



Effect on watermelon cultivars (*Citrullus lanatus* L. cv. Calhoun Grey, Fascination)

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

Crop: Watermelon (*Citrullus lanatus* L. cv. Calhoun Grey, Fascination)
 Stress 1: *Meloidogyne incognita*
 Stress 2: *Fusarium oxysporum* f. sp. *niveum*
 Stage of plant: Seedling (2 leaf stage)

The table shows the impact of nematode and fungus alone and in combination on the shoot weight and root weight of watermelon plants.

	Treatment	Plant response to stress (reduction over control %) Type A parameters*	
		Shoot weight	Root weight
Calhoun grey	<i>Fusarium oxysporum</i> (5×10^5 spores/ plant)	32.6 ↓	25.6 ↓
	<i>Meloidogyne incognita</i> (1000 J2/ plant)	2.2 ↓	30.8 ↓
	<i>Meloidogyne incognita</i> (1000 J2/plant) + <i>Fusarium oxysporum</i> (5×10^5 spores/ plant) 5 days later (Sequential stress)	12.6 ↓	20.5 ↓
	<i>Meloidogyne javanica</i> (1000 J2/ plant) + <i>Fusarium oxysporum</i> (5×10^5 spores/ plant) (Simultaneous stress)	27.8 ↓	43.6 ↓
	<i>Fusarium oxysporum</i> (5×10^5 spores/ plant) + <i>Meloidogyne incognita</i> (1000 J2/plant) 5 days later (Sequential stress)	0.0	38.5 ↓
Fascination	<i>Fusarium oxysporum</i> (5×10^5 spores/ plant)	82.3 ↓	85.2 ↓
	<i>Meloidogyne incognita</i> (1000 J2/ plant)	-6.2 ↑	-3.7 ↑
	<i>Meloidogyne incognita</i> (1000 J2/plant) + <i>Fusarium oxysporum</i> (5×10^5 spores/ plant) 5 days later (Sequential stress)	85.4 ↓	77.8 ↓
	<i>Meloidogyne javanica</i> (1000 J2/ plant) + <i>Fusarium oxysporum</i> (5×10^5 spores/ plant) (Simultaneous stress)	78.8 ↓	74.1 ↓

	<i>Fusarium oxysporum</i> (5X10 ⁵ spores/ plant) + <i>Meloidogyne incognita</i> (1000 J2/plant) 5 days later (Sequential stress)	92.9↓	88.9↓
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Note: Values presented in the table were calculated using the formula described below.

$$\text{Reduction over control (\%)} = \frac{(\text{Value}_{\text{Control}} - \text{Value}_{\text{Stress}})}{\text{Value}_{\text{Control}}} \times 100$$

- 1) '↓'- indicates plant parameters affected by stress that lead to high susceptibility (higher the value more the damage).
- 2) '↑'- indicates plant parameters less/not affected by stress leading to improved resistance (higher the value lesser the damage).
- 3) "0.0" value indicates plant parameter behaved similarly under control and stress condition (no damage).

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

2. The interaction between nematode and fungal pathogen under combined stress at plant interface

The table shows the effect of the nematode on fungus induced disease severity under combined stress treatment

	Treatment	Response to combined stress** Type B parameters*
		Disease severity
Calhoun grey	<i>Fusarium oxysporum</i> (5X10 ⁵ spores/ plant)	1.5
	<i>Meloidogyne incognita</i> (1000 J2/ plant)	0.3
	<i>Meloidogyne incognita</i> (1000 J2/plant) + <i>Fusarium oxysporum</i> (5X10 ⁵ spores/ plant) 5 days later (Sequential stress)	2.2
	<i>Meloidogyne javanica</i> (1000 J2/ plant) + <i>Fusarium oxysporum</i> (5X10 ⁵ spores/ plant) (Simultaneous stress)	2.7

	<i>Fusarium oxysporum</i> (5×10^5 spores/ plant) + <i>Meloidogyne incognita</i> (1000 J2/plant) 5 days later (Sequential stress)	2.7
Fascination	<i>Fusarium oxysporum</i> (5×10^5 spores/ plant)	1.8
	<i>Meloidogyne incognita</i> (1000 J2/ plant)	0.2
	<i>Meloidogyne incognita</i> (1000 J2/plant) + <i>Fusarium oxysporum</i> (5×10^5 spores/ plant) 5 days later (Sequential stress)	3.3
	<i>Meloidogyne javanica</i> (1000 J2/ plant) + <i>Fusarium oxysporum</i> (5×10^5 spores/ plant) (Simultaneous stress)	3.2
	<i>Fusarium oxysporum</i> (5×10^5 spores/ plant) + <i>Meloidogyne incognita</i> (1000 J2/plant) 5 days later (Sequential stress)	3.7

For raw data – Click here (.xlsx file)

Reference - Hua GKH, Timper P, Ji P (2019) *Meloidogyne incognita* intensifies the severity of *Fusarium* wilt on watermelon caused by *Fusarium oxysporum* f. sp. *niveum*. Canadian Journal of Plant Pathology 41: 261-269

Note:

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

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

Inference From the study: Hua GKH et.al. 2019 studied interaction of *Meloidogyne incognita* and *Fusarium oxysporum* in two watermelon cultivars Calhoun grey and Fascination. Pathogens were inoculated singly, sequentially and simultaneously. Plants were then analyzed for their shoot and root weight. In cultivar, Calhoun grey root weight showed an additive reduction under combined stress treatment, whereas shoot weight did not show an additive reduction under combined stress. Cultivar Fascination showed a synergistic reduction in both shoot and root weight. Disease severity was high under sequential and simultaneous stress conditions compared to single inoculation for both cultivars. However, cultivar fascination is more susceptible to this pathogen combination and shows a higher disease severity. **Thus, this pathogen combination works synergistically to reduce growth and form a complex disease in watermelon.**