

Invited Speaker : Awadhesh Prasad (University of Delhi)

Title : Use of synchronization to control fruit production

Major plants which produce large seed crops usually show alternate bearing, i. e. a heavy yield year is followed by extremely light ones, and vice versa. This phenomenon causes the cascading effect throughout the ecosystem, and may cause the serious health problem for human beings. Therefore, it is very important to understand this natural phenomenon. In this talk, we will discuss the resource budget model [1], which characterizes the ecological alternate bearing phenomenon in fruit crops. We will attempt to understand some of the dynamical complexities [2] of this phenomenon.

We will discuss a new fruits production strategy, direct coupling [3], to get constant total fruits production form an orchard by shifting alternate bearing of individual trees, based on the principles of synchronization of coupled oscillators. In this method a pair of plants are coupled to show the dominance of outofphase synchronization, even in the presence of indirect interactions (e. g., pollen). This technique, which is automatic and selfsustaining, may be used for controlling fruit production. We will also discuss the effect of Solar Cycle on alternate bearing phenomenon.

[1] Y. Isagi, K. Sugimura, A. Sumida, and H. Ito, J. Theor. Biol. 187, 231 (1997).

[2] A. Prasad and K. Sakai, CHAOS 25, 123102 (2015).

[3] A. Prasad, K. Sakai, and Y. Hoshino, Sci. Rep. 7, 39890 (2017).