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Research Paper

Studies on Role of Brassinosteriods on Metabolite Content of Germinating Groundnut Cultivars Under Salinity Stress

Biotechnology

KEYWORDS : Arachis hypogaea L., Metabolite, Brassinosteroids, (24, Epibrassinolide), (22(S),23(S) Homobrassinolide)

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ABSTRACT

Groundnut (Arachis hypogaea L.) is an important oil seed and emerging food crop of India. salinity is one of the major problem limiting crop production by affecting its many phases viz, seed germination, growth ,flowering and fruting ,metabolite content. Brassinosteroid are novel type of phytohormone that influences various physiological processes in plant during various stress condition. In this study pot experiment was conducted by selecting four groundnut cultivars viz.GG2, GG4, TMV13, Girnar 2. The seedling metabolite content at early sprouting stage was measured as changes in protein, total amino acid and proline content all Brassinosteroids treatment over control in the seedling. Here, studies deals with evaluation of role of brassinosteroids on metabolites content of some germinating groundnut cultivars under salinity stress.

Introduction

Groundnut (*Arachis hypogaea L.)*is one of the important legume crops grown globally. It is grown in 26 million hectors area in more than 100 countries around the world (FAO, 2003). It is an essential component of intercropping systems in the dry tropics, and the haulm provides fodder for cattle. High and stable groundnut productivity is an essential component in the improvement of efficiency of farming systems in the semi-arid tropics. In the world salinity is one of the major stress that affects the plant growth and productivity of crop (Wang *et. al*., 2003 ;Zhu ,2003). In spite being a major oil seed crop Groundnutis facing soil and water salinity problem in part of the world. Brassinosteroids are natural plant growth promoting substances which occur as all plant parts in low concentration affecting its growth (Fujiko 1999). Now a days it consider as sixth group of hormones and influences different physiological process such as seed germination , plant growth, senescence, rhizogenesis and provide resistant to biotic and abiotic stress in some crop plants (Sasse ,1997; (Vardhini and Rao 1998a)).Brassinosteroids have been reported as antistress hormones for some plants (Mandava, 1988; Sasse, 1997; Clouse and Sasse, 1998).Present studies deals with assessment of role of brassinosteroids on metabolites status of some germinating groundnut cultivars under salinity stress.

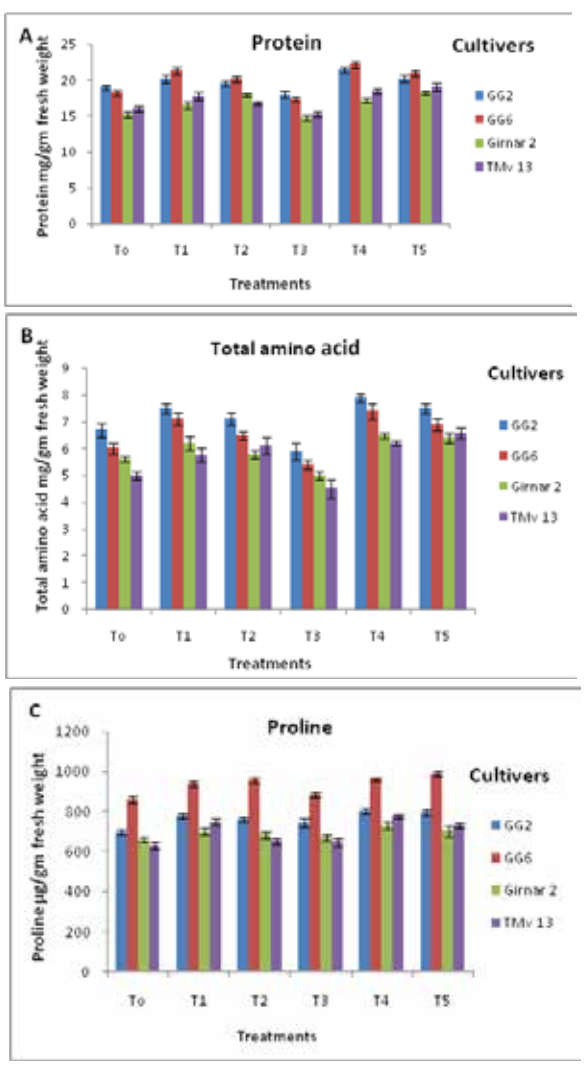
Materials and Methods

Seeds of Groundnut cultivars GG 2, GG 4, Girnar 2, and TMV 13 obtained from National Research Center of Groundnut(NRCG), Junagadh, Gujarat. A pot experiment was conducted in botanical garden of Hemchandachaya North Gujarat University, Patan during 2014. A standardization work in laboratory for applicationof Salinity and brassinosteroids doses was done and 1%Nacl salinity, Epibrassinosteroid (EBR) (10^{-7}) M,Homobrassinosteroid (HBR) (10^{-7}) Mand Control (DW) were selected for the treatments. Healthy 20 seeds of each cultivar were presoaked for 24 hrs. in (DW) as Control,EBR (10^{-7}) M and HBR (10^{-7}) and germinated in pot containing soil with 1%Nacl salinity and vermicompost as biofertilizers. Biochemical parameters as various metabolites of early developed seedling of age 30 days after sowing (DAS) viz. Protein (Lowry *et. al.*,1951), total amino acid and Proline(Moore and Stein,1948) were measured in control and treated seedling.

Metabolite extraction:

1 gram of leaves were weighted and crush in 10 ml of 80 % ethanol. The homogenate was centrifuge for 15 minutes at 10,000 rpm.After the centrifugation the supernant was collected Same was repeated once more total supernant was used for estimation of total amino acid and proline.The residue were homogenate in 5 ml of 0.1 N NaoH and centrifuge for 15 minutes at 10,000 rpm and the supernant wascollected for estimation of Protein.

Figure: 1. Effect brassinosteriods on metabolite content of groundnut cultivars. A-Protein,B-total amino acid,C – Proline



Note-T_0= distilled water; T_1= Epibrassinosteroid; T_2= Ho-

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mobrassinosteroid; T_3=1% Nacl; T_4= Epibrassinosteroid +Salinity;T_5= Homobrassinosteroid + Salinity

Results and Discussion

The result on the effect of brassinosteroids as in figure 1 A. shows highest protein content as 22.2 mg/gm in Epibrassinosteroid +Salinity treatment compare to control as 18.2 mg/gm , B. total amino acid was high 7.9 mg/ gm in Epibrassinosteroid +Salinity compare to control as 6.7 mg/ gm and C. proline is 991 µg/ gm Homobrassinosteroid +Salinity in compare to control as 860 **µg/** gm in groundnut seedlings treated with brassinosteroids.Salinity reduced all biochemical parameters but application of brassinosteroids significantly increasesall metabolite contents over control.

Number of studies evident that exogenous application of brassinosteroids induces abiotic stress like salinity tolerance in crop plants as in rice (Anuradha and Rao, 2001), tomato (Prakash *et. al.*, 1999). Amino acid is the monomer of protein and function of amino acid in plant is reserve food materials. The concentration of total as well as proline amino acids is significantly increased due to both epi and homo brassinosteroid application in all four cultivars under salinity stress. Protein is most important substance responsible for growth of seedling. Treatment with both the brassinosteroids resulted in increased in protein levels in all four cultivars. Increased Proline level may help plant to synthesized new group of stress resistant proteins under salinity due to osmolytic role for proline in plants similar results were reported in other crop by (chen *et. al.*2007; sharifi *et. al.*2007).Both salinity resistant and susceptible verities grow well and tolerate salinity stress due to application of brassinosteroids shows ameliorative role of hormones in metabolites synthesis.

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