Effect of Floret Whorls and Culture Media on Anther Culture in Sunflower

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Abstract

The main aim of this research was to investigate the effect of floret whorls and culture media on haploid plant production via anther culture in sunflower. Three outermost unopened disk florets of the flower head at the R5.1 reproductive stage of three sunflower varieties including S473, Pacific 22 and Prado Red were used in this study. For haploid plant production via anther culture, anthers were cultured on various callus induction media for 30 days, and the anther-derived embryogenic calli were subsequently induced on shoot induction medium for 14 days. Then, the embryogenic calli were immerged in 100 and 300 μM of colchicine solution for 3 and 6 hours for chromosome doubling. The polyploidy level was determined with flow cytometry. It was found that callus growth parameters (callus size, fresh weight, and dry weight), the percentage of callus and the percentage of embryogenic calli were significantly affected by medium types. MS medium supplemented with 2 mg/l NAA, 1 mg/l BAP and 10% (v/v) CW induced the highest percentage of calli for all three varieties with the highest frequency of 65.48%. For shoot induction study, embryogenic calli gave the best response on MS medium supplemented with 2 mg/l BAP, 500 mg/l CH and 0.2% activated charcoal. Some embryogenic calli could develop into shoot or root but not a complete plant. Colchicine concentrations and treatment durations had a significant effect on the survival rate and growth of callus. Optimization of anther culture with regard to high efficiency shoot regeneration needs to be further investigated.

Key words: sunflower, microspore, colchicine, *in vitro* regeneration, anther

轮生花和培养基对向日葵花药培养的影响

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摘　要

本研究的主要目的是通过向日葵花药培养，探究轮生花和培养基对单倍体植株产生的影响。试验选用S473、Pacific 22 和 Prado Red 三个向日葵品种，在R5.1生殖生长期选花盘最外面未开放的管状花为材料。通过花药培养增加单倍体植株，将花药在不同的愈伤组织诱导培养基上培养30天，随后由花药得到的的胚性愈伤组织在芽诱导培养基上培养14天。之后将胚性愈伤组织在 100和300 μM的秋水仙素溶液中分别浸泡3小时和6小时，进行染色体加倍。用流式细胞术测定染色体倍数。结果表明培养基类型对愈伤组织的生长参数（愈伤组织大小、鲜重和干重），愈伤组织的百分比和胚性愈伤组织的百分比具有显著影响。MS培养基中添加2mg/lNAA，1mg/lBAP和10%（v/v）CW对三个品种愈伤组织的诱导百分比最高，为65.48%。在芽诱导试验中，胚性愈伤组织在添加2mg/lBAP/500mg/l CH和0.2％活性炭的MS培养基上表现最佳。一些胚性愈伤组织可以发育成芽或根，但不能发育成完整的植株。秋水仙素的浓度和处理时间对愈伤组织的存活率和生长具有显著影响。关于花药培养对高效的芽的再生和优化还需进一步研究。

关键词：向日葵，花粉粒，秋水仙素，离体再生，花药