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STUDIES ON THE EFFECT OF AUXINS ON THE NUCLEIC ACID CONTENTS OF NORMAL AND NEMATODE INDUCED ROOT GALL TISSUES OF *LYCOPERSICON ESCULENTUM* MILL. IN CULTURE

ANIL MATHUR and R. K. SHARMA

Post-Graduate Department of Botany,
Govt. M.S.J. College, Bharatpur-321001, India.

Effect of varying concentrations of different auxins i.e. IAA, NAA and 2, 4-D on the nucleic acid contents of normal and gall tissues of *Lycopersicon esculentum* Mill. was recorded in tissue culture. RNA contents of normal tissue with IAA and 2, 4-D in the medium, RNA content of gall tissue was lower than that of the normal tissue with NAA. DNA content of gall tissue was higher as compared to the normal tissue with all the auxin tested. Maximum RNA and DNA contents were recorded in normal tissues at 10.0 mg/l of all the auxins tested while varying results were obtained for RNA and DNA contents in gall tissues.

Keywords : Auxins; Gall tissue; *Lycopersicon esculentum* Mill. Nematode; Normal tissue; Tissue culture.

Introduction

The positive role of auxins in the nucleic acid metabolism of the plant tissues has been reported [1-4]. Differences were observed in nucleic acid of *Phylloxera* gall and grape stem single cell clones at different NAA levels[2]. Vajranabhaiah and Mehta[4] while studying nucleic acid metabolism in *Cucumis melo* L. suspension cultures revealed greater concentrations of total RNA, DNA and protein contents at growth promoting NAA levels. Vyas[5] and Tandon *et al*[3]. have described the necleic acid metabolism in *Eriophyes* induced *Zizyphus* gall and normal stem calli in culture. DNA contents of the gall tissue were significantly high to that of the normal tissue. Increased NAA concentrations in the medium increased RNA content of normal tissue. While no appreciable change was recorded in gall tissue.

During the present investigation effect of varying concentrations of auxins such as IAA, NAA and 2, 4-D on the nucleic acid contents of normal and gall tissues of *Lycopersicon esculentum* Mill.was studied in tissue culture.

Materials and Methods

The stock cultures of normal and gall tissues maintained[6] on MS-medium[7] were used for studying effects of various auxins on nucleic acid contents. Different concentrations of indole-3yl-acetic acid (IAA), alpha-naphthaleneacetic acid (NAA) and 2, 4-dichlorophenoxyacetic acid (2, 4-D) ranging from 1.0 to 15.0 mg/l were used in auxin omitted MS-medium. All the media were adjusted to pH 5.8 before autoclaving. For every test, twelve replicates were used. In control experiments, the auxin in question was eliminated from the media. Each experiment was repeated three times. One piece of callus, about 200mg, was transferred to 40ml solidified test media. The cultures were incubated at 26±2°C in dark for 30 days. The callus pieces were then removed and dried at low temperature and pressure. Extraction of nucleic acids was made in perchloric acid as devised by Ogur and Rosen[8], and Jensen[9]. The quantitative estimation of RNA[10] and DNA[11] was made in terms of optical density by using spectrophotometer (Carl Zeiss Jena VSU-2P).

Results and Discussion

Effect of auxins on RNA contents : The results obtained are presented in Figs. 1-3. Relatively low yields of RNA were obtained on the auxin omitted medium, in the normal tissue compared with those of the gall tissue.

The RNA contents of normal and gall tissues were increased with the addition of 1.0mg/l of auxins in the medium. A considerable increase was recorded in RNA contents of the gall tissue with IAA and 2, 4-D. On the other hand, the gall tissue, with NAA in medium, showed increase in RNA content to a smaller extent. The RNA contents of normal tissue were found to be less as

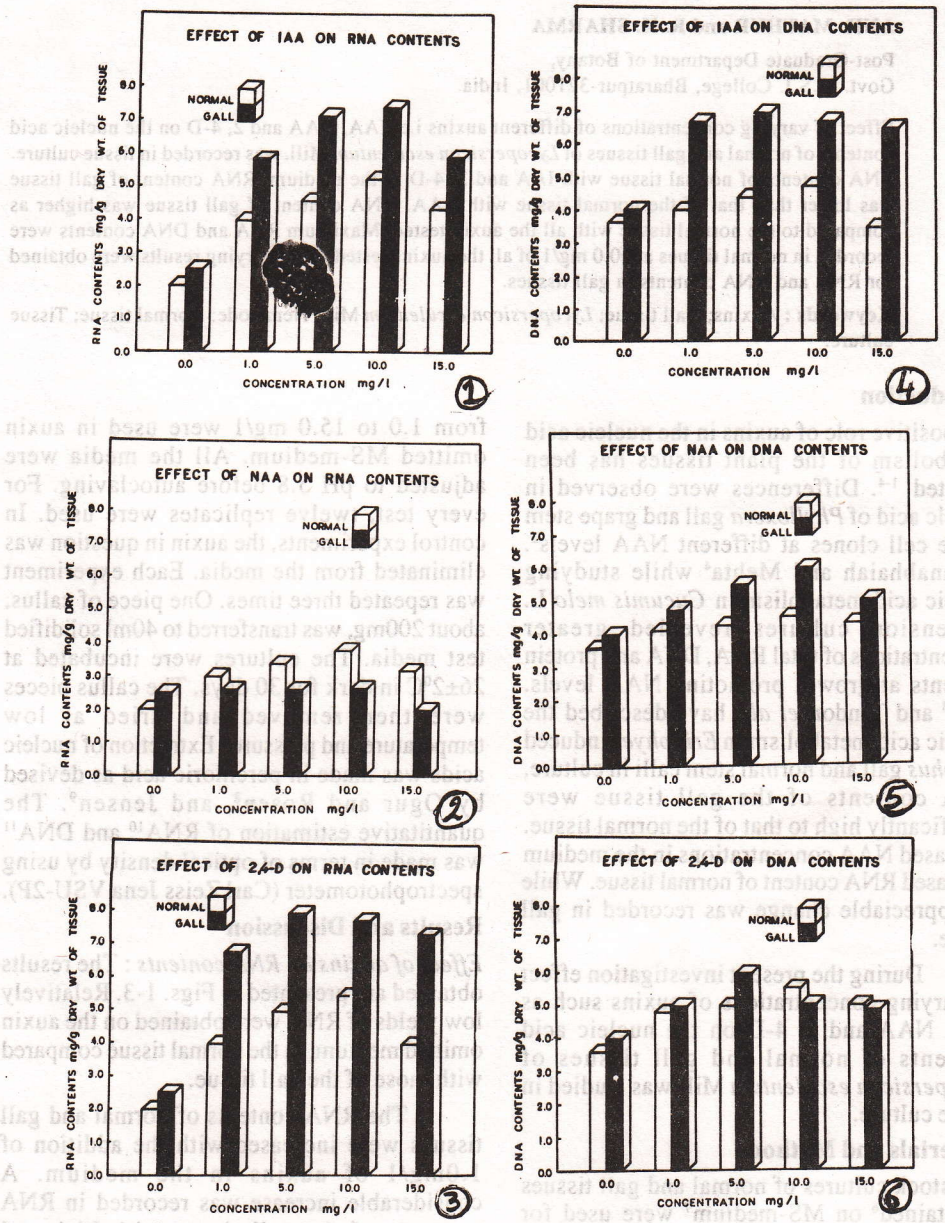

Fig. 1-3 : RNA contents of normal and gall tissues of *Lycopersicon esculentum* Mill. on MS-medium supplemented with different concentrations of IAA, NAA and 2, 4-D.

Fig. 4-6 : DNA contents of normal and gall tissues of Lycopersicon esculentum Mill on MS-medium supplemented with different concentrations of IAA, NAA and 2, 4-D.

compared to the gall tissues with IAA and 2, 4-D in the medium, while with NAA, the RNA content of gall tissue was lower than that of the normal tissue.

An increase in RNA contents of both the normal and gall tissues was recorded with increased concentrations of these auxins in the medium. The maximum RNA content of normal tissue was observed with 10.0mg/l of IAA, NAA and 2, 4-D while gall tissue showed maximum RNA content at 5.0 mg/l of 2, 4-D and 10.0 mg/l of IAA and NAA. RNA content of both the gall and normal tissues were decreased with 15.0 mg/l of all the auxins tested.

The IAA and 2, 4-D supported maximum RNA production in normal and gall tissue respectively. Interestingly it was observed the RNA contents of normal tissue was lower than the gall tissue with all the levels of IAA and 2, 4-D while reverse case was noticed with NAA in the medium.

Effect of auxins on DNA contents : The results presented in Figs. 4-6 show that the DNA content of gall tissue was higher than that of the normal tissue on the auxin omitted medium. Addition of low concentrations (1.0 mg/l) of IAA, NAA and 2, 4-D to the medium resulted in a considerable increase in the DNA contents of both normal and gall tissues. The DNA content of noraml tissues was found to be maximum at 10.0 mg/l of all these auxins. The gall tissue showed maximum DNA contents at 5.0 mg/l of IAA and 2, 4-D and 10.0 mg/l of NAA. Higher concentrations (above optimum) were found to be inhibitory for the production of DNA in both normal and gall tissues grown on different auxins.

The influence of auxin on protein synthesis has been studied extensively. In addition, as protein synthesis also involves RNA synthesis, the involvement of auxin and nucleic acids has been studied in detail[12, 13]. Several workers have observed that auxin induced growth is prevented by inhibitors of RNA and protein synthesis. At the same time auxin increases RNA and protein syntheisis [14, 15]. It has been suggested on several occassion that auxin binds to RNA, particularly t-RNA[16]. This has been used as the basis of a hypothesis for auxin action in as much as the IAA-t-RNA complex might form a protein chain initially complex[17]. Further fractionation has, however, shown that this complex is probably not an IAA-RNA complex[18, 19] but a complex with another compound not yet fully elucidated.

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