

DYNAMICS OF BT-PLANTS UNDER BT-RESISTENT MOTH INVASION. MATHEMATICAL MODELING.

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We investigate the model of the four-component agro-ecosystem including: genetically modified Bt-crops which produce insecticidal Bt-toxin; insect populations which possess Bt-susceptible features, Bt-resistant features and both of them simultaneously. It's supposed that insect populations are moth whose larvae eat plants. The model is a modification of our previous agro-ecosystem model [1]. Bt-plants and Bt-susceptible insect biomass distributions are supposed to be homogeneous. A localized invasion of the insects with intermediate features possessing both Bt-susceptible and Bt-resistant features is considered. It's shown that an integral characteristic of the Bt-plant biomass (Bt-plant biomass averaged in space at the end of the vegetation season) nonlinearly depends on the level of the Bt-plant germination. Namely, Bt-plant biomass averaged in space at the end of the vegetation season reaches its minimal values not only in case of a low Bt-plant germination level, but also at a high level of Bt-plant germination. Whereas a middle level of Bt-plant germination leads to a considerable increase of Bt-plant biomass averaged in space at the end of the vegetation season.

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Literature

1. A.B. Medvinsky, M.M. Gonik, Y.V. Tyutyunov, B.-L. Li, A.V. Rusakov, H. Malchow. Insecticidal Bt crops under massive Bt-resistant pest invasion: mathematical simulation. // Aspects of Mathematical Modelling. In: Basel, Birkhäuser (eds. R.J. Hosking and E. Venturino), 2008, pp. 81-94.