Physiological studies on mango trees

Farid Saad Eid Kassim

The present study was conducted during the two experimental 1997-98 and 1998-99 seasons on fruitful mango trees of three mango cultivars namely; Taimour;Zebda and Hindi Be-Sinnara grown in the Experimental Farm of Horti-cultural Research Station at El Kheiria Barrage region; Kalubia Governorate.Because of the great reduction in return of most mango orchards due to non identified means/reasons, therefore this work aimed to face such problem through attempts of evaluating the differential investigated treatments within the two main fields of study included in this investigation. Since, it was hoped to investigate the response of some related factors determining the mango tree productivity i.e, their growth; flowering measurements and nutritional status to the pre-bloom girdling and growth regulators spray viz PP333, NAA andGA3 (the 1St fieldof study). Moreover, it was also aimed to throw some lights on the relationship between the malformation disorder and the comparative level of some endogenous growth substances and other components in different plant organs of the three mango cultivars under study, as well as studying the possibility of minimizing or overcomming such phenomenon through applying the previously mentioned pre-bloom treatments (the 2 r-lci field of study).Field experimental layout:In this study, pre-bloom application of late autumn girdling combined with winter spray of three growth regulators (PP333; NAA and GA3) each at 3 concen-trations, beside water spray as control were investigated during both 1997- 98 and 1998-99 seasons on the three mango cultivars. Hence, the following 10 foliar sprays treatments were evaluated on either girdled or ungirdled limbs:- V . SUMMARY AND CONCLUSION --- 1801- Water spray (control); 2- PP333 at 500 ppm; 3- PP333 at 1000 ppm; 4- PP333 at 2000 ppm; 5- NAA at 100 ppm; 6- NM at 200 ppm; 7- NAA at 400 ppm; 8- GA3 at 50 ppm; 9- GA3at 100 ppm and 10- GA3at 200 ppm.For arranging the aforesaid 10 spray treatments combined with either girdling or no-girdling application, the complete randomized block design with three replications was employed, whereas each replicate was represented by a single tree. Accordingly; 30 trees were needed for each cultivar. During each season, the required trees were carefully selected in October as being healthy; uniform in vigour and in the expected on—year state in next spring. Four main branches (limbs) were carefully selected and tagged on every tree, then two of them were girdled in mid November, while two other ones were left sound with no girdling. Moreover, on each tagged limb 25-30 mature shoots ”spring sprouted ”were labelled. Growth regulators treatments were applied twice i.e on 151n of both November and January during each season. Thus, data were recorded as follows:V.I. Part one (first field of study):Response of growth, flowering measurements and nutritional status of mango trees to girdling and growth regulators application.V.I.1.Terminal buds behaviour ”sprouting nature ”of mature shoots (spring flushed ones):The behaviour ” sprouting nature ” of the terminal buds of the mature labelled shoots ” spring flushed ” in response to girdling and various spray treat-ments were evaluated during following spring. Whereas number of each case i.e, a) differentiated into panicles (floral buds); b) vegetatively sprouted (leaf buds) and c) arrested buds (remained dormant) were counted when emergence of new inflorescences was nearly ceased in spring. Then percentage of each case--- V. SUMMARY AND CONCLUSION--- 181(dormant, leaf and floral buds) were estimated on the base of the total number of labelled shoots per each limb.V.I.2.Vegetative growth measurements:In this regard, average length of both normal and malformed newly flushed shoots during following spring in response to the different combinations of autumn girdling and winter PP 333, NAA and GA3 sprays was determined in late October during each experimental season.V.I.3.Floral measurements ” panicle characteristics ”:The whole

inflorescence length,number and average length of main branches (strands) per three panicle’s portions (basal; middle and terminal thirds) ; number of either total or perfect flowers as well as sex expression No. of perfect flowers Total No. of flowerswhole inflorescence were the investigated floral measurements, regarding their response to the different 10 PP333, NAA and GA3 spray treatments only during 2’3’1 season.V.I.4. Nutritional status:Leaf mineral composition (N, P, K, Ca, Mg, Fe, Mn and Zn); free amino acids content in both leaves and terminal buds, as well as mature shoots total carbohydrates content were the three investigated nutritional status measure-ments for the three mango cultivars under study regarding their response to autumn girdling; winter spray with the differential 10 PP 333 ; NAA and GA3 solutions and their combinations during both experimental 1997— 98 and 1998 —99 seasons.Whereas, the plant materials needed were periodically sampled (3 times during each season) starting one,three and four month/s after girdling application and V spray had been done i.e, in mid of December ; February and March for 1St 2naand 3rd samples, respectively.x 100) per each panicle portion, beside sex expression% of the- V . SUMMARY AND CONCLUSION -- 182V.II. Part two (second field of study):This division was dealing with investigating the response of both vegetative and floral malformation types in the 3 mango cultivars to the exogenous sprays of the same 10 GA3 , NAA and PP333 treatments combined with girdling application as previously mentioned in the former field of study .In addition,the relationship between some endogenous growth substances (GA3, IAA, ABA, syringic and tannic acids); indoles and phenols contents in 3 mango cultivars (Taimour, Zebda and Hindi Be-Sinnara) and their susceptibility to malformation from one hand and changes in levels of these components as affected by the PP333, NAA and GA3 spray from the other side were concerned.V.II.1. Effect of girdling; PP333 ; NAA and GA3 spray on mango malformation:The percentage of both vegetative and floral malformation observed on newly spring flushed shoots and panicles in 3 mango cultivars as affected by pre-bloom application of PP333 ,NAA and GA3 in combination with autumn girdling were investigated during both 1997-98 and 1998-99 seasons.V.II.2. Mango malformation as related to the endogenous level of some growth substances and other chemical components:V.II.2.A. Endogenous growth substances level in floral organs(buds/ panicles) as affected by PP333; NAA and GA3 application:GA3, IAA, ABA, syringic and tannic acids contents in floral buds and panicles sampled at four definite stages of their development (fully swollen bud,-- V SUMMARY AND CONCLUSION - 183panicle inception, full expanded strands/flowering branches and full bloom stages) as influenced by the exogenous PP333, NAA and GA3 applied in mid Nov. & Jan. at 1000, 200 and 100 ppm, respectively were investigated during 2r`i season only for the 3 mango cultivars (Taimour , Zebda and Hindi Be-Sinnara).