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RESEARCH PAPER

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Biochemical and molecular markers of auxin induced senescence in mustard seedlings

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The objective of the present study was identification and characterization of the biochemical and molecular events during senescence. Senescence is known to be an active developmental process and not a passive degradative process. Accordingly a set of biomolecules, namely phtohormones (IAA), ethylene and abscisi acid (ABA), generation of signaling molecules and induction of enzyme, for e.g. catalase, constitute the components of active process of senescence. 2, 4-D induced senescence pathway was the focus of the present study. Native auxin (IAA) and synthetic auxin (2, 4-D) were employed in the present study. It is known that besides 2, 4-D two other hormones namely, ethylene and ABA are involved in this process. Silver ions in the from of $AgNO_3$ was provided to the young seedling of black mustard to interfere in the ethylene biosynthesis which is the midpoint in induced senescence.

Key words : Senescence, Phtohormones, Auxin and mustard

INTRODUCTION

Senescence in plant is an anabolic process and termed as negative aspect of growth. This means senescence in plants is not a passive process. In contrast it is a programmed morphogenesis and termed as programmed cell death (PCD) (Lohman *et al.*, 1994). PCD occurs even in the normal course of the plant development for example, even during the embryogenesis in immature seeds there is PCD in relation to the formation of water conducting elements, namely, xylem formation.

Control and regulation of senescence in plants have biotechnological prospective in terms of regulating developmental process such as, fruit ripening, regulation of ageing, compression of life cycle or life span in *in vitro* plants, optimal storage of seeds and tuber, shelf life of agricultural commodities such as, fruits, seeds and grains, germinability of seeds subsequent to storage etc (Salisbury and Ross, 1991).

The present study was undertaken to characterize the senescence markers in the 2, 4-D induced senescence pathway. Effect of 2, 4-D + Ag NO_3 a few selected inhibitors of ethylene biosynthesis and action were studied to mark the senescence stages. The study focused on the identification of biomolecules or bioprocesses during senescence as possible markers (Mittler and Lan, 1995). Pigment degradation, catalase activity and nuclear DNA degradation were considered as prominent senescence markers. These markers differed from the signal molecules because of the fact; these are consequences or responses and manifestations of senescence. Signal molecules on the contrary mean those bimolecules which induce and regulate senescence. Thus, the focus of the present study was to sequence the senescence markers in the young seedling of black mustard (Lohman *et al.*, 1994).

MATERIALS AND METHODS

Seeds of black mustard (*Brassica nigra* L.) was allowed to germinate at room temperature 35 ± 2°C on a thin layer of cotton. ABA, 2, 4 – D + 0.4% 1-Butanol, 2,4-D + Na- tungstate was added on the 3rd, 5th and 7th day similarly on 0´ d, 1´ d, 3´ d and 4´ d. The root and shoot of the plants were measured in cm and the samples were collected from the above days.

Determination of root-shoot length:

One week old mustard seedling were uprooted and the roots and shoots were stretched with the help of a scale and root and shoot lengths were measured for every treatment in 3rd, 5th and 7th day similarly on 0´ d, 1´ d, 3´ d and 4´ d. Chlorophyll (Arnon, 1949), Carotenoids (Mackinneys, 1941), lipid (Chapman, 1998), Thin layer chromatography (Manoharan, 1981), Phospholipids (Wagner *et al.*, 1962), galactolipids, Genomic DNA from plant tissue by the method of CTAB, Agarose Gel Electrophoresis and catalase activity were analysed.