

**Table S1** Root weight density (g m<sup>-3</sup>) of cultivar DH618 and SC704 in different soil depths at silking and maturity under density D1 and D2 in 2019 and 2021

Growth stage	Density	Cultivar	2019					2021				
			Soil depths (cm)				Total	Soil depths (cm)				Total
			0-10	10-20	20-40	40-60		0-10	10-20	20-40	40-60	
Silking	D1	DH618	973.43cd	189.81a	93.93bc	39.11c	324.07cd	1020.10cd	294.52a	111.49cde	57.25abc	370.84b
		SC704	920.23cd	146.45ab	82.45c	64.05b	303.29d	1071.04bcd	232.32bc	127.65bcd	73.11a	376.03b
	D2	DH618	1420.38a	185.79a	122.73b	48.61bc	444.38a	1390.18a	315.60a	227.17a	65.35ab	499.58a
		SC704	1384.66a	180.13a	102.21bc	63.69b	432.67a	1395.52a	278.10ab	128.48bc	57.17abc	464.82a
Maturity	D1	DH618	963.25cd	127.06b	79.65c	37.04c	301.75d	837.65e	134.63e	107.37cde	46.09bc	281.44d
		SC704	859.27d	188.98a	97.34bc	43.28c	297.22d	1001.44d	152.63de	94.20e	42.89c	322.79c
	D2	DH618	1016.01bc	193.82a	163.95a	108.88a	370.67b	1163.95b	203.60cd	141.24b	72.39a	395.29b
		SC704	1144.17b	150.65ab	76.36c	48.41bc	354.90bc	1157.41bc	156.16de	101.20de	56.77abc	367.88b

Note: Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.

**Table S2** Between-row root weight density ( $\text{g m}^{-3}$ ) of cultivar DH618 and SC704 at silking and maturity under density D1 and D2 in 2019 and 2021

Growth stage	Density	Cultivar	2019					2021				
			From narrow row center (cm)					From narrow row center (cm)				
			0-11	11-22	22-33	33-44	44-55	0-11	11-22	22-33	33-44	44-55
Silking	D1	DH618	138.14bc	804.99c	542.94ab	71.55ab	62.74a	251.36bc	1032.04bcd	336.57bc	186.76a	47.47b
		SC704	95.35c	910.55c	447.58bc	42.71c	20.29b	213.01cd	1034.09bcd	517.68a	72.37cd	43.00bc
	D2	DH618	272.15a	1548.43a	264.96d	79.38a	56.97ab	370.96a	1629.39a	332.53bc	114.37b	50.63b
		SC704	132.92bc	1649.11a	281.35d	60.75abc	39.23ab	326.01ab	1530.56a	275.51c	110.10b	81.92a
Maturity	D1	DH618	189.20b	942.55c	303.98d	45.60bc	27.41ab	180.53cd	996.50d	149.10d	45.99d	35.07
		SC704	150.86bc	921.94c	277.92d	79.39a	55.98ab	190.18cd	1018.84cd	306.26c	60.68cd	38.00bc
	D2	DH618	173.31b	1171.50b	385.03cd	69.73abc	53.76ab	361.58a	1177.92b	346.37bc	65.57cd	25.03c
		SC704	100.55c	932.15c	613.41a	64.78abc	63.60a	153.07d	1143.32bc	418.88ab	78.71c	45.43b

Note: Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.

**Table S3** Root weight density (g m<sup>-3</sup>) of cultivar DH618 and SC704 at different positions at silking and maturity under density D1 and D2 in 2019 and 2021

Growth stage	Density	Cultivar	2019		2021	
			plant	Among plant	plant	Among plant
Silking	D1	DH618	561.59bc	205.31bc	581.85cd	265.34b
		SC704	447.38d	221.78bc	583.90cd	272.09b
	D2	DH618	699.34a	316.90a	760.29a	369.22a
		SC704	701.75a	298.13a	681.45ab	356.50a
Maturity	D1	DH618	491.03cd	207.10bc	527.64d	158.33c
		SC704	460.53d	215.56bc	615.09bcd	176.64c
	D2	DH618	622.82ab	244.59b	683.50ab	251.19b
		SC704	694.31a	185.19c	619.55bc	242.05b

Note: “Plant” refers to the middle of the three portions based on the plant spacing for a single-plant, “Among Plant” refers to the average value of the other two portions. Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.

**Table S4** Root length density (cm cm<sup>-3</sup>) of cultivar DH618 and SC704 in different soil depths at silking and maturity under density D1 and D2 in 2019 and 2021

Growth stage	Density	Cultivar	2019					2021				
			Soil depths (cm)				Total	Soil depths (cm)				Total
			0-10	10-20	20-40	40-60		0-10	10-20	20-40	40-60	
Silking	D1	DH618	1.05a	0.48b	0.23bcd	0.14c	0.47bc	1.00ab	0.57b	0.17d	0.10d	0.46bc
		SC704	1.01ab	0.19d	0.16d	0.18c	0.39d	0.87b	0.55b	0.31b	0.20ab	0.48ab
	D2	DH618	1.04ab	0.63a	0.47a	0.33a	0.62a	1.11ab	0.71a	0.22cd	0.15bcd	0.55a
		SC704	0.92ab	0.34c	0.28b	0.26b	0.45bcd	1.19a	0.51b	0.34b	0.14cd	0.55a
Maturity	D1	DH618	0.95ab	0.56ab	0.26bc	0.13c	0.48bc	0.58c	0.20d	0.27bc	0.25a	0.33de
		SC704	0.56c	0.20d	0.20bcd	0.18c	0.29e	0.55c	0.24cd	0.16d	0.09d	0.26e
	D2	DH618	0.80b	0.60a	0.40a	0.18c	0.50b	0.87b	0.30c	0.42a	0.12cd	0.43bc
		SC704	0.96ab	0.29cd	0.18cd	0.14c	0.39cd	0.95ab	0.27cd	0.21cd	0.15bc	0.40cd

Note: Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.

**Table S5** Between-row root length density ( $\text{cm cm}^{-3}$ ) of cultivar DH618 and SC704 at silking and maturity under density D1 and D2 in 2019 and 2021

Growth stage	Density	Cultivar	2019					2021				
			From narrow row center (cm)					From narrow row center (cm)				
			0-11	11-22	22-33	33-44	44-55	0-11	11-22	22-33	33-44	44-55
Silking	D1	DH618	0.41bc	0.95ab	0.53ab	0.30b	0.18bc	0.49bc	0.83bc	0.51a	0.32a	0.17b
		SC704	0.37c	0.75bc	0.51ab	0.22bcde	0.09c	0.60ab	0.89bc	0.47a	0.27a	0.19ab
	D2	DH618	0.72a	0.91ab	0.62ab	0.45a	0.38a	0.66ab	1.14a	0.57a	0.24ab	0.12c
		SC704	0.38bc	0.90ab	0.44bc	0.27bc	0.26b	0.70a	0.97ab	0.55a	0.30a	0.21a
Maturity	D1	DH618	0.53b	0.92ab	0.50bc	0.25bcd	0.18bc	0.35cd	0.71cd	0.32b	0.17bc	0.09cd
		SC704	0.33c	0.56c	0.31c	0.15e	0.09c	0.33cd	0.50d	0.27b	0.13c	0.07d
	D2	DH618	0.39bc	1.02a	0.70a	0.20cde	0.18bc	0.52abc	1.02ab	0.34b	0.14c	0.11cd
		SC704	0.26c	0.85ab	0.62ab	0.16de	0.08c	0.29d	0.89bc	0.55a	0.17bc	0.09cd

Note: Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.

**Table S6** Root length density (cm cm<sup>-3</sup>) of cultivar DH618 and SC704 at different positions at silking and maturity under density D1 and D2 in 2019 and 2021

Growth stage	Density	Cultivar	2019		2021	
			plant	Among plant	plant	Among plant
Silking	D1	DH618	0.48bc	0.47b	0.51b	0.44b
		SC704	0.47bc	0.35cd	0.60a	0.43b
	D2	DH618	0.64a	0.60a	0.65a	0.49ab
		SC704	0.50bc	0.42bc	0.50bc	0.57a
Maturity	D1	DH618	0.56ab	0.43bc	0.41d	0.29c
		SC704	0.35d	0.26d	0.29e	0.24c
	D2	DH618	0.55abc	0.47b	0.42cd	0.43b
		SC704	0.46c	0.36c	0.39d	0.40b

Note: Note: “Plant” refers to the middle of the three portions based on the plant spacing for a single-plant, “Among Plant” refers to the average value of the other two portions. Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.

**Table S7** Root dry weight (g plant<sup>-1</sup>) of cultivar DH618 and SC704 in different soil depths at silking and maturity under density D1 and D2 in 2019 and 2021

Growth stage	Density	Cultivar	2019					2021				
			Soil depths (cm)				Total	Soil depths (cm)				Total
			0-10	10-20	20-40	40-60		0-10	10-20	20-40	40-60	
Silking	D1	DH618	12.85a	2.51a	2.48ab	1.03b	18.87a	13.47a	3.89a	2.94bc	1.51ab	21.81a
		SC704	11.81ab	1.93b	2.18abc	1.69a	17.61ab	14.14a	3.07b	3.37ab	1.93a	22.5a
	D2	DH618	11.72ab	1.53bc	2.03bc	0.80b	16.08bc	11.47b	2.60bc	3.75a	1.08bc	18.9b
		SC704	11.42b	1.49bc	1.69cd	1.05b	15.65c	11.51b	2.29cd	2.12de	0.94c	16.87c
Maturity	D1	DH618	12.71a	1.68bc	2.10abc	0.98b	17.47ab	11.06b	1.78def	2.83bc	1.22bc	16.89c
		SC704	11.34b	2.49a	2.57ab	1.14b	17.55ab	13.22a	2.01de	2.49cd	1.13bc	18.85b
	D2	DH618	8.38c	1.60bc	2.71a	1.80a	14.48c	9.60c	1.68ef	2.33cd	1.19bc	14.81d
		SC704	9.44c	1.24c	1.26d	0.80b	12.74d	9.55c	1.29f	1.67e	0.94c	13.44d

Note: Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.

**Table S8** Root length (m plant<sup>-1</sup>) of cultivar DH618 and SC704 in different soil depths at silking and maturity under density D1 and D2 in 2019 and 2021

			2019					2021				
Growth	Density	Cultivar	Soil depths (cm)				Total	Soil depths (cm)				Total
			0-10	10-20	20-40	40-60		0-10	10-20	20-40	40-60	
Silking	D1	DH618	138.50a	63.11b	59.63bc	37.14bcd	298.39a	132.15a	75.52a	45.9cd	25.45b	279.01b
		SC704	133.87a	25.04d	42.84cd	48.79ab	250.54bc	114.31ab	72.91a	81.73a	52.53a	321.49a
	D2	DH618	85.54b	51.78c	77.50a	54.15a	268.96ab	91.52bcd	58.17b	36.26d	24.52b	210.47cd
		SC704	75.81b	27.83d	45.56cd	42.93abc	192.14de	98.46bc	42.04c	56.05bc	23.00b	219.55cd
Maturity	D1	DH618	125.34a	74.51a	68.41ab	33.59cde	301.85a	77.11cd	26.93de	71.67ab	65.57a	241.27c
		SC704	74.46b	26.85d	52.92bc	47.64ab	201.88d	72.87d	31.57d	41.58cd	24.79b	170.80e
	D2	DH618	66.22b	49.39c	66.76ab	30.25de	212.62cd	72.17d	25.02de	68.86ab	19.43b	185.47de
		SC704	79.27b	24.27d	29.32d	23.42e	156.27e	78.75cd	21.96e	35.17d	25.34b	161.22e

Note: Means in the same column not sharing any letter are significantly different by the LSD-test at the 5% level of significance.