

Lab 6: Interspecific competition

Basic instructions:

For today's lab, the 'Lotka-Volterra Competition' module will be used. To get to this module, click on 'Multi species dynamics' then on 'Lotka-Volterra Competition'. For all questions, set 'Plot type' to N vs. t and 'Termination conditions' to 'Run until steady'.

Mathematical background:

The mathematical background for today's lab was covered in the lecture 'Interspecific competition'. It would be very helpful to review that material and to bring a copy of it with you. It is worth noting, however, that there is one important difference between the lecture material and Populus. Specifically, Populus calls the α_{12} from lecture α , and the α_{21} from lecture β .

Questions:

1. Set α and β equal to 1.

A. What do these values of the competition coefficients (α and β) mean in terms of the relative strengths of inter and intraspecific competition?

B. Set $K_1 = 500$ and $K_2 = 700$. Which species ultimately wins (i.e., reaches its carrying capacity while the other species goes extinct)?

C. Set $K_1 = 800$ and $K_2 = 400$. Now which species ultimately wins?

D. Step through different values for the two K 's. Which values allow the two species to coexist? Which values don't?

E. Why?

2. Set α and β equal to .5.

A. What do these values of the competition coefficients (α and β) mean in terms of the relative strengths of inter and intraspecific competition?

B. Set $K_1 = 500$ and $K_2 = 700$. Which species ultimately wins (i.e., reaches its carrying capacity while the other species goes extinct)?

C. Set $K_1 = 800$ and $K_2 = 400$. Now which species ultimately wins?

D. Step through different values for the two K 's. Which values allow the two species to coexist? Which values don't?

- E. Why?
3. Set α and β equal to 1.5.
- A. What do these values of the competition coefficients (α and β) mean in terms of the relative strengths of inter and intraspecific competition?
- B. Set $K_1 = 500$ and $K_2 = 700$. Which species ultimately wins (i.e., reaches its carrying capacity while the other species goes extinct)?
- C. Set $K_1 = 800$ and $K_2 = 400$. Now which species ultimately wins?
- D. Step through different values for the two K 's. Which values allow the two species to coexist? Which values don't?
- E. Why?
4. Set α equal to .75 and β equal to 1.25.
- A. What do these values of the competition coefficients (α and β) mean in terms of the relative strengths of inter and intraspecific competition for each species?
- B. Step through different values of K_1 and K_2 . Which values allow the two species coexist?
- C. Step through different values of K_1 and K_2 . Which values cause Species 1 to win?
- D. Why?