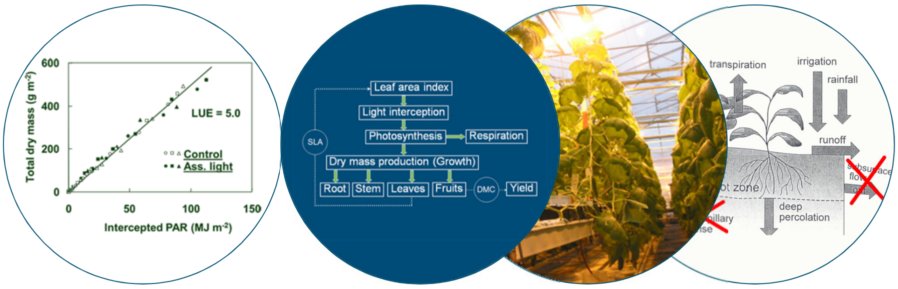
Simulation of biomass production

Light interception



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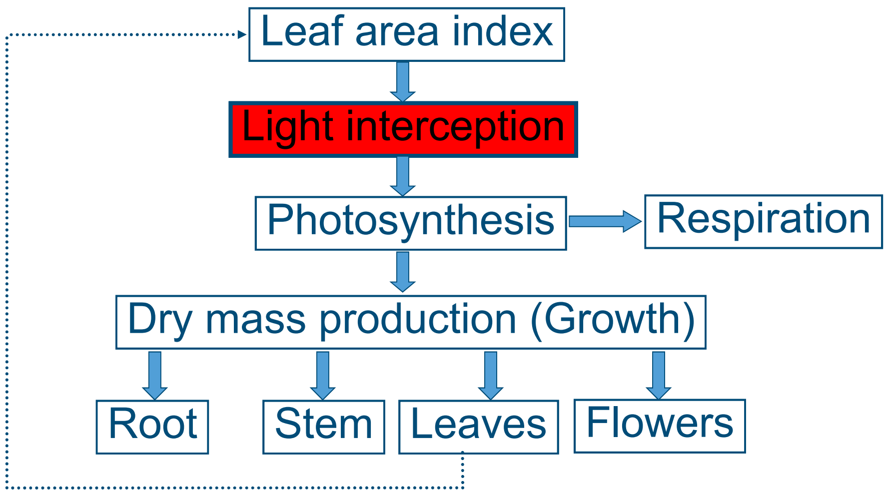
The processes: step by step - Light interception



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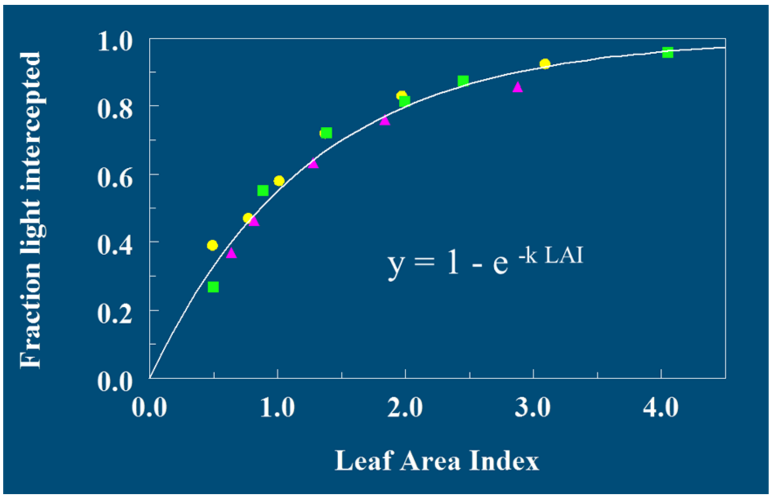
Influence of Leaf Area Index (LAI) on the fraction of light intercepted by a tomato crop *(k = extinction coefficient = 0.8)*



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Simulation of biomass production

– Light on top of canopy -

Wavelength :

Global radiation : 300-3000 nm

PAR: Photosynthetically Active Radiation: 400-700 nm

Energy:

In day light PAR outside≈ 0.5 x Global radiation

In a glasshouse: PAR ≈ 0.7 x PAR outside

Example:

20 MJ day^{-1} global radiation outside would result in about

20 x 0.5 x 0.7 = 7 MJ (PAR) day^{-1} inside a glasshouse.

NB: Absorbed ≠ Intercepted

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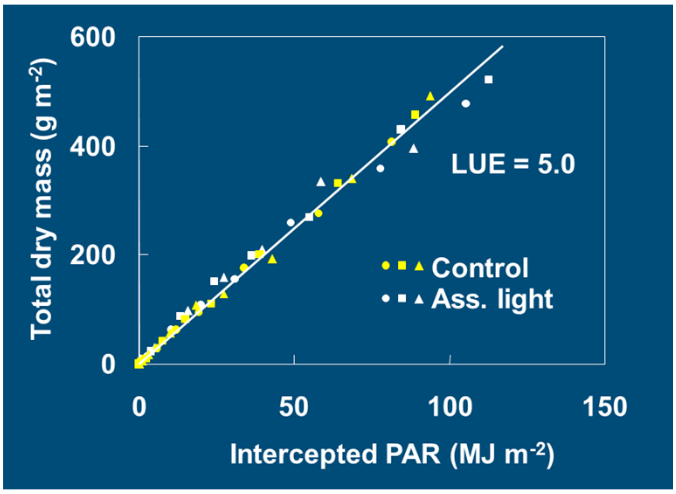
Light use efficiency (LUE, g MJ^{-1}) in winter: 3 plant densities and - or + assimilation light for cut chrysanthemum



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Simulation of biomass production

– Dry matter production: a simple LUE model –

$$dW/dt = LUE\ (1 - e^{-k * LAI})\ I$$

d*W*/dt = growth rate [g(DM)m^{-2} d^{-1}]

LUE = light use efficiency [g(DM) MJ^{-1}(PAR)]

K = extinction coefficient

LAI = Leaf area index

I = Photosynthetic Active Radiation (PAR) incident on crop [MJ(PAR)m^{-2} d^{-1}]

Assumes constant LUE !

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