Effect on rice cultivars (*Oryza sativa* L. cv. TOG5674, TOG5675, CG14, IR64, UPLRi-5)

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

Crop: Rice (*Oryza sativa* L. cv. TOG5674, TOG5675, CG14, IR64, UPLRi-5)
Stress 1: Flooding (till plant maturity)
Stress 2: *Meloidogyne graminicola*
Stage of plant: One week old seedling

The table shows the impact of nematode and flooding alone and in combination on the growth of rice plants.

		Plant response to stress (reduction over control %) Type A parameters*				
	Treatment	**Fresh root weight**	**Fresh shoot weight**	**Plant height**	**Number of spikelets/panicle**	**Filled grain weight/plant**
TOG5674	*Meloidogyne graminicola* (6000 J2/plant)	55.8↓	32.6↓	12.4↓	22.2↓	21.6↓
	Flooding (till plant maturity)	-51.7↑	-46.9↑	0.9↓	-11.0↑	-46.4↑
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	-105.3↑	-22.1↑	17.5↓	-15.6↑	-9.3↑
TOG5675	*Meloidogyne graminicola* (6000 J2/plant)	20.6↓	37.4↓	2.9↓	26.2↓	16.7↓
	Flooding (till plant maturity)	-325.6↑	-71.1↑	-10.5↑	-28.2↑	-8.3↑

	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	-304.9↑	-31.5↑	-3.3↑	-25.4↑	0.0
CG14	*Meloidogyne graminicola* (6000 J2/plant)	19.1↓	31.9↓	13.6↓	49.3↓	20.8↓
	Flooding (till plant maturity)	-111.8↑	-138.9↑	-20.0↑	3.3↓	-24.5↑
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	-190.8↑	-61.1↑	-5.6↑	-7.2↑	10.1↓
IR64	*Meloidogyne graminicola* (6000 J2/plant)	31.7↓	43.4↓	11.0↓	40.9↓	39.0↓
	Flooding (till plant maturity)	-90.5↑	-18.6↑	-2.2↑	-21.0↑	-78.1↑
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	-171.0↑	-33.7↑	-3.9↑	-16.7↑	-85.6↑
UPLRi-5	*Meloidogyne graminicola* (6000 J2/plant)	66.2↓	72.1↑	18.5↓	29.3↓	26.5↓
	Flooding (till plant maturity)	-48.2↑	-21.5↑	-4.1↑	-13.7↑	27.2↓
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	-102.7↑	-23.0↑	2.6↓	-23.2↑	13.2↓

Reference - Cabasan MTN, Kumar A, Waele DD (2018) Effects of initial nematode population density and water regime on resistance and tolerance to the rice rootknot nematode Meloidogyne graminicola in African and Asian rice genotypes. International Journal of Pest Management 64:3, 252-261.

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

$$\textit{Reduction over control (\%)} = \frac{(\textit{Value}_{\textit{Control}} - \textit{Value}_{\textit{Stress}})}{} \; x100$$

Value $_{Control}$

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 flooding under combined stress at plant interface

The table shows the effect of the nematode and flooding on nematode population, multiplication factor, and root gall index under combined stress treatment

	Treatment	Response to combined stress** Type B parameters*			
		No. of J2/g root	**No. of J2/root system**	**Multiplication factor (Mf)**	**Root galling index**
TOG5674	*Meloidogyne graminicola* (6000 J2/plant)	753.00	9544.00	1.6	1.3
	Flooding (till plant maturity)	N/A	N/A	N/A	N/A
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	98.00	295.00	0	0.1
TOG5675	*Meloidogyne graminicola* (6000 J2/plant)	771.00	9681.00	1.6	1.4
	Flooding (till plant maturity)	N/A	N/A	N/A	N/A
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	23.00	228.00	0	0.2

CG14	*Meloidogyne graminicola* (6000 J2/plant)	402.00	6392.00	1.1	1.4
	Flooding (till plant maturity)	N/A	N/A	N/A	N/A
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	52.00	720.00	0.1	0.3
IR64	*Meloidogyne graminicola* (6000 J2/plant)	1069.00	20341.00	3.4	4.1
	Flooding (till plant maturity)	N/A	N/A	N/A	N/A
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	36.00	2066.00	0.3	0.0
UPLRi-5	*Meloidogyne graminicola* (6000 J2/plant)	3945.00	39569.00	6.6	4.6
	Flooding (till plant maturity)	N/A	N/A	N/A	N/A
	Meloidogyne graminicola (6000 J2/plant) + Flooding (1 week later) (Sequential stress)	22.00	2763.00	0.5	0.0

Reference - Cabasan MTN, Kumar A, Waele DD (2018) Effects of initial nematode population density and water regime on resistance and tolerance to the rice rootknot nematode Meloidogyne graminicola in African and Asian rice genotypes. International Journal of Pest Management 64:3, 252-261.

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 the 'methodology' tab.*

Inference From the study: Cabasan et al. studied the interaction of *Meloidogyne graminicola* and flooding in five cultivars of rice; TOG5674, TOG5675, CG14, IR64, UPLRi-5. Stress was

given singly and sequentially. Growth parameters like fresh shoot weight, fresh root weight, number of spikelet/panicle, and filled grain weight/plant did not show an additive reduction under combined stress. Although, plant height did reduce synergistically under combined stress for cultivar TOG5674. Moreover, under flooding conditions, the growth parameters were increased. Cultivar CG14 and UPLRi-5 did show reduced filled grain/plant under combined stress. Nematode population, nematode multiplication factor, and root galling index were reduced under combined stress. Root galling index was higher for cultivar IR64 and UPLRi-5, indicating their susceptible nature. **Overall, this stress combination does not reduce rice growth and yield synergistically and is not detrimental to the plant.**