

Abstract Submitted
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Vegetative Rhombic Pattern Formation Driven by Root Suction for an Interaction-Diffusion Plant-Ground Water Model System in an Arid Flat Environment DAVID WOLLKIND, Washington State University, INTHIRA CHAIYA, Mahidol University, Bangkok, Thailand, RICHARD CANGELOSI, BONNI DICHONE, Gonzaga University, CHONTITA RATTANAKUL, Mahidol University, Bangkok, Thailand — A rhombic planform nonlinear cross-diffusive instability analysis is applied to an interaction-diffusion plant-ground water model system in an arid flat environment containing a root suction effect. A threshold-dependent paradigm is introduced to interpret stable rhombic patterns driven by this plant root suction effect in the ground water equation. The results of that analysis are represented by plots in a root suction coefficient versus rainfall rate dimensionless parameter space. From those plots regions corresponding to bare ground and vegetative patterns consisting of isolated patches, rhombic arrays of pseudo spots or gaps separated by an intermediate rectangular state, and homogeneous distributions from low to high density are identified in this parameter space. Then that morphological sequence, produced upon traversing an experimentally determined root suction characteristic curve, is compared with observational evidence relevant to the occurrence of leopard, pearled, or labyrinthine-type tiger bush and used to motivate an aridity classification scheme.

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