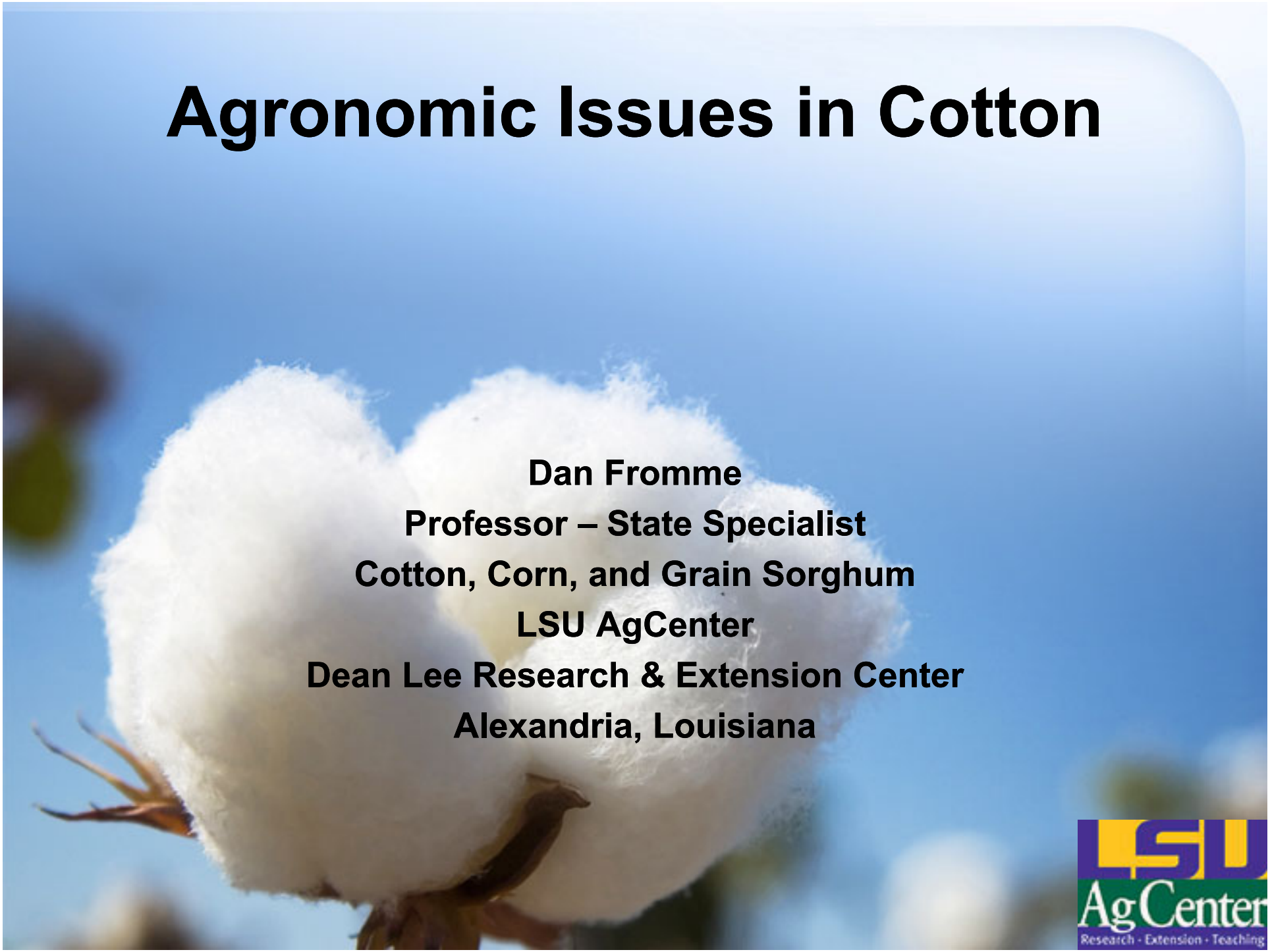
Agronomic Issues in Cotton



Dan Fromme
Professor – State Specialist
Cotton, Corn, and Grain Sorghum
LSU AgCenter
Dean Lee Research & Extension Center
Alexandria, Louisiana

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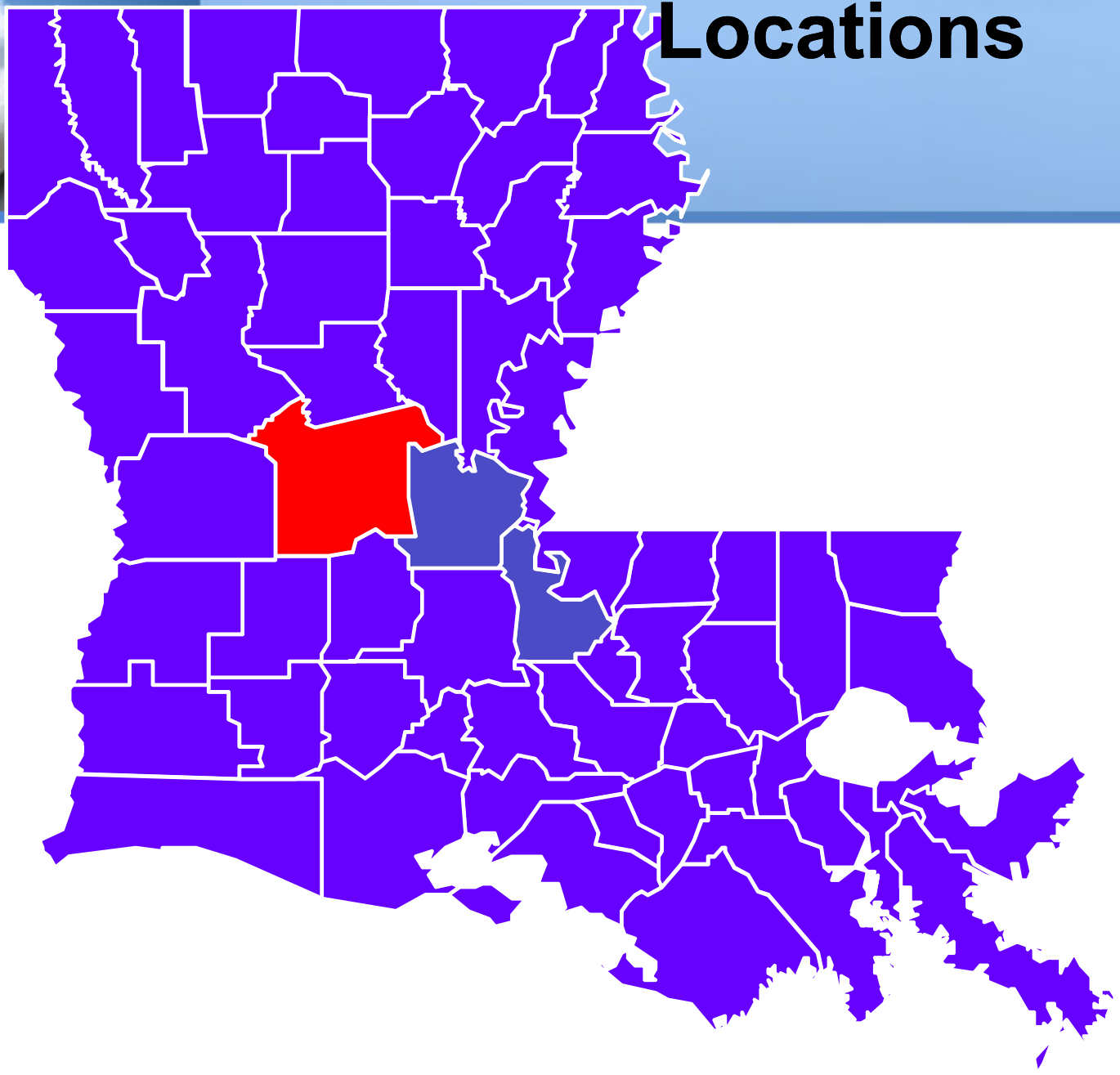
Locations



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Cotton Seed Quality

- Benefits of quality seed
  - Timely emergence
  - Uniform emergence
  - Greater resistance to seeding disease organisms
  - Tolerance of early-season stresses
  - Tolerance of deeper planting depths
  - Reduced risk of replanting
  - Achieving a stand at lower seeding rates
  - Improved chance of achieving an optimum planting date

Cotton seed quality

- **Seed Tag**
  - **All that is required by law**
  - **Standard germination test**
    - **68F for 16 hours and 86F for 8 on a daily basis**
    - **Counted after 7 days**
    - **Conducted in laboratory conditions under ideal moisture and temperature conditions.**
    - **Some cases seed can have high viability (germination percentage), but have a low vigor.**

Cool-Warm Vigor Index (CWVI)

- Is not required by law
- Therefore, not on the seed tag
- More accurate estimate of the actual vigor of the seed.
- The CWVI combines information obtained from the warm germination test and the Texas cool germination test.

Cool-Warm Vigor Index (CWVI)

- The CWVI combines information obtained from the warm germination test and the Texas cool germination test.
  - Warm – 68F for 16 hours and 86F for 8 hours on daily basis with germinated seedlings counted after **4** days not **7** days like the standard germination test.
  - Texas cool test is conducted at 64F with seedling counted after 7 days.
  - Seed companies or distributors could have this information

Cotton seed quality

- **Cool-Warm Vigor Index**
  - **Combines both test**
  - **Helps determine which seed to plant first, etc.**

CWVI	Rationg
Excellent	160 or >
Good	140-159
Fair	120-139
Poor	<120

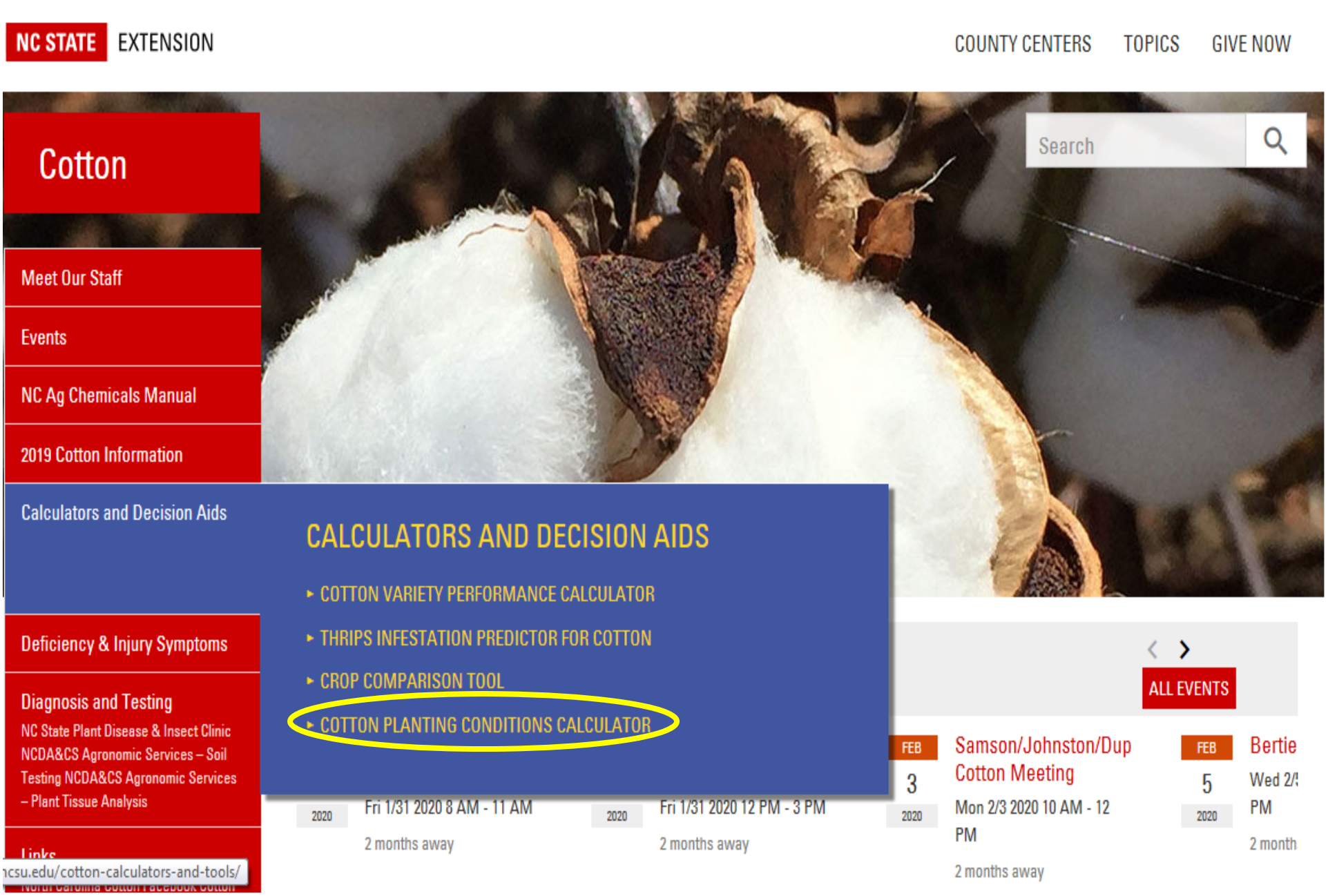
Cotton seed quality

- Cool germination test

Cool germ %	Vigor
>80	Excellent
65-80	Good
50-65	Acceptable-plant under good conditions
<50	Poor-most seed companies will not sell this seed

2020 Seed Quality

- Better than last year?
  - AZ
  - TX


NC STATE EXTENSION
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NC Ag Chemicals Manual
2019 Cotton Information
Calculators and Decision Aids
Deficiency & Injury Symptoms
Diagnosis and Testing
NC State Plant Disease & Insect Clinic
NCDA&CS Agronomic Services – Soil Testing NCDA&CS Agronomic Services – Plant Tissue Analysis
Links
CALCULATORS AND DECISION AIDS
COTTON VARIETY PERFORMANCE CALCULATOR
THRIPS INFESTATION PREDICTOR FOR COTTON
CROP COMPARISON TOOL
COTTON PLANTING CONDITIONS CALCULATOR
ALL EVENTS
2020
Fri 1/31 2020 8 AM - 11 AM
2 months away
2020
Fri 1/31 2020 12 PM - 3 PM
2 months away
FEB
3
2020
Samson/Johnston/Dup Cotton Meeting
Mon 2/3 2020 10 AM - 12 PM
2 months away
FEB
5
2020
Bertie
Wed 2/5
PM
2 month

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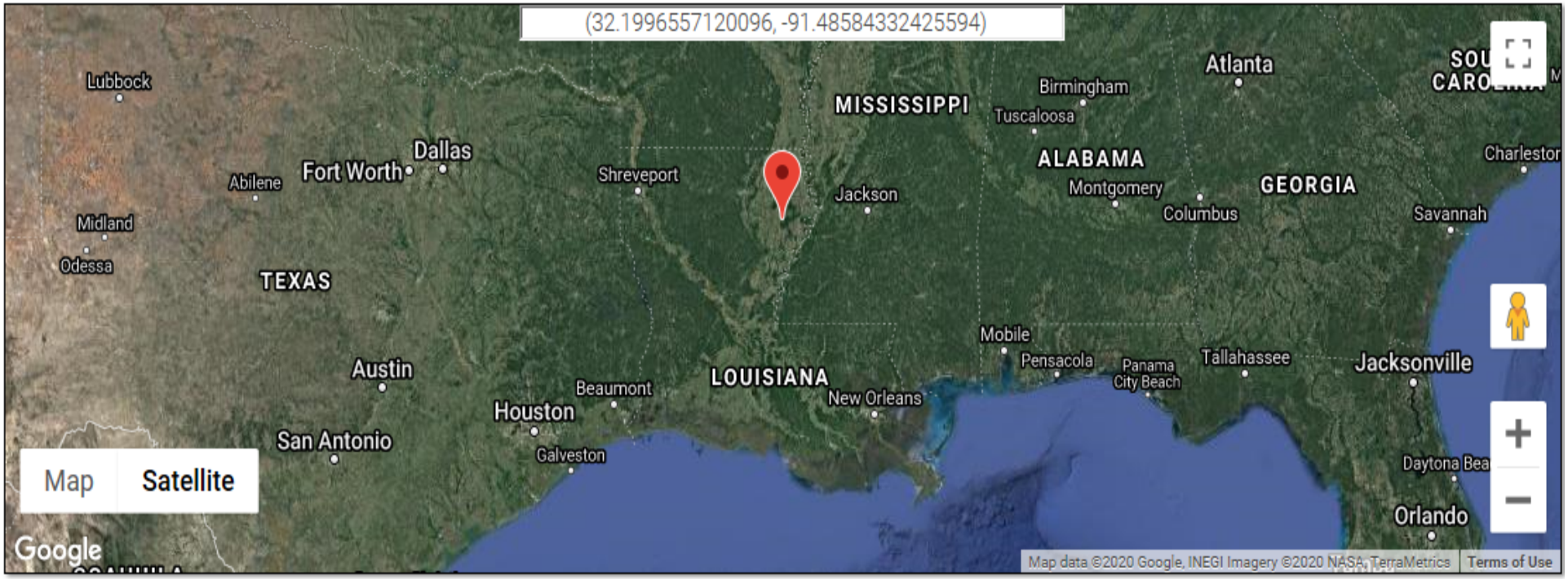
COTTON PLANTING CONDITIONS CALCULATOR



SUBMIT

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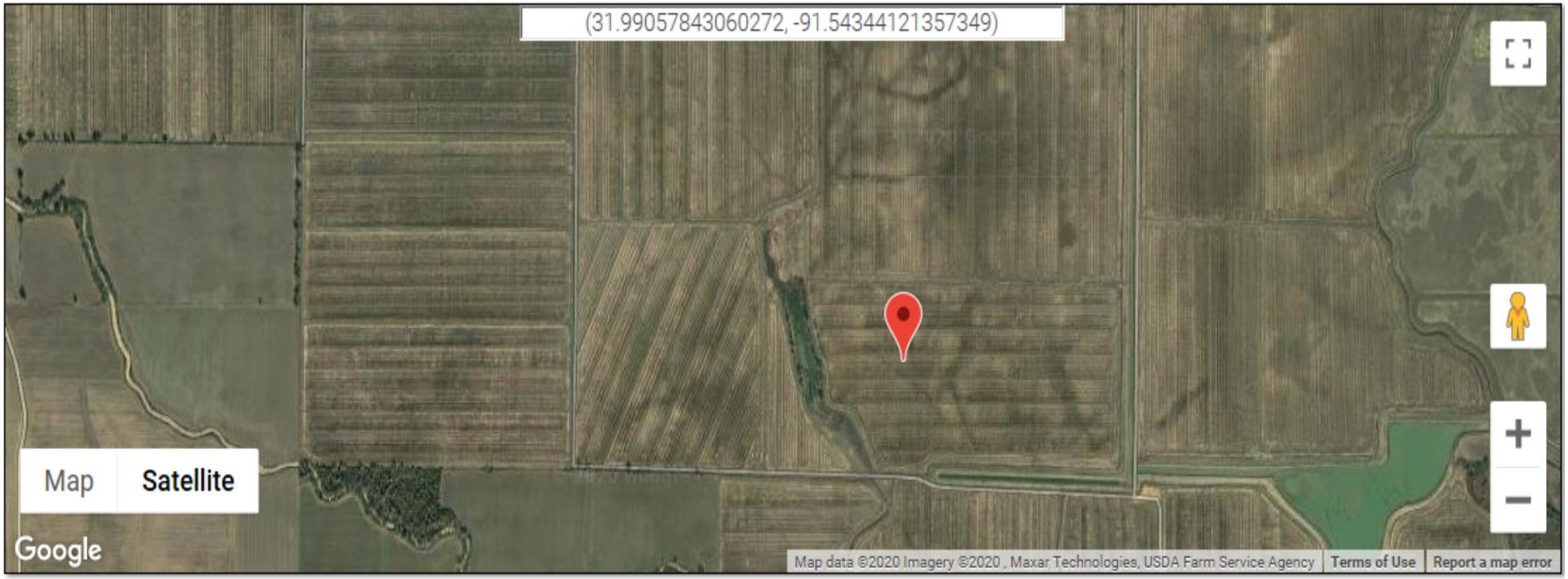
COTTON PLANTING CONDITIONS CALCULATOR



SUBMIT

About

PLANTING DATE	5-DAY DD60 FORECAST	DD60 BASED PLANTING FORECAST	COMMENTS
January 15, 2019	21	Adequate	Consider waiting on better conditions, or switching to large-seeded varieties with a high cool germ percentage (>65%), planting shallower (no more than 0.5 inches deep), hill-dropping, or slightly increasing seeding rate. Avoid planting into saturated soils prone to crusting. Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.
January 16, 2019	21	Adequate	Consider waiting on better conditions, or switching to large-seeded varieties with a high cool germ percentage (>65%), planting shallower (no more than 0.5 inches deep), hill-dropping, or slightly increasing seeding rate. Avoid planting into saturated soils prone to crusting. Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.
January 17, 2019	21	Adequate	Consider waiting on better conditions, or switching to large-seeded varieties with a high cool germ percentage (>65%), planting shallower (no more than 0.5 inches deep), hill-dropping, or slightly increasing seeding rate. Avoid planting into saturated soils prone to crusting. Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.

Forecasted Cotton Planting Conditions

PLANTING DATE	5-DAY DD60 FORECAST	DD60 BASED PLANTING FORECAST	COMMENTS
January 15, 2019	0	Poor	Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.
January 16, 2019	0	Poor	Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.
January 17, 2019	0	Poor	Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.

PLANTING DATE	5-DAY DD60 FORECAST	DD60 BASED PLANTING FORECAST	COMMENTS
January 15, 2019	12	Marginal	Consider waiting on better conditions, or switching to large-seeded varieties with a high cool germ percentage (>65%), planting shallower (no more than 0.5 inches deep), hill-dropping, or slightly increasing seeding rate. Avoid planting into saturated soils prone to crusting. Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.
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PLANTING DATE	5-DAY DD60 FORECAST	DD60 BASED PLANTING FORECAST	COMMENTS
January 15, 2019	21	Adequate	Consider waiting on better conditions, or switching to large-seeded varieties with a high cool germ percentage (>65%), planting shallower (no more than 0.5 inches deep), hill-dropping, or slightly increasing seeding rate. Avoid planting into saturated soils prone to crusting. Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.
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Forecasted Cotton Planting Conditions

PLANTING DATE	5-DAY DD60 FORECAST	DD60 BASED PLANTING FORECAST	COMMENTS
January 15, 2019	34	Good	Caution - be aware of soil temperatures early in the morning.
January 16, 2019	32	Good	Avoid planting cotton if the low temperature is predicted to be below 50°F for either of the two nights following planting or predicted daily DD60's is near zero for the day of planting.
January 17, 2019	31	Good	Caution - be aware of soil temperatures early in the morning.

Resources for You

Cotton Portal Website: http://cotton.ces.ncsu.edu/

NC Cotton Planting Conditions Calculator:
http://climate.ncsu.edu/cotton_planting

WHEN TO PLANT COTTON

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-Cotton
-Agronomy

Background:

In Louisiana, cotton is generally planted from mid-April to mid-May. However, the optimal time to plant cotton is determined by soil temperature and not by the calendar. If planted too early, the cotton crop may suffer stand loss, and the remaining plants are less vigorous, which reduces yield potential.

Cotton is a tropical plant. During the critical germination period, soil temperatures below 50 degrees Fahrenheit can cause chilling injury to germinating plants. The crop is most susceptible to chilling injury when the seed is initiating water uptake (imbibition) and in the first couple of days after planting. Imbibition is a sensitive period because moisture content can increase from 10 to 12 percent to 40 to 80 percent in fewer than 12 hours after planting. Therefore, the minimum temperature at seed depth during this time interval is especially important.

The first two to four days after planting is when the radicle (tiny root) begins to emerge from the seed, with warm temperatures leading to a more rapid emergence. The adverse effect of cool temperatures during this period is cumulative, and yield reduction can be related to chilling hours below 50 degrees Fahrenheit. Injury at this stage affects the emerging seedlings' capacity to manufacture proteins, which can ultimately limit yield.

Chilling injury can result in malformed seedlings, loss of the taproot, reduced vigor, a less-than-acceptable stand and the increased likelihood of seedling disease problems (Figures 1 and 2). The severity of injury increases the longer seeds are exposed to the cold. Therefore, chilling within the first five days after planting often results in weak plants with delayed maturity and reduced yield. The graph on the following page depicts the relative sensitivity of cotton to chilling injury. Dry seeds are highly tolerant to chilling, but as soon they are placed in moist soil, they begin to imbibe water and enter their most sensitive stage.

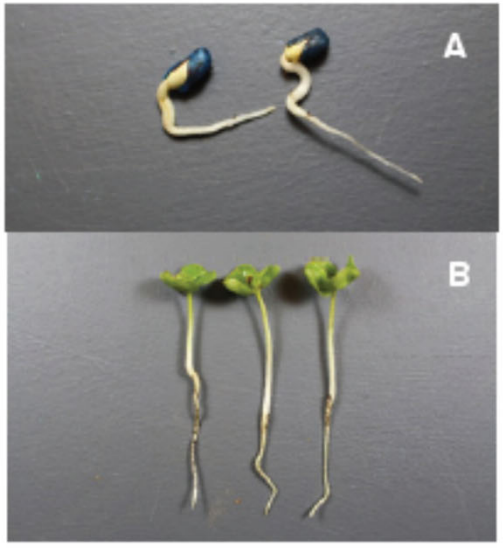


Figure 1. Cotton seedlings subjected to chilling temperature (A) compared to seedlings not chilled (B) during imbibition. Seedlings in A and B were exposed to the same temperature (90 degrees Fahrenheit) with the exception of the first six hours of imbibition, in which they were exposed to chilling temperatures of 40 degrees Fahrenheit.

Figure 2. Chilling injury can increase the likelihood of seedling disease problems.

When to Plant Cotton

4 inch depth is 65 degrees or greater at 8 a.m. for at least three consecutive days. Five day forecast is favorable.

Table 1. Five-day outlook for planting.

Predictive DD60 accumulation for five days following planting	Outlook for planting
<10	Very poor
11-15	Poor
16-25	Marginal
26-50	Good
>51	Very good

Cotton Incorporated

- **cottoncultivated.cottoninc.com**
- **Wet for March – May**
- **Eric Snodgrass**
- **Sponsored by Nutrien**

LA Cotton Varieties Planted-Top Ten

Variety	2019 (%)	2018 (%)	2017 (%)	2016 (%)
DP1646B2XF	64.76	53.3	13.6	1.8
DP1845B3XF	10.72	1.23	0	0
PHY430W3FE	3.28	2.12	0	0
NG5711B3XF	3.02	.23	0	0
PHY390W3FE	2.60	0	0	0
DP1725B2XF	2.40	1.6	0.9	0
DP1518B2XF	1.77	5.4	1.5	6.7
PHY580W3FE	1.50	0	0	0
DP1555B2RF	1.30	15.5	22.9	15.1
NG5007B2XF	1.33	.44	0	0

Based on: USDA gin survey

2019 On-Farm Across Locations

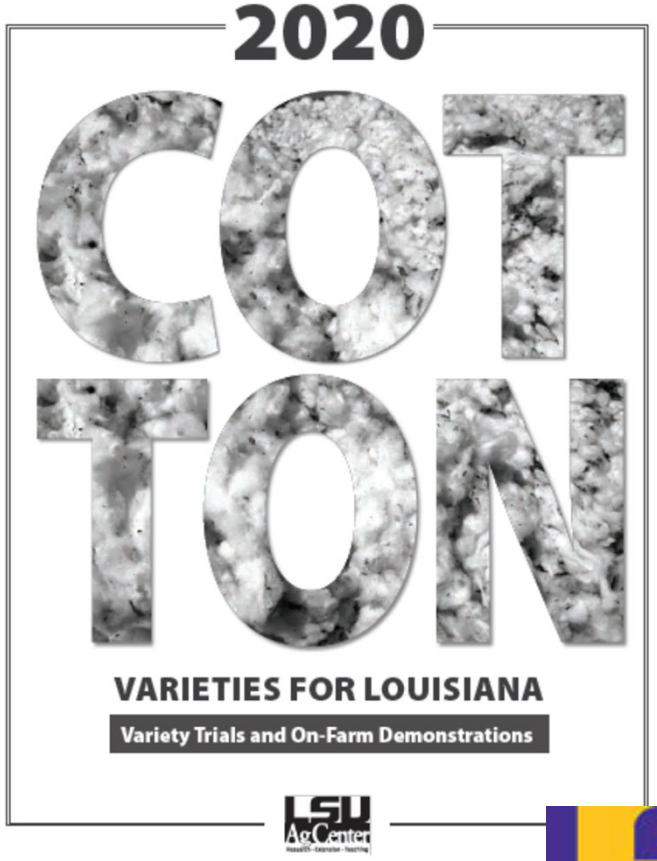
	P. Coupee	Avoyell	Rap-1	W. Carroll	Morehouse	Ouachita	Tensas	Rap-2	Rap-3	Frank	Avg.
PHY400W3FE	1194	1629	1252	1248	1192	1140	1234	1007	1449	1420	1277
DP1646B2XF	1063	1482	1394	813	1300	1147	994	1268	1329	1272	1206
NG4936B3XF	1088	1304	1193	928	1276	1131	991	966	1418	1199	1149
DG3605B2XF	932	1314	1278	954	1342	1087	851	1119	1324	1202	1140
ST4550GLTP	1024	1302	1058	1111	1086	923	1142	972	1197	1372	1119
DG3427B3XF	974	1204	941	1046	998	1121	1035	1082	1408	1163	1097
DP1845B3XF	1064	1406	986	886	1110	940	950	1033	1326	1261	1096
ST5600B2XF	902	1311	899	974	1145	1002	1003	927	1268	1206	1064
NG3994B3XF	864	1238	968	792	1169	997	850	1096	1245	1213	1043
PHY580W3FE	976	1279	803	1103	865	909	798	845	1213	1298	1009

2019-Across Locations OVTs-Top 25%

Variety	Alex-cl	Alex-sl	Winn	SJ-cl	SJ-sl	BC-cl	BC-sl	Avg.
PHY400W3FE	1105	783	1672	1100	1388	1549	1518	1302
PX5C45W3FE	1094	827	1957	1123	1099	1408	1523	1290
CP9608B3XF	1044	780	1866	897	1240	1422	1528	1254
PX5C05W3FE	1060	806	1828	993	1207	1530	1298	1246
DP1835B3XF	1039	860	1810	932	993	1446	1572	1236
DP1518B2XF	1132	895	1426	1017	1293	1450	1361	1225
PX3D43W3FE	1039	1010	1486	915	1450	1234	1398	1219
PHY340W3FE	1114	947	1489	916	1209	1244	1586	1215
DP1646B2XF	1028	1039	1580	892	1168	1329	1453	1213
AMX19A005B3XF	979	1096	1468	879	1214	1230	1567	1205
H959B3XF	1337	944	1576	922	1020	1385	1178	1195
ST4550GLTP	1166	799	1558	821	1129	1384	1500	1194
DP1845B3XF	1084	932	1677	949	1089	1182	1441	1194

Variety Selection

- Local
- Stability
  - State
- 2 year comparisons
- Soil type
- Replicated better than strip trials
- On-farm
- OVTs



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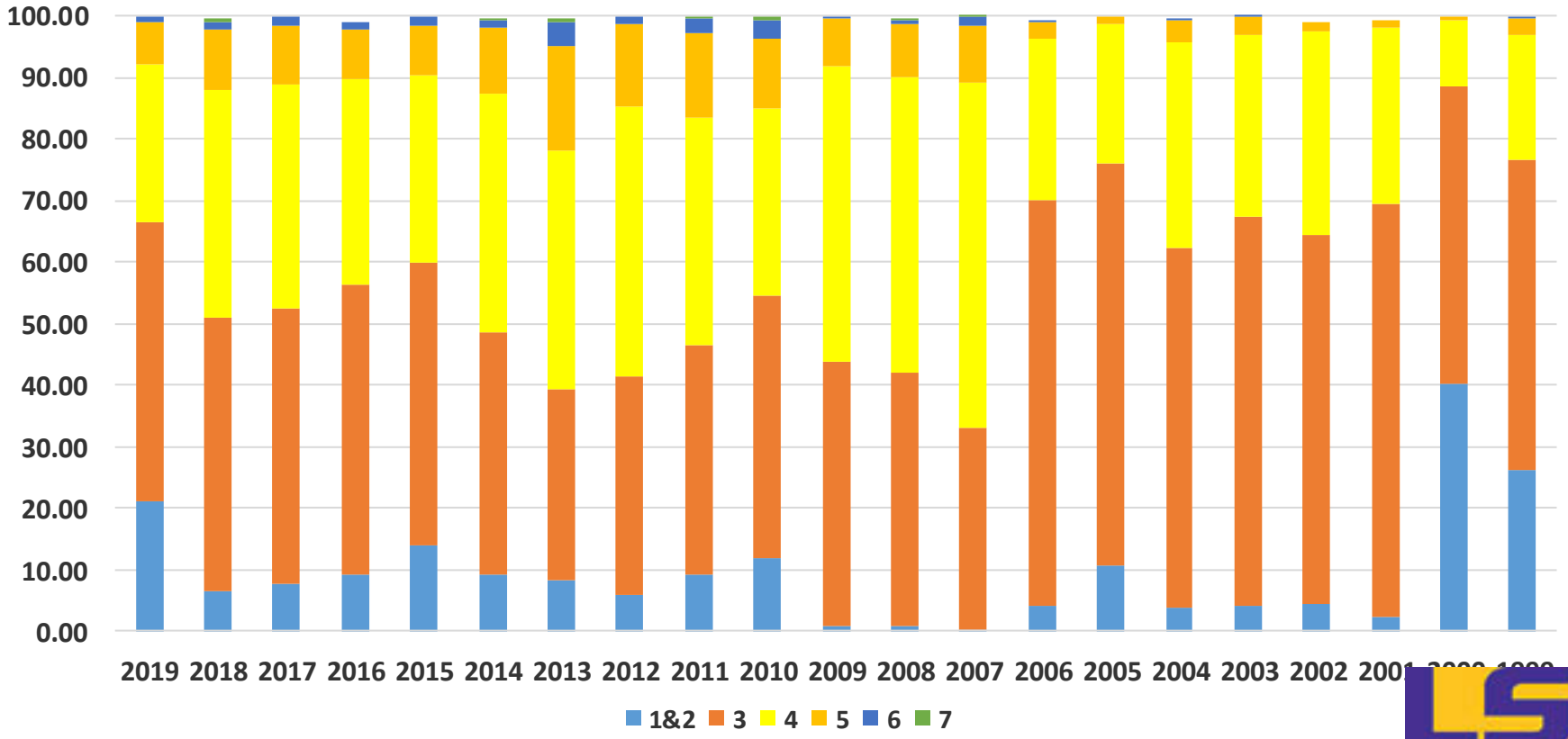
Fiber Quality

Leaf Grades-Rayville



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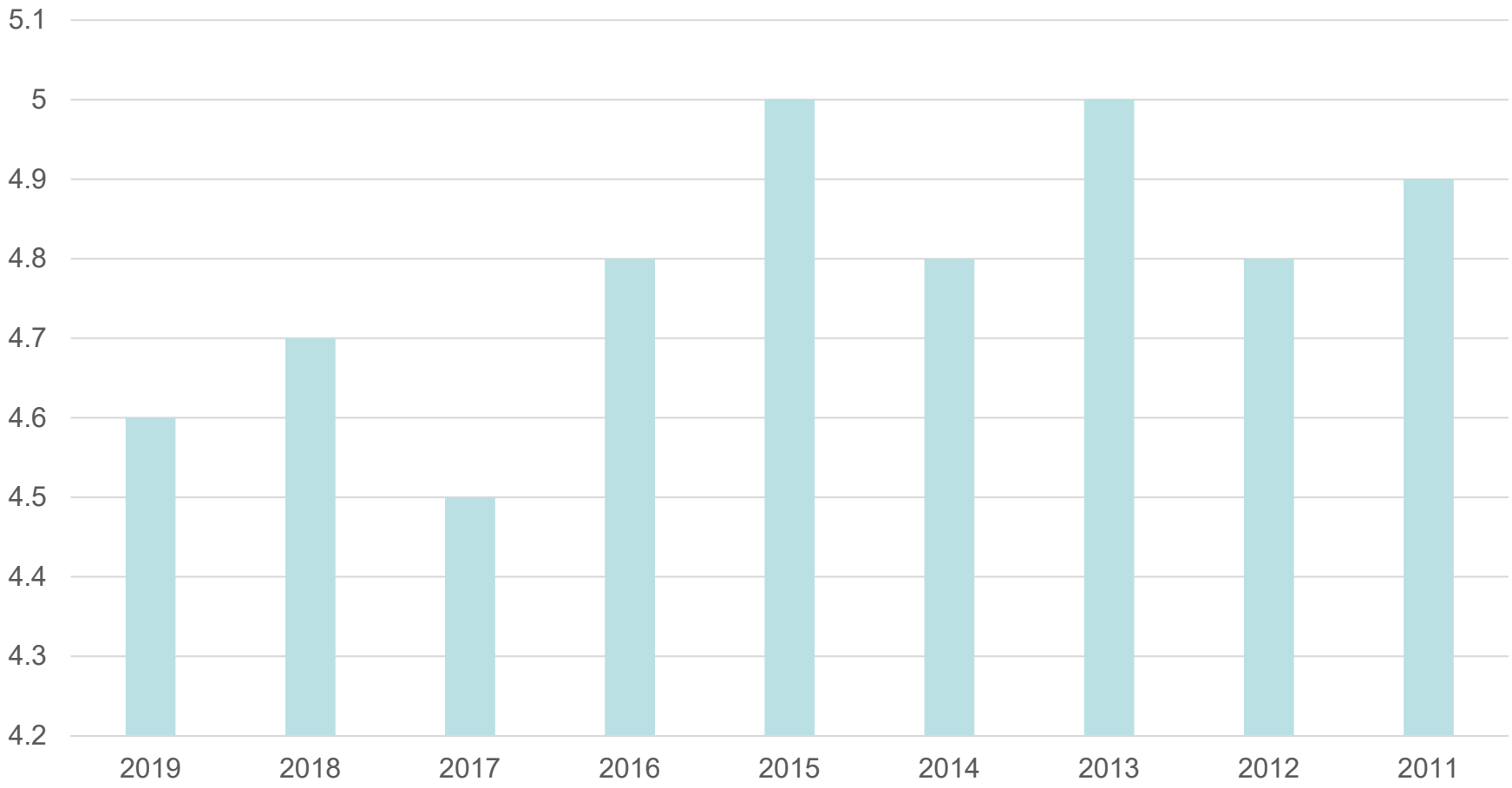
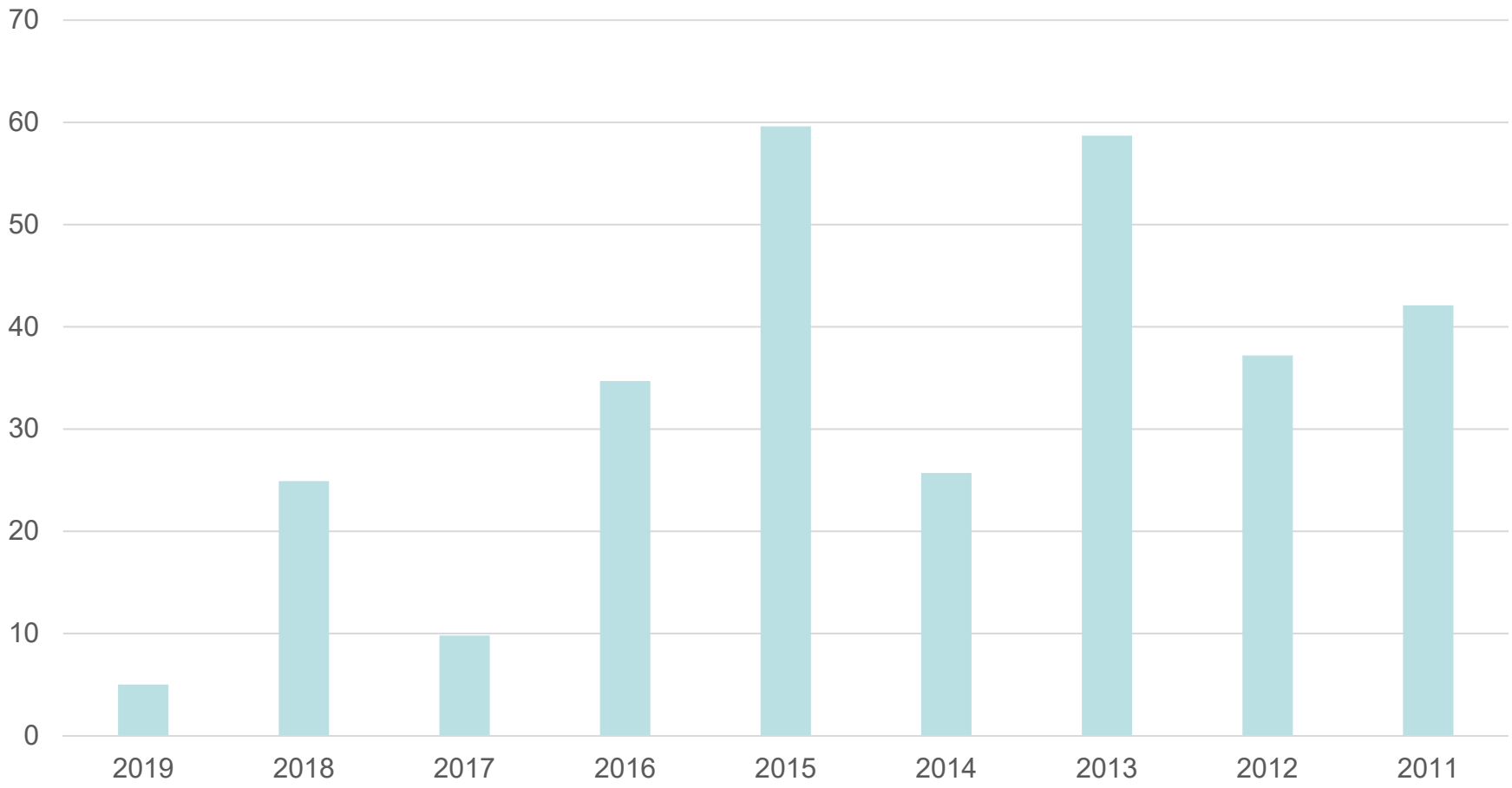
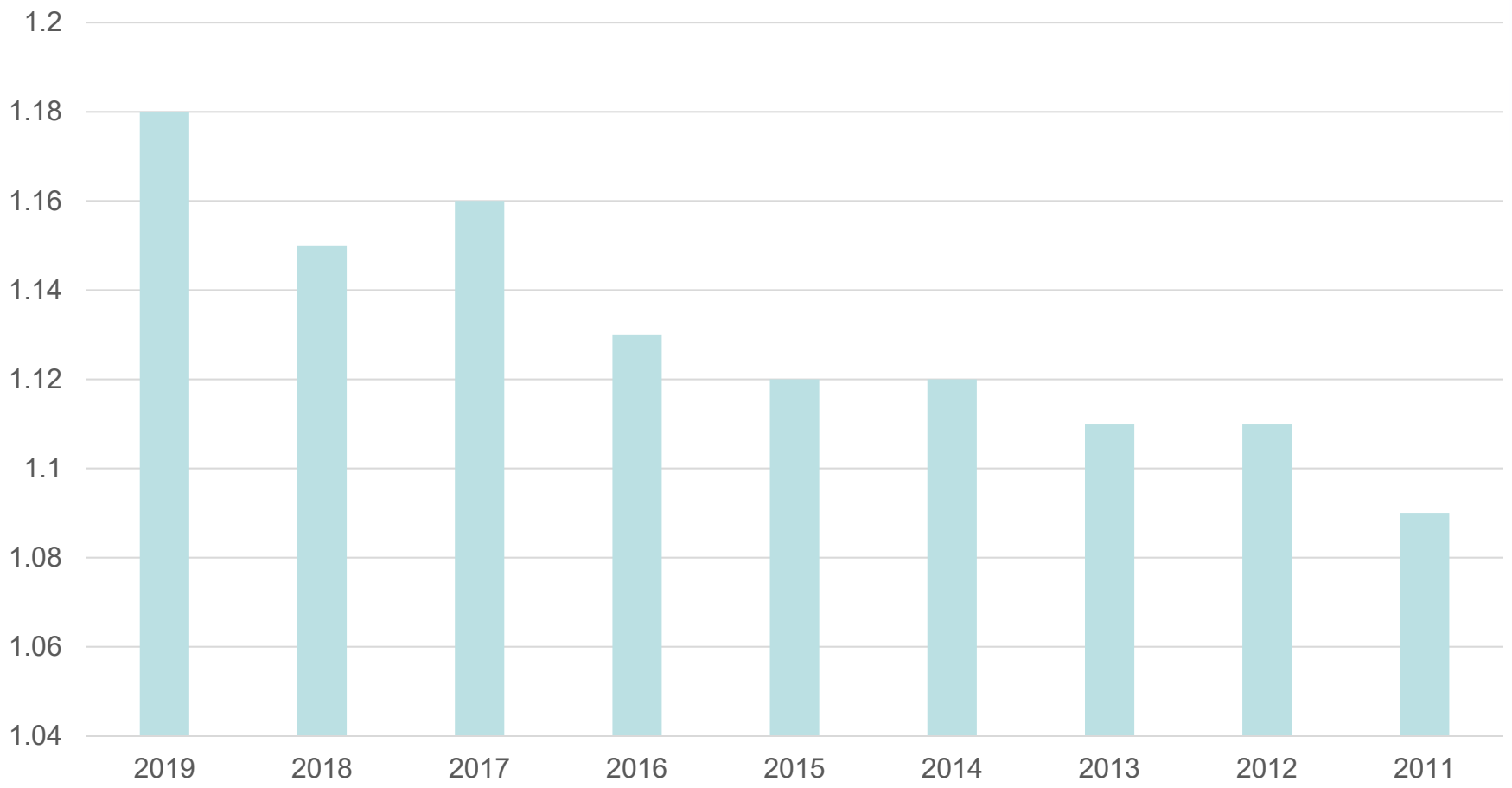
Micronaire


5.1
5
4.9
4.8
4.7
4.6
4.5
4.4
4.3
4.2
2019
2018
2017
2016
2015
2014
2013
2012
2011

Micronaire (% 5 or above)



Fiber Length



RESEARCH

Genetic and Environmental Contributions to Cotton Yield and Fiber Quality in the Mid-South

Tyson B. Raper,* John L. Snider, Darrin M. Dodds, Andrea Jones, Bill Robertson, Dan Fromme, Tyler Sandlin, Trey Cutts, and Ryan Blair

ABSTRACT

Producers need to know the contributions of genotype, environment, and their interaction (G×E) in determining cotton (*Gossypium hirsutum* L.) lint yield, lint percentage, and fiber quality. The recent introduction of longer upper half mean length (UHML) fiber, lower micronaire cultivars may alter previously defined contributions. The objectives of this research were to define the genotype, environment, and G×E contributions to lint yield, lint percentage, and fiber quality from common cultivars evaluated within the US Mid-South and define shifts in these contributions caused by the introduction of a longer UHML, lower micronaire cultivar. Data from 102 large-plot trials within Alabama, Arkansas, Louisiana, Mississippi, Missouri, and Tennessee were compiled from the 2015 and 2016 seasons; 85 site-years contained three common cultivars, and 69 contained four common cultivars. Analysis of three common cultivars within the 69-site-year dataset indicated environment dominated factors of lint yield (85.8%), lint percentage (88.5%), micronaire (70.9%), length (70.5%), and uniformity (70.4%). Large increases in the contribution of genotype to micronaire (26.0%) and length (37.6%) were observed when the lower micronaire, longer UHML cultivar was included. The relatively minor role of cultivar in determining lint yield and the substantial role of cultivar in determining micronaire and length suggest that producers within the Mid-South should begin to place more importance on fiber quality data when selecting cultivars.

T.B. Raper, Dep. of Plant Sciences, Univ. of Tennessee, 605 Airways Blvd., Jackson, TN 38301; J.L. Snider, Dep. of Crop and Soil Sciences, Univ. of Georgia, 115 Coastal Way, Tifton, GA 31793; D.M. Dodds, Dep. of Plant and Soil Sciences, Mississippi State Univ., 138 Dorman Hall, Mississippi State, MS 39762; A. Jones, previous address, Fisher Delta Research Center, Univ. of Missouri, PO Box 160, Portageville, MO 63873; B. Robertson, Dep. of Crop, Soil and Environmental Sciences, Univ. of Arkansas, 649 Jackson 917, Newport, AR 72112; D. Fromme, Louisiana State Univ. Ag Center, 8103 Tom Bowman Dr., Alexandria, LA 71302; T. Sandlin, Dep. of Crop, Soil and Environmental Sciences, Auburn Univ., PO Box 159, Belle Mina, AL 35615; T. Cutts, previous address, Dep. of Crop, Soil and Environmental Sciences, 202 Funchess Hall, Auburn Univ., AL 36849; R. Blair, Univ. of Tennessee Extension, Univ. of Tennessee, 605 Airways Blvd., Jackson, TN 38301. Received 3 Apr. 2018. Accepted 13 Sept. 2018. *Corresponding author (traper@utk.edu). Assigned to Associate Editors Emily Merewitz and Gustavo Slafer.

Abbreviations: G×E, genotype × environment interactions; RHQ, Regional High Quality; UHML, upper half mean length; USDA-AMS, USDA Agricultural Marketing Service.

Cotton (*Gossypium hirsutum* L.) cultivar selection is becoming more challenging. Shortened cultivar lifespans, the introduction of new herbicidal and insecticidal traits, ever-developing resistance of weeds and insects to pesticides, and the increasing importance of cultivar resistance to diseases are only a few of the many factors that now influence cultivar selection. However, potential and stability of lint yield and fiber quality parameters remain the most important factors in maximizing returns and minimizing risks. Seed cotton yield, the percentage of seed cotton that is lint (referred to as lint percentage), and quality of the fiber determine the monetary value of the crop. Bradow and Davidonis (2009) defined cotton buyers' ideal cotton fiber to be as "white as snow; strong as steel; fine as silk; long as wool; cheap

Published in Crop Sci. 59:307–317 (2019).
doi: 10.2135/cropsci2018.04.0222

% Contribution Environment and Genetics

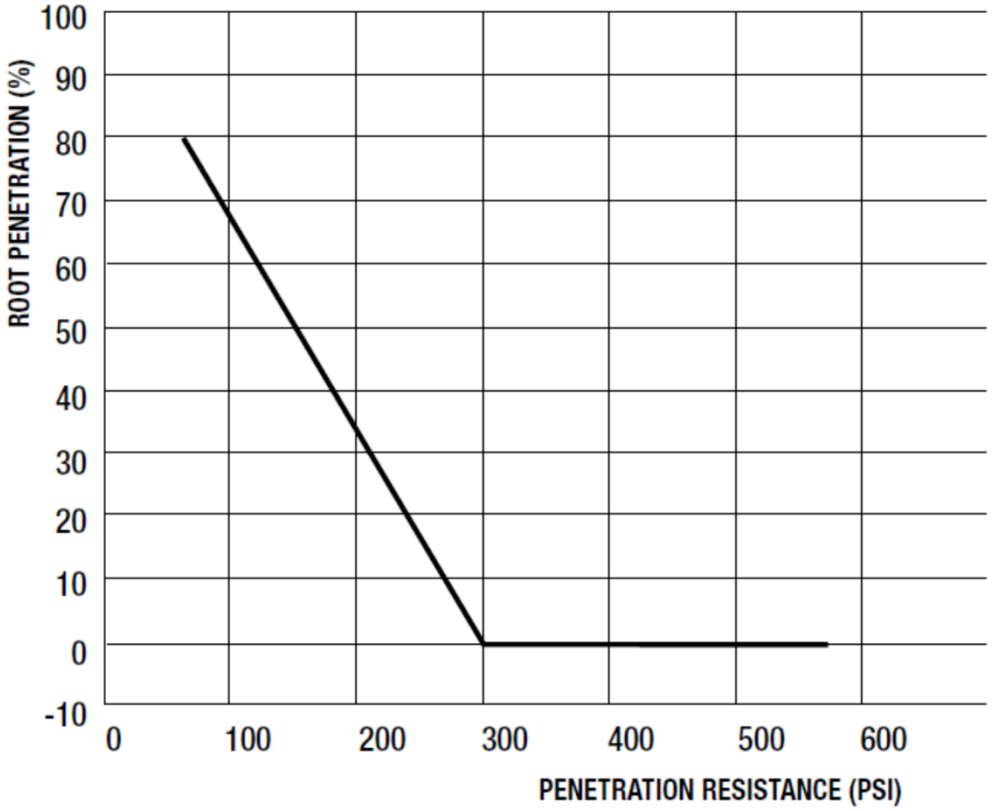
Source	Lint Yield	Lint %	Micronaire	Length	Strength	Uniform
Snider et al. (2013)						
Environ	96.1	38.8	63.8	80.6	47	69.8
Geno	1.2	51.5	9.9	5.1	27.7	6.5
Kirby et al. (2000)						
Environ	90	82	78	85	66	NR
Geno	1	6	6	6	15	NR
E x G	9	12	16	9	19	NR
Raper et al. (2019)						
Environ	82.8	83.9	47.5	39.1	46.6	64.1
Geno	2.1	8.1	42.8	49.6	17.2	6.4

Take Home

- Mid-South should begin to place more value on fiber quality data when selecting among high-yielding cultivars of today.

Compaction Induced Deficiencies - K & N

University of Kentucky-Extension



The penetrometer simulates root growth. Root growth decreases linearly with increasing penetration resistance, until practically stopping above 300 psi. Remember, however, that roots may still penetrate soil with a penetration resistance greater than 300 psi if natural cracks and pores are present.

Soil Penetrometer

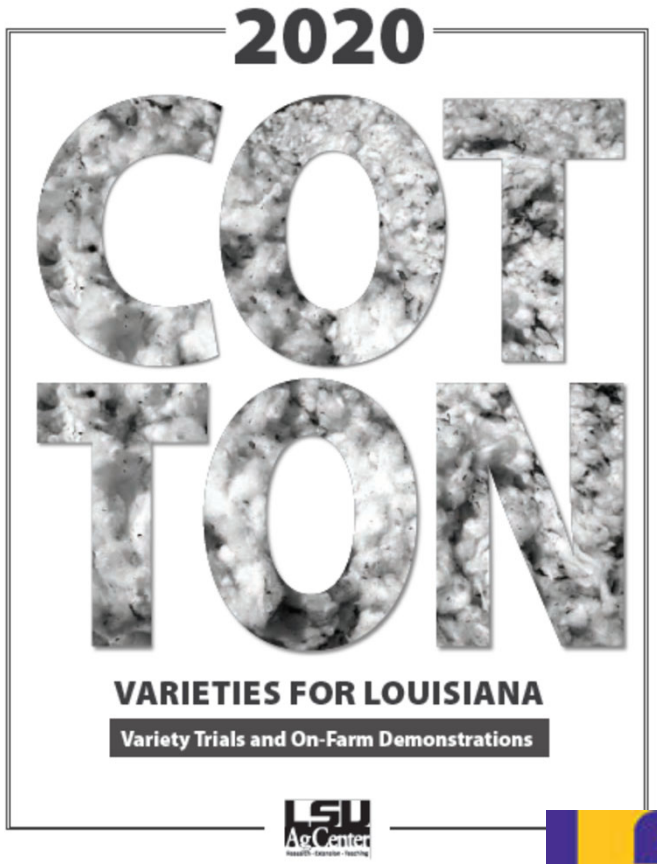
$200

3-inch intervals

Green – 0-200 psi
Yellow- 200-300 psi
Red- 300 psi and above

2020 Cotton Varieties for Louisiana Publication

- **Fertility recommendations**
  - **N**
  - **P**
  - **K**
  - **S**
  - **Etc.**



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Acknowledgments

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Questions

Dan Fromme
318-880-8079
dfromme@agcenter.lsu.edu