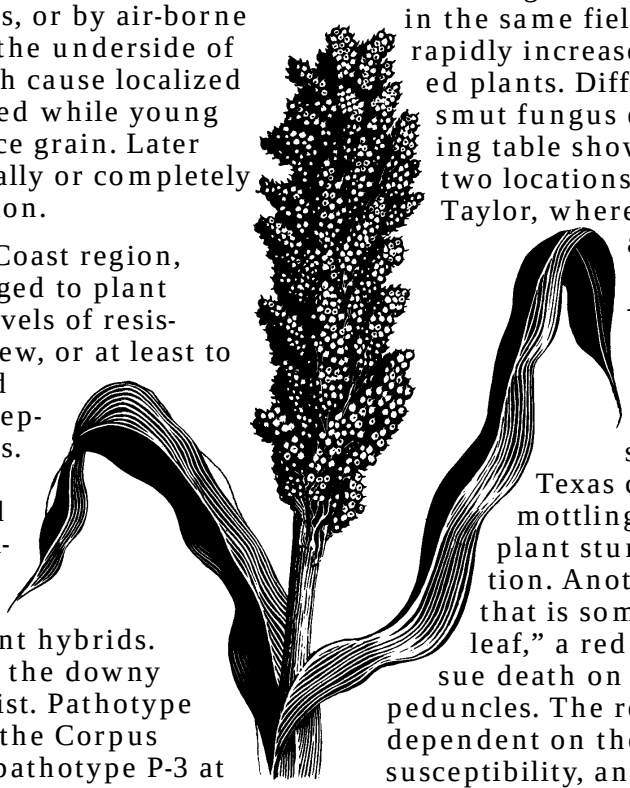
Disease Response of Grain Sorghum Hybrids

Disease Descriptions

Downy Mildew

Sorghum downy mildew, caused by the fungus *Peronosclerospora sorghi*, is most prevalent along the Gulf Coast in Texas. Systemically infected plants have light green to yellow stripes lengthwise in the leaves often with a grayish-white downy fungal growth consisting of numerous tiny spores on the lower surface of the leaf. Grain sorghum seedlings can be infected by soil-borne inoculum, resulting in systemic infections, or by air-borne spores produced on the underside of infected leaves, which cause localized lesions. Plants infected while young often will not produce grain. Later infections may partially or completely inhibit grain formation.

In the Texas Gulf Coast region, growers are encouraged to plant hybrids with good levels of resistance to downy mildew, or at least to rotate with unrelated crops and avoid susceptible forage sorghums. In other parts of the state, growers should be watchful for possible increases in the disease before having to rely on resistant hybrids. Pathotypes (races) of the downy mildew pathogen exist. Pathotype P-1 was prevalent at the Corpus Christi test site and pathotype P-3 at the Edroy site about 20 miles west of Corpus Christi. As can be seen from the data in the accompanying table, some hybrids resistant to pathotype P-1 are not resistant to pathotype P-3. But all hybrids resistant to pathotype P-3 should also be resistant to pathotype P-1.



Head Smut

Head smut, caused by the fungus *Sporisorium reilianum*, is most prevalent along the Texas Gulf Coast and into central Texas. Soil-borne smut spores from previous crops infect young sorghum seedlings which remain relatively normal in appearance until heading time. At heading, a large mass of dark-brown smut spores appears in place of the panicle. The spores fall to the ground and initiate infection in a subsequent sorghum crop.

Planting head-smut susceptible hybrids in the same field year after year can rapidly increase the percentage of infected plants. Different races of the head smut fungus exist, therefore the following table shows the disease reactions at two locations, Corpus Christi and Taylor, where the populations of races are different.

Maize Dwarf Mosaic (MDM)

Maize dwarf mosaic virus commonly infects grain sorghum in all parts of Texas causing a distinctive leaf mottling (light-green blotchiness), plant stunting, and yield reduction. Another prominent symptom that is sometimes observed is “red leaf,” a reddish discoloration and tissue death on leaves, sheaths, and peduncles. The red leaf symptom is dependent on the virus strain, the hybrid susceptibility, and cool night temperatures usually below 60°F.

Johnsongrass serves as the overwintering source of the virus, which is maintained in the underground rhizomes until it moves into the young johnsongrass shoots in the spring. Aphids feeding on the infected johnsongrass acquire the

virus and move it to other non-infected johnsongrass plants or to young grain sorghum plants.

All presently-grown grain sorghum hybrids are susceptible to MDM; however, some hybrids are "tolerant" to the disease and show less severe symptoms and little or no yield loss. Where johnsongrass is prevalent in or around a field, it would be wise to avoid a grain sorghum hybrid classified as "susceptible" or "very susceptible."

The MDM disease reaction data came from a trial in College Station where both inoculated and naturally-infected plots were evaluated.

Anthracnose

Anthracnose is a disease, caused by the fungus *Colletotrichum graminicola*, that damages leaves, stems, and panicles of grain sorghum plants. When infected stems are cut lengthwise, brick-red sections can be seen in the normally white pith. Severe infection can significantly reduce yields.

Anthracnose development is weather-dependent, and has been mostly restricted to the more humid Gulf Coast region of Texas. In this area, avoidance of hybrids rated as "susceptible," good residue management, and rotation with crops unrelated to grain sorghum are suggested practices for managing the disease. The anthracnose disease reaction data came from a cooperative test site near Griffin, Georgia, and from College Station, Texas.

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Disease Reaction of Commercial Grain Sorghum Hybrids to Downy Mildew, Head Smut, MDM, and Anthracnose from Trials in 1994

	% Downy Mildew		% Head Smut		MDM	Anthracnose
	C. Christi	Edroy	Taylor	C. Christi		
AgriPro Seeds						
AP9135	6	15	2	16	S	S
AP9210	12	6	2	6	I	S
AP9250	3	14	2	18	S	S
AP9670	21	6	1	0	I	VS
AP9690	32	21	1	1	S	S
AP9830	0	9	4	7	S	S
AP9850	0	0	1	0	I	I
AP9857	0	0	0	0	I	I
AP9860	0	3	0	0	S	I
D701G	0	1	2	4	I	I
ST686	0	5	0	0	S	VS
ST3280	39	24	4	9	I	S
ST3502	13	19	1	2	S	I
TEK1094R	10	15	2	4	I	S
W-690	0	1	0	0	I	I
WAC681	0	0	1	0	I	VS
DeKalb Plant Genetics						
DK37	0	10	1	17	I	S
DK40y	0	3	1	14	I	VS
DK51	1	4	1	22	I	VS
DK54	0	3	1	4	I	S
DK55	15	7	2	14	S	S
DK56	0	3	3	12	I	S
DK58	0	4	0	8	I	S
DK64	1	3	3	11	VS	S
Douglass W. King Co.						
dk715E	1	8	0	2	I	VS
dk760	0	4	1	0	I	VS
dk775	0	1	0	9	I	I
dk780	1	2	1	1	I	VS
dk785	0	7	4	15	Tol.	VS
dk790	0	4	1	8	I	I
dk940W	5	5	1	10	VS	I
Garrison & Townsend, Inc.						
SG-614	0	15	0	0	I	VS
SG-622	2	24	7	7	I	VS
SG-651	1	20	6	12	I	VS
SG-674	0	11	0	1	I	VS
SG-722	11	19	5	15	I	S
SG-737	9	22	0	1	I	VS
SG-742	0	8	1	7	I	I
SG-747	12	20	1	28	I	VS

Disease Reaction of Commercial Grain Sorghum Hybrids (continued)

	% Downy Mildew		% Head Smut		MDM	Anthracnose
	C. Christi	Edroy	Taylor	C. Christi		
(Garrison & Townsend, Inc. - continued)						
SG-821	0	14	3	9	S	S
SG-822	25	12	5	7	S	I
SG-825	2	10	0	9	S	VS
SG-833	1	17	2	18	I	S
SG-843	6	14	0	5	I	VS
SG-872	0	5	9	10	S	S
SG-919	0	10	1	15	I	S
SG-922	2	12	3	5	I	VS
SG-925	1	2	1	1	Tol.	VS
SG-927	1	12	1	17	Tol.	S
SG-932	0	0	4	7	I	I
SG-942	0	0	0	0	I	I
ICI Seeds Inc.						
5319	0	1	3	11	I	I
5323	0	4	8	15	I	S
5329	0	5	1	8	I	S
5392	2	2	1	1	I	S
5503	0	0	0	0	I	VS
5506Y	0	4	2	12	I	S
5511	19	13	0	12	I	S
5514Y	2	8	4	25	I	S
5517	18	25	1	15	S	S
5521	1	3	0	6	S	S
5522Y	17	8	3	13	I	I
5536	0	1	1	5	S	VS
5616	0	4	0	3	VS	S
5643	1	13	0	7	I	VS
5681	0	3	1	5	S	VS
5712	7	3	1	9	VS	S
5715	26	24	4	17	I	S
Mycogen Plant Sciences						
Golden Acres-						
Elite	33	16	2	13	I	S
Eden	0	5	0	0	I	VS
Chico	1	13	0	3	I	VS
Gage	31	11	3	19	S	I
Hardy	23	18	3	16	I	I
Omaha	14	30	3	21	S	I
Prosper	21	11	0	13	I	S
Ranger	0	0	1	9	I	S
Rio	2	8	0	6	I	VS
Sonora	0	4	1	12	S	VS
Y-75	0	4	0	0	I	VS
Y-76	0	0	0	1	I	VS
Y-77E	1	3	2	17	I	I
Y-101G	19	5	0	8	I	S

Disease Reaction of Commercial Grain Sorghum Hybrids (continued)

	% Downy Mildew		% Head Smut		MDM	Anthracnose
	C. Christi	Edroy	Taylor	C. Christi		
(Mycogen Plant Sciences - continued)						
Growers-						
1214E	23	19	4	30	S	I
1290	0	0	0	18	Tol.	S
1310A	9	4	1	3	I	S
1310AE	9	9	0	9	I	S
1313	1	3	1	0	I	VS
3146	0	2	0	11	I	S
3150	0	2	1	7	S	S
3151	0	9	0	0	I	VS
3157	0	10	0	4	I	VS
3159	0	4	0	0	S	VS
3225	43	24	0	22	I	S
3260	0	3	1	12	I	S
3622	23	15	6	20	I	I
3624	14	27	0	15	VS	I
Jacques-						
111E	0	19	0	0	I	VS
266E	36	27	5	18	I	S
355W	18	28	10	15	I	I
375W	18	34	4	18	VS	I
411	0	1	2	15	I	VS
444E	0	1	1	10	I	VS
455E	0	5	0	0	I	VS
466W	8	13	2	17	S	S
505	14	4	0	8	I	S
505E	16	11	0	9	S	S
606E	0	4	0	8	I	I
611E	0	6	1	15	I	I
ORO Alpha	2	25	0	1	I	VS
ORO Amigo	0	2	2	9	I	I
ORO Baron	0	8	0	0	I	VS
ORO Bonita	0	2	1	30	I	VS
ORO Bonus	20	9	1	9	I	S
ORO Eagle	49	23	0	16	I	S
ORO Edge	0	6	0	0	Tol.	VS
ORO Excel	20	21	9	24	I	I
ORO G-Plus	20	3	0	6	I	S
ORO Hombre	0	0	0	0	I	VS
ORO Ike	15	29	0	20	S	I
ORO Quest	0	1	0	12	I	S
ORO Silverado	14	19	4	16	S	I
ORO Ultra	0	7	1	6	I	VS
ORO Zenith	0	1	0	9	I	I

Disease Reaction of Commercial Grain Sorghum Hybrids (continued)

	% Downy Mildew		% Head Smut		MDM	Anthracnose
	C. Christi	Edroy	Taylor	C. Christi		
NC+ Hybrids						
472	0	13	0	8	S	VS
573E	0	4	0	0	I	VS
6B12	33	25	0	10	S	VS
6B50	0	18	8	18	I	VS
6B67	0	5	2	9	I	VS
6R55E	0	7	5	32	S	VS
7B27	0	6	1	11	S	VS
7B44	0	35	1	20	S	VS
7B51	1	17	2	10	Tol.	VS
7B90	0	5	1	11	I	I
7R37E	0	2	7	29	I	VS
8B10	0	7	2	7	S	S
X581	2	35	13	19	Tol.	S
X670	19	32	0	5	Tol.	S
X766	1	19	1	5	I	S
X839	0	11	1	13	I	R
Northrup King Co.						
1210	0	7	0	4	I	I
1580	2	27	2	7	VS	VS
2030	1	6	1	10	I	S
2656	0	0	0	21	Tol.	S
2660	0	1	1	8	I	S
2665	0	1	0	2	S	I
KS 383Y	0	0	2	16	I	S
KS 397	0	11	2	15	I	VS
KS 524	6	17	0	11	I	VS
KS 555Y	1	16	4	17	S	S
KS 560Y	0	5	3	11	I	S
KS 710	0	2	2	15	I	VS
KS 714Y	0	5	5	24	S	S
KS 735	0	1	1	7	I	I
KS 737	0	2	2	11	I	S
KS 936	0	1	1	0	I	I
KS 955	0	0	0	1	I	I
KS 989	0	0	0	0	I	S
NK2244(Apron)	0	0	0	8	I	R
S9750	0	2	2	11	I	R
Savanna 5	0	5	0	0	I	I
XM406	0	5	1	0	I	I
G.E. Pogue Seed Co.						
AG 222	0	4	0	0	I	VS
AG 233	0	2	1	6	S	I

Disease Reaction of Commercial Grain Sorghum Hybrids (continued)

	% Downy Mildew		% Head Smut		MDM	Anthracnose
	C. Christi	Edroy	Taylor	C. Christi		
Pioneer Hi-Bred Int'l						
8118	0	0	0	0	VS	S
8305	0	9	0	9	I	R
8310(Apron)	0	0	0	1	I	R
8313	0	0	0	2	S	S
Richardson Seeds, Inc.						
RS 290E	1	3	2	3	I	S
Texas Seed Co.						
TS422A	1	6	0	3	S	VS
TS466	0	1	2	8	I	I
TS477A	0	0	0	0	I	I
TS488	0	2	1	1	I	VS
Triumph Seed Co.						
TR60-G	0	6	0	0	I	VS
TR65-G	0	1	0	0	S	VS
TR82-G	0	1	2	0	Tol.	S
TR459	0	7	0	0	I	VS
TR481	0	6	0	6	I	VS
TRX22412	0	11	1	1	I	S
TRX23113	0	21	14	41	I	VS
TRX23215	1	9	8	55	Tol.	S
TRX25222	0	7	0	4	VS	I
Two80-D	0	4	0	9	I	I

Disease Rating Key:

Downy Mildew - % plants with systemic infection

Head Smut - % plants with smutted panicles

NOTE: Occasionally, some sorghum lines will develop downy mildew local lesions and show few systemically infected plants. This reaction could be genetically controlled, but may also result from seeds treated with the systemic fungicide Apron®. Participants in the downy mildew tests were requested to indicate if Apron® was used on seed submitted, and this is noted whenever the fungicide was indicated as present.

MDM (Maize Dwarf Mosaic): 1-5 scale (1 = no apparent symptoms; 5 = extensive leaf tissue death, severe stunting):

1.0 - 2.5 Tolerant (Tol.)
2.6 - 3.5 Intermediate (I)
3.6 - 4.0 Susceptible (S)
4.1 - 5.0 Very Susceptible (VS)

Anthracnose: 1-5 scale (1 = little or no infection; 5 = extensive tissue death):

1.0 - 2.5 Resistant (R)
2.6 - 3.5 Intermediate (I)
3.6 - 4.5 Susceptible (S)
4.6 - 5.0 Very Susceptible (VS)

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Zerle L. Carpenter, Director, Texas Agricultural Extension Service, The Texas A&M University System.

5M–3-95, New PP