

Response of three Brassica Species at germination and early seedling growth under salt stress

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Objective

Salinity is an important constraint to crop production in the world. Because of salinity problems, researchers are trying to get the salt resistant vegetables on which human's food depend. The present study was therefore initiated to investigate the effect of salinity on the germination and early seedling growth of three *Brassica* species.

Materials and Methods

□ Plant material

- Cabbage (*Brassica oleracea capitata* L.),
- Cauliflower (*Brassica oleracea botrytis* L.)
- Canola (*Brassica napus* L.)

□ Methods

- Seeds were planted in plastic Pots (16 cm diameter, 22 cm height) in sand culture.
 - The solution consisted were 0.0 (control), 4.7, 9.4 and 14.1 dS m⁻¹ NaCl along with Hoagland's nutrient Solution
 - Seeds were considered to be germinated with the emergence of the radicle.
 - Leaf area of the plant was measured by using Area meter (AM-200), ADC Bio Scientific Ltd. England).
- All measurements were made after 15 days of germination.

Results

- Germination percentage in all three species showed considerable decrease with increasing salinity up to 14.1 dS m⁻¹ NaCl. This reduction was more in cauliflower as compared to cabbage and canola (Table 1).
- Germination started within 36 hours and was complete on the 6th day. Canola and cabbage completed their germination nearly in same time but cauliflower took comparatively more time to complete germination (Table 1).
- The seedling growth of three species was significantly inhibited by all salinity levels. The decrease in length of shoot was more pronounced as compared to root. However this decrease was more prominent in canola then cauliflower and cabbage. Strong inhibition in root length was recorded in cauliflower (Table 2).
- Fresh root and shoot weight, leaf area and number of leaves were also severely affected at all salinity treatments. Cabbage showed more decrease while canola showed less effect of salt solution at all salinity treatments in case of fresh root and shoot weight (Table 2). Leaf area of canola was comparatively

more affected than other species (Table 3).

Table 1. Affect of various treatments of NaCl on the germination (A) and germination rate (B) of canola, cabbage and cauliflower.

NaCl (dS m ⁻¹)	(A) Germination (Arcsin transformed)			(B) Germination rate (1/t ₅₀)		
	Cabbage Canola	Cauliflower	Canola	Cabbage	Cauliflower	Canola
0.0	90.00	90.00	90.00	0.67	0.61	0.67
4.7	90.00	68.86	90.00	0.61	0.43	0.56
9.4	68.86	35.22	68.85	0.47	0.32	0.47
14.1	21.15	18.44	50.85	0.38	0.26	0.38
LSD (0.05)	3.91	3.44	4.44	0.07	0.07	0.07

Table 2. Affect of various treatments of NaCl on root length (A), shoot length (B), fresh root weight (C) and fresh shoot weight (D) of canola, cabbage and cauliflower.

NaCl (dS m ⁻¹)	(A) Root length (cm)			(B) Shoot length (cm)		
	Cabbage	Cauliflower	Canola	Cabbage	Cauliflower	Canola
0.0	5.97	3.87	5.40	4.20	2.37	9.20
4.7	5.40	2.37	4.50	2.20	2.17	5.00
9.4	4.67	1.93	4.33	1.87	1.90	3.37
14.1	2.53	0.70	2.30	1.03	0.80	2.06
LSD (0.05)	0.51	0.17	0.32	0.38	0.17	0.71

NaCl (dS m ⁻¹)	(C) Fresh root weight (mg)			(D) Fresh Shoot weight (mg)		
	Cabbage	Cauliflower	Canola	Cabbage	Cauliflower	Canola
0.0	2.10	2.53	1.73	83.33	33.33	160.00
4.7	1.70	2.27	1.32	66.67	16.67	60.89
9.4	0.70	1.73	0.60	13.33	9.06	36.67
14.1	0.25	0.62	0.30	8.67	6.00	13.33
LSD (0.05)	0.21	0.23	0.21	6.78	9.64	12.72

Table 3. Affect of various treatments of NaCl on leaf area (A) and number of leaves per plant (B) of canola, cabbage and cauliflower.

NaCl (dS m ⁻¹)	(A) Leaf area (cm ²)			(B) Number of leaves per plant		
	Cabbage	Cauliflower	Canola	Cabbage	Cauliflower	Canola
0.0	8.09	1.03	20.41	6.00	4.33	6.00
4.7	6.14	0.49	4.89	4.67	3.33	4.67
9.4	5.10	0.33	3.54	4.33	2.33	4.33
14.1	2.66	0.18	1.87	2.00	2.00	2.33
LSD (0.05)	0.55	0.17	0.82	0.48	0.59	0.59