Effect on sunflower cultivars (*Helianthus annuus* L. cv. DRSF 108, Sungold)

The net impact of individual and combined stress on plant growth

Crop: Sunflower (*Helianthus annuus* L. cv. DRSF 108, Sungold)
Stress 1: UV-B (7.2 kJ m^{-2})
Stress 2: Ozone (10 ppb)
Stage of plant: 7 days after germination

The table shows the impact of UV-B irradiance and ozone alone and in combination on growth and yield of soybean cultivars.

		Plant response to stress (reduction over control %) Type A parameters*				
	Treatment	**Biomass**	**Stem diameter**	**Leaf area**	**Number of leaves**	**Plant height**
DRSF	UV-B (7.2 kJ m-2)	29.3↓	22.0↓	8.0↓	26.2↓	18.0↓
	Ozone (10 ppb)	41.4↓	41.5↓	12.9↓	43.7↓	27.4↓
	UV-B (7.2 kJ m-2) + Ozone (10 ppb) Simultaneous stress	48.5↓	51.2↓	20.2↓	60.7↓	36.8↓
Sungold	UV-B (7.2 kJ m-2)	21.7↓	32.5↓	8.9↓	20.3↓	13.0↓
	Ozone (10 ppb)	35.7↓	52.5↓	13.4↓	32.4↓	15.3↓
	UV-B (7.2 kJ m-2) + Ozone (10 ppb) Simultaneous stress	41.6↓	57.5↓	19.1↓	50.9↓	26.7↓

		Plant response to stress (reduction over control %) Type A parameters*		Plant response to stress (reduction over control %) Type B parameters*	
	Treatment	**Harvest Index**	**Weight of achenes plant^{-1}**	**Pollen viability**	**Pollen size**
DRSF	UV-B (7.2 kJ m-2)	9.3⬇	16.2⬇	14.4⬇	9.7⬇
	Ozone (10 ppb)	23.3⬇	33.0⬇	28.6⬇	24.0⬇
	UV-B (7.2 kJ m-2) + Ozone (10 ppb) Simultaneous stress	30.2⬇	41.6⬇	37.7⬇	29.2⬇
Sungold	UV-B (7.2 kJ m-2)	13.6⬇	11.5⬇	15.1⬇	7.7⬇
	Ozone (10 ppb)	27.3⬇	30.3⬇	29.4⬇	9.5⬇
	UV-B (7.2 kJ m-2) + Ozone (10 ppb) Simultaneous stress	34.1⬇	39.8⬇	37.8⬇	26.6⬇

Reference - Tripathi R, Rai K, Singh S, Agrawal M, Agrawal SB (2019) Role of supplemental UV-B in changing the level of ozone toxicity in two cultivars of sunflower: growth, seed yield and oil quality. Ecotoxicology 28(3):277-293.

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

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

'⬇'- indicates plant parameters affected by stress that lead to high susceptibility (higher the value more the damage).

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

Inference From the study: Tripathi et.al. studied the interaction of UV-B irradiation and ozone in two sunflower cultivars DRSF108 and sungold. Stress was given singly and simultaneously. Biomass, stem diameter, leaf area, number of leaves, plant height, harvest index, weight of achenes per plant were reduced under combined stress. Pollen viability and pollen size was also reduced under combined stress in both cultivars. **Thus, this stress combination is detrimental to sunflower.**