Changes of Proline Levels and Abscisic Acid Content in Tolerant/Sensitive Cultivars of Soybean under Osmotic Conditions

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INTRODUCTION

In responses to drought and salinity stresses many plant species including soybean accumulated high levels of proline (Pro) which is thought to function in stress adaptation [1]. Also abscisic acid (ABA) plays an important role in the responses of plants to drought stress. It appears that drought stress triggers the production of endogenous ABA which in turn induced the transcription of several genes. These genes are also thought to function in the protection of cells from dehydration [2]. Here changes of free proline levels and endogenous ABA content in seedling leaves of different soybean cultivars were detected showing a correlation of biotypes having elevated levels of proline and ABA content with enhanced tolerance to PEG stress.

MATERIALS AND METHODS

Plant Materials: The 11 cultivars were classified into two groups: a tolerant and a sensitive group because they were much different in drought sensitivity according to the reported data on yield fruit set plant height and weight of 100 seeds under high temperature and due to shortage of water [3]. The two groups of the tolerant (T1-7) and sensitive cultivars (S1-4) were selected for this study.
Stress Treatment: Soybean seeds were germinated and grown in vermiculite for 3--4 weeks. The roots of the soybean seedlings were treated in Hoagland solution containing 6% PEG (6000) or 0.5 % NaCl for 36-48h.
Determination of proline and ABA levels: The stressed-leaf samples were

grounded. Proline and ABA concentration was determined as described by Bates et al. [4] and by Wu et al (ELISA) [5] respectively.

RESULTS AND DISCUSSION

Under 6% PEG treatment :

1. The elevated proline levels in each cultivar of tolerant group (T1-7) was 1.7-4.6 times as much as that in the corresponding controls in the range of 274.9-441.2 m g/g dry weight. The elevated proline levels in each sensitive cultivar (S1-S4) were 1.3-1.9 times in the range of 145.6-258.9m g/g dry weight (Table 1).
2. ABA content in the tolerant cultivars increased to the different extent. And it was 1.5-8.5 times of the original levels in the range of 12.76-92.54m g/g dry weight. ABA content of S2 and S3 cultivars showed a slight increase. ABA content in the other two sensitive cultivars (S1 and S4) declined (Table 2).
3. The above results showed that the elevated proline levels and ABA content in soybean seedlings were consistent with enhanced tolerance to PEG stress. We speculate that elevated proline levels and ABA content in the stressed leaves function in PEG-stress adaptation.