Supporting Document S1

Calculation of the total area of a multi-crop (MC) plot

Let us take the land area of design A (Fig. 1). Let us first calculate the area occupied by brinjal (BR) plants:

All BR saplings, like all other species, are planted in a single column, 3 times over (col. 1, 8 and 15). The number of BR plants in each of these 3 columns is 21 (1 in each row), and the gaps on all 4 sides of each BR plant is \( G_{BR} = 40 \text{ cm} \). We leave an equal amount of gap \( (G_{BR}) \) beyond each border row. Therefore, the area in each column is \( 2G_{BR}^2(R+1) \), and for the 3 repeated columns of BR in the plot, \( 2G_{BR}^2(R+1)C_{BR} \) (Eq. S1),

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which translates to \( 2 \times (80 \text{ cm} \times 80 \text{ cm}) \times (21 + 1 \text{ rows}) \times 3 \text{ m}^2 \), where \( C_{BR} \) is the number of columns bearing BR in each row, which is uniformly designed to be 3.

However, the spacing \( (G_i = 25 \text{ cm}) \) on all sides of each non-BR plant in each row needs to be less by 1 for each column of crop \( i \), because on one side this space is subsumed in \( G_{BR} = 40 \text{ cm} \) for each neighbouring BR plant. We also leave an extra space of 25 cm on the last (21^{st}) column. Therefore, the total area planted to all non-BR crops \( S (= 6) \) is :

\[ \sum_{i=1}^{6} A_i = (S-1)G_i^2C_i(R+1) + G_i^2(R+1)[1 + C_i(S-1)] \] (Eq. S2)

Combining Eq. S1 and S2, and because \( C_{BR} = C_{i \neq BR} = 3 \), we obtain the total area sown to all (BR and 6 non-BR) crops :

\[ A_{BR} + \sum_{i=1}^{6} A_{i \neq BR} = 2G_{BR}^2C_i(R+1) + G_i^2(R+1)[1 + C_i(S-1)] \] (Eq. S3)

Defining \( X = 2C_i \) and \( Y = [1 + C_i(S-1)] \), the eqn. S3 can be rewritten as a general equation

\[ \sum_{i=1}^{7} A_i = G_i^2(R+1)[X + Y] \] (Eq. S4)

where \( X = 2C_i ; \ Y = 0 \); and \( G_i = 40 \text{ cm} \) for \( i = BR \)

\( X = 0; \ Y = [1 + C_i(S-1)]; \) and \( G_i = 25 \text{ cm} \) for \( i \neq BR \)

Because all designs of MC plots are planted with the same number of crop species, and identical number of plants (assuming zero mortality) with the same crop-specific plant-to-plant spacing, Eq. S4 is applicable to all designs of MC plots. In cases of mortality of crop \( i \) in a plot, the actual area covered by the surviving individuals \( (N_i) \) is \( AA_i = A_i\frac{N_i}{C_iR} \), as described in Eq. 1 in the main text.