An Introduction to Balanced Sequential Arrays on the Square Grid

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(joint work with Marks R Nester)

Plants grown in large numbers for commercial purposes are usually set out on a regular grid, triangular, square or hexagonal, or possibly a rectangular grid. We need to understand their behaviour when they compete with each other for light, water and nutrients. In a greenhouse, there may be a lamp over each plant, half the plants having their lamps on and half off. The intensity of light falling on any particular plant is determined *mainly* by whether its own lamp is on, *next* by the number of its nearest neighbours whose lamps are on, and *perhaps also* by the number of its second-nearest neighbours whose lamps are on.

Such arrays are also used to study competition among different types of plants and, with some extra restrictions, to design field layouts as well. The problem of constructing suitable arrays was introduced in 1979 by R M Cormack (St Andrews), and discussed further by David J Gates (CSIRO, Canberra) in 1980. Here we consider only the square grid.

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