

Probabilistic Assessment of Cereal Rye Cover Crop Impacts on Regional Crop Yield and Soil Carbon

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Table S1. Probability and Expected increase in SOC under corn-rye-corn-rye rotation as compared to corn-corn rotation. Values express % area under the corresponding class for given year.

Name	Description	Values	2010 (%)	2015 (%)	2020 (%)
Class 1	Low pSOC Low ESOC	< 0.75 < 15%	0.36	0.16	0.09
Class 2	Low pSOC High ESOC	< 0.75 > 15%	0.29	0.18	0.11
Class 3	High pSOC Low ESOC	> 0.75 < 15%	0.03	0.02	0.01
Class 4	High pSOC High ESOC	> 0.75 > 15%	0.32	0.64	0.79

Table S2. Probability and Expected increase in SOC under corn-rye-soybean-rye rotation as compared to corn-corn rotation. Values express % area under the corresponding class for given year.

Name	Description	Values	2010 (%)	2015 (%)	2020 (%)
Class 1	Low pSOC Low ESOC	< 0.75 < 15%	0.41	0.18	0.07
Class 2	Low pSOC High ESOC	< 0.75 > 15%	0.35	0.21	0.08
Class 3	High pSOC Low ESOC	> 0.75 < 15%	0.03	0.03	0.03
Class 4	High pSOC High ESOC	> 0.75 > 15%	0.21	0.58	0.82

Table S3. Effect of various factors on corn yield as explained by linear regression model.

Variables	Slope
Latitude	-200
Rye biomass	0.009
Precipitation	-1.52
Clay	14.4
Sand	11.4
Residuals (Intercept)	9220

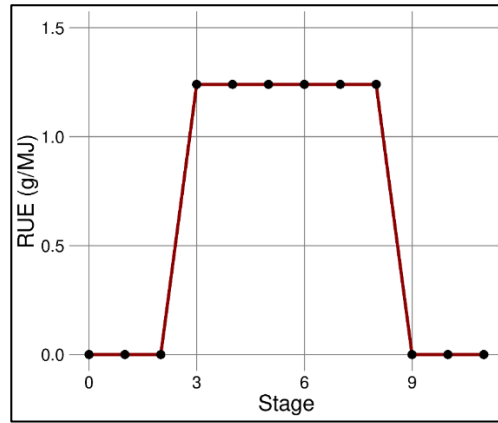


Figure S1 APSIM implementation of the influence of cereal rye crop growth stage on radiation use efficiency

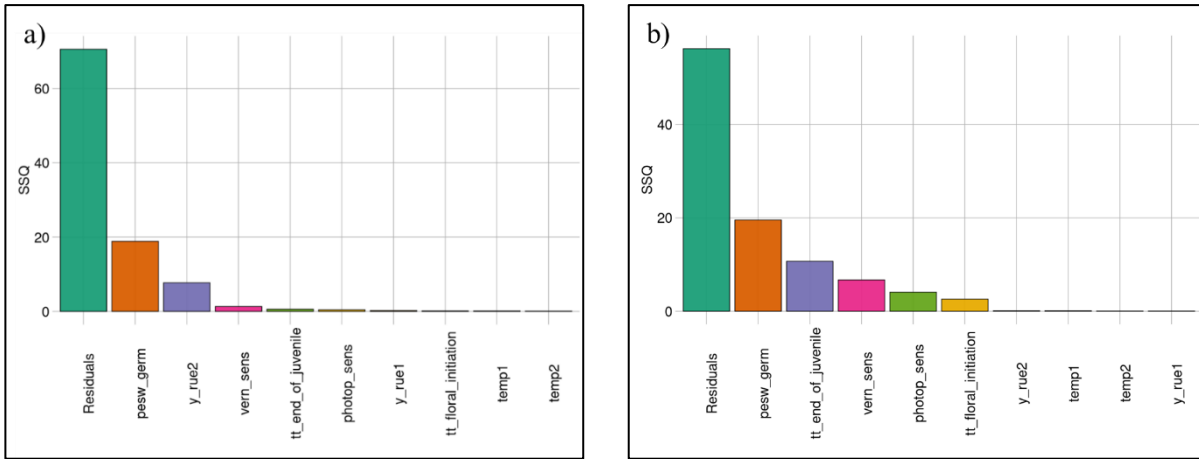


Figure S2 Global sensitivity analysis (GSA) to identify the most influential parameters controlling (a) cereal rye phenology and (b) biomass as measured by percentage of sum of squares corresponding to each parameter out of total sum of squares (SSQ; %). Parameter definitions are presented in Table 2

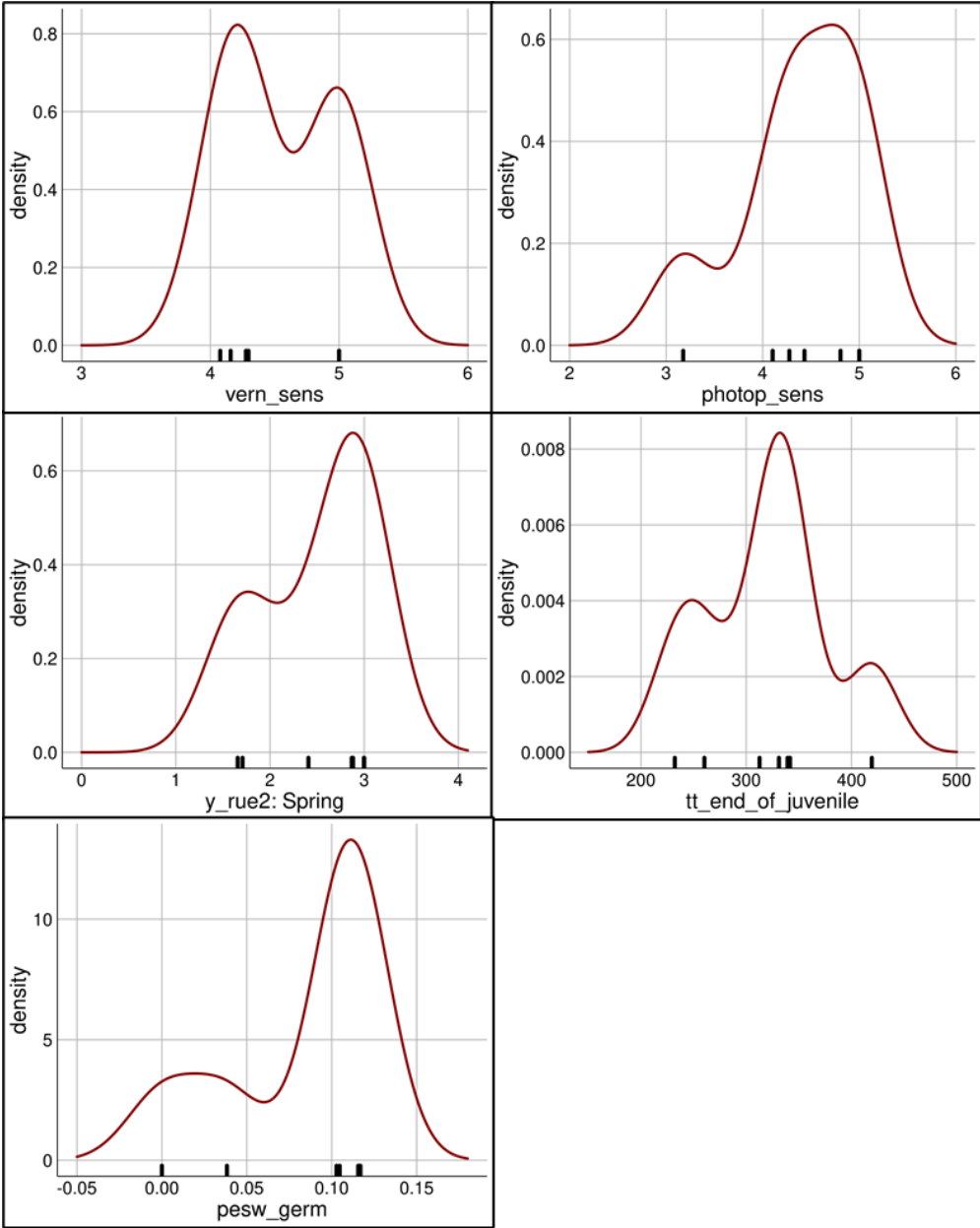


Figure S3 Posterior distribution of parameters after calibration

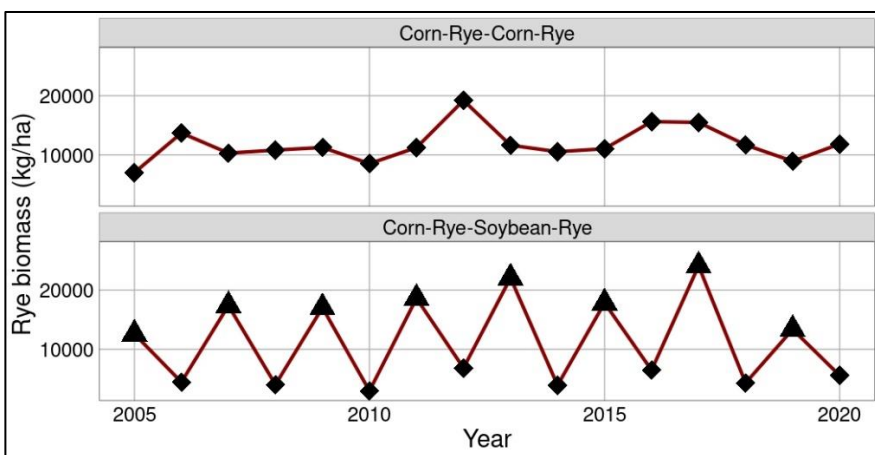


Figure S4 Average cereal rye biomass production (kg ha^{-1}) across 16 years. Note: \blacklozenge represents cereal rye biomass preceding corn, \blacktriangle represents cereal rye biomass preceding soybean

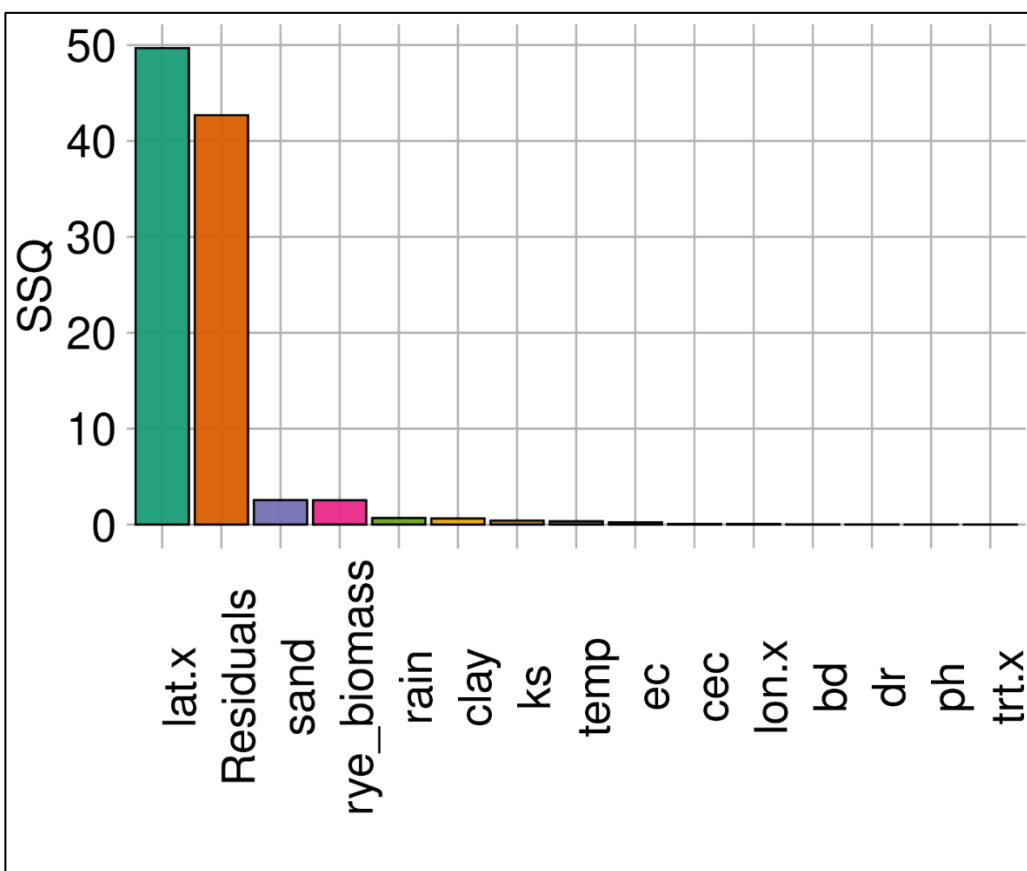


Figure S5 Quantification of variability in corn yield as explained by various factors (%)

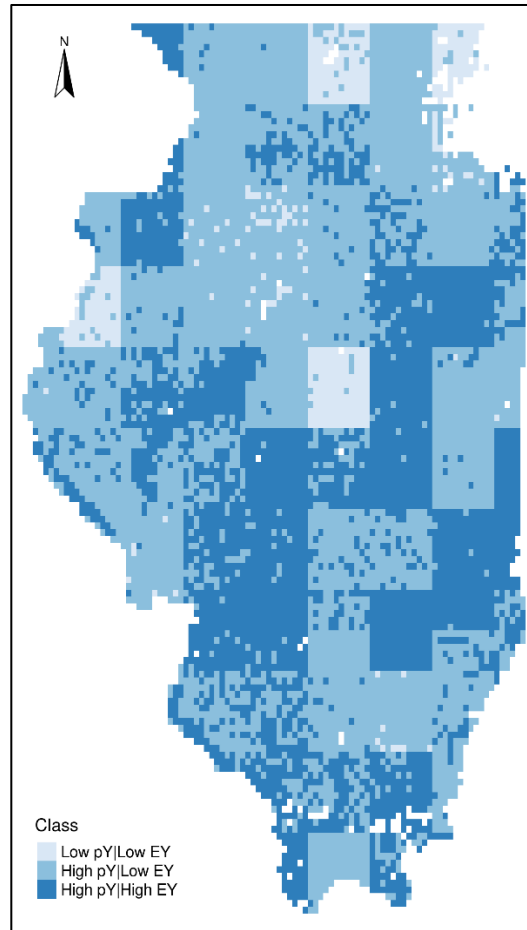


Figure S6 Probability of change and expected change in soybean yield when cereal rye is integrated into corn-soybean rotation. ESOC > 5% is classified as high and ESOC < 5% is classified as low, whereas pSOC > 0.5 is classified as high and pSOC < 0.5 is classified as low

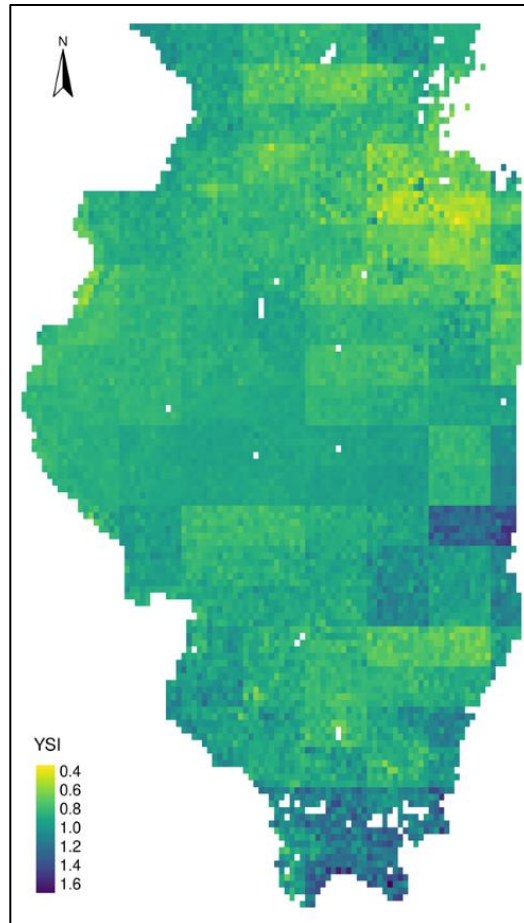


Figure S7 Yield stability index for soybean yield across Illinois for comparison of corn-soybean vs corn-rye-soybean-rye rotation