

Effect on tobacco (*Nicotiana tabacum*) cultivars

The net impact of stress on plant growth

The table shows the effect of individual and combined ozone and viral infection on the biomass of tobacco cultivars

Crop: Tobacco (*Nicotiana tabacum*) cultivar Greenville 13, Burley 21 and Burley 49
Virus: Tobacco etch virus (TEV) and Tobacco vein mottling virus (TVMV)
Stress 1: Swab inoculation with extracts of TEV or TVMV infected tobacco leaves
Stress 2: Ozone-0.05, 0.1, 0.2 and 0.4 ppm ozone for 3h day⁻¹, 5 days week⁻¹ for 15 days

Cultivars	Stress treatments	Plant response to stress	
		Type A parameter *	
		Leaf dry weight	Stem dry weight
Greenville 131	TEV	12.8 ↓	26.6 ↓
	Ozone (0.05 ppm)	8.6 ↓	6.5 ↓
	Ozone (0.10 ppm)	7.5 ↓	8.3 ↓
	Ozone (0.20 ppm)	26.6 ↓	39.6 ↓
	Ozone (0.40 ppm)	77.7 ↓	90.5 ↓
	TEV and Ozone (0.05 ppm)	10.1 ↓	26.0 ↓
	TEV and Ozone (0.10 ppm)	17.9 ↓	34.9 ↓
	TEV and Ozone (0.20 ppm)	26.1 ↓	46.1 ↓
	TEV and Ozone (0.40 ppm)	74.8 ↓	88.2 ↓
	TVMV	-0.8 ↑	-2.5 ↑
	Ozone (0.05 ppm)	-15.8 ↑	-35.8 ↑
	Ozone (0.10 ppm)	-7.9 ↑	-15.4 ↑
	Ozone (0.20 ppm)	2.3 ↓	9.9 ↓
	Ozone (0.40 ppm)	67.7 ↓	80.6 ↓
	TVMV and Ozone (0.05 ppm)	-9.0 ↑	-16.9 ↑
	TVMV and Ozone (0.10 ppm)	-8.2 ↑	-23.9 ↑
TVMV and Ozone (0.20 ppm)	21.2 ↓	32.8 ↓	
TVMV and Ozone (0.40 ppm)	79.4 ↓	85.6 ↓	
Burley 21	TEV	44 ↓	50 ↓
	Ozone (0.05 ppm)	3 ↓	-2.8 ↓
	Ozone (0.10 ppm)	15.8 ↓	18.2 ↓
	Ozone (0.20 ppm)	54.3 ↓	65.9 ↓
	Ozone (0.40 ppm)	86.5 ↓	94.3 ↓
	TEV and Ozone (0.05 ppm)	48.2 ↓	55.1 ↓
	TEV and Ozone (0.10 ppm)	50.4 ↓	56.2 ↓
	TEV and Ozone (0.20 ppm)	64.1 ↓	73.9 ↓
	TEV and Ozone (0.40 ppm)	90.9 ↓	93.7 ↓
	TVMV	-1.7 ↑	13.5 ↓
Ozone (0.05 ppm)	-9.1 ↑	-11.1 ↑	
Ozone (0.10 ppm)	-8.5 ↑	-10.1 ↑	

	Ozone (0.20 ppm)	13.6 ↓	26 ↓
	Ozone (0.40 ppm)	70.7 ↓	89.9 ↓
	TVMV and Ozone (0.05 ppm)	-1.2 ↑	10.6 ↓
	TVMV and Ozone (0.10 ppm)	5.5 ↓	15.9 ↓
	TVMV and Ozone (0.20 ppm)	55 ↓	68.7 ↓
	TVMV and Ozone (0.40 ppm)	89.9 ↓	95.2 ↓
Burley 149	TEV	66.5 ↓	73 ↓
	Ozone (0.05 ppm)	10.9 ↓	9.5 ↓
	Ozone (0.10 ppm)	23.3 ↓	27.5 ↓
	Ozone (0.20 ppm)	42.0 ↓	55.0 ↓
	Ozone (0.40 ppm)	83.8 ↓	92.0 ↓
	TEV and Ozone (0.05 ppm)	66.1 ↓	75.7 ↓
	TEV and Ozone (0.10 ppm)	61.9 ↓	73.0 ↓
	TEV and Ozone (0.20 ppm)	68.9 ↓	77.8 ↓
	TEV and Ozone (0.40 ppm)	81.3 ↓	88.3 ↓
	TVMV	25.5 ↓	39.4 ↓
	Ozone (0.05 ppm)	-0.48 ↑	5.9 ↓
	Ozone (0.10 ppm)	4.8 ↓	15.3 ↓
	Ozone (0.20 ppm)	29.2 ↓	45.8 ↓
	Ozone (0.40 ppm)	79.5 ↓	93.1 ↓
	TVMV and Ozone (0.05 ppm)	20.1 ↓	34 ↓
	TVMV and Ozone (0.10 ppm)	23.9 ↓	41.9 ↓
	TVMV and Ozone (0.20 ppm)	51.4 ↓	70.9 ↓
	TVMV and Ozone (0.40 ppm)	85.7 ↓	95.1 ↓

Note:

The values presented in the table were calculated using the formula described below.

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

- 1) ↓ - indicates plant parameters affected by stress that lead to high susceptibility (higher the value more the damage).
- 2) ↑ - indicates plant parameters affected by stress that lead to reduced susceptibility (higher the value less the damage).

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

For raw data – Click here (.xlsx file)

Reference-

Reinert RA, Rufty RC and Eason G (1988). Interaction of tobacco etch or tobacco vein mottling virus and ozone on biomass changes in burley tobacco. *Environmental Pollution* 53(1-4): 209-18.

The inference from the study: Reinart et al. 1988 studied the interaction between ozone and TEV and TVMV infection in different cultivars of tobacco differing in sensitivities to TEV, TVMV, and ozone. Burley 21 was moderately susceptible to TEV/TVMV but highly sensitive to ozone. Burley 49 was highly susceptible to TEV and TVMV but least sensitive to ozone, and Greenville 131 was resistant to the virus and moderately sensitive to ozone. The virus-infected plants were exposed to different concentrations of ozone and analyzed for the effect of combined stress. At 0.40 ppm of ozone, the TEV-infected plants showed less reduction in biomass in all the cultivars. In the case of TVMV infected plants exposed to 0.20 and 0.40 ppm of ozone, the suppression of biomass was significantly more than the individually stressed plants in cv Greenville 131 and Burley 21.

