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**Title of Thesis: Effect of Temperature Change on Growth and Productivity of Some  
Mango Cultivars Grown Under FayoumGovernorate Conditions**

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## ABSTRACT

This investigation was conducted during three successive seasons of 2011, 2012 and 2013 on five mango cultivars (*Mangifera indica* L.) namely; “Ewais”, “Alphonso”, “Sediek”, “Zebda” and “Keitt” grown in clay soil in a private orchard at Aboukksa region, Fayoum governorate, Egypt. The main aims of this present work were to study the influence of temperature change on behaviour of different growth flushes, flowering, sex ratio, fruit setting, dropping and productivity as affected by alternate bearing under Fayoum climatic conditions. The results obtained could be summarized as follows:

- **Morphological characteristics of vegetative growth cycles:** Trees in “Off” year produced higher shoots and leaves characteristics than those in “On” year. “Alphonso” cv. recorded the highest average shoot length, leaf length and leaf area. “Ewais” cv. produced the highest number of leaves per shoot and “Keitt” cv. recorded the highest averages shoot thickness, leaf width and leaf thickness in the three growth cycles. There were three main vegetative growth cycles namely spring, summer and autumn in the three seasons for all cultivars. Growth cycles of the “Off” year trees were longer than those in the “On” year trees in the three growth cycles.
- **Flowering time:** “Sediek” and “Keitt” cvs. were the earliest cultivars that reached start, full bloom and end bloom in “On” year. While, “Zebda” and “Alphonso” cvs. were the latest in “Off” year. The duration of flowering in 2012 season was longer as compared with that of 2011 and 2013 seasons. The trees of “Sediek” and “Ewais” cvs. took longer periods of flowering as compared with that of other cultivars. Flowering in all cultivars was earlier in the “On” year than that in the “Off” year.
- **Percentage of perfect flowers:** “Keitt” cv. had the maximum perfect flowers percentage. Meanwhile, “Ewais” cv. had the least percentage in that respect. The numbers of total flowers per inflorescence and perfect flowers percentage for all cultivars in “On” year were higher than in the “Off” year.
- **Fruit set and fruit drop (%):** The highest percentage of initial fruit set (%) was detected in 2013 season while, the lowest value registered in 2011 season. “Keitt” cv. had the highest fruit set and drop (%) while, “Sediek” and “Alphonso” cvs. recorded the lowest fruit drop (%). Percentage of fruit set and drop (%) in the “On” year were higher than in the “Off” year.
- **Heat units and time of maturity:** “Keitt” cv. fruits needed the highest amount of heat units from the end of flowering to reach maturity while “Sediek” cv. required the lowest value. Fruits in “Off” year needed significantly higher heat unit than in “On” year. Fruits of all cultivars in the “On” year reached the maturity stage early than that of the “Off” year

during the three seasons. “Sediek” cv. fruits were the earliest to reach maturity, while that of “Keitt” cv. were the latest.

- **Alternate bearing index:** The highest alternate bearing index was recorded in “Zebda” cv. while, “Keitt” cv. showed the lowest alternate bearing index.
- **Yield:** The highest yield was registered in 2012 season, while, the lowest one was recorded in 2013 season. The fruit yield was significantly higher in “Zebda” cv. while, “Keitt” cv. recorded significantly lower fruit yield.
- **Fruit physical characteristics:** The highest fruit and pulp weight was recorded in 2012 season, while, the lowest values were recorded in 2013 season. “Keitt” cv. produced the highest fruit and pulp weight and pulp percentage, while, “Ewais” cv. had the lowest values. Physical characteristics in the “Off” year were significantly higher than in the “On” year, while, percentages of peel and stone in the “On” year were significantly higher than in the “Off” year.
- **Fruit chemical characteristics:** TSS, TSS/acid ratio, ascorbic acid content, carotenes and dry matter in 2013 season recorded the maximum values while, in 2012 season had the minimum values. TSS/ acid ratio and dry matter in the “On” year were significantly higher than those in the “Off” year. Carotenes in the fruit pulp in the “Off” year were significantly higher than in the “On” year. Fruit of “Ewais” cv. had the highest value of TSS and dry matter while, “Zebda” cv. recorded the lowest values.
- **Leaf chemical composition:** The average total carbohydrates and C/N ratio in the leaves were highly significant in the “On” year compared to that noticed in “Off” year. The average nitrogen in the leaves were significantly higher in the “Off” year compared to that noticed in the “On” year.
- Correlations between the number of days  $T_{min} < 12$  °C during period before flowering were positively correlated with flowering duration, total flowers, perfect flowers %, fruit set % and yield, while negatively correlated with inflorescences length.
- Correlations between temperature during flowering were positive with inflorescences length, total flowers, perfect flowers and fruit set while, negatively correlated with flowering duration and sex ratio.
- Correlations between temperature during fruit growth were positive with TSS, Vitamin C, carotenes and dry matter while negatively correlated with fruit age, fruit weight, total acidity and yield.
- The most important climate factors effecting on mango yield: **1)** number of days  $T_{min} < 12$  °C, during period before flowering, **2)**  $T_{min}$  from inflorescences emergence to end of flowering during period of flowering and **3)**  $T_{max} - T_{min}$  from full bloom to harvest during period fruit growth.
- “Sediek”, and “Keitt” considered the best two promising mango cultivars grown successfully under Fayoum climatic conditions.

**Keywords:** *Mangifera indica*, mango cultivars, influence of temperature, alternate bearing, vegetative growth, flowering time, fruit set, fruit drop, yield and fruit characteristics.