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Screening of Wheat (*Triticum aestivum L.*) Lines for Identification of Drought Tolerant Genotypes

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Abstract **: Wheat is one of the most important staple food crops of the world. The yield potential of the crop is reduce by 50-90% of the irrigated potential by drought in marginal rainfed environments. Identification and utilization of new and diverse source of drought tolerance is essential, hence, an experiment was set up using diverse collection of one hundred and three bread wheat cultivars consisting of winter, spring and CIMMYT lines. These lines were evaluated in two different water regime (well watered and drought stress). Material was sown in aluminum trays under artificial moisture stress in glass house conditions. Before sowing, each tray was given equal quantity of water to ensure uniformity and proper germination of the seeds. Thereafter, no irrigation was provided till most of the genotypes exhibited mortality. The selection criterion adopted was the seedling survivability under moisture stress conditions. The genotypes exhibited differential response to the screening conditions. Majority of the genotypes started withering from 19-29 days after sowing. Basal leaves were the first to show the drying symptoms and in the leaf, the drying started from tip to bottom. Ninety-five genotypes showed complete death between 29-33 days after sowing. Only eight lines including the check C-306 survived for more than 33 days after sowing.**

INTRODUCTION

Plant growth and productivity are greatly affected by environmental stresses such as drought, high salinity, and low temperature [8]. Drought is the most common environmental stress affecting about 32 million hectares area under wheat (*Triticum aestivum* L.) cultivation in developing countries. In India, nearly 80% wheat is cultivated under irrigated conditions, 66% of it receives only partial irrigations, and the remaining 20% is grown under rainfed environments.

Shao *et al.* [5] and Kirigwi *et al.* [2] reported that the loss due to drought is the total for other natural disasters and with increasing global climate change makes the situation more serious. Being adapted to a wide range of moisture conditions, Wheat is grown on more land area worldwide than any other crop, including drought prone areas.

Rainfed wheat is generally grown on stressed soil moisture and often experiences water deficit and high temperature stress during grain development. Significant work has been done and many varieties suitable for rainfed cultivation have been released. Johnson [1] have suggested that a good screening technique should be rapid, capable of evaluating plant performance at the critical developmental stages, use only small sample and also capable of screening large populations. Also, to develop superior cultivars that exhibit a great degree of tolerance to drought, it is imperative that diverse source of tolerance are identified and utilized. So the present piece of work was done for identification of the genotypes capable of tolerance to water stress.

MATERIALS AND METHODS

The experimental material consisted of one hundred and three bread wheat cultivars consisting of winter, spring and CIMMYT lines (Table 1). These genotypes were screened for moisture stress tolerance at seedling stage in glass house using seedling survivability as a criterion.

The experiment was conducted in aluminum trays filled with mixture of soil and FYM. All the trays were given equal quantity of water 12 hours before sowing to ensure good germination. Seeds were sown in row spaced 10 cm apart and were placed at uniform depth of 3 cm by making a hole in the soil. Single seed was placed in each hole and then filled with same soil mixture. No irrigation was given after sowing and the seedlings were left undisturbed. Data was recorded on duration of survival of the genotypes.

RESULTS AND DISCUSSION

For identification of drought tolerant genotypes, survivability of seedlings under extreme conditions of moisture stress as a selection criterion was adopted in the present study. One hundred and three wheat genotypes were screened under moisture stress conditions. Based on the response of the

genotypes, in terms of days to survival, the genotypes were grouped into three categories (Table 3).

Different genotypes showed diverse response for seedling survivability duration. Many genotypes started withering from 19-20 day of germination but at the same time some were still healthy. The withering started from the basal leaf (tip to bottom of the leaf) turning into brown colour and consequently complete drying. Complete seedling death started from 29 day onwards and by 35 day most of the genotypes exhibited seedling death. Remaining genotypes also started withering after 35 days.

Most prominent genotypes which died earlier include Kalyansona, Sonalika and Chinese spring. The well known drought tolerant genotype, C306 performed well and could survive upto 35 days after sowing. Many workers [3, 4, 6,7] have emphasized the seedling survivability and seedling characters as useful screening criteria for moisture stress tolerance. The present study grouped the genotypes into three distinct classes based on their response to seedling screening technique adopted.

Table1: Number of wheat genotypes screened under each group

Genotypes Screened	**No of lines screened**
Winter wheat	21
Spring wheat	63
CIMMYT lines	19

Table 2: Duration of seedling survivability under drought stress screening conditions

Parameters	**Days after sowing**
Most of seedling started withering	19-20
Many of the seedling lines died	29-33
Remaining Lines started dying	35

Table 3: Number of genotypes survived at the specified period of drought stress

Number of genotypes survived (after sowing)		
Less than 29 days	29-33 days	More than 33 days
59	36	08

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