

Effect on wheat cultivars (*Triticum aestivum* L.)
A. The net impact of individual and combined stress on the plant

 Stress 1: *Puccinia striiformis*
 Stress 2: *Mycosphaerella graminicola*
 Stage of plant: 2 leaves seedling

The table shows the impact of individual and combined stress on the dry leaf increment of wheat cultivars

Cultivar	Treatment	Response under combined stress (Type A parameters*)
		Dry leaf increment
Lakish	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	11
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) on 17 day after plant at G.S. 12 (Simultaneous stress)	1
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S. 12	28
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	3
Anza	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	1
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) on 17 day after plant at G.S. 12 (Simultaneous stress)	2
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S. 12	1
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	0
Lemhi	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	25
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) on 17 day after plant at G.S. 12 (Simultaneous stress)	23
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S. 12	41
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	-3
Baart	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	27
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) on 17 day after plant at G.S. 12 (Simultaneous stress)	25
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S. 12	68
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	1

(G.S. –Growth Stage**)

Note: Values are presented as it is from the source article without subjecting to the calculation.

‘*’ - For more information on parameters classification, please refer to ‘methodology’ tab
 ‘**’ - G.S. 0-9: Tillering, G.S. 10-19: Seedling growth, G.S. 20-29: Tillering, G.S. 30-39: Stem elongation, G.S. 40-49: Booting, G.S. 50-59: Inflorescence (ear/panicle emergence), G.S. 60-69: Anthesis (flowering), G.S. 70-79: Milk development, G.S. 80-89: Dough development, G.S. 90-99: Ripening (by Tottman D.R. 1979)

B. The interaction between the fungal pathogens under combined stress at plant interface

The table shows the effect of fungus *P. striiformis* on *M. graminicola* in wheat cultivars in relation to the area under disease progress curve

Cultivar	Treatment	Response under combined stress (Type B parameters*)
		Area under the disease progress curve
Lakish	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	3.8
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) on 17 day after plant at G.S. 12 (Simultaneous stress)	0.9
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S. 12	6.1
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	1.5
Anza	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	7.2
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) on 17 day after plant at G.S. 12 (Simultaneous stress)	8.7
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S. 12	13
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	12.7
Lemhi	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	14.3
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/mL) on 17 day	2.9



	after plant at G.S. 12 (Simultaneous stress)	
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S 12	20
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	17.2
Baart	<i>P. striiformis</i> (10^7 conidia/ml) + <i>M. graminicola</i> (10^7 conidia/mL) at plant G.S. 12 (Simultaneous stress)	17.9
	<i>P. striiformis</i> (10^7 conidia/mL) + <i>M. graminicola</i> (10^7 conidia/ml) on 17 day after plant at G.S. 12 (Simultaneous stress)	2.7
	<i>P. striiformis</i> (10^7 conidia/mL) at G.S 12	16.6
	<i>M. graminicola</i> (10^7 conidia/mL) at G.S. 12	16.9

(G.S. –Growth Stage**)

For raw data – Click here (.xlsx file)

Reference– Madariaga RB, Scharen AL (1986) Interactions of *Puccinia striiformis* and *Mycosphaerella graminicola* on wheat. Plant Dis. **70**:651-654

Note: Values are presented as it is from the source article without subjecting to the calculation.

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The inference from the study: Maradiaga and Scharen, 1986 studied the effect of interaction between the pathogens *P. striiformis* (causal organism of stripe rust) and *M. graminicola* (causal organism of *Septoria tritici* blotch) on four spring wheat cultivars, Lakish, Anza, Lehmi, and Baart. The *P. striiformis* caused an increase in dry weight of susceptible cultivars Baart, Lehmi and moderately susceptible cultivar Lakish by 68, 41 and 28 mg respectively which is more than the simultaneous inoculation of both the pathogen and single inoculation of *M. graminicola*. The resistant cultivar Anza remains less affected by inoculations. **The overall observations lead to the conclusion that combination treatment of both the pathogens did not have additive effects on the dry weight of wheat cultivars.**