

**PRODUCTION OF PURE LINES IN BROCCOLI
AND CABBAGE USING BREEDING METHODS
AND BIOTECHNOLOGY**

By

MARWA OMAR ARAFEH

B.Sc. Agric. Sci., Fac. Agric., Al Baath Univ., Syria, 2000

M.Sc. Agric. Sci., (Vegetable Crops), Fac. Agric., Cairo Univ., Egypt, 2006

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Approval Committee

Dr. MOHAMED IMAM RAJAB.....
Professor of Vegetable Crops, Fac. Agric., Ain Shams University

Dr. AHMED ABDEL-MONEIM HASSAN.....
Professor of Vegetable Crops, Fac. Agric., Cairo University

Dr. MOHAMED ABD EL-MAJEED BADAWI
Professor of Vegetable Crops, Fac. Agric., Cairo University

Date: 5 / 1 / 2010

SUPERVISION SHEET

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SUPERVISION COMMITTEE

Dr. MOHAMED ABD EL-MAJEED BADAWI
Professor of Vegetable Crops, Fac. Agric., Cairo University

Dr. EL-MAHDY IBRAHIM METWALLY
Professor of Vegetable Crops, Fac. Agric., Kafr EL-Shikh University

Dr. SAHAR SAMYH TAHA
Assistant Professor of Vegetable Crops, Fac. Agric., Cairo University

Name of Candidate: Marwa Omar Arafeh	Degree: Ph.D.
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Supervisors: Dr. Mohamed Abd El-Majed Badawi Dr. El- Mahdy Ibrahim Ali Metwally Dr. Sahar Sameh Taha Mohamed	
Department: Vegetable Crops	Approval: 5 / 1 / 2010

ABSTRACT

Microspore culture is a very important and useful tool in plant breeding for haploid production and has been developed for many years. Broccoli (*Brassica. oleracea* var. *italica*) and cabbage (*Brassica. oleracea* var. *capitata*) are important cole vegetable crops; conditions for reliable induction of embryogenesis and plantlets from isolated microspores were studied in eight genotypes of broccoli (Hanin, Conde F₁, Baladi, Dellstare F₁, Marathon F₁, Parthenon F₁, Naxos F₁ and Tiburom) and four genotypes of cabbage (Sabayni , Baladi ,Bronzwic and Nadin F₁). The optimum timing for microspore culture was confirmed to be during the mid to late uninucleate stage. For such purpose, four laboratory and one field trials were conducted at the Agric. Exp. Farm, Fac. Agric., Cairo Univ., Giza, Egypt from 2006/2007 to 2008/2009 growing seasons. Broccoli and cabbage genotypes were responsive significantly to embryogenesis and plantlets regeneration. Embryo and plantlets yield were significantly increased in broccoli genotypes by incubation at 32.5 °C for 24 hours, than that incubated at 32.5 °C for 48 hours or 35.5 °C for 24 or 48 hours, while the best temperature-time treatment in cabbage genotypes embryo and plantlets yield was at 32.5 °C for 48 hours . The use of the NLN-13 medium yielded greater number of embryos than ½NLN-13 and B5 media. Parthenon F₁ and Marathon F₁ from broccoli and Nadin F₁ from cabbage genotypes presented a better response to the NLN-13. Microspore culture density on embryo production was evaluated in selected genotypes, microspore plating density was critical for efficient embryonic induction and development, with an optimal plating density of 4×10⁴ microspore/ml. which obtained 237.33 embryos/dish and 23.33 plantlets/dish from Parthenon F₁, and 171.00 embryos/dish and 52.67 plantlets/dish from Marathon F₁, and for cabbage genotype obtained 23.667 embryo/dish and 14.67 plantlets/dish from Sabayni and 54.33 embryo /dish and 20.00 plantlets/dish from Nadin F₁ at density 3×10⁴microspore /ml. Activated charcoal (0.2 ml) was added to the liquid NLN-13 medium, embryo yield was significantly higher than those cultures without activated charcoal. Regeneration plantlets developed to double haploid plants as new pure lines, which evaluated for field horticultural characters performance.

Key words: broccoli, cabbage, microspore culture, embryogenesis, double haploid, NLN medium, microspore density, pure line.

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تستخدم تقنية زراعة حبوب اللقاح لإنتاج نباتات أحادية متضاعفة كوسيلة مهمة و فعالة في مجال تربية النبات، يعتبر البروكولي و الكرنب من محاصيل الخضر الهامة. و قد تمت دراسة العوامل المؤثرة على تكوين أجنة أحادية متضاعفة من زراعة حبوب اللقاح و إمكانية إنتاج نباتات أحادية متضاعفة في ثمانية طرز وراثية من البروكولي ، Hanin, Conde F₁, Baladi Dellstare F₁ , Tiburom Marathon F₁, Parthenon F₁,Naxos F₁ ، أربعة طرز وراثية من الكرنب Sabayni , Baladi , Bronzvic and Nadin F₁ ، كانت أفضل مرحلة لاستخلاص حبوب اللقاح في مرحلة حبة اللقاح وحيدة النواة .استجابت كل من الطرز الوراثية المختلفة للبروكولي و الكرنب بشكل معنوي لتكوين الأجنة و إعادة تشكيل النباتات، كما ازداد تكوين الأجنة معنوياً عند التحضين على درجة حرارة ٣٢.٥ م° لمدة ٢٤ ساعة بالمقارنة بالتحضين على حرارة ٣٢.٥ م° لمدة ٤٨ ساعة أو ٣٥.٥ م° لمدة ٢٤ ساعة مع استخدام الفحم النشط في وسط الزراعة. بينما كانت أفضل استجابة للزراعة في الوسط NLN-13 وعند كثافة حبوب لقاح ٤×١٠ حبة لقاح /مل، كانت أفضل النتائج و هي ٢٣٧.٣٣ جنين/طبق و ٢٣.٣٣ نبات/طبق من الطراز الوراثي Parthenon F₁ من البروكولي و من الكرنب كانت أفضل النتائج من الطراز الوراثي Nadin F₁ ٥٤.٣٣ جنين/طبق و ٢٠.٠٠ نبات/طبق. تم إجراء الدراسة السيتولوجية للسلاسل الناتجة و اختيار الأحادية المتضاعفة منها كسلالات جديدة ، كما تم إجراء تقييم للصفات البستانية للسلاسل الجديدة في الحقل بغية اختيار السلالات ذات الصفات الأفضل و استخدامها في برامج التربية.

الكلمات الدالة : بروكولي ، كرنب ، زراعة حبوب اللقاح ، أحادية متضاعفة ، تكوين الأجنة ، وسط الزراعة NLN ، كثافة حبوب اللقاح ، سلالة نقية.