Supplementary information S2 (box) | **Parameters and equations for the toxin production model in box 2**

The toxin dynamics of the model are as follows[1]:

$$\frac{dP}{dt} = \left(1 - fH\left(\delta - \mu_{max}\frac{N}{N+K_N}\right)\right)\mu_{max}\frac{N}{N+K_N}P$$

$$\frac{dS}{dt} = \left(\mu_{max}\frac{N}{N+K_N} - k_T T\right)S$$

$$\frac{dT}{dt} = H\left(\delta - \mu_{max}\frac{N}{N+K_N}\right)af\mu_{max}\frac{N}{N+K_N}P - \beta_T T$$

$$\frac{dN}{dt} = -\frac{1}{Y}\mu_{max}\frac{N}{N+K_N}(P+S)$$

P is the density of toxin producers; S is the density of sensitive non-producers; T is the concentration of toxin; N is the concentration of nutrients; t is time; f is the relative investment that a producer puts into toxin production; K_N is the nutrient half saturation constant; k_T is the killing rate of the toxin; β_T is the rate of toxin loss owing to environmental decay; Y is the yield of biomass production; and a is the stoichiometric coefficient of bacteriocin production. $H(x)$ is the Heaviside step function (1 for positive x values and 0 otherwise), which represents toxin production only when cell growth rate (μ) falls below the constant δ.

Parameters used are:

$f = 0.1$

$K_N = 10^4$ mg per litre

$k_T = 1.5 \times 10^{-4}$ litre per mg toxin per hour

$\beta_T = 10^{-1}$ per hour

$\mu_{max} = 1$ per hour

$Y = 0.7$ mg bacteria per mg nutrients

$a = 4$ mg toxin per mg bacteria

μ_{max} is the maximum specific growth rate. Initially there is 1 mg per litre of each cell type, and no toxins are present. We refer the reader to Bucci *et al.*[1] for model details and spatial extensions.

1. Bucci, V., Nadell, C. D. & Xavier, J. B. The evolution of bacteriocin production in bacterial biofilms. *Am. Nat.* **178**, 162–173 (2011).