Effect on wheat cultivars (*Triticum aestivum* cv. Dusty, Fielder)

1. The net impact of individual and combined stress on plant growth

Crop: Wheat (*Triticum aestivum* cv. Dusty, Fielder)
Stress 1: High/Low temperature (15°C, 30°C)
Stress 2: *Meloidogyne chitwoodi* Idaho race (R1) and Utah race (R2) (2, 10, 20 eggs/cm3)
Stage of plant: 12 days after emergence

The table shows the impact of high/low temperature and nematode alone and in combination on growth of wheat cultivars.

	Treatment	Plant response to stress** Type A parameters*			
		Plant height (cm)	Tillers per plant	Root dry weight (g)	Shoot dry weight (g)
Dusty	Low temperature (15°C)	37.7	12.1	2.4	1.50
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	29.4	12.1	2.3	1.50
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	32.1	10.8	2.0	1.40
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	30.2	10.2	1.9	1.40
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3) (Simultaneous stress)	32.1	11.5	2.1	1.40
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	32.1	8.4	1.9	1.40
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	32.6	7.3	1.7	1.30

	High temperature (30°C)	31.0	17.7	0.9	1.55
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	26.0	15.4	0.9	1.50
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	26.8	13.3	0.6	1.42
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	26.8	9.8	0.5	1.37
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3) (Simultaneous stress)	26.8	16.0	0.7	1.53
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	27.6	15.1	0.6	1.43
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	24.9	13.8	0.5	1.38
Fielder	Low temperature (15°C)	48.6	3.8	2.2	1.70
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	41.7	4.2	2.1	1.50
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	41.1	4.7	1.8	1.50
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	44.9	4.0	1.6	1.50
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3)	45.0	4.0	1.9	1.50

	(Simultaneous stress)				
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	45.8	3.8	1.6	1.50
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	42.4	4.2	1.4	1.40
	High temperature (30°C)	33.6	3.5	0.6	1.73
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	28.1	2.3	0.4	1.48
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	26.7	2.3	0.4	1.40
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	27.3	2.3	0.3	1.29
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3) (Simultaneous stress)	28.1	2.0	0.5	1.53
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	27.3	2.5	0.5	1.44
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	27.5	2.5	0.4	1.30

Note:

'' - For more information on parameter classification, please refer to the 'methodology' tab.*

'**' - *Values are presented as it is from the source article without subjecting to the calculation.*

2. The interaction between high/low temperature and nematode under combined stress at plant interface

The table shows the effect of high/low temperature on nematode reproduction number and root galling index under combined stress treatment.

	Treatment	Response to combined stress** Type B parameters*	
		Reproduction number (Pf/Pi)	Root galling index
Dusty	Low temperature (15°C)	N/A	N/A
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	3.90	2.60
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	3.40	3.10
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	2.40	3.20
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3) (Simultaneous stress)	4.30	2.20
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	3.90	3.20
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	2.80	3.40
	High temperature (30°C)	N/A	N/A
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	9.80	2.50
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	7.70	2.50
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	5.30	3.70

	High temperature (30°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3) (Simultaneous stress)	7.90	2.70
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	6.50	2.80
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	4.30	3.50
Fielder	Low temperature (15°C)	N/A	N/A
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	5.70	2.10
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	4.60	2.70
	Low temperature (15°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	3.20	3.10
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3) (Simultaneous stress)	5.70	2.10
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	4.20	2.90
	Low temperature (15°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	3.30	3.20
	High temperature (30°C)	N/A	N/A
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 2 eggs/cm3) (Simultaneous stress)	6.80	2.30
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 10 eggs/cm3) (Simultaneous stress)	6.10	2.70
	High temperature (30°C) + Meloidogyne chitwoodi (R1; 20 eggs/cm3) (Simultaneous stress)	4.20	3.20

	High temperature (30°C) + Meloidogyne chitwoodi (R2; 2 eggs/cm3) (Simultaneous stress)	8.70	2.40
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 10 eggs/cm3) (Simultaneous stress)	6.70	2.40
	High temperature (30°C) + Meloidogyne chitwoodi (R2; 20 eggs/cm3) (Simultaneous stress)	4.60	3.30

Reference – Griffin GD (1993) Influence of Temperature on the Virulence of Two Races of *Meloidogyne chitwoodi* on Wheat and Barley. Journal of nematology 25(3): 454–460.

Note:
'' - For more information on parameter classification, please refer to the 'methodology' tab.*

'**' - *Values are presented as it is from the source article without subjecting to the calculation.*

Inference from the study: Griffin 1993 studied the interaction of high/low temperature and *Meloidogyne chitwoodi* (two strains R1 and R2) interaction in two wheat cultivars; Dusty and Fielder. Plants were grown at a low temperature of 15°C and high temperature of 30°C, along with three concentrations of *Meloidogyne chitwoodi* inoculum. Plant height, tillers per plant, root dry weight, and shoot dry weight reduced under combined stress conditions. This reduction was more at higher temperatures and strain R1 showed a more detrimental effect compared to R2 strain. Reproduction number decreased at higher nematode inoculum whereas root galling index increased with higher nematode inoculum. **Thus, this stress combination is detrimental to both wheat cultivars.**