STICS Performance Evaluation Report: Grass

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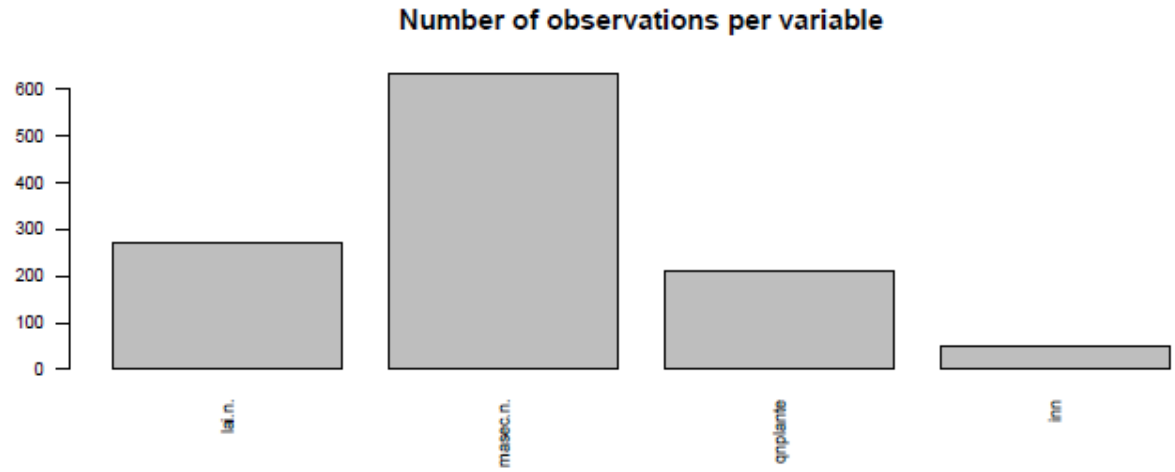
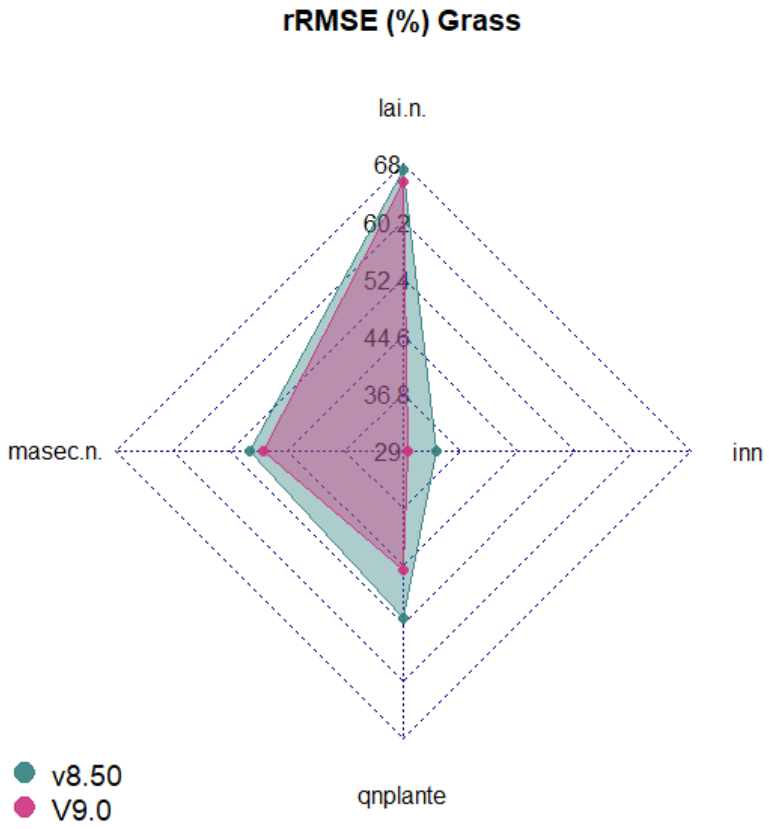
JavaSTICS version: 1.41
STICS version: 9.0
IdeSTICS version: r1220
Number of USMs: 107
Number of cultivars: 1
Cultivars names: mélange



The evaluation dataset includes 107 USMs not used for model calibration, a large number of observations for *lai*, *masec* and *QNplante*, but relatively few for *inn*. Observations correspond to a single functional grassland type (B only, Cruz et al., 2010) simulated with the 'grass_till_plt.xml' plant file. It must be noted that measurements of herbage growth were made in all seasons: mainly summer and spring (with or without initial cut as it happens in the French agricultural practices). This dataset does not include any measurement of soil water and soil nitrogen content nor residual biomass or root parts.
Only a global overview of the dataset is given here. There are very different situations in this dataset:

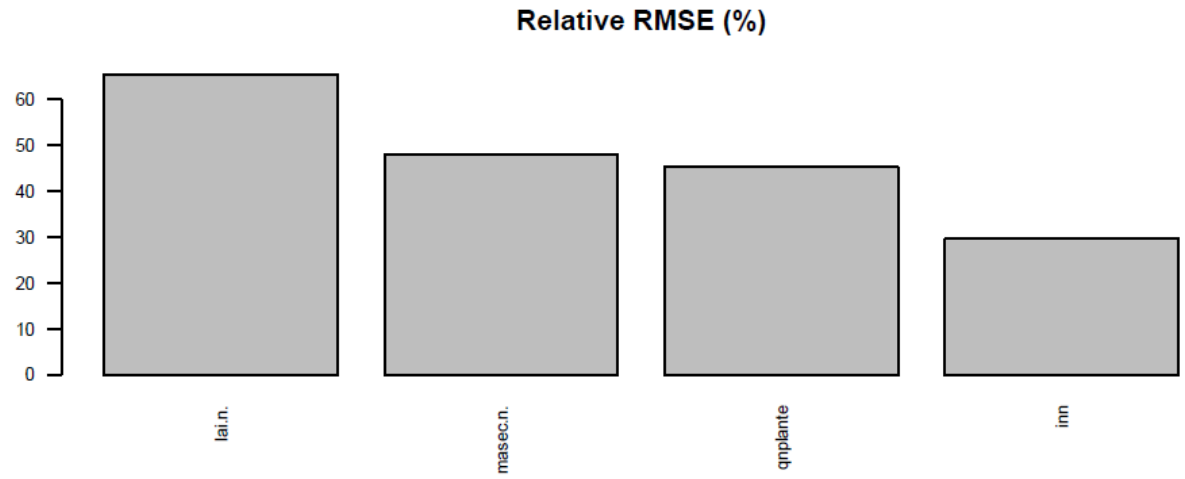
- per species: tall fescue, cocksfoot, "natural" grasslands,
- per season: spring, summer and intermediate (late spring),
- per level of fertilization (response curve to fertilization) and organic nitrogen in the soil,
- rainfed vs irrigated treatments analysis.

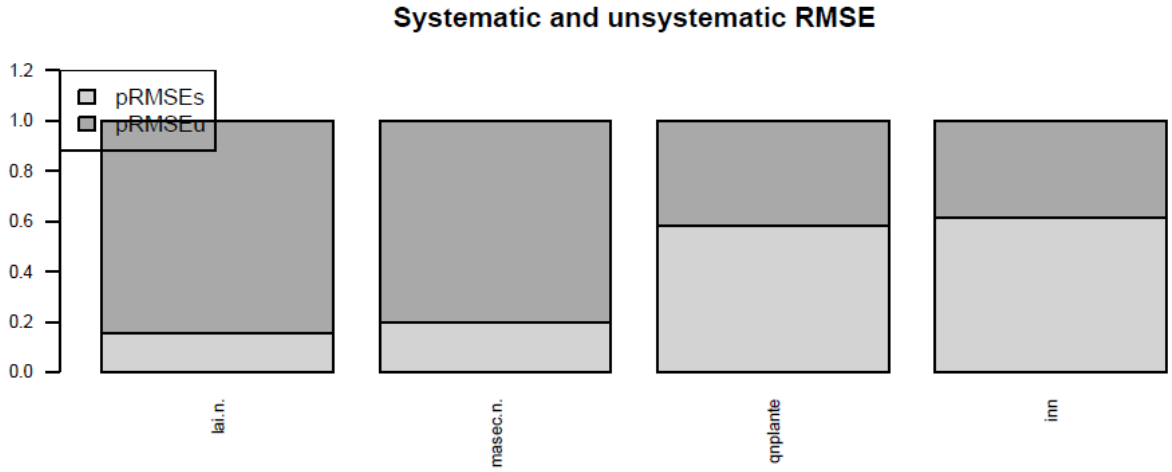
Evolution of performances with respect to former version 8.50



rRMSE are improved for the four measured variables with the new version 9.0 compared to those obtained with the former version V8.50.

Global analysis





Comments:

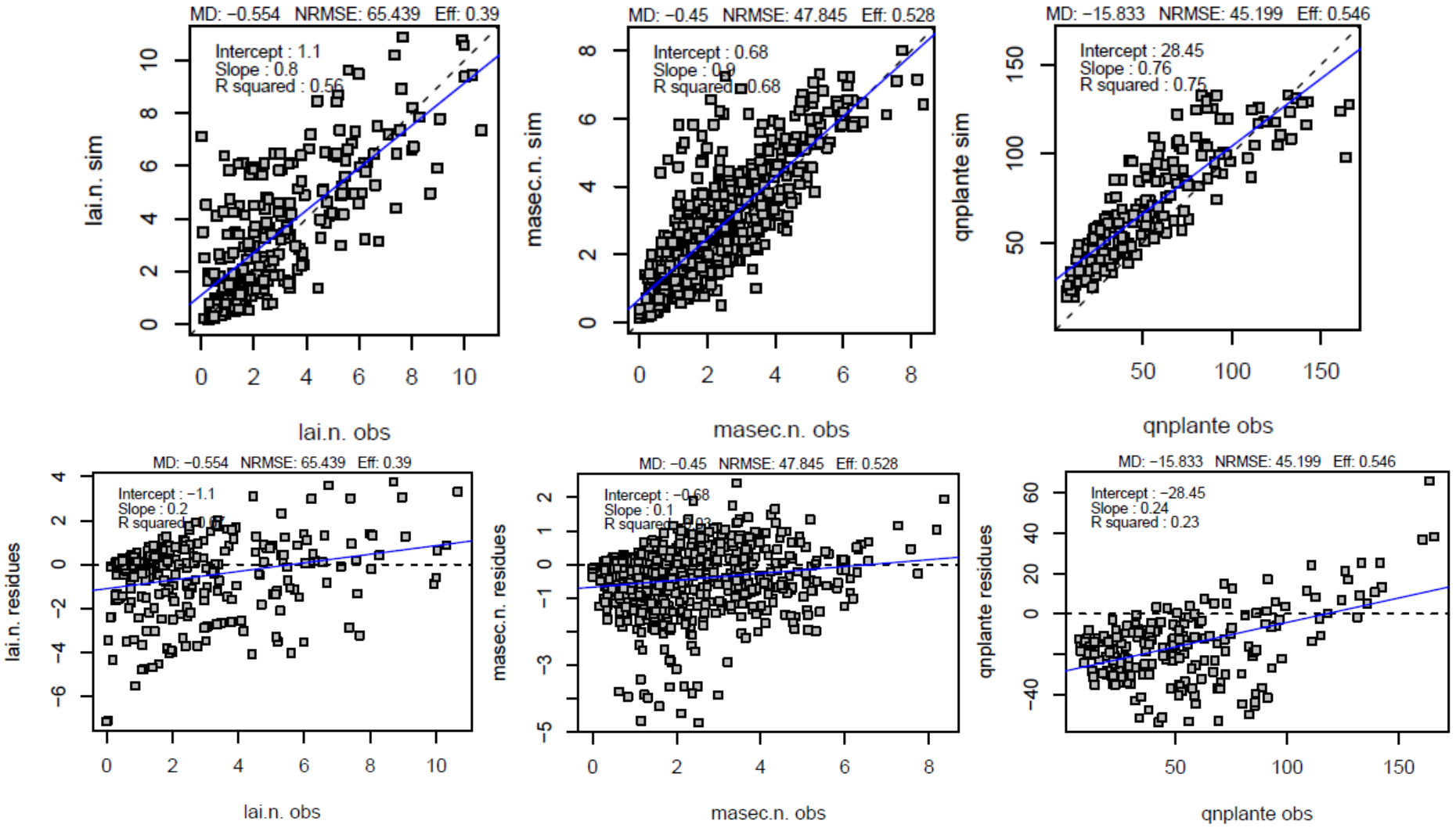
- Model errors (rRMSE) for *lai* are relatively high (>60%). For the agronomical variables simulating forage yield (*masec*) and protein content (*QNplante*) model errors are lower and relatively acceptable.
- No systematic error of the model (bias) was observed compared to dispersion for *lai* and *masec* while a significant bias is observed for *QNplante* with respect to dispersion error.
- Regarding *inn*, only a few situations were characterized. A significant bias of model predictions towards high *inn* values was observed in these situations.

Growth dynamic

	Output variable		
Criteria	lai	masec	QNplante
number-of-usm	38	107	36
number-of-observations	269	633	211
mean-of-measurements	2.77	2.25	52.12
CV-measurements	84	70	67
CV-simulations	75	63	45
RMSE	1.81	1.07	23.56
rRMSE (%)	65.44	47.85	45.20
pRMSEs	0.16	0.20	0.58
pRMSEu	0.84	0.80	0.42
Mean-difference (M)	-0.55	-0.45	-15.83
Relative error (%)	-168.86	-42.36	-59.05

Comments:

- Simulated *lai* and *masec* are strongly overestimated for a limited set of USMs, which may largely impact the statistical criteria.
- The model overestimate *QNplante*, particularly for low to medium values.
- CV of simulations is slightly lower than CV of measurements for all three variables.


MD: −0.554 NRMSE: 65.439 Eff: 0.39
Intercept : 1.1
Slope : 0.8
R squared : 0.56
lai.n. sim
lai.n. obs
MD: −0.45 NRMSE: 47.845 Eff: 0.528
Intercept : 0.68
Slope : 0.9
R squared : 0.68
masec.n. sim
masec.n. obs
MD: −15.833 NRMSE: 45.199 Eff: 0.546
Intercept : 28.45
Slope : 0.76
R squared : 0.75
qnplante sim
qnplante obs
MD: −0.554 NRMSE: 65.439 Eff: 0.39
Intercept : −1.1
Slope : 0.2
lai.n. residues
lai.n. obs
MD: −0.45 NRMSE: 47.845 Eff: 0.528
Intercept : −0.68
Slope : 0.1
masec.n. residues
masec.n. obs
MD: −15.833 NRMSE: 45.199 Eff: 0.546
Intercept : −28.45
Slope : 0.24
R squared : 0.23
qnplante residues
qnplante obs

Conclusion

Model performances are globally acceptable, although RMSE is a bit high for *lai*. It must however be noticed that the few badly simulated USMs may significantly degrade the statistical criteria values. Bias is low for *lai* and *masec* simulations, but the model tends to overestimate low to medium *QNplante* values.