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Analysis of effects of vector preference on the transmission of insect-borne plant diseases

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Recent studies have shown that pathogens can alter the behaviour of hosts or vectors to improve their transmission power. This happens not only in animal pathosystems but in plant pathosystems. While animal pathogens can alter the behaviour of both hosts and vectors in ways that increase frequency of host-host or host-vector encounters, in plant pathosystems the host does not have mobility, so the potential for behavioural manipulation is restricted to just vector mobile component in these systems [1].

Motivated by [2], we investigate how this manipulation affects transmission of specific insect-borne plant diseases. To do so, we use the compartmental model of vector preference in which the probability of which vectors settle on individual host plants. Then we demonstrate that interactions between host and vector infection status, the effect of a vector preference and difference of the effect between animal- and plant systems, together with any evolutionary implications.

[1] Ingwell, L. L., Eigenbrode, S. D., & Bosque-Pérez, N. A. (2012). Plant viruses alter insect behavior to enhance their spread. *Scientific Reports*, 2, 578.

[2] Cunniffe, N. J., Koskella, B., Metcalf, C. J. E., Parnell, S., Gottwald, T. R., & Gilligan, C. A. (2015). Thirteen challenges in modelling plant diseases. *Epidemics*, 10, 6-10.

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