Data Article

Data on seed priming and seedling growth of Barli 21 tobacco varieties under polyethylene glycol and salinity stress conditions

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ABSTRACT

Data on the effect of seed priming on Barli 21 tobacco (Nicotiana tabacum L.) cultivars, an experiment was carried out in 2014 at the Tobacco Research center of Urmia, Iran under saline and Polyethylene glycol conditions. This experiment was arranged as factorial, based on RCB design with three replications. Treatments were polyethylene glycol (−0.5%, −1%, −1.5% and −2% (PEG) and hydropriming, and salinity levels (1, 2, 3 and 4 dS m⁻¹ KNO₃) in periods 1, 2, 3, 5 and 10 days. Means of Emergence time, emergence rate coefficient, Emergence rate index, Emergence rate, and Emergence percentage decreased with increasing salinity. Emergence time and emergence rate coefficient increased with hydropriming in priming 5 and 10 days. Emergence rate index, Emergence rate, and Emergence percentage increased with 1.5% Polyethylene glycol. Seed priming with Polyethylene glycol was more beneficial in improving Emergence percentage, compared with KNO₃ priming.

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Specifications Table

| Subject area                        | chemistry, biology |
|-------------------------------------|--------------------|
| More specific subject area          | Seed Priming and Seedling Growth of Barli 21 Tobacco data Under PEG and Salinity stress |
| Type of data                        | Table and figure   |

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Value of the data

- These data provide the priming of seed and seedling growth of Barli 21 Tobacco under PEG (polyethylene glycol) and salinity stress and relationships between seed priming and salinity stress it shows.
- PEG (polyethylene glycol) treatment may be applied to improving germination of Tobacco seeds as valuable method for increasing hardening at salinity stress conditions.
- These data are valuable to researchers investigating priming technique to improving germination of Barli 21 Tobacco seed at salinity stress.

1. Data

Effect of Polyethylene glycol and hydro priming treatments on Emergence traits of tobacco seed are presented in Table 1. Effect of priming time on emergence traits of tobacco are presented in comparison table (Table 2). Means of emergence traits of tobacco affected by salinity treatments are presented in Table 3. In addition, Analyses of variance of the effects of priming, priming time on emergence traits of tobacco under salinity stress are presented in Table 4. Means of interaction of priming duration × concentration of polyethylene glycol and hydropriming on emergence percentage of tobacco are presented in Fig. 1. Also Means of interaction of salinity × concentration of polyethylene glycol and hydropriming on Emergence time of tobacco are presented in Fig. 2. In addition, means of interaction of salinity × concentration of polyethylene glycol and hydropriming on Emergence rate index of tobacco are presented in Fig. 3.

Table 1
Means of emergence traits of tobacco affected by Polyethylene glycol and hydro priming treatments.

| Treatment | Emergence time (day) | Emergence rate coefficient (%) | Emergence rate index (seed day⁻¹) | Emergence rate (% day⁻¹) | Emergence percentage (%) |
|-----------|----------------------|-------------------------------|-----------------------------------|--------------------------|--------------------------|
| PEG-0.5   | 6.70 bc              | 2.1 b                         | 42 ab                             | 42 ab                    | 97 a                     |
| PEG-1     | 6.52 c               | 2.2 b                         | 46 a                              | 45 a                     | 96 a                     |
| PEG-1.5   | 6.55 c               | 2.1 b                         | 45 a                              | 44 a                     | 98 a                     |
| PEG-2     | 6.90 ab              | 2.2 b                         | 38 bc                             | 40 b                     | 96 a                     |
| Hydropriming | 7.00 a             | 2.5 a                         | 35 c                              | 35 c                     | 91 b                     |

Different letters in each column indicating significant difference at \( p \leq 0.05 \).
2. Experimental design, materials, and methods

An experiment was conducted to evaluate emergence traits and emergence percentage of tobacco under PEG and saline conditions in different periods. Treatments were polyethylene glycol (PEG) solutions, hydropriming, and salinity levels (1, 2, 3, and 4 dS m⁻¹ KNO₃) in periods 1, 2, 3, 5, and 10 days. Seeds of tobacco (Nicotiana tabacum L.) were divided into three sub-samples, one of which was kept as control (hydropriming) and two other sub-samples were prepared for priming. A sub-sample was soaked in (PEG6000) solution and another one was pretreated with KNO₃ solution with electrical conductivity of 12.5 dS m⁻¹ for four hours [1,2]. After priming, seeds were thoroughly washed with distilled water for a minute and then dried back to primary moisture at 20–23°C in the laboratory. The greenhouse experiment was conducted at the Tobacco Research center of Urmia in 2014. This experiment was arranged as factorial, based on RCB (Randomized Complete Block) design with three replications. Ten seeds were sown 1 cm deep in each Petridis. Salinity treatments (1, 2, 3, and 4 dS m⁻¹) were applied immediately after sowing. Water and saline solutions were added to the Petridis. After emergence, seedling emergence was counted daily.

Table 2
Means of emergence traits of tobacco affected by priming duration.

| Treatment    | Emergence time (day) | Emergence rate coefficient (%) | Emergence rate index (seed day⁻¹) | Emergence rate (% day⁻¹) | Emergence Percentage (%) |
|--------------|----------------------|--------------------------------|-----------------------------------|--------------------------|--------------------------|
| Priming 1 day| 6.6 b                | 2.1 b                          | 1.9 b                             | 44 a                     | 97 a                     |
| Priming 2 day| 6.8 ab               | 2.2 b                          | 2.0 ab                            | 39 ab                    | 96 ab                    |
| Priming 3 day| 6.78 ab              | 2.1 b                          | 2.02 b                            | 41 ab                    | 95 ab                    |
| Priming 5 day| 6.9 a                | 2.2 b                          | 2.01 ab                           | 37 b                     | 96 ab                    |
| Priming 10 day| 6.77 ab              | 2.5 a                          | 2.1 a                             | 40 ab                    | 94 b                     |

Different letters in each column indicating significant difference at \( p \leq 0.05 \).

Table 3
Means of emergence traits of tobacco affected by salinity treatments.

| Salinity treatment | Emergence time (day) | Emergence rate index (seed day⁻¹) | Emergence rate (% day⁻¹) |
|--------------------|----------------------|-----------------------------------|--------------------------|
| 1 ds/m             | 6.4 c                | 45 a                              | 45 a                     |
| 2 ds/m             | 6.5 bc               | 41 b                              | 41 b                     |
| 3 ds/m             | 6.8 ab               | 39 bc                             | 39 bc                    |
| 4 ds/m             | 7.0 a                | 35 c                              | 37 c                     |

Different letters in each column indicating significant difference at \( p \leq 0.05 \).

Table 4
Analyses of variance of the effects of priming, priming time on emergence traits of tobacco under salinity stress.

| Source of variation | Df | Emergence time (day) | Emergence rate coefficient (%) | Emergence rate index (seed day⁻¹) | Emergence rate (% day⁻¹) | Emergence Percentage (%) |
|--------------------|----|----------------------|--------------------------------|-----------------------------------|--------------------------|--------------------------|
| Priming (A)        | 4  | 2.021**              | 0.147**                        | 1258.4**                         | 848.9**                  | 230.5 **                 |
| Priming time (B)   | 4  | 0.664*               | 0.027*                         | 307.45 *                         | 202.08**                 | 36.76*                   |
| Salinity (C)       | 3  | 2.034**              | 0.0094**                       | 1031.14**                        | 636.6**                  | 22.22 ns                 |
| (A x B)            | 16 | 0.278 ns             | 0.0308 ns                      | 138.69 ns                        | 90.42 ns                 | 40.66 ns                 |
| (A x C)            | 12 | 0.356*               | 0.0042 ns                      | 172.11*                          | 105.17 ns                | 9.36 ns                  |
| (B x C)            | 12 | 0.0322 ns            | 0.0080 ns                      | 12.74 ns                         | 8.68 ns                  | 12.50 ns                 |
| (A x B x C)        | 48 | 0.276 ns             | 0.0066 ns                      | 132.63 ns                        | 85.52 ns                 | 10.08 ns                 |
| Error              | 198| 0.195                | 0.008                          | 93.29                            | 58.62                    | 5058.6                   |
| SCV                | 6.5| 4.65                | 92.3                           | 18.42                            | 3.59                     |

ns, not significant, * and **: significant at 1% and 5% respectively.

2. Experimental design, materials, and methods

An experiment was conducted to evaluate emergence traits and emergence percentage of tobacco under PEG and saline conditions in different periods. Treatments were polyethylene glycol (−0.5%, −1%, −1.5% and −2% (PEG)) and hydropriming, and salinity levels (1, 2, 3 and 4 dS m⁻¹ KNO₃) in periods 1, 2, 3, 5 and 10 days. Seeds of tobacco (Nicotiana tabacum L.) were divided into three sub-samples, one of which was kept as control (hydropriming) and two other sub-samples were prepared for priming. A sub-sample was soaked in (PEG₆₀₀₀) solution and another one was pretreated with KNO₃ solution with electrical conductivity of 12.5 dS m⁻¹ at 15°C for four hours [1,2]. After priming, seeds were thoroughly washed with distilled water for a minute and then dried back to primary moisture at 20–23°C in the laboratory. The greenhouse experiment was conducted at the Tobacco Research center of Urmia in 2014. This experiment was arranged as factorial, based on RCB (Randomized Complete Block) design with three replications. Ten seeds were sown 1 cm deep in each Petridis. Salinity treatments (1, 2, 3, and 4 dS m⁻¹) were applied immediately after sowing. Water and saline solutions were added to the Petridis. After emergence, seedling emergence was counted daily.
Fig. 1. Means of interaction of priming duration × concentration of polyethylene glycol and hydromonic on emergence percentage of tobacco. Different letters in each column indicating significant difference at $p \leq 0.05$.

Fig. 2. Means of interaction of salinity × concentration of polyethylene glycol and hydromonic on emergence time of tobacco. Different letters in each column indicating significant difference at $p \leq 0.05$.

Fig. 3. Means of interaction of salinity × concentration of polyethylene glycol and hydromonic on emergence rate index of tobacco. Different letters in each column indicating significant difference at $p \leq 0.05$. 
with seeds recorded as emerged, when hypocotyls appeared and mean emergence rate was calculated according to Ellis and Roberts (1980) [3]. After emergence, Emergence time, emergence rate coefficient, Emergence rate index, Emergence rate, and Emergence percentage were determined.

2.1. Germination assays

Response to priming was assessed by germination performance (rate, uniformity, total germination percentage, mean germination time and germination index). Germination was expressed as the cumulative percentage of germinated seeds. Mean germination time (\(MGT\)) was calculated according to the equation of Ellis and Roberts (1980) [3].

\[
MGT = \frac{\sum Dn}{\sum n}
\]

where \(n\) is the number of seeds, which were germinated on day \(D\) and \(D\) is the number of days counted from the beginning of germination.

Rate of germination (\(R\)) was calculated following modified formula [3]:

\[
R = \frac{1}{MGT}
\]

Uniformity (\(GU\)) was calculated following modified formula:

\[
GU = \frac{\sum n}{\sum \left(\Gamma n - t\right)^2 n}
\]

where \(t\) is the time in days, starting from days 0, the day of germination and \(n\) is the number of seeds germinate \(t\) and \(\Gamma\) is equal to \(MGT\).

Germination index (\(GI\)) was calculated as described in the Association of Official Seed Analysts (1983) as the following formulae:

\[
GI = \frac{\text{No. of germinated seeds}}{\text{Days of first count}} + \frac{\text{No. of germinated seeds}}{\text{Days of final count}}
\]

2.2. Statistical analysis

Analysis of variance of the data was carried out using MSTATC software. Duncan test was applied to compare means of each trait at \(p \leq 0.05\). EXCEL software was used to draw figures.

Acknowledgments

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Transparency document. Supplementary material

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.08.033.

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