Response of Camelina sativa Varieties to NaCl Salinity
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ABSTRACT
Three cultivars of Camelina sativa L. namely Blaine creek, Suneson and Cheyenne were compared for their response to NaCl salinity. The seeds were germinated on Murashige and Skoog (1962) medium supplemented with 0 mM (control), 50, 100, 150, 200, 250 and 300 mM NaCl. Medium pH was adjusted to 5.8 prior to autoclaving at 121°C for 20 min. Rate of seed germination; growth (fresh and dry weights) and form (gross morphology of the seedling) were recorded. Proline levels of all the varieties in each treatment were determined using published protocols (Bates et al. 1973) on 21st day from planting the seeds. Seed germination rate declined with the increase in the concentration of salt in the medium. Although germination occurred in medium supplemented with 300 mM salt, further development of the seedlings did not take place. Fresh weight was slightly higher in medium containing 50 mM salt but dry weight was highest for the control seedlings. Seedlings were progressively smaller in accordance with the increase in the salinity levels in the medium. The roots became shorter and highly branched as the NaCl concentration reached 100 mM or more. All the varieties included in the study had similar levels of proline in the control, however, a drastic increase in the proline levels was observed in all varieties challenged with 100 – 250 mM salt.

INTRODUCTION
Camelina [Camelina sativa (L.) Crantz.] is a member of the mustard family (Brassicaceae) that is native to Central Asia and the Mediterranean. C. sativa plants are heavily branched, and grow to heights of one to three feet. They produce prolific small, pale yellow or greenish-yellow flowers consisting of four petals. It is a short-season crop, best adapted to cooler climates where excessive heat during flowering does not occur. Camelina has been used as an oil crop in Europe in the past. C. sativa L. is a second generation biofuel crop that could be produced as an intercrop and it is naturally tolerant to cold and drought. It yields 30-40% oil by seed weight making it a good source of oil for biodiesel production.

Salinity is a major constrain for crop production affecting over 800 million ha across the globe (Rangasamy, 2010). Use of cultivars resistant to salinity can help in the utilization of salinity affected crop land. Abiotic stresses including salinity affect vigor, growth, morphology and productivity of crops. NaCl salinity enhances the production and accumulation of proline (Verbruggen and Hermans, 2008). Therefore, we compared growth, morphology and proline levels of three varieties of Camelina to NaCl salinity ranging from 50-300 mM to evaluate their relative resistance to salinity.

MATERIALS AND METHODS
Materials
• Used seeds of Camelina sativa cv. Blaine creek, Suneson and Cheyenne.
• Used MS (Murashige and Skoog 1962) medium supplemented with 0 (CO), 50 (C1), 100 (C2), 150 (C3), 200 (C4), 250 (C5) and 300 (C6) mM NaCl

Medium Preparation
• Added 4.43 g/l of MS w/ vitamin powder
• Added 20 g/l sucrose
• Added necessary amounts of NaCl to make 50-300 mM conc. in the medium
• Adjusted the pH to 5.8
• Added 7g/l agar
• Medium was sterilized at 121°C and 1.2 kg/cm² for 20' and dispensed into Petri dishes (1.5 x 10 cm)

In vitro culture techniques
• Washed for 10' with tween 20®
• Treated with 70% ethanol for 5'
• Washed for 10' with tween 20®
• Rinsed with sterile water (3x)
• Incubated on lighted racks from day 3
• Separation of chromosphere in toluene
• Incubated in the dark for 2 days
• Incubated on lighted racks from day 3

RESULTS
Fresh weight collected on day 21

 Dry weight
Proline content of NaCl stressed C. sativa on day 21, average of 3 replications

CONCLUSIONS
• Seed germination and growth (Fresh and dry weight) of Camelina were affected by NaCl salinity to different extends in different varieties
• Proline contents of the seedlings were increased by 50-250 mM salt to different extends
• Tolerance of Camelina to NaCl salinity cv. Blaine creek < cv. Suneson < cv. Cheyenne

REFERENCES

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