

Table S1. fixed crop model parameters for different crops (SB:- spring barley, WW:- winter wheat & WOSR:- winter oilseed rape)

Parameter	Description	Notation	Unit	SB	WW	WOSR
Fixed	Climatic efficiency	ϵ		0.48	0.48	0.48
	Light interception coefficient	K		0.5	0.5	0.5
	Specific leaf area	SLA	m ² /g	0.024	0.024	0.024
	Initial above ground biomass	DAM ₀	g/m ²	4.5	4.5	4.5
	Optimal temperature for crop growth	T _{opt}	°C	15	15	15
	Minimum temperature for crop growth	T _{min}	°C	0	0	0
	Maximum temperature for crop growth	T _{max}	°C	30	30	30
	Root growth rate	Rgrt	cm·°C ⁻¹ ·Day ⁻¹	0.16	0.16	0.16
	Root length/Weight ratio	Rrt	cm/g	0.98	0.98	0.98
	Bare soil albedo	SALB		0.18	0.18	0.18
	Runoff factor	Rnff		0.2	0.2	0.2
	Corrective Factor	Cs		1.2	1.2	1.2
	Reference respiration at 10°C	R10		0.0025	0.0025	0.0025
	Q10 Coefficient	Q10		2	2	2
	Growth conversion efficiency	Y _G		0.74	0.74	0.74
	Reference Rh	a		0.28	0.28	0.28
	Constant to compute Rh	b		0.0833	0.0833	0.0833
	Corrective Factor	CF		1.07	1.07	1.07

Table S2. list of variable crop model parameters (SB:- spring barley, WW:- winter wheat & WOSR:- winter oilseed rape)

	Day of Emergence	The day of year when the dry biomass of the crop is 4.5 g/m ²	D ₀	day	90-120	1-30	1-30
Variable	Leaf Partitioning Coefficient 1	Initial fraction of daily accumulated dry biomass partitioned to leaf at the emergence	PLa		0.1-0.4	0.1-0.4	0.1-0.4
	Leaf Partitioning Coefficient 2	PLa and PLb together determine the cumulated GDD when GAI reaches peak value	PLb		0.001-0.01	0.001-0.01	0.001-0.01
	Leaf Senescence Coefficient 1	Cumulated GDD when leaf starts to senescence (GAI decreases)	SenA	°C. Day	700-1000 2000-	700-1000 2000-	700-1000 2000-
	Leaf Senescence Coefficient 2	Determines the rate of leaf senescence	SenB	°C. Day ⁻¹	2000-15000	15000	15000
	Effective Light Use Efficiency	The ratio between produced dry biomass and APAR	ELUE	g/MJ	2.5-5.0	2.5-5.0	2.5-5.0