International Journal of Economic Plants 2014, 1(1):040-042

Full Research Article

Screening Of Cotton Hybrids For High Moisture Stress At Emergence And Early Seedling Stage

R. K. Maiti, Desari Rajkumar, Alam Ramswamy, P. Vidyasager

Vibha Agtotech Ltd, Hyderabad, Andhra Pradesh, India

Article History

Manuscript No. IJEP6
Received in 16.03.2014
Received in revised form 28.04.2014
Accepted in final form 01.06.2014

Correspondence to

E-mail: ratikanta.maiti@gmail.com

Keywords

Cotton, hybrid, moisture stress, seedling

Abstract

9 Cotton commercial hybrids were screened for high moisture stress at emergence and early seedling stage. Emergence (%) and Percentage of seedling survival are taken in to consideration for selecting high moisture stress tolerance. 4 lines are selected for high moisture stress tolerance which includes 1915, 1919, 1924, and 1929. Above selected hybrids is recommended for growing in high moisture areas (early stage flood prone stress).

1. Introduction

Moisture stress reduces seed germination, seedling emergence and seedling survival percentage, poor root growth and also roots rotting due to insufficient oxygen. This leads to poor seedling establishment and poor crop stand. The crop growing under water lodging area usually faces this problem. In order to overcome this problem crop cultivars should be evaluated for high moisture stress at early stages of seedling establishment. Present study indicates screening for cotton lines for high moisture stress at early stages of seedling establishment.

2. Material and Methods

9 Cotton commercial hybrids are used in this experiment. Seeds are sown in plastic pots (coco peat) containing holes at the bottom in the same distance. Pots are kept in plastic trays containing water. The amount of water in plastic trays is maintained constant by adding water. For each line 4 replications are taken. Water moves to the top of the coco peat layer by capillary force. During the experiment seeds are allowed for seedling emergence and seedling growth under high moisture stress. Seedling emergence was recorded at initial stage and experiment was terminated at 18 days. At the end of the experiment, below mention parameters were taken in to consideration for stress tolerance.

1. Emergence (%)
2. Percentage of seedling survival
3. Shoot length
4. Root length and
5. Number of lateral roots

3. Results and Discussion

High Moisture stress reduced seedling emergence (%), seedling survival (%), shoot length, root length, and number of lateral roots.

- Hybrids 1915, 1919, 1924, and 1929 are showing good emergence (75 to 95%), and 94.7 to 100 % of seedling survival (seedling establishment), more number of lateral roots and good root length under excess moisture stress.
- These hybrids showing mean values of shoot length ranging from 11.4 to 13.9 cm, root length ranging from 9.6 to 10.6 cm and number of lateral roots ranging from 13.8 to 18.4 which are high compared to reaming hybrids.
- From above these parameters it is considered that these 4 lines have high capacity of seedling emergence, seedling establishment, and good seedling vigour under high moisture condition.

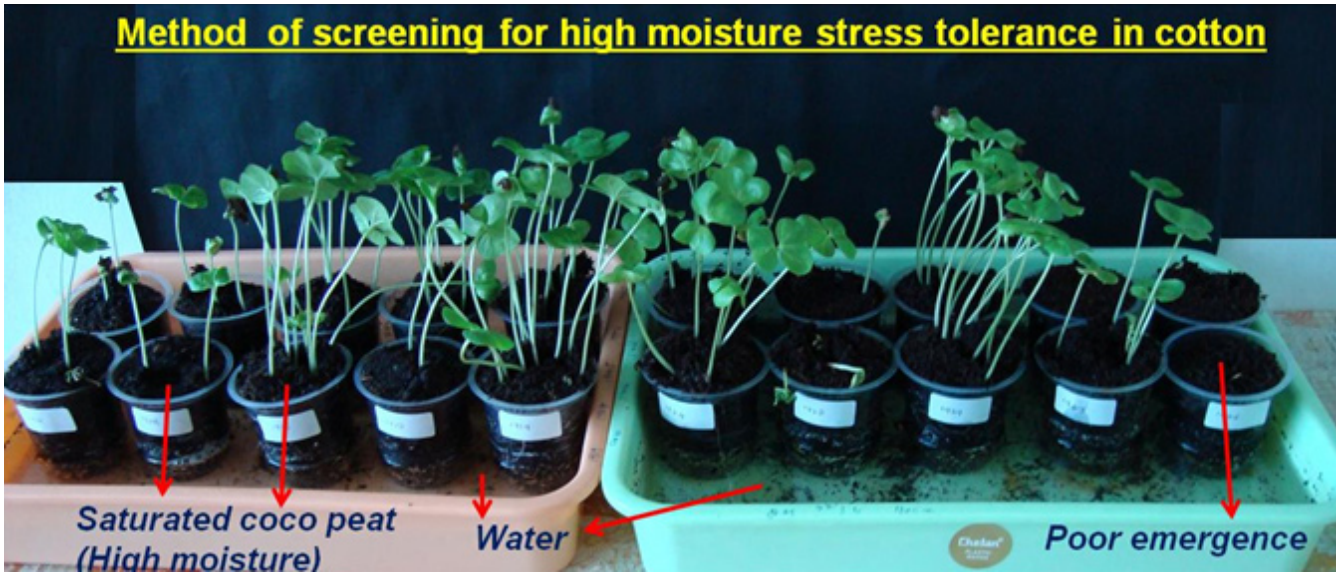

Figure 1: Indicating the method of screening for high moisture stress tolerance at final stage (18 days). Variability in seedling emergence and seedling survival among the hybrids is clearly observed.

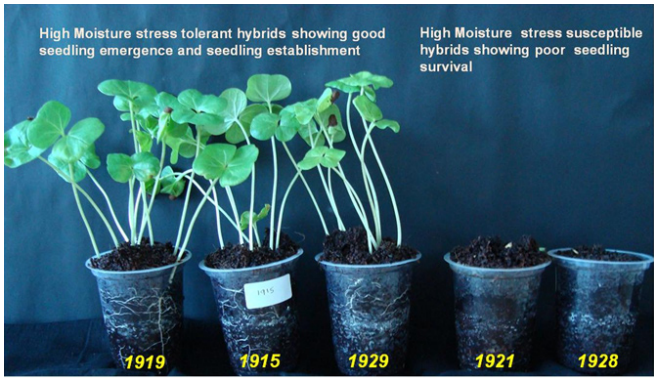

Figure 2: indicating the response of moisture stress tolerant and susceptible lines exposed to continuous moisture stress. Variability in seedling emergence and seedling establishment, and seedling vigour was clearly observed in the picture. Susceptible lines 1921, 1928 are showing poor survival.

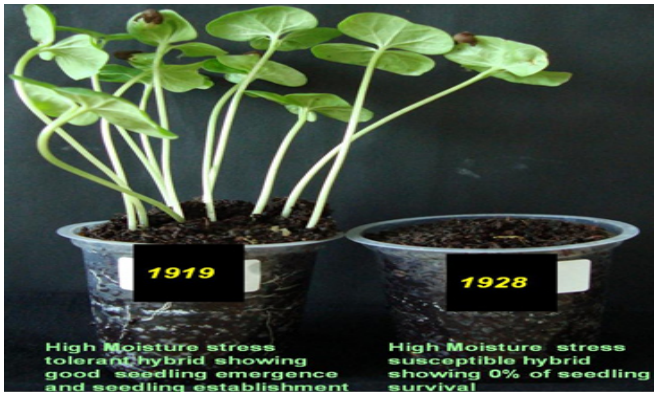

Figure 3: showing the difference in survival (%)

Finally it is noted that high seedling emergence, high % of seedling survival, more number of lateral roots and good

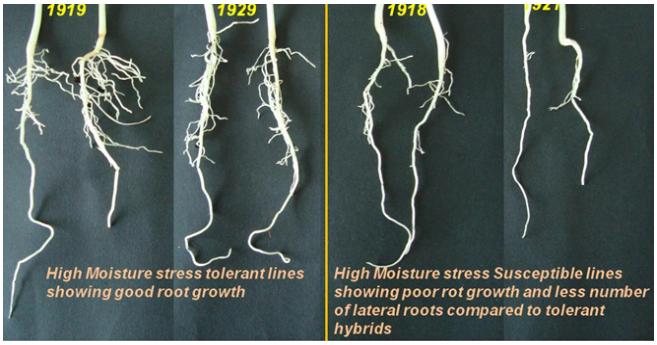

Figure 4: shows the response of root growth of moisture stress tolerant hybrids (1919 & 1929) and Moisture stress susceptible hybrids (1918 & 1921) under continuous 18 days moisture stress. It is clearly observed that moisture stress tolerant lines have good root growth and more number of lateral roots compared to susceptible lines.

Table 1: Mean Values of seedling parameters after continuous 18 days of moisture stress are tabulated below

Entry No.	Emergence (%)	Seedling survival (%)	Shoot length (cm)	Root length (cm)	Number of lateral roots
*1915	80.0	100.0	12.8	10.6	17.7
1918	25.0	60.0	9.8	7.1	11.0
*1919	95.0	94.7	13.8	10.6	18.4
1921	35.0	28.6	4.3	3.8	4.0
*1924	75.0	100.0	11.4	9.6	13.8
1928	25.0	0.0	0.0	0.0	0.0
*1929	90.0	100.0	13.9	10.0	14.4
1941	30.0	50.0	4.5	3.8	5.8
1945	10.0	0.0	0.0	0.0	0.0

*Selected hybrids are shaded in *yellow*

seedling vigour are simple parameters for selecting excess moisture stress tolerance in cotton.

4. Conclusion

From the above study it is concluded that hybrids showing high seedling emergence (%), 90 to100% of seedling survival, and more number of lateral roots are selected for excess moisture stress tolerance.

4 lines are selected for high moisture stress tolerance which includes 1915, 1919, 1924, and 1929

Suggestion: Above selected hybrids is recommended for growing in high moisture areas (early stage flood prone stress).