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

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

Stress 1: *Pyrenophora tritici-repentis*
Stress 2: *Puccinia tritici*
Stage of plant: Seedling

The table shows the competitive interaction between fungus *P. tritici-repentis* and *P. tritici* in wheat cultivars in relation to the germination, appressorium formation, germ tube formation, fungal re-isolation, incubation period and disease lesion formed by the pathogen

Spore production in the absence of competition				
Cultivar	**Leaf stage**	**Treatment**	**Response under combined stress (Type B Parameter*)**	
			Conidia (x10^2)/leaf	**Urediniospores(x10^2)/leaf**
2145	Young	*P. tritici-repentis* (1×10^4 conidia/mL)	13.10	--
	Old	*P. tritici-repentis* (1×10^4 conidia/mL)	40.77	--
Jagger	Young	*P. tritici-repentis* (1×10^4 conidia/mL)	3.20	--
	Old	*P. tritici-repentis* (1×10^4 conidia/mL)	6.69	--
TAM 217	Young	*P. tritici-repentis* (1×10^4 conidia/mL)	10.77	--
	Old	*P. tritici-repentis* (1×10^4 conidia/mL)	31.74	--
2145	Young	*P. tritici* (2 mg spores/mL)	--	15.68
	Old	*P. tritici* (2 mg spores/mL)	--	4.27
Jagger	Young	*P. tritici* (2 mg spores/mL)	--	213.4
	Old	*P. tritici* (2 mg spores/mL)	--	171.1
TAM 217	Young	*P. tritici* (2 mg spores/mL)	--	306.8
	Old	*P. tritici* (2 mg spores/mL)	--	210.3

Competition between *P. tritici-repentis* and *P. tritici*			
Proportion of urediniospore production by *P. triticina* when *P. tritici-repentis* was present as a competitor compared to when *P. tritici-repentis* was absent			
Cultivar	**Leaf stage**	**Treatment**	**Proportion of urediniospores production**
2145	Young	*P. tritici* (2 mg spores/mL) +*P. tritici-repentis* (1×10^4 conidia/mL) (Simultaneous stress) on 28 days old plant	0.31

	Old	*P. tritici* (2 mg spores/mL) +*P. tritici-repentis* (1×10^4 conidia/mL) (Simultaneous stress) on 28 days old plant	0.14
	Young	*P. tritici* (2 mg spores/mL) + 3 days interval +*P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 28 days old plant	0.35
	Old	*P. tritici* (2 mg spores/mL) +3 days interval +*P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 28 days old plant	0.32
	Young	*P. tritici-repentis* (1×10^4 conidia/mL) +*P. tritici* (2 mg spores/mL) (Sequential stress) on 31 days old plant	0.19
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) +*P. tritici* (2 mg spores/mL) (Sequential stress) on 31 days old plant	0.38
Jagger	Young	*P. tritici* (2 mg spores/mL) +*P. tritici-repentis* (1×10^4 conidia/mL) (Simultaneous stress) on 28 days old plant	0.73
	Old	*P. tritici* (2 mg spores/mL) +*P. tritici-repentis* (1×10^4 conidia/mL) (Simultaneous stress) on 28 days old plant	0.31
	Young	*P. tritici* (2 mg spores/mL) + 3 days interval + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 28 days old plant	0.89
	Old	*P. tritici* (2 mg spores/mL) + 3 days interval + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 28 days old plant	0.58
	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Sequential stress) on 31 days old plant	0.54
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) +*P. tritici* (2 mg spores/mL) (Sequential stress) on 31 days old plant	0.62
TAM 2107	Young	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Simultaneous stress) on 28 days old plant	0.25
	Old	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Simultaneous stress) on 28 days old plant	0.086
	Young	*P. tritici* (2 mg spores/mL) + 3 days interval + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 28 days old plant	0.40
	Old	*P. tritici* (2 mg spores/mL) +3 days interval + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 28 days old plant	0.26

	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Sequential stress) on 31 days old plant	0.28
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Sequential stress) on 31 days old plant	0.16
Proportion of conidial production by *P. tritici repentis* when *P. triticina* was present as a competitor compared to when *P. triticina* was absent			
Cultivar	**Leaf stage**	**Treatment**	**Proportion of conidial production**
2145	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Simultaneous stress) on 31 days old plant	1.11
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Simultaneous stress) on 31 days old plant	1.10
	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + 3 days interval + *P. tritici* (2 mg spores/mL) (Sequential stress) on 28 days old plant	1.42
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) + 3 days interval + *P. tritici* (2 mg spores/mL) (Sequential stress) on 28 days old plant	1.20
	Young	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 31 days old plant	0.89
	Old	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 31 days old plant	0.96
Jagger	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Simultaneous stress) on 31 days old plant	0.58
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Simultaneous stress) on 31 days old plant	0.66
	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + 3 days interval + *P. tritici* (2 mg spores/mL) (Sequential stress) on 28 days old plant	1.66
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) + 3 days interval + *P. tritici* (2 mg spores/mL) (Sequential stress) on 28 days old plant	1.37
	Young	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 31 days old plant	0.13
	Old	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 31 days old plant	0.21

TAM 2107	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Simultaneous stress) on 31 days old plant	0.062
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) + *P. tritici* (2 mg spores/mL) (Simultaneous stress) on 31 days old plant	0.87
	Young	*P. tritici-repentis* (1×10^4 conidia/mL) + 3 days interval + *P. tritici* (2 mg spores/mL) (Sequential stress) on 28 days old plant	0.86
	Old	*P. tritici-repentis* (1×10^4 conidia/mL) + 3 days interval + *P. tritici* (2 mg spores/mL) (Sequential stress) on 28 days old plant	1.18
	Young	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 31 days old plant	0.58
	Old	*P. tritici* (2 mg spores/mL) + *P. tritici-repentis* (1×10^4 conidia/mL) (Sequential stress) on 31 days old plant	0.66

For raw data – Click here (.xlsx file)

Reference– AL Naimi FA, Garrette KA, Bockus WW (2005) Competition, facilitation, and niche differentiation
in two foliar pathogens. Oecologia **143:** 449-457

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*

The inference from the study: Al-Naimi *et al.*, 2005 studied the interaction between the facultative saprophyte *P. tritici – repentis* and obligate biotroph *P. tritici* in old and young leaves of the three wheat cultivars. Both the pathogens were inoculated singly and in combination in different orders on wheat leaves. Three winter wheat genotypes; 2145 supporting high reproduction in *P. tritici-repentis* only, Jagger supporting high reproduction in *P. tritici* only, and TAM 107 supporting high reproduction in both the pathogens. The overall data revealed that the competition among both the pathogens resulted in the high sporulation index for *P. tritici-repentis* than for *P. tritici* for all the cultivars. **The overall observations lead to the conclusion that due to interspecific competition *P. tritici* sporulation was substantially reduced in the presence of *P. tritici-repentis,* whereas *P. tritici-repentis* had proportionally low reductions in sporulation in the presence of *P. tritici* irrespective of the genotype supporting the high sporulation of either fungi.**