

دراسات على إنتاج هجن فراولة محلية

رسالة مقدمة من

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ماجستير علوم الزراعية (خضر) ، جامعة عين شمس ، 2009

للحصول على

**درجة دكتور فلسفة في العلوم الزراعية
(خضر)**

قسم البساتين

كلية الزراعة

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(خضر)**

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STUDIES ON PRODUCTION OF LOCAL STRAWBERRY HYBRIDS

By

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B.Sc. Agric. Sc. (Horticulture), Ain Shams University, 2004

M.Sc. Agric. Sc. (Vegetable Crops), Ain Shams University, 2009

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INTRODUCTION

Strawberry is a member of the family Rosaceae, subfamily Rosoideae, and genus *Fragaria*. *Fragaria* species can be grouped by ploidy: there are nine diploids, two tetraploids, one hexaploid, and four octoploids. The Four octoploids ($2n=56$) are known: *F. iturupensis* Schlect. *F. chiloensis* (L.) Duch. *F. virginiana* Duch., and *F. ×ananassa* Duch. The cultivated varieties of commercial strawberries are almost all octoploids and are derived chiefly from the octoploids *F. chiloensis* and *F. virginiana*, usually recognized as *F. x ananassa*.

In Egypt, strawberry is of the most important horticultural crops, this tended Egypt into the development of production at high rates and spread cultivated in many regions of the Qaliubiya, Esmailia and Elbehera governorates. Where its acreage reached about 16216 feddan in 2012, yielding about 21.151 tons⁽¹⁾ (Statistical year book, 2012).

The crop is vegetatively propagated but using the frozen transplants, a method now prevailing in Egypt, which is not suitable for export to the European countries for the delay in production until the first of March, which is near the end of the export season and low prices. This led the producer attention to increase the amount of strawberry production during the period from November to February, which can be obtained at the highest price and to avoid competition with other countries. Therefore, the trend towards cultivation of early cultivars and following the way of fresh transplants allow production at the beginning of export season during the month of November and thus increasing in export of fresh strawberries

Strawberries are grown throughout Egypt. The common cultivars obtained in California are quite satisfactory, but there are no local

⁽¹⁾ Central Administration for Agricultural Economics
General Administration for Agricultural Statistics, Fao, Egypt, 2012.

INTRODUCTION

cultivars or types as well as no vegetative production for the new American cultivars could be done because of the breeder rights. Genetic improvement for the first 200 years was largely from the efforts of amateur private breeders. Strawberry cultivars followed heterozygous homogenous as well as cross pollination, so any seed produced of hybridization considered line The object of hybridization is to combine desirable genes found in two or more different varieties and to produce pure-breeding progeny superior in many respects to the parental types.

The breeding programs aimed to improve plant architecture, taste, flavour, and time of ripening, vitamins, potassium and fiber, fruit appearance and firmness. Success in breeding using hybridization depends to a great extent on the correct choice of parents for crossing.

In this thesis, we aimed to evaluate adaptation performance especially average yield/plant, fruit weight and some phonological plant characteristics such as plant length, number of leaves and leaf area to produce new Egyptian hybrid of strawberry. The new hybrids will be produced through hybridization and reciprocal hybridization among three cultivars, namely: Sweet Charli, Camarosa and Festival.

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2. REVIEW OF LETTERATURE

2.1. Seed germination:

Propagation of strawberry plants from seed is not a common practice for commercial production, but is usually used for obtaining new cultivars. One of the difficult problems that face strawberry breeding is seed germination.

2.1.1. Seed germination percentage:

El Shimi (1978) reported that the germination of the hybrid seeds ranged mostly from 58 to 94%.

Melvill *et al.* (1980) found that seed germination of nine strawberry progenies were significantly differed among them and ranged from 53% to 79%.

Miller and Chandler (1990) developed a protocol for overcoming germination failures, thus rescuing more gene combinations and generating numerous plantlets from a single embryo through continuous shoot proliferation. Achenes were surface sterilized and cultured on M.S. medium. The results showed that seed germination ranging from 40% to 97% depending on genotype and achene treatments.

El Miniawy (1991) mentioned that seed germination ranged from 28% to 77% due to different genotypes used.

Esmail (2003) used two different media. Seed germination percentage on M.S. medium ranged from 10.4 to 79.7% and on Damiano medium ranged from 12.3 to 64.1%. The highest value was recorded form *Fragaria chiloensis* X *Fragaria virginiana* while the lowest value was observed for the *Fragaria chiloensis* sp.

Marta *et al.* (2004) made crosses between *F. vesca* and *F. x ananassa* and produced 35 hybrid achenes but only 14% germinated.

Ibrahim (2008) reported that the germination of the cultivar achenes ranged from 25.52 to 94.17%.

2.1.2. Speed of germination:

Seeds of the different species and cultivars of strawberry vary greatly in their speed of germination.

Darrow (1927) mentioned that seeds of *F. virginiana* germinated more rapidly than any other species, while seeds of *F. chiloensis* did not germinate before two or even four weeks.

El Shimi (1978) found significant difference between speed germination of Balady cultivar and those of Tioga and Fresno.

El Miniawy (1991) indicated that great differences were detected among the tested genotypes in speed of seed germination. Generally Chandler, Tufts and Parker germinated more rapidly than other cultivars. Intermediate germination speed was recorded for Douglas, Pajaro, Sequoia and Balady while the Sequoia and Selva were the latest cultivars regarding their speed of germination.

Miller et al. (1992) enhanced strawberry seed germination through *in vitro* and decreased the time to germinating achenes by cutting surface sterilized achenes across the embryo axis then placing the shoot apex radical – containing sections on semi-solid Murashige and Skoog medium. They reported that nearly 100% of the achenes from freshly harvested red-ripe strawberries germinated after cutting and culture the achenes.

Esmail (2003) reported that seeds of *Fragaria virginiana* and some produced hybrids germinated more rapidly than the other genotypes.

2.2. Vegetative growth characters

It is well known that strawberry cultivars showed great difference regarding their vegetative growth characteristics.

2.2.1. Plant length:

Ragab *et al.* (2000) mentioned that Rosa-linda was the tallest cultivar as compared with Chandler, Camarosa and Sweet Charlie.

Mohamed *et al.* (2002) found significant differences in some strawberry strains regarding plant length.

Esmail (2003) cleared that the highest average of plant length was 16.03 cm, and the lowest value was 10.43 cm, these differences in the lengths are due to genetic factor.

Abd Ellatif *et al.* (2009) found that the highest values of plant length were obtained from Camarosa and Vantana cultivars.

El Sayed (2009) indicated that great differences were detected among the tested genotypes in plant length. Festival recorded 15.75 cm, Camarosa gave 15.25 cm and Sweet Charlie recorded 15.05 cm of plant length.

2.2.2. Number of leaves/plant:

El Shimi (1978) found that F1 hybrids were intermediate between their parents and no heterotic effect was noticed in all F1 hybrids in number of leaves/plant.

El Miniawy (1991) showed that there were significant differences among 9 strawberry cultivars in their number of leaves/plant. Selva had number of leaves equal to both Tufts and Pajaro, lower than Douglas and Sequoia and higher than Chandler.