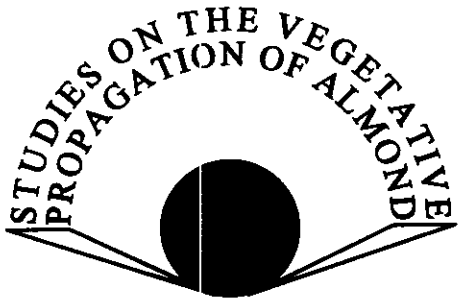



# SUMMARY AND CONCLUSIONS

# 5- SUMMARY AND CONCLUSIONS.

The present study was carried out to investigate the feasibility of using rootstocks other than bitter almond that are more adapted to different soil types and conditions prevailing in lower Egypt. The research work included the following studies :

I- Rooting of softwood and hardwood cuttings of three almond rootstocks i.e. bitter almond, Okenawa peach and Marianna 2624 plum.

II- Budding of Ne Plus Ultra almond on the same mentioned rootstocks.

III- Clonal propagation by tissue culture techniques for the same rootstocks.

Cutting and budding experiments were conducted during two consecutive seasons, 1992 and 1993 in the greenhouse of Horticulture Research Institute, Giza, Ministry of Agriculture and Faculty of Agriculture, Moshtohor, Kalubia Governorate, respectively. The third experiment was carried out at the plant Tissue Culture Laboratory of the Horticulture Research Institute, Ministry of Agriculture.

## 1- Rooting of softwood and hardwood cuttings of three almond rootstocks. i.e. bitter almond, Okenawa peach and Marianna 2624 plum.

In both seasons, subterminal softwood cuttings of 10 - 15 cm. long were prepared in May and July from less than three-month-old shoots, whereas hardwood cuttings of 20 - 25 cm. long were prepared in December from the medium part of one year old shoots. The two types of cuttings were subjected to the following quick dip treatments:

1) - Tap water as control.

2) - W (wounding) followed by tap water dip.

3) - W + 3000 ppm IBA.

4) - W + 6000 ppm IBA.

5) - W + 9000 ppm IBA.

6) - W + 1000 ppm NAA.

7) - W + 2000 ppm NAA.

8) - W + 4000 ppm NAA.

9) - W + 250 ppm $PP_{333}$.

10) - W + 500 ppm $PP_{333}$.

11) - W + 1000 ppm $PP_{333}$.

The treated subterminal softwood cuttings were planted directly in the greenhouse under mist system, while those of hardwood cuttings were stored in moist mixture of sand and peat

moss (1:1 v:v) one month before planting in the greenhouse. After two months from planting, rooted cuttings were counted and rooting percentages were calculated. Afterwards, rooted cuttings were transplanted in black polyethylene bags filled with a mixture of peat moss : sand : loamy soil (1:1:1 v/v/v).

At the end of the growing season in late December survived cuttings were subjected to different vegetative measurements.

Furthermore, anatomy of Adventitious root origin on cuttings was conducted and examined microscopically for root initiation, root primordia and root development.

## The obtained results revealed that:

1- Wounding for Marianna 2624 plum and Okenawa peach softwood cuttings prepared either in May or July was successful in improving rooting and survival percentages, as well as, values of different growth parameters under study.

2- Treating wounded softwood cuttings with different growth regulators (IBA, NAA and $PP_{333}$) induced further increase in rooting and survival percentages as well as different growth parameters over wounded cuttings only.

3- IBA treatments for softwood cuttings of Marianna 2624 plum and Okenawa peach surpassed NAA and $PP_{333}$ treatments in their effect.

4- Generally, rooting and survival percentages as well as, growth parameters of shoot and root growth of cuttings were highest

when bases of wounded cuttings were dipped in 6000 ppm IBA, while the 4000 ppm NAA treatment took the other way around in this concern for Marianna 2624 plum. However, Okenawa peach cuttings failed to show any positive responce to the 4000 ppm NAA.

5- Wounding for hardwood Marianna 2624 plum and Okenawa peach cuttings, prepared in December gave good callusing, rooting and survival percentages as well as all parameters of shoot and root growth over the unwounded ones.

6- Treating wounded hardwood cuttings with different concentrations of IBA, NAA and $PP_{333}$ improved callusing, rooting and survival percentages as well as values of different growth parameters over wounding only except the 4000 ppm NAA treatment of Okenawa peach hardwood cuttings.

7- Callusing, rooting and survival percentages as well as values of different growth parameters were mostly increased with increasing the concentration of IBA and NAA up to 6000 ppm and 2000 ppm, respectively, then decreased with high levels of IBA and NAA. On the contrary, Paclobutrazol ($pp_{333}$) induced a decrease in rooting and survival percentages and values of growth parameters with increasing $PP_{333}$ levels.

8- IBA treatment for hardwood Marianna 2624 plum and Okenawa peach cuttings surpassed the NAA and $PP_{333}$ treatments in their effect on callusing, rooting and survival percentages and different growth parameters studied.

9- Wounding + 6000 ppm IBA was the best treatment while 4000 ppm NAA took the other way around for Marianna 2624 plum cuttings. Okenawa peach hardwood cuttings failed to respond to the same latter treatment.

10- Preparation time for softwood cuttings of Marianna 2624 plum and Okenawa peach, was more promising in early May than early July.

11- Bitter almond cuttings failed completely to respond to different growth regulator treatments used at all dates.

12- Rooting of both Marianna 2624 plum and Okenawa peach cuttings were initiated from the cambium zone and continued to develop. Bitter almond roots were initiated from both cambium and pith zones and failed to develop perhaps due to the presence of inhibitors that accumulated in the shoots.

## 2- Budding by Ne Plus Ultra almond:

Three rootstocks i.e. bitter almond, Okenawa peach and Marianna 2624 plum were used for Ne Plus Ultra almond. The stock plants were shield budded in : Mid-July, Mid-August and Mid-September. Meanwhile, other group of stocks were left without budding. Survival percentages were counted. The survived plants were subjected to growth measurements, chemical nutrient elements determinations and anatomical studies.

## The obtained results indicated that:

1) Growth of Ne Plus Ultra almond budlings as affected by rootstocks and time of budding, it is found that, survival percentage and other growth parameters of bitter almond and Okenawa peach were significantly affected by time of budding. Mid-July was the best budding time followed by Mid-August and Mid-September in a descending order. Marianna 2624 plum took the opposite trend.

2) Ne Plus Ultra almond scion survived best on bitter almond rootstock than on either Okenawa peach or Marianna 2624 plum rootstocks in a descending order.

3) Marianna 2624 plum proved to be the most vigorous one. The picture was changed to the opposite when bitter rootstock was concerned Okenawa peach was in between in this respect.

4) Marianna 2624 plum gave the highest foliar N content followed descendingly by Okenawa peach and bitter almond.

5) Scion leaf on bitter almond had the highest levels of phosphorus, potassium, calcium and magnesium followed by those on Okenawa peach and Marianna 2624 plum rootstocks in a descending order.

6) leaf N, P, K, Ca and Mg levels of Ne Plus Ultra budded on either bitter almond or Okenawa peach were affected by time of

budding which were highest in Mid-July, followed descendingly by Mid-August and Mid-September.

7) The opposite was true for Marianna 2624 plum rootstock.

8) Marianna 2624 plum gave the highest foliar N content followed descendingly by Okenawa peach and finally bitter almond.

9) The highest P. level existed in leaves of bitter almond followed descendingly by Okenawa peach and Marianna 2624 plum. Besides, leaves of Okenawa peach had the highest values of potassium, calcium and magnesium, followed by bitter almond, and Marianna 2624 plum in a descending order.

10) The obtained section of Ne Plus Ultra almond/bitter almond combination showed a clean and smooth connection between scion and stock which indicated a high degree of compatibility.

11) Obtained sections of Ne Plus Ultra almond/Okenawa peach, showed a destinct dark line.

12) The illustrated section of Ne Plus Ultra almond/Marianna 2624 plum showed a thicker dark line, it turns a lower degree of compatibility.

## 3- Tissue Culture Studies

Tissue culture studies were carried out during the season of 1994. Shoot tips and one-node cuttings explants were taken from

two years old seedlings of three rootstocks i.e. (bitter almond, Okenawa peach and Marianna 2624 plum).

The prepared explants were cultured on establishment liquid medium consisted of modified MS **(Murashig** and **Skoog, 1962)** and vitamins basal salt at full strength supplemented with 20 gm/L sucrose. After four weeks, explants were transferred on the same nutrient medium supplemented with 7 gm/L Difico Bacto agar and 6-BAP at the rate of 1.0 mg/L for proliferation. However, IBA at the rates of 0, 1, 2, 4, 5 and NAA at the rate of 1 mg/L were used. The growth parameters were determined during the three stages.

## The obtained results revealed that:

1) Explants prepared in April whether as shoot-tips or one-node cuttings gave the highest survival percentage as well as shoot length and number of leaves per explant for all the rootstocks. Such measurements were decreased as explants preparation was delayed during the season.

2) Survival, shoot length and number of leaves of rootstocks used could be arranged descendingly as follows; bitter almond, Okenawa peach and Marianna 2624 plum.

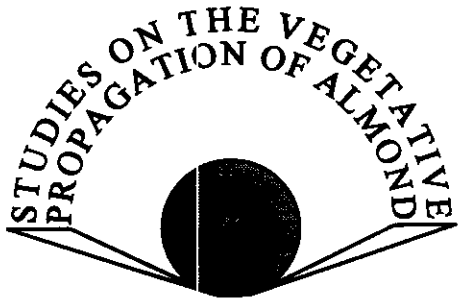
3) Shoot-tip explants recorded lower percentage of survival as compared with one-node cuttings, while shoot length and number of leaves / explant showed an opposite trend.

4) Explants prepared in April gave the largest number of shoots in first, second and third subcultures for all the rootstocks in the two types of explants.

5) Number of shoots were decreased by the delay in the preparation of explants during the season.

6) The rootstocks used could be arranged descendingly according to number of shoots produced as follows: bitter almond, Okenawa peach and Marianna 2624 plum.

7) Root initiation and primordia were formed. But root primordia failed to continue and produce a well developed roots due to the overgrowth of callus formed around the roots primordia.

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# 6- LITERATURE CITED.

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