# Seasonal scenarios for Insecticide Resistance Management game. v3

*Andy South*

*2015-12-10*

This document demonstrates seasonal scenarios for vector populations and resistance to be used in the game.

The game will modify input parameters to generate reasonable scenarios. The input parameters are simply a means to generate reasonable scenarios.

In the following plots time in weeks is represented on the x axis, the top panel shows insecticide use, the middle panel shows vector population and the lower panel shows frequency of resistance (in these examples there is just co-resistance to ddt & pyr).

The code included is there merely to show us as developers how the scenarios were generated.

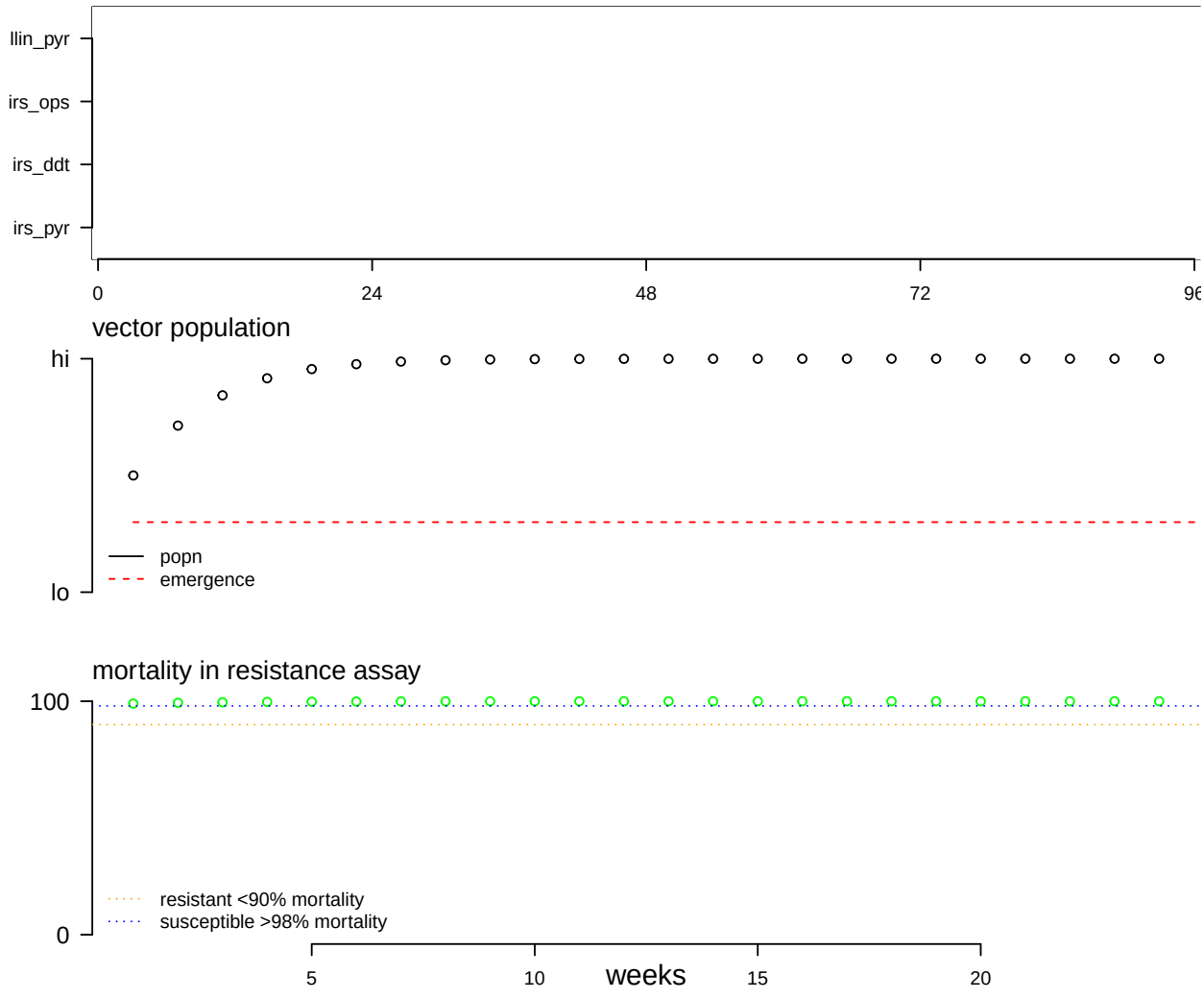
For a previous interactive version of the equations used to generate these plots see https://andysouth.shinyapps.io/shinyGame4.

Remember that years are 336 days (7days * 4weeks * 12months), half=168, 2 years=672.

6 months = 24 weeks, year=48weeks, 1.5 year=72weeks, 2 years=96weeks

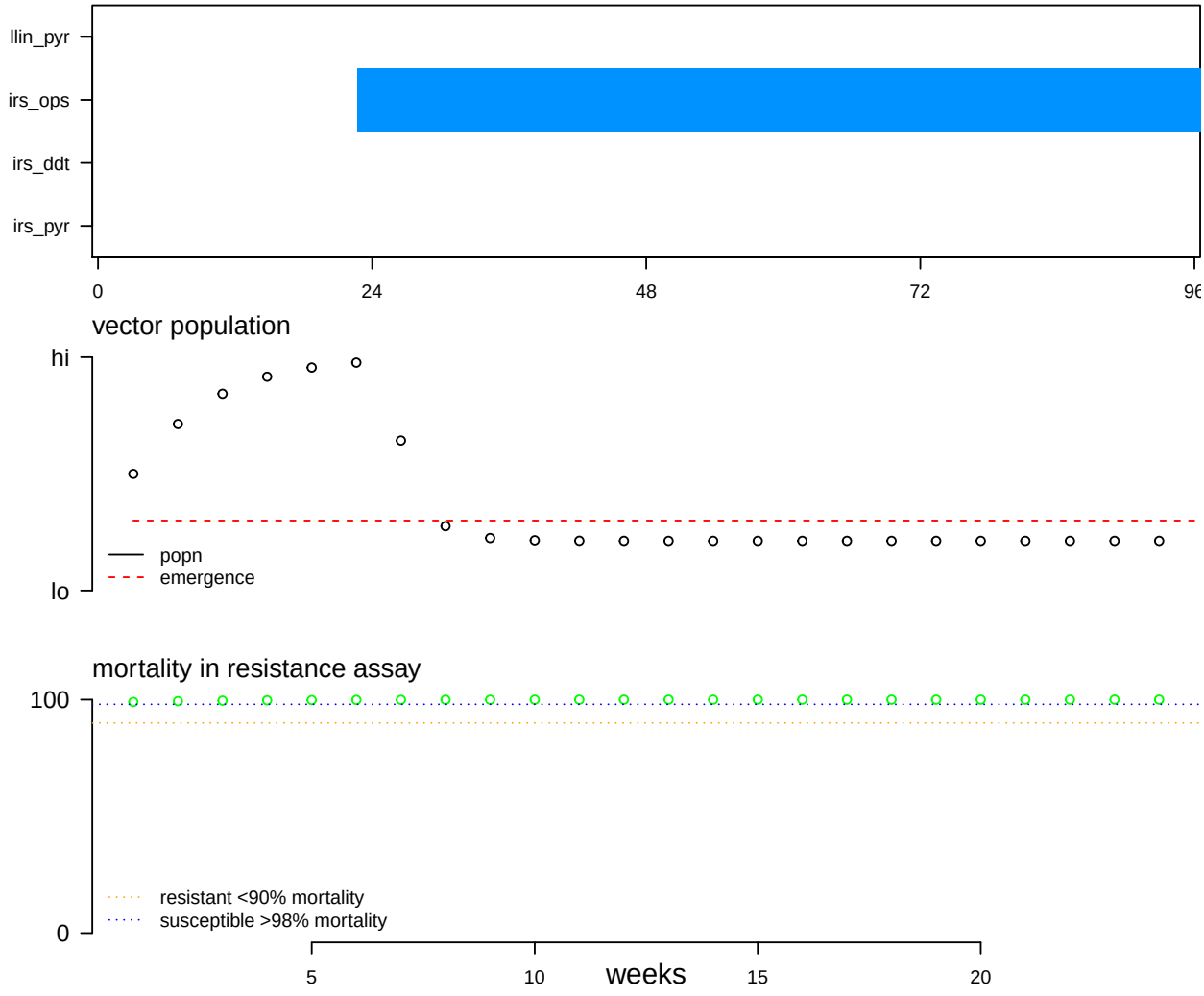
### constant emergence, no intervention, 2 years

```
emergence <- 0.3
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



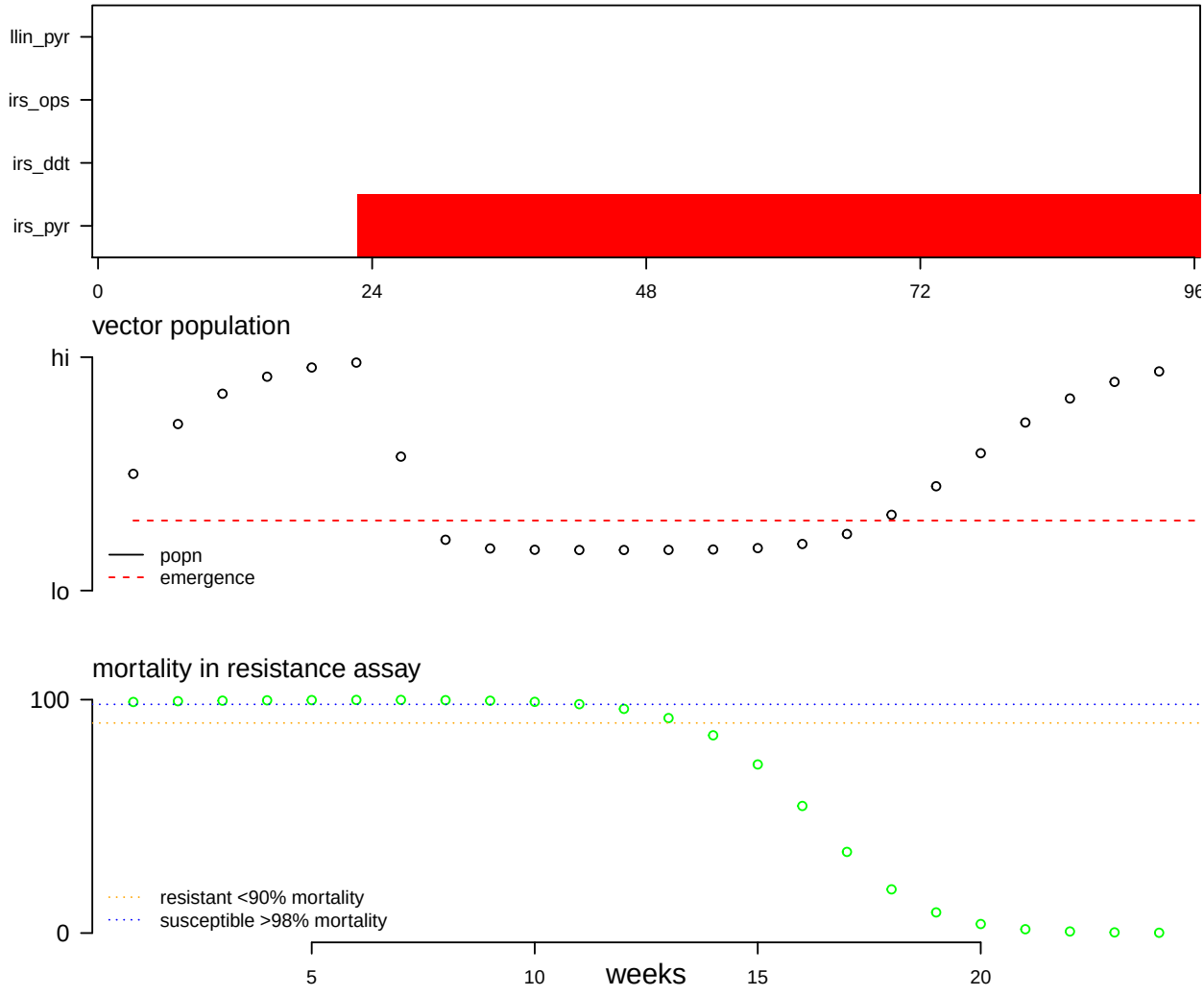
### constant emergence, intervention, no resistance

```
emergence <- 0.3
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(96),
                         control_id=c('irs_ops'))
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  l_config=l_config2,
                  insecticide_kill=0.5,
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



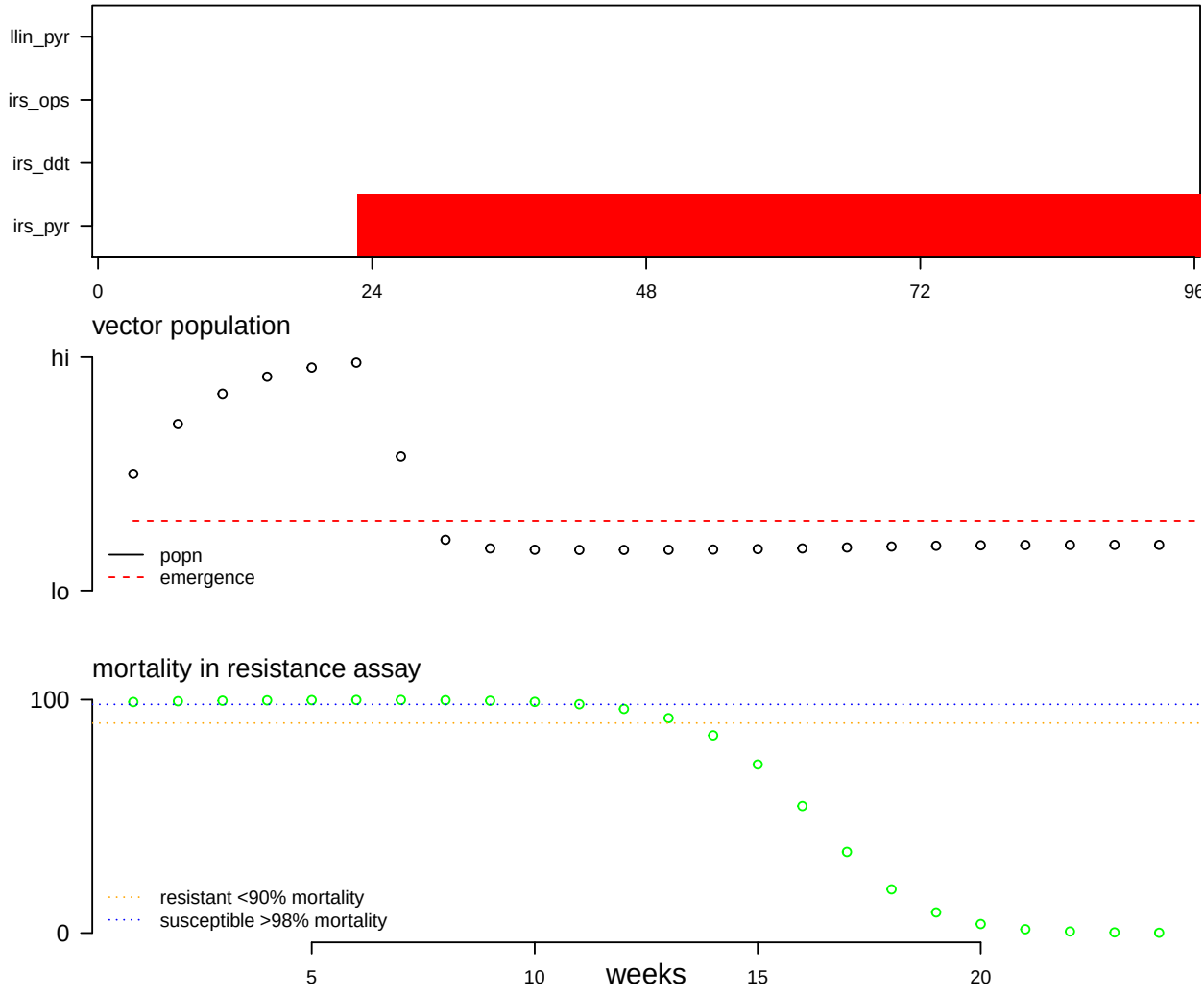
### constant emergence, intervention, resistance metabolic

```
emergence <- 0.3
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(96),
                         control_id=c('irs_pyr'))
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  l_config=l_config2,
                  insecticide_kill=0.6, resist_freq_start = 0.01, resist_mech='metabolic',
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



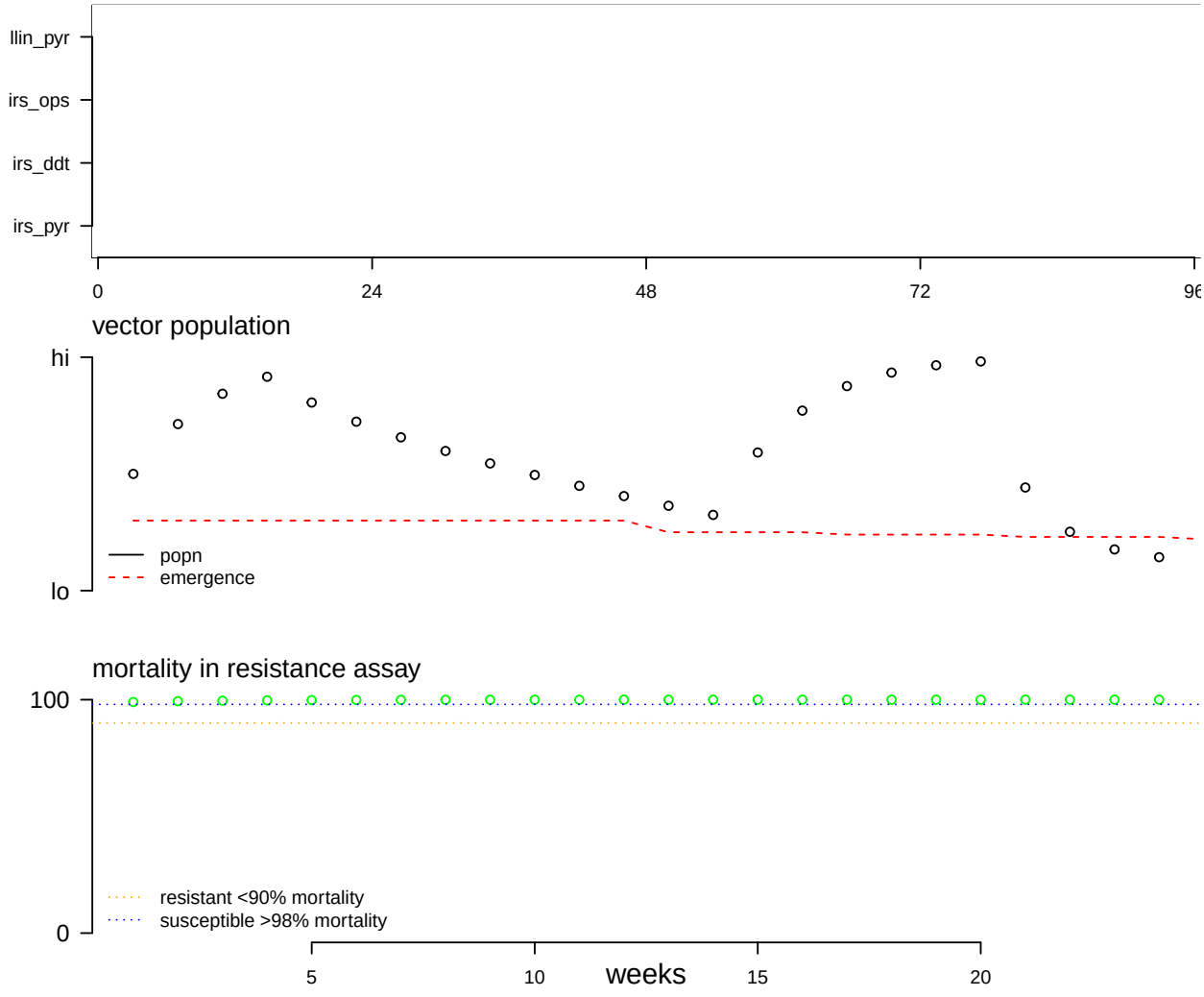
### constant emergence, intervention, resistance target

```
emergence <- 0.3
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(96),
                         control_id=c('irs_pyr'))
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  l_config=l_config2,
                  insecticide_kill=0.6, resist_freq_start = 0.01, resist_mech='target',
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



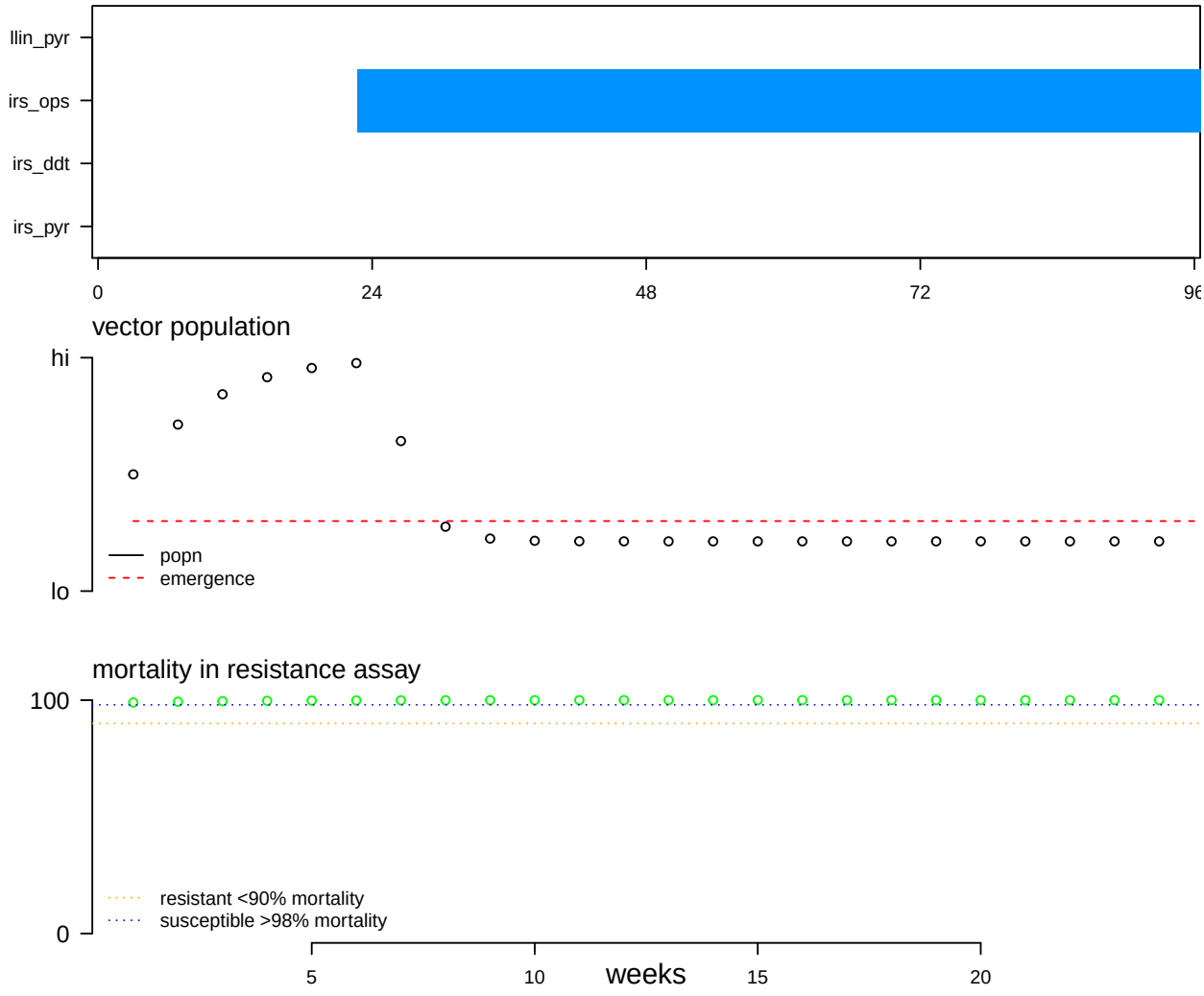
### seasonal emergence, no intervention, 2 years

```
#emergence <- expand_season(season_string="6:0.3;6:0.1;6:0.3;6:0.1")
emergence <- expand_season(season_string="3:0.3;1:0.25;1:0.24;1:0.23;1:0.22;1:0.21;1:0.20;1:0.19;1:0.18
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



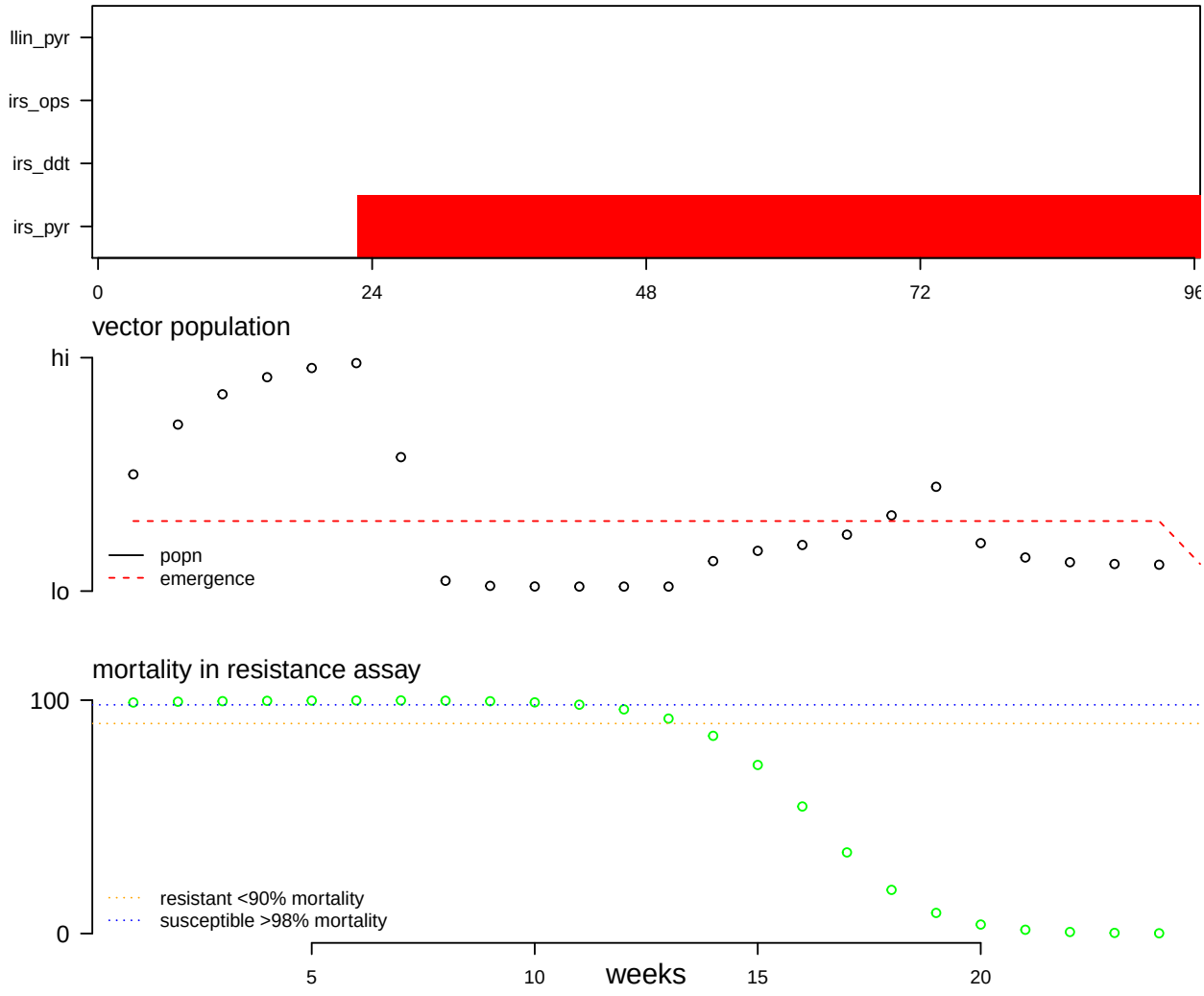
### seasonal emergence, intervention, no resistance

```
emergence <- expand_season(season_string="6:0.3;6:0.1;6:0.3;6:0.1")
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(96),
                         control_id=c('irs_ops'))
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  l_config=l_config2,
                  insecticide_kill=0.5,
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



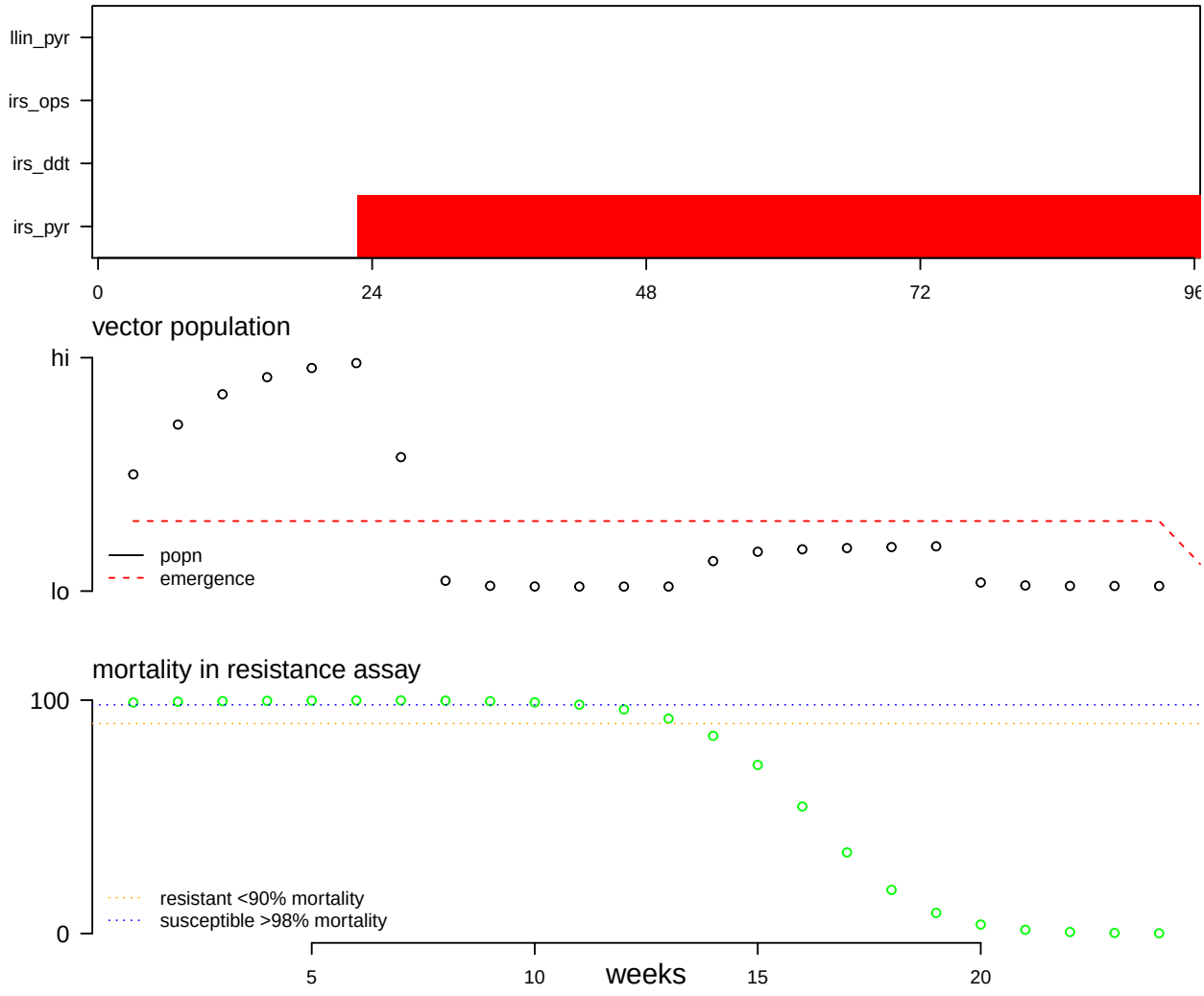
### seasonal emergence, intervention, resistance metabolic

```
emergence <- expand_season(season_string="6:0.3;6:0.1;6:0.3;6:0.1",return_tstep='weeks')
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(96),
                         control_id=c('irs_pyr'))
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  l_config=l_config2,
                  insecticide_kill=0.6, resist_freq_start = 0.01, resist_mech='metabolic',
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



### seasonal emergence, intervention, resistance target

```
emergence <- expand_season(season_string="6:0.3;6:0.1;6:0.3;6:0.1",return_tstep='weeks')
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(96),
                         control_id=c('irs_pyr'))
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  l_config=l_config2,
                  insecticide_kill=0.6, resist_freq_start = 0.01, resist_mech='target',
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```



**seasonal emergence, intervention, resistance metabolic, change intervention to susceptible**

```
emergence <- expand_season(season_string="6:0.3;6:0.1;6:0.3;6:0.1",return_tstep='weeks')
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(1,25), t_stop=c(24,96),
                         control_id=c('irs_pyr','irs_ops'))
plot_sim( run_sim(num_tsteps=96, emergence=emergence, survival=0.7,
                  l_config=l_config2,
                  insecticide_kill=0.6, resist_freq_start = 0.01, resist_mech='metabolic',
                  resist_incr=0.2, resist_decr = 0.1),
                  plot_emergence=TRUE )
```