Appendix of Supplementary Materials

Table S1: Regression results of the main model specification

	lnyld
plant density	0.329***
	(0.019)
tmin5	0.168***
	(0.031)
tmin6	-0.153***
	(0.042)
tmin7	0.211***
	(0.038)
tmin8	-0.446***
	(0.033)
tmin9	0.451***
	(0.029)
tmax5	-0.031
	(0.026)
tmax6	0.071*
	(0.038)
tmax7	0.170***
	(0.031)
tmax8	0.306***
	(0.031)
tmax9	-0.135***
	(0.027)
tmin5 × plant density	-0.004***
	(0.001)
tmin6 × plant density	0.003**
	(0.001)
tmin7 × plant density	-0.007***
	(0.001)
tmin8 × plant density	0.015***
	(0.001)
tmin9 × plant density	-0.014***
	(0.001)
tmax5 × plant density	0.000
	(0.001)
tmax6 × plant density	-0.001
	(0.001)
tmax7 × plant density	-0.005***
	(0.001)
tmax8 × plant density	-0.011***
	(0.001)
tmax9 × plant density	0.005***
	(0.001)

PDSI5(wet)	-0.077**
	(0.033)
PDSI6(wet)	-0.148***
	(0.039)
PDSI7(wet)	0.146***
	(0.029)
PDSI8(wet)	-0.466***
	(0.037)
PDSI9(wet)	0.021
	(0.035)
PDSI5(dry)	-1.479***
	(0.067)
PDSI6(dry)	1.885***
	(0.121)
PDSI7(dry)	0.000
	(0.087)
PDSI8(dry)	-1.363***
	(0.088)
PDSI9(dry)	-0.652***
	(0.077)
PDSI5(wet) × plant density	0.001
	(0.001)
PDSI6(wet) × plant density	0.006***
	(0.001)
PDSI7(wet) × plant density	-0.005***
	(0.001)
PDSI8(wet) × plant density	0.016***
	(0.001)
PDSI9(wet) × plant density	-0.000
	(0.001)
PDSI5(dry) × plant density	0.051***
	(0.002)
PDSI6(dry) × plant density	-0.065***
	(0.004)
PDSI7(dry) × plant density	-0.003
	(0.003)
PDSI8(dry) × plant density	0.046***
	(0.003)
PDSI9(dry) × plant density	0.023***
	(0.003)

Continued

year	0.009***
	(0.000)
RW	0.039***
	(0.005)
other GM	0.040***
	(0.003)
1 if previous crop is corn	0.080***
	(0.027)
1 if previous crop is wheat	0.120***
	(0.027)
1 if previous crop is alfalfa or alfalfa/hay	0.185***
	(0.026)
1 if previous crop is soybean	0.095***
	(0.026)
1 if previous crop is lupine	-0.175***
	(0.035)
fall tillage, 1 if yes, 0 if no	0.000
	(0.002)
spring tillage, 1 if yes, 0 if no	-0.037***
	(0.004)
apply insecticide, 1 if yes, 0 if no	-0.062***
	(0.004)
fertilizer N	0.000***
	(0.000)
Observations	28521
R-squared	0.662

Notes: Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and monthly PDSI from May to September), the interactions between plant density and weather variables, and the managerial inputs and practices described in Table 1. The model also includes linear time trend and production zone fixed effect model. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S2: Regression results of the model specification in equations (1) and (8)

	(1) lnyld
planting density	0.267***
	(0.045)
RW × planting density	-2.025***
	(0.132)
other GM × planting density	-0.126*
	(0.072)
tmin5	0.282***
	(0.056)
tmin6	0.504***
	(0.087)
tmin7	-0.244***
	(0.077)
tmin8	-0.650***
	(0.059)
tmin9	0.702***
	(0.054)
tmax5	0.068
	(0.044)
tmax6	-0.155**
	(0.071)
tmax7	0.380***
	(0.048)
tmax8	0.364***
	(0.056)
tmax9	-0.372***
	(0.047)
tmin5 × planting density	-0.008***
	(0.002)
tmin6 × planting density	-0.020***
	(0.003)
tmin7 × planting density	0.009***
	(0.003)
tmin8 × planting density	0.022***
	(0.002)
tmin9 × planting density	-0.023***
	(0.002)
tmax5 × planting density	-0.003*
	(0.002)
tmax6 × planting density	0.007***
	(0.003)
tmax7 × planting density	-0.012***
	(0.002)
tmax8 × planting density	-0.013***
	(0.002)
tmax9 × planting density	0.013***
	(0.002)

RW × tmin5	3.550***
	(0.559)
RW × tmin6	4.771***
	(0.556)
RW × tmin7	-4.341***
	(0.617)
RW × tmin8	-1.386***
	(0.374)
RW × tmin9	1.354***
	(0.342)
other GM × tmin5	-0.389***
	(0.140)
other GM × tmin6	-0.646***
	(0.144)
other GM × tmin7	0.546***
	(0.141)
other GM × tmin8	1.269***
	(0.157)
other GM × tmin9	-1.293***
	(0.127)
RW × tmax5	-2.967***
	(0.395)
RW × tmax6	-2.851***
	(0.558)
RW × tmax7	1.108***
	(0.373)
RW × tmax8	2.100***
	(0.535)
RW × tmax9	-1.829***
	(0.414)
other GM × tmax5	-0.004
	(0.114)
other GM × tmax6	-0.544***
	(0.138)
other GM × tmax7	-0.091
	(0.108)
other GM × tmax8	-0.705***
	(0.125)
other GM × tmax9	1.038***
	(0.108)

PDSI5(wet)	-0.594***
	(0.070)
PDSI6(wet)	0.149
	(0.091)
PDSI7(wet)	-0.397***
	(0.064)
PDSI8(wet)	-0.583***
	(0.070)
PDSI9(wet)	-0.166***
	(0.063)
PDSI5(dry)	-4.155***
	(0.462)
PDSI6(dry)	2.785***
	(0.294)
PDSI7(dry)	0.386*
	(0.210)
PDSI8(dry)	-2.973***
	(0.251)
PDSI9(dry)	-0.447**
	(0.183)
PDSI5(wet) $\times$ planting density	0.020***
	(0.002)
PDSI6(wet) $\times$ planting density	-0.005
	(0.003)
PDSI7(wet) $\times$ planting density	0.014***
	(0.002)
PDSI8(wet) $\times$ planting density	0.021***
	(0.003)
PDSI9(wet) $\times$ planting density	0.006***
	(0.002)
PDSI5(dry) $\times$ planting density	0.147***
	(0.017)
PDSI6(dry) $\times$ planting density	-0.097***
	(0.011)
PDSI7(dry) $\times$ planting density	-0.018**
	(0.008)
PDSI8(dry) $\times$ planting density	0.103***
	(0.009)
PDSI9(dry) $\times$ planting density	0.016**
	(0.007)

RW × PDSI5(wet)	2.185***
	(0.381)
RW × PDSI6(wet)	-2.111***
	(0.438)
RW × PDSI7(wet)	0.998***
	(0.236)
RW × PDSI8(wet)	-0.148
	(0.479)
RW × PDSI9(wet)	1.175***
	(0.295)
other GM × PDSI5(wet)	0.609***
	(0.115)
other GM × PDSI6(wet)	-0.156
	(0.128)
other GM × PDSI7(wet)	0.681***
	(0.089)
other GM × PDSI8(wet)	0.904***
	(0.132)
other GM × PDSI9(wet)	-0.364***
	(0.133)
RW × PDSI5(dry)	5.027***
	(0.618)
RW × PDSI6(dry)	3.669***
	(1.292)
RW × PDSI7(dry)	-3.996***
	(0.473)
RW × PDSI8(dry)	2.584**
	(1.062)
RW × PDSI9(dry)	-0.459
	(0.881)
other GM × PDSI5(dry)	3.768***
	(0.503)
other GM × PDSI6(dry)	-3.970***
	(0.433)
other GM × PDSI7(dry)	0.189
	(0.272)
other GM × PDSI8(dry)	4.147***
	(0.386)
other GM × PDSI9(dry)	-0.420
	(0.275)

RW × tmin5 × planting density	-0.116***
	(0.018)
RW × tmin6 × planting density	-0.162***
	(0.018)
RW × tmin7 × planting density	0.145***
	(0.021)
RW × tmin8 × planting density	0.051***
	(0.012)
RW × tmin9 × planting density	-0.046***
	(0.011)
RW × tmax5 × planting density	0.095***
	(0.013)
RW × tmax6 × planting density	0.096***
	(0.018)
RW × tmax7 × planting density	-0.039***
	(0.012)
RW × tmax8 × planting density	-0.071***
	(0.018)
RW × tmax9 × planting density	0.064***
	(0.014)
other GM × tmin5 × planting density	0.012**
	(0.005)
other GM × tmin6 × planting density	0.023***
	(0.005)
other GM × tmin7 × planting density	-0.018***
	(0.005)
other GM × tmin8 × planting density	-0.040***
	(0.005)
other GM × tmin9 × planting density	0.042***
	(0.004)
other GM × tmax5 × planting density	0.000
	(0.004)
other GM × tmax6 × planting density	0.017***
	(0.005)
other GM × tmax7 × planting density	0.003
	(0.004)
other GM × tmax8 × planting density	0.022***
	(0.004)
other GM × tmax9 × planting density	-0.034***
	(0.004)

Continued

RW × PDSI5(wet) × planting density	-0.073***
	(0.012)
RW × PDSI6(wet) × planting density	0.072***
	(0.015)
RW × PDSI7(wet) × planting density	-0.035***
	(0.008)
RW × PDSI8(wet) × planting density	0.003
	(0.016)
RW × PDSI9(wet) × planting density	-0.038***
	(0.010)
RW × PDSI5(dry) × planting density	-0.172***
	(0.022)
RW × PDSI6(dry) × planting density	-0.129***
	(0.044)
RW × PDSI7(dry) × planting density	0.146***
	(0.017)
RW × PDSI8(dry) × planting density	-0.089**
	(0.035)
RW × PDSI9(dry) × planting density	0.012
	(0.029)
other GM × PDSI5(wet) × planting density	-0.020***
	(0.004)
other GM × PDSI6(wet) × planting density	0.005
	(0.004)
other GM × PDSI7(wet) × planting density	-0.024***
	(0.003)
other GM × PDSI8(wet) × planting density	-0.030***
	(0.005)
other GM × PDSI9(wet) × planting density	0.012***
	(0.005)
other GM × PDSI5(dry) × planting density	-0.133***
	(0.018)
other GM × PDSI6(dry) × planting density	0.142***
	(0.015)
other GM × PDSI7(dry) × planting density	-0.008
	(0.010)
other GM × PDSI8(dry) × planting density	-0.142***
	(0.013)
other GM × PDSI9(dry) × planting density	0.013
	(0.009)

1 if previous crop is corn	-0.006
	(0.032)
1 if previous crop is wheat	0.038
	(0.032)
1 if previous crop is alfalfa or alfalfa/hay	0.090***
	(0.031)
1 if previous crop is soybean	0.001
	(0.031)
1 if previous crop is lupine	-0.092***
	(0.033)
fall tillage, 1 if yes, 0 if no	-0.001
	(0.003)
spring tillage, 1 if yes, 0 if no	-0.048***
	(0.005)
apply insecticide, 1 if yes, 0 if no	-0.076***
	(0.005)
fertilizer N	0.000***
	(0.000)
Observations	28521
R-squared	0.705

Notes: Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and monthly PDSI from May to September), GM variety dummies, and managerial inputs and practices. The specification also includes linear time trend, production fixed effect and the interactions among plant density, weather variables, and GM variety dummies. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S3: Regression results of the main model specification without including the managerial inputs and practices as control variables

	lnyld
planting density	0.396***
	(0.020)
year	0.012***
	(0.000)
tmin5	0.142***
	(0.029)
tmin6	-0.310***
	(0.041)
tmin7	0.061
	(0.042)
tmin8	-0.237***
	(0.033)
tmin9	0.498***
	(0.033)
tmax5	-0.070***
	(0.025)
tmax6	0.195***
	(0.037)
tmax7	0.237***
	(0.034)
tmax8	0.210***
	(0.031)
tmax9	-0.100***
	(0.027)
tmin5 $\times$ planting density	-0.003***
	(0.001)
tmin6 $\times$ planting density	0.009***
	(0.001)
tmin7 $\times$ planting density	-0.001
	(0.002)
tmin8 $\times$ planting density	0.007***
	(0.001)
tmin9 $\times$ planting density	-0.016***
	(0.001)
tmax5 $\times$ planting density	0.002*
	(0.001)
tmax6 $\times$ planting density	-0.006***
	(0.001)
tmax7 $\times$ planting density	-0.008***
	(0.001)
tmax8 $\times$ planting density	-0.008***
	(0.001)
tmax9 $\times$ planting density	0.004***
	(0.001)

PDSI5(wet)	-0.046
	(0.033)
PDSI6(wet)	-0.168***
	(0.042)
PDSI7(wet)	0.212***
	(0.029)
PDSI8(wet)	-0.363***
	(0.038)
PDSI9(wet)	0.011
	(0.037)
PDSI5(dry)	-1.738***
	(0.068)
PDSI6(dry)	1.443***
	(0.110)
PDSI7(dry)	0.220***
	(0.074)
PDSI8(dry)	-1.538***
	(0.096)
PDSI9(dry)	-0.134
	(0.082)
PDSI5(wet) × planting density	0.001
	(0.001)
PDSI6(wet) × planting density	0.006***
	(0.001)
PDSI7(wet) × planting density	-0.007***
	(0.001)
PDSI8(wet) × planting density	0.013***
	(0.001)
PDSI9(wet) × planting density	-0.000
	(0.001)
PDSI5(dry) × planting density	0.060***
	(0.002)
PDSI6(dry) × planting density	-0.048***
	(0.004)
PDSI7(dry) × planting density	-0.010***
	(0.003)
PDSI8(dry) × planting density	0.052***
	(0.003)
PDSI9(dry) × planting density	0.004
	(0.003)
Observations	28521
R-squared	0.641

Notes: Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and monthly PDSI from May to September), and the interactions between plant density and weather variables. The model also includes linear time trend and production zone fixed effect model. Units for **tmin** and **tmax** are $^{\circ}$C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S4: Estimated changes in the effects of plant density on yield as a result of 1°C warming

	All Months		Jun-Aug	
	Estimates	P-value	Estimates	P-value
tmin & tmax	-0.0195	0.000	-0.0056	0.000
tmin	-0.0042	0.000	0.0154	0.000
tmax	-0.0153	0.000	-0.0209	0.000

Notes: (1) The table shows the results of the first robustness check (the main specification without including managerial inputs and practices as control variables). (2) The first column indicates what weather variables the marginal effects of plant density are based on. The first row indicates a 1°C increase in both **tmin** and **tmax**. The second row refers to a warming scenario where only **tmin** increases by 1°C. The third row refers to a 1°C increase in **tmax**. (3) The second and the third column report coefficients and p-values of the changes in the marginal effects of plant density as a result of warming scenarios (both **tmin** and **tmax**, and **tmin** and **tmax** separately) where the temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the changes in the marginal effects of warming scenarios where the temperature of each month from June to August increases by 1°C.

Table S5: Regression results of the second robustness check

	(1) lnyld
plant density	0.328***
	(0.019)
t	-0.007
	(0.005)
t × plant density	0.001***
	(0.000)
tmin5	0.173***
	(0.031)
tmin6	-0.112**
	(0.044)
tmin7	0.200***
	(0.039)
tmin8	-0.462***
	(0.033)
tmin9	0.441***
	(0.029)
tmax5	-0.025
	(0.026)
tmax6	0.018
	(0.042)
tmax7	0.194***
	(0.032)
tmax8	0.315***
	(0.031)
tmax9	-0.118***
	(0.028)
tmin5 × plant density	-0.004***
	(0.001)
tmin6 × plant density	0.002
	(0.002)
tmin7 × plant density	-0.007***
	(0.001)
tmin8 × plant density	0.016***
	(0.001)
tmin9 × plant density	-0.014***
	(0.001)
tmax5 × plant density	-0.000
	(0.001)
tmax6 × plant density	0.001
	(0.001)
tmax7 × plant density	-0.006***
	(0.001)
tmax8 × plant density	-0.012***
	(0.001)
tmax9 × plant density	0.004***
	(0.001)

PDSI5(wet)	-0.030
	(0.036)
PDSI6(wet)	-0.199***
	(0.042)
PDSI7(wet)	0.170***
	(0.030)
PDSI8(wet)	-0.467***
	(0.037)
PDSI9(wet)	0.014
	(0.036)
PDSI5(dry)	-1.475***
	(0.067)
PDSI6(dry)	1.946***
	(0.120)
PDSI7(dry)	-0.005
	(0.086)
PDSI8(dry)	-1.414***
	(0.086)
PDSI9(dry)	-0.624***
	(0.076)
PDSI5(wet) $\times$ plant density	-0.000
	(0.001)
PDSI6(wet) $\times$ plant density	0.007***
	(0.001)
PDSI7(wet) $\times$ plant density	-0.006***
	(0.001)
PDSI8(wet) $\times$ plant density	0.016***
	(0.001)
PDSI9(wet) $\times$ plant density	-0.000
	(0.001)
PDSI5(dry) $\times$ plant density	0.051***
	(0.002)
PDSI6(dry) $\times$ plant density	-0.067***
	(0.004)
PDSI7(dry) $\times$ plant density	-0.003
	(0.003)
PDSI8(dry) $\times$ plant density	0.048***
	(0.003)
PDSI9(dry) $\times$ plant density	0.022***
	(0.003)

1 if previous crop is corn	0.089***
	(0.026)
RW	0.036***
	(0.004)
other GM	0.039***
	(0.003)
1 if previous crop is wheat	0.128***
	(0.027)
1 if previous crop is alfalfa or alfalfa/hay	0.193***
	(0.026)
1 if previous crop is soybean	0.102***
	(0.026)
1 if previous crop is lupine	-0.175***
	(0.035)
fall tillage, 1 if yes, 0 if no	0.000
	(0.002)
spring tillage, 1 if yes, 0 if no	-0.038***
	(0.004)
apply insecticide, 1 if yes, 0 if no	-0.063***
	(0.004)
fertilizer N	0.000***
	(0.000)
Observations	28521
R-squared	0.662

Notes: Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and monthly PDSI from May to September), the interactions between plant density and weather variables, and the managerial inputs and practices described in Table 1. The model also includes linear time trend, and production zone fixed effect model. The density effect is allowed to vary across years by including the interaction between plant density and time trend. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S6: Estimated changes in the effects of plant density on yield as a result of 1°C warming

	All Months		Jun-Aug	
	Estimates	P-value	Estimates	P-value
tmin & tmax	-0.0191	0.000	-0.0053	0.000
tmin	-0.0069	0.000	0.0110	0.000
tmax	-0.0122	0.000	-0.0163	0.000

Notes: (1) The table shows the results of the second robustness check (the model specification includes the interaction term between plant density and the time trend in addition to the independent variables of the main specification). (2) The first column indicates what weather variables the marginal effects of plant density are based on. The first row indicates a 1°C increase in both **tmin** and **tmax**. The second row refers to a warming scenario where only **tmin** increases by 1°C. The third row refers to a 1°C increase in **tmax**. (3) The second and the third column report coefficients and p-values of the changes in the marginal effects of plant density as a result of warming scenarios (both **tmin** and **tmax**, and **tmin** and **tmax** separately) where the temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the changes in the marginal effects of warming scenarios where the temperature of each month from June to August increases by 1°C.

Table S7: Regression results of the model using a quadratic form of precipitation as measure of water availability

| | (1) |
	lnyld
plant density	0.352***
	(0.020)
tmin5	0.135***
	(0.031)
tmin6	-0.501***
	(0.042)
tmin7	0.055
	(0.034)
tmin8	-0.133***
	(0.030)
tmin9	0.615***
	(0.034)
tmax5	-0.043*
	(0.023)
tmax6	0.405***
	(0.029)
tmax7	0.210***
	(0.032)
tmax8	0.058**
	(0.028)
tmax9	-0.272***
	(0.026)
tmin5 × plant density	-0.003***
	(0.001)
tmin6 × plant density	0.016***
	(0.001)
tmin7 × plant density	-0.001
	(0.001)
tmin8 × plant density	0.004***
	(0.001)
tmin9 × plant density	-0.021***
	(0.001)
tmax5 × plant density	0.001
	(0.001)
tmax6 × plant density	-0.012***
	(0.001)
tmax7 × plant density	-0.008***
	(0.001)
tmax8 × plant density	-0.002**
	(0.001)
tmax9 × plant density	0.010***
	(0.001)
prec	0.030***
	(0.007)
prec × plant density	-0.001***
	(0.000)
prec × prec × plant density	0.000***
	(0.000)

year	0.011***
	(0.000)
RW	0.034***
	(0.005)
other GM	0.026***
	(0.003)
1 if previous crop is corn	0.023
	(0.025)
1 if previous crop is wheat	0.094***
	(0.025)
1 if previous crop is alfalfa or alfalfa/hay	0.125***
	(0.024)
1 if previous crop is soybean	0.004
	(0.024)
1 if previous crop is lupine	-0.177***
	(0.040)
fall tillage, 1 if yes, 0 if no	-0.027***
	(0.003)
spring tillage, 1 if yes, 0 if no	-0.005
	(0.003)
apply insecticide, 1 if yes, 0 if no	-0.057***
	(0.003)
fertilizer N	0.000***
	(0.000)
Observations	28521
R-squared	0.627

Notes: Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and a quadratic form of the mean of monthly cumulative precipitation for the whole growing season, the interactions between plant density and weather variables, and the managerial inputs and practices described in Table 1. The model also includes linear time trend and production zone fixed effect model. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S8: Estimated changes in the effects of plant density on yield as a result of 1°C warming

	All Months		Jun-Aug	
	Estimates	P-value	Estimates	P-value
tmin & tmax	-0.0161	0.000	-0.0030	0.000
tmin	-0.0049	0.000	0.0190	0.000
tmax	-0.0112	0.000	-0.0220	0.000

Notes: (1) The table shows the results of the third robustness check which replaces PDSI as a measure of water availability with a quadratic form of the mean of monthly cumulative precipitation for the whole growing season. (2) The first column indicates what weather variables the marginal effects of plant density are based on. The first row indicates a 1°C increase in both **tmin** and **tmax**. The second row refers to a warming scenario where only **tmin** increases by 1°C. The third row refers to a 1°C increase in **tmax**. (3) The second and the third column report coefficients and p-values of the changes in the marginal effects of plant density as a result of warming scenarios (both **tmin** and **tmax**, and **tmin** and **tmax** separately) where the temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the changes in the marginal effects of warming scenarios where the temperature of each month from June to August increases by 1°C.

Table S9: Regression results of the model specification measuring water availability with a quadratic form of precipitation

| | (1) |
	lnyld
planting density	0.516***
	(0.047)
RW × planting density	-1.617***
	(0.091)
other GM × planting density	-0.322***
	(0.070)
tmin5	0.255***
	(0.057)
tmin6	-0.575***
	(0.091)
tmin7	-0.610***
	(0.061)
tmin8	0.359***
	(0.049)
tmin9	0.362***
	(0.042)
tmax5	-0.180***
	(0.048)
tmax6	0.493***
	(0.070)
tmax7	0.448***
	(0.043)
tmax8	-0.339***
	(0.048)
tmax9	0.161***
	(0.036)
tmin5 × planting density	-0.008***
	(0.002)
tmin6 × planting density	0.019***
	(0.003)
tmin7 × planting density	0.023***
	(0.002)
tmin8 × planting density	-0.014***
	(0.002)
tmin9 × planting density	-0.012***
	(0.002)
tmax5 × planting density	0.006***
	(0.002)
tmax6 × planting density	-0.016***
	(0.002)
tmax7 × planting density	-0.016***
	(0.002)
tmax8 × planting density	0.013***
	(0.002)
tmax9 × planting density	-0.005***
	(0.001)

RW × tmin5	-0.524***
	(0.141)
RW × tmin6	1.353***
	(0.182)
RW × tmin7	-0.146
	(0.236)
RW × tmin8	0.277
	(0.208)
RW × tmin9	0.057
	(0.210)
other GM × tmin5	-0.567***
	(0.108)
other GM × tmin6	0.629***
	(0.128)
other GM × tmin7	1.385***
	(0.096)
other GM × tmin8	0.214**
	(0.103)
other GM × tmin9	-0.920***
	(0.111)
RW × tmax5	0.586***
	(0.147)
RW × tmax6	-0.430**
	(0.184)
RW × tmax7	0.155
	(0.153)
RW × tmax8	-1.131***
	(0.185)
RW × tmax9	-0.667***
	(0.171)
other GM × tmax5	0.397***
	(0.088)
other GM × tmax6	-1.274***
	(0.119)
other GM × tmax7	-0.464***
	(0.077)
other GM × tmax8	0.216**
	(0.089)
other GM × tmax9	0.171*
	(0.089)

RW × tmin5 × planting density	0.018***
	(0.005)
RW × tmin6 × planting density	-0.050***
	(0.006)
RW × tmin7 × planting density	0.002
	(0.008)
RW × tmin8 × planting density	-0.002
	(0.007)
RW × tmin9 × planting density	-0.004
	(0.007)
RW × tmax5 × planting density	-0.023***
	(0.005)
RW × tmax6 × planting density	0.015**
	(0.006)
RW × tmax7 × planting density	-0.004
	(0.005)
RW × tmax8 × planting density	0.036***
	(0.006)
RW × tmax9 × planting density	0.025***
	(0.006)
other GM × tmin5 × planting density	0.018***
	(0.004)
other GM × tmin6 × planting density	-0.023***
	(0.004)
other GM × tmin7 × planting density	-0.049***
	(0.003)
other GM × tmin8 × planting density	-0.002
	(0.004)
other GM × tmin9 × planting density	0.029***
	(0.004)
other GM × tmax5 × planting density	-0.014***
	(0.003)
other GM × tmax6 × planting density	0.043***
	(0.004)
other GM × tmax7 × planting density	0.017***
	(0.003)
other GM × tmax8 × planting density	-0.010***
	(0.003)
other GM × tmax9 × planting density	-0.004
	(0.003)

Continued

prec	0.124***
	(0.017)
prec × prec	-0.001***
	(0.000)
prec × planting density	-0.004***
	(0.001)
prec × prec × planting density	0.000***
	(0.000)
RW × prec	-0.517***
	(0.029)
other GM × prec	-0.042*
	(0.023)
RW × prec × prec	0.002***
	(0.000)
other GM × prec × prec	0.000*
	(0.000)
RW × prec × prec × planting density	-0.000***
	(0.000)
other GM × prec × prec × planting density	-0.000**
	(0.000)
pcorn	0.047*
	(0.027)
1 if previous crop is wheat	0.113***
	(0.027)
1 if previous crop is alfalfa or alfalfa/hay	0.166***
	(0.026)
1 if previous crop is soybean	0.044*
	(0.026)
1 if previous crop is lupine	-0.067*
	(0.038)
fall tillage, 1 if yes, 0 if no	-0.037***
	(0.003)
spring tillage, 1 if yes, 0 if no	0.006
	(0.003)
apply insecticide, 1 if yes, 0 if no	-0.055***
	(0.004)
fertilizern N	0.000***
	(0.000)
Observations	28521
R-squared	0.665

Notes: Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and a quadratic form of the mean of monthly cumulative precipitation for the whole growing season), GM variety dummies, and managerial inputs and practices. The specification also includes linear time trend, production fixed effect and the interactions among plant density, weather variables, and GM variety dummies. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S10: Estimated changes in the effects of plant density on yield as a result of 1°C warming

		All months		Jun-Aug	
		Estimates	P-value	Estimates	P-value
tmin & tmax	Conventional	-0.0104	0.000	0.0084	0.000
	GM-RW	0.0018	0.547	0.0051	0.331
	other GM	-0.0053	0.030	-0.0151	0.000
tmin	Conventional	0.0086	0.000	0.0280	0.000
	GM-RW	-0.0282	0.000	-0.0222	0.001
	other GM	-0.0176	0.000	-0.0456	0.000
tmax	Conventional	-0.0190	0.000	-0.0197	0.000
	GM-RW	0.0300	0.000	0.0272	0.000
	other GM	0.0123	0.000	0.0305	0.000

Notes: (1) The table displays coefficients and p-values of the change in the marginal effect of plant density as a result of 1° warming. The results are calculated from the estimated results of the model specification in equations (1) and (8) that replaces monthly PDSI as a measure of water availability with a quadratic form of the mean of monthly cumulative precipitation for the whole growing season. (2) The first column indicates what weather variables are the marginal effects of plant density based on. The first row of the first panel indicates a 1°C increase in both **tmin** and **tmax**. The first row of the second panel refers to a scenario where only **tmin** increases by 1°C. The first row of the third panel refers to a situation where only **tmax** increases by 1°C. (3) The second column indicates the hybrid groups: "RW" is GM hybrids expressing Bt trait for corn rootworm. "other GM" refer to GM hybrids without Bt trait for corn rootworm. (4)The third and fourth column report coefficients and p-values of the change in marginal effect of plant density as a result of warming scenarios (both **tmin** and **tmax**, and **tmin** and **tmax** separately) where temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the change in the marginal effect of warming scenarios where the temperature of each month from June to August increases by 1°C.

Table S11: Regression results of the model controlling for year fixed effects

	lnyld
plant density	0.083***
	(0.022)
tmin5	0.457***
	(0.043)
tmin6	0.055
	(0.055)
tmin7	-0.105**
	(0.049)
tmin8	-0.470***
	(0.038)
tmin9	0.354***
	(0.033)
tmax5	-0.316***
	(0.033)
tmax6	0.315***
	(0.044)
tmax7	0.153***
	(0.037)
tmax8	0.168***
	(0.037)
tmax9	-0.229***
	(0.032)
tmin5 × plant density	-0.016***
	(0.001)
tmin6 × plant density	-0.003
	(0.002)
tmin7 × plant density	0.003*
	(0.002)
tmin8 × plant density	0.017***
	(0.001)
tmin9 × plant density	-0.012***
	(0.001)
tmax5 × plant density	0.010***
	(0.001)
tmax6 × plant density	-0.010***
	(0.002)
tmax7 × plant density	-0.003**
	(0.001)
tmax8 × plant density	-0.008***
	(0.001)
tmax9 × plant density	0.008***
	(0.001)

PDSI5(wet)	0.011
	(0.039)
PDSI6(wet)	-0.146***
	(0.048)
PDSI7(wet)	0.243***
	(0.034)
PDSI8(wet)	-0.695***
	(0.043)
PDSI9(wet)	0.132***
	(0.039)
PDSI5(dry)	-1.180***
	(0.071)
PDSI6(dry)	1.252***
	(0.140)
PDSI7(dry)	0.669***
	(0.105)
PDSI8(dry)	-0.773***
	(0.099)
PDSI9(dry)	-0.965***
	(0.087)
PDSI5(wet) × plant density	-0.000
	(0.001)
PDSI6(wet) × plant density	0.005***
	(0.002)
PDSI7(wet) × plant density	-0.009***
	(0.001)
PDSI8(wet) × plant density	0.025***
	(0.001)
PDSI9(wet) × plant density	-0.004***
	(0.001)
PDSI5(dry) × plant density	0.041***
	(0.002)
PDSI6(dry) × plant density	-0.038***
	(0.005)
PDSI7(dry) × plant density	-0.029***
	(0.004)
PDSI8(dry) × plant density	0.025***
	(0.003)
PDSI9(dry) × plant density	0.034***
	(0.003)

RW	0.047***
	(0.005)
other GM	0.046***
	(0.003)
1 if previous crop is corn	0.159***
	(0.028)
1 if previous crop is wheat	0.148***
	(0.028)
1 if previous crop is alfalfa or alfalfa/hay	0.261***
	(0.027)
1 if previous crop is soybean	0.165***
	(0.027)
1 if previous crop is lupine	-0.223***
	(0.036)
fall tillage, 1 if yes, 0 if no	-0.006**
	(0.003)
spring tillage, 1 if yes, 0 if no	-0.020***
	(0.004)
apply insecticide, 1 if yes, 0 if no	-0.059***
	(0.004)
fertilizer N	0.000***
	(0.000)
Observations	28521
R-squared	0.689

Notes: Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and monthly PDSI from May to September), the interactions between plant density and weather variables, and the managerial inputs and practices described in Table 1. The model also includes year fixed effects and production zone fixed effect model. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S12: Estimated changes in the effects of plant density on yield as a result of 1°C warming

	All Months		Jun-Aug	
	Estimates	P-value	Estimates	P-value
tmin & tmax	-0.012	0.000	-0.002	0.052
tmin	-0.010	0.000	0.018	0.000
tmax	-0.002	0.084	-0.020	0.000

Notes: (1) The results here are estimated through our main specification in equations (1) and (2) but replacing linear time trend with year fixed effects. (2) The first column indicates what weather variables the marginal effects of plant density are based on. The first row indicates a 1°C increase in both **tmin** and **tmax**. The second row refers to a warming scenario where only **tmin** increases by 1°C. The third row refers to a 1°C increase in **tmax**. (3) The second and the third column report coefficients and p-values of the changes in the marginal effects of plant density as a result of warming scenarios (both **tmin** and **tmax**, and **tmin** and **tmax** separately) where temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the changes in the marginal effects of warming scenarios where the temperature of each month from June to August increases by 1°C.

Table S13: Regression results of the model including quadratic term of plant density

	lnyld
plant density	0.123***
	(0.025)
plant density × plant density	0.004***
	(0.000)
tmin5	0.051
	(0.034)
tmin6	0.259***
	(0.055)
tmin7	0.151***
	(0.039)
tmin8	-0.553***
	(0.033)
tmin9	0.424***
	(0.029)
tmax5	0.134***
	(0.030)
tmax6	-0.193***
	(0.046)
tmax7	0.232***
	(0.031)
tmax8	0.333***
	(0.030)
tmax9	-0.151***
	(0.027)
tmin5 × plant density	0.000
	(0.001)
tmin6 × plant density	-0.011***
	(0.002)
tmin7 × plant density	-0.005***
	(0.001)
tmin8 × plant density	0.019***
	(0.001)
tmin9 × plant density	-0.013***
	(0.001)
tmax5 × plant density	-0.006***
	(0.001)
tmax6 × plant density	0.009***
	(0.002)
tmax7 × plant density	-0.007***
	(0.001)
tmax8 × plant density	-0.012***
	(0.001)
tmax9 × plant density	0.006***
	(0.001)

PDSI5(wet)	0.255***
	(0.041)
PDSI6(wet)	-0.485***
	(0.048)
PDSI7(wet)	0.244***
	(0.030)
PDSI8(wet)	-0.441***
	(0.038)
PDSI9(wet)	-0.031
	(0.037)
PDSI5(dry)	-1.558***
	(0.067)
PDSI6(dry)	2.179***
	(0.120)
PDSI7(dry)	-0.031
	(0.084)
PDSI8(dry)	-1.659***
	(0.087)
PDSI9(dry)	-0.387***
	(0.078)
PDSI5(wet) × plant density	-0.010***
	(0.001)
PDSI6(wet) × plant density	0.017***
	(0.002)
PDSI7(wet) × plant density	-0.009***
	(0.001)
PDSI8(wet) × plant density	0.016***
	(0.001)
PDSI9(wet) × plant density	0.001
	(0.001)
PDSI5(dry) × plant density	0.054***
	(0.002)
PDSI6(dry) × plant density	-0.075***
	(0.004)
PDSI7(dry) × plant density	-0.002
	(0.003)
PDSI8(dry) × plant density	0.057***
	(0.003)
PDSI9(dry) × plant density	0.014***
	(0.003)

RW	0.037***
	(0.004)
other GM	0.042***
	(0.003)
year	0.008***
	(0.000)
1 if previous crop is corn	0.064**
	(0.026)
1 if previous crop is wheat	0.103***
	(0.027)
1 if previous crop is alfalfa or alfalfa/hay	0.165***
	(0.026)
1 if previous crop is soybean	0.072***
	(0.026)
1 if previous crop is lupine	-0.173***
	(0.032)
fall tillage, 1 if yes, 0 if no	-0.002
	(0.002)
spring tillage, 1 if yes, 0 if no	-0.043***
	(0.004)
apply insecticide, 1 if yes, 0 if no	-0.060***
	(0.004)
fertilizer N	0.000***
	(0.000)
Observations	28521
R-squared	0.665

Notes: Table regresses plot-level log of yield on linear and quadratic plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and monthly PDSI from May to September), the interactions between plant density and weather variables, and the managerial inputs and practices described in Table 1. The model also includes linear time trend and production zone fixed effect model. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S14: Estimated changes in the effects of plant density on yield as a result of 1°C warming

| | All Months | | | Jun-Aug | |
	Estimates	P-value		Estimates	P-value
tmin & tmax	-0.021	0.000	-0.008		0.000
tmin	-0.010	0.000	0.003		0.087
tmax	-0.011	0.000	-0.011		0.000

Notes: (1) The results here are estimated through our main specification in equations (1) and (2) but adding quadratic term of plant density. (2) The first column indicates what weather variables the marginal effects of plant density are based on. The first row indicates a 1°C increase in both **tmin** and **tmax**. The second row refers to a warming scenario where only **tmin** increases by 1°C. The third row refers to a 1°C increase in **tmax**. (3) The second and the third column report coefficients and p-values of the changes in the marginal effects of plant density as a result of warming scenarios (both **tmin** and **tmax**, and **tmin** and **tmax** separately) where temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the changes in the marginal effects of warming scenarios where the temperature of each month from June to August increases by 1°C.

Table S15: Regression results of the main model specification SEs clustered by year

	lnyld
plant density	0.329**
	(0.150)
tmin5	0.168
	(0.240)
tmin6	-0.153
	(0.306)
tmin7	0.211
	(0.304)
tmin8	-0.446*
	(0.250)
tmin9	0.451*
	(0.219)
tmax5	-0.031
	(0.209)
tmax6	0.071
	(0.248)
tmax7	0.170
	(0.244)
tmax8	0.306
	(0.257)
tmax9	-0.135
	(0.199)
tmin5 × plant density	-0.004
	(0.008)
tmin6 × plant density	0.003
	(0.011)
tmin7 × plant density	-0.007
	(0.011)
tmin8 × plant density	0.015*
	(0.001)
tmin9 × plant density	-0.014*
	(0.001)
tmax5 × plant density	0.000
	(0.007)
tmax6 × plant density	-0.001
	(0.010)
tmax7 × plant density	-0.005
	(0.009)
tmax8 × plant density	-0.011
	(0.009)
tmax9 × plant density	0.005
	(0.006)

PDSI5(wet)	-0.077
	(0.243)
PDSI6(wet)	-0.148
	(0.326)
PDSI7(wet)	0.146
	(0.211)
PDSI8(wet)	-0.466
	(0.336)
PDSI9(wet)	0.021
	(0.315)
PDSI5(dry)	-1.479
	(0.550)
PDSI6(dry)	1.885**
	(0.852)
PDSI7(dry)	0.000
	(0.657)
PDSI8(dry)	-1.363*
	(0.770)
PDSI9(dry)	-0.652
	(0.639)
PDSI5(wet) × plant density	0.001
	(0.008)
PDSI6(wet) × plant density	0.006
	(0.011)
PDSI7(wet) × plant density	-0.005
	(0.008)
PDSI8(wet) × plant density	0.016*
	(0.011)
PDSI9(wet) × plant density	-0.000
	(0.011)
PDSI5(dry) × plant density	0.051***
	(0.019)
PDSI6(dry) × plant density	-0.065**
	(0.030)
PDSI7(dry) × plant density	-0.003
	(0.024)
PDSI8(dry) × plant density	0.046
	(0.027)
PDSI9(dry) × plant density	0.023
	(0.022)

year	0.009***
	(0.020)
RW	0.039*
	(0.005)
other GM	0.040***
	(0.001)
1 if previous crop is corn	0.080
	(0.181)
1 if previous crop is wheat	0.120
	(0.191)
1 if previous crop is alfalfa or alfalfa/hay	0.185
	(0.174)
1 if previous crop is soybean	0.095
	(0.174)
1 if previous crop is lupine	-0.175
	(0.234)
fall tillage, 1 if yes, 0 if no	0.000
	(0.024)
spring tillage, 1 if yes, 0 if no	-0.037
	(0.031)
apply insecticide, 1 if yes, 0 if no	-0.062**
	(0.026)
fertilizer N	0.000
	(0.000)
Observations	28521
R-squared	0.662

Notes: **SEs are clustered by year.** Table regresses plot-level log of yield on plant density, weather variables(monthly average of daily minimum and maximum temperature(**tmin** and **tmax**), and monthly PDSI from May to September), the interactions between plant density and weather variables, and the managerial inputs and practices described in Table 1. The model also includes linear time trend and production zone fixed effect model. Units for **tmin** and **tmax** are °C. Unit for plant density is 1000 acre^{-1}. In consideration of the possible heteroskedasticity, Huber-White's robust standard errors are calculated and shown in parentheses. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Table S16: Estimated changes in the effects of plant density on yield as a result of 1°C increase in temperatures SEs clustered by year

	All Months		Jun-Aug	
	Estimates	P-value	Estimates	P-value
tmin & tmax	-0.0186	0.021	-0.0055	0.435
tmin	-0.0066	0.441	0.0116	0.377
tmax	-0.0121	0.124	-0.0170	0.168

Notes: **SEs are clustered by year** (1) The results here are estimated through our main specification in equations (1) and (2). (2) The first column indicates what weather variables the marginal effects of plant density are based on. The first row indicates a 1°C increase in both **tmin** and **tmax**. The second row refers to a scenario where only **tmin** increases by 1°C. The third row refers to a 1°C increase in **tmax**. (3) The second and the third column report coefficients and p-values of the changes in the marginal effects of plant density as a result of higher temperatures (both **tmin** and **tmax** increase, and **tmin** and **tmax** separately increase) where temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the changes in the marginal effects where the temperature of each month from June to August increases by 1°C.

Table S17: Estimated changes in the effects of plant density on yield as a result of 1°C increase in temperatures (accounting for type of corn hybrid) SEs clustered by year

		All months		Jun-Aug	
		Estimates	P-value	Estimates	P-value
tmin & tmax	Conventional	-0.0279	0.002	-0.0069	0.416
	GM-RW	-0.0127	0.660	0.0123	0.821
	Other GM	-0.0019	0.859	-0.0002	0.989
tmin	Conventional	-0.0194	0.128	0.0118	0.368
	GM-RW	-0.1480	0.000	0.0458	0.512
	Other GM	-0.0016	0.886	-0.0240	0.344
tmax	Conventional	-0.0085	0.445	-0.0186	0.175
	GM-RW	0.1353	0.000	-0.0334	0.376
	Other GM	-0.0004	0.976	0.0238	0.281

Notes: **SEs are clustered by year** (1) The table displays coefficients and p-values of the changes in the marginal effects of plant density as a result of 1° in temperatures. The results are calculated from the estimated results of the model specification in equations (1) and (2) (the specifications including interactions among the weather, plant density and GM varietal dummy variables). (2) The first column indicates what weather variables the marginal effects of plant density are based on. The first row of the first panel indicates a 1°C increase in both **tmin** and **tmax**. The first row of the second panel refers to a scenario where only **tmin** increases by 1°C. The first row of the third panel refers to a situation where only **tmax** increases by 1°C. (3) The second column indicates the hybrid groups: "RW" is GM hybrids expressing Bt trait for corn rootworm. "other GM" refer to GM hybrids without Bt trait for corn rootworm. (4)The third and fourth column report coefficients and p-values of the changes in marginal effects of plant density as a result of higher temperatures (both **tmin** and **tmax** increase, and **tmin** and **tmax** separately increase) where the temperature of each month of the May-September growing season increases by 1°C. The last two columns provide coefficients and p-values of the changes in marginal effects where the temperature of each month from June to August increases by 1°C.
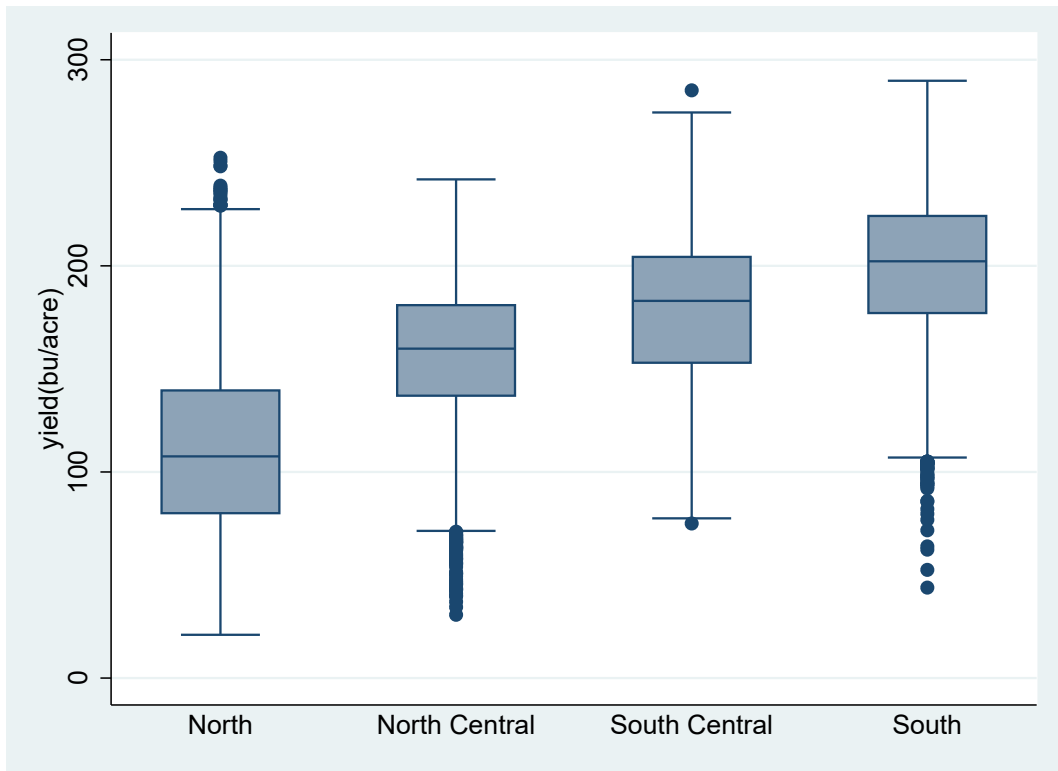
Figure S1: Distribution of yield for four production zones

Notes: Each box plot corresponds to the yield of plots in a production zone. The solid line in each distribution is the median. The upper hinge and the lower hinge are the 75th and the $25th$ percentile values of yield separately. The upper adjacent line represents 75th *percentile value* $+ 1.5 \times$ *interquantile range* and the lower adjacent line represents 25th *percentile value* $- 1.5 \times$ *interquantile range.*
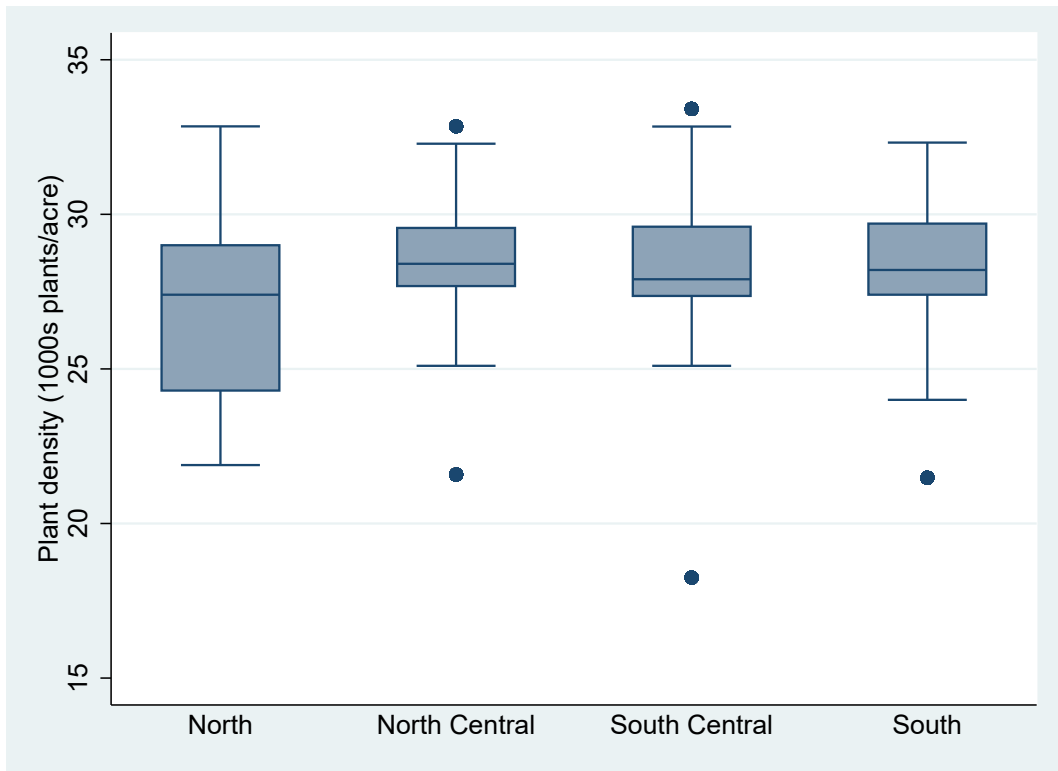
Figure S2: Distribution of plant density for four production zones

Notes: Each box plot corresponds to the plant density of plots in a production zone. The solid line in each distribution is the median. The upper hinge and the lower hinge are the 75th and the $25th$ percentile values of plant density separately. The upper adjacent line represents 75th *percentile value* $+ 1.5 \times$ *interquantile range* and the lower adjacent line represents 25th *percentile value* $- 1.5 \times$ *interquantile range*.
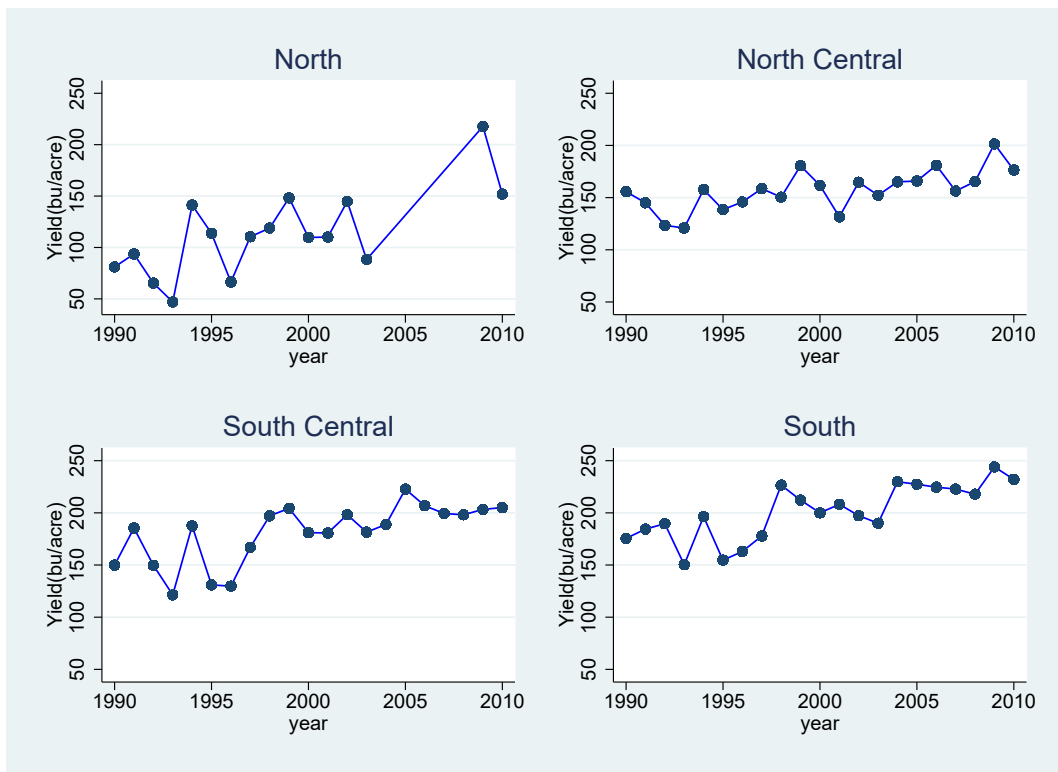
Figure S3: The change in the average corn yields in four production zones over years
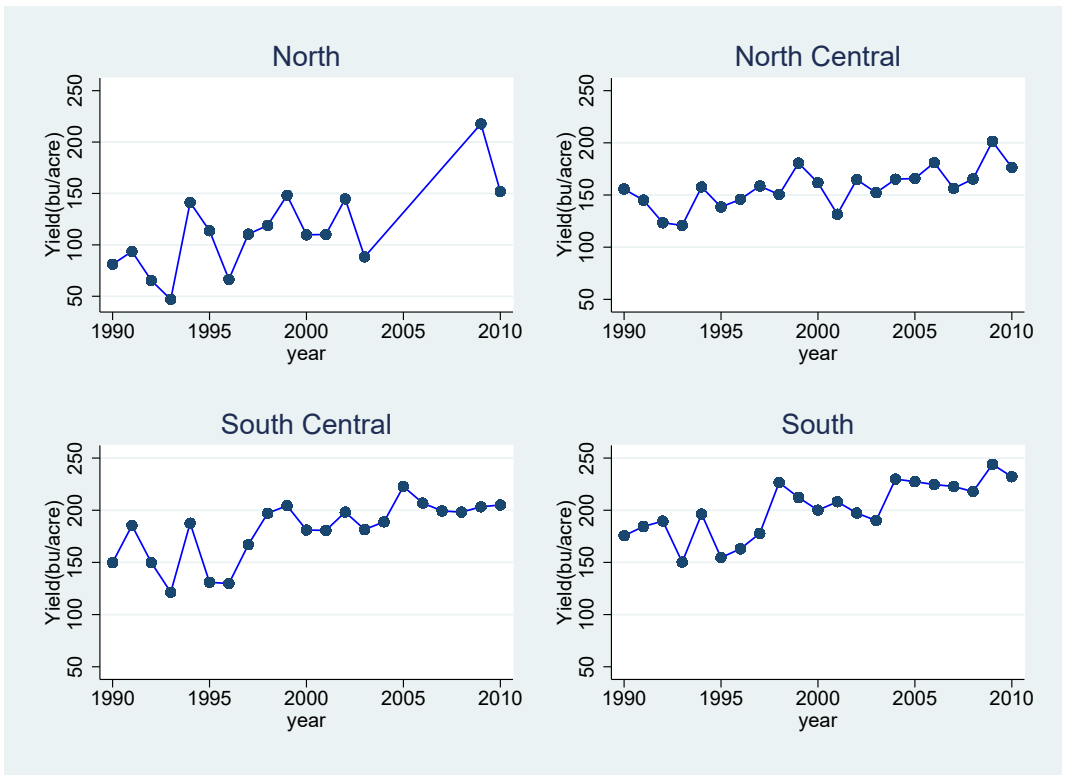
Figure S4: The change in the average of plant density in four production zones over years
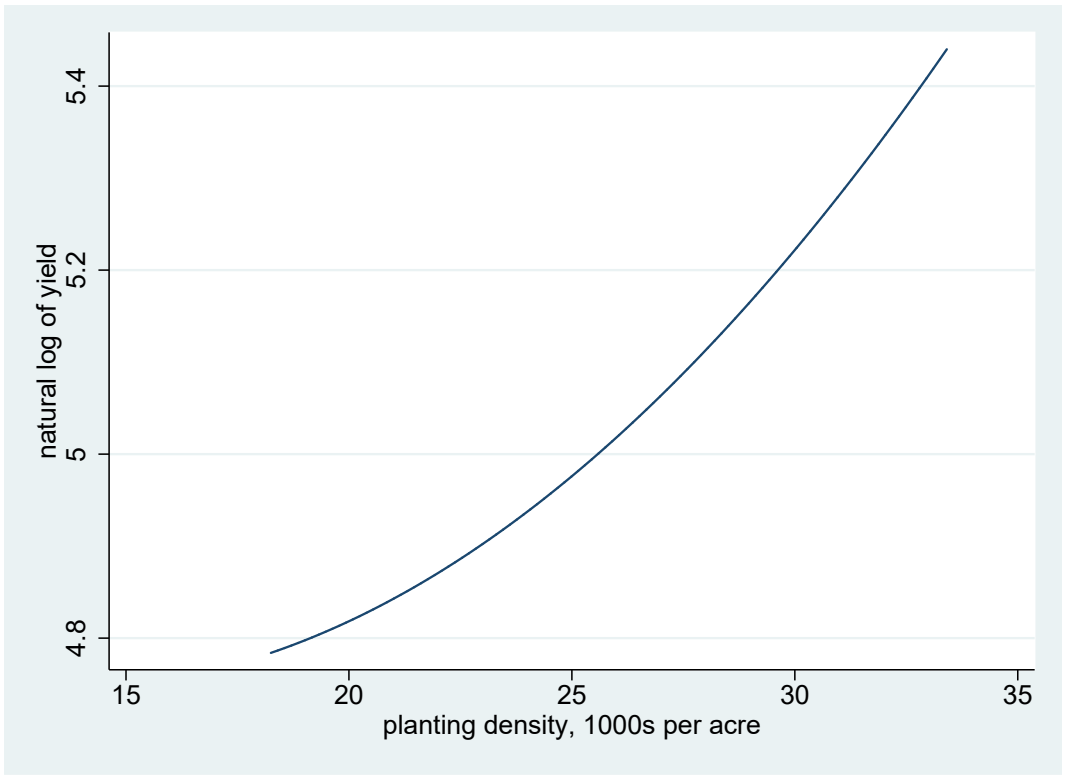
Figure S5: Regression of the natural log of yield on a quadratic form of plant density
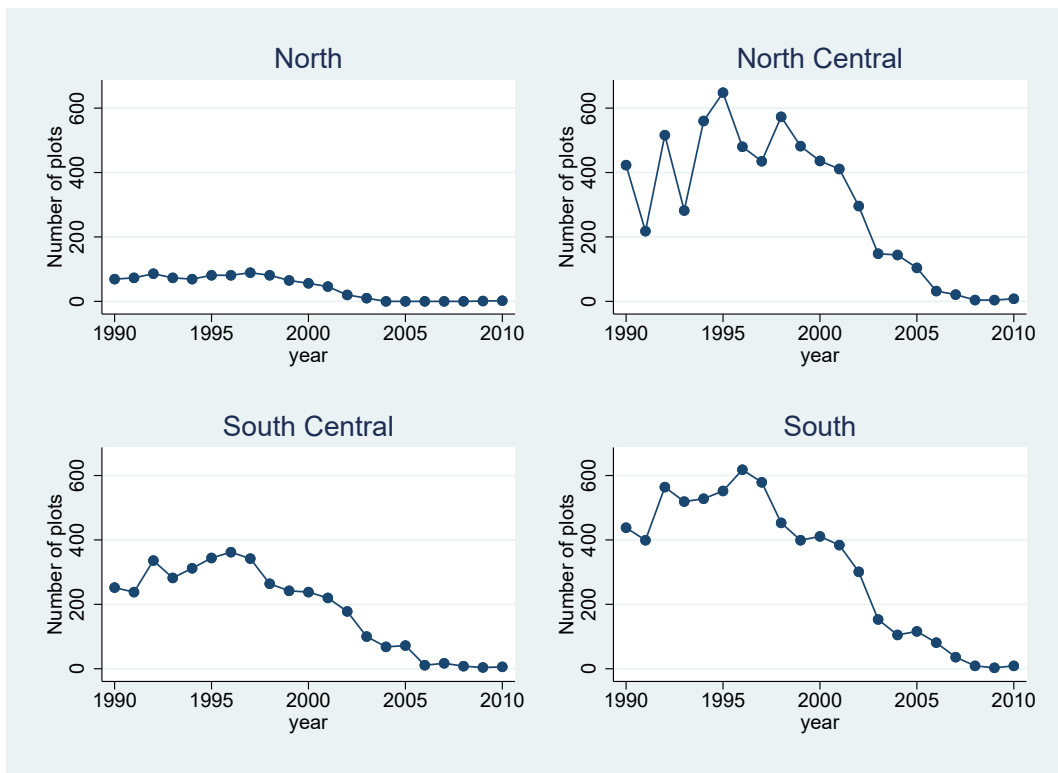
Figure S6: The change in number of plots planting conventional corn over years
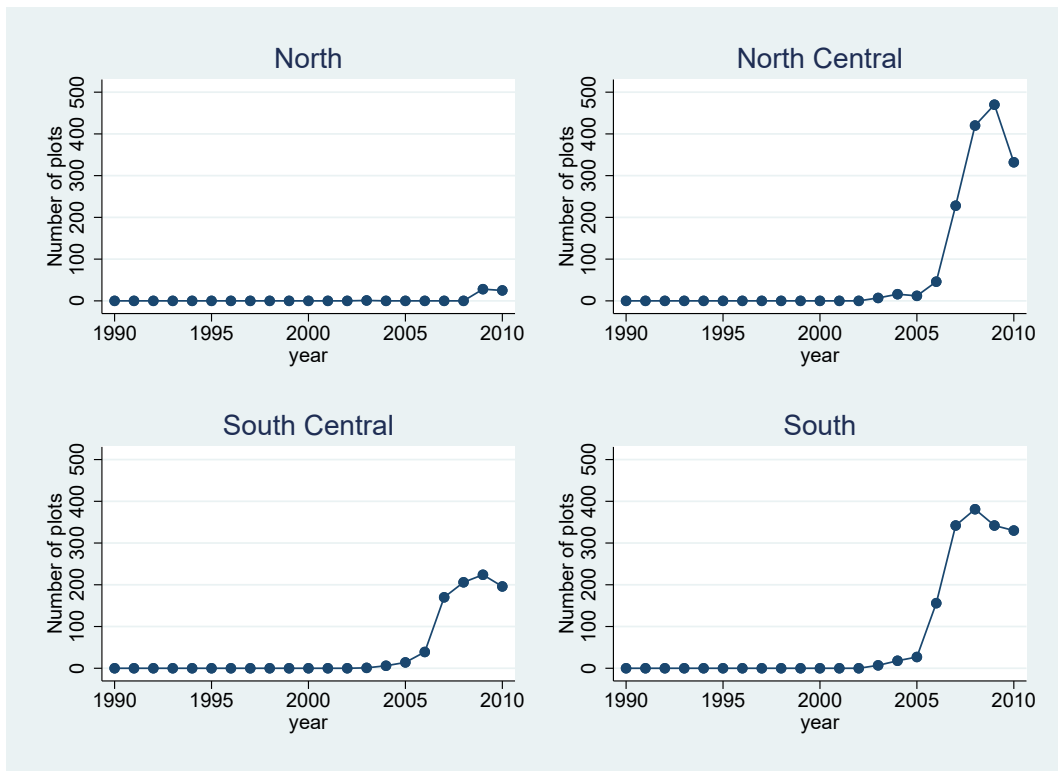
Figure S7: The change in number of plots planting GM corn with Bt trait for corn rootworm.
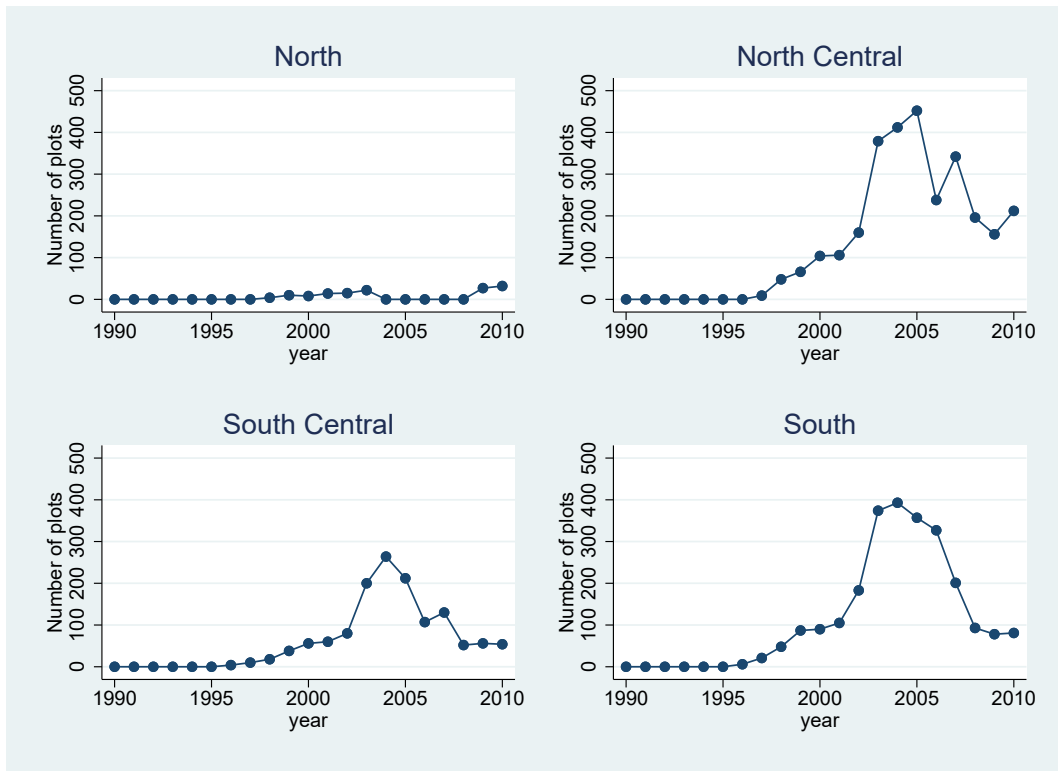
Figure S8: The change in number of plots planting GM corn without Bt trait for corn rootworm
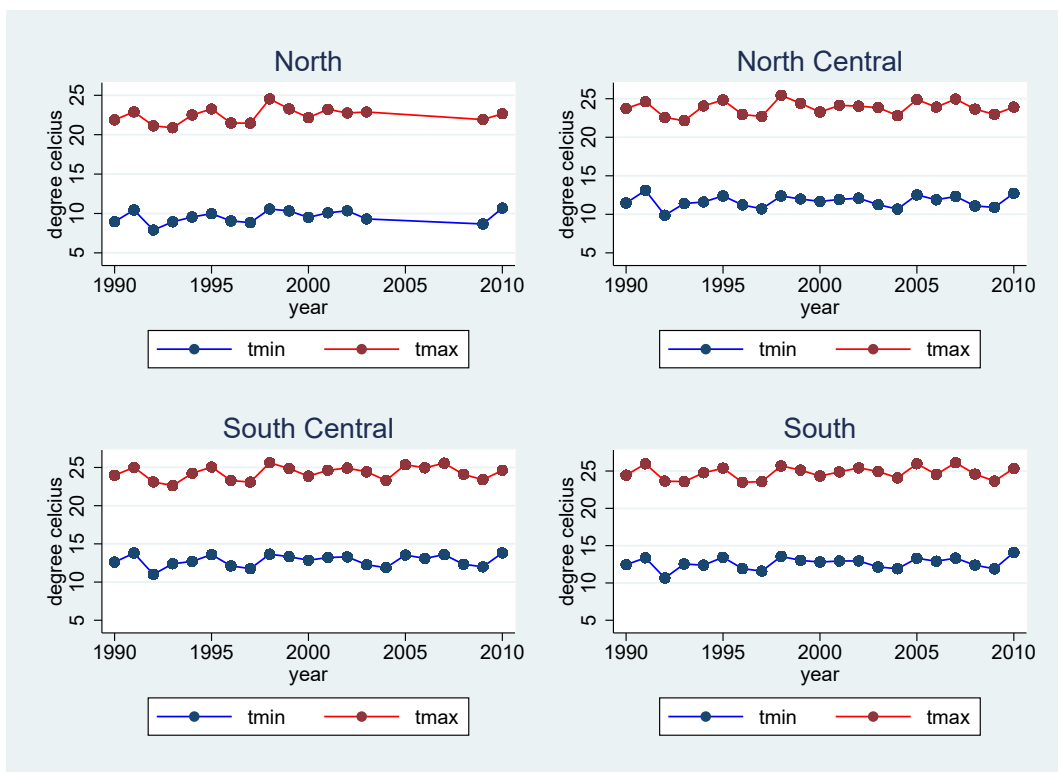
Figure S9: The change in **tmin** and **tmax** across years

Notes: **tmin** and **tmax** are the average of monthly minimum and maximum temperature during the May-September growing season
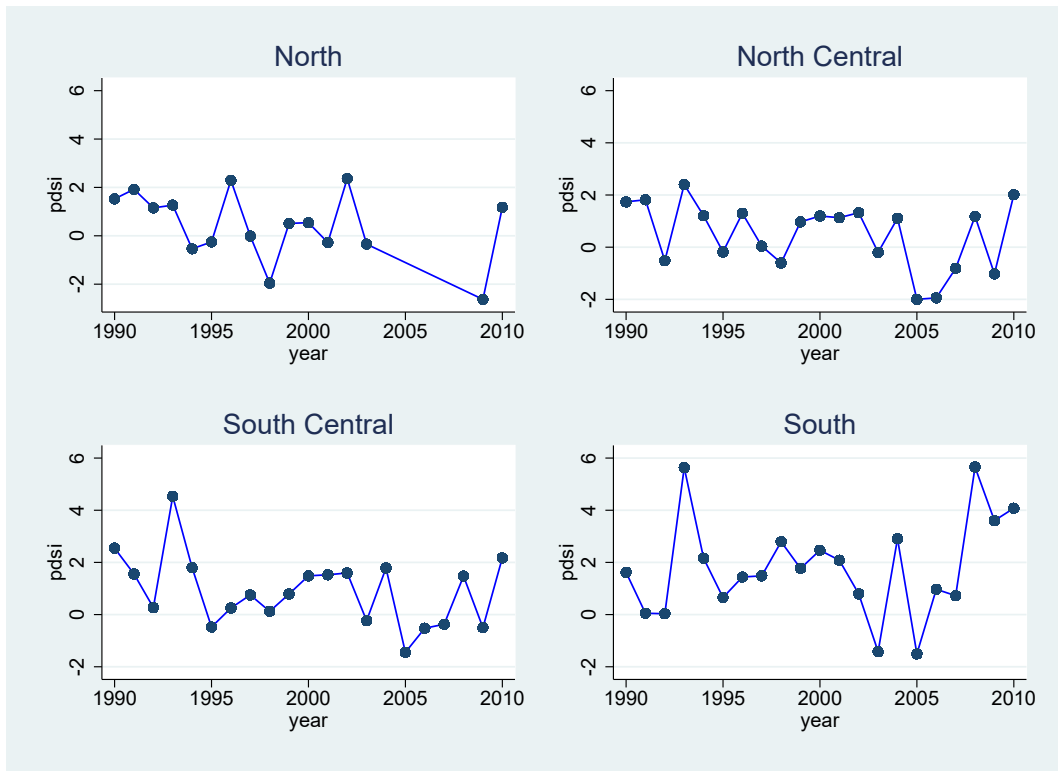
Figure S10: The change in PDSI across years

Notes: PDSI here are the average of monthly PDSI during the May-September growing season
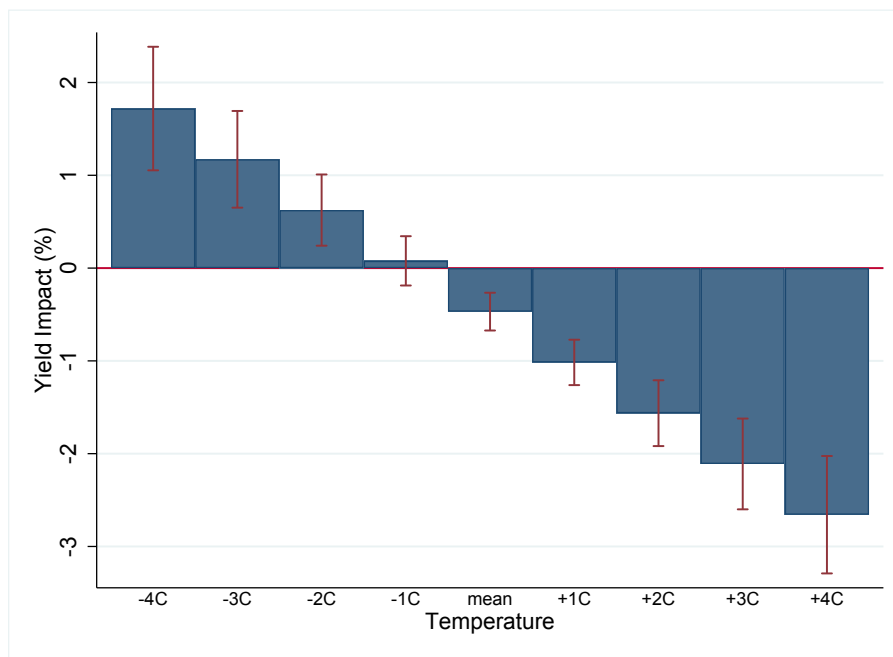
Figure S11: Marginal percentage effect of plant densities as *tmin* and *tmax* of each month from June to August deviate from the mean by 1°C increments

Notes: The main specification in equations (1) and (2) is implemented. Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.
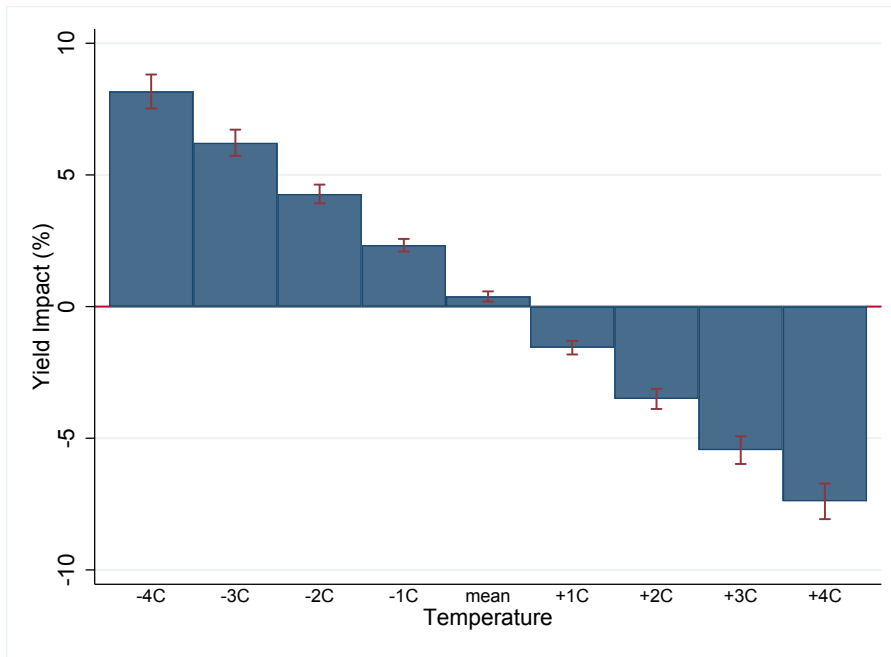
Figure S12: Marginal percentage effect of plant density as *tmin* and *tmax* of each month deviate from the mean by 1°C increments

Notes: The figure shows the results of the model with all variables of the main specification except the managerial inputs and practices. Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.
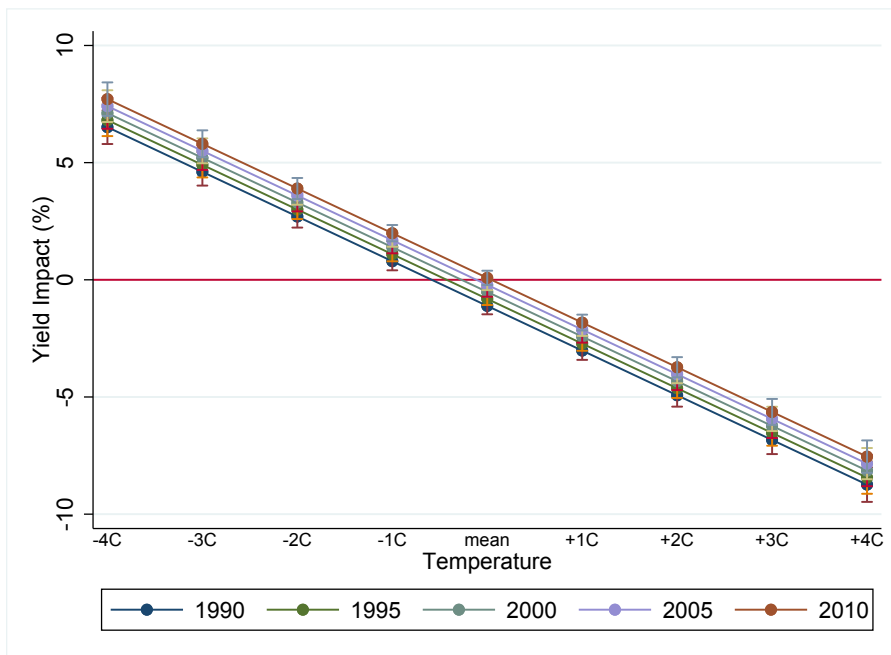
Figure S13: Marginal impact of plant density across years estimated by the model including the interaction term between time trend and plant density

Notes: The figure shows the results of the model with all variables of the main specification and the interaction term between time trend and plant density. Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.
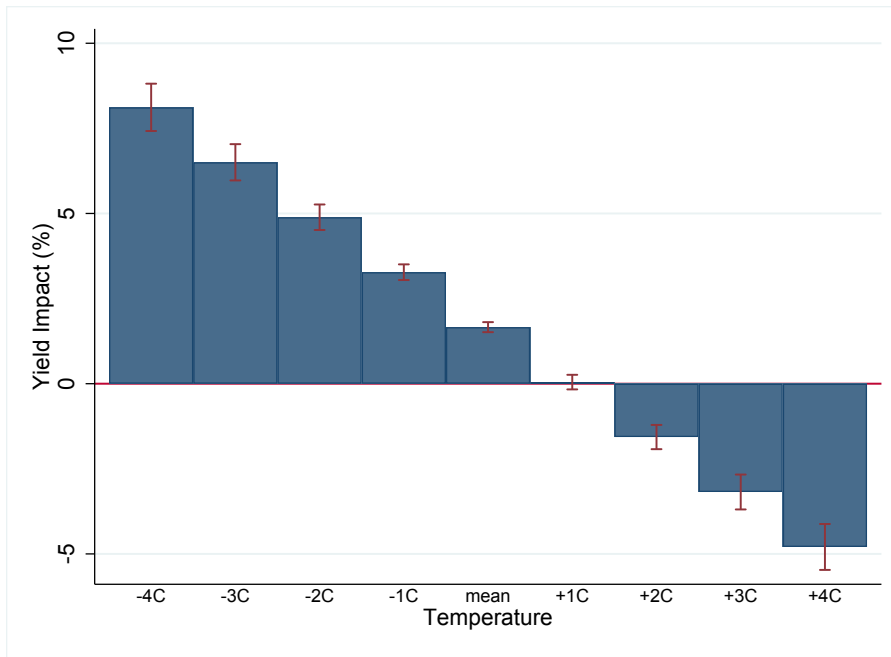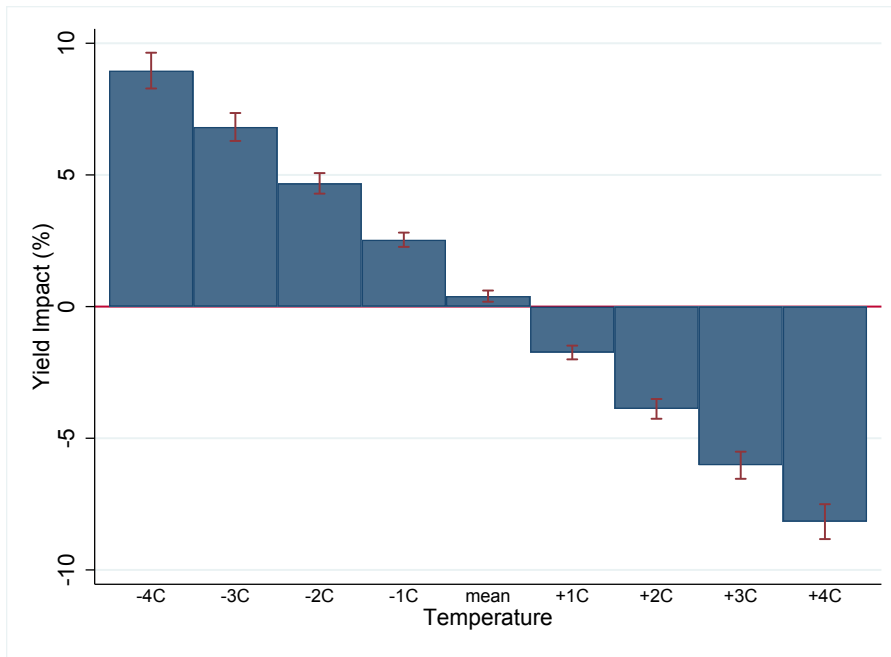
Figure S14: Marginal percentage effect of plant densities as *tmin* and *tmax* of each month deviate from the mean by 1°C increments

Notes: The figure shows the results of the model with the main specification that replaces PDSI as a measure of water availability with a quadratic function of precipitation.
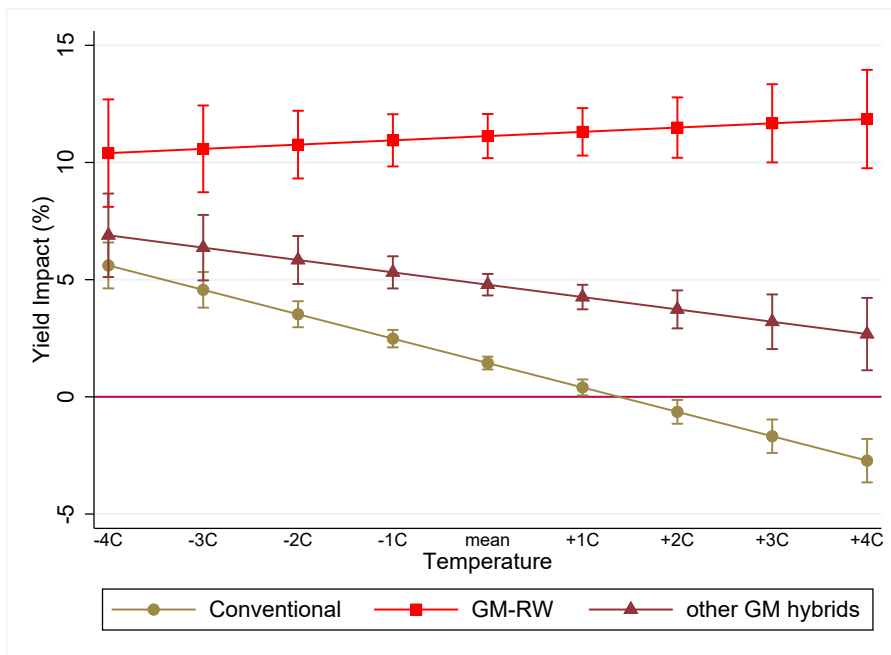
Figure S15: Marginal impacts of plant density for the three varietal groups

Notes: The figure shows the results of the model specification in equations (1) and (8) replacing PDSI as a measure of water availability with a quadratic function of precipitation. Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.

Figure S16: Marginal percentage effect of plant densities as *tmin* and *tmax* of each month deviate from the mean by 1°C increments

Notes: The difference between this model and the main specification (the specification in equations (1) and (2)) is that this model controls for year fixed effects rather than linear time trend. The Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.
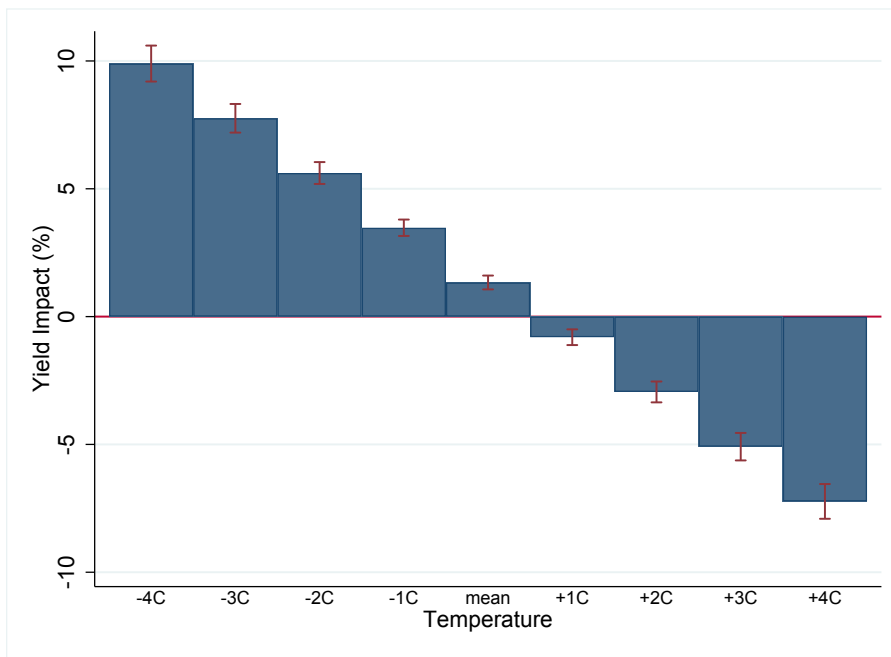

Figure S17: Marginal percentage effect of plant densities as *tmin* and *tmax* of each month deviate from the mean by 1°C increments

Notes: This model includes a quadratic term of plant density in addition to the explanatory variables adopted in the main specification. The Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.
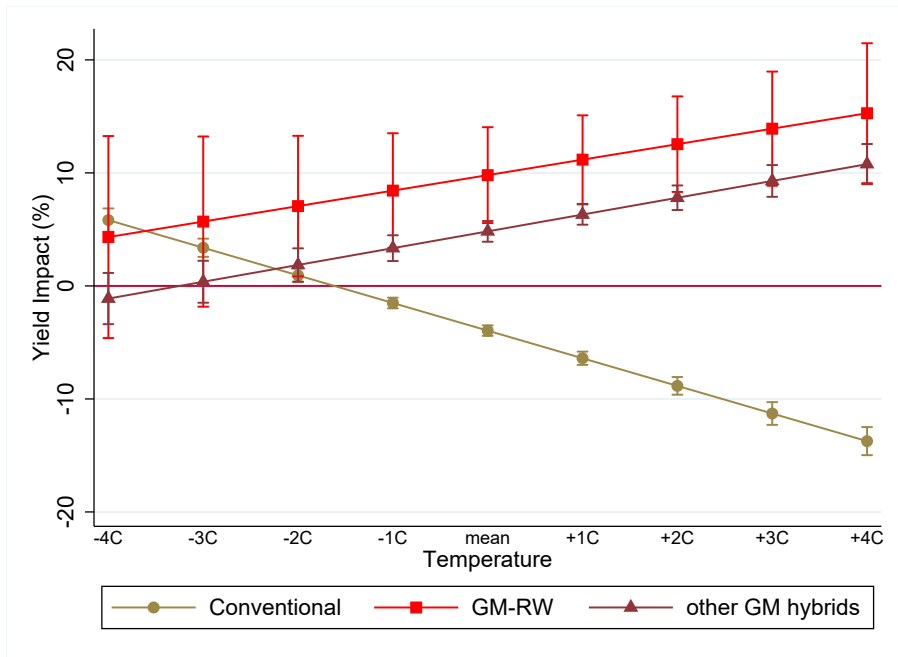
Figure S18: Marginal impacts of plant density for the three varietal groups

Notes: The model specification is the same as the model specification in equations (1) and (8) except it controls for year fixed effect rather than linear time trend. Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.
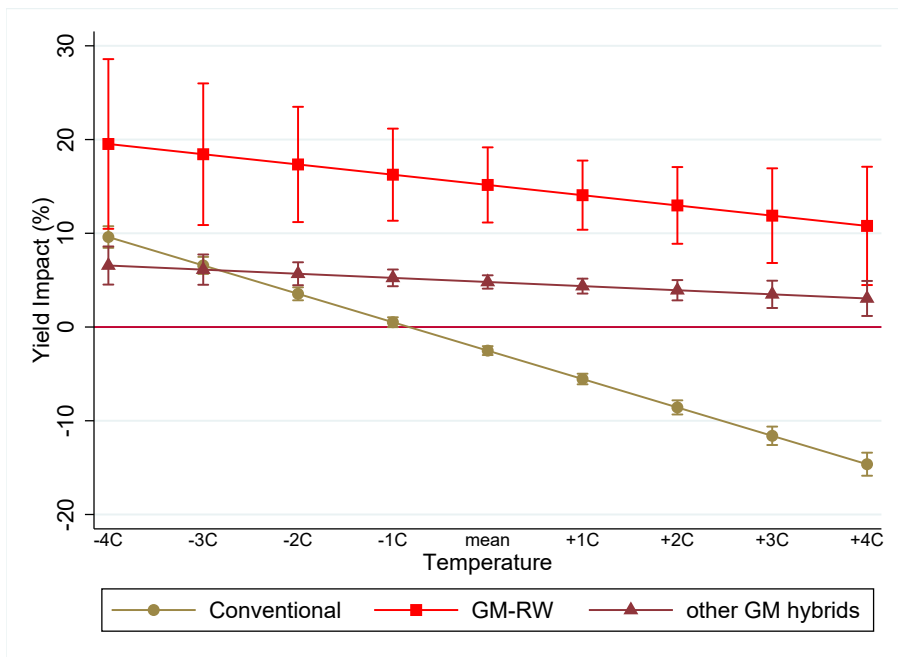

Figure S19: Marginal impacts of plant density for the three varietal groups

Notes: The model adds a quadratic term of plant density into the specification in (1) and (8) except it controls for year fixed effect rather than linear time trend. Impacts are reported as the percentage change in yield. The vertical solid lines show 90% confidence interval.