

Role of seed age in screening for salt tolerance of sunflower at germination

Lakshmi Prayaga, Lakshamma P and C. Sarada

ICAR-IIOR, Rajendranagar, Hyderabad-500030

Abstract:

Three sunflower hybrid seeds of known age viz., 3, 2 and 1 month old seeds of DRS-1, KBSH-44, CO-2 respectively were tested for salt tolerance by conducting germination studies in 200, 250, 300, 350 mM NaCl at monthly intervals. Results differed when seeds of same age were compared with seeds of mixed age. For valid comparison, the seeds should essentially be of same age.

Introduction:

Sunflower is moderately tolerant to salinity. Due to prevalence of genotypic differences, selection of lines tolerant at germination stage for use in breeding has been in practice for long. Majority of the times when large number of entries are to be evaluated or when seed lots are to be tested for salt tolerance, the seed are usually of mixed age. This experiment was conceived as the sunflower hybrid CO-2 which showed tolerance to salt consistently failed to show tolerance one year which was suspected to be due to old age of seed. Though many reports on sunflower salt tolerance at germination are available (Islam *et al* 2008), none of them mention age of seeds at the time of study. The objective of the present study is to know whether the seeds should essentially be of similar age for comparison for salt tolerance under lab conditions or even otherwise the comparison holds good.

Materials and Methods: The present experiment started with 3, 2 and 1 month old seeds of DRS-1, KBSH-44, CO-2 respectively. The seeds were stored at ambient conditions. These hybrids were selected as they were found tolerant in the previous experiments. Seeds were germinated in 4 different salt concentrations (200, 250, 300, 350 mM) along with control at monthly intervals.

Results and Discussion: Thirteen sowings were taken up for DRS-1, 12 sowings for KBSH-44 and CO-2. About 70% germination was noticed up to 11 months in KBSH-44 and DRS-1 and in CO-2 up to 10 months (Table 1) and declined later. This could be due to increased solute leakage from seeds with advancing seed age. Germination in highest concentration of salt (350mM NaCl) was observed till 7, 6, 8 months in DRS-1, KBSH-44 and CO-2, respectively.

By comparing performance of 4-month age seed of all the three hybrids for salt tolerance, CO-2 was found to be more tolerant with higher germination (20%) at high salt stress and with least percent reduction followed by DRSH-1 and KBSH-44 (Table 1). By comparing seeds of mixed ages, 12-month old CO-2, 6-month old KBSH-44 and 2- month old DRSH-1 in an experiment, KBSH-44 emerges as more tolerant followed by DRSH-1 and CO-2 with no germination at highest salt stress (Table 1). In alfalfa it was reported that salt tolerance at germination of different aged seed lots from the same germplasm source was shown to differ significantly compared to control (nonsaline) of each lot (Smith and Dobrenz 1987).

Inference drawn from experiments involving seeds of mixed age leads to erroneous conclusions as different age seeds respond differently to salt stress. Therefore, it is essential to conduct the lab experiments with seeds of similar age for stress tolerance.

Table 1. Effect of salt stress on germination of hybrid seed of same and mixed age

Hybrid	seed age	Germination (%)					Seedling length (cm)				
		Con- trol	200 mM NaCl	250 mM NaCl	300 mM NaCl	350 mM NaCl	Con- trol	200 mM NaCl	250 mM NaCl	300 mM NaCl	350 mM NaCl
Seeds of same age											
DRSH-1	4	78	60	44	29	12	12.6	2.6	1.9	1.4	1.2
KBSH-44	4	94	50	45	38	10	13.2	2.3	1.7	1.6	1.1
CO-2	4	75	56	53	27	20	9.4	2.5	2.0	1.7	1.3
Seeds of mixed age											
DRSH-1	2	90	32	10	5	0	10.9	2.5	1.8	1.1	0.0
KBSH-44	6	82	42	20	10	5	12.7	3.6	2.0	1.2	1.1
CO-2	12	44	32	16	10	0	2.2	1.3	0.9	1.0	0.0

References:

Smith S. E. and A. K. Dobrenz. 1987. Seed age and salt tolerance at germination in alfalfa. *Crop Science*, 27(5), :1053-1056

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