

## IN VITRO STUDIES ON NEMATODE INDUCED ROOT GALL AND NORMAL TISSUES OF *SOLANUM MELONGENA* : AUXIN-KINETIN INTERACTION

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Responses of cultured normal and nematode (*Meloidogyne incognita*) induced root gall tissues of *Solanum melongena* on different combinations of auxins and kinetin were studied. Effect of various concentrations (0.1-20.0 mg/l) of auxins viz. IAA and NAA, in combination with varying amounts of KN (0.02-2 mg/l) was observed on the growth of normal and gall tissues. In control experiments both normal and gall tissues failed to grow on auxin and kinetin omitted medium. Increasing levels of either of the two auxins, in presence of varying concentrations of kinetin, increased the fresh weight of both the tissues. IAA or NAA (10.0 mg/l) in combination with kinetin (0.1 mg/l) supported maximum growth of normal tissue while the gall tissue required 5.0 mg/l IAA+0.1 mg/l kinetin and 10.0 mg/l NAA+0.08 mg/l kinetin combination. However, NAA proved better for the growth of both normal and gall tissues.

**Keywords:** Auxin-kinetin interaction, *Solanum melongena*, Nematode.

### Introduction

Cultivation of plant tissues *in vitro* requires a number of growth factors, which play important role in the cell metabolism, predetermining the course of cell division and cell hypertrophy<sup>1,2</sup>. Interaction between auxins and cytokinins has been considered to be important in regulation of cellular differentiation, growth and morphogenesis<sup>3,4</sup>. Increasingly, attention has been focused on the role of growth regulators in the physiology of diseased plant<sup>5</sup>. Plant galls induced by viruses, bacteria and insects have been studied in detail but no much work has been done on the physiological aspect of nematode induced root galls. In continuation to our previous work<sup>6-8</sup> the present study is, therefore concerned with the auxin-kinetin interaction on the comparative growth of cultured nematode (*Meloidogyne incognita*) induced root gall and normal tissues of *Solanum melongena*.

### Material and Methods

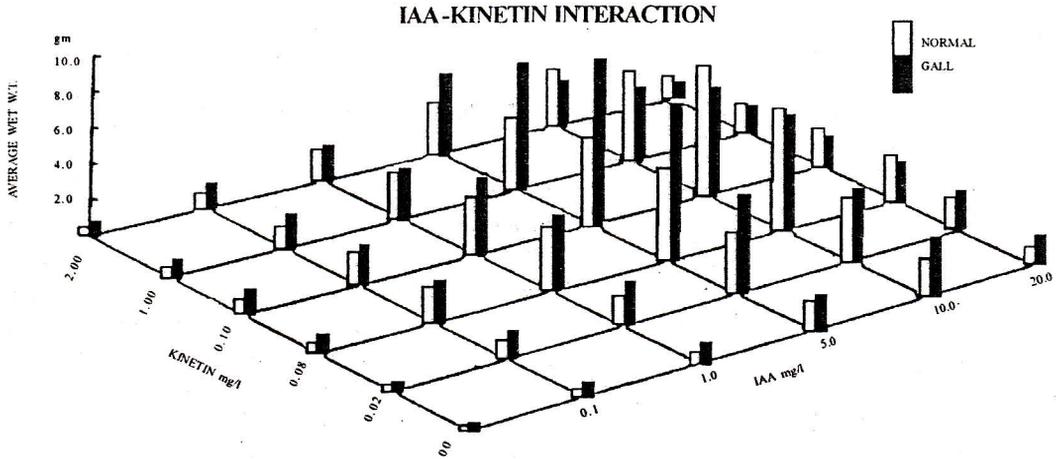
Normal and gall tissues of *Solanum melongena* were isolated from the normal root (hypocotyl) and nematode induced root galls, respectively. The tissues were maintained on MS-medium<sup>9</sup> supplemented with 10.0 mg/l NAA, 0.08 mg/l kinetin, 8.0 g/l agar and 30.0 g/l sucrose. For this particular experiment one tissue piece (about 200 mg) was grown on 40 ml of solidified MS-medium. The cultures were incubated in dark at 26±2° C and around 55% relative humidity.

The effect of auxin-kinetin interaction was observed on the growth of normal and gall tissues using varying concentrations (0.1-20 mg/l) of indole-3-acetic acid

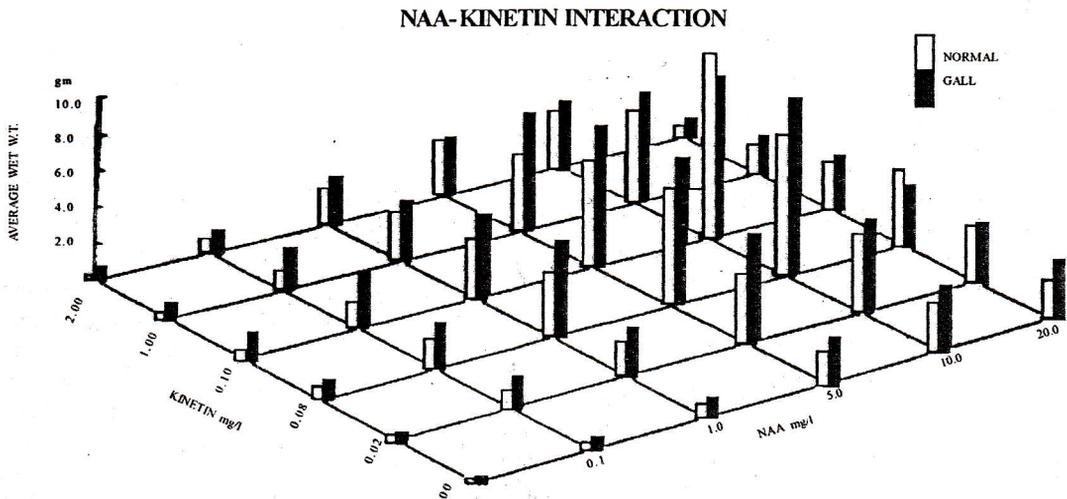
(IAA) or alpha-naphthalene acetic acid (NAA) were added in combination with various concentrations (0.02-2.0 mg/l) of kinetin in auxin-kinetin omitted MS-medium. The media were adjusted to pH 5.8 before autoclaving at 1.06 Kg/cm<sup>2</sup> and for 15 minutes. In control experiments the kinetin and auxin in question was eliminated. Each combination was replicated six times and each experiment was repeated thrice. After 30 days of growth, the tissues were harvested and the fresh weight was determined.

### Results and Discussion

Normal tissue almost failed to grow on the auxin (IAA and NAA) and Kinetin omitted medium while the gall tissue could grow, though poorly. This may reflect partial auxin and kinetin autotrophy of the gall tissue<sup>10</sup>. On the medium without kinetin, the increasing levels (1.0-10.0 mg/l) of IAA showed slight increase in growth of both the type of tissues with a maximum at 10.0 mg/l. Similarly kinetin alone could not support good growth of both the normal and gall tissues in the absence of IAA. The dependence of cytokinin action on other growth regulators is well established. The two substances, auxin and kinetin determines not only, whether the tissue grows, but also how it grows<sup>11</sup>. Various combinations of IAA and kinetin increased fresh weight of both the type of tissues. Considerable growth of normal and gall tissues was observed at higher levels of IAA (1.0-10.0 mg/l) in combination with kinetin (0.02-1.0 mg/l). The normal tissue showed maximum growth (6.9 g/flask) at 10.0 mg/l IAA with 0.1 mg/l kinetin, as compared to the gall tissue (8.9 g/flask) with 5.0 mg/l IAA+0.1 mg/l kinetin combination (Fig. 1). Yeoman<sup>12</sup> also reported, the kinetin



**Fig. 1.** Comparative growth of normal and gall tissues of *Solanum melongena* on M S-medium containing various combinations of IAA and Kinetin.



**Fig. 2.** Comparative growth of normal and gall tissues of *Solanum melongena* on M S-medium containing various combinations of NAA and Kinetin.

was particularly active as interactant with IAA or 2,4-D in tobacco pith cultures.

The combinations of varying concentrations of NAA and kinetin significantly increased the fresh weight of both normal and gall tissues as compared to the control experiments where the absence of kinetin/NAA reduced the growth of normal tissue to a great extent while the gall tissue showed some amount of growth. In *Datura innoxia* crown gall tissue Palni *et al.*<sup>13</sup> emphasized the role of cytokinins. Better growth of normal tissue was recorded on 1.0-10.0 mg/l NAA in combination with 0.02-1.0 mg/l Kinetin, with a maximum at 10.0 mg/l NAA+0.1 mg/l kinetin

(Fig. 2). While the gall tissue grew well on 0.1-20.0 mg/l NAA when combined with 0.02-1.0 mg/l kinetin, with optimal growth at 10.0 mg/l + 0.08 mg/l kinetin combination. In *Acer pseudoplatanus*<sup>14</sup> and *Nigella* tissues<sup>15</sup> absolute requirement for an auxin in culture medium have been reported. Higher concentrations (above optimum) of either of the two auxins tested when combined with higher levels of kinetin (2.0 mg/l) reduced the growth of both the normal and gall tissues.

In present studies NAA was proved to be a better auxin as compared to the IAA when it is combined with kinetin. Whereas the kinetin alone supported little growth,

however, as an interactant with IAA, or NAA was much beneficial for growth of both the normal and gall tissues. These observations effected variations in metabolic capabilities of the normal and gall tissues in culture.

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