



Effect on bean cultivars (*Phaseolus vulgaris* L. cv. Calima, ZPV-292)

The net impact of individual and combined stress on plant growth

Crop: Bean (*Phaseolus vulgaris* L. cv. Calima, ZPV-292)
 Stress 1: Nutrient stress (Manganese 5 μM , 200 μM)
 Stress 2: High light (870 $\mu\text{mol m}^{-2} \text{s}^{-1}$)
 Stage of plant: 21 day old seedling

The table shows the impact of low and high manganese and high light in combination on the physiology and biochemical composition of bean plants.

	Treatment	Plant response to stress**			
		Type B parameters*	Type C parameters*		
		Chlorophyll content ($\mu\text{g cm}^{-2}$)	Ascorbate ($\mu\text{mol g}^{-1}$ FW)	Dehydroascorbate ($\mu\text{mol g}^{-1}$ FW)	Thiols (-SH) groups (nmol g^{-1} FW)
Calima	Manganese (5 μM) + HL (870 $\mu\text{mol m}^{-2} \text{s}^{-1}$) Simultaneous stress	19.50	4.70	1.66	1.58
	Manganese (200 μM) + HL (870 $\mu\text{mol m}^{-2} \text{s}^{-1}$) Simultaneous stress	14.30	1.50	1.67	1.43
ZPV-292	Manganese (5 μM) + HL (870 $\mu\text{mol m}^{-2} \text{s}^{-1}$) Simultaneous stress	20.16	3.90	1.28	1.74
	Manganese (200 μM) + HL (870 $\mu\text{mol m}^{-2} \text{s}^{-1}$) Simultaneous stress	13.19	1.10	1.28	1.28

HL-High light

Reference - Gonzalez A, Steffen KL, Lynch JP (1998) Light and excess manganese . Implications for oxidative stress in common bean. *Plant Physiol.* 118(2):493-504.

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: Gonzalez et al. studied the interaction of high and low manganese concentration and high light in two bean cultivars Calima and ZPV-292. Stress was given simultaneously. Chlorophyll concentration, Ascorbate accumulation, and thiol levels were reduced under high manganese conditions compared to low manganese treatment in both cultivars. **Thus, high manganese with high light stress alters the plant physiology of bean cultivars calima and ZPV-292.**