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**The effects of interference competition on stability, structure and invasion of a multi-species system.** (English) Zbl 0568.92017

J. Math. Biol. 21, 97-113 (1984).

Consider a Lotka-Volterra model for  $N$  competing species:

$$dx_i/dt = (\epsilon_i - \sum_{j=1}^n \mu_{ij}x_j)x_i, \quad i = 1, 2, \dots, N,$$

where  $x_i$  is the population density of the  $i$ th species;  $\epsilon_i (> 0)$  is its intrinsic growth rate;  $\mu_{ii}$  and  $\mu_{ij}$  ( $i \neq j$ ) are the coefficients of intra- and interspecific competitions, respectively. The paper assumes that the competition coefficients can be written in the form  $\mu_{ij} = \sigma_i \alpha_i$  for  $i = j$  or  $\mu_{ij} = \sigma_i \beta_j$  for  $i \neq j$ .

All the equilibrium points of the model are obtained explicitly in terms of the parameters, and these equilibria are classified according to the concept of sector stability. Thus survival or extinction of species at a stable equilibrium point can be determined analytically.

The result of the analysis is extended to the successional processes of a community. A criterion for invasion of a new species is obtained and it is also shown that there are some characteristic quantities which show directional changes as succession proceeds.

Reviewer: [J.Keesling](#)

**MSC:**

**92D25** Population dynamics (general)  
**34C99** Qualitative theory for ordinary differential equations  
**92D40** Ecology

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**Keywords:**

[interference competition](#); [multispecies system](#); [Lotka-Volterra model](#); [competing species](#); [equilibrium points](#); [sector stability](#); [survival](#); [extinction](#); [successional processes](#); [invasion of a new species](#)

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