

ANTHER CULTURE OF SUNFLOWER CULTIVARS

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SUMMARY

Anthers of six sunflower cultivars in the stage of uninucleate microspores were placed on six different culture media. Media were supplemented with basic MS (Murashige and Skoog 1962) macro and micro salts, 30 g l⁻¹ sucrose, 0.3% gelrite, pH 5.7, while composition of vitamins varied. Two media were supplemented with 1 mg l⁻¹ AgNO₃, and other two with 0.1% polyvinylpyrrolidone (PVP) (Zhong et al. 1995). Media were supplemented either with 2.2 mg l⁻¹ BAP and 0.01 mg l⁻¹ NAA or with 0.5 mg l⁻¹ each of BAP and NAA. Anthers were cultured in the dark at 30°C. In contrast to PVP, silver nitrate was found to have a positive effect on intensity of organogenesis and somatic embryogenesis of sunflower anthers.

INTRODUCTION

For commercial hybrid production, homozygous lines are of great importance. Anther and microspore cultures allow acceleration of breeding programmes by providing homozygous doubled haploids within a comparatively short time.

Anther culture in sunflower still needs considerable improvement, as sunflower proved to be very recalcitrant in anther culture (Mezzarobba and Jonard 1986) and the regeneration rates are very low.

PVP was found to have a positive effect on regeneration capacity of sunflower anthers (Zhong et al. 1995), while silver nitrate had the same effect on regeneration capacity of some other sunflower tissues (Chraibi et al. 1991). The effect of these two components on organogenesis and somatic embryogenesis on anthers of sunflower cultivars is described in this paper.

MATERIAL AND METHODS

Anthers of six sunflower cultivars in the stage of uninucleate microspores were placed on six different culture media. Media were supplemented with basic MS (Murashige and Skoog 1962) macro and micro salts, 30 g l⁻¹ sucrose, 0.3% gelrite, pH 5.7, while composition of vitamins varied. Two media were supplemented with 1 mg l⁻¹ AgNO₃, and other two with 0.1% polyvinylpyrrolidone (PVP) (Zhong et al. 1995) (Table 1). Media were supplemented either with 2.2 mg l⁻¹ BAP and 0.01 mg l⁻¹ NAA or with 0.5 mg l⁻¹ each of BAP and NAA. Anthers were cultured in the dark at 30°C.

Table 1. Composition of media used in the experiment

Medium	BAP (mg l ⁻¹)	NAA (mg l ⁻¹)	AgNO ₃ (mg l ⁻¹)	PVP (%)
KM	0.5	0.5	1.0	-
R	2.2	0.01	1.0	-
N	0.5	0.5	-	-
N'	2.2	0.01	-	-
Z	0.5	0.5	-	0.1
Z'	2.2	0.01	-	0.1

Intensity of organogenesis and somatic embryogenesis was observed in the second week of culture.

RESULTS AND DISCUSSION

Culture of anthers on the media with 0.5 mg l^{-1} each of BAP and NAA favored callus formation (Table 2).

Table 2. Intensity of organogenesis and somatic embryogenesis of six sunflower cultivars depending on culture medium. Total number of anthers placed on one medium was 60 per genotype. Intensities of organogenesis and somatic embryogenesis are given in percentages of anthers with calli or somatic embryos.

Medium	KM		R		N		N'		Z		Z'	
Cultivar	Calli	Som. e.	Calli	Som. e.	Calli	Som. e.	Calli	Som. e.	Calli	Som. e.	Calli	Som. e.
1	90.0	20.0	10.0	5.0	86.7	15.0	76.7	11.7	0.0	0.0	0.0	8.3
2	81.7	6.7	40.0	0.0	65.0	3.3	53.3	0.0	0.0	0.0	6.7	0.0
3	60.0	0.0	53.3	1.7	75.0	6.7	48.3	3.3	18.3	1.7	10.0	0.0
4	68.3	51.7	55.0	5.0	63.3	26.7	60.0	16.7	3.3	5.0	20.0	0.0
5	50.0	15.0	43.3	25.0	26.7	3.3	28.3	10.0	0.0	6.7	11.7	5.0
6	88.3	10.0	40.0	15.0	71.7	0.0	48.3	10.0	33.3	6.7	8.3	0.0

Increased concentration of BAP (2.2 mg l^{-1}) in the medium did not lead to increase in somatic embryogenesis on anthers. This is in contrast with the results of Krasnyanski et al. (1992) and Trabace et al. (1995) who found that BAP in this concentration promotes somatic embryogenesis on calli induced on leaves of *H. giganteus* and calli regenerated from protoplasts of cultivated sunflower.

Both organogenesis and somatic embryogenesis were very poor on medium supplemented with PVP, which is in contrast with the results obtained by Zhong et al. (1995). Best results were obtained on the media supplemented with silver nitrate, which promoted both somatic embryogenesis and organogenesis. Positive effect of silver nitrate on regeneration and development of sunflower *in vitro* was observed by other authors (Chraibi et

al. 1991, Krasnyanski and Menczel 1993) and is thought to be the consequence of inhibition of ethylene activity by silver ions (Beyer 1976).

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