Physiological studies on the propagation of guava

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This study was carried out during 1992 and 1993 seasons at the Horticulture, Research Institute at Giza, Egypt, to throw some lights on rooting ability of gauva cuttings cvs. Banaty and Montakhab El-Sabahia. Following, a week of spraying guava trees of both cvs. with ethephon at 100 ppm subterminal cuttings (about 15 cm. long and 0.5 cm diameter, with one half of two leaves) were prepared and planted in three dates namley May, 5th, July, 5th and September, 5th. Furthermore, two trees of both cultivars were left without ethephon sprays and sprayed with tap water as a source of ”control” cutting (general control).Moreover, in the previously three mentioned planting dates, the following treatments were carried out:1- General control: Cuttings taken from tap water- sprayed trees weredipped for 10 seconds in tap water.In addition, cuttings prepared from100 ppm ethephon-sprayed trees were dipped for 10 seconds in oneof the following solutions:2-Tap water (control).3-Indole butyric acid (IBA) at 2000, 4000 and 6000 ppm.4-2000 ppm IBA + 500 ppm Naphthalene acetic acid (NAA).5-2000 ppm IBA + 1000 ppm NAA.6-4000 ppm IBA + 500 ppm NAA.7-4000 ppm IBA + 1000 ppm NAA.8-6000 ppm IBA + 500 ppm NAA.9-6000 ppm IBA + 1000 ppm NAA.10-1000 ppm Paclobutrazol (PP333).11-1000 ppm PP333 + 500 ppm NAA.8512-1000 ppm PP„, + 1000 ppm NAA.13-1000 ppm PP„, + 4000 ppm IBA (In the second season, only). The treated cuttings were immediately planted in plastic trays (32cm. length x 25 cm. widlth x 15 cm. height), filled with a mixture of peat moss and sand (1:2 by volume) and kept under intermittent mist for 90 days inthe shade house, operating during day hours according to seasonal anddaily weather conditions within a range of 2.5-5 minutes between sprayswith mist duration of 5-10 seconds.Thus, the study of each cv.is considered a factorial experiment consistedof 42 and 45 treatments (3 planting dates x 14 and 15 growth regulator treatments) in 1992 and 1993 seasons, respectively. The treatments werearranged in a completely randomized block design with four replicates foreach treatment and each replicate included ten cuttings. The obtained results could be summarized as follows:5jL Rooting DI guava cuttings: 5.1.1. Banat(guava. 5.1.1.1. Rooting percentage:Cuttings planted in early May gave higher rooting percentage than thoseplanted in early July or September.Cuttings taken from 100 ppm ethephon-sprayed trees and treated withgrowth regulators (Particularly 4000 ppm IBA + 500 ppm NAA) gave higher rooting percentage as compared with those of the ”general control” or”control,” treatments.Furthermore, growth regulator-treated cuttings gave higher rootingpercentage as compared with those of the ”general control” or the”control”, regardless of the planting date. Also, most interactions between May planting and growth regulator treatments gave significantly higher86rooting percentage as compared with the analogous ones of July planting.Generally, (4000 ppm IBA + 500 ppm NAA)-treated cuttings and planted in May gave the highest rooting percentage. 5.1.1.2. Survival percentage:Cuttings planted in early May gave higher survival percentage as compared with those planted in early September or early July.Moreover, growth regulator treatments significantly increased survival percentage as compared with the ”general control” or the ”control” - (4000 ppm IBA + 500 ppm NAA) treatment induced significantly the highestsurvival percentage.On the other hand, all interactions between growth regulator treatments and planting dates significantly increased survival percentage as compared with the analogous ones of the ”general control” or the ”control”. Also, the interactions of early May planting statistically increased survival percentage as compared with those of early September and early July plantings. Briefly, (4000 ppm IBA + 500 NAA) -treated cuttings and planted in early May showed the highest survival percentage. 5.1.1.3. Nat af roots per cutting)Early May planting

increased the number of developed adventitious roots per cutting as compared with early September or early July planting. In addition, (4000 ppm IBA + 500 ppm NAA) was the most effective growth regulator treatment in enhancing the development of adventitious roots on the cutting.On the other hand, the interactions of the ”general control” and ”control” induced the lowest number of developed adventitious roots per cutting. Also, the interactions of early May planting significantly increased87number of roots per cuttings as compared with those of September or July planting. Briefly, (4000 ppm IBA + 500 ppm NAA) -treated cuttings and planted in early May induced the highest number of devloped roots per cutting.Rafit lenglth:Cuttings planted in early May-produced statistically the longest roots as compared with September or July planting.Furthermore, (4000 ppm IBA + 500 ppmn NAA) treatment produced the longest root, regardless of planting date.In addition, the interactions of May planting induced generally longer roots as compared with the interactions of other planting dates. (Particularly with 4000 ppm IBA + 500- ppm NAA treatment).ILL& No. of sproated shoats= touinglPlanting date and growth regulator treatments as well as their interaction failed to induce a significant effect on number of sprouted shoots per cutting. ILL/. Sha.ol longtiuMay planting induced longer shoots than July or September planting.Furthermore, the effect of tested growth regulator treatments was more pronounced and highly significant when the treated cuttings were planted in early May. Consequently, (4000 ppm IBA + 500 ppm NAA) - treated cuttings and planted in early May produced the longest shoots.&LI/. Tap sill Height:.Early planting of Banaty guava cuttings in May significantlyincreased top dry weight of rooted cuttings as compared with late planting in September.88On the other hand, all tested growth regulator treatments significantly increased top dry weight of rooted cuttings as compared with those of ”general control” and ”control” treatments. Generally, (4000 ppm IBA + 500 ppm NAA) was the superior treatment in this respect.Moreover, (4000 ppm IBA + 500 ppm NAA) -treated cutt- ings induced the heaviest top dry weight, regardless of planting date. The effect of (4000 ppm IBA + 500 ppm NAA) was more pronounced when the treated cuttings were planted in May. 5.1.1.8. Rad dry weight:May planting induced the heaviest root dry weight,whereasSeptember planting exerted the lowest stimulating effect on root dryweight.In addition, all growth regulator treatments significantly increasedroot dry weight as compared with ”general control” or ”control” treatments. However, (4000 ppm IBA + 500 ppm NAA) induced the highest significant stimulating effect in this concern. Furthermore, all interactions between growth regulator treatments and planting dates significantly increased root thy weight as compared with those of the ”general control” and ”control”. Generally, all interactions of May planting (particularly 4000 ppm IBA + 500 ppm NAA treatment) induced the highest significant effect in this respect. 5.1.1.9. Top: Root ratio:Planting Banaty guava cuttings in September increased top: root ratio thanearly planting in May.Furthermore, ”general control” treatment gave significantly higher top: rootratio as compared with all tested growth regulator treatments.89On the other hand, untreated cuttings ”general control” planted in September, May or July induced the highest top: root ratio.Conclusively, early May showed to be the proper time for planting Banaty guava cuttings, hence it enhanced all tested rooting parameters and the growth of rooted cuttings. Also, (4000 ppm IBA + 500 ppm NAA) proved to be the most effective treatment in improving rooting ability of Banaty guava cuttings. Consequently, cutting taken from ethephon-sprayed trees, treated with (4000 ppm IBA + 500 ppm NAA) and planted in early May showed the best rooting parameters and subsequent growth of the rootedcuttings.5,11 IVIontakhab El-Sabahi4 guava: 5.1.2.1. Rooting percentage:Cuttings planted in July rooted better than those planted in Septemberor May.Furthermore, all growth regulator treatments significantly increased rooting percentage as compared with ”general control” and ”control” treatments. Briefly, (4000 ppm IBA + 500 ppm NAA) proved to be the most effective treatments in enhancing rooting perecnetage. On the other hand, all interactions of July planting caused high significant increase in rooting percentage as compared with the analogous ones of September and May plantings. Shortly, (4000 ppm IBA + 500 ppm NAA) -treated cuttings and planted in July gave the highest rooting percentage. 5.1.2.2. Survival percentage:The rooted cuttings survived best when planted in July than those plantedlater in September or early in May.90Moreover, cuttings taken from ethephon-sprayed trees and treated with some growth regulator treatments significantly increased survival percentage as compared either with ”general control” or ”control”. However, (4000 ppm IBA + 500 ppm NAA)

treatment induced the highest suvival percentage.In addition, the interaction between planting date and growth regulator treatments induced high significant increase in survival percentage as compared with those of the ”general control” and ”control”. Besides, (4000 ppm IBA + 500 ppm NAA) -treated cuttings and planted in July gave the highest survival percentage. 5.1.2.3. ND.4f roots per. cutting:Cutting planted in July produced the highest number of roots per cuttingsas compared with other tested planting dates.Moreover, growth regulators-treated cuttings gave higher number ofroots as compared with the untreated ones ”general control” or ”control”. Briefly, (1000 ppm NAA + 1000 ppm PP„,) and (4000 ppm IBA + 500 ppmNAA) gave the highest number of roots per cutting.On the other hand, all interactions between growth regulator treatmentand planting dates significantly increased number of adventitious rootsper cutting as compared with those of the ”general control” and ”control”. Also, growth regulator-treated cuttings planted in July produced higher number of adventitious roots. 5.1.2.4. Root lengith:Cuttings planted in July produced longer roots than those planted inSeptember or May.On the other hand, cuttings taken from ethephon-sprayed trees and treatedwith growth regulator treatments produced longer roots than those of91”general control” or the ”control”. Generally, (4000 ppm IBA + 500 ppm NAA) treatment induced significantly the longest roots.Furthermore, root length was significantly increased due to the effect of interaction between planting date and growth regulator treatments as compared with the interaction between planting date and ”general control” or ”control”. Also, the interaction of July planting statistically increased root length as compared with the analogous ones of September and May plantings. Consequently, (4000 ppm IBA + 500 ppm NAA) -treated cuttings, painted in July or May produced comparatively the longest roots. 5.1.2.5.19, Etf sprouted shoots per cutting:Cuttings planted in July produced the highest number of shoots as compared with those planted in May or September.Furthermore, growth regulator-treated cuttings (particularly 4000 ppm IBA + 500 ppm NAA) significantly increased number of sprouted shoots percutting.In addition, (4000 ppm IBA + 500 ppm NAA), (1000 ppm NAA + 1000 ppm PP,„) and (4000 ppm IBA) -treated cuttings and planted in July gave the highest number of shoots as compared with all interactions between planting date and growth regulator treatments including the ”general control” and ”control” treatments. 5.1.2.6. Shoot length:Planting date (early May, early July and early September) failed to effect shoot length of the rooted cuttings in 1992 and 1993 seasonsOn the other side, cuttings taken from ethephon-sprayed trees and treated with growth regulators gave longer shoots than those of the ”general92 control” and ”control” treatments. Briefly, (4000 ppm IBA + 500 ppm NAA)treatment induced the longest shoots.Moreover, shoot length of the rooted cuttings was greatly increased dueto the interactions between planting date and growth regulator treatments as compared with those resulted from the interaction between planting date and ”general control” or ”control” treatments. Generally, (4000 ppm IBA + 500 ppm NAA) -treated cuttings and planted in July or May produced significantly the longest shoots. 5.1.2.7. Top, dry weight:Cuttings planted in July produced heavier top dry weight as comparedwith those of May or Septebmer planting. Furthermore, cuttings taken fromethephon-sprayed trees and treated with growth regulators significantly increased top dry weight as compared with those of the ”general control” or ”control”. Briefly, (4000 ppm IBA + 500 ppm NAA) proved to be the mosteffective treatment in this respect.In addition, top dry weight of the rooted cuttings showed significantincreased due to the interactions between planting date and growth regulator treatments as compared with the interaciton between the planting date and ”general control” or ”control” treatment. Briefly, (4000 ppm IBA + 500 ppm NAA) -treated cuttings and planted in July gave statistically the heaviest top dry weight. 5.1.2.8. Root lla weight:July planting of guava cuttings induced statistically heavier root dryweight as compared with September or May plantings.In addition, all growth regulator treatments significantly increased rootdry weight as compared with the ”general control” or ”control” treatments.93 Conclusively, (4000 ppm IBA + 500 ppm NAA) caused high significantincrease in root dry weight.Furthermore, top dry weight was significantly increased due to to theinteraction between planting date and growth regulator treatments as compared with those of the ”general control” and ”control”. Besides, all interactions of July planting exerted more pronounced effect on root dry weight than the analogous ones of September and May plantings. Consequently, (4000 ppm, IBA + 500 ppm NAA) -treated cuttings and planted in July gave the heaviest root dry weight. 5.1.2.9. Top: root ratio:Planting dates induced

statistically similar effect on top: root ratio in bothseasons.Furthermore, (4000 ppm IBA + 500 ppm NAA) and (1000 ppm NAA +1000 ppm PP,„) treatments significantly increased top: root ratio ascompared with the ”general control” and ”control” as well as all tested treatments (except for 4000 ppm IBA treatment).On the other hand, (4000 ppm IBA + 500 ppm NAA) and (4000 ppm IBA) -treated cuttings and planted in September gave the highest top:root ratio. 5.2. Chemical study: 5.2.1. Banaty guava cuttings:Generally, total soluble phenols did not show significant response to the studied factors i.e. planting date, ethephon treatment and their interactionsduring the two seasons of the study.Furthermore cuttings planted in May showed higher content of totalsoluble indoles as compared with those planted either in July or September.94Also, spraying Banaty guava trees with ethephon significantly increased the cutting content of total soluble indoles as compared with those of the control. Moreover, total soluble indoles showed siviificant response to interaction between ethephon treatment and planting date. Briefly, cuttings taken from ethephon-sprayed trees and planted in May showed the highest total soluble indoles as compared with the analogous ones of July andSeptember. 5.2.2. Montakhab El-Sabahia guava cuttings:Total soluble phenols of Montakhab El-Sabahia guava cuttings showed significant response to planting date and ethephon treatment and their interactions in both seasons of study.In addition, cuttings planted in July had higher total soluble indoles as compared with those planted in May or September. Moreover, cuttings taken from ethephon-sprayed trees had higher total soluble indoles than those of the ”control”. On the other hand, total soluble indoles significantly responded to the interaction between planting dates and ethephon treatment. Briefly, cuttings taken from ethephon-sprayed trees showed significantly higher total soluble indoles as compared with those of the ”control”, regardless of planting dates. 5.3. Anatomical AnalHistological study indicates that the preformed root initials were noticed in the cortex of Montakhab El-Sabahia guava cuttings, only, whereas, Banaty guava cuttings was lack from preformed root initials. Root initials were arised from the cambium zone in both cultivars. Moreover, cambium was activated in all growth regulators-treated (particularly, 4000 ppm IBA + 500 ppm NAA).95Conclusively, one can say that May planting of Banaty guava cuttings taken from 100 ppm ethephon-sprayed trees, a week prior to cutting preparation and treated with (4000 ppm IBA + 500 ppm NAA) as well as July planting of Montakhab El-Sabahia guava cuttings taken from 100 ppm ethephonsprayed trees and treated with (4000 ppm IBA + 500 ppm NAA) greatly enhancedrooting ability of guava cuttings.