Figure S1. Figure of normal distribution Q-Q of major traits and its normality test.

Notes: T_m-mechanical tissue thickness. T_c- cortical thickness. N_b-total number of vascular bundles. DWUL- dry weight per unit stem length. SCS-stalk crushing strength. SBS- stalk breaking strength.
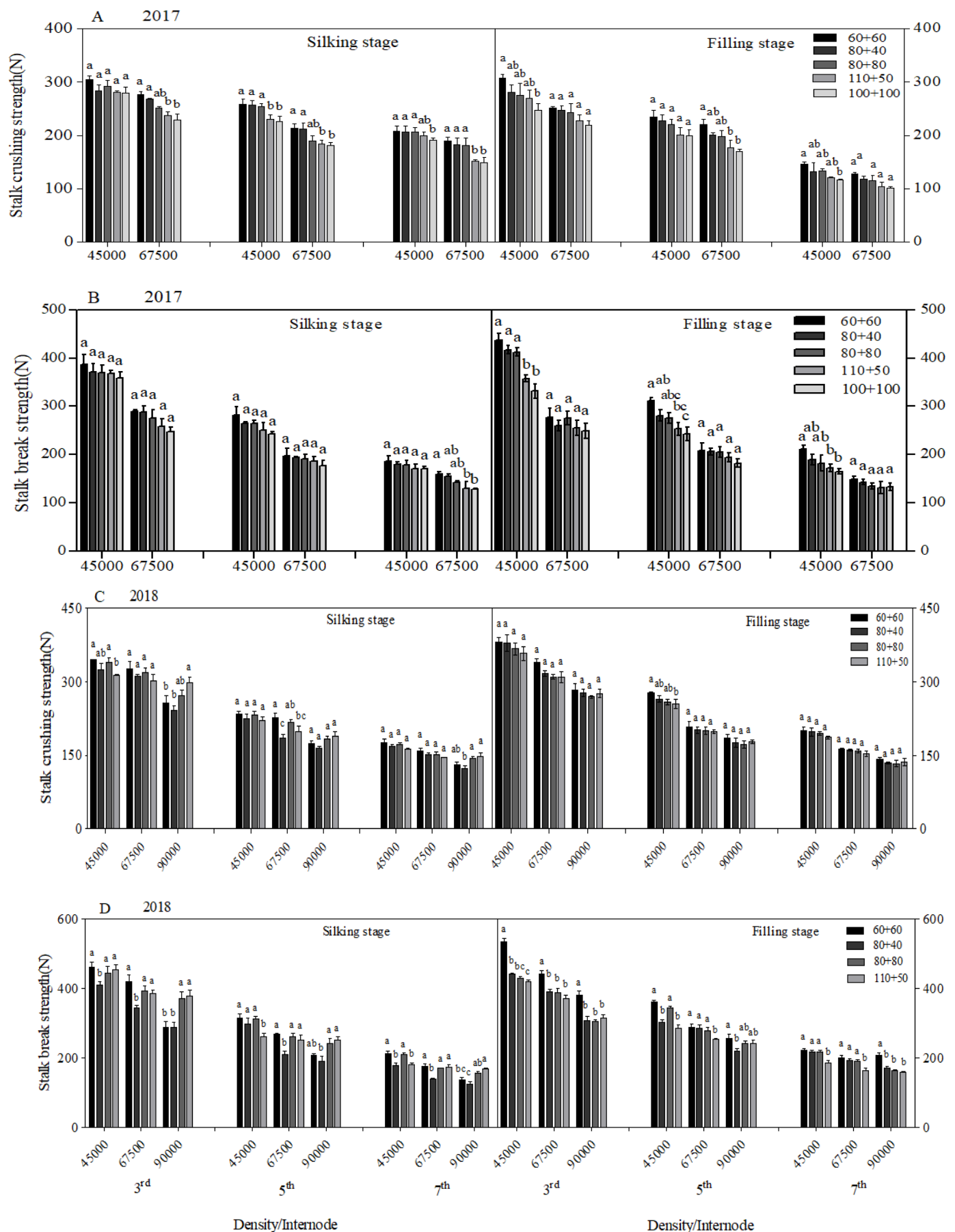
Figure S2. Effects of planting density and row spacing on SCS and SBS of basal internodes.

Note: The means of treatments were compared based on the Tukey test at a probability level of 0.05. In the same year, different lowercase letters indicate a significant difference.

Table S1. Effects of density and row spacing on the internode length (cm)

Year	Density (D)	Row spacing(R)	Silking stage			Filling stage		
			3rd	5th	7th	3rd	5th	7th
2017	45000	60+60	9.18±0.48 a	13.27±0.19 b	15.99±0.38 a	8.29±0.02 b	13.33±0.39 b	15.72±0.23 a
		80+40	10.01±0.32 a	13.75±0.25 ab	16.47±0.27 a	8.46±0.33 b	14.07±0.20 b	16.15±0.21 a
		80+80	9.57±0.41 a	13.47±0.22 b	16.54±0.25 a	8.92±0.15 b	14.00±0.16 b	16.26±0.32 a
		110+50	10.02±0.23 a	14.75±0.21 a	16.59±0.26 a	9.81±0.07 a	15.57±0.17 a	16.26±0.11 a
		100+100	10.13±0.15 a	14.52±0.47 a	16.76±0.14 a	9.94±0.11 a	16.08±0.41 a	16.38±0.13 a
		Mean	**9.78 b**	**13.95 b**	**16.47 b**	**9.08 b**	**14.61 b**	**16.15 a**
	67500	60+60	11.20±0.09 b	14.12±0.29 b	16.79±0.25 a	9.58±0.07 b	15.08±0.34 b	16.55±0.34 b
		80+40	11.40±0.35 ab	15.08±0.24 a	17.04±0.34 a	10.90±0.29 a	16.04±0.23 ab	17.07±0.18 ab
		80+80	11.42±0.20 ab	15.41±0.17 a	17.69±0.24 a	10.92±0.07 a	15.35±0.50 ab	17.32±0.44 ab
		110+50	12.43±0.14 ab	15.61±0.03 a	17.60±0.19 a	11.48±0.17 a	16.33±0.51 ab	17.54±0.36 ab
		100+100	12.55±0.28 a	15.76±0.07 a	18.03±0.39 a	11.59±0.34 a	16.76±0.16 a	18.01±0.22 a
		Mean	**11.80a**	**15.20a**	**17.43 a**	**10.89 a**	**15.91 a**	**17.30 a**
	F-Value	D	30.17*	276.97**	30.90*	130.59**	12.51ns	18.02ns
		R	4.01*	7.87**	2.52ns	21.39**	10.48**	2.68ns
		D×R	0.80ns	1.02ns	0.33ns	1.79ns	1.04ns	0.45ns
2018	45000	60+60	8.27±0.21 ab	16.72±0.06 b	18.62±0.43 b	8.44±0.30 b	17.69±0.45 a	20.20±0.32 b
		80+40	8.62±0.24 a	18.16±0.27 a	19.08±0.26 ab	9.03±0.16 ab	18.00±0.46 a	20.45±0.02 bc
		80+80	7.88±0.18 b	18.30±0.19 a	19.44±0.32 a	9.17±0.27 a	18.53±0.16 a	20.61±0.26 ab
		110+50	8.76±0.12 a	18.83±0.10 a	19.66±0.22 a	9.28±0.26 a	18.72±0.19 a	21.15±0.54 a
		Mean	**8.38 b**	**18.00 a**	**19.20 b**	**8.98 c**	**18.24 c**	**20.60 b**
	67500	60+60	8.71±0.08 a	18.44±0.28 a	19.46±0.42 b	9.47±0.18 a	18.78±0.41 a	20.44±0.16 b
		80+40	8.89±0.11 a	18.70±0.29 a	20.25±0.34 ab	9.81±0.13 a	18.78±0.30 a	20.58±0.18 ab
		80+80	8.93±0.16 a	18.44±0.31 a	20.37±0.29 ab	9.97±0.26 a	19.03±0.36 a	21.09±0.07 ab
		110+50	9.04±0.34 a	18.96±0.06 a	20.58±0.36 a	10.25±0.10 a	19.36±0.11 a	21.44±0.06 a
		Mean	**8.89 b**	**18.63 a**	**20.17 b**	**9.87 b**	**18.99 b**	**20.89 b**
	90000	60+60	9.73±0.12 a	18.56±0.39 a	21.46±0.15 b	9.67±0.25 b	18.83±0.45 a	21.47±0.24 b
		80+40	10.03±0.12 a	18.91±0.25 a	22.60±0.01 a	10.47±0.26 ab	19.58±0.34 a	22.06±0.11 ab
		80+80	10.06±0.19 a	19.22±0.07 a	22.79±0.12 a	10.78±0.23 a	20.19±0.20 a	22.61±0.06 a
		110+50	9.96±0.36 a	19.17±0.31 a	21.86±0.17 ab	10.47±0.28 ab	19.94±0.30 a	21.95±0.32 ab
		Mean	**9.94 a**	**18.97 a**	**22.18 a**	**10.35 a**	**19.64 a**	**22.02 a**
	F-Value	D	34.03**	5.02ns	29.56**	60.75**	40.80**	21.74**
		R	1.47ns	8.77**	7.66**	4.45*	3.01ns	6.01**
		D×R	0.97ns	2.48ns	1.33ns	0.27ns	0.33ns	1.20ns

Note: Values represent the average ± the standard error. The means of treatments were compared based on the Tukey test at a probability level of 0.05. In the same year, different lowercase letters indicate a significant difference. ns-non-significant. ** and * indicate a significant level of 0.01 ($p < 0.01$) and 0.05 ($p < 0.05$) respectively.

Table S2. Effects of density and row spacing on the internode diameter (cm)

Year	Density(D)	Row spacing(R)	Silking stage			Filling stage		
			3rd	5th	7th	3rd	5th	7th
2017	45000	60+60	1.89± 0.05 a	1.86± 0.04 a	1.84± 0.05 a	1.91± 0.05 a	1.86± 0.03 a	1.82± 0.03 a
		80+40	1.84± 0.03 a	1.81± 0.03 a	1.77± 0.02 ab	1.88± 0.03 a	1.83± 0.03 a	1.77± 0.04 a
		80+80	1.80± 0.06 a	1.81± 0.04 a	1.72± 0.05 ab	1.87± 0.03 a	1.81± 0.02 a	1.76± 0.01 a
		110+50	1.80± 0.08 a	1.79± 0.03 a	1.71± 0.04 ab	1.86± 0.02 a	1.80± 0.04 a	1.76± 0.03 a
		100+100	1.76± 0.06 a	1.78± 0.04 a	1.65± 0.05 b	1.84± 0.01 a	1.80± 0.02 a	1.75± 0.02 a
		Mean	**1.82 a**	**1.81a**	**1.74 a**	**1.87a**	**1.82a**	**1.78 a**
	67500	60+60	1.79± 0.04 a	1.67± 0.00 a	1.66± 0.02 a	1.83± 0.01 a	1.75± 0.02 a	1.69± 0.02 a
		80+40	1.78± 0.03 a	1.63± 0.00 a	1.63± 0.03 a	1.77± 0.01 a	1.71± 0.01 a	1.64± 0.01 a
		80+80	1.76± 0.03 a	1.66± 0.03 a	1.63± 0.03 a	1.75± 0.02 a	1.70± 0.00 a	1.63± 0.02 a
		110+50	1.66± 0.02 a	1.66± 0.02 a	1.63± 0.02 a	1.71± 0.05 a	1.69± 0.01 a	1.62± 0.04 a
		100+100	1.66± 0.05 a	1.63± 0.05 a	1.60± 0.02 a	1.70± 0.03 a	1.67± 0.02 a	1.61± 0.01 a
		Mean	**1.73 a**	**1.65 a**	**1.63 b**	**1.75 b**	**1.70 b**	**1.64 b**
	F-Value	D	2.49ns	15.72ns	32.00*	2707.89*	66.22*	54.66*
		R	2.17ns	0.85ns	2.07ns	1.95ns	1.57ns	1.82ns
		D×R	0.24ns	0.25ns	0.70ns	0.24ns	0.10ns	0.01ns
2018	45000	60+60	2.13± 0.03 a	2.07± 0.01 a	1.89± 0.05 a	2.24± 0.03 a	2.14± 0.08 a	1.94± 0.01 a
		80+40	2.09± 0.07 a	2.07± 0.02 a	1.86± 0.03 a	2.19± 0.01 a	2.11± 0.01 ab	1.93± 0.04 a
		80+80	2.04± 0.05 a	2.03± 0.04 a	1.84± 0.02 a	2.15± 0.02 a	2.09± 0.04 ab	1.90± 0.02 ab
		110+50	2.02± 0.01 a	2.01± 0.01 a	1.81± 0.02 a	2.01± 0.03 b	2.01± 0.03 b	1.83± 0.04 b
		Mean	**2.07 a**	**2.04 a**	**1.85 a**	**2.15 a**	**2.09 a**	**1.90 a**
	67500	60+60	2.06± 0.02 a	1.98± 0.02 a	1.85± 0.01 a	1.99± 0.01 a	1.93± 0.01 a	1.80± 0.04 a
		80+40	1.91± 0.05 ab	1.89± 0.04 ab	1.83± 0.01 a	1.96± 0.01 ab	1.88± 0.03 a	1.76± 0.03 a
		80+80	1.88± 0.03 b	1.85± 0.01 b	1.83± 0.03 ab	1.95± 0.03 b	1.87± 0.04 a	1.75± 0.01 a
		110+50	1.86± 0.03 b	1.82± 0.03 b	1.76± 0.01 b	1.86± 0.02 c	1.84± 0.02 a	1.73± 0.04 a
		Mean	**1.93 b**	**1.89 ab**	**1.82 a**	**1.94 b**	**1.88 b**	**1.76 b**
	90000	60+60	1.83± 0.04 a	1.80± 0.04 a	1.69± 0.04 a	1.93± 0.03 a	1.84± 0.05 a	1.72± 0.02 a
		80+40	1.81± 0.05 a	1.77± 0.05 a	1.66± 0.02 a	1.82± 0.01 ab	1.76± 0.02 a	1.68± 0.01 a
		80+80	1.80± 0.02 a	1.74± 0.01 a	1.65± 0.01 a	1.80± 0.02 b	1.77± 0.02 a	1.66± 0.03 a
		110+50	1.81± 0.01 a	1.78± 0.02 a	1.66± 0.03 a	1.83± 0.04 ab	1.82± 0.04 a	1.66± 0.03 a
		Mean	**1.81 c**	**1.77 b**	**1.66 b**	**1.84 c**	**1.80 b**	**1.68 b**
	F-Value	D	69.01**	89.37**	18.12**	96.77**	27.95**	22.13**
		R	6.80**	6.95**	2.65ns	12.35**	1.87ns	3.04ns
		D×R	1.66ns	1.91 ns	0.45ns	2.36ns	0.66ns	0.34ns

Note: Values represent the average ± the standard error. Values represent the average ± the standard error. The means of treatments were compared based on the Tukey test at a probability level of 0.05. In the same year, different lowercase letters indicate a significant difference. ns-non-significant. ** and * indicate a significant level of 0.01 ($p < 0.01$) and 0.05 ($p < 0.05$) respectively.

Table S3. Effects of density and row spacing on the internode dry weight (g cm^{-1})

Year	Density(D)	Row spacing(R)	Silking stage			Filling stage		
			3rd	5th	7th	3rd	5th	7th
2017	45000	60+60	5.43± 0.28 a	6.14± 0.19 a	5.49± 0.18 a	5.76± 0.18 a	6.19± 0.17 a	6.88± 0.06 a
		80+40	5.26± 0.46 a	5.80± 0.35 ab	5.25± 0.04 ab	5.02± 0.10 b	5.90± 0.11 a	6.53± 0.11 a
		80+80	5.22± 0.37 a	5.56± 0.34 ab	5.23± 0.11 ab	5.01± 0.11 b	5.84± 0.17 a	6.01± 0.16 b
		110+50	5.15± 0.48 a	5.65± 0.14 ab	5.20± 0.06 ab	4.99± 0.05 b	5.26± 0.07 b	5.96± 0.11 b
		100+100	5.11± 0.22 a	5.42± 0.16 b	4.95± 0.08 b	4.84± 0.19 b	5.10± 0.10 b	5.90± 0.07 b
		Mean	**5.24 a**	**5.71 a**	**5.22 a**	**5.13 a**	**5.66 a**	**6.26 a**
	67500	60+60	4.94± 0.37 a	5.40± 0.40 a	4.93± 0.09 a	5.14± 0.19 a	4.49± 0.10 a	4.94± 0.03 a
		80+40	4.59± 0.54 ab	5.04± 0.21 ab	4.92± 0.08 a	4.57± 0.13 ab	4.31± 0.15 a	4.55± 0.09 ab
		80+80	4.53± 0.45 ab	5.08± 0.14 ab	4.72± 0.10 a	4.53± 0.10 bc	4.51± 0.09 a	4.47± 0.06 b
		110+50	4.07± 0.21 bc	4.56± 0.21 bc	4.20± 0.29 b	4.18± 0.24 bc	4.30± 0.07 a	4.45± 0.07 b
		100+100	3.90± 0.43 c	4.45± 0.16 bc	4.10± 0.03 b	4.07± 0.18 c	3.92± 0.08 a	4.33± 0.01 b
		Mean	**4.41 b**	**4.91 b**	**4.57 b**	**4.50 b**	**4.31 b**	**4.55 b**
	F-Value	D	103.56**	81.62*	27.50*	99.23**	311.88**	4616.04**
		R	4.78**	8.32**	10.43**	14.65**	14.62**	18.20**
		D×R	1.49ns	1.09ns	2.40ns	0.66ns	0.83ns	2.25ns
2018	45000	60+60	4.29± 0.18 a	6.69± 0.18 a	6.31± 0.16 a	4.94± 0.14 a	7.45± 0.05 a	6.67± 0.05 a
		80+40	3.82± 0.04 ab	6.03± 0.40 b	5.80± 0.20 a	4.35± 0.16 b	7.32± 0.05 a	6.40± 0.07 a
		80+80	4.02± 0.02 bc	6.53± 0.33 a	6.08± 0.18 a	4.17± 0.28 bc	7.32± 0.19 a	6.31± 0.07 a
		110+50	3.76± 0.10 c	6.01± 0.03 b	5.76± 0.07 a	4.08± 0.17 c	6.95± 0.13 b	6.27± 0.12 a
		Mean	**3.97 a**	**6.31 a**	**5.99 a**	**4.39 a**	**7.26 a**	**6.41 a**
	67500	60+60	3.98± 0.29 a	6.01± 0.23 a	5.81± 0.30 a	4.25± 0.11 a	6.62± 0.03 a	5.82± 0.21 a
		80+40	3.45± 0.09 ab	5.93± 0.11 a	5.36± 0.12 a	3.90± 0.07 b	6.11± 0.06 b	5.48± 0.16 a
		80+80	3.59± 0.10 b	5.97± 0.04 a	5.87± 0.22 a	4.17± 0.19 ab	6.02± 0.05 b	5.70± 0.14 a
		110+50	3.43± 0.03 b	5.76± 0.10 a	5.29± 0.10 a	4.01± 0.16 ab	5.98± 0.05 b	5.41± 0.02 a
		Mean	**3.61 b**	**5.92 ab**	**5.58 ab**	**4.08 ab**	**6.18 b**	**5.60 b**
	90000	60+60	3.22± 0.09 a	4.71± 0.30 bc	4.95± 0.43 a	3.89± 0.12 a	5.62± 0.18 ab	5.12± 0.14 ab
		80+40	3.13± 0.10 a	4.48± 0.48 c	4.62± 0.07 a	3.79± 0.00 a	5.38± 0.12 b	4.83± 0.08 b
		80+80	3.41± 0.12 a	5.34± 0.45 ab	5.15± 0.12 a	3.74± 0.12 a	5.83± 0.09 a	5.32± 0.02 ab
		110+50	3.36± 0.21 a	5.56± 0.42 a	5.19± 0.08 a	3.86± 0.12 a	5.89± 0.09 a	5.36± 0.26 a
		Mean	**3.28 c**	**5.02 b**	**4.98 b**	**3.82 b**	**5.68 b**	**5.16 c**
	F-Value	D	73.57**	11.30*	14.37*	18.58**	45.79**	83.00**
		R	6.93**	3.95*	3.83*	9.21**	9.85**	2.01ns
		D×R	2.51ns	4.82**	1.13ns	4.23**	11.45**	1.59ns

Note: Values represent the average ± the standard error. The means of treatments were compared based on the Tukey test at a probability level of 0.05. In the same year, different lowercase letters indicate a significant difference. ns-non-significant. ** and * indicate a significant level of 0.01 ($p < 0.01$) and 0.05 ($p < 0.05$) respectively.

Table S4. Effects of density and row spacing on the internode length stem density (g cm^{-1})

Year	Density(D)	Row spacing(R)	Silking stage			Filling stage		
			3rd	5th	7th	3rd	5th	7th
2017	45000	60+60	0.59±0.01 a	0.46±0.02 a	0.34±0.02 a	0.70±0.02 a	0.47±0.04 a	0.44±0.01 a
		80+40	0.52±0.03 bc	0.42±0.02 ab	0.32±0.01 a	0.60±0.01 ab	0.42±0.05 a	0.41±0.03 ab
		80+80	0.58±0.02 ab	0.42±0.01 ab	0.32±0.01 a	0.57±0.01 bc	0.42±0.04 a	0.37±0.01 b
		110+50	0.53±0.01 bc	0.38±0.01 b	0.32±0.01 a	0.51±0.02 c	0.34±0.00 b	0.37±0.02 b
		100+100	0.51±0.02 c	0.37±0.01 b	0.30±0.01 a	0.49±0.02 c	0.32±0.00 b	0.36±0.02 b
		Mean	**0.55a**	**0.41a**	**0.32 a**	**0.57 a**	**0.39 a**	**0.39 a**
	67500	60+60	0.44±0.02 a	0.39±0.04 a	0.29±0.01 a	0.55±0.01 a	0.30±0.01 a	0.30±0.00 a
		80+40	0.42±0.02 ab	0.33±0.02 ab	0.29±0.02 a	0.44±0.06 ab	0.27±0.01 a	0.27±0.02 a
		80+80	0.40±0.01 ab	0.33±0.02 ab	0.27±0.01 ab	0.42±0.03 b	0.29±0.01 a	0.26±0.02 a
		110+50	0.34±0.04 bc	0.29±0.01 b	0.24±0.02 ab	0.38±0.05 b	0.27±0.01 a	0.26±0.02 a
		100+100	0.32±0.01 c	0.28±0.01 b	0.23±0.00 b	0.36±0.04 b	0.23±0.01 a	0.24±0.00 a
		Mean	**0.38 b**	**0.33 b**	**0.26 b**	**0.43 b**	**0.27 b**	**0.26 b**
	F-Value	D	1061.68**	59.72*	50.87*	18.77*	62.78*	2627.97**
		R	7.29**	8.71**	4.34*	18.35**	6.88**	4.36*
		D×R	1.62ns	0.05ns	0.77ns	0.21ns	1.59ns	0.38ns
2018	45000	60+60	0.52±0.03 a	0.40±0.01 a	0.34±0.02 a	0.59±0.03 a	0.42±0.01 a	0.33±0.00 a
		80+40	0.45±0.03 a	0.33±0.01 bc	0.30±0.01 ab	0.48±0.03 b	0.41±0.02 a	0.31±0.01 ab
		80+80	0.51±0.01 ab	0.36±0.02 b	0.31±0.01 ab	0.47±0.05 b	0.40±0.01 a	0.31±0.00 ab
		110+50	0.43±0.01 b	0.32±0.01 c	0.29±0.00 b	0.44±0.02 b	0.37±0.01 b	0.30±0.01 b
		Mean	**0.48 a**	**0.35 a**	**0.31 a**	**0.50 a**	**0.40 a**	**0.31 a**
	67500	60+60	0.46±0.03 a	0.33±0.01 a	0.30±0.01 a	0.45±0.00 a	0.35±0.01 a	0.28±0.01 a
		80+40	0.39±0.02 a	0.32±0.01 a	0.27±0.00 ab	0.40±0.01 a	0.33±0.01 ab	0.27±0.02 ab
		80+80	0.40±0.01 a	0.33±0.01 a	0.29±0.01 ab	0.42±0.03 a	0.32±0.01 ab	0.27±0.01 ab
		110+50	0.38±0.01 a	0.31±0.01 a	0.26±0.00 b	0.39±0.02 a	0.31±0.01 b	0.25±0.00 b
		Mean	**0.41 b**	**0.32 ab**	**0.28 b**	**0.42 b**	**0.33 b**	**0.27 b**
	90000	60+60	0.34±0.03 a	0.26±0.02 ab	0.23±0.02 a	0.40±0.02 a	0.30±0.00 a	0.24±0.01 a
		80+40	0.31±0.01 a	0.24±0.03 b	0.21±0.00 a	0.36±0.01 a	0.27±0.01 a	0.22±0.00 b
		80+80	0.34±0.02 a	0.28±0.02 a	0.23±0.00 a	0.34±0.01 a	0.29±0.00 a	0.24±0.00 a
		110+50	0.34±0.01 a	0.29±0.02 a	0.24±0.00 a	0.37±0.00 a	0.30±0.01 a	0.24±0.01 a
		Mean	**0.33 c**	**0.27 b**	**0.23 c**	**0.37 c**	**0.29 b**	**0.23 c**
	F-Value	D	70.84**	9.02*	69.61**	118.57**	53.93**	44.51**
		R	3.37*	5.40**	4.16*	4.81*	5.06*	2.83ns
		D×R	0.90ns	6.32**	1.30ns	0.89ns	1.65ns	1.34ns

Note: Values represent the average ± the standard error. The means of treatments were compared based on the Tukey test at a probability level of 0.05. In the same year, different lowercase letters indicate a significant difference. ns-non-significant. ** and * indicate a significant level of 0.01 ($p < 0.01$) and 0.05 ($p < 0.05$) respectively.

Table S5. Effects of density and row spacing on basal internode lignin content of maize (%)

Year	Plant density(D)	Row spacing(R)	Silking stage			Filling stage		
			3rd	5th	7th	3rd	5th	7th
2017	45000	60+60	16.87±0.41 a	13.23±0.35 a	12.82±0.37 a	17.23±0.33 a	14.02±0.54 a	12.45±0.00 a
		80+40	15.49±0.48 ab	11.47±0.32 b	10.48±0.26 bc	16.86±0.04 a	13.71±0.54 a	12.37±0.06 ab
		80+80	15.19±0.38 ab	13.03±0.16 a	11.50±0.27 ab	16.67±0.37 a	13.71±0.26 a	12.40±0.04 ab
		110+50	15.23±0.33 ab	11.14±0.39 bc	10.44±0.16 bc	16.34±0.27 a	13.48±0.13 a	12.10±0.23 bc
		100+100	14.76±0.33 b	10.09±0.36 c	9.99±0.12 c	16.07±0.20 a	13.37±0.26 a	11.43±0.48 c
		Mean	**15.51a**	**11.79 a**	**11.05 a**	**16.63 a**	**13.66 a**	**12.15 a**
	67500	60+60	12.76±0.41 a	10.60±0.57 a	8.81±0.59 a	14.68±0.37 a	12.72±0.41 a	10.03±0.08 a
		80+40	12.17±0.43 a	10.23±0.39 ab	8.75±0.31 a	14.06±0.17 a	12.44±0.26 ab	9.87±0.02 a
		80+80	12.13±0.48 a	10.09±0.22 ab	8.74±0.14 a	13.79±0.38 a	11.83±0.19 ab	10.06±0.13 a
		110+50	11.69±0.51 a	9.38±0.29 bc	8.47±0.42 a	13.25±0.60 a	11.49±0.04 b	9.64±0.28 a
		100+100	11.63±0.45 a	8.98±0.26 c	7.90±0.43 a	13.15±0.56 a	11.70±0.14 b	9.11±0.33 a
		Mean	**12.08 b**	**9.86 a**	**8.53 b**	**13.79 b**	**12.04 a**	**9.74 b**
		CV(%)	6.65	6.61	6.90	4.79	4.47	3.33
		D	140.91**	13.18ns	1375.62**	158.73ns	8.13ns	158.64**
	F-Value	R	2.92ns	15.39**	6.92**	2.78**	4.11*	7.05**
		D×R	0.33ns	2.79ns	2.91ns	0.09ns	0.90ns	0.07ns
2018	45000	60+60	14.74±0.22 a	11.67±0.20 a	11.35±0.33 a	15.02±0.46 a	13.39±0.27 a	12.20±0.29 a
		80+40	13.11±0.34 b	11.27±0.09 a	10.65±0.32 a	14.84±0.33 ab	12.55±0.25 ab	11.54±0.31 a
		80+80	12.28±0.31 b	10.06±0.12 b	9.56±0.27 b	14.30±0.23 ab	12.73±0.32 ab	11.69±0.30 a
		110+50	12.21±0.41 b	10.04±0.33 b	9.53±0.23 b	14.03±0.38 b	12.15±0.11 b	11.58±0.28 a
		Mean	**13.08 a**	**10.76 a**	**10.27 a**	**14.55 a**	**12.71 a**	**11.75 a**
	67500	60+60	11.98±0.28 a	10.75±0.19 a	9.50±0.15 a	14.83±0.26 a	12.52±0.35 a	11.26±0.26 a
		80+40	11.66±0.26 ab	10.60±0.42 a	9.28±0.13 ab	14.13±0.32 a	12.50±0.31 a	9.94±0.36 b
		80+80	10.6±0.47 b	10.22±0.24 a	8.40±0.14 bc	12.96±0.30 b	10.74±0.29 b	10.08±0.23 ab
		110+50	11.42±0.41 ab	10.07±0.16 a	8.30±0.31 c	12.80±0.27 b	11.16±0.37 b	10.01±0.42 b
		Mean	**11.42 b**	**10.41 a**	**8.87 b**	**13.68 b**	**11.73 b**	**10.32 b**
	90000	60+60	11.76±0.27 a	10.04±0.19 a	8.39±0.26 a	11.13±0.45 a	12.09±0.11 a	9.81±0.21 a
		80+40	10.70±0.16 ab	9.19±0.15 a	8.33±0.38 a	11.72±0.22 a	10.17±0.20 b	9.20±0.38 a
		80+80	9.86±0.35 b	9.14±0.42 a	7.26±0.21 b	10.86±0.41 a	9.72±0.26 b	8.00±0.29 b
		110+50	11.07±0.33 ab	9.41±0.35 a	8.19±0.36 a	11.70±0.21 a	10.73±0.32 b	9.07±0.28 a
		Mean	**10.85 b**	**9.44 b**	**8.04 b**	**11.35 c**	**10.68 c**	**9.02 c**
		CV(%)	5.80	5.04	6.10	5.24	4.84	6.26
		D	51.81**	15.91*	35.66**	103.16**	177.88**	321.16**
	F-Value	R	12.09**	9.09**	15.42**	6.73**	14.04**	8.15**
		D×R	1.50ns	1.84ns	1.69ns	2.91*	3.34*	1.58ns

Note: Values represent the average ± the standard error. The means of treatments were compared based on the Tukey test at a probability level of 0.05. In the same year, different lowercase letters indicate a significant difference. ns-non-significant. ** and * indicate a significant level of 0.01 (p < 0.01) and 0.05 (p < 0.05) respectively.

Table S6. Effects of density and row spacing on basal internode cellulose content of maize (%)

Year	Plant density(D)	Row spacing(R)	Silking stage			Filling stage		
			3rd	5th	7th	3rd	5th	7th
2017	45000	60+60	30.37±0.57 a	25.80±0.31 a	25.53±0.09 a	31.60±0.49 a	30.43±0.31 a	29.51±0.32 a
		80+40	26.84±0.80 b	25.65±0.73 a	25.01±0.49 a	31.29±0.51 a	26.26±0.42 c	26.83±0.22 b
		80+80	24.73±0.20 c	24.55±0.67 ab	20.40±0.40 b	26.90±0.39 b	22.98±0.20 d	25.95±0.33 b
		110+50	23.97±0.59 c	23.37±0.21 bc	21.34±0.23 b	23.18±0.45 c	27.17±0.21 b	23.94±0.26 c
		100+100	23.00±0.63 d	22.32±0.21 c	17.57±0.81 c	27.27±0.30 b	26.69±0.07 bc	22.41±0.24 d
		Mean	**25.78 a**	**24.34 a**	**21.97 a**	**28.05 a**	**26.71 a**	**25.73 a**
	67500	60+60	26.74±0.83 a	24.24±0.29 a	20.49±0.27 ab	30.24±0.08 a	28.84±0.11 a	24.02±0.24 a
		80+40	20.90±0.54 d	19.33±0.21 c	21.99±0.11 a	27.69±0.24 b	23.88±0.06 c	23.73±0.36 a
		80+80	25.06±0.83 b	22.81±0.27 ab	19.87±0.20 b	25.57±0.32 c	25.73±0.13 d	23.77±0.25 a
		110+50	25.54±0.44 ab	18.64±0.15 c	19.56±0.43 b	21.36±0.48 d	21.87±0.11 b	20.74±0.21 b
		100+100	22.21±0.64 c	22.00±0.49 b	17.17±0.42 c	24.05±0.32 c	23.92±0.13 c	20.54±0.21 b
		Mean	**24.09 b**	**21.41 b**	**19.82 b**	**25.78 b**	**24.85 b**	**22.56 b**
		CV(%)	5.18	3.21	3.70	2.90	1.43	2.32
	F-Value	D	83.05*	166.14**	587.07**	826.86**	0.36ns	1299.68**
		R	113.50**	18.18**	79.03**	93.55**	1.64ns	73.05**
		D×R	53.87**	12.00**	12.06**	2.32ns	0.82ns	7.71**
2018	45000	60+60	28.14±0.40 a	24.98±0.45 a	20.40±0.48 a	29.05±0.32 a	26.01±0.13 a	24.55±0.35 a
		80+40	26.11±0.26 b	23.95±0.34 a	19.05±0.48 ab	26.27±0.48 b	24.36±0.42 b	24.38±0.40 a
		80+80	25.91±0.64 b	22.59±0.20 b	18.41±0.43 b	25.58±0.31 bc	22.02±0.42 c	22.33±0.46 b
		110+50	24.59±0.71 c	21.36±0.25 c	18.86±0.33 ab	25.15±0.55 c	23.72±0.33 b	20.65±0.50 c
		Mean	**26.19 a**	**23.22 a**	**19.18 a**	**26.51 a**	**24.03 a**	**22.98 a**
	67500	60+60	25.81±0.40 a	21.70±0.39 a	18.78±0.57 a	25.44±0.26 a	22.71±0.38 a	21.60±0.25 a
		80+40	22.45±0.29 b	19.92±0.53 b	18.23±0.52 a	24.88±0.37 ab	22.37±0.45 a	21.56±0.43 a
		80+80	22.52±0.49 b	21.40±0.42 ab	18.94±0.29 a	23.75±0.34 bc	19.28±0.48 b	20.50±0.27 b
		110+50	22.04±0.41 b	20.87±0.22 ab	18.42±0.54 a	23.18±0.36 c	19.91±0.20 b	20.19±0.14 b
		Mean	**23.21 b**	**20.97 b**	**18.59 a**	**24.31 b**	**21.07 b**	**20.96 b**
	90000	60+60	23.40±0.42 a	19.56±0.58 a	17.39±0.41 a	22.41±0.15 a	21.18±0.40 a	19.90±0.34 a
		80+40	21.76±0.35 ab	18.98±0.28 a	17.15±0.16 a	22.05±0.22 a	19.68±0.14 ab	18.86±0.28 ab
		80+80	21.76±0.50 b	18.92±0.20 a	17.72±0.26 a	21.53±0.50 a	18.58±0.12 b	18.50±0.31 b
		110+50	22.31±0.45 ab	19.72±0.43 a	18.13±0.54 a	22.14±0.38 a	19.03±0.12 b	18.96±0.50 ab
		Mean	**22.31 b**	**19.29 c**	**17.60 b**	**22.03 c**	**19.62 c**	**19.06 c**
		CV(%)	3.95	3.61	4.79	3.09	2.93	3.56
	F-Value	D	19.60**	122.41**	33.38**	168.53**	168.90**	69.00**
		R	21.33**	45.86*	1.07ns	14.36**	36.10**	26.93**
		D×R	2.08ns	4.27**	1.50ns	3.38*	1.74ns	6.92**

Note: Values represent the average ± the standard error. The means of treatments were compared based on the Tukey test at a probability level of 0.05. In the same year, different lowercase letters indicate a significant difference. ns-non-significant. ** and * indicate a significant level of 0.01 ($p < 0.01$) and 0.05 ($p < 0.05$) respectively.