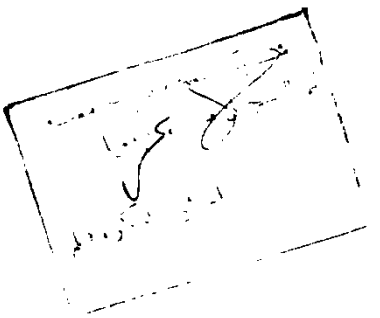
# PHYSIOLOGICAL STUDIES ON RIPENING OF BANANA FRUITS

By

*MOHAMED MAHER MOHAMED MOSTAFA EL-ZNKALOUNY*



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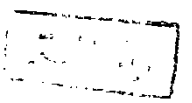

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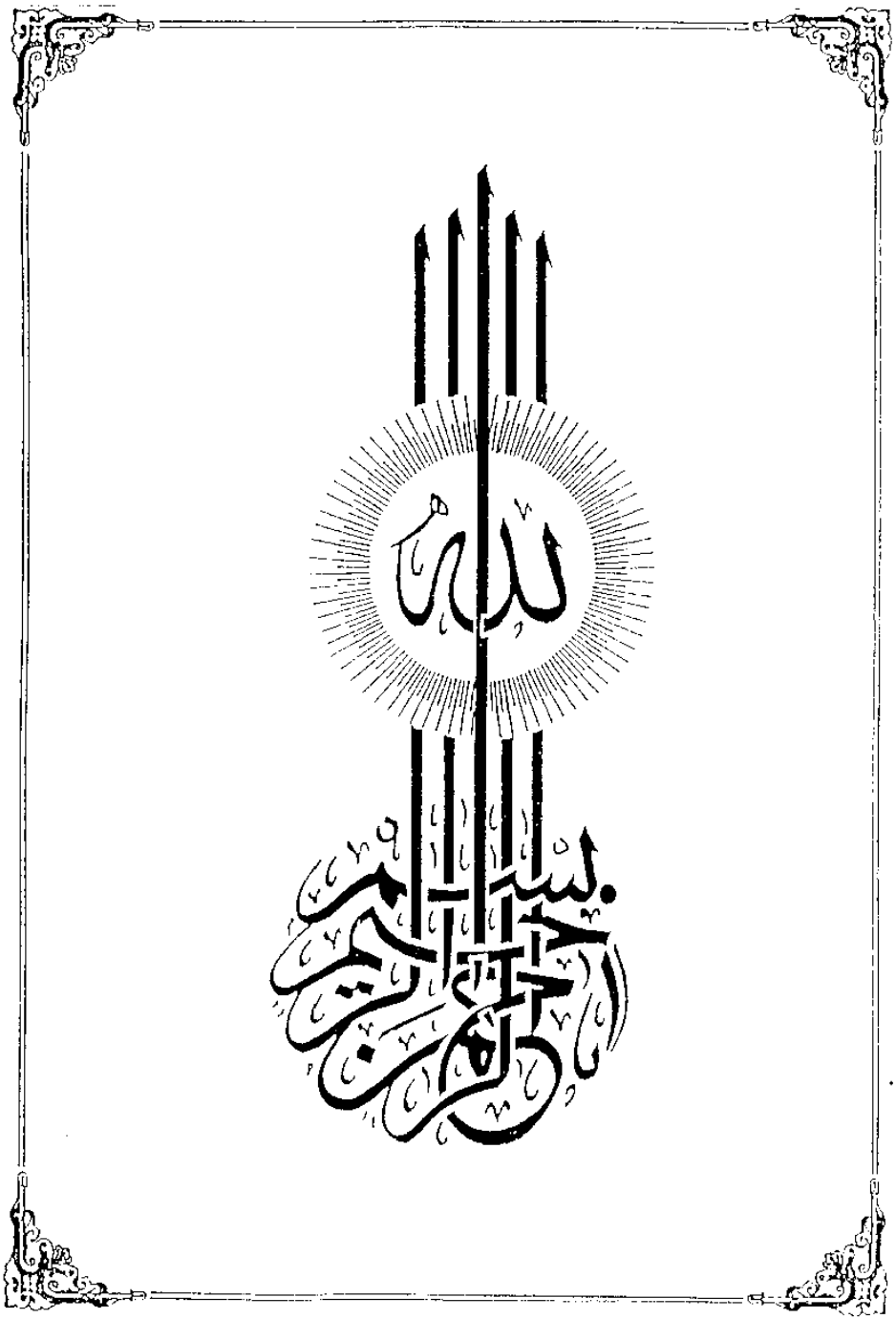


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By

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B. Sc. Agric. (Horticulture), Ain shams Univ., 1983

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## ABSTRACT

Finger drop, the dislodgement of the individual banana fingers from the bunch during ripening was studies in Maghrapi, Hindi and Williams banana fruits. Ethrel at 500 or 750 ppm as dipping treatment was used for inducing ripening in these cultivars alone or in combination with $CaCl_2$ at 2% or NAA at 25, 50 and 100 ppm. The physical properties i.e. weight loss, pulp percent, colour development and finger drop percent were studied during ripening periods. Moreover, chemical determination such as T.S.S., total acidity, total tannins and starch contents were also done. Anatomical studies in pedicle fruits was also studied.

There was an evident increase in weight loss %, pulp %, finger drop %, colour score development, T.S.S., acidity and total tannins. However, starch content was reducing with advanced in ripening process.

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In addition, anatomical studies in pedicel fruits clearly indicated the low lignification and resins and large area at vascular bundle in the abscission zone of Williams fruits in comparison to Maghrapi and Hindi fruits might be explained the low percentage of separation of Williams fruits.

In general, the best treatments in this study was 2% $CaCl_2$ before 500 ppm ethrel or 25 ppm NAA before 500 ppm ethrel which were more effective in reducing finger drop and improving fruit quality in artificial ripening of banana fruits.

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# INTRODUCTION

Banana is considered one of the most popular and favourite fruits for many people all over the world. Banana fruits had excellent flavour, good taste and high nutritional value. Moreover, from the economical point of view banana fruits are considered the green gold of some producing countries. In Egypt, the cultivated area with banana was 38000 Fed. (Ministry of Agriculture, 1989).

Artificial ripening of bananas is very essential since the fruit does not ripen normally on the plant. Consequently commercial method under controlled temperature and humidity should be used. The preliminary method of ripening banana fruits was simply by exposing the fruits to the fumes of burned coal in special closed chambers. Later on, some modifications developed exposing the full green fruits to acetylene gas in closed chambers. These techniques require special preparations and ripening process atmospheres.

The compound known as ethephon (CEPA) which decomposes in plant tissues releasing ethylene may be effective in hastening the ripening without need to special ripening conditions. On the other hand, attention has been shifted towards using some growth regulating substances such as NAA and some mineral salts such as calcium chloride as a post-harvest dipping treatment in combination with ethephon for

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improving fruit quality and reducing finger drop during ripening process.

This investigation was carried out to study the effect of ethephon, NAA and calcium chloride as a post-harvest dipping treatments on physical and chemical properties of Maghrapi, Hindi and Williams banana fruits. However, anatomical studies has been done to study the factors affecting finger drop during ripening process.

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# REVIEW OF LITERATURE

I. Physical and chemical properties of banana fruits:

Ethephon (2-Chloroethane phosphonic acid) is a compound which decomposes at physiological pH, releasing ethylene gas (Cook and Randall, 1968; Warner and Leopold, 1969), stimulation of endogenous ethylene production from the ethephon treated tissues was also reported. Pratt and Goeschl (1969) reported that ethylene acts as a ripening hormone in many plant species and affected the ripening process in many fruits.

Aziz *et al.* (1969) found that fruit flavour of Dwarf cavendish banana was not affected by dipping in 2,4-D or 2,4,5-T both at 10-10000 ppm, and was best after storage for 6 days at 55°F.

Rao *et al.* (1971) mentioned that mature persimmon, banana and Sapodilla fruits were dipped in 5000 ppm ethephon before storage at room temperature or kept in air-tight chamber in the presence of aqueous ethephon at concentrations of 500-5000 ppm with added NaOH. Ripening occurred within 2-5 days in banana, 2 days in sapodilla and 1-3 days in persimmon, compared with 14 days, 7 days and no ripening respectively, in untreated fruit. Persimmons turned red and bananas yellow. T.S.S. contents increased, but there was no change in sapodilla colour or T.S.S. There was a marked reduction in starch content of banana. Titratable acidity decreased in

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persimmon and banana and increased in sapodilla. Ripening time and changes in fruit composition were directly proportional to the concentrations of ethephon used.

Awad and Compagno (1973) has dipped dwarf banana fruits in solutions of ethephon at 500 or 1000 ppm for periods ranging from 1 min. to 1 h. They found that all concentrations and dipping times were equally effective in inducing ripening about 8 days before untreated fruits.

Blanpied *et al.* (1975) reported that applying NAA at 20 ppm to Mcintosh trees was more effective in reducing fruit-abscission which resulted in from ethephon treatment. The same results was also obtained by Faragher and Brohier (1975) on Jonathan apples.

El-Banna (1976) reported that ethephon treatment shortened the time required for ripening of bananas cv. Maghraby (Gross Michel) from 14 days (control) to 4 days when used ethephon at 500 or 1000 ppm and to 6 days (100 and 250 ppm). This favourable effect through the effect on colour development.

Rizk *et al.* (1976) found that spraying of 2,4-D or 2,4,5-T each at 500 or 1000 ppm on Dwarf Cavendish bananas after harvest caused uneven ripening.

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