

Marker Assisted Selection for Nematode Resistance - Progress

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Initial Crossing in 2007

- ◆ **Dr. Bell develops BC1F1 (College Stn)**
 - Lonren lines x MAFES Lines
- ◆ **Thaxton-Wallace Lonren Crosses**
 - DREC-MSU field & greenhouse
- ◆ **Initially efforts directed at Reniform alone**

2007 – Misc. Breeding Lines x Lonren

- ◆ 8824-1-2-25-192-10-57 RKN
- ◆ STV 732N(h/ne)/8806-2-2-21
- ◆ STV 7A/Tamcot Sphinx
- ◆ STV 213/SPNXCDUG8H-1-95
- ◆ DPL 90/LBCHGP12KS-1-96
- ◆ DPL 90/DG2387
- ◆ DG 2387/STV 474
- ◆ ACSI1017/DP 5415 NE
- ◆ FM 832/DES 24NE
- ◆ 96WD-18/F5(89E-51/93WA126ne)
- ◆ SG747/DES 24NE
- ◆ DES227/H01-09-03
- ◆ 0110-1ne
- ◆ 0141-15ne
- ◆ 0023-11ne
- ◆ Lonren 63-11
- ◆ Lon O-15
- ◆ Lon A-2
- ◆ Lon 84-4
- ◆ Lon 83-1
- ◆ Lon 83-31
- ◆ Lon 64-1
- ◆ Lon M-3
- ◆ Lon 83-8
- ◆ Lon 84-4

2008 – 1st Year of MAS

- ◆ Planted 27 F2 and 95 BC1F2 populations with 40 parents
- ◆ Tagged 3566 plants
- ◆ BNL3279 Results[†]
 - 1865 null
 - 980 heterozygous
 - 850 homozygous

[†]USDA-ARS Genomics Lab – Stoneville, MS
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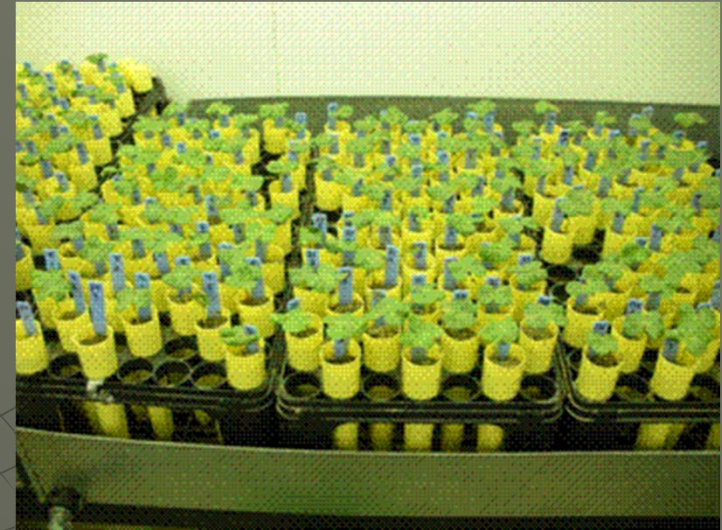
2008 – MAS Plant Selections

- ◆ ~300 F2 IP's
- ◆ Criteria
 - BNL3279
 - lack of stunting
 - # bolls
 - general appearance
- ◆ Lint%
- ◆ Fiber Quality



2009

- ◆ F2:F3—Confirm phenotype
 - random sample
 - winter greenhouse – (Stetina)
- ◆ MAS F2:F3 planted to progeny row
- ◆ Testing
 - Homogeneity
 - Segregants discarded
 - Lint% - Fiber Quality
- ◆ 68 rows (F3) selected for further evaluation



2010 F4 Yield

Table. Least square means for lint yield and fiber for Lonren dervied F4 yield trial- Stoneville, MS,2010.

2010 ENTRY	2009 PLANT TAG #	Pedigree	Lint Yield †	Lint Percent	MIC	UHM	STRN	QS1 ‡	QS2 ‡
			lbs/a	%	mic	%	g/tex		
57	289-229	161)FM 832/DES 24 NE//(804)L	1060	35.56	5.40	1.11	42.60	58.00	79.50
72	FM 958	Commercial Check	1057	37.47	5.20	1.19	34.70	79.00	76.00
71	SG 105	Commercial Check	1018	35.92	5.20	1.15	31.60	70.00	72.50
70	DP 393	Commercial Check	998	38.16	5.00	1.17	33.30	79.00	76.50
64	392-239	161)FM 832/DES 24 NE//(804)L	986	35.98	5.10	1.11	40.05	62.50	82.50
63	376-238	161)FM 832/DES 24 NE//(804)L	952	35.72	4.90	1.14	35.40	72.00	76.00
62	369-237	161)FM 832/DES 24 NE//(804)L	951	35.54	5.55	1.15	38.85	65.50	77.50
14	239, 124	-2-25-192-10-56 RKN/84-38 Lc	900	39.79	5.20	1.11	38.50	59.00	76.00
56	281-228	161)FM 832/DES 24 NE//(804)L	875	36.05	4.90	1.12	36.75	66.50	71.00
60	345-235	161)FM 832/DES 24 NE//(804)L	872	35.61	5.15	1.14	36.70	67.50	74.50
1	532-551	-2-25-192-10-10 RKN/83-30 Lc	855	34.20	4.40	1.18	33.05	88.50	78.00
31	712-171	0029-5/LONREN-1	851	38.08	4.80	1.09	35.00	59.00	68.00
43	997,199	23)ACSI 1017/DP 5415 NE//(804)	827	37.80	4.60	1.12	37.40	70.00	76.00
17	312-133	-2-25-192-10-56 RKN/84-38 Lc	820	39.93	4.95	1.09	33.10	53.50	59.50
69	LONREN-	Reniform Parent	699	36.55	4.70	1.13	35.60	71.50	71.50
41	969-197	23)ACSI 1017/DP 5415 NE//(804)	671	35.65	4.70	1.09	39.25	61.00	74.00
16	272-129	-2-25-192-10-56 RKN/84-38 Lc	661	37.02	4.55	1.09	33.05	60.50	64.50
53	193-220	23)ACSI 1017/DP 5415 NE//(804)	659	37.53	5.20	1.05	35.00	37.50	55.50
44	025-203	23)ACSI 1017/DP 5415 NE//(804)	450	33.92	4.05	1.13	35.20	76.50	78.00
15	252-127	-2-25-192-10-56 RKN/84-38 Lc	449	34.86	4.95	1.10	34.65	56.00	62.50
6	872-891	-2-25-192-10-3 RKN/84-37 Lc	447	34.32	4.60	1.07	35.70	59.50	75.00
13	212-123	-2-25-192-10-56 RKN/84-38 Lc	443	38.08	5.35	1.03	35.80	32.00	61.00
23	512-151	0036-10/LONREN-1	429	33.12	5.50	1.05	36.85	33.00	57.50
65	416-242	D-18/F5(89E-51/93WA-126ne)/	406	34.33	4.40	1.14	37.00	78.50	79.00
Mean			764	36.30	4.93	1.11	36.05	63.17	71.75
LSD (.05)			287	2.31	0.41	0.06	2.18	19.70	
CV(%)			28.95	3.23	4.26	2.67	3.05	16.08	
R-Square			0.50	0.81	0.83	0.77	0.90	0.79	
Reps			4	2	2	2	2	2	2

2011 F5 Yield

Table 1. LSmeans for performance of 2011 Lonren F5 Yield A (Stoneville, MS).

Entry	ID	Pedigree	Lint Yield	r	Lint Percent	MIC	UHM	STRN	QS1†	QS2†
			lbs/a		%	mic	%	g/tex		
3	0762-9	8824-1-2-2	1314	1	37.69	4.97	1.21	30.85	60.25	67.25
20	0774-6	0110-1ne/L	1175	2	32.88	4.74	1.23	37.08	69.25	81.75
26	(06-22 ne)	(06-22 ne)	1082	3	35.61	5.17	1.17	33.48	46.50	55.75
11	0763-4	8824-1-2-2	1081	4	36.92	4.96	1.16	29.78	43.75	56.50
4	DP 5415N	DP 5415NE	719	19	31.83	4.81	1.24	32.95	70.50	77.25
16	Lonren-1/0	Lonren-1/0	719	20	34.89	4.20	1.30	32.40	92.00	91.50
19	0774-7	0110-1ne/L	708	21	31.89	4.21	1.29	31.13	89.50	90.50
35	FM958	CK	687	22	37.29	4.82	1.24	34.05	74.25	78.25
6	0750-5	0050-14 / L	681	23	35.75	4.70	1.18	30.30	50.00	63.00
31	DES 227/H	DES 227/H	674	24	32.94	4.57	1.21	32.30	66.50	73.25
33	DP393	CK	667	25	35.65	4.82	1.21	32.20	65.00	71.00
18	Lonren-1/0	Lonren-1/0	664	26	32.12	4.15	1.30	33.68	97.75	93.75
7	0778-2	0141-15ne/L	563	31	33.90	5.09	1.12	31.03	32.00	47.75
36	DP 491	CK	538	32	37.13	4.46	1.30	32.35	91.50	90.50
29	0723-5	0038-4 / LC	470	33	33.69	5.31	1.17	33.05	42.25	54.25
34	SG105	CK	431	34	32.92	4.64	1.19	30.33	60.50	66.75
25	(04PST-12)	(04PST-12)	418	35	33.09	4.81	1.15	36.45	49.50	63.25
24	0708-3	0029-5/LO	391	36	33.38	4.22	1.22	34.55	64.50	72.25
Mean			721		34.42	4.70	1.21	32.66	64.75	71.92
LSD (.05)			230		1.18	0.28	0.04	1.84	12.55	9.12
CV(%)			18.77		2.40	4.22	2.13	4.00	14.47	9.39
R-Square			0.77		0.86	0.76	0.83	0.80	0.83	0.86
Reps			4		4	4	4	4	4	4

2012

- ◆ 2010-2011 Yield testing –marginal
- ◆ 2012
 - Multi-location testing of top picks
 - ◆ pending root-tip homogeneity
 - Infested & Non-Infested
 - Checks
 - ◆ Lonren / Barbren / Commercial

SUMMARY

- ◆ Three additional cycles of crossing and MAS since initial crosses in 2007
- ◆ New sources of resistance added each cycle
 - RKN, GB713 derived
- ◆ Learning experience each year
 - Mechanics –
 - ◆ tagging
 - ◆ #samples
 - ◆ testing homogeneity
 - ◆ Infested field yield trial

SUMMARY-continued

- ◆ Approach – very applied, screen max # plants possible for rare recombinant
- ◆ Define, refine protocol, improve efficiency
- ◆ Tools / Aides – new for 2012

Root Tip Testing

- ◆ **F3RKN IP**
7 Homozygous RKN
- ◆ **F2IP**
84 Homo Ren
35 RKN
29 Het Ren, Homo RK
- ◆ **F2F3IP**
45 Homo Ren
52 Het RN, homo RKN
3 Het RN, het RKN
- ◆ **F2F3 Progeny Rows**
29 Homozygous

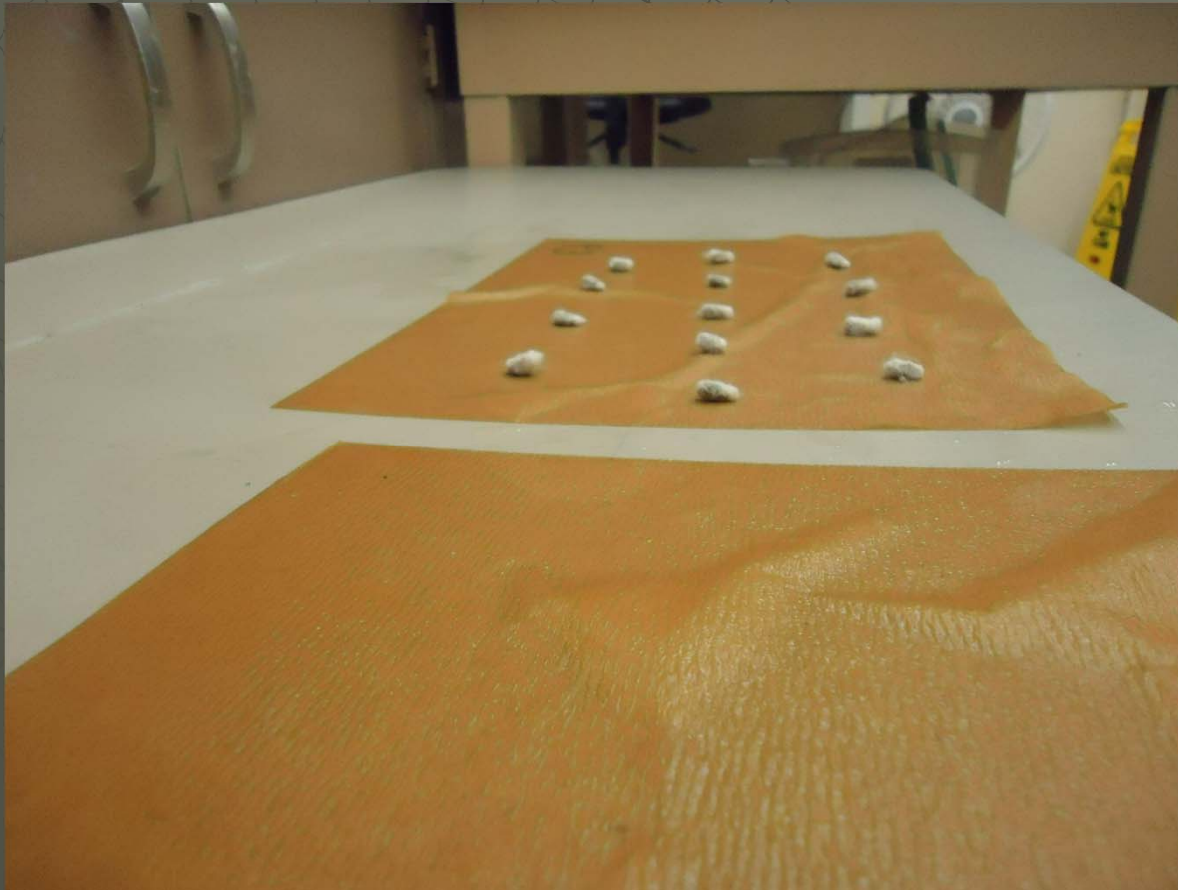
Root-Tips

Confirm MAS in Field

Zygoty of marker assisted selected IP's and rows in 2011

2011 Generation	Ren	RKN	Ren / RKN	Ren / RKN	Ren / RKN	TOTALS
	Hom	Hom	Hom / Hom	Het / Hom	Het / Het	
F2 IP's	84	35		29		148
F2F3 IP's	41		4	51	4	100
F2F3 Rows	20	9				29
Total Selected	145	44	4	80	4	277

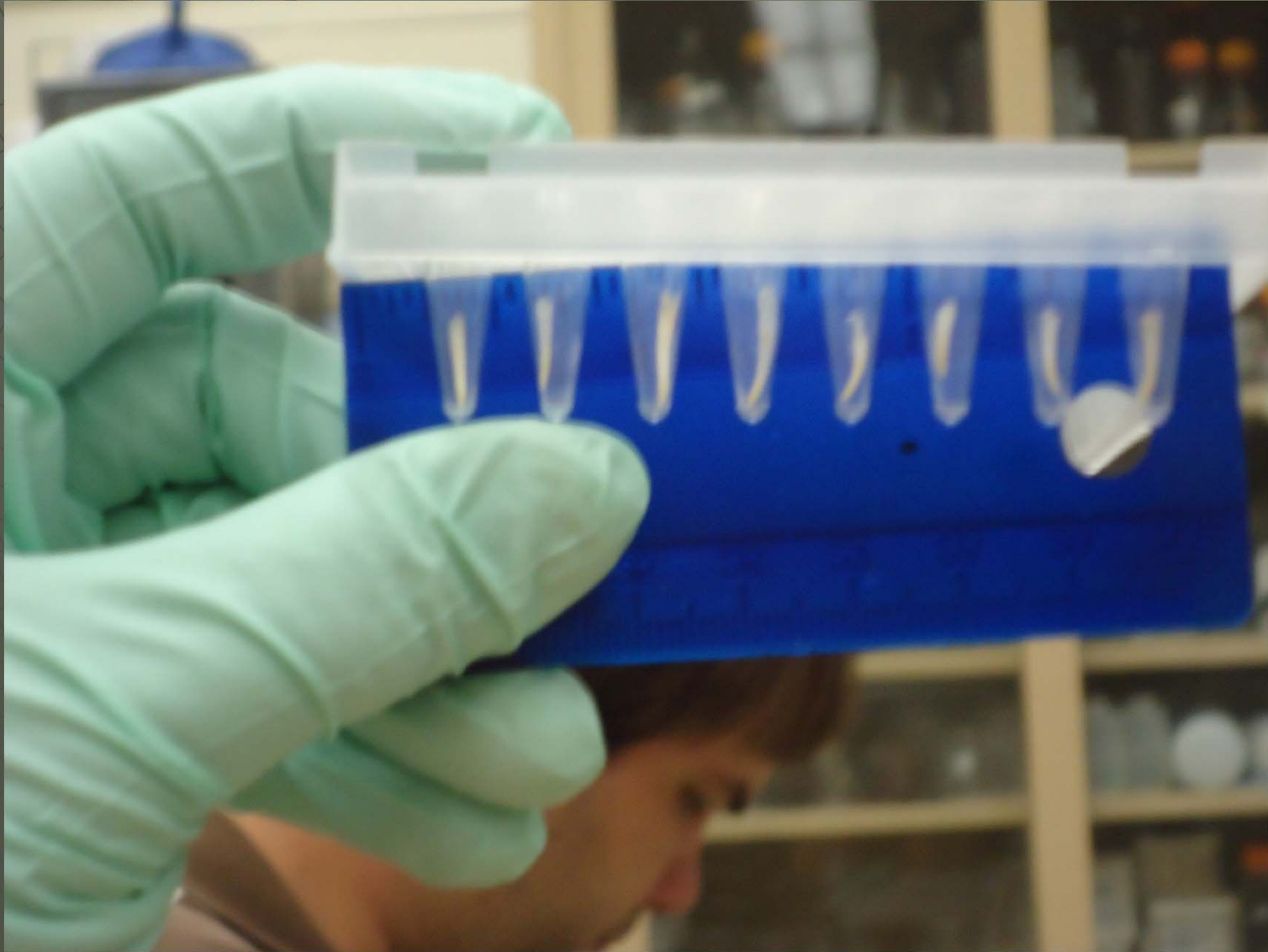
MAKE RAG DOLLS



**Incubate at
85F for 48 hrs**



4 seed/entry
.5 to 1 cm length





Add buffer A
Seal plate with film

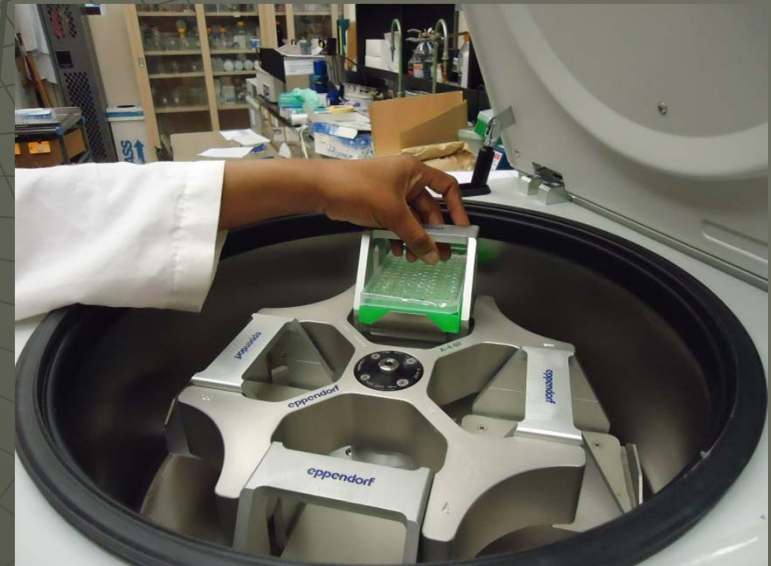


**Incubate plates in
thermocycler for
10 min with heated lid**



Add buffer B
Put film back on
Vortec briefly

Spin plates in
Centrifuge
4000 for 1 min



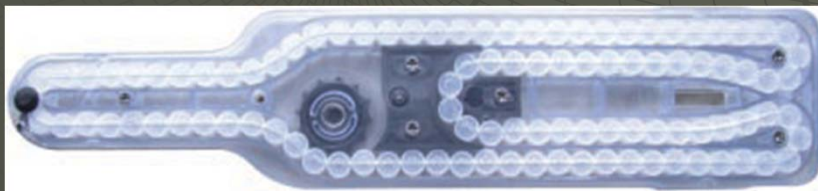
Results of Root-tip

???

The image features a dark gray background with a faint, light gray grid of concentric circles and radial lines. The grid is centered on a small, dark gray oval. At the top of the grid, there is a small, light gray circle. Three thin, dark gray lines radiate from this top circle, extending downwards and outwards. The text '???' is positioned in the middle of the grid, near the center of the concentric circles.

PLANT TRAK

Genetic Sampling and Barcoding



Planttrak Bench Top Unloader

