Table S1. Sentinel-1 image inventory used in the development of models for wheat. Each line represents a dataset with specific geometrical parameters.

Area	Orbit	Local Incidence Angle (°)	Wheat Height Model		Wheat LAI Model		Wheat K_c Model	
			Period*	# of images used	Period*	# of images used	Period*	# of images used
Saad	Ascending	36.5–36.6	29-Jan-18 05-Apr-18	11	10-Feb-18 05-Apr-18	9	06-Mar-18 05-Apr-18	5
Saad	Ascending	47.7	28-Jan-18 04-Apr-18	12	09-Feb-18 04-Apr-18	10	05-Mar-18 04-Apr-18	6
Yavne	Ascending	35.3–35.4	06-Jan-19 06-Apr-19	15	12-Jan-19 06-Apr-19	15	-	-

Note: * Period indicates the starting and ending dates.

Table S2. Sentinel-1 image inventory used in the development of models for cotton. Each line represents a dataset with specific geometrical parameters.

Area	Orbit	Local Incidence Angle (°)	Cotton K_c Model		Cotton Height Model	
			Period*	# of images used	Period*	# of images used
Tel Nof	Ascending	35.9	08-Jul-16 25-Aug-16	5	20-Jul-16 13-Aug-16	2
Tel Nof	Descending	46.1	04-Jul-16 02-Sep-16	6	04-Jul-18 09-Aug-18	4
Negba	Ascending	36.0	-	-	27-Jul-17 08-Aug-17	2
Negba	Descending	34.5	-	-	03-Aug-17	1
Negba	Descending	45.6	-	-	29-Jul-17 10-Aug-17	3

Note: * Period indicates the starting and ending dates.

Table S3. Sentinel-1 image inventory used in the development of models for processing tomatoes. Each line represents a dataset with specific geometrical parameters.

Area	Orbit	Local Incidence Angle (°)	K_c		LAI		Height	
			Period*	# of images used	Period*	# of images used	Period*	# of images used
Gadash 2018	Ascending	42.3–42.7	-	-	-	-	17-May-18 03-Aug-18	14
Gadash 2018	Descending	30.8–31.2	-	-	-	-	18-May-18 04-Aug-18	14
Gadash 2018	Descending	42.2–43.6	-	-	-	-	19-May-18 30-Jul-18	12
Gadash 2019	Ascending	42.0–42.1	06-May-19 23-Jul-19	13	18-May-19 23-Jul-19	11	06-May-19 23-Jul-19	13
Gadash 2019	Descending	43.3–43.4	07-May-19 13-Jul-19	6	26-May-19 13-Jul-19	5	07-May-19 13-Jul-19	6
Gadash 2019	Descending	31.6–31.7	07-May-19 18-Jul-19	6	09-May-19 18-Jul-19	5	07-May-19 18-Jul-19	6
Gadot	Ascending	43.1	30-April-19 10-Aug-19	17	18-May-19 10-Aug-19	14	18-May-19 10-Aug-19	14
Gadot	Descending	30.3	07-May-19 11-Aug-19	8	19-May-19 11-Aug-19	7	19-May-19 11-Aug-19	7
Gadot	Descending	42.1	14-May-19 12-Aug-19	9	26-May-19 12-Aug-19	8	26-May-19 12-Aug-19	8

Note: * Period indicates the starting and ending dates

Table S4. Wheat height, LAI, and K_c models.

	Height	LAI	K_c
Overpass	Asc	Asc	Asc
# SAR images used	38	34	11
Local incidence angle (°)	35.3–47.7	35.3–47.7	36.5–47.7
Backscatter processing algorithm	$x=\sigma^0_{VH}* \theta - \sigma^0_{VV}* \theta$	$x=\sigma^0_{VH}* \theta + \sigma^0_{VV}* \theta$	$x=\sigma^0_{VH}* \theta + \sigma^0_{VV}* \theta$
R^2	0.8566	0.7225	0.6722
RMSE	6 cm	0.6	0.073
RMSE Saad	6 cm	0.6	0.073
RMSE Yavne	6 cm	0.6	-

R_0^2 backscatter processing algorithm	$x=\sigma_{VH}^0 - \sigma_{VV}^0$	$x=\sigma_{VH}^0 + \sigma_{VV}^0$	$x=\sigma_{VH}^0 + \sigma_{VV}^0$
R_0^2	0.7828	0.5636	0.5121
Model's R^2 improvement	0.0738	0.1589	0.1601
Z R^2	2.217	3.388	0.863
p R^2	0.026595	0.000704	0.38801 (NS)
$RMSE_0$	8 cm	0.8	0.089
Model's RMSE improvement (%)	2 cm (25)	0.2 (25)	0.016 (18)
Z RMSE	0.0218	-1.7866	-0.1778
p RMSE	0.98404 (NS)	0.07346 (NS)	0.85716 (NS)

Table S5. Processing tomato height, LAI, and K_c models based on the σ^0 normalization method.

	Height	**LAI**	**K_c**
Overpass	Asc and Dsc	Asc and Dsc	Asc and Dsc
# SAR images used	94	50	59
Local incidence angle (°)	30.3–43.6	30.3–43.6	30.3–43.6
Backscatter processing algorithm	$x=\sigma_{VV}^0 * \theta$	$x=\sigma_{VH}^0 * \theta + \sigma_{VV}^0 * \theta$	$x=\sigma_{VV}^0 * \theta$
R^2	0.4201	0.7881	0.8549
RMSE	11 cm	1.0	0.0871
RMSE Gadash 2018	11 cm	-	-
RMSE Gadash 2019	12 cm	0.8	0.0940
RMSE Gadot	10 cm	1.2	0.0905
R_0 backscatter processing algorithm	$x=\sigma_{VV}^0$	$x=\sigma_{VH}^0 + \sigma_{VV}^0$	$x=\sigma_{VV}^0$
R_0^2	0.3755	0.688	0.8377
Model's R^2 improvement	0.0446	0.1001	0.0172
Z R^2	0.921	1.668	0.517
p R^2	0.357227 (NS)	0.095402 (NS)	0.60509 (NS)
$RMSE_0$	12 cm	2.1	0.0921
Model's RMSE improvement (%)	1 cm (8)	1.1 (52)	0.005 (5)
Z RMSE	0.1263	-6.1347	-5.2836
p RMSE	0.89656 (NS)	< 0.00001	< 0.00001

Table S6. Cotton height and K_c models based on the σ^0 normalization method.

	Height	**K_c**
Overpass	Asc and Dsc	Asc and Dsc
# SAR images used	11	12
Local incidence angle (°)	35.9–46.1	34.5–46.1
Backscatter processing algorithm	$x=\sigma^0_{VH}* \theta - \sigma^0_{VV}* \theta$	$x=\sigma^0_{VV}* \theta$
R^2	0.8721	0.3747
RMSE	5 cm	0.0511
RMSE Tel Nof	5 cm	0.0183
RMSE Negba	-	0.0698
R^2_0 backscatter processing algorithm	$x=\sigma^0_{VH} - \sigma^0_{VV}$	$x=\sigma^0_{VV}$
R^2_0	0.5051	0.0199
Model's R^2 improvement	0.367	0.3548
Z R^2	1.894	2.071
p R^2	0.058205 (NS)	0.038389
$RMSE_0$	10 cm	0.0639
Model's RMSE improvement (%)	5 cm (50)	0.0128 (21)
Z RMSE	-0.1778	-3.0594
p RMSE	0.85716 (NS)	0.00222

Table S7. Processing tomato height, LAI, and K_c models based on the β^0 normalization methods.

	Height	**LAI**	**K_c**
Overpass	Asc and Dsc	Asc and Dsc	Asc and Dsc
# SAR images used	94	50	59
Local incidence angle (°)	30.3–43.6	30.3–43.6	30.3–43.6
Backscatter processing algorithm	$x = \beta^0_{VV}$	$x = \frac{\beta^0_{VH}}{\sin(\text{Radians}(90-\theta)^3)} + \frac{\beta^0_{VV}}{\sin(\text{Radians}(90-\theta)^3)}$	$x = \frac{\beta^0_{VV}}{\sin(\text{Radians}(90-\theta)^3)}$
R^2	0.8107	0.8341	0.871
RMSE	9 cm	0.9	0.0821
RMSE Gadash 2018	7 cm	-	-
RMSE Gadash 2019	9 cm	0.8	0.0636

RMSE Gadot	10 cm	1.0	0.0935
R_0 backscatter processing algorithm	$x = \beta^0_{VV}$	$x = \beta^0_{VH} + \beta^0_{VV}$	$x = \beta^0_{VV}$
R_0^2	0.4665	0.4821	0.7567
Model's R^2 improvement	0.3442	0.352	0.1143
Z R^2	4.429	4.17	2.395
p R^2	0.000009	0.000031	0.016634
$RMSE_0$	11 cm	1.6	0.1128
Model's RMSE improvement (%)	2 cm (18)	0.7 (44)	0.0307 (27)
Z RMSE	-1.7893	0.0241	-1.6907
p RMSE	0.07346 (NS)	0.98404 (NS)	0.09102 (NS)

Table S8. Cotton height and K_c models based on the β^0 normalization method.

	Height	**K_c**
Overpass	Asc and Dsc	Asc and Dsc
# SAR images used	11	12
Local incidence angle (°)	35.9–46.1	34.5–46.1
Backscatter processing algorithm	$x=\beta^0_{VH} + \beta^0_{VV}$	$x=\beta^0_{VH} + \beta^0_{VV}$
R^2	0.9467	0.707
RMSE	8 cm	0.1293
RMSE Tel Nof	8 cm	0.1620
RMSE Negba	-	0.0849
R_0^2 backscatter processing algorithm	$x=\beta^0_{VH} + \beta^0_{VV}$	$x=\beta^0_{VH} + \beta^0_{VV}$
R_0^2	0.2779	0.0717
Model's R^2 improvement	0.668	0.6353
Z R^2	3.536	1.912
p R^2	0.000407	0.055925 (NS)
$RMSE_0$	13 cm	0.1672
Model's RMSE improvement (%)	5 cm (38)	0.0379 (23)
Z RMSE	0	-2.6672
p RMSE	1 (NS)	0.00758