UNKNOWN FACTOR IN REGULATION OF TOMATO FRUIT DEVELOPMENT

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Introduction

Tomato fruits grow *in vivo* mainly by cell divisions during the first week after anthesis, followed by 6-7 weeks of cell enlargement. Final fruit size is correlated with the number of seeds. Growth occurs in the pericarp tissue; also in the ovules, where rapid cell divisions start in the endosperm soon after fertilization, the embryo developing only after day 18 until maturity; and in the locular tissue that very early arises from the placenta and gradually surrounds the developing seeds.

Material and methods

In order to study the hormonal requirements for these three regions of cell division and elongation, fertilized ovaries were excised, sterilized during 10 min in 1.3% NaClO, and grown *in vitro* on a Murashige-Skoog medium without agar and containing 3% sucrose, 10 ppm oxytetracycline, and usually 10^{-6}M of different plant growth regulators (PGR's).

Results and conclusion

Mitotic activity in all 3 regions is immediately interrupted upon separation from the mother plant, growth only occurs by excessive cell elongation; ripening proceeds normally. No (combination of) PGR's can restore the cell divisions. However, grafting back onto the mother plant within 3 days leads to a nearly normal growth and development. Prolongation of the period of growth *in vitro* up to 14 days gradually reduces fruit size and number of viable seeds upon grafting back, the interruption of mitotic activity apparently being too long.

Ovary growth *in vitro* can be improved when a piece of cluster stalk, and particularly also a piece of stem remains attached to the explant. Fruit size may surpass 40 mm diameter, the number of vialable seeds exceeding 30. Such auxins as IAA and NAA, and gibberellins GA_3 and GA_{4+7}, stimulate pericarp growth even more but completely suppress the development of ovules and locular tissue, resulting in empty, puffy fruits. The cytokinins, 2iP and zeatin, stimulate the development of locular tissue but inhibit that of pericarp and ovules, so that small fruits with few seeds result.

No combination of PGR's was able to restore normal fruit development *in vitro*, either added to the medium or injected into the fruitlet. Also rooting of fruitlets had no effect.

It is concluded that the fertilized tomato ovary requires (a) factor(s) from the mother plant, possibly from the leaves, which is essential for cell division in pericarp, placenta, and ovules, and which cannot be replaced by cytokinin, auxin, and/or gibberellin.

Reference

Varga, A. and J. Bruinsma, 1976. Z. Pflanzenphysiol. 80: 95-104.

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Growth regulators in fruit production