

**Ben-Gurion University of the Negev  
Blaustein Institutes for Desert Research**

The Swiss Institute for Dryland Environmental and Energy Research  
Alexandre Yersin Department of Solar Energy and Environmental Physics

## **The Role of Self-Organized Spatial Patterns in the Design of Agroforestry Systems**

*Omer Tzuk*

*BIDR, Ben-Gurion University of the Negev*

### **Abstract**

The development of sustainable agricultural systems in drylands is currently an important issue in the context of mitigating the outcomes of population growth under the conditions of climatic changes. The need to meet the growing demand for food, fodder, and fuel under the threat of climate change, requires cross-disciplinary studies of ways to increase the livelihood while minimizing the impact on the environment. Practices of agroforestry systems, in which herbaceous species are intercropped between rows of woody species plantations, have shown to increase land productivity. As vegetation in drylands tends to self-organize in spatial patterns, it is important to explore the relationship between the patterns that agroforestry systems tend to form, and the productivity of these system in terms of biomass, their resilience to variability of water availability, and water use efficiency.

A spatially-explicit vegetation model for two species that compete for water and light and may exploit soil layers of different depths will be introduced. Spatially-uniform and periodic solutions, and their stability properties, will be presented for different scenarios of species and environmental conditions. The implications for optimal intercropping in terms of biomass productivity, water use efficiency, and resilience to environmental changes, will be discussed.

**Date & Location:**

**Tuesday, October 16, 2018, 11:00**

**Lecture room, Physics Building (ground floor)**

