AGRONOMIC AND PHYSIOLOGICAL EFFECTS OF SOIL MOISTURE DEFICIT STRESS IN MUNGBEAN (*Vigna radiata* (L.) Wilezek).

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ABSTRACT

Studies were conducted in the greenhouse of the agro-forest of the Eastern University, Sri Lanka to determine the agronomic and physiological responses of soil moisture deficit stress on mungbean var. 'MI-6' during the vegetative, flowering and pod-filling stages. The experiment was layed out in a Completely Randomized Design with 4 treatments and 30 replications for each treatment. Moisture stress was imposed for different treatments for a period of 12 days per treatment during the above growth stages. Moisture stress was imposed by withholding water completely at once. The control plants were regularly watered at four days interval. Moisture stress reduced the Leaf Area Index (LAI) and Root Length Density (RLD) of mungbean. The highest reduction in the LAI and RLD was observed when the stress was imposed during the vegetative and flowering stages respectively. The % reduction in the LAI was higher than the % reduction in the RLD for all the treatments. There was a partial recovery in the LAI and RLD of plants after re-watering. The Stomatal Resistance (RS) was significantly higher whereas Transpiration Rate (TR), Leaf Water Potential (LWP) and Relative Water Content (RWC) were significantly lower in the stressed plants than the control treatments irrespective of the stages of growth. There was a complete recovery in the RS and TR values of plants after re-watering. The RS was recovered on the 5th day and 7th day after re-watering during the vegetative and flowering stages respectively. The TR was recovered on the 4th day and 6th day after re-watering during the vegetative and flowering stages respectively. There were significant differences in the Harvest Index (HI) and yield of plants between the stressed and the control treatments. Moisture stress during the flowering stage showed the highest yield reduction compared to the other growth stages. Delay in the recovery of RS and TR during the

flowering stage could be the physiological reasons for the reduction in yield. The relationship between RS and TR was assessed for the stressed and the control treatments on the 12th day from the commencement of the stress during the flowering stage. A large variation in the TR values for a narrow range of low RS values in the control treatment indicated the stress avoidance characteristics of mungbean under well watered condition. Persistence of low TR values to a wide range of high RS values in the water stressed treatment indicated the stress tolerance characteristics of mungbean under water deficit situation. RWC showed the highest correlation with the yield among the measured physiological parameters. Hence, reduction in yield could also be attributed to reduced water content in the plants.

Key words: Leaf Area Index, Root Length Density, Stomatal Resistance, Leaf Water potential, Transpiration Rate, Relative Water Content

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