Competitive exclusion and coexistence for competitive systems on ordered Banach spaces. (English summary)


The authors investigate the dynamics of competitive systems using the abstract setting of semiflows in an ordered Banach space $X = X_1 + X_2$. Let $T: X^+ \to X^+$ be continuous, order compact, strictly order-preserving, and satisfy additional appropriate hypotheses. The authors prove that exactly one of the following holds: (1) there is a positive fixed point of $T$; (2) $T^n(x_1, x_2) \to (x_1, 0)$ for every $(x_1, x_2) \neq (0, 0)$; (3) $T^n(x_1, x_2) \to (0, x_2)$ for every $(x_1, x_2) \neq (0, 0)$ (where $(x_1, 0)$ and $(0, x_2)$ are boundary fixed points of $T$). The interpretation of the results is that either one or the other population becomes extinct while the surviving population approaches a steady state or there is a positive steady state representing the coexistence of both populations.

G. F. Webb