# *Physiological studies on the interaction effects of gibberellic acid and benzyladenine on roselle (Hibiscus sabdariffa L.) plant*

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Submitted for the degree of

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In

Science ( Botany, Plant Physiology )

By

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# دراسات فسيولوجية عن تأثير التفاعل بين حمض الجبريلليك و البنزيل أدينين علي نبات الكركديه

رسالة مقدمة للحصول علي

درجة دكتوراه الفلسفة في العلوم

فى النبات (فسيولوجيا النبات)


من

**مرفت شمعون صداق**

بكالوريوس في العلوم 1990

ماجستير في العلوم 1997

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جامعة عين شمس

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**BY**

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رسالة مقدمة من

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**ماجستيرفى العلوم 1997**

للحصول علي درجة دكتوراه الفلسفة في العلوم

فى النبات (فسيولوجيا النبات)

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# Abstract

Mervat Shamoon Sadak (Physiological studies on the interaction effects of Gibberellic acid and Benzyladenine on roselle (*Hibiscus sabdariffa* L.) plant. Doctor Philosphy Degree of Science, Botany Department. Faculty of Science, Ain Shams University. 2005.

The effect of foliar spray with $GA_3$ and / or BA in absence and presence of Fe–EDTA on the growth and yield components of roselle plants (*Hibiscus sabdariffa* L) were investigated. The changes induced by the same treatments on the different types of the endogenous phytohormones, photosynthetic pigments, carbohydrates, nitrogenous constituents, nucleic acid contents, activities of phenylalanine ammonia lyase (PAL) and tyrosine ammonia lyase (TAL), total phenols, titratable acidity and organic acids content and element composition of treated plants were also studied. $GA_3$ and / or BA significantly increased all growth parameters throughout the experimental period and yield components expressed as number of fruits per plant and their weights, fresh and dry weights of sepals per plant and dry weight of seeds per plant above those of the untreated control. Anthocyanin contents, soluble sugars, K, Mg, Ca, P and Fe ion contents of sugars increased in response to $GA_3$ and/or BA treatments while Na ion content, titratable acidity decreased. The most suitable harvest age for roselle sepals is at 50 – 60 days after the beginning of flowering, where the highest amount of anthocyanins and acid contents which declined if being left later.

The most effective treatment in inducing the highest seed, sepal yield and anthocyanin contents of sepals is the mixture of 100 mg / L of both $GA_3$ and BA in presence of Fe–EDTA.

Total soluble sugars, protein–N and oil contents of the harvest seeds of differently treated roselle plants increased, while soluble–N content decreased. Roselle seeds are provided as a new source of edible oil, since the fatty acid composition of their oil was found to be closely similar to that of corn oil.

$GA_3$ and / or BA treatments improved fibre yield and fibre properties in terms of length, tensile strength and diameter. Also, the same treatments increased cellulose and decreased lignin contents of fibres and consequently increased the cellulose/lignin ratio. Cellulose is known to increase the strength of plant fibres to approach that of steel.

The different treatments applied were shown to increase the endogenous phytohormones which are responsible for the increase in growth and yield components of roselle plant on one hand and the regulation of metabolic activity on the other hand.

**Key words:** Roselle – *Hibiscus sabdariffa* L. – $GA_3$ – BA – Fe–EDTA Anthocyanin – oil – fibre – endogenous phytohormones - mineral ions – nucleic acids.

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