**Seedling tolerance of castor genotypes with desirable root traits for drought, temperature and salinity: (2012-13 to 2014-15)**

Selected germplasm with good root traits were screened in lab for germination with Poly Ethylene Glycol (PEG) induced drought stress. Seeds of different germplasm lines were sown in petriplates with PEG solutions of different concentrations that can induce 0, -2, -4, -6, -8 and -1.0 mega pascals (MPa) of drought stress. Data on germination percent and days to germination were recorded. Castor could germinate upto -6 MPa only. A total of 42 germplasm were screened and 10 were selected with drought tolerance during germination with >75% germination at -2 MPa osmotic potential and showed survival even at -4 MPa (Table 5). RG 111 recorded 47% and RG 72 recorded 50% germination even at -6 MPa.

Temperature Induction Response technique (TIR) was standardized for castor (Lakshmamma and Lakshmi Prayaga, 2006) and Optimum lethal and induction temperatures were identified as 48ºC for 2 hours; 35ºCfor 2 h followed by 40ºC for 2 h and 45ºC for one hour respectively. 44 genotypes selected with good root and WUE traits were screened for temperature tolerance at seedling level using this technique. 13 best genotypes with >75% seedling survival with induction temperature and >40% survival even at lethal temperature were selected (Table 5). RG 72, RG 1826, RG 2048 and RG 2439 showed >90% seedling survival at induction and >80% survival even at lethal temperature.

During 2013-14, 6 genotypes were screened for salinity tolerance during germination with different concentrations of NaCl viz; 0, 50, 100, 150, 200 and 250 mM. 3 germplasm lines with >70% germination in 100mM NaCl were selected (Table 5).

Table 5. Selected germplasm lines with drought, temperature and salinity tolerance during germination and seedling growth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Year of study** | **Tolerance to** | | | | | |
| **Drought**  **(PEG induced)** | | **Temperature**  **(TIR technique)** | | **Salinity**  **(NaCl induced)** | |
|  |  | No. screened | No. selected | No. screened | No. selected | No. screened | No. selected |
|  | 2012-13 | 13 | 4 | 19 | 5 | - | - |
|  | 2013-14 | 20 | 4 | 15 | 4 | 6 | 3 |
|  | 2014-15 | 9 | 2 | 10 | 4 | - | - |
|  | Total | **42** | **10** | **44** | **13** | **6** | **3** |
|  |  | **Selected genotypes** | | **Selected genotypes** | | **Selected genotypes** | |
|  |  | RG72 | RG289 | RG72 | RG1661 | RG289 |  |
|  |  | RG82 | RG298 | RG89 | RG1826 | RG941 |  |
|  |  | RG89 | RG1494 | RG111 | RG1941 | RG2149 |  |
|  |  | RG111 | RG2048 | RG211 | RG2048 |  |  |
|  |  | RG248 | RG2139 | RG941 | RG2094 |  |  |
|  |  |  |  | RG1618 | RG2153 |  |  |
|  |  |  |  |  | RG2439 |  |  |

Out of 12 best genotypes with good root growth and drought tolerance in field, 9 were screened with PEG induced stress in lab and 7 (RG 72, RG 82, RG 89, RG 111, RG 298, RG 1494, RG 2139) were selected for drought tolerance during seed germination also. All the 5 genotypes that were screened with TIR (RG 72, RG 89, RG 111, RG 1826 and RG 1941) also showed seedling tolerance to temperature. Only 4 germplasm lines (RG 89, RG 1437, RG 1826 and RG 2139) were screened for salinity tolerance so far and none showed tolerance to salinity during germination. The screening of remaining lines for PEG, TIR, salinity stress will continue for these lines in new germplasm project. So far, the best lines with good root growth, field tolerance to drought, seedling tolerance to drought and temperature include: RG 72, RG 89 and RG 111.Among these, RG 72 was already registered for its drought tolerance.