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

By

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

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APPROVAL SHEET

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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 F_1, Baladi, Dellstare F_1, Marathon F_1, Parthenon F_1, Naxos F_1 and Tiburom) and four genotypes of cabbage (Sabayni , Baladi ,Bronzwic and Nadin F_1). 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 F_1 and Marathon F_1 from broccoli and Nadin F_1 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 4×10^4 microspore/ml. which obtained 237.33 embryos/dish and 23.33 plantlets/dish from Parthenon F_1, 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 F_1 at density 3×10^4microspore /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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إنتاج سلالات نقية من البروكولي و الكرنب باستخدام طرق التربية و التقنية الحيوية

Production of Pure Lines in Broccoli and Cabbage Using Breeding Methods and Biotechnology

الاسم	القسم	الكلية	الجامعة
١- الأستاذ الدكتور/ محمد عبد المجيد بدوي	الخضر	الزراعة	القاهرة
٢- الأستاذ الدكتور/ المهدي ابراهيم متولي	الخضر	الزراعة	كفر الشيخ
٣- الأستاذ الدكتور/ سحر سميح طه	الخضر	الزراعة	القاهرة

(Abstract) _____ -

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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 F_1, Baladi Dellstare F_1 Marathon F_1, Parthenon F_1,Naxos F_1 , Tiburom و أربعة طرز وراثية من الكرنب Sabayni , Baladi , Bronzwic and Nadin F_1 ، 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 مْلمدة ٢٤ ساعة بالمقارنة بالتحضين على حرارة ٣٢.٥ مْ لمدة ٤٨ ساعة أو ٣٥.٥ مْلمدة ٢٤ ساعة مع استخدام الفحم النشط في وسط الزراعة. بينما كانت أفضل استجابة للزراعة في الوسط NLN-13 وعند كثافة حبوب لقاح ١٠×٤ ٤حبة لقاح /مل، كانت أفضل النتائج و هي ٢٣٧.٣٣ جنين/طبق و ٢٣.٣٣ نبات/طبق من الطراز الوراثي Parthenon F_1 من البروكولي و من الكرنب كانت أفضل النتائج من الطراز الوراثي Nadin F_1 ٥٤.٣٣ جنين/طبق و ٢٠.٠٠ نبات/طبق. تم إجراء الدراسة السيتولوجية للسلالات الناتجة و اختيار الأحادية المتضاعفة منها كسلالات جديدة ، كما تم اجراء تقييم للصفات البستانية للسلالات 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.