Stress Combination and their Interaction in Plants (SCIP) Database

Website link: http://www.nipgr.res.in/scipdb.php

Effect on wheat cultivars (*Triticum aestivum* L.)

A. The net impact of individual and combined stress on the plant

Stress 1: *Septoria tritici*
Stress 2: *Septoria nodorum*
Stage of plant: Stem extention to heading

The table shows the impact of individual and combined stress on yield loss of wheat cultivars

Cultivar	Treatment	Response under combined stress (Type A parameters*)		
		Reduction over control (%)		
		Grain yield/ear	1000 grain weight	Grain number/ ear
Maris Widgeon	*S. tritici* (10^4 spores/mL) at plant G.S.6 + *S. nodorum* ($5x10^5$spores/mL) at plant G.S.10.3 (Sequential stress)	52.80 ↓	41.52 ↓	17.71↓
	S. tritici (10^4 spores/mL) at plant G.S.8+*S. nodorum* ($5x10^5$spores/mL) at plant G.S.10.3 (Sequential stress)	57.86 ↓	44.11 ↓	22.59↓
	S. tritici (10^4 spores/mL) at plant G.S.6	30.33 ↓	16.94 ↓	13.34↓
	S. tritici (10^4 spores/mL) at plant G.S.8	47.75 ↓	30.47 ↓	21.65↓
	S. nodorum ($5x10^5$ spores/mL) at plant G.S.10.3	52.24 ↓	30.70 ↓	28.26↓
Cappelle-Desprez	*S. tritici* (10^4 spores/mL) at plant G.S.6 + *S. nodorum* ($5x10^5$spores/mL) at plant G.S.10.3 (Sequential stress)	54.19 ↓	42.16 ↓	18.14↓
	S. tritici (10^4 spores/mL) at plant G.S.8 + *S. nodorum* ($5x10^5$spores/mL) at plant G.S.10.3 (Sequential stress)	60 ↓	44.64 ↓	26.94↓
	S. tritici (10^4 spores/mL) at plant G.S.6	14.19 ↓	11.22 ↓	1.93 ↓
	S. tritici (10^4 spores/mL) at plant G.S.8	40.64 ↓	25.32 ↓	18.33↓
	S. nodorum ($5x10^5$spores/mL) at plant G.S.10.3	45.80 ↓	36.68 ↓	22.33↓
Maris Nimrod	*S. tritici* (10^4 spores/mL) at plant G.S.6 + *S. nodorum* ($5x10^5$ spores/mL) at plant G.S.10.3 (Sequential stress)	62.31 ↓	56.31 ↓	17.17↓
	S. tritici (10^4 spores/mL) at plant G.S.8+*S. nodorum* ($5x10^5$spores/mL) at plant G.S.10.3 (Sequential stress)	47.73 ↓	37.68 ↓	16.51↓
	S. tritici (10^4 spores/mL) at plant G.S.6	43.21 ↓	36.85 ↓	9.12 ↓
	S. tritici (10^4 spores/mL) at plant G.S.8	53.76 ↓	41.09 ↓	11.23↓
	S. nodorum ($5x10^5$spores/mL) at plant G.S.10.3	49.24 ↓	48.34 ↓	3.42 ↓
Kolibri + Sappo	*S. tritici* + *S. nodorum* (50:50 mixture at $5x10^5$spores/mL) at plant G.S.9+ *S. nodorum* (10^4 spore/mL) at plant G.S. 10.5.4 (Sequential stress)	5.59 ↓	N/A	N/A
	S. tritici + *S. nodorum* (75:25 mixture at $5x10^5$ spores/mL) at plant G.S.9+ *S. nodorum* (10^4 spore/mL) at plant G.S. 10.5.4 (Sequential stress)	7.78 ↓	N/A	N/A
	S. tritici + *S. nodorum* (90:10 mixture at $5x10^5$	5.26 ↓	N/A	N/A

	spores/mL) at plant G.S.9 + *S. nodorum* (10^4 spore/mL) at plant G.S. 10.5.4(Sequential stress)			
	S. tritici (100% at $5x10^5$spores/mL) at plant G.S.9 + *S. nodorum* (10^4 spore/mL) at plant G.S. 10.5.4 (Sequential stress)	6.32 ⬇	N/A	N/A
	S. tritici + *S. nodorum* (50:50 mixture at $5x10^5$spores/mL) at plant G.S.9 + *S. nodorum* ($5x10^5$ spore/mL) at plant G.S. 10.5.4 (Sequential stress)	8.69 ⬇	N/A	N/A
	S. tritici + *S. nodorum* (75:25 mixture at $5x10^5$ spores/mL) at plant G.S.9 + *S. nodorum* ($5x10^5$ spore/mL) at plant G.S. 10.5.4 (Sequential stress)	13.77 ⬇	N/A	N/A
	S. tritici + *S. nodorum* (90:10 mixture at $5x10^5$ spore/mL) at plant G.S.9 + *S. nodorum* ($5x10^5$ spore/mL) at plant G.S. 10.5.4(Sequential stress)	14.03 ⬇	N/A	N/A
	S. tritici (100% at $5x10^5$ spore/mL) at plant G.S.9+ *S. nodorum* ($5x10^5$ spore/mL) at plant G.S. 10.5.4 (Sequential stress)	13.21 ⬇	N/A	N/A
	S. nodorum (10^4 spore/mL) at plant G.S. 10.5.4	8.34 ⬇	N/A	N/A
	S. nodorum ($5x10^5$ spore/mL) at plant G.S. 10.5.4	13.42 ⬇	N/A	N/A

(*N/A– Not available; G.S. –Growth stage***)

Note: *Values presented in the table were calculated using the formula described below.*

$$\textit{Reduction over control (\%)} = \frac{(Value_{Control} - Value_{Stress})}{Value_{Control}} x\ 100$$

⬇*'- indicates plant parameter is more affected by stress that leads to high susceptibility (higher the value more the damage).*

'*'- *For more information on parameters classification, please refer to 'methodology' tab*
'**'- *G.S 1-5: Tillering, G.S 6-10: Stem extension, G.S 10.1-10.5: Heading, G.S 11: Ripening* (*Feekes scale by Large E.C. 1954*)

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

The table shows the interaction between fungus *S. tritici and S. nodorum* in wheat cultivars in relation to the assessment of glume blotch disease

Cultivar	**Treatment**	**Response under combined stress (Type B parameters*)**	
		Leaf disease scored (%)	
		Youngest leaves	**Flag leaves**
Kolibri	*S. tritici* + *S. nodorum* (50:50 mixture at $5x10^5$spores/mL) at G.S.9 (Simultaneous stress)	12.67	N/A
	S. tritici + *S. nodorum* (75:25 mixture at $5x10^5$spores/mL) at G.S.9 (Simultaneous stress)	12.33	N/A
	S. tritici + *S. nodorum* (90:10 mixture at $5x10^5$spores/mL) at G.S.9 (Simultaneous stress)	10.83	N/A
	S. nodorum at G.S.9 ($5x10^5$spores/mL)100%	13.5	N/A

	S. tritici at G.S.9 ($5x10^5$spores/mL)100%	11.67	N/A
Sappo	*S. tritici* + *S. nodorum* (50:50 mixture at $5x10^5$spores/mL) at G.S.9 (Simultaneous stress)	18.5	N/A
	S. tritici + *S. nodorum* (75:25 mixture at $5x10^5$spores/mL) at G.S.9 (Simultaneous stress)	16.5	N/A
	S. tritici + *S. nodorum* (90:10 mixture at $5x10^5$spores/mL) at G.S.9 (Simultaneous stress)	12.33	N/A
	S. nodorum at G.S.9 ($5x10^5$spores/mL)100%	22.17	N/A
	S. tritici at G.S.9 ($5x10^5$spores/mL)100%	12.17	N/A
Maris Huntsman	*S. tritici* (10^4 spores/mL) inoculated thrice at plant G.S.1, G.S.4, G.S.9 + *S. nodorum* ($5x10^5$spores/mL) at plant G.S. 10.5.3 (Sequential stress)	N/A	22.5
	S. tritici (10^4 spores/mL) inoculated thrice at plant G.S.1, G.S.4, G.S.9	N/A	12
	S. nodorum ($5x10^5$spores/mL) at plant G.S. 10.5.3	N/A	11.2
	Uninoculated	N/A	0
Maris Ranger	*S. tritici* (10^4 spores/mL) inoculated thrice at plant G.S.1, G.S.4, G.S.9 + *S. nodorum* at plant G.S. 10.5.3 (Sequential stress)	N/A	45.3
	S. tritici (10^4 spores/mL) inoculated thrice at plant G.S.1, G.S.4, G.S.9	N/A	17.8
	S. nodorum($5x10^5$spores/mL) at plant G.S. 10.5.3	N/A	25
	Uninoculated	N/A	0

(*N/A– Not available; G.S.– Growth stage***)

For raw data – Click here (.xlsx file)

Reference– Jenkins PD, Jones DG (1981) The effects of dual inoculation of wheat cultivars with *Septoria tritici* and *Septoria nodorum*. Phytopath. **101:**210-221

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 1-5: Tillering, G.S 6-10: Stem extension, G.S 10.1-10.5: Heading, G.S 11: Ripening on the Feekes scale by Large E.C. 1954*

The inference from the study: Jenkins and Jones, 1981 have studied the possible interaction between the *Septoria* species, i.e., *S. tritici* and *S. nodorum* in the wheat plants by giving treatment at a different of growth stages. Five wheat cultivars called Maris Widgeon, Cappelle-Desprez, Maris Nimrod, Kolibri, and Sappo were investigated for the data collection on disease level with the assessment of yield. **The overall observation from this study revealed that the combined inoculation of the pathogens caused a smaller yield reduction than the sum total reductions by a single pathogen in plants of all the cultivars.**