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Evaluation of Wild Soybean Accessions by Vegetative Indices under Waterlogging Condition

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[Introduction]

Waterlogging stress is a major problem for production of various crops such as maize, soybean and sugarcane. In the case of soybean, waterlogging can result to heavy yield loss (17%–57%), so several waterlogging-tolerant cultivars have been screened by soybean breeders. In spite of wild soybeans have wide range of genetic resources, evaluation of waterlogging resistance among wild soybeans are still unexplored until now. For this reason, this experiment was carried out to evaluate waterlogging tolerance and sensitivity in wild soybean accessions by using various vegetative indices.

[Materials and Methods]

The plants were grown in polyvinyl chloride (PVC) pipes [6 cm (diameter) × 40 cm (height)]. When the wild soybeans made it to V1 growth stage, all the pots were placed in a pool of water for two weeks to secure waterlogging conditions. Visual score evaluation and observation of phenotypic data was done at 14 days and 21 days after waterlogging (DAW). This experiment was conducted in three replications per accessions (n = 1).

[Results and Discussion]

According to visual score, approximately 90% of wild soybean accessions had a 1.0–3.5 visual score in 14DAW and 21DAW. To specify the proper indicator of waterlogging stress, various vegetative indices were analyzed and correlation tests were conducted with the obtained visual scores. Among the 26 vegetative indices we measured, only 17 indices showed high correlation with visual score. Based on the visual scores, 5 waterlogging-tolerant accessions (199, 659, 884, 1022, and 1116) and 3 waterlogging-tolerant accessions (504, 888, and 1080) were selected. Correlation tests were conducted with the selected wild soybean accessions, and significantly high *P*-values were detected in ARI1 ($P = 0.98069$ in 14 DAW; $P = 0.86734$ in 21 DAW), ARI2 ($P = 0.98434$ in 14 DAW; $P = 0.87934$ in 21 DAW) and photochemical reflectance index (PRI) ($P = -0.9801$ in 14 DAW; $P = -0.9268$ in 21 DAW), respectively. Therefore, our results suggested that ARI and PRI can be used as the predictors of waterlogging tolerance and susceptibility among various vegetable indices furthermore selected contrasting accessions can be used for further researches.

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