



Physiological studies on evolution of soybean genotypes for drought tolerance

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Abstract : Studies were undertaken during 1998-99 in the Department of Crop Physiology, Agricultural College and Research Institute, Madurai to screen soybean genotypes for drought tolerance. The extent of drought tolerance was tested by photosynthetic rate, leaf water potential, leaf temperature, transpiration rate, stomatal diffusive resistance. The genotypes culture 425, UGM 34 and EC 2541 showed tolerance to drought due to higher photosynthetic rate, higher pod number per plant, higher yield among the genotypes tested.

Key Words : Drought, Genotypes, Soybean, Photosynthetic rate, Yield, Tolerance

View Point Article : Amutha, R., Nithila, S., Siva Kumar, T. and Rajendran, C. (2012). Physiological studies on evolution of soybean genotypes for drought tolerance. *Internat. J. agric. Sci.*, 8(1): 216-219.

Article History : Received : 26.07.2011; Revised : 11.10.2011; Accepted : 30.11.2011

INTRODUCTION

The area under soybean cultivation in India has grown from 300 hectares in 1967 to seven lakhs hectares as on today. But the average productivity per unit area is low due to several factors (Tripathi, 1985). Raising soybean crop offers a number of advantages viz., ability to fix nitrogen, low phosphorus requirement (Tadano and Tanaka, 1980), tolerance to low pH and high soil moisture content (Tadano *et al.*, 1979). Many scientists have reported the adverse effects of water stress on soybean (Wein *et al.*, 1979). Drought stress has been observed to be one of the factors causing low yields since soybean cultivation is confirmed mostly to drought prone areas.

The main objective of this study which was undertaken during the year 1998-99 was to evaluate different soybean genotypes and identify suitable cultivars for adoption in drought prone areas.

MATERIALS AND METHODS

The experiment was conducted to evaluate different soybean genotypes under rainfed condition with a view to

select the drought tolerant types. A total of 30 genotypes of soybean were taken up for the study. The experiment was carried out during dry season of 1998-99 at Agricultural College and Research Institute, Madurai. The experiment was laid out in a Randomized Block Design replicated thrice with a spacing of 30 x 10 cm. The plot size was 5.0 x 8.0 m. Observations were recorded at the reproductive stage of the crop for the following physiological parameters. The water potential was measured using Pressure bomb Apparatus.

Leaf temperature, transpiration rate and stomatal diffusive resistance were determined by means of "Steady State Porometer" of make Licor, Lincoln, Nebraska, U.S.A. Photosynthetic rate was recorded in the top fully expanded leaf with the help of "Infra Red Gas Analyser" of model 225-2B-SS. At harvest date, yield components such as pod number/plant and pod yield / plant were collected in randomly selected ten plants in each replication and in each genotype.

RESULTS AND DISCUSSION

During summer, the period of drought is common under dry land conditions. Crop plants modify their physiological activities in response to the water deficit conditions. The