

Table 1: Number and frequency (%) of virulence phenotypes of *Puccinia triticina* in the United States in 2017 identified by virulence to 20 lines of wheat with single genes for leaf rust resistance.

Race	Virulence combination (ineffective Lr genes)	Southeast		Northeast		Ohio Valley		TX, OK		KS, NE		MN, SD, ND		CA		WA		Total	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
LBDSG	1,17,B,10,14a,28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	45.5	10	2.1
LCDSG	1,26,17,B,10,14a,28	1	0.8	0	0	0	0	0	0	0	0	0	0	0	0	3	13.6	4	0.9
MBDSB	1,3,17,B,10,14a	0	0	0	0	0	0	3	2.6	0	0	0	0	0	0	0	0	3	0.6
MBDSB	1,3,17,B,10,14a,39	6	5	0	0	0	0	5	4.3	7	17.5	7	5.5	1	50	0	0	26	5.5
MBDSG	1,3,17,B,10,14a,28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9.1	2	0.4
MBPSB	1,3,3ka,17,30,B,10,14a	0	0	0	0	0	0	4	3.4	0	0	0	0	0	0	0	0	4	0.9
MBPSD	1,3,3ka,17,30,B,10,14a,39	2	1.7	0	0	0	0	4	3.4	0	0	2	1.6	0	0	0	0	8	1.7
MBTNB	1,3,3ka,11,17,30,B,14a	33	27.5	0	0	17	44.7	0	0	1	2.5	2	1.6	0	0	0	0	53	11.3
MCDSB	1,3,26,17,B,10,14a	0	0	0	0	0	0	1	0.9	0	0	0	0	0	0	0	0	1	0.2
MCDSB	1,3,26,17,B,10,14a,39	0	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0	1	0.2
MCDSG	1,3,26,17,B,10,14a,28	0	0	0	0	0	0	0	0	0	0	3	2.4	0	0	6	27.3	9	1.9
MCPSB	1,3,26,3ka,17,30,B,10,14a	0	0	0	0	0	0	2	1.7	0	0	0	0	0	0	0	0	2	0.4
MCPSD	1,3,26,3ka,17,30,B,10,14a,39	0	0	0	0	0	0	1	0.9	0	0	2	1.6	0	0	0	0	3	0.6
MCTNB	1,3,26,3ka,11,17,30,B,14a	24	20	0	0	7	18.4	0	0	2	5	0	0	0	0	0	0	33	7
MDBBG	1,3,24,28	0	0	0	0	0	0	1	0.9	0	0	0	0	0	0	0	0	1	0.2
MDPSD	1,3,24,3ka,17,30,B,10,14a,39	4	3.3	0	0	0	0	0	0	0	0	2	1.6	0	0	0	0	6	1.3
MFGJG	1,3,24,26,11,10,14a,28	4	3.3	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	5	1.1
MFGJJ	1,3,24,26,11,10,14a,28,39	0	0	0	0	0	0	0	0	1	2.5	0	0	0	0	0	0	1	0.2
MFGKG	1,3,24,26,11,10,14a,18,28	1	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2
MFJSB	1,3,24,26,11,17,B,10,14a	0	0	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	1	0.2
MFPSB	1,3,24,26,3ka,17,30,B,10,14a	1	0.8	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	2	0.4
MFPSD	1,3,24,26,3ka,17,30,B,10,14a,39	0	0	0	0	1	2.6	2	1.7	1	2.5	0	0	0	0	0	0	4	0.9
MFTSB	1,3,24,26,3ka,11,17,30,B,10,14a	0	0	0	0	0	0	0	0	0	0	2	1.6	0	0	0	0	2	0.4
MGPSB	1,3,16,3ka,17,30,B,10,14a	0	0	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	1	0.2
MLPSD	1,3,9,3ka,17,30,B,10,14a,39	3	2.5	0	0	0	0	1	0.9	3	7.5	2	1.6	0	0	0	0	9	1.9
MMDSB	1,3,9,26,17,B,10,14a,39	0	0	0	0	0	0	1	0.9	0	0	0	0	0	0	0	0	1	0.2
MMNSD	1,3,9,26,3ka,17,30,B,10,14a,39	1	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2
MMPSD	1,3,9,26,3ka,17,30,B,10,14a,39	1	0.8	0	0	0	0	1	0.9	0	0	1	0.8	0	0	0	0	3	0.6
MNPSD	1,3,9,24,3ka,17,30,B,10,14a,39	5	4.2	0	0	0	0	9	7.7	6	15	10	7.9	0	0	0	0	30	6.4
MPDSB	1,3,9,24,26,17,B,10,14a,39	0	0	0	0	0	0	1	0.9	0	0	0	0	0	0	0	0	1	0.2
MPPSD	1,3,9,24,26,3ka,17,30,B,10,14a,39	3	2.5	0	0	1	2.6	16	13.7	5	12.5	12	9.4	0	0	0	0	37	7.9
PBDGG	1,2c,3,17,10,28	0	0	3	100	0	0	0	0	0	0	0	0	0	0	0	0	3	0.6
PBDGJ	1,2c,3,17,10,28,39	0	0	0	0	0	0	0	0	0	0	3	2.4	0	0	0	0	3	0.6
PBDJG	1,2c,3,17,10,14a,28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4.5	1	0.2	
TBBGJ	1,2a,2c,3,10,28,39	0	0	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	1	0.2
TBBGS	1,2a,2c,3,10,21,28,39	0	0	0	0	0	0	7	6	4	10	17	13.4	0	0	0	0	28	6
TBBKG	1,2a,2c,3,10,14a,18,28	0	0	0	0	2	5.3	0	0	0	0	0	0	0	0	0	0	2	0.4
TBBQJ	1,2a,2c,3,B,10,28,39	0	0	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	1	0.2
TBGJG	1,2a,2c,3,11,10,14a,28	0	0	0	0	1	2.6	0	0	0	0	0	0	0	0	0	0	1	0.2
TBRKG	1,2a,2c,3,3ka,11,30,10,14a,18,28	7	5.8	0	0	1	2.6	1	0.9	0	0	0	0	0	0	0	0	9	1.9
TCGJG	1,2a,2c,3,26,11,10,14a,28	0	0	0	0	1	2.6	0	0	0	0	0	0	0	0	0	0	1	0.2
TCGKG	1,2a,2c,3,26,11,10,14a,18,28	1	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2
TCISB	1,2a,2c,3,26,11,17,B,10,14a	2	1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.4
TCJTB	1,2a,2c,3,26,11,17,B,10,14a,18	2	1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.4
TCTFG	1,2a,2c,3,26,3ka,11,30,14a,18,28	0	0	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	1	0.2
TCTRG	1,2a,2c,3,26,3ka,11,30,10,14a,18,28	4	3.3	0	0	0	0	0	0	1	2.5	4	3.1	0	0	0	0	9	1.9
TCSQB	1,2a,2c,3,26,3ka,11,17,B,10	3	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.6
TCTNB	1,2a,2c,3,26,3ka,11,17,30,B,14a	5	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1.1
TCTSB	1,2a,2c,3,26,3ka,11,17,30,B,10,14a	1	0.8	0	0	1	2.6	0	0	0	0	0	0	0	0	0	0	2	0.4
TDBGD	1,2a,2c,3,24,10,39	0	0	0	0	0	0	0	0	1	2.5	0	0	0	0	0	0	1	0.2
TDPSB	1,2a,2c,3,24,3ka,17,30,B,10,14a	0	0	0	0	1	2.6	1	0.9	0	0	0	0	0	0	0	0	2	0.4
TDRKG	1,2a,2c,3,24,3ka,11,30,10,14a,18,28	0	0	0	0	0	0	1	0.9	0	0	0	0	0	0	0	0	1	0.2
TDTSB	1,2a,2c,3,24,3ka,11,17,30,B,10,14a	0	0	0	0	1	2.6	0	0	0	0	0	0	0	0	0	0	1	0.2
TFBJQ	1,2a,2c,3,24,26,10,14a,21,28	0	0	0	0	0	0	0	0	1	2.5	2	1.6	0	0	0	0	3	0.6
TFPSB	1,2a,2c,3,24,26,3ka,17,30,B,10,14a	0	0	0	0	0	0	0	0	0	0	3	2.4	0	0	0	0	3	0.6
TFTNB	1,2a,2c,3,24,26,3ka,11,17,30,B,14a	0	0	0	0	1	2.6	0	0	0	0	0	0	0	0	0	0	1	0.2
TFTSB	1,2a,2c,3,24,26,3ka,11,17,30,B,10,14a	1	0.8	0	0	3	7.9	43	36.8	0	0	4	3.1	0	0	0	0	51	10.9
TNBJG	1,2a,2c,3,9,24,10,28,39	0	0	0	0	0	0	6	5.1	5	12.5	12	9.4	0	0	0	0	23	4.9
TNBJJ	1,2a,2c,3,9,24,10,14a,28,39	1	0.8	0	0	0	0	4	3.4	2	5	20	15.7	0	0	0	0	27	5.8
TNMJJ	1,2a,2c,3,9,24,3ka,30,10,14a,28,39	0	0	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	1	0.2
TNPSD	1,2a,2c,3,9,24,3ka,17,30,B,10,14a,39	0	0	0	0	0	0	1	0.9	0	0	0	0	0	0	0	0	1	0.2
TNRJJ	1,2a,2c,3,9,24,3ka,11,30,10,14a,28,39	4	3.3	0	0	0	0	1	0.9	0	0	0	0	0	0	0	0	5	1.1
TPBGJ	1,2a,2c,3,9,24,26,10,28,39	0	0	0	0	0	0	0	0	0	0	4	3.1	0	0	0	0	4	0.9
TPBJJ	1,2a,2c,3,9,24,26,10,14a,28,39	0	0	0	0	0	0	0	0	0	0	2	1.6	0	0	0	0	2	0.4
TPDQJ	1,2a,2c,3,9,24,26,17,B,10,28,39	0	0	0	0	0	0	0	0	0	0	3	2.4	0	0	0	0	3	0.6
Total		120		3		38		117		40		127		2		22		469	

Table 2. Number and frequency (%) of isolates of *Puccinia triticina* in the United States in 2017 virulent to 20 lines of wheat with single resistance genes for leaf rust resistance.

Gene	Southeast		Northeast		Ohio Valley		TX, OK		KS, NE		MN,SD, ND		CA		WA		Total	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Lr1	120	100	3	100	38	100	117	100	40	100	127	100	2	100	22	100	469	100
Lr2a	31	25.8	0	0	12	31.6	65	55.6	14	35	75	59.1	0	0	0	0	197	42
Lr2c	31	25.8	3	100	12	31.6	65	55.6	14	35	78	61.4	0	0	1	4.5	204	43.5
Lr3	119	99.2	3	100	38	100	117	100	40	100	127	100	2	100	9	40.9	455	97
Lr9	18	15	0	0	1	2.6	41	35	21	52.5	67	52.8	0	0	0	0	148	31.6
Lr16	0	0	0	0	0	0	0	0	0	0	1	0.8	0	0	0	0	1	0.2
Lr24	24	20	0	0	8	21.1	86	73.5	22	55	80	63	0	0	0	0	220	46.9
Lr26	55	45.8	0	0	15	39.5	68	58.1	11	27.5	46	36.2	1	50	9	40.9	205	43.7
Lr3ka	102	85	0	0	34	89.5	88	75.2	19	47.5	50	39.4	0	0	0	0	293	62.5
Lr11	92	76.7	0	0	33	86.8	46	39.3	5	12.5	15	11.8	0	0	0	0	191	40.7
Lr17	98	81.7	3	100	33	86.8	96	82.1	25	62.5	61	48	2	100	22	100	340	72.5
Lr30	98	81.7	0	0	34	89.5	88	75.2	19	47.5	50	39.4	0	0	0	0	289	61.6
LrB	98	81.7	0	0	33	86.8	96	82.1	25	62.5	59	46.5	2	100	21	95.5	334	71.2
Lr10	58	48.3	3	100	13	34.2	116	99.1	37	92.5	124	97.6	2	100	22	100	375	80
Lr14a	117	97.5	0	0	38	100	103	88	30	75	86	67.7	2	100	22	100	398	84.9
Lr18	15	12.5	0	0	3	7.9	2	1.7	1	2.5	5	3.9	0	0	0	0	26	5.5
Lr21	0	0	0	0	0	0	7	6	5	12.5	19	15	0	0	0	0	31	6.6
Lr28	23	19.2	3	100	5	13.2	21	17.9	14	35	75	59.1	0	0	22	100	163	34.8
Lr39	30	25	0	0	2	5.3	60	51.3	35	87.5	102	80.3	2	100	0	0	231	49.3
Lr42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	120		3		38		117		40		127		2		22		469	