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Benefits of a robotic chamber system for determining evapotranspiration in an erosion-affected, heterogeneous cropland

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Supplement:

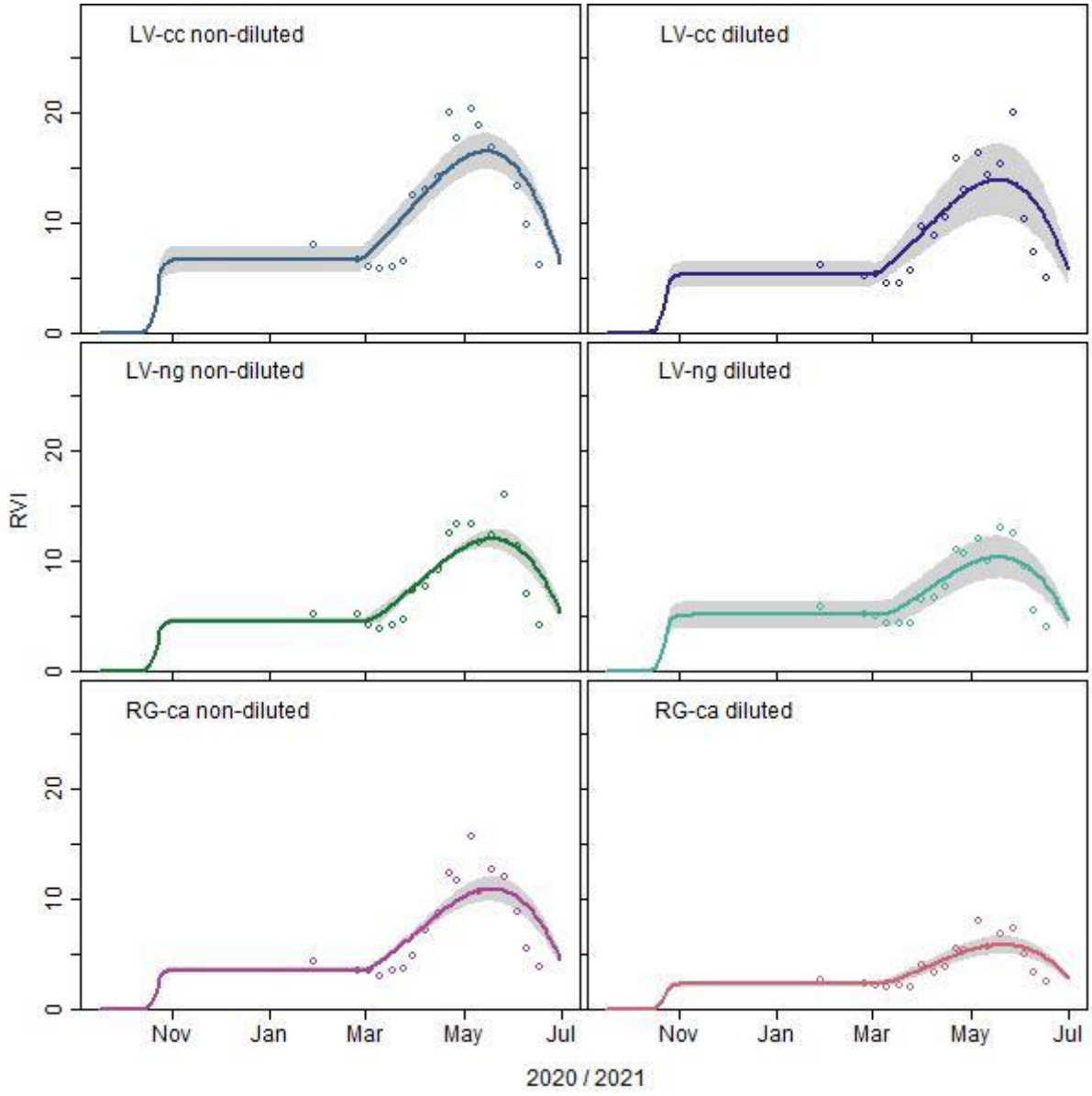


Figure S1: RVI fit (colored lines) of the different treatments with the standard deviation between replicates (light gray) and the corresponding averages of the daily measurements (points).

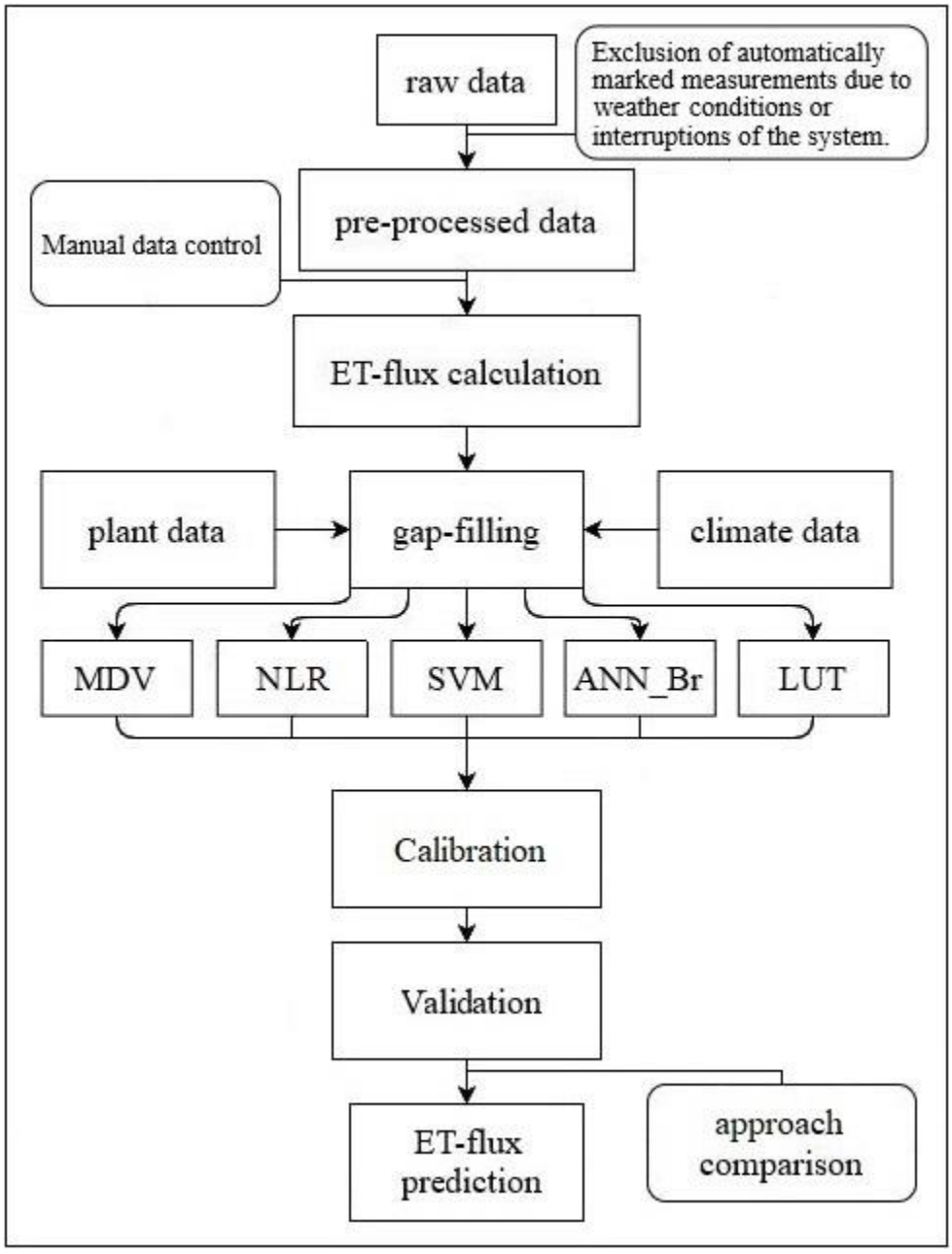


Figure S2: Schematic representation of the main steps of the presented data processing: raw data preparation was followed by a campaign-specific ET-flux calculation. Then, environmental parameters were used for modeling using five different approaches. After calibration and validation, the most accurate approach was used for ET flux modeling.

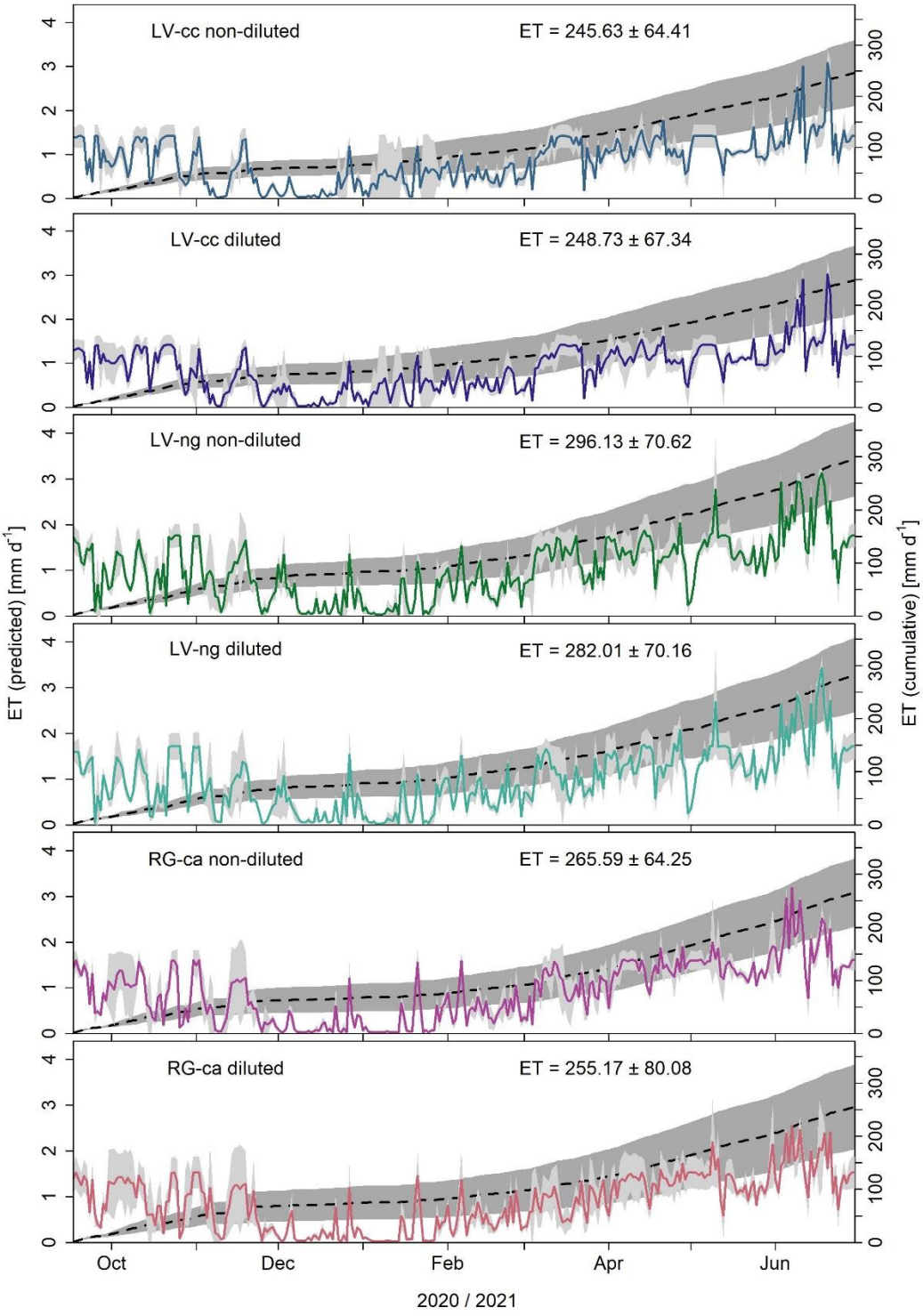
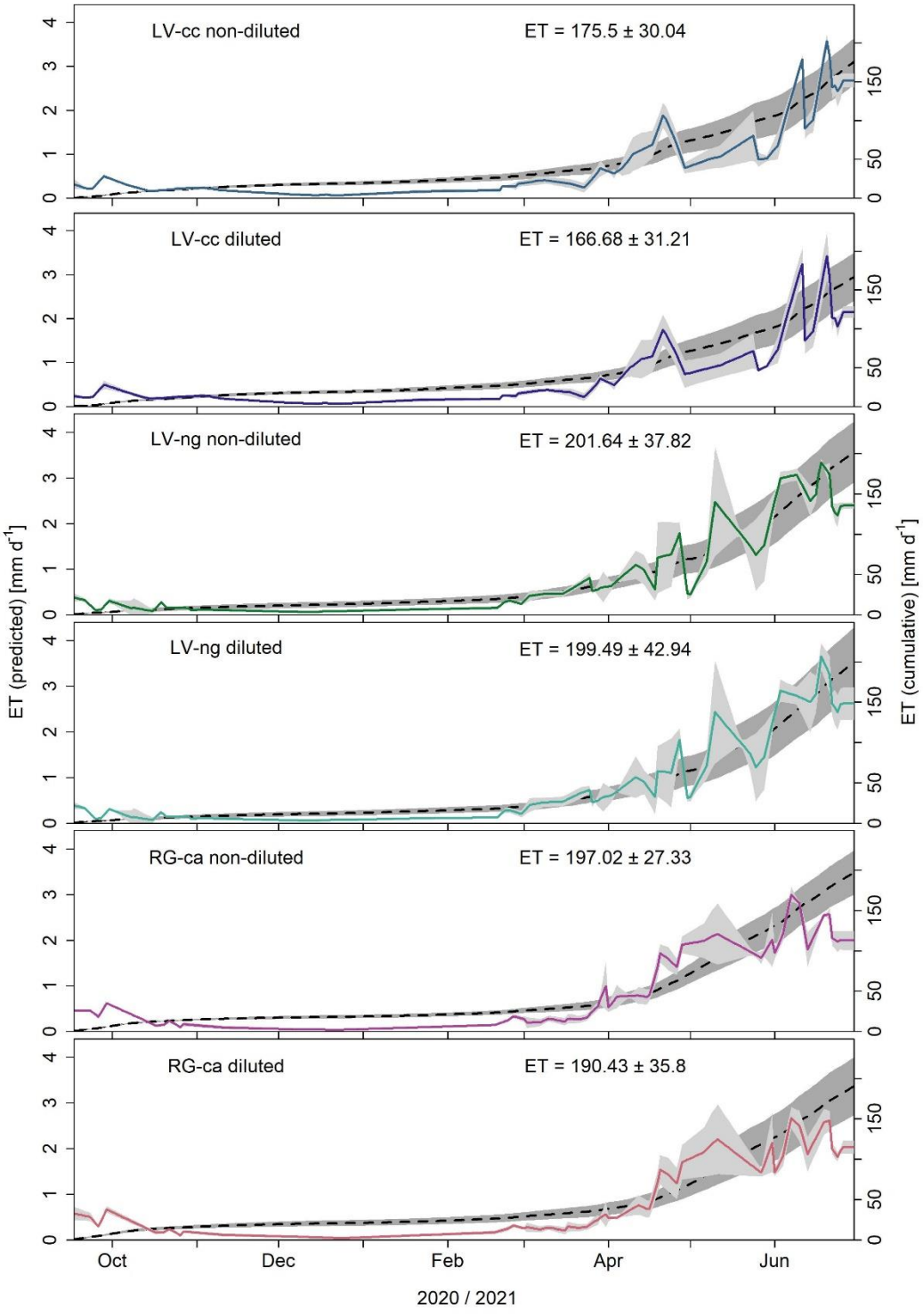


Figure S3: LUT predicted daily mean ET sums (colored lines) of the different treatments and seasonal cumulative ET (ET_{sum}; dashed lines) with standard deviation between replicates (light and dark gray).



20 **Figure S4:** MDV predicted daily mean ET sums (colored lines) of the different treatments and seasonal cumulative ET (ET_{sum}; dashed lines) with standard deviation between replicates (light and dark gray).

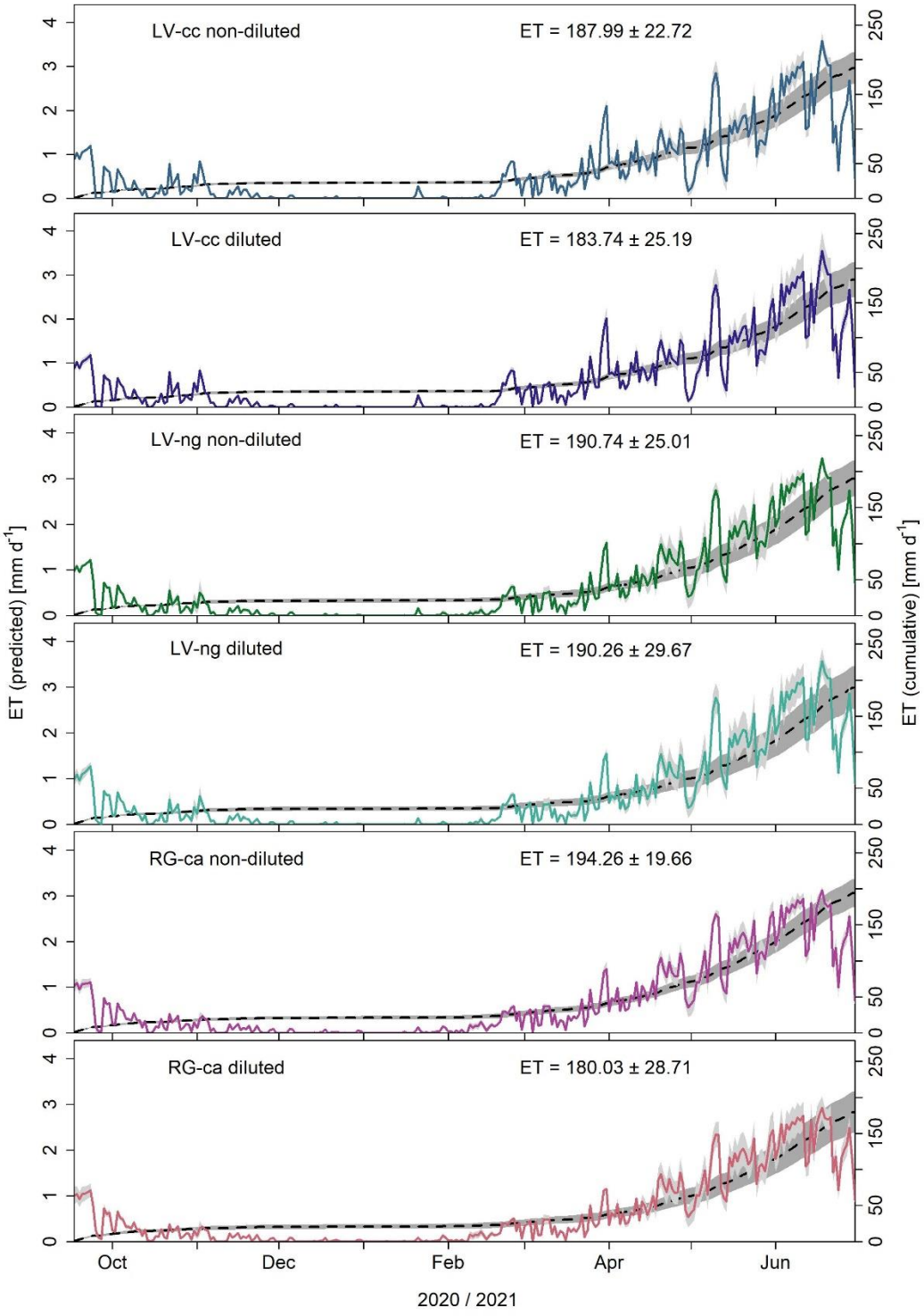


Figure S5: NLR predicted daily mean ET sums (colored lines) of the different treatments and seasonal cumulative ET (ET_{sum}; dashed lines) with standard deviation between replicates (light and dark gray).

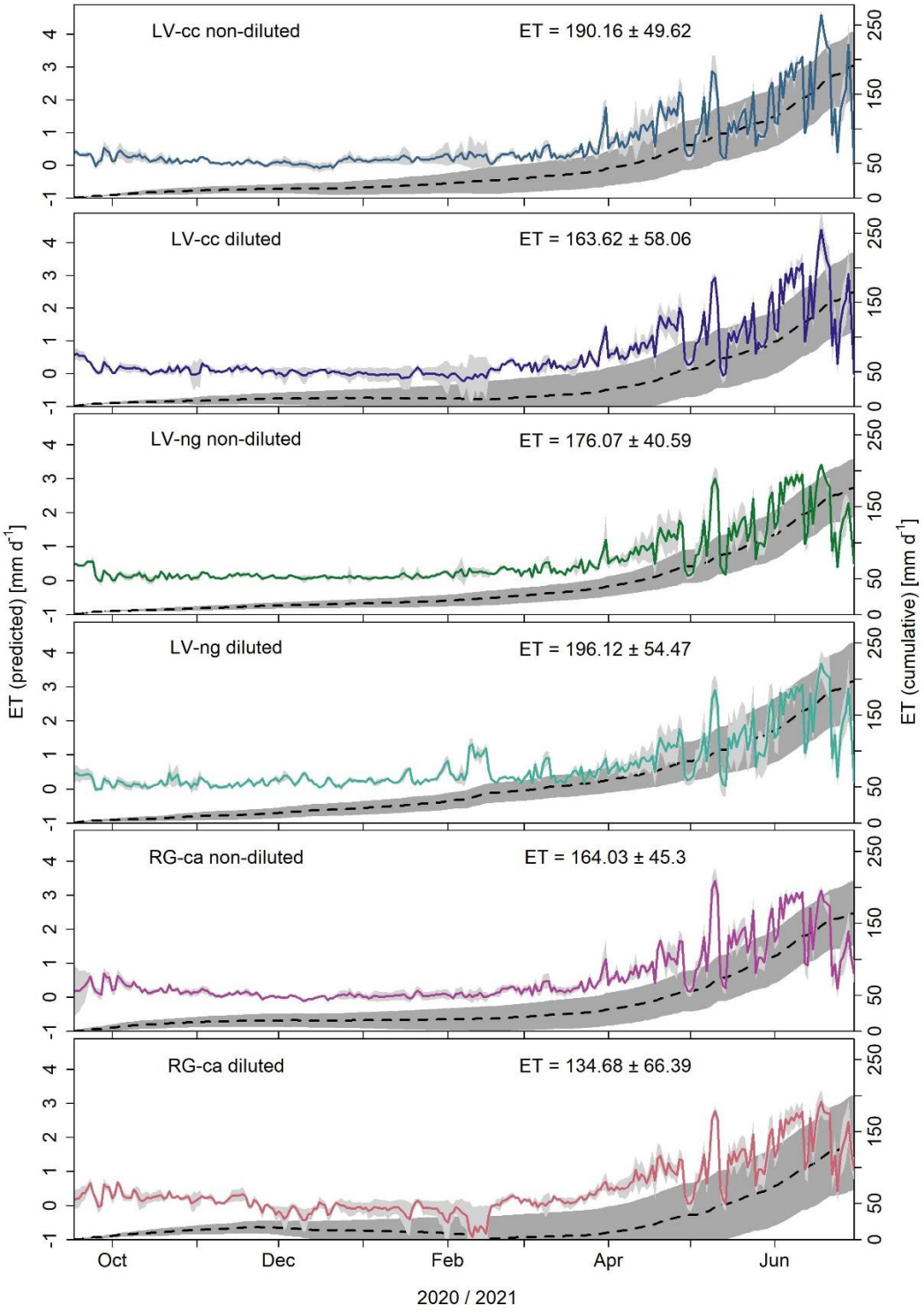


Figure S6: ANN_BR predicted daily mean ET sums (colored lines) of the different treatments and seasonal cumulative ET (ET_{sum}; dashed lines) with standard deviation between replicates (light and dark gray).

Table S1: Fertilization information for the field.

Date	Amount	Details
15.10.2020	161 kg P_2O_5 ha^{-1}	applied on 6 plots of LL as TSP
22.03.2020	77 kg P_2O_5 ha^{-1}	as Triple Super Phosphate (TSP)
22.03.2020	259 kg K_2O ha^{-1}	as 40% grain potash
16.09.2020	30 kg N ha^{-1}	10 m^3 ha^{-1} digestate
10.03.2021	91 kg N ha^{-1}	30 m^3 ha^{-1} digestate
08.04.2021	45 kg N ha^{-1}	12 m^3 ha^{-1} digestate

Table S2: The number of measurements per treatment and the percentage of modeling data.

Plot		Measurements [n]	modelled [%]
LV-cc n-d	1	990	85.63
LV-cc n-d	2	624	90.94
LV-cc n-d	3	996	85.54
LV-cc d	1	624	90.94
LV-cc d	2	735	89.33
LV-cc d	3	989	85.64
LV-ng n-d	1	1210	82.43
LV-ng n-d	2	1210	82.43
LV-ng n-d	3	705	89.76
LV-ng d	1	718	89.58
LV-ng d	2	1215	82.36
LV-ng d	3	1205	82.51
RG-ca n-d	1	657	90.46
RG-ca n-d	2	772	88.79
RG-ca n-d	3	669	90.29
RG-ca d	1	669	90.29
RG-ca d	2	1130	83.59
RG-ca d	3	1129	83.61

Table S3: Used R packages and associated sources.

package	source
Akima	Akima & Gebhardt (2021)
Andrews	Myslivec (2012)
Base	R Core Team (2021)
Boot	Davison & Hinkley (1997)
Caret	Kuhn (2021)
data.table	Dowle & Srinivasan (2021)
e1071	Meyer et al. (2021)
FSA	Ogle et al. (2022)
ggplot2	Wickham (2016)
gridExtra	Auguie (2017)
gt	Iannone et al. (2022)
hydroGOF	Mauricio Zambrano-Bigiarini (2020)
Kernlab	Karatzoglou et al. (2004)
Lattrice	Sarkar (2008)
Lmtest	Zeileis & Hothorn (2002)
lookupTable	Jia & Maier (2015)
Lubridate	Grolemund & Wickham (2011)
Neuralnet	Fritsch et al. (2019)
Nortest	Gross & Ligges (2015)
Plotrix	J (2006)
Plyr	Wickham (2011)
Reshape	Wickham (2007)
Shape	Soetaert (2021)
Tibble	Müller & Wickham (2021)
tidyr	Wickham & Girlich (2022)
Vioplot	Adler & Kelly (2020)
webshot	Chang (2022)
Zoo	Zeileis & Grothendieck (2005)

Table S4: Calibration mean error (ME) for different ranges of ET fluxes (less than 2, between 2 and 4 and greater than 4 mmol m^{-2} s^{-1}) for all modeling approaches.

Approach	< 2	2 - 4	> 4
SVM	-0.05	0.05	0.4
MDV	-0.03	0.06	0.29
ANN_BR	-0.03	0.08	0.33
NLR	-0.2	0.39	1.14
LUT	-0.01	0.01	0.12