Seventh Workshop Dynamical Systems Applied
to Biology and Natural Sciences DSABNS 2016
Évora, Portugal, February 2-5, 2016

MATHEMATICAL INSIGHTS INTO RNA INTERFERENCE

K.B. Blyuss

Department of Mathematics, University of Sussex, Falmer, Brighton, BN1 9QH, United Kingdom

k.blyuss@sussex.ac.uk

ABSTRACT

One of the fascinating features of cellular dynamics of eukaryotes, including animals, is *RNA interference* that refers to the ability of cells to suppress an undesired gene expression. This process plays a fundamental role in organisms' ability to defend their cells against infections, and also is very important for development. In this talk I will discuss two mathematical models addressing different aspects of RNA interference, with particular emphasis on immune responses in plants. The first model [1] investigates the effects of time delays associated with the propagation time of RNA silencing signal and the maturation time of plant cells. I will present detailed bifurcation analysis of this model to illustrate how stability and dynamical behaviour is affected by the system parameters and the time delays. The second model [2] analyses the complex interactions between the immune system and two concurrent viral infections. Analytical and numerical bifurcation analyses allow us to identify parameter regions where the system exhibits synergistic or antagonistic behaviour between viruses, as well as different types of host recovery. We show that not only viral attributes but also the propagating component of RNA interference is important in determining the dynamics.

References

[1] G. Neofytou, Y.N. Kyrychko, K.B. Blyuss, *Time-delayed mathematical model of immune response in plants*, submitted (2015).

[2] G. Neofytou, Y.N. Kyrychko, K.B. Blyuss, *Mathematical model of plant immune response to two viral infections*, submitted (2015).

 ISBN: 978-989-98750-2-9