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Vrushali A Bokil* (bokilv@math.oregonstate.edu), 368 Kidder Hall, Department of Mathematics, Oregon State University, Corvallis, OR 97331, and **Carrie Manore, Sean M Moore, Elizabeth T Borer** and **Parvies R Hosseini**. *A Spatiotemporal Model of Barley and Cereal Yellow Dwarf Virus Transmission Dynamics with Seasonality, Age Structure and Plant Competition.*

In this talk we present a model for transmission of barley and cereal yellow dwarf viruses (B/CYDV) spread by aphid vectors among non-native annual and native perennial grass species in the western United States. We model transmission of disease within a patch framework that incorporates the movement of aphid vectors between discrete patches. Our spatiotemporal model incorporates age structure in perennial grasses, competition between the grass species and seasonal variations in population dynamics of the host species. Using this B/CYDV system as a case study we investigate the effects of spatial distributions and relative abundances of different host species on disease dynamics. An analysis of a simplified two-patch model identifies how key parameters influence both the ability of the pathogen to invade a heterogeneous host community and the effect of the pathogen on host coexistence. Numerical simulations over a larger group of patches demonstrate that increasing connectivity between patches tends to increase prevalence at the regional scale. We find that host composition and patch structure can affect not only the ability of the pathogen to invade a system but can either facilitate or hinder invasion by non-native competitor host species. (Received September 22, 2010)