Improved Flowering of Cotyledon-derived Shoots of 'Burpless Hybrid' Cucumber in Vitro

Karim Al-Juboory¹, Robert M. Skirvin, and David J. Williams
Department of Horticulture, University of Illinois, Urbana, IL 61801

Additional index words. *Cucumis sativus*, flower induction, growth regulators, sex expression, tissue culture, adventitious

The ability of cucumber (*Cucumis sativus* L.) cotyledons to develop flowers in vitro was reported by Msikita et al. (1990). The majority of those flowers in culture were staminate (up to 48%); a few pistillate flowers (up to 12%) were obtained through media manipulation. In this paper, we report further investigations concerning the control of sex expression among adventitious cotyledon-derived cucumber flowers.

Cotyledon explants (without embryonic axes) of 'Burpless Hybrid' cucumber were prepared and disinfested as described by Msikita et al. (1990). Explants were transferred to modified Murashige and Skoog (MS) medium (Murashige and Skoog, 1962) supplemented with 20 combinations of 6-benzylaminopurine (BA; 0.1, 0.2, 0.3, or 0.5 mg-liter⁻¹) and naphthaleneacetic acid (NAA; 1.0, 2.0, 3.0, 4.0, or 5.0 mg-liter⁻¹) (Table 1). Staba (1969) vitamins were added before autoclaving (at 106 kPa and 120C for 15 min). The pH was adjusted to 5.7, and agar (7 g-liter⁻¹) was added. Cultures were grown for 2 months at 25C under cool-white fluorescent tubes (40 μ mol-m⁻².s⁻¹) with a 16-h photoperiod. The experiment consisted of 24 single-explant replicates per treatment arranged in a 5 $\times$ 4 factorial. Data were analyzed using the General Linear Model procedure of SAS Inst., Cary, N.C.

Shoots regenerated on all media supplemented with NAA at ³ 3.0 mg-liter⁻¹ (Table 1), but none regenerated at lower concentrations of NAA (data not presented). Adventitious flower development (Fig. 1) was observed only on media supplemented with NAA at 3.0 mg-liter⁻¹ and the three highest

concentrations of BA. BA concentration significantly interacted with NAA in respect to shoot and flower formation. The percentage of cultures with adventitious pistillate flowers reported in the present study is far higher than that reported earlier by Msikita et al. (1990) (i.e., 67% vs. 12%, respectively). The higher percentage of staminate flowers was about the same (i.e., 42% vs. 48%, respectively). Thus, sex expression in cucumber can be regulated in vitro through media manipulation. This information may be useful to researchers interested in studying flower induction and development in vitro.

Literature Cited

- Msikita, W., R.M. Skirvin, J.A. Juvik, W.E. Splittstoesser, and N. Ali. 1990. Regeneration and flowering in vitro of 'Burpless Hybrid' cucumber cultured from excised seed. *HortScience* 25:474-477.
Murashige, T. and F. Skoog. 1962. A revised me-

Fig. 1. A pistillate flower that has developed adventitiously on a cotyledon of 'Burpless Hybrid' cucumber in vitro.

dium for rapid growth and bioassays with tobacco tissue cultures. *Physiol. Plant.* 15:474-497.

- Staba, J.E. 1969. Plant tissue culture as a technique for the phytochemist, p. 75-106. In: M.K. Seikel and V.C. Runeckles (eds.). *Recent advances in phytochemistry*, vol. 2. Appleton Century Crofts, New York.

Table 1. The effect of BA and NAA on the development of adventitious shoots and flowers from cotyledons of 'Burpless Hybrid' cucumber in vitro.¹

NAA mg-liter ⁻¹	BA	Percentage of cultures with shoot regeneration	Percentage of cultures with flowers	
			Pistillate	Staminate
3.0	0.1	2.0	0.0	0.0
	0.2	12.0	67.0	42.0
	0.3	8.0	54.0	32.0
	0.5	14.1	63.0	34.0
4.0	0.1	8.0	0.0	0.0
	0.2	6.0	0.0	0.0
	0.3	6.1	0.0	0.0
	0.5	20.0	0.0	0.0
5.0	0.1	12.3	0.0	0.0
	0.2	5.7	0.0	0.0
	0.3	18.1	0.0	0.0
	0.5	16.4	0.0	0.0
Significance				
NAA		*	*	*
BA		*	*	*
NAA $\times$ BA		*	*	*

¹No shoots or flowers formed at 1.0 or 2.0 mg NAA/liter in combination with BA (data not shown).

*Significant at $P = 0.05$.

Received for publication 27 Sept. 1990. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

¹Current address: Dept. of Horticulture, College of Agriculture, Univ. of Baghdad, Abu-Ghraib, Baghdad, Iraq.