	3	3	3	3
	0.042	3	3	3	3	3	3	3
	0.043	3	3	3	3	3	3	3
	0.044	3	3	3	3	3	3	3
	0.045	3	3	3	3	3	3	3
	0.046	3	3	3	3	3	3	3
	0.047	3	3	3	3	3	3	3
	0.048	3	3	3	3	3	3	3
	0.049	3	3	3	3	3	3	3
	0.05	3	3	3	3	3	3	3
	0.051	3	3	3	3	3	3	3
	0.052	3	3	3	3	3	3	3
	0.053	3	3	3	3	3	3	3
	0.054	3	3	3	3	3	3	3
	0.055	3	3	3	3	3	3	3
	0.056	4	4	4	4	4	4	4
	0.057	4	4	4	4	4	4	4
	0.058	4	4	4	4	4	4	4
	0.059	4	4	4	4	4	4	4
	0.06	4	4	4	4	4	4	4
	0.061	4	4	4	4	4	4	4

Control panel | RIDL | nonRIDL | WT bisex | Temporal graph | allele&phenotype temporal graph | start 0.1, 0.1 on 0.4 off | start 0.1, 0.1 on 0.7 off | start 0.1, 0.2 on 0.4

Ready | 80%

12:42 20/12/2012