

**GIBBERELLIN AND AUXIN LEVELS IN MATURE EMBRYOS AND YOUNG SEEDLINGS OF *PISUM SATIVUM* L.**

Belay Ayele, Jocelyn Ozga\*, and Dennis Reinecke

Plant Physiology and Molecular Biology Research Group  
Department of Agricultural, Food and Nutritional Science  
University of Alberta  
Edmonton, Alberta, Canada T6G 2P5

Gibberellins (GAs) and auxins are two classes of hormones that influence processes during seed germination and early seedling growth. This study examines how auxin and GA levels change during these developmental phases in two different genotypes of pea (*Pisum sativum* L.), 'Alaska' (*LE*) and 'Carneval' (*le*), both which germinate readily upon imbibition. The endogenous levels of gibberellins ( $GA_{19}$ ,  $GA_{20}$ ,  $GA_1$ ,  $GA_8$ ,  $GA_{29}$ , and  $GA_3$ ) and auxins (IAA and 4-Cl-IAA) in mature embryos and component tissues (root, shoot and cotyledon) of 4-d-old seedlings were determined by gas chromatography-mass spectrometry. Relative to their level in the mature embryos, there was an increase of IAA and a decrease of 4-Cl-IAA in the cotyledons 4 days after imbibition, suggesting a difference in the roles of these two auxins in the germination process. 4-d-old roots of both cultivars contained higher levels of both IAA and 4-Cl-IAA than the corresponding shoots. IAA and 4-Cl-IAA levels of 4-d-old 'Alaska' shoot were elevated in comparison to that in 'Carneval' shoots. There was an elevated level of  $GA_{20}$  in the mature embryo of both genotypes which decreased markedly by 4 days after imbibition, suggesting the role of  $GA_{20}$  as a substrate to be 3 $\alpha$ -hydroxylated to  $GA_1$  upon germination. Some  $GA_1$  was detected in mature embryos of both genotypes; however, no endogenous  $GA_1$  was detected in the three organs of 'Carneval' (*le*) 4 days after imbibition. The three tissues of 'Alaska' seedlings contained  $GA_1$ , and its level was highest in the root, the most actively growing organ in 4 days after imbibition seedlings. This together with the higher level of the two auxins found in the root support the theory that biologically active GA ( $GA_1$ ) and auxins are mainly localized in actively growing tissue. The inactive 2 $\alpha$ -hydroxylated GAs ( $GA_{29}$  and  $GA_8$ ) were much higher in the mature embryo and the three tissues of 4-d-old seedlings of 'Alaska' than that of 'Carneval'. Supported in part by NSERC grant #138166.