Scenarios for Insecticide Resistance Management game march 2016. v5

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Starting to work out exactly which scenarios and parameter values we want in the game. Liverpool workshop March 2016.

It was already working on a weekly timestep, but now change axes to be shown in months.

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.

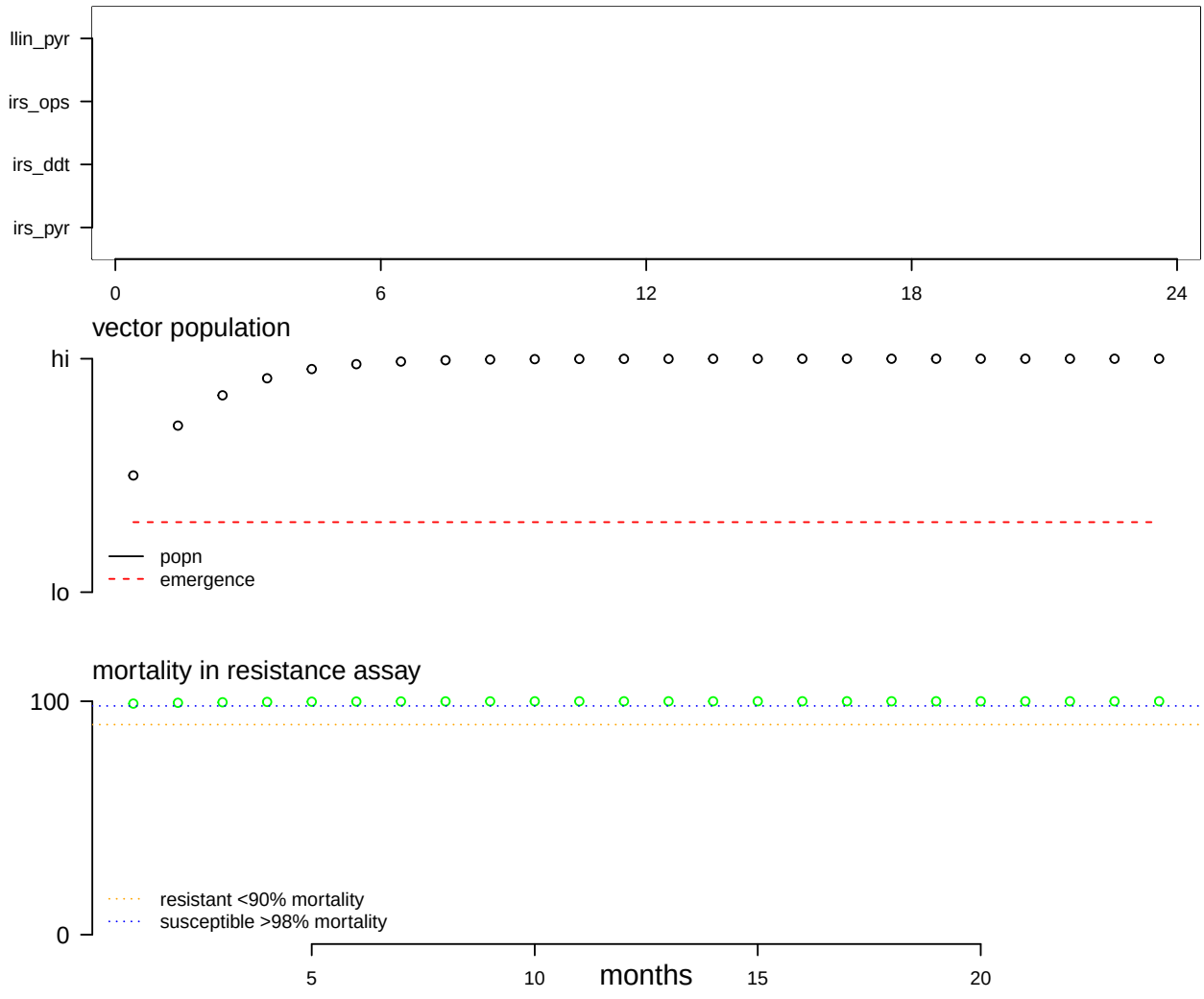
For a previous interactive version of the equations used to generate these plots see https://andysouth.shinyapps.io/shinyGame4.

Remember runs on a weekly timestep.

6 months = 24 weeks, year=48weeks, 1.5 year=72weeks, 2 years=96weeks, 3 years=144

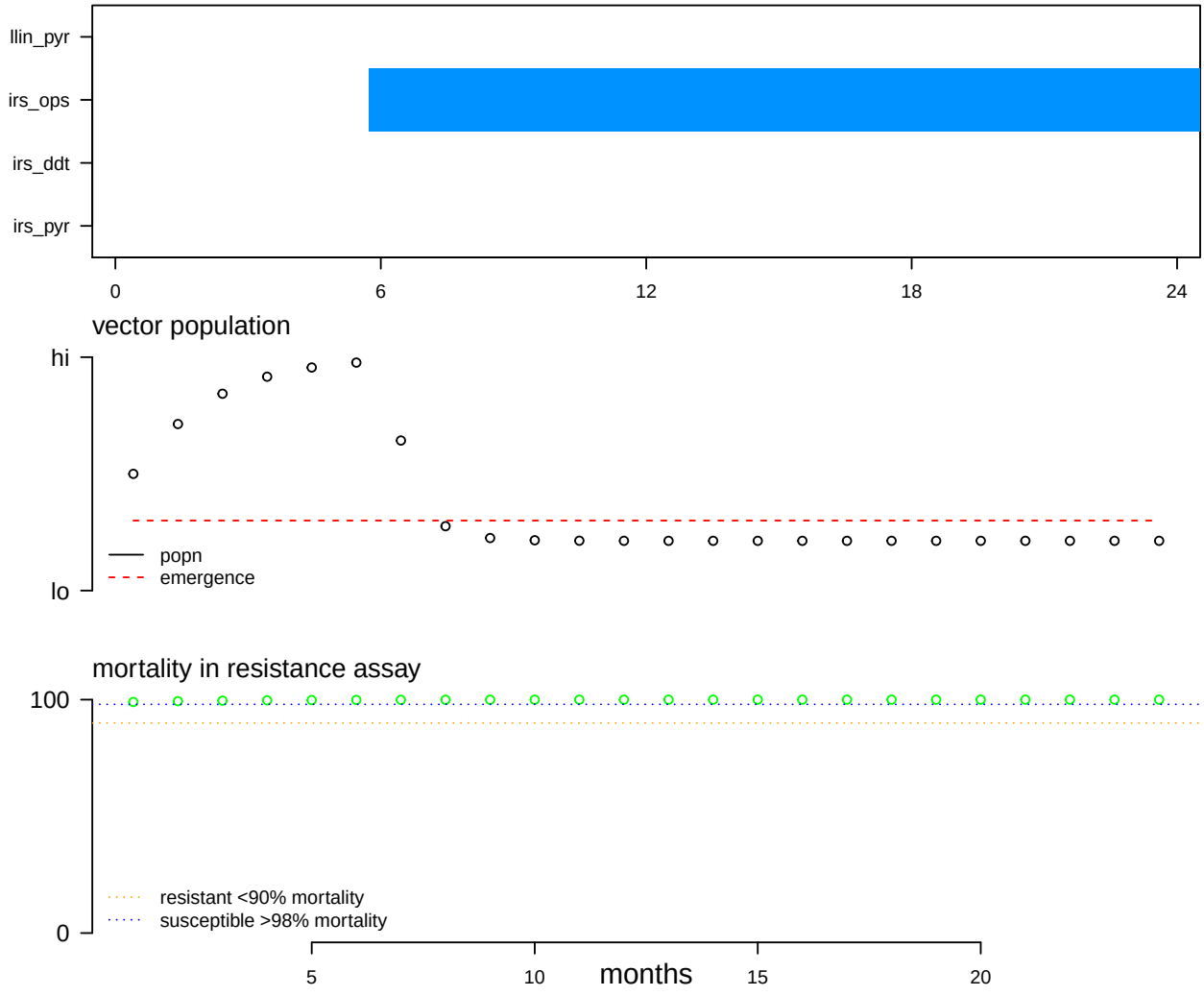
constant emergence, no intervention, 2 years

```
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 )
```



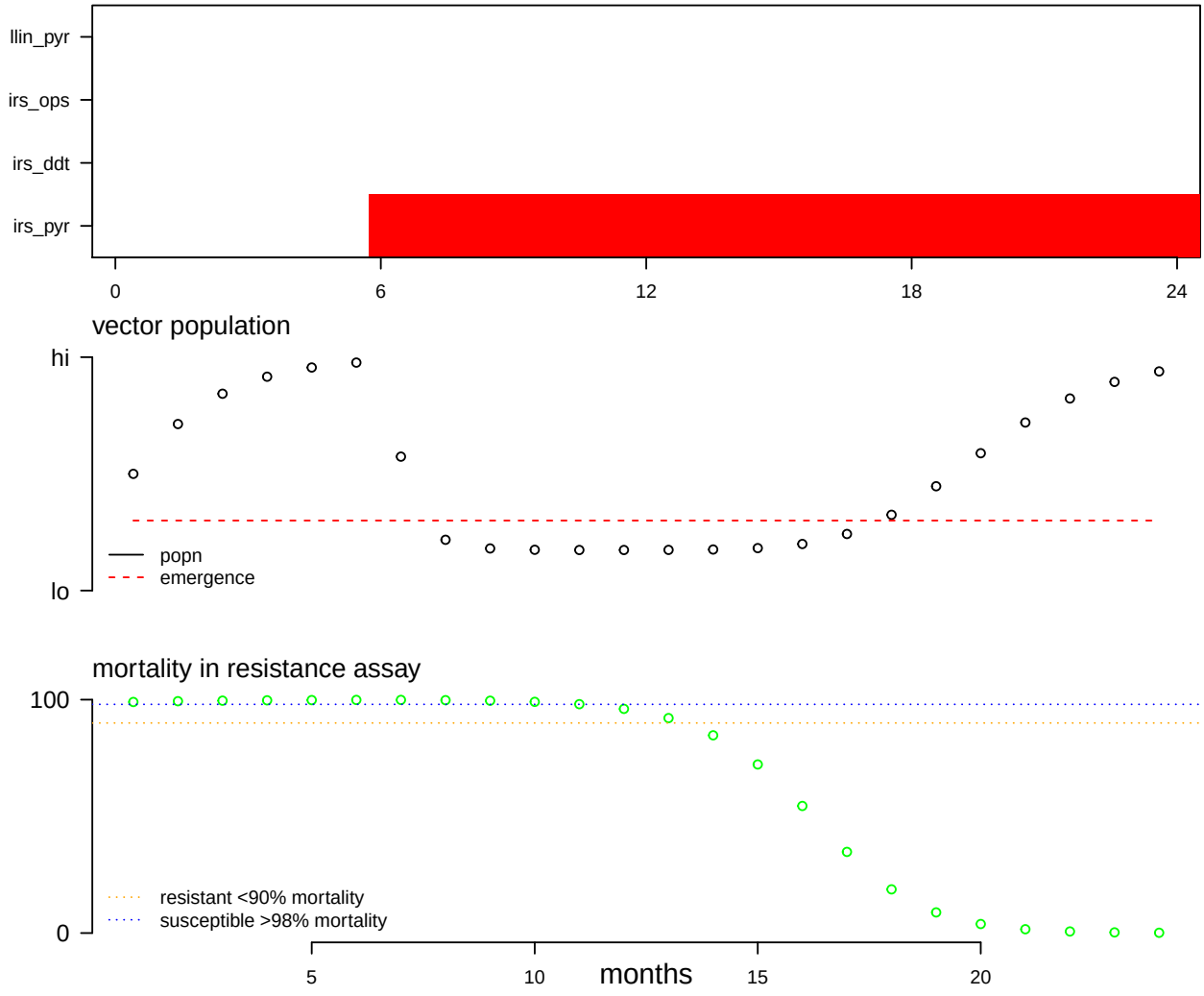
constant emergence, intervention, no resistance

```
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 )
```



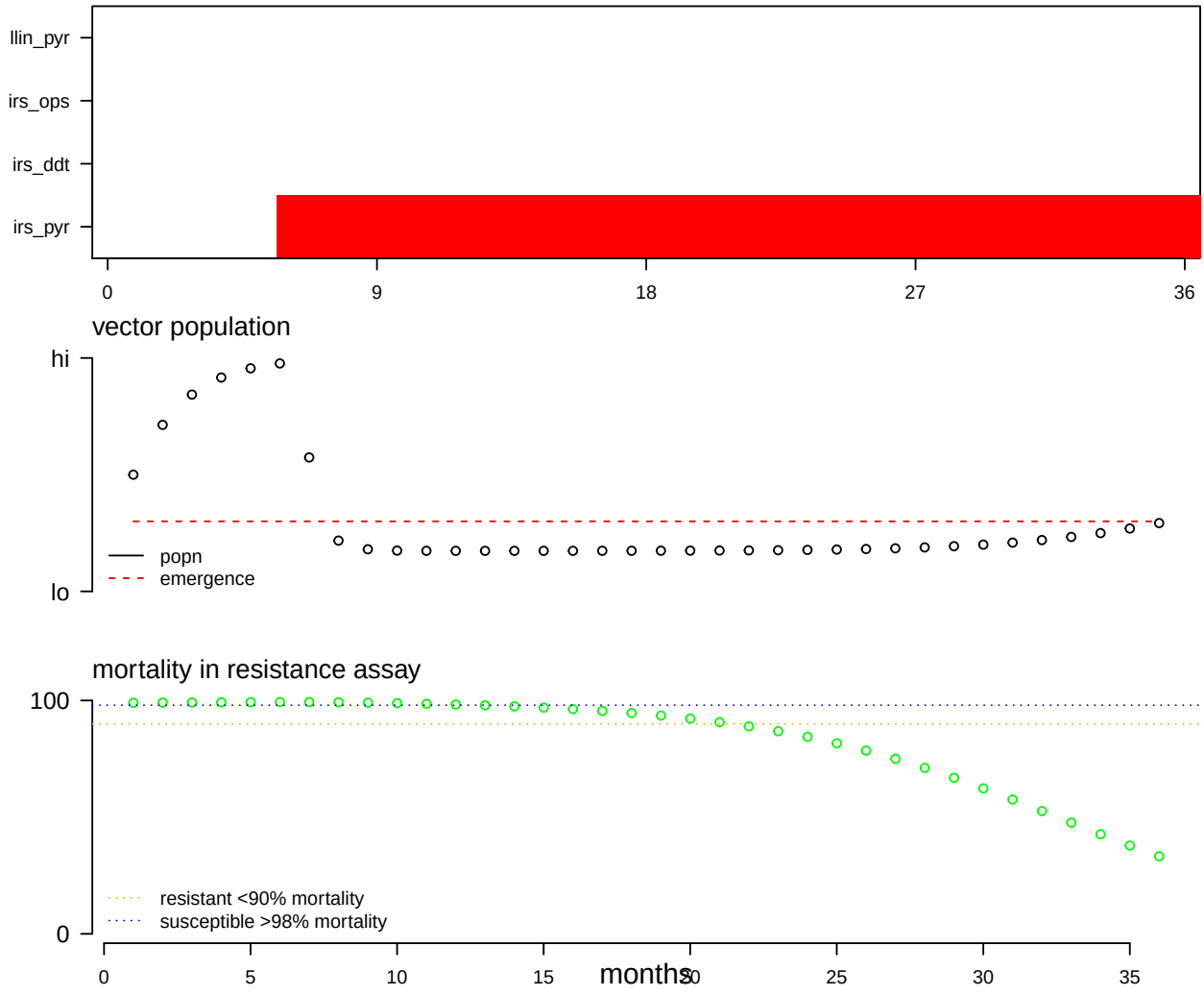
constant emergence, intervention, resistance metabolic

```
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 )
```



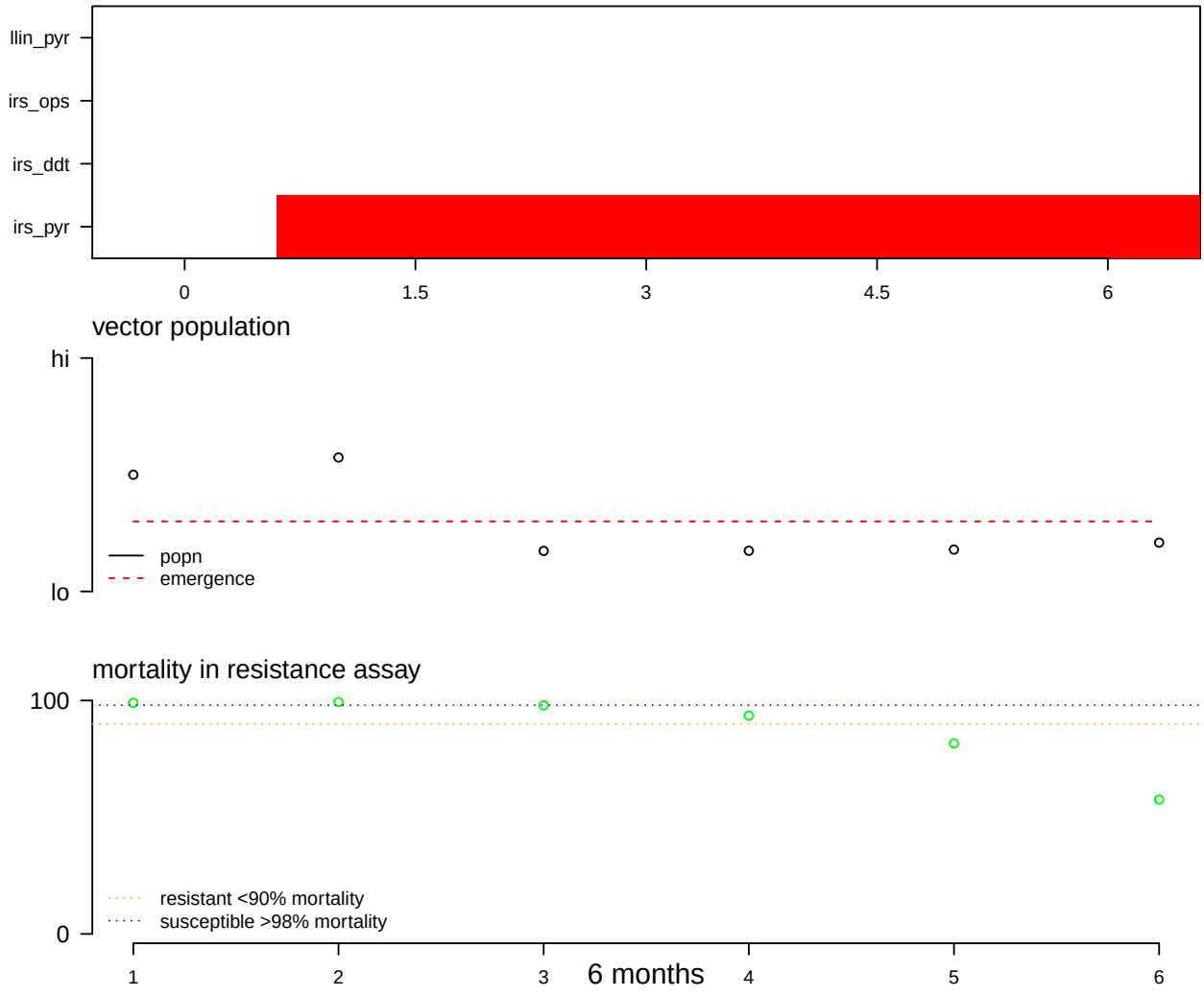
constant emergence, intervention, resistance metabolic, make change slower

```
emergence <- 0.3
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(144),
                         control_id=c('irs_pyr'))
plot_sim( run_sim(num_tsteps=144, 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),
                  resist_incr=0.05, resist_decr = 0.02),
                  plot_emergence=TRUE )
```



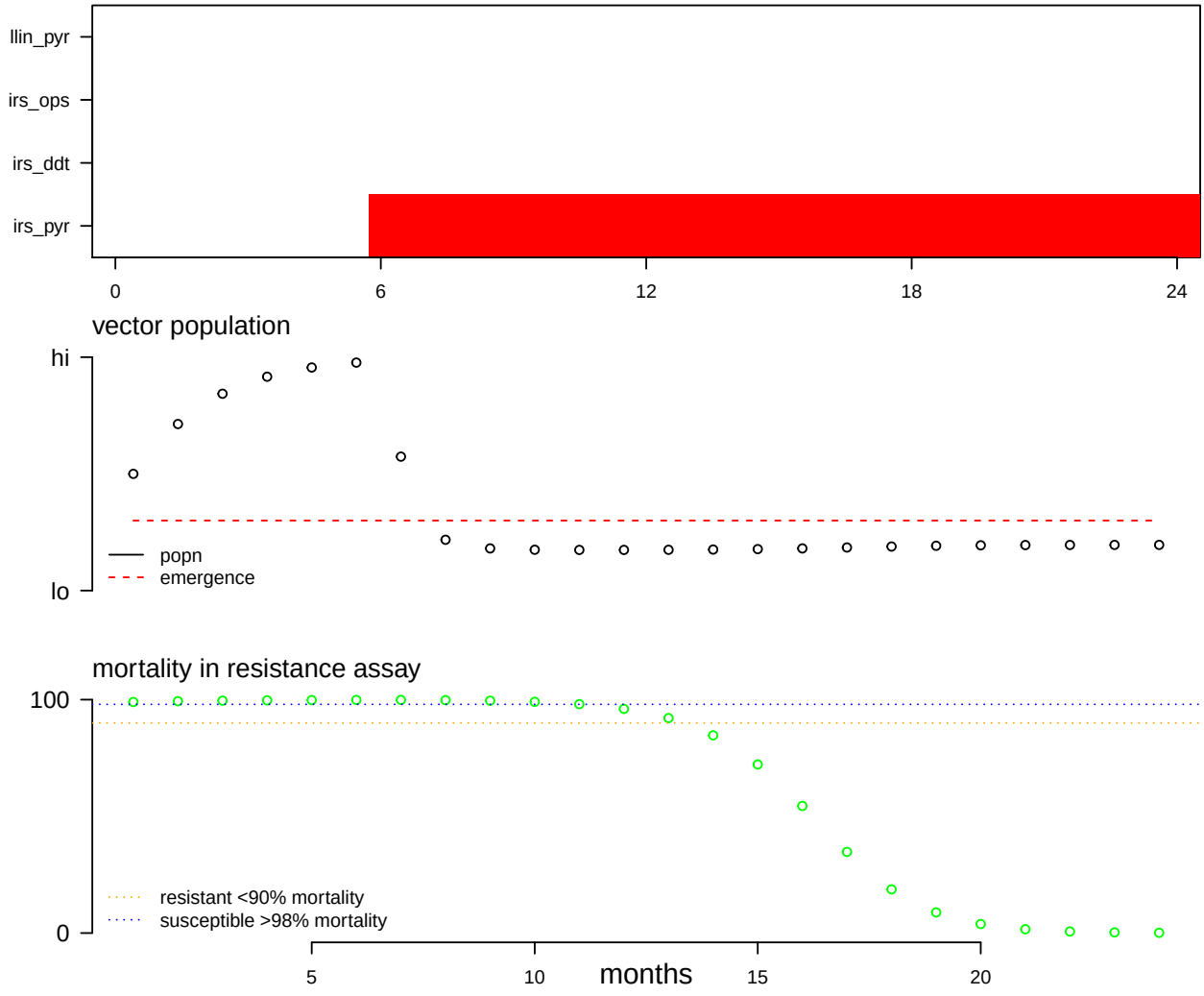
6 month timesteps, constant emergence, intervention, resistance metabolic

```
emergence <- 0.3
l_config <- read_config()
l_config2 <- config_plan(l_config, t_strt=c(24), t_stop=c(144),
                         control_id=c('irs_pyr'))
plot_sim( run_sim(num_tsteps=144, 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),
                  resist_incr=0.05, resist_decr = 0.02),
                  plot_emergence=TRUE, plot_type = '6month' )
```



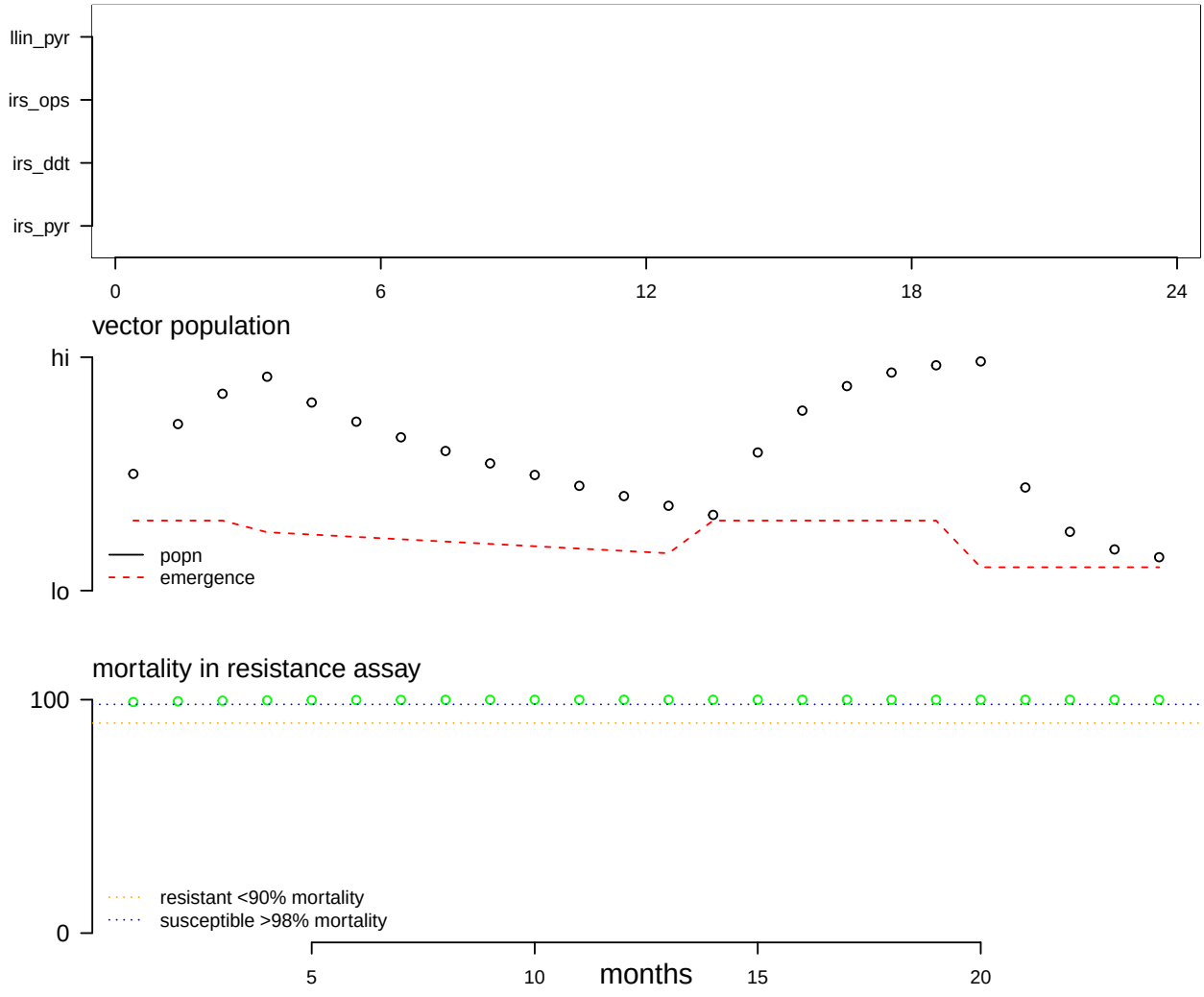
constant emergence, intervention, resistance target

```
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 )
```



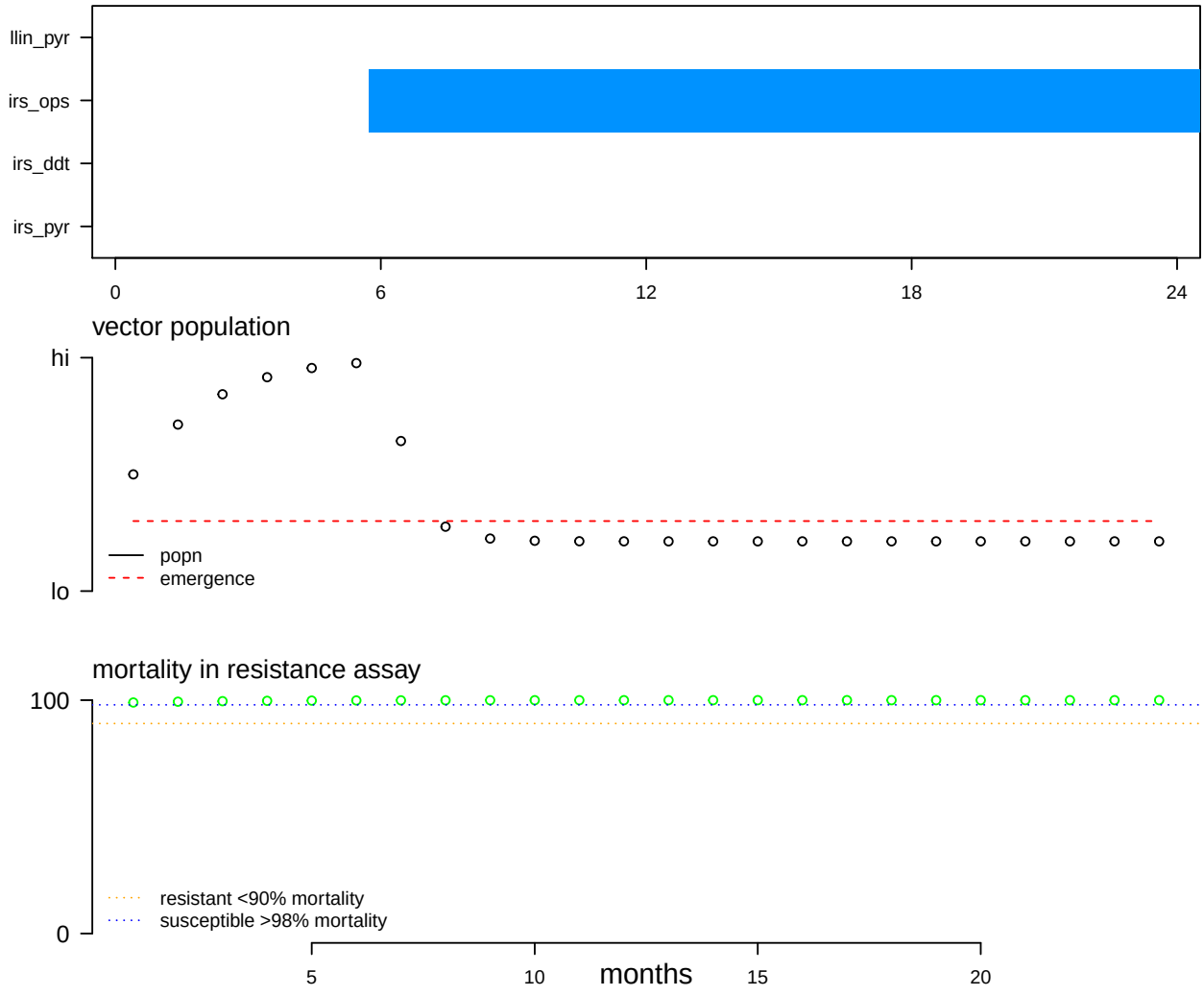
seasonal emergence, no intervention, 2 years

```
#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 )
```



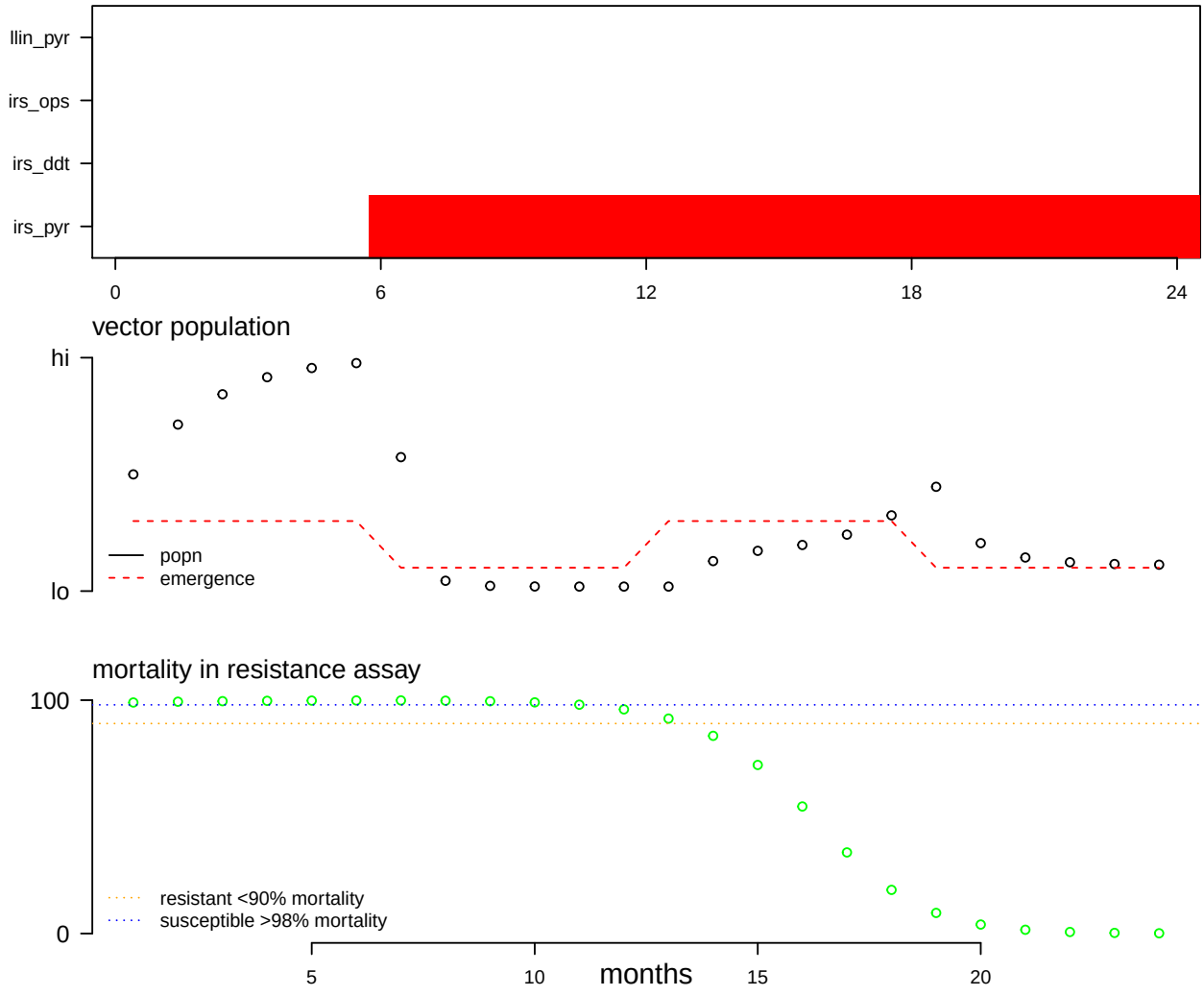
seasonal emergence, intervention, no resistance

```
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 )
```



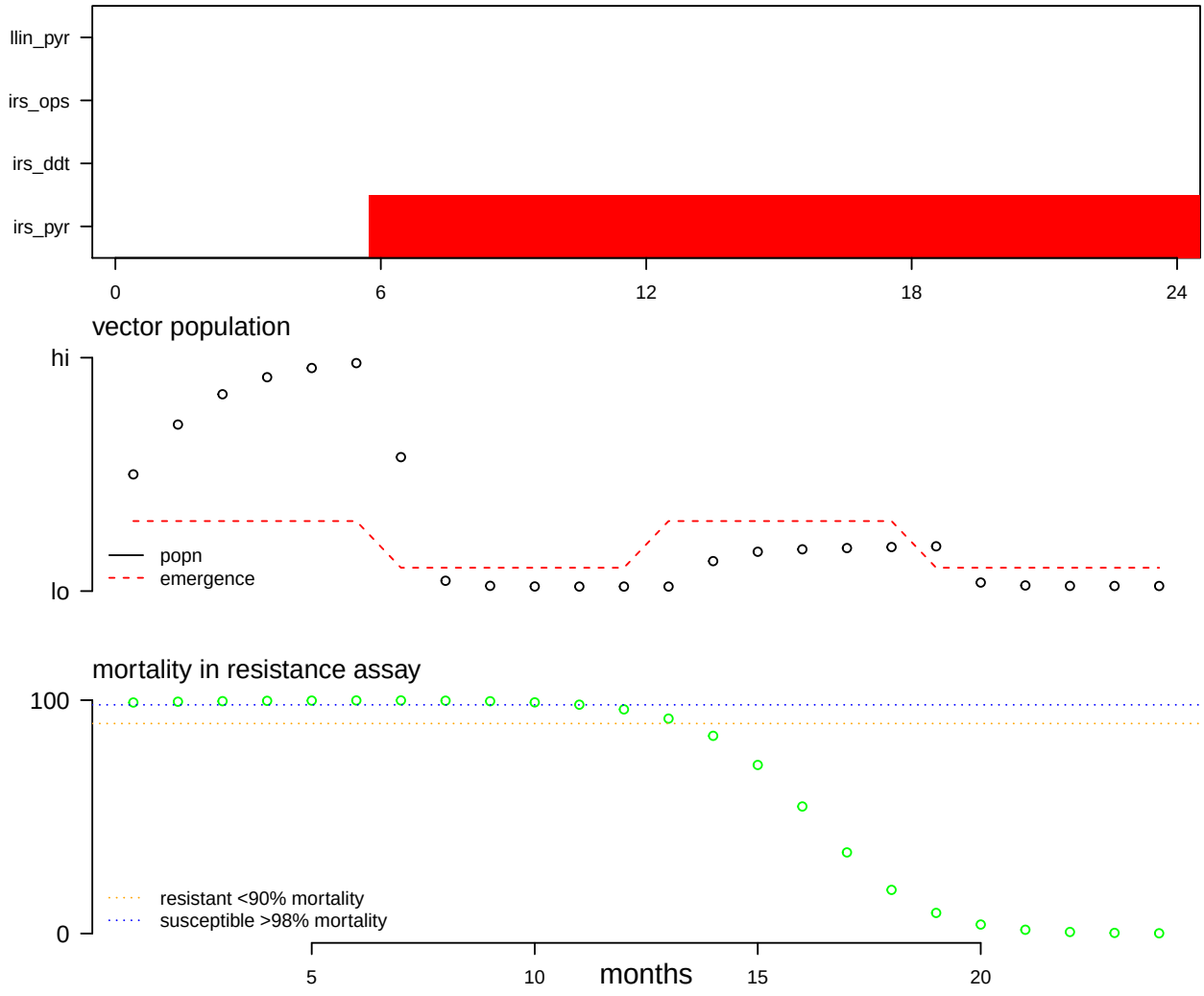
seasonal emergence, intervention, resistance metabolic

```
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 )
```