

Comparative Performance of BARBREN and LONREN

**David B. Weaver
Professor
Department of Agronomy and Soils
Auburn University AL 36849**

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BARBREN-713 activities at Auburn

Since April 2011, four BARBREN related activities were started:

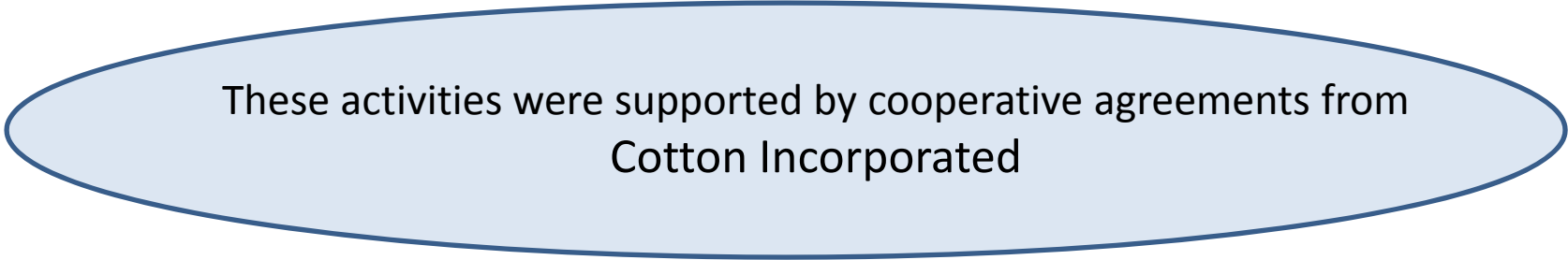
(1) Uniform Field Evaluation of BARBREN

conducted in collaboration with LSU Agricultural Center and Texas AgriLife Research

(2) Inclusion in ongoing Yield + Quality trial (LONREN-1 × Fibermax 966 progenies)

(3) Various inoculums assay in greenhouse

(4) BARBREN progeny development



These activities were supported by cooperative agreements from
Cotton Incorporated

Activity 1

Uniform Evaluation of BARBREN-713 and LONREN 21-4

**2 lines of
interest**

LONREN 21-4

GB 6-1-2

a.k.a. BARBREN-713

4 checks

DP5415

ST5288B2F

PHY375WR

FM9160B2F

3 locations

Belle Mina, AL

Lubbock, TX

St. Joseph, LA

Common design

6 x 6 Latin Square

2 row plots - 50 ft ea.

**common fungicide
treatment**

4 seed / foot

field data

nematode counts

(pre-plant and mid-August)

stand count (30 DAP)

plant heights (45 DAP)

node count (45 DAP)

yield and turnout

fiber analysis

root analysis

10 seedlings/plot

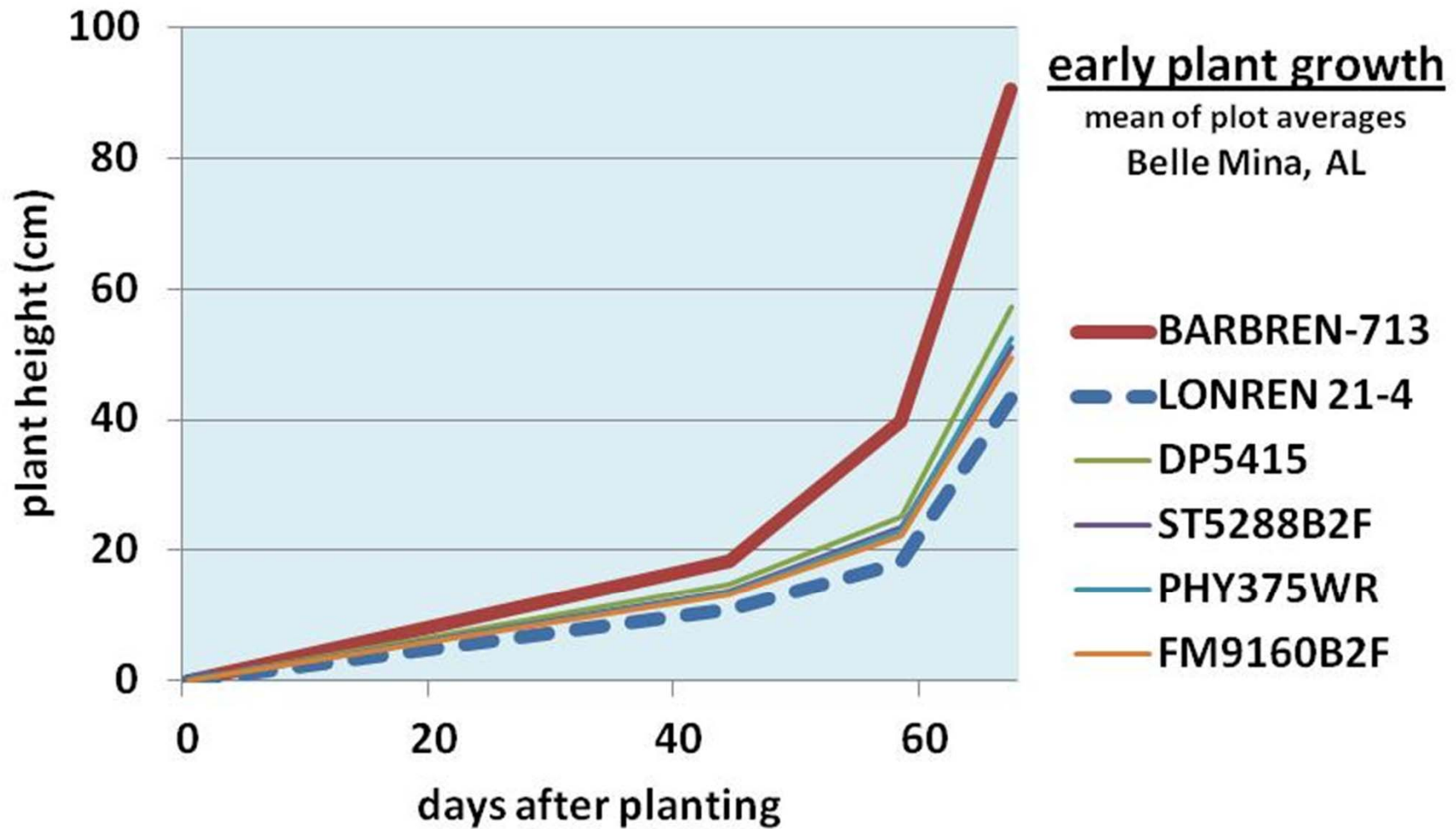
(excavate at 30 DAP)

nematode count

egg count

seedling development

at the 2011 uniform evaluation test



Belle Mina, July 14, 2011 (58 days after planting)



plot 301 – BARBREN-713

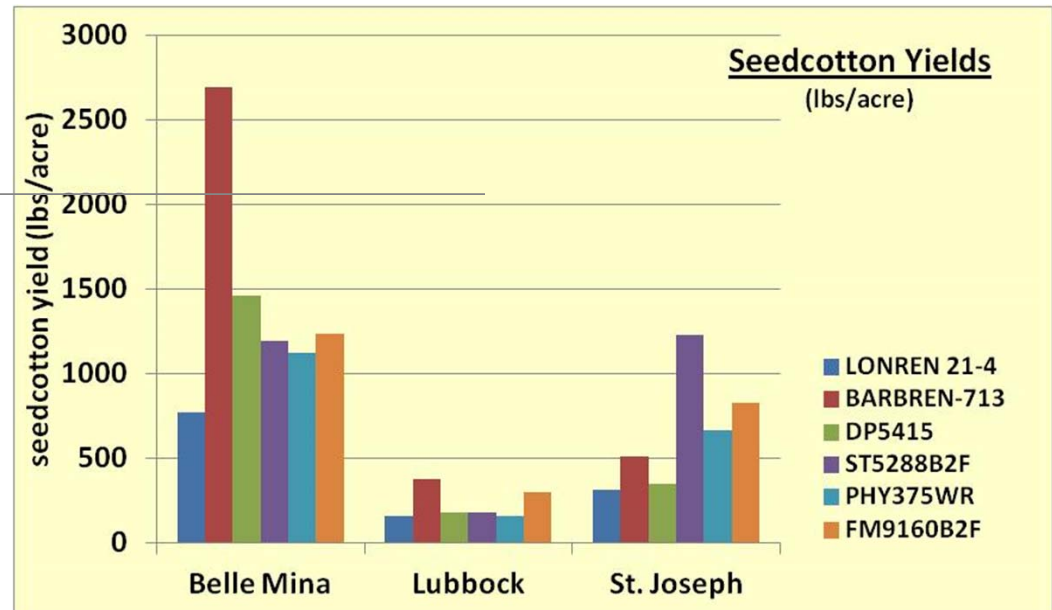
plot 302 - LONREN 21-4

four row plots

Seed cotton Yields

variety	Belle Mina (1)	Lubbock (1)	St. Joseph (2)
	-----	lbs/acre	-----
LONREN 21-4	776 c (3)	163 b	317 c
BARBREN-713	<u>2698</u> a (4)	<u>381</u> a	513 bc
DP5415	1462 b	181 b	350 c
ST5288B2F	1196 bc	184 b	<u>1232</u> a
PHY375WR	1124 bc	161 b	666 bc
FM9160B2F	1235 bc	<u>304</u> a	827 b
LSD _{0.05}	549	109	400

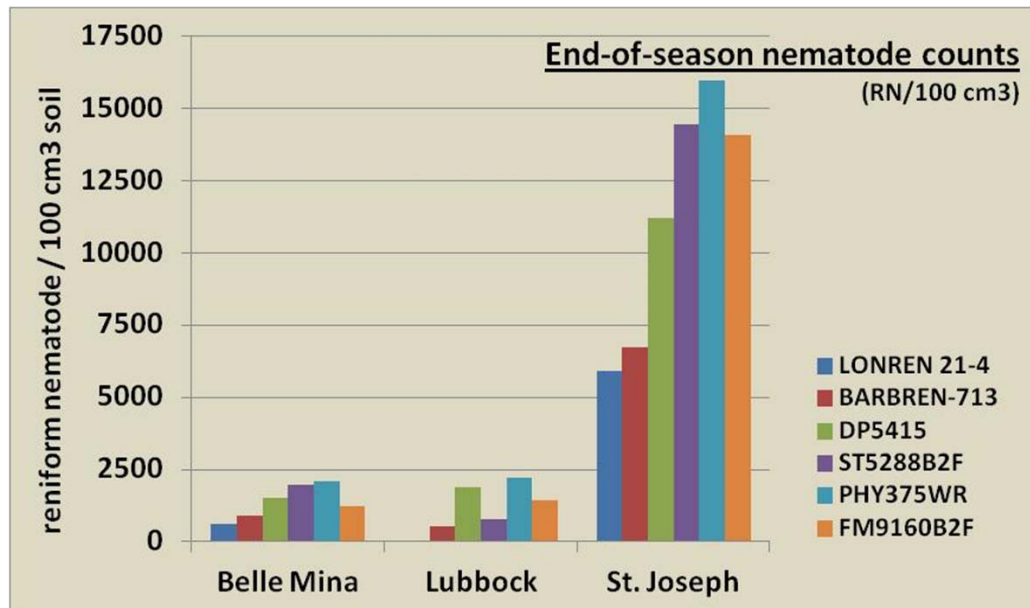
- (1) Belle Mina and Lubbock: means from 6 replications
 (2) St. Joseph: means from 4 replications
 (3) Means in columns followed by the same letter do not differ significantly at the 0.05 probability level
 (4) Lint percentage = 37.5%; lint yield = 1015 lbs/acre



End of season reniform nematode counts

<u>variety</u>	<u>Belle Mina (1)</u>	<u>Lubbock (1)</u>	<u>St. Joseph (1)</u>
	----- reniform nematode per 100 cm ³ soil -----		
LONREN 21-4	601 c⁽²⁾	23 d	5911 c
BARBREN-713	893 bc	533 bcd	6709 bc
DP5415	1519 abc	1893 ab	11221 abc
ST5288B2F	1983 ab	767 bcd	14432 a
PHY375WR	2086 a	2233 a	15957 a
FM9160B2F	1245 abc	1447 abc	14091 ab
LSD _{0.05}	1196	1223	7597

- (1) all locations: data are means of 6 replications
 (2) Means in columns followed by the same letter do not differ significantly at the 0.05 probability level



Activity 2

Inclusion of BARBREN-713 in ongoing Yield + Quality trial

- * Second year of progeny testing of the cross LONREN-1 × FM966 (F2:5 seed planted in 2011)
- * Consist of 20 RN resistant lines + 20 RN susceptible lines + 4 checks
- * Conducted at Tennessee Valley Research Station (Belle Mina)
- * Conducted on two adjacent fields:
 - one inoculated with reniform nematode
 - one free of reniform nematode (verified yearly)

Field view - 58 days after planting

TVREC - July 14, 2011



row 2227
LONREN 21-4

row 2228
LONREN-1

row 2229
LONREN-1 x FM966
resistant line A107

row 2230
BARBREN-713

single row plots

Results of the Yield and Quality test 2011

Lint Yield (summary)

group	Lint yield group means (lbs/acre)			
	RN present		RN absent	
	Estimate	StdErr	Estimate	StdErr
BARBREN-713	979	± 186	731	± 77
LONREN 21-4	525		721	
RN resistant lines (1)	782	± 43	920	± 20
RN susceptible lines (2)	921	± 42	962	± 20
LONREN-1 and -2	746	± 132	906	± 55
Susceptible checks (3)	1044	± 132	1031	± 55

Reniform Nematode Counts (summary)

group	36 days	4 days	season
	after	after	increase
	planting	harvesting	
	(RN/150cm ³ of soil)		(%)
BARBREN-713	973	1916	+ 97
LONREN 21-4	464	1097	+ 137
(1) 20 RN resistant lines of the cross LONREN-1 × FM966	1126	1242	+ 10
(2) 20 RN susceptible lines of the cross LONREN-1 × FM966	1031	2813	+ 173
(3) FM966 and DP393	765	1406	+ 84
Susceptible checks (3)	1035	3160	+ 205

Fiber Quality (summary)

group	group means of selected fiber quality traits						
	turnout	Upper Half	Uniformity		Strength	Elongation	Short Fiber
		Mean	Micronaire	Index			Content
	(%)	(inch)	(-)	(%)	(g/tex)	(%)	(%)
<u>Nematode present:</u>							
BARBREN-713	36.8	1.11	4.3	82.9	30.3	5.9	7.3
LONREN 21-4	38.5	1.15	4.6	83.1	30.6	5.9	7.2
RN resistant lines (1)	39.2	1.14	4.5	84.2	33.2	5.7	6.8
RN susceptible lines (2)	39.0	1.14	4.5	83.6	31.1	6.0	7.1
LONREN-1 and -2	39.5	1.13	4.3	83.4	30.7	5.7	7.2
Susceptible checks (3)	39.4	1.19	4.5	84.8	32.6	6.2	6.9
<u>Nematode absent:</u>							
BARBREN-713	38.8	1.11	4.6	82.8	32.2	4.2	7.2
LONREN 21-4	39.0	1.12	4.8	84.2	33.1	4.5	7.0
RN resistant lines	40.1	1.12	4.7	84.5	34.2	4.2	6.6
RN susceptible lines	40.8	1.13	4.7	84.3	32.1	4.6	6.7
LONREN-1 and -2	40.3	1.12	4.5	84.6	32.0	4.3	6.6
Susceptible checks	42.1	1.16	4.6	85.0	32.6	4.8	6.6

(1) 20 Reniform Nematode resistant lines of the cross LONREN-1 × FM966

(2) 20 Reniform Nematode susceptible lines of the cross LONREN-1 × FM966

(3) FM966 and DP393

Activity 3

Various inoculums assay

Similar to an assay conducted in 2010

see *Nematropica* 2011, Vol. 41, No. 1, pp. 68-74

Seven genotypes

RN resistant: BARBREN-713, LONREN 21-4, LONREN-1 and -2

RN susceptible: FM966, DP393 and line B211 (of LONREN-1 × FM966)

10 replications (2 for intermediate observations)

Six inoculum levels

0 - 500 - 1000 - 5000 - 10,000 - 50,000 RN per 150 cm³ of soil

Reniform Nematode extraction at 60 DAI

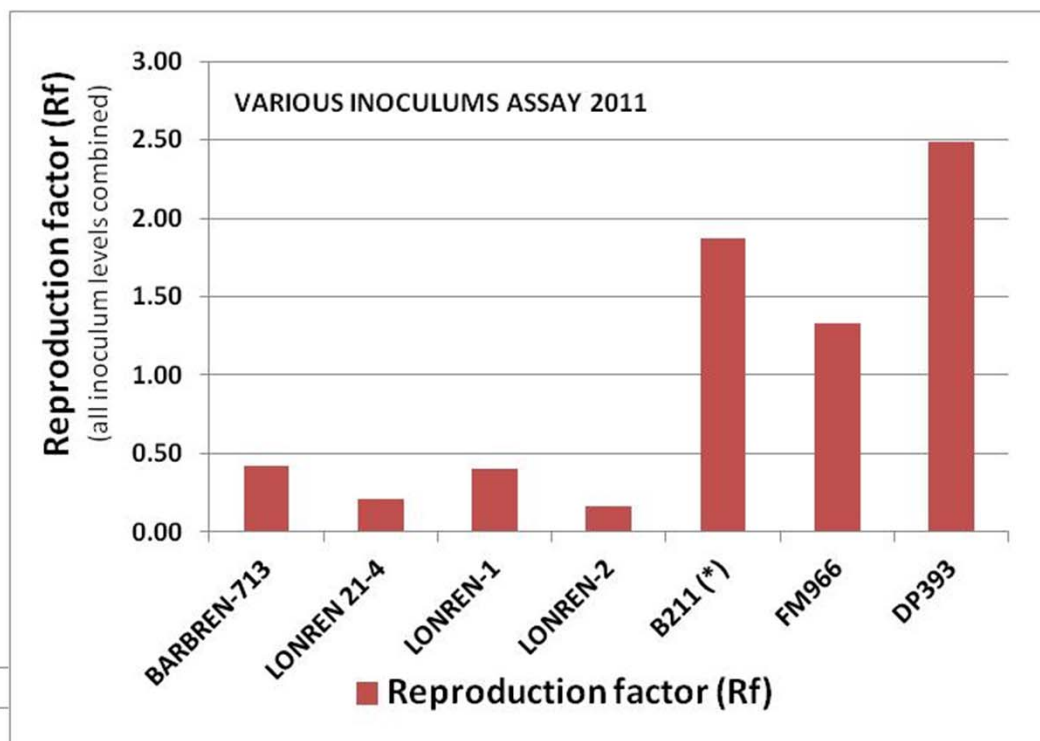
all seedlings photographed after extraction

data on fresh shoot and root mass collected

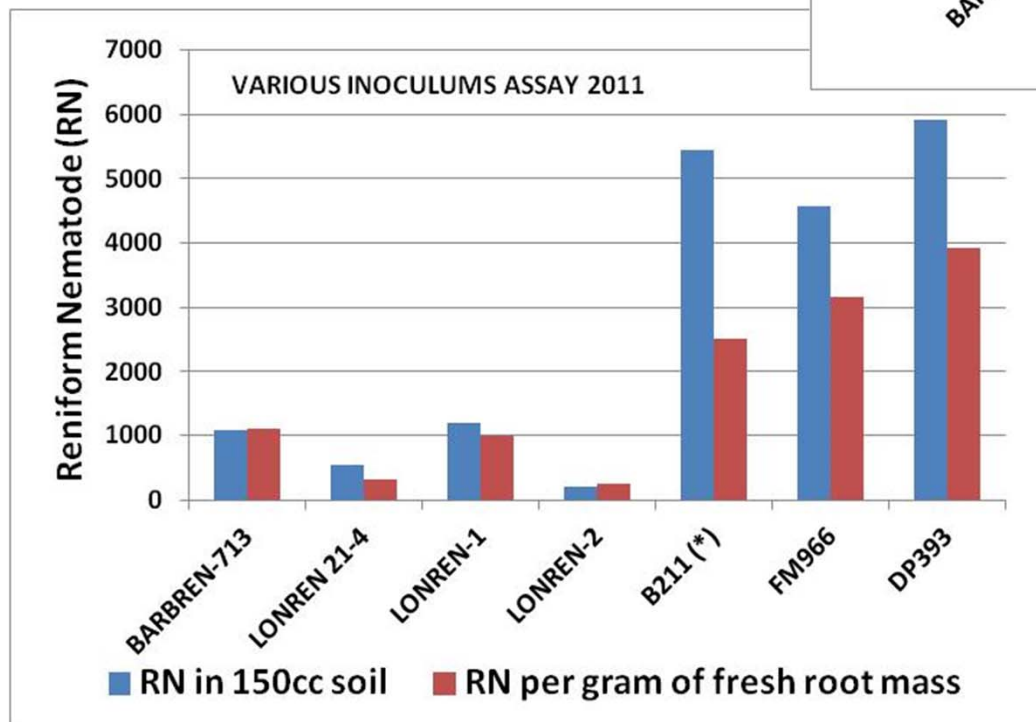
Combined results across all inoculum levels

Extracted reniform nematode:

- per cone-tainer (150 cm³)
- per gram of fresh root mass



Reproduction factors



(*) B211 is a RN susceptible line of the cross LONREN-1 x FM966

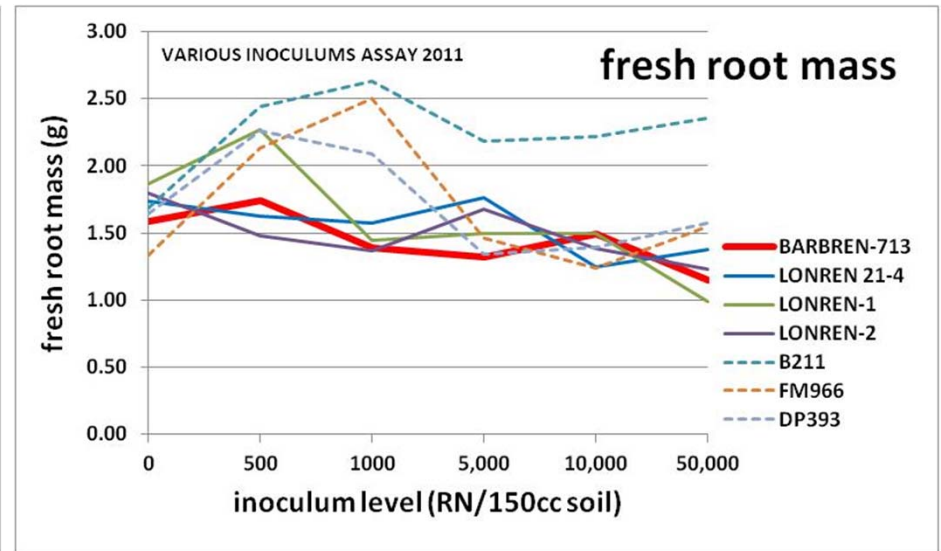
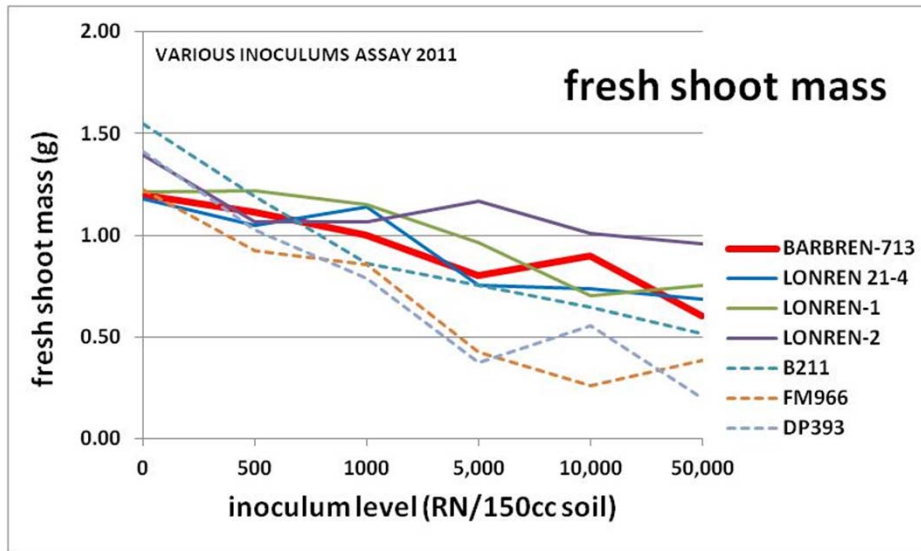


BARBREN-713

At 60 DAI, roots of BARBREN-713 showed, in general, less damage than those of the LONREN lines, but results varied widely.

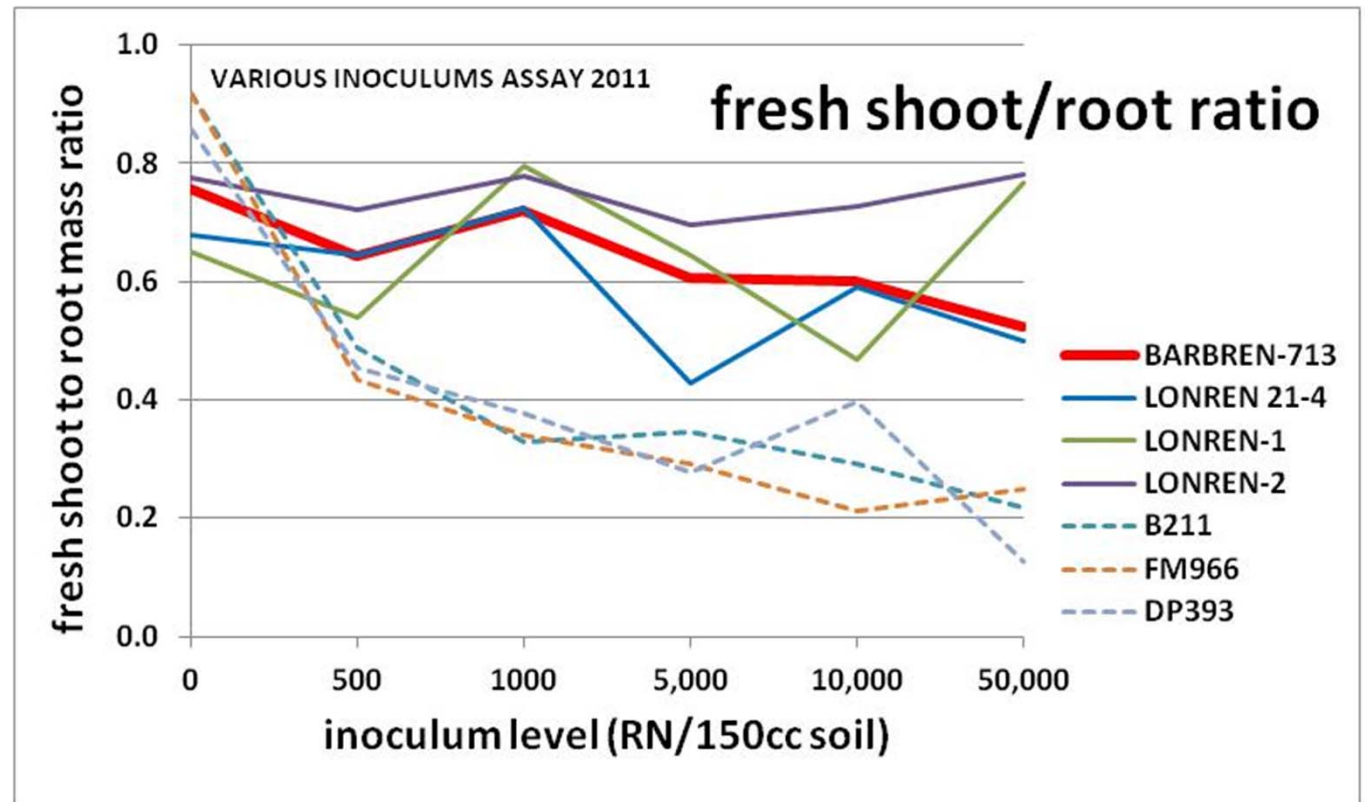


LONREN 21-4



Shoot and root development

In this assay
BARBREN-713
simulated the
behavior of the
LONREN lines



Summary of conclusions of the BARBREN-713 studies

BARBREN-713 limits reniform nematode reproduction

compared to non-resistant RN genotypes, though this
RN reproduction reduction seems to be less than achieved with LONREN lines

BARBREN-713 does not show signs of seedling stunting

BARBREN-713 yields on RN infested fields are encouraging

due to varied nature of the interaction between cotton and reniform nematode,
more field experience in a range of environments is required to allow for a
more qualified conclusion

BARBREN-713 fiber quality is acceptable

a breeding program incorporating the RN resistance of BARBREN-713 into high
yielding, high quality germplasm lines could combine desired traits

BARBREN-713's mechanism of RN resistance needs further investigation

more physiological and histological information is required

activity 4

BARBREN-713 breeding program

Currently underway:

cross LA06307025 × BARBREN-713 made in Summer 2011

LA06307025 is a high yielding RBTN entrant

F₁ planted at Mexico winter nursery

5 other crosses with BARBREN-713 made later in 2011

including one with RN resistant lines of LONREN-1 × FM966
generation advancement currently underway in greenhouse

Planned:

F_{2:3} populations will be generated during the growing season of 2012

RN resistance screening will start in October 2012 and continue till Spring 2013

Advancement to F_{2:4} and seed increase will be done during 2013

Field evaluation, including RN stress tests, will commence in 2014