

Cotton (new) disease: symptoms development and inheritance

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Disease progress depends on inoculation time

- Late inoculation (Early planting/older plants): Symptoms like Brazilian Atypical CDB;
- Early inoculation (Late Planting/young seedlings): Drastic symptoms after exposed to stressful environment.

Early infection (Stages & Symptoms)

- Stage 1: Changing in leaves color. Normal growth;
 - Stage 2: Leaves fold downwards. Petioles and stem become reddish. Plants stop growing;
 - Stage 3: Leaf withering;
 - Stage 4: Complete withering and beginning of defoliation;
 - Stage 5: Complete defoliation, sometimes bud necrosis;
 - Stage 6: Plants start to develop new sprouts;
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- Sometimes, plants die.
 - Recovered plants stunted, low few fruit retention

Cotton aphids associated with plantlets showing initial symptoms



Early infection. Stage 1: Changing in leaves color: reddening or dark green. Normal plant growth.



Early infection. Stage 2: Leaves fold downwards. Petioles become reddish. Plants stop growing.



Early infection. Stage 3: Leaves wilting.



Early infection. Stage 4: Complete withering and beginning of defoliation



Early infection. Stage 5: Defoliation. Frequently, the apical meristem dies.



Early infection. Stage 6: Plants start to develop new sprouts (regrowth)









Late infection (stages and symptoms)

- Stage 1: Changing in leaves color. Normal growth;
- Stage 2: Leaves fold downwards. Petioles and stem become reddish. Reduced growing;
- Stage 3: Shortening of internodes. Sometimes, occurs leaf withering;
- Stage 4: Most of all reproductive structures are aborted;

- Rarely plant die

Late infection. Stage 1: Changing in leaves color: reddening or dark green. Normal plant growth.



Late infection. Stage 2: Leaves fold downwards. Petioles and stem become reddish. Reduced growing.







Late infection. Stage 3: Shortening internodes. Sometimes, occurs leaf withering.



Update on Cotton Incorporated supported project

- Develop genetic populations segregating for resistance to ACBD.
- Screen populations to determine the segregation of resistance
- Genotype populations with DNA markers to determine the location of R gene and identify markers associated with resistance



Cotton blue disease in central-west Brazil: Occurrence, vector (*Aphis gossypii*) control levels and cultivar reaction

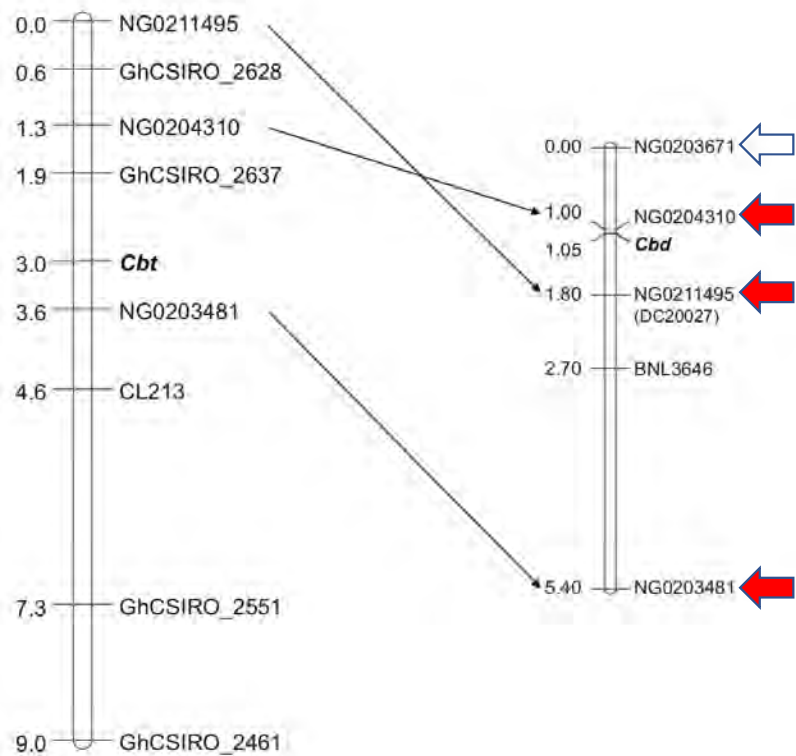
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Table 4 Cotton cultivar reactions to blue disease (CBD) and atypical cotton blue disease (ACBD) under greenhouse conditions in 2015

Cultivar	CBD ^a	ACBD	Cultivar	CBD	ACBD
BRS 368RF	1.0a	1.0a	FM 975WS	1.0a	3.8d
BRS 369RF	1.0a	2.0b	FM 980GLT	1.0a	2.3b
BRS 371RF	2.0b	4.0d	FM 982GL	2.0b	4.0d
BRS 372	1.3a	3.0c	IAC 26RMD	1.3a	4.0d
IMA 2106GL	1.0a	3.5c	IMA 5675B2RF	1.0a	4.3d
DP 1227B2RF	1.3a	2.5b	TMG 11WS	1.0a	1.8b
DP 1228B2RF	2.8c	4.8d	TMG 41WS	1.0a	1.8b
DP 1240B2RF	1.0a	3.0c	TMG 42WS	1.0a	1.5a
IMA 8405GLT	1.0a	2.6b	TMG 43WS	1.0a	1.5a
FM 913GLT	1.0a	1.3a	TMG 81WS	1.0a	2.3b
FM 940GLT	1.0a	1.8b	TMG 82WS	1.0a	2.5b
FM 944GL	1.0a	4.5d	Delta Opal	1.0a	1.0a
FM 966LL	3.8d	3.3c	FMT 701	1.0a	4.5d
C.V. (%)	6.3	8.7			
r ^b	0.4n.s.				



Symptomatic plants in Brazil



Population planted at Fairhope, AL

Pedigree	F2:3 population size
BRS286 x GA9100	40
BRS286 x RK-Rn-04	115
BRS286 x GA5024	72
BRS286 x GA5095	45
BRS286 x GA2141	71
BRS286 x GA230	42

F2 Breeding nursery (July 3, 2019)



Field map and symptomatic plants

1001	1024	1025	1048	1049	1072	1073	1096	1097	1120
1002	1023	1026	1047	1050	1071	1074	1095	1098	1119
1003	1022	1027	1046	1051	1070	1075	1094	1099	1118
1004	1021	1028	1045	1052	1069	1076	1093	1100	1117
1005	1020	1029	1044	1053	1068	1077	1092	1101	1116
1006	1019	1030	1043	1054	1067	1078	1091	1102	1115
1007	1018	1031	1042	1055	1066	1079	1090	1103	1114
1008	1017	1032	1041	1056	1065	1080	1089	1104	1113
1009	1016	1033	1040	1057	1064	1081	1088	1105	1112
1010	1015	1034	1039	1058	1063	1082	1087	1106	1111
1011	1014	1035	1038	1059	1062	1083	1086	1107	1110
1012	1013	1036	1037	1060	1061	1084	1085	1108	1109

1121	2016	2017	2048	2049	2080	2081	2112	2113	GA 230
1122	2015	2018	2047	2050	2079	2082	2111	2114	GA 230
1123	2014	2019	2046	2051	2078	2083	2110	2115	GA 230
1124	2013	2020	2045	2052	2077	2084	2109	2116	GA 230
1125	2012	2021	2044	2053	2076	2085	2108	2117	GA 230
1126	2011	2022	2043	2054	2075	2086	2107	2118	GA 230
1127	2010	2023	2042	2055	2074	2087	2106	2119	GA 230
1128	2009	2024	2041	2056	2073	2088	2105	2120	GA230
1129	2008	2025	2040	2057	2072	2089	2104	2121	2136
1130	2007	2026	2039	2058	2071	2090	2103	2122	2135
1131	2006	2027	2038	2059	2070	2091	2102	2123	2134
1132	2005	2028	2037	2060	2069	2092	2101	2124	2133
1133	2004	2029	2036	2061	2068	2093	2100	2125	2132
1134	2003	2030	2035	2062	2067	2094	2099	2126	2131
1135	2002	2031	2034	2063	2066	2095	2098	2127	2130
1136	2001	2032	2033	2064	2065	2096	2097	2128	2129

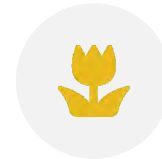


Heat Map Dark Red < 15, Red = 10-15
 Orange = 5-10, Yellow = 1-5, Green = 0

Resistant and susceptible F2s



TOTAL 136 F2 POPULATIONS (TWO REPLICATIONS) (TWO ROW PLOTS)



69 F2 POPULATIONS HAVE SHOWN SYMPTOMATIC PLANTS



SELECTED 13 POPULATIONS BASED ON BRONZE WILT SCORING DATA



DISEASE SEVERITY VARIED FROM STAGE 1 TO 6



Scoring of bronze wilt was consistent in both the replications



Same 69 F2s has shown symptoms in both the replications.



Among F2s segregating for bronze wilt, parents GA 230, LA 3001, LA 3101, ARK 60, ARK 13, ARK 18 and AU 90098 appeared to be resistant and GA 2016016, GA 201620, BRS 335, BRS 293 and BRS286 appeared to be susceptible.



Based on these cross combinations we have selected 13 F2 populations as our mapping populations. DNA samples were collected from a total of 3,385 F2 plants for the 13 populations.