Appendix S1

To find the evolutionarily stable strategy (ESS) of the defense strategist, we consider the defense strategist's net growth rate R_D (from Table 1B in article):

$$R_D = \alpha_{DN}N^* - \alpha_{PD}P^* - \delta_D = (1-S)^\tau \alpha_{CN}N^* - (1-S^\tau)\alpha_{PC}P^* - \delta_D \tag{1}$$

The first partial derivative of R_D with respect to S (i.e. $\dfrac{\partial R_D}{\partial S}$) is:

$$\frac{\partial}{\partial S}[(1-S)^\tau \alpha_{CN}N^* - (1-S^\tau)\alpha_{PC}P^* - \delta_D] = -\tau(1-S)^{\tau-1}\alpha_{CN}N^* + \tau S^{\tau-1}\alpha_{PC}P^* \tag{2}$$

The second partial derivative of R_D with respect to S (i.e. $\dfrac{\partial^2 R_D}{\partial S^2}$) is:

$$\frac{\partial}{\partial S}[-\tau(1-S)^{\tau-1}\alpha_{CN}N^* + \tau S^{\tau-1}\alpha_{PC}P^*] = \tau(\tau-1)(1-S)^{\tau-2}\alpha_{CN}N^* + \tau(\tau-1)S^{\tau-2}\alpha_{PC}P^* \tag{3}$$

The ESS for the defense strategist when all three populations (C, D, and P) are present is found analytically by setting the first partial derivative of the net growth rate R_D with respect to S equal to zero and solving for S. For $\tau > 0$, using the equilibrium solution $N^* = \dfrac{\alpha_{PC}}{\alpha_{CN}}P^*$ (Table 1B in article) when all three populations are present, this gives an ESS of S = 0.5, independent of the parameter values used:

$$\frac{\partial R_D}{\partial S} = -\tau(1-S)^{\tau-1}\alpha_{CN}N^* + \tau S^{\tau-1}\alpha_{PC}P^* = 0$$

$$\frac{1-S}{S} = \left(\frac{\alpha_{PC}P^*}{\alpha_{CN}N^*}\right)^{\frac{1}{\tau-1}} = \left(\frac{\alpha_{PC}P^*\alpha_{CN}}{\alpha_{CN}\alpha_{PC}P^*}\right)^{\frac{1}{\tau-1}} = 1$$

$$\Rightarrow \quad S = 0.5 \tag{4}$$

The analytical solution for the ESS when the competition specialist is absent is more complicated and varies as a function of the trade-off parameter τ and the total nutrient content N_T. Using the equilibrium solution $N^* = \dfrac{\alpha_{PD} * P^* + \delta_D}{\alpha_{DN}}$ (Table 1B in article) when C is absent, we get:

$$\frac{1-S}{S} = \left(\frac{\alpha_{PC}P^*}{\alpha_{CN}N^*}\right)^{\frac{1}{\tau-1}} = \left[\frac{\alpha_{PC}}{\alpha_{CN}}P^*\frac{\alpha_{DN}}{\alpha_{PD}P^* + \delta_D}\right]^{\frac{1}{\tau-1}}$$

$$\Rightarrow \quad S = \frac{1}{\left[\frac{\alpha_{PC}}{\alpha_{CN}} P^* \frac{\alpha_{DN}}{\alpha_{PD} P^* + \delta_D}\right]^{\frac{1}{\tau - 1}} + 1} \tag{5}$$

where $P^* = \dfrac{1}{1 + \alpha_{PD}/\alpha_{DN}} \left(N_T - \dfrac{\delta_P}{Y_P \alpha_{PD}} - \dfrac{\delta_D}{\alpha_{DN}} \right)$ (from Table 1B in article).

The ESS is thus found numerically instead by solving the first partial derivative of R_D with respect to S as a function of S for different trade-off parameters and total nutrient contents. Extracting the S-value for which the partial derivative equals zero gives the ESS. The second partial derivative with respect to S was calculated and found to be negative, verifying that the extremum where the first partial derivative equals zero is a local maximum. Graphically, this procedure is illustrated in Figure S1. Figure 5 in the article shows the ESS in red as a function of the trade-off parameter τ and different total nutrient contents N_T.