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Dynamic game for optimal resource allocation of annual plants and grazing consumers

In [1] authors have formulated a model of optimal resource allocation in annual plants with constant grazing pressure along a season of fixed length. The plant has two choices: either to invest nutrients in the vegetative part of the plant or in the reproductive part. This kind of problem has been stated and solved as a problem of optimal control using Pontryagin's maximum principle.

In our work we consider a similar model but we take into account that the grazing pressure on the plant varies in time and occurs due to the presence of consumers in the system. Consumers are also faced with an allocation dilemma between the investment of time in increasing their internal energy through grazing or in reproduction (see for details [2]). Hence we are dealing here with a dynamic game of two players which are known to be fairly advanced mathematical objects [3]. Its resolution address interesting questions such as the influence of an adaptive, rather than fixed, grazing pressure on plants phenology.

References

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