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Organogenesis from Long-term Callus Culture from Hypocotyl in *Lycopersicon esculentum* L.

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Organogenesis from callus culture of tomato has been reported only by Norton et al (1954) and Greshoff & Doy (1972). The former obtained complete plantlet from callus culture of root in L. *peruvianum* and the latter from haploid callus culture of anther culture in L. *esculentum*. In this paper, an instance is reported on shoot and root formation from long-term callus culture from hypocotyl in L. *esculentum*.

One cultivar of tomato, Tōkō K, was used in this study. The solid medium of Murashige & Skoog (1962) was used for basal medium. The plant growth substances added to the medium were the auxin α-naphthaleneacetic acid (NAA), the cytokinin 6-benzyladenine (BA) and the anti-auxin 2, 3, 5-triiodobenzoic acid (TIBA). All media were autoclaved for 15 min. at 120°C with 1.2 kg/cm² pressure. The process of culture was arbitrarily divided into three steps : callus induction, callus maintenance and organ induction. The same basal medium was used throughout and the different levels of the concentration of the plant growth substances were used for each of these steps. In the culture of callus induction from hypocotyl (1 cm), the medium of 1 ppm NAA and 1 ppm BA was used and the culture continued for about one month. Subsequently, the medium of 5 ppm BA and 1 ppm TIBA was utilized in the culture of callus maintenance which continued for about three months. All combinations of 0.0, 0.1, 0.5, 1.0, 5.0, 10.0 ppm NAA and 0.0, 0.1, 1.0, 5.0, 10.0 ppm BA were designed in the culture of organ induction. Three pieces of callus tissues planted onto the medium of organ induction in a 100 ml Erlenmeyer flask were excised from the parts with chlorophyll in the callus tissues and were about 50 mg fresh weight per callus. All cultures in the three steps were incubated at about 25°C and with a 16 hr. photoperiod (about 2000 lux and an 8 hr. dark period).

The results of callus growth are presented in Table 1. Superior enlargement of callus tissue was observed in the combinations of 0.1, 0.5, 1.0 ppm NAA and 0.1, 1.0 ppm BA. The highest fresh weight was recorded at the combination of 1.0 ppm NAA and 1.0 ppm BA. The results of shoot and root formation are given in Table 2. Root formation was observed

Table 1. Effect of NAA- BA interaction on fresh weight (g) of callus in culture for organ induction

		BA (ppm)				
		0.0	0.1	1.0	5.0	10.0
NAA (ppm)	0.0	0.40	0.30	0.39	0.24	0.17
	0.1	0.63	0.54	1.87	0.58	0.56
	0.5	0.63	1.22	2.17	0.27	0.59
	1.0	0.38	0.97	2.85	0.62	0.34
	5.0	0.84	0.58	0.43	0.28	0.41
	10.0	0.59	0.61	0.67	0.32	*

* : Missing data.

Table 2. Effect of NAA- BA interaction on shoot and root formation from callus in culture of organ induction.

		BA (ppm)									
		0.0		0.1		1.0		5.0		10.0	
		R	S	R	S	R	S	R	S	R	S
NAA (ppm)	0.0	+	4	−	3	−	1	−	3	−	3
	0.1	+	7	−	2	−	2	−	4	−	5
	0.5	+	3	−	0	−	3	−	2	−	4
	1.0	−	0	−	0	−	0	−	0	−	1
	5.0	−	0	−	0	−	0	−	0	−	0
	10.0	−	2	−	0	−	1	−	1	*	*

* : Missing data.

R : Root formation. S : Shoot formation. Numeral shows the number of shoot-like organs formed on 3 pieces of callus.

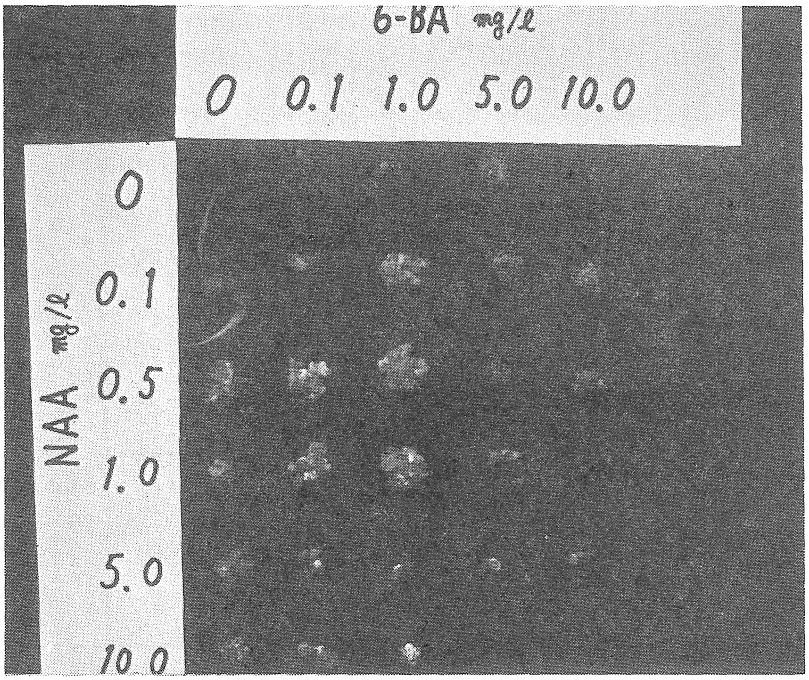

Fig. 1. Effect of NAA-BA interaction on callus growth and organ induction.

only at three levels of NAA concentration (0.0, 0.1, 0.5 ppm) without addition of BA. Shoot or shoot-like organs were much more formed in the combinations with relatively higher concentration of BA than NAA. This would agree with the result first pointed out by Skoog & Miller (1957) that root and shoot initiation is basically regulated by interactions between two growth substances, auxin and cytokinin. In this experiment, most remarkable observation was a best formation of shoot and a development of complete plantlets from long-term callus culture at a low level of NAA concentration in the absence of BA, as shown in Fig. 1. This fact may be explained by either a preceding of embryoid induction during the culture of callus maintenance or a hypothesis (Nishi et al, 1973) that auxin is the only exogenous factor which determines dedifferentiation and redifferentiation in plant tissue cultured in vitro.

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トマトの胚軸由来・長期培養カルスからの器官分化

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Murashige および Skoog (1962) の基本培地に NAA と BA を 1 mg/l づつ加えた寒天培地でトマトの幼苗胚軸からカルスを誘導させ，つぎに，同じ基本培地に 5 mg/l BA と 1 mg/l TIBA を加えた寒天培地に移して3ケ月間カルスを継代培養し，さらに，再分化培地へ移したところ，BA 無添加の NAA 低濃度培地で正常な茎葉と根の分化がみられた．