A mathematical model for formulating intercrop proportions for intercropping systems' design

P.O. Adetiloye

Abstract

The concept of land equivalent coefficient (LEC), formulated for the valuation of intercrop interactions and productivity in simple to complex crop mixtures, is further employed in this work to formulate intercrop proportions for intercropping research based on the concept of expected LEC. This framework is based on the assumption that the proportion of each component crop within a crop mixture is a probability statement on its expected contribution to final yield. The product of these proportions gives the predicted or expected land equivalent coefficient value which is an index of the potential productivity of the mixture.

In a mixture of N components, the smallest expected component's proportion is , which gives the optinum sole crop population equivalent, , of a mixture. With N as the common denominator, mixtures can attain a theoretical maximum of N optimum sole crop populations and NN possible combinations of intercrop proptions. However, the practical combinations of component proportions on an arable land is restricted to 2N such that the maximum population pressure is twice that of a sole crop.

This model suggests that mixtures have an inbuilt tendency to give yield advantages as the number of crop components and mixture plant population increases and as intercrop proportions become more equitable. The productivity of crop mixtures can therefore be represented and predicted in mathematical terms.

University of Agriculture, Abeokuta
http://www.unaab.edu.ng