



UNIVERSIDAD DE CÓRDOBA



CROP PARAMETERS IN AQUACROP

THEORY



ITALIAN AGENCY
FOR DEVELOPMENT
COOPERATION

OBJECTIVES



1. Type of crop parameters

2. Required crop parameters

OBJECTIVES



1. Type of crop parameters

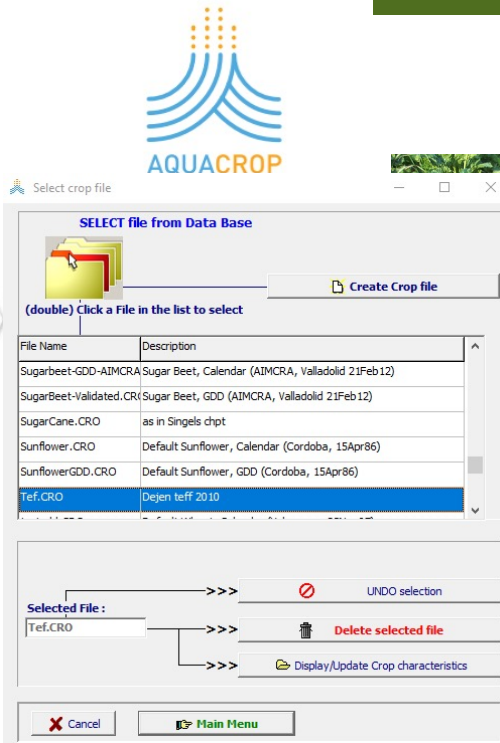
2. Required crop parameters

1. TYPE OF CROP PARAMETERS



AquaCrop database

15 crops



Crops in research publications

13 other major crops

9 other minor crops

	A	B	C	D	E	F	G	H	I	J	K	L
	ID	Article	Comments	Tbase (°C)	Tupper (°C)	Kct	WP* (kg/m2)	WP* adjust (%)	Hlo (%)	xpan. P-uppe	Expan. P-low	Expan. shape
1				8	30	1.05	33.7		48	0.14	0.72	2.9
2		Default										
3		Khordadi et al. (2019)		10	30	1.05	28	0	42	0.14	0.72	2.9
4	5	Shen et al. (2019)		8	30	1.25		0		0.14	0.72	2.9
5	13	Babel et al. (2019)	Variable values for each treatment					0				
6	14			8	30		29.3	0	52	0.14	0.74	2.9
7	17	Sallah et al. (2019)		6	33	1	32.2	0		0.1	0.6	2.9
8	21	Dizal et al. (2019)										
9	47	Huang et al. (2018)	Variable values					0				
10	49	Mibulo and Kiggundu (2018)		8	30	0.95	33.7	50				
11	58	Raja et al. (2018)		8	30	1.05	34	0		0.14	0.72	2.9
12	76	Ran et al. (2018)		8	30	1.2	20.9	0	33	0.14	0.72	2.9
13	107	Araya et al. (2017)				1.05	33.7	0	52	0.1	0.45	2.9
14	116	Mulneh et al. (2017)		8	30	1.03	30.7	0	48	0.14	0.72	2.9
15	135	Ran et al. (2017)		8	30	1.2		0		0.14	0.72	2.9
16	137	Akumaga et al. (2017)		8	30	1.03	33.7	0		0.14	0.72	2.9
17	143	Linker and Kisekka (2017)	Calibrated with data from CERES			1.2	32	0	47	0.12	0.78	3.5
18	144	Wibowo et al. (2017)				1.05	33.7	0	52	0.1	0.45	2.9
19	151	Yang et al. (2017)				1.05		0	45			
20	160	Greaves and Wang (2017)		8	30	1.02	33.7	0	52	0.14	0.72	2.9

1. TYPE OF CROP PARAMETERS



Conservative crop parameters



Valid for all cultivars and in all environments

Non-conservative crop parameters



Need to be adjusted to the cultivar and/or the environment

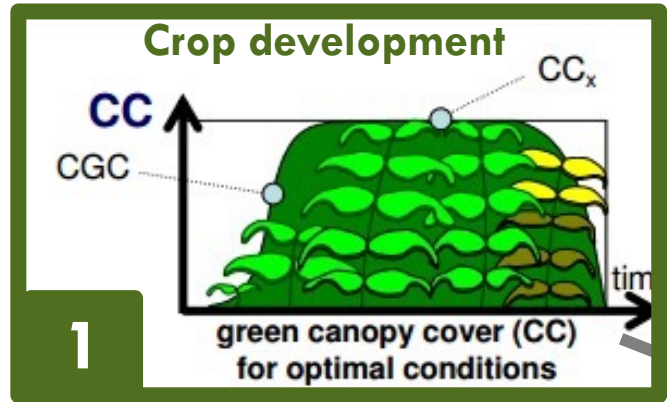
OBJECTIVES



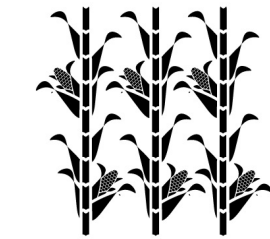
1. Type of crop parameters

2. Required crop parameters

2. REQUIRED CROP PARAMETERS



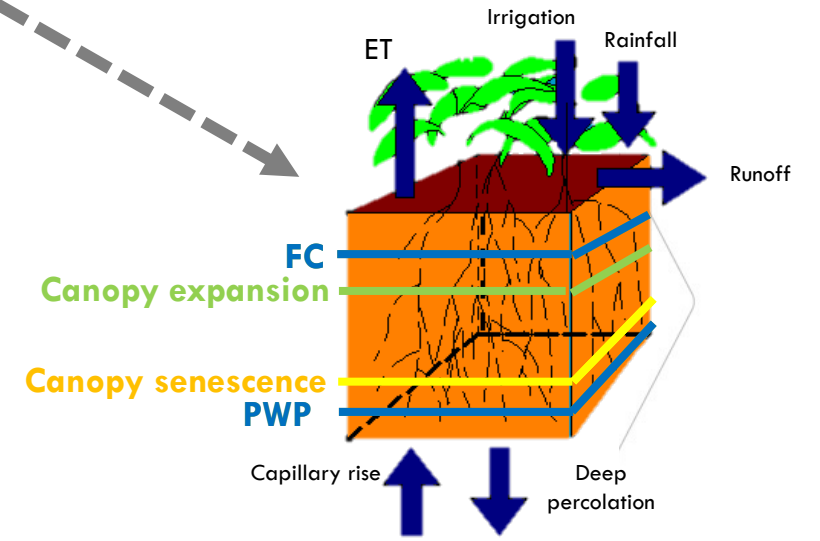
$$Tr = K_s \times K_{c_{Tr}} \times ETo$$



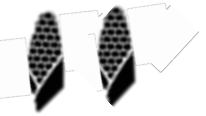
$$\text{Biomass} = WP^* \times \sum (Tr/ETo)$$

Stomatal closure

Harvest index



Yield



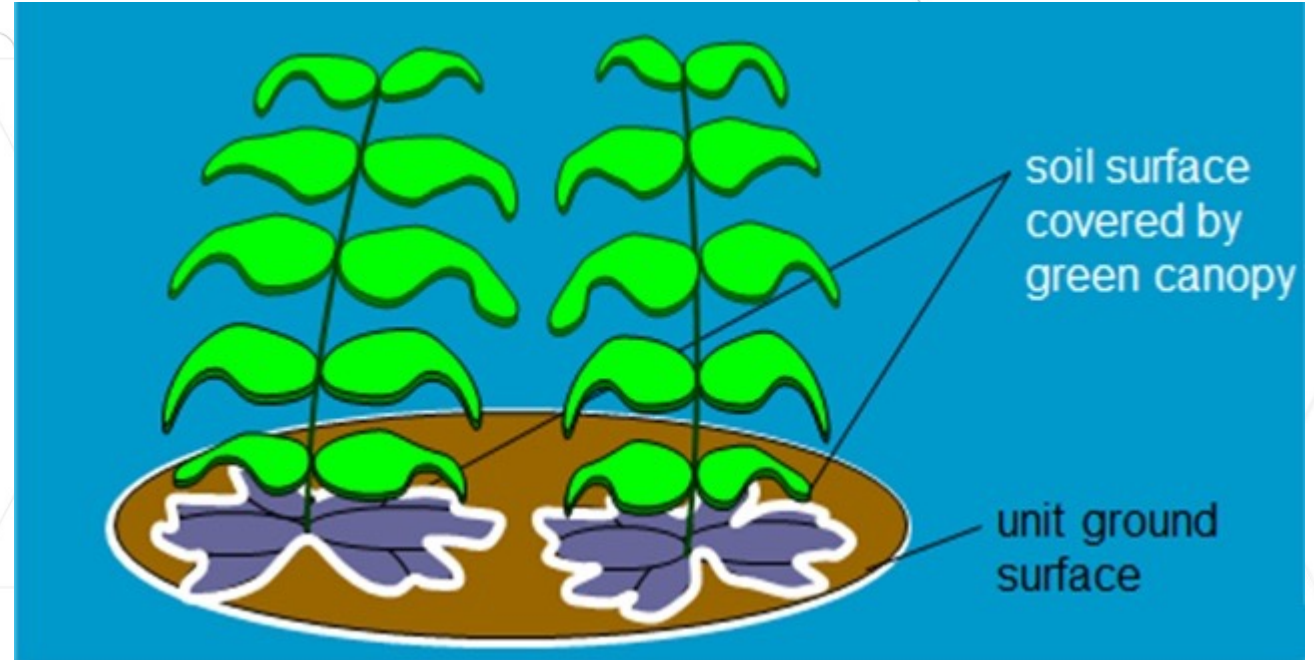
2. REQUIRED CROP PARAMETERS



Green canopy cover (CC)

$$CC = \frac{\text{Soil surface covered by the green canopy}}{\text{Unit ground surface area}}$$

(0-100%)

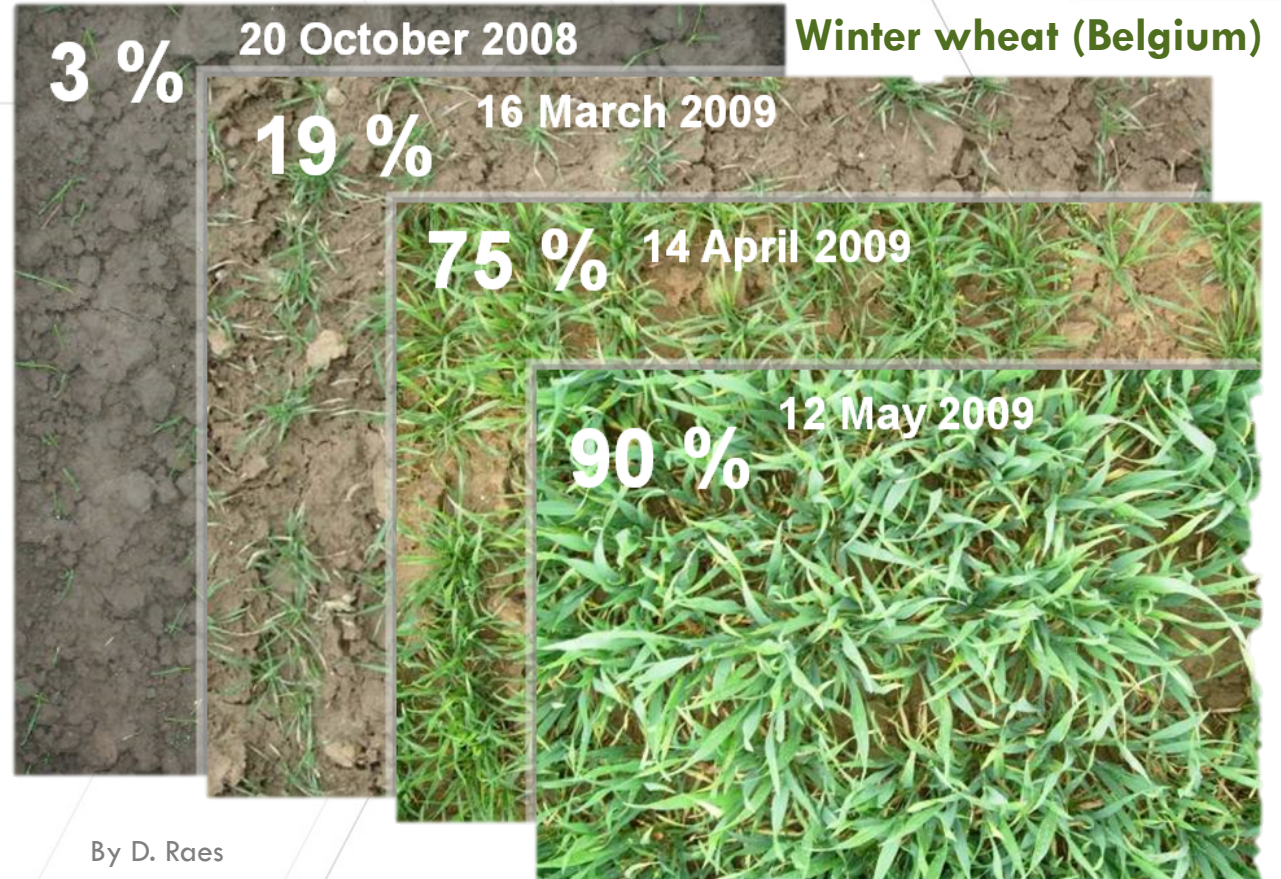
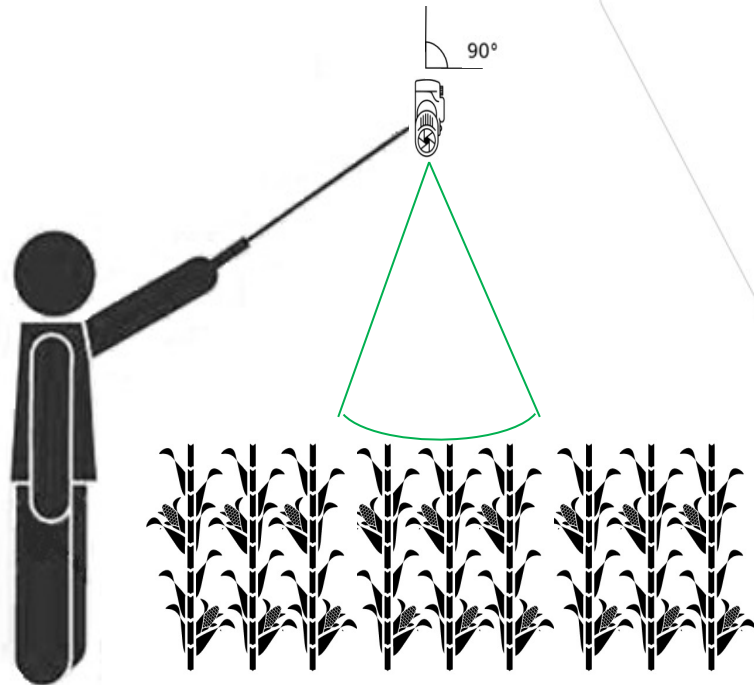


By D. Raes

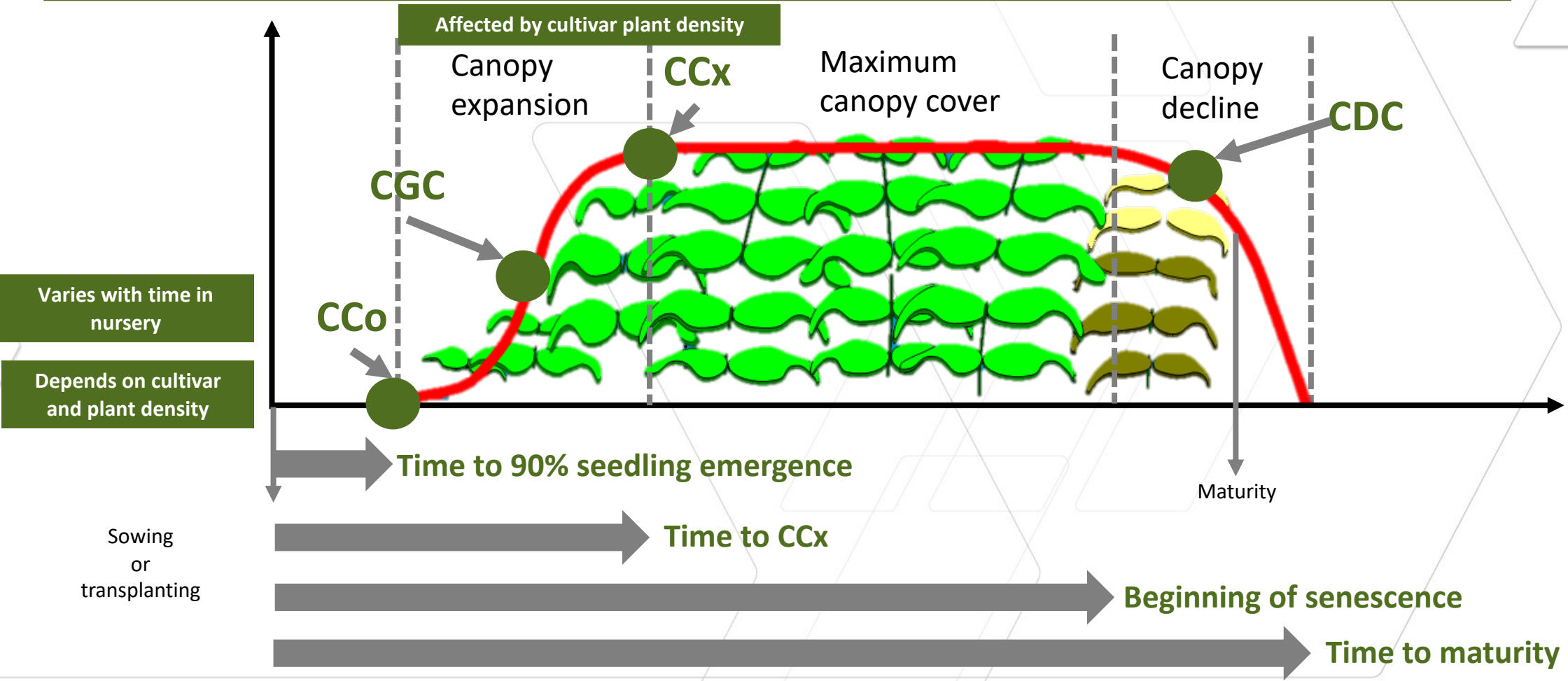
2. REQUIRED CROP PARAMETERS



Canopy development



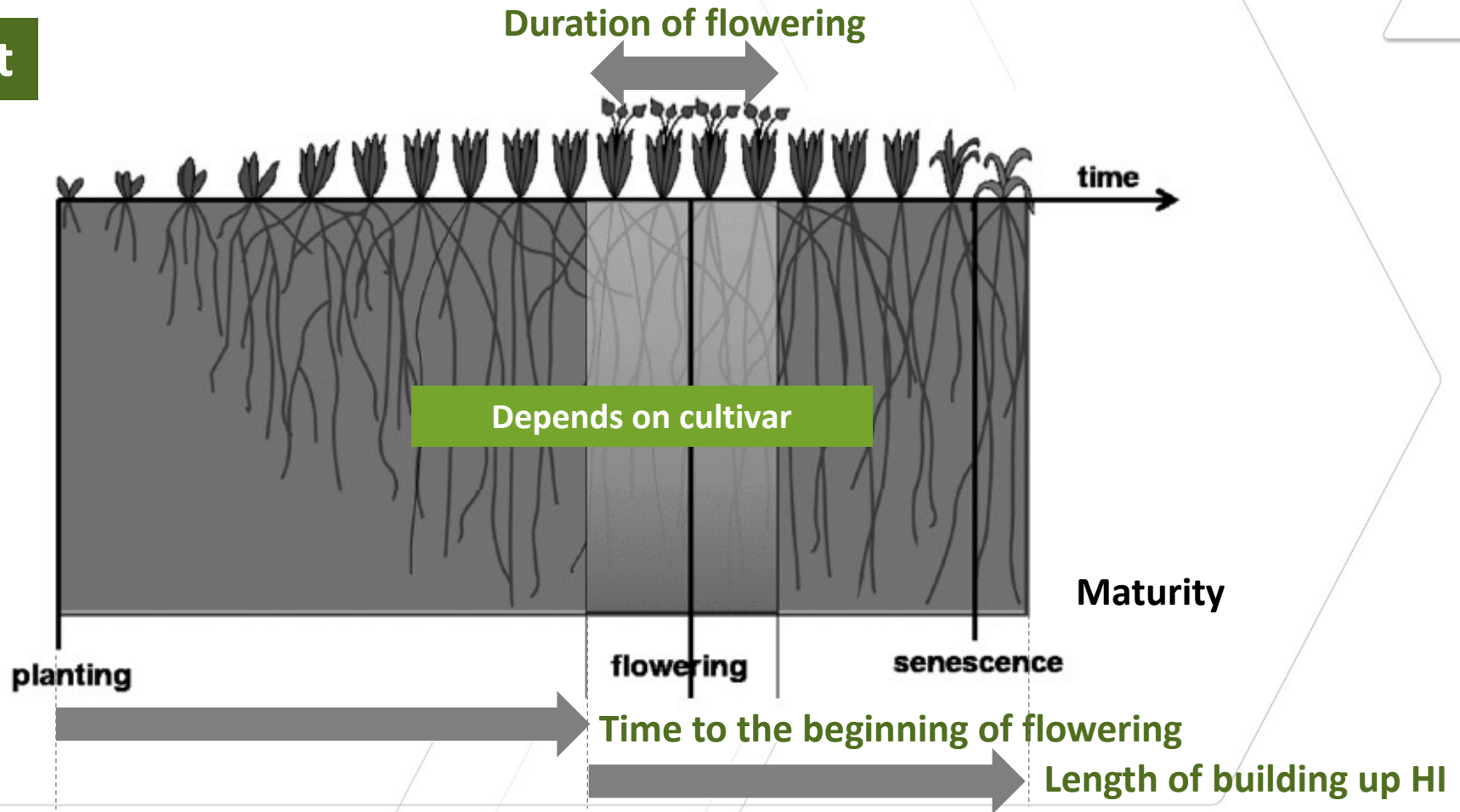
2. REQUIRED CROP PARAMETERS



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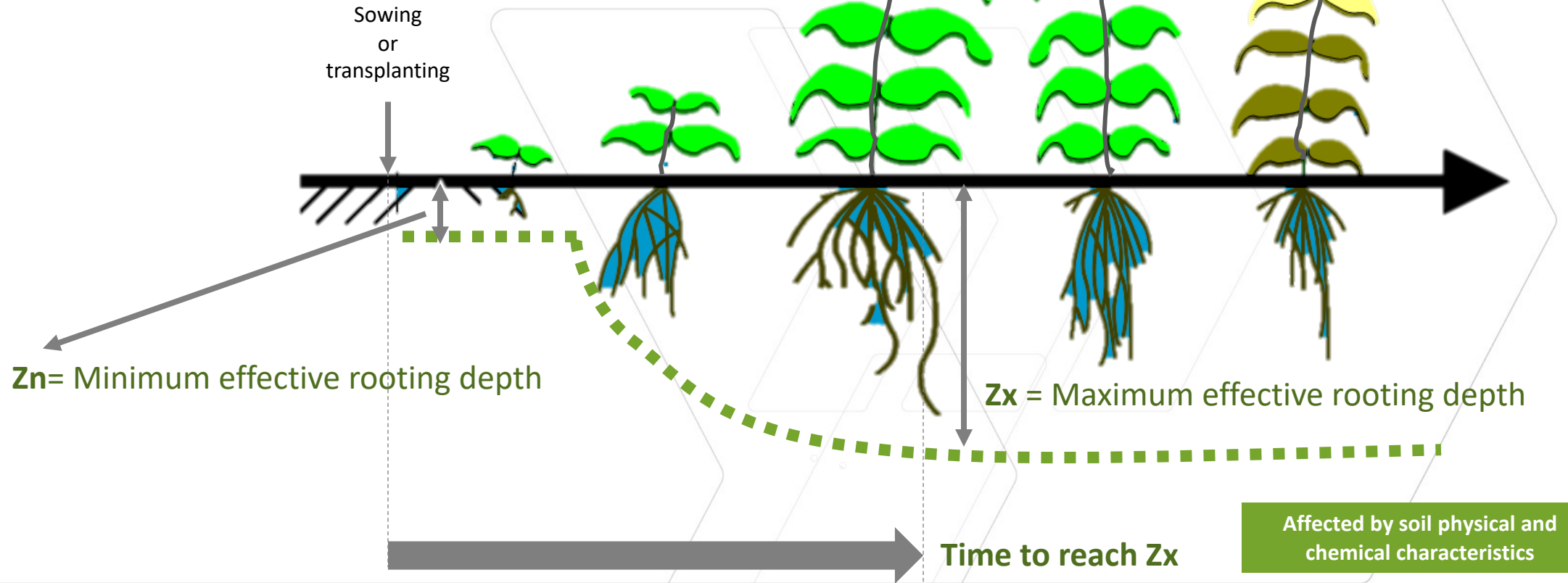
Crop development



2. REQUIRED CROP PARAMETERS



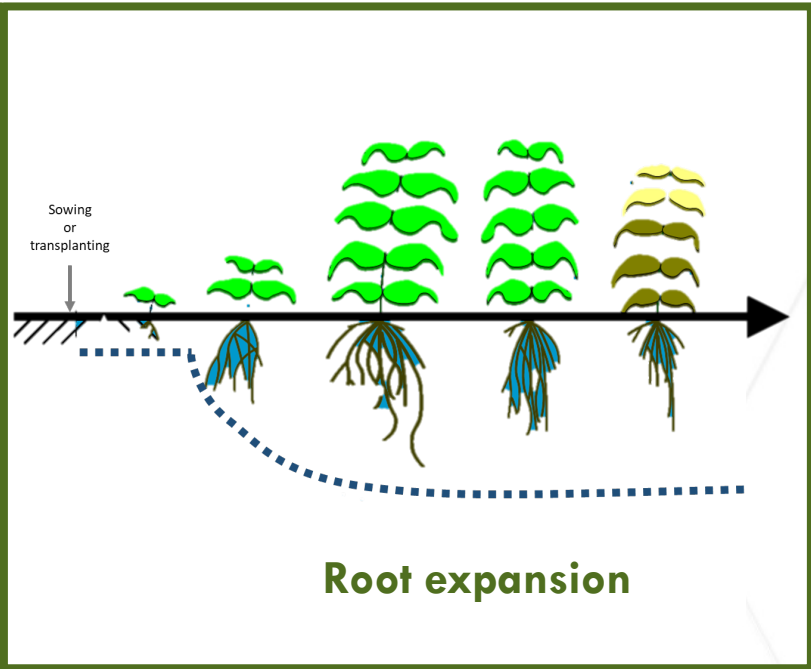
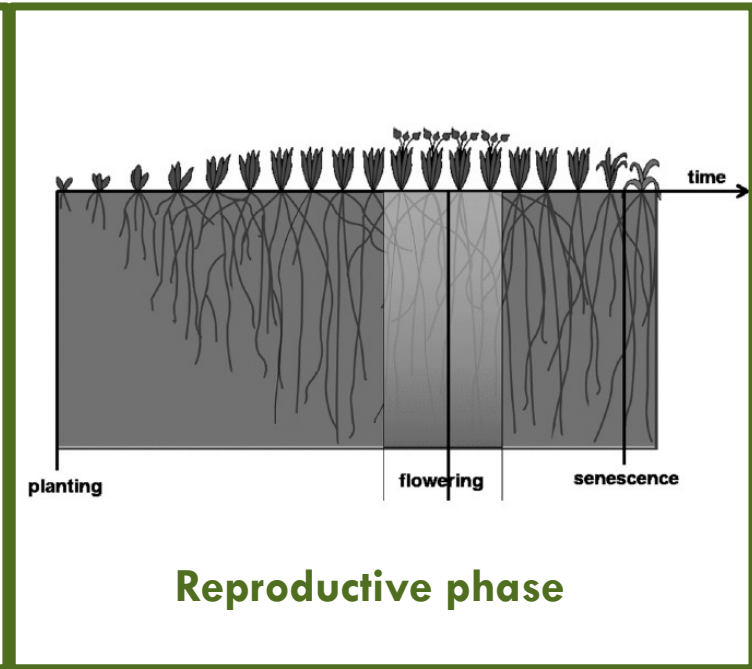
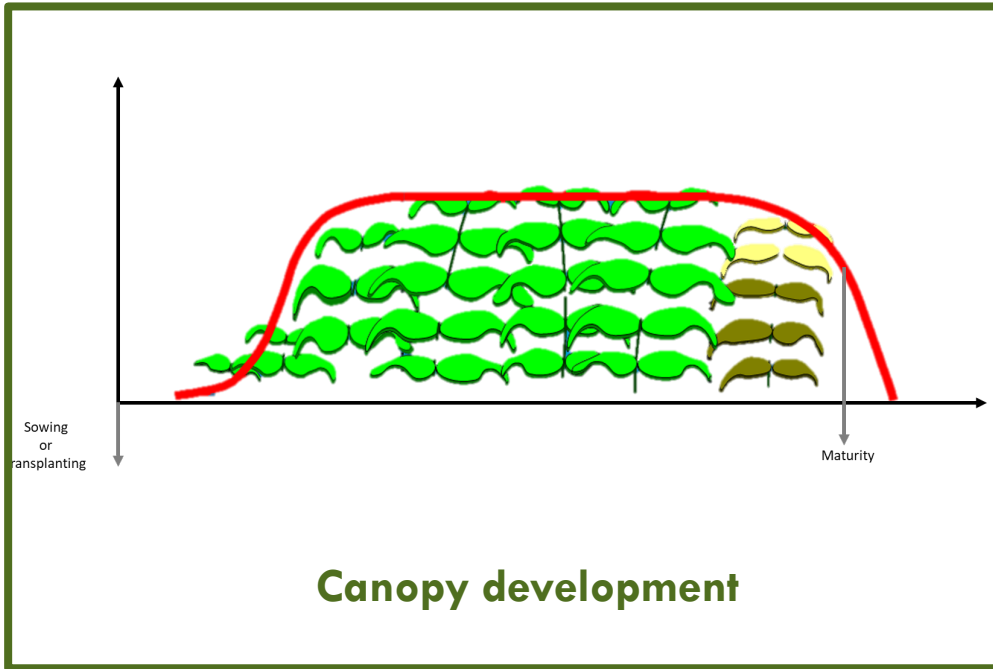
Root expansion



2. REQUIRED CROP PARAMETERS

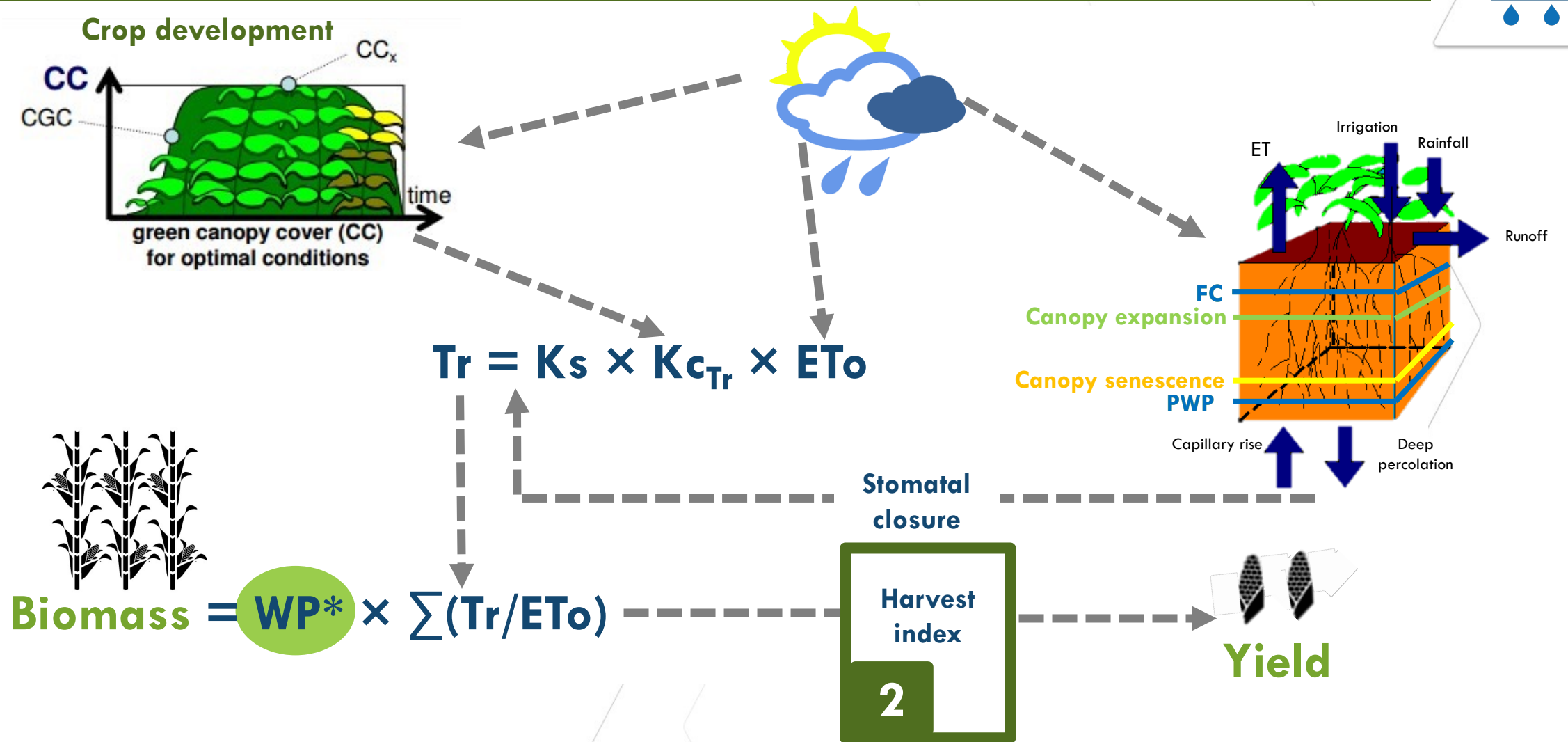


Affected by temperature



Calendar days  Thermal time

2. REQUIRED CROP PARAMETERS



2. REQUIRED CROP PARAMETERS



ABOVE-GROUND
BIOMASS



Harvest Index

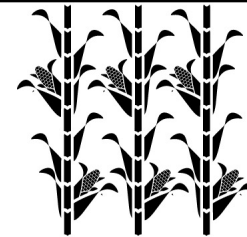
=

Yield



=

Biomass



2. REQUIRED CROP PARAMETERS



Non-conservative crop parameters

1. Affected by Planting/Management

- Size of transplanted seedling (if crop is transplanted)
- Plant density
- Maximum canopy cover (CCx)
- Time to 90% seedling emergence (CCo)

2. Phenology (Crop development)

- Time to CCx
- Time to beginning of canopy senescence
- Time to physiological maturity
- Time to start of flowering
- Duration of flowering

3. Affected by conditions in the soil profile

- Maximum effective rooting depth
- Time to reach maximum rooting depth

4. Cultivar class crop parameters

- Reference harvest index (HIo)**