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EFFECT OF SOME CHEMICALS AND GROWTH REGULATORS ON THE MORPHOLOGICAL AND THE HISTOLOGICAL STAGES OF THE TERMINAL FLOWERY BUD IN SOME MANGO CULTIVARS.

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ABSTRACT

This study was carried out during seasons of 1999,2000 and 2001 on four mango cultivars (Hindy Sinnara, Dabsha, Zebda and Ewais) in 'on' and 'off' years through the period of September – February.

Data were indicated that the morphological and histological stages in all studied cultivars were similar in 'on' and 'off'- year of the two studied seasons whith some slowly and delay in these stages in 'off'- year season. The studied cultivars and treatments had significant effect on the beginning time and period of both the histological and the morphological stages in all studied cultivars and the percentage of the terminal flowery buds; the studied cultivars were affected differently by the studied treatments in respect of earliness or delaying the flowering. The percentage of the terminal flowery buds in 'on'- year season was more than that of 'off'- year season. Also, the studied cultivars were great differed in the number and the histological features of these stages in all studied cultivars.

Four morphological stages were determined as follows: fully swollen bud, bud inception, developing panicle prior to full bloom and fully developed panicle at full bloom.

Hindy Sinnara cultivar have nine stages (bud primordium, scales initiation, flat flowery bud, slightly dome- shaped flowery bud, dome- shaped flowery bud, stamens and carpel primordia, differentiation of stamens and carpel, differentiation of the upper part of carpel and differentiation of the lower part of carpel); Zebda cultivar have eight stages (flat flowery bud, pre-dome-shaped flowery bud, slightly dome-shaped flowery bud, dome-- shaped flowery bud, stamens primordia initation, carpel initiation, closed differentiated flowery bud and developed ovary); Ewais cultivar have eight stages (appearance of active tissues, conical- shaped bud, rounded bud, conical like- shaped grown apex, developed floral leaves, stamens and carpel primordia, differentiated bud and pre- burst bud) and Dabsha cultivar have five stages (undifferentiated bud, slight protrusion, active bud, early differentiation and axillary floral bud initiation). In most cases, the treatments of urea and its combinations caused buming of scales and another parts of the terminal flowery bud; treatment of paclobutrazole caused excessive differentiation of scales, NAA, BA and GA3 treatments caused some of upnormal initiation and differentiation in the terminal flowery buds of all studied cultivars. Hindy Sinnara cultivar have an early beginning time and short period in the most stages ,while Dabsha cultivar have delay beginning time and long period in most stages and Zebda and Ewais cultivars came between them. These results were obtained in 'on' and 'off'-year for the two studied seasons.

INTRODUCTION

Few of the investigators were referred to the histological features of the early initiation stages of mango flowery buds in respect of their anatomical structure such as Azzouz, 1961 ,which described 5 steps of flower bud differentiation of Hindy Sinnara and Pairi mango cultivars and elucidated their time as follows: Inactive bud stage ,which charaterising by the apical meristem is small cone like shape as vaegetative buds (it occurs during Augst to

October); apical meristematic dome and broadly conical protuberances arise stout from the axilla of some scales (on November and the first week of December); conical shape flower bud; bud swelling and distal end of the main axis and some of the side protuberances become rounded up and multilobed due to the initiation of primary and secondary branches (second week of December); conical, broading base, pointed towards the apex shape, all older scales drop and floral primordia appear (first half of January); bud break and bud burst ,which characterized by loosening of the scales , elongation of the floral axes and profuse hairs(late January). Both floral differentiation and bursting of mango buds were closely related. However, the presence of a mass of actively growing cells in the axis of a bud scale and the enlargement of the terminal bud are considered as the first sign of floral initiation. Three successive stages of flower bud differentiation came next. On the other hand, the hermaphrodite flower passes through five stages, whereas the staminate flower was completely differentiated through eight stages of development.

Raafat *et al.*(1995) showed that the shoot apices of Hindy showed earlier differentiation of flower buds than zebda as manifested by the elongation of the apical meristem and the appearance of lateral branch primordial. Tongumpai *et al.*, 1997 reported that mango apical meristems of control and paclobutrazol drench treated trees slowly developed increasing amounts of leaf primordia and bud scales. After 91 days, 30% of apical buds on paclobutrazol treaded trees developed floral primordia. Of the treated shoots, 90 and 100% developed floral buds at 105 and 112 days after treatment, respectively (Non of the terminal buds of the control trees developed into flower buds.

Osuna Enciso *et al.* (2000) found that vegetative buds of Manila mango had dome – shaped apical meristems and axillary protuberances only in the basal nodes ,which appeared to be dormant during December and January. However, during this period ,morphological changes related floral initiation were observed. There was a slight elongation of the main axis, and axillary meristematics protuberances formed in the leaf primordia at the base and middle parts of the buds. Floral differentiation started in the first 2 weeks of February and ended 4-6 weeks later.

Zora Singh and Dhillon (1998) described the stages of panicles growth as follows: (I) Fully swollen buds, (II) bud inception , (III) full growth panicles prior to full bloom and (IV) full growth panicles at full bloom. Usha *et. al.* (1995) mentioned that 4 developmental stages of mango cultivar. Amarapali shoots (fully swollen buds, bud inception, developing panicles and fully developed panicles)

Bakr *et al.* (1981) found that GA_3 (200 ppm) or NAA (50 ppm), generally prevented the floral initiation and differentiation in mango. Phayaphutanon *et al.* (2000) said that as vegetative growth of "Nam Dok Mai" mango was inhibited by paclobutrazol drench in June ,also it was induced "off" – season flowering in September, while the control still grew vegetatively. Machado and SaoJose (2000) reported that KNO_3 (3%) in November promoted flowering of Tommy Atkins mango. Burondkar *et. al.* (2000)found that Alphonso flowering of paclobutrazole – treated trees was linearly advanced by 28.3 days and flower number stimulated by 85.71% compared

with the control. EL-Tomy (1995) found spraying of mango tree by ethephon and urea 1% treatment was increased hermaphrodite flower percentage Barros *et. al.* (1998) found that spraying of KNO3 (2.4 and 6%) advanced the flowering date of Tommy Atkins by up to 43 days and increased flowering intensity. Salomon and Reuveni(1994)reported that without PBZ,25% of the 13-1 mango plants flowered ,while with PBZ,95-100% of 13-1 seedlings flowered (64% of intact seedlings and 31% of autografted seedlings). Medina Urrutia (1994). found that early flowering and the percentage of flowering shoots was greater in the 2 and 3g. PBZ./Litre/ha. Soil applied treatment(51.2 and 55.79%,respectively) tnan in control(7%). Mossak (1996) reported that paclobutrazole treat was inducing early flowering of Jolic mango cultivar while potassium nitrate (6%) foliar spray did not give quite as good reslts as paclobut razol. Rao *et al.* (1997) found that sprays of paclobutrazole (2000 ppm.) during the critical period of fruit bud differentiation (October- November) promoted flowering directly on fruiting shoots (62%) compared with control treatment (5%). Maas (1989) found that the KNO_3 Spray (on 15 Nov.) resulted in 100% flowering 2 weeks later in keitt and Tommy Atkins mango cultivars.

The aims of this study were as follows: follow up, determine and characterize the histological stages of initiation and differentiation of the terminal flowery buds in the upper part of the inflorescence, which had the hermaphrodite flowers; study the effect of different treatments (Urea 2%, GA_3 at 70 ppm., KNO3 at 70g /L. BA 25%, Paclobutrazole 2%, NAA at 100 ppm and their combinations) on the beginning time; period of both the histological and the morphological stages in the terminal flowery bud;the percentage of initiated and early differentiated terminal flowery buds and determine the suitable times for applying the proper treatments and subsequently controlling in the time of the flowering in the studied cultivars which lead to earliness or delaying the fruiting and hence obtaining highly income or escaping from the unsuitable climatic conditions or some diseases (malformation).

MATERIALS AND METHODS

Four varieties mango (*Mangifera indica*) were used in this investigation viz. Hindy Sinnara (early),Ewais (mid), Zebda (mid) and Dabsha (late). The trees were grafted onto ordinary seedlings and planted in loamy types of soil at Wardan region-Giza governorate, trees were more than 20 years old, planted 7 meters apart and subjected to ordinary field cultural practices.The previous recorded crops of the chosen trees for the two successive years 1998/1999 and 1999/2000 show that all cultivars exhibit biennial bearing habit. Twenty four uniform budded trees (5 meters height), from each of previous cultivars, were chosen at random for studying the inflorescence initiation and early differentiation in respect of the time, features of the histological stages and influencing by spraying the following treatments :untreat (Control); 2% urea; 70 ppm. GA_3; 70g/l KNO_3; 25% BA; 2% paclobutrazol; 100 p.p.m. NAA; mixture of Urea, KNO_3 and NAA; mixture of urea, KNO_3 and BA; mixture of GA_3, KNO_3, BA and pacloputrazole.The time of treatments was started from 1st September, until 15th February (flower buds became apparently seen by their swelling).

The investigation was carried out during two successive seasons 1998/ 1999 and 1999/2000; the first year was 'on'- year, while the second was 'off'- year. The trees were chosen as follows: for each variety and in the first year, 12 trees were in 'on'- year and the others 12 trees were in 'off'- year, in the second year, 12 trees, which were in 'on'- year,in the first year, became in 'off'- year and the others 12 trees ,which were in 'off'- year, in the first year, became in 'on'- year, hence it could be consider that there are two successive seasons of 'off'- year and two successive seasons of 'on' -year.

On the previous season 1998 and the first year 1999, the vegetative growth flushes of March and April (Spring) for each tree were labelled. The labelled flushes of 1998 season were used in the first studied season (1999), while the labelled flushes of 1999 season were used in the second studied season (2000).Each treatment consists of 3 replicates and each replicate have 3 random terminal buds of spring flushes(previously labelled flushes) (each tree have at least 90 labelled flushes in every season).

Nine samples (terminal buds)were taken, for each treatment, at two weeks intervals beginning September and until February 15th, the terminals buds (samples) were prepared for histological studies as follows: The buds were put in F.A.A solution, washed in 70% ethylalcohol immediately for one week for the reason of killing and fixing; then dehydration by tertiarty butylalcohol according to Johansen (1940), the method recommended by Mustard and Lynch(1946) and Singh (1958) on mangoes; infiltration was carried out according to Johansen (1940); Embedding in paraffin wax (M.P,52-54) and cutting by the Rotary microtome into longitudinal sections at 10-15 microns in thickness, then the investigation by light microscope was carried out to detect the initiation of inflorescence in numerous terminal buds sections and to determined the clear stages of inflorescence early differentiation, hence calculating the percentage of terminal buds ,which exhibit the earlier stages of inflorescence initiation and recorded the date of each stage for each studied cultivar and tabulated data .Samples ,which exhibit clear different stages of initiation and differentiation of the inflorescence(specially in the upper part of the inflorescence ,which included the hermaphrodite flowers),were chosen and staining with safranin and fast green according to Mustard and Lynch(1946) and Singh (1958) on mangoes, cleared in xylene and mounted in Canada balsam, then microscopical photocopy was carried out for the chosen sections to illustrate and discuss the histological stages for each studied cultivar. Morphological study was carried out, during December 1st- May 30th ,on the temminal buds, depending on notice their appearance or their shapes, at week intervals ,in order to detect the morphological stages of the terminal flower buds prior to full bloom (the others previous labelled spring flushes influenced by the previous treatments were used in the morphological study beside the previous labelled spring flushes ,which have used in the histological study ,where each treatment consists of 3 replicates and each replicate = 3 random labelled spring flushes).Data of the morphological study have taken as photo graphs and write down the most clear development (main stages) of the terminal flowery buds, influenced by the previous treatments,in respect of the starting time of

these stages for each of the studied cultivars for more than 50% of the labelled flushes.

Tabulated data of early intiated terminal flowery bud percentages in both seasons were transformation and subjected to statistical analysis. the differences between means were detected using L.S.D method at 5% level of significance according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSIONS

Table (1) shows that Dabsha cultivar in all treatments except treatment of GA_3 + BA+KNO_3 + paclobutrazole, gave the like dates of the final histological stage (axillary floral bud initiation) as they started this stage approximately on 1st - 15th February in the two studied seasons ,while the treatment of GA_3 +BA+ KNO_3+ paclobutrazol gave earlier date as the final previous stage started on 1st., February in 'on' and 'off'-year of the two studied seasons, also KNO_3 treatment gave good result as the final stage started on 1st. February in the others times of the studied seasons. On the other hand, GA_3+BA+KNO_3+ paclobutrazole treatment gave the best result followed by KNO_3 treatment in respect of the starting date of the first stage (1st December and 1st-15th December, respectively) as these results were confirmed with those obtained by Perez-Barraza *et al.*(2000) whose reported that paclobutrazol drench in June suppressed vegetative flushing during summer and autumn, allowing shoots to mature and initiate apical inflorescences earlier than shoots of control which had flushed during autumn (flower anthesis was 28 -35 days earlier in PBZ treat).

Paclobutrazol treatment was gave earlier starting date of the first stage in 'on'- year only as confirmed with those obtained by Burondkar *et al* , 2000. and Perez-Barraza; 2000, NAA,GA_3 and urea treatments were delayed the starting date of the first stage as these results confirmed with results reported by Das *et al.* (1989) whose found that on langra mango cultivar, GA_3 applied alone or with urea produeed a vagtative flush in both 'on'-and 'off' – year shoots.,while these results conflicted with results of El-Tomy, 1995 and Abou – Rawash *et al.* (1998) whose reported that sprayed Taimor mango trees of NAA at 200 ppm.+ ethephon at 500 p.p.m. once in November advanced the time of flower bud opening.BA treatment have satisfactory result as for the starting date of the first stage (it was confirmed with results of Yamashita and Ogawa (1998) found that Benzyladenine treat (50 p.p.m.. as a soil drench) at the end of September promoted flower bud differentiation while paclobutrazol at the same concentration and conditions did not. The others stages were almost nearby in their starting dates ,so it could be concluded that the most previous treatments have great effects on the first stages, some effects on the last stage and little effect on the others stages in Dabsha cultivar, also most of the treatments have good effects on the starting dates of these stages in 'off'-year of both studied seasons.Without treatments (control), the five stages began on 15th December in 'on' – year and on 1st, January in 'off'- year and finished on 15th February as Dabsha is late maturity cultivar or have late flowering date. This result was conflicted with results obtained by Ravishankar (1978) who found that fruit bud differentiontion of cv. Alphonso and Totapuri was intiated in October and attained apeak in mid - November.

Table [illegible]: The effect of treatments of Urea,GA3,BA,NAA paclo.,combinations and untreatment on the dates of the histological stages of the studied cultivars at "OFF" and "ON" - years of 1998-1999 (A) and 1999-2000 (B) seasons during the period of Sep 1st until Feb 15th.

Treatments	Season	Dabsha 1	Dabsha 2	Dabsha 3	Dabsha 4	Dabsha 5	Ewaise 1	Ewaise 2	Ewaise 3	Ewaise 4	Ewaise 5	Ewaise 6	Ewaise 7	Ewaise 8
Untreatment	A1	Dec.15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.15	Dec.15	Dec.15-Jan.1	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1-15	Feb.15
	A2	Jan.1	Jan.15	Feb.1-15	Feb.1-15	Feb.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.15
	B1	Dec.15	Jan.15	Feb.1	Feb.1-15	Feb.15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.1-15	Feb.1	Feb.1-15	Feb.15
	B2	Jan.1	Jan.15	Feb.1	Feb.1-15	Feb.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.15
Urea 2 %	A1	Jan.1	Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.15
	A2	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B1	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.1-15
	B2	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.15	Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.1-15	Feb.1-15	Feb.15
10 p.p.m. GA3	A1	Jan.1	Jan.15-Feb.1	Jan.15-Feb.1	Feb.1-15	Feb.15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	A2	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	B1	Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1	Feb.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	B2	Jan.1-15	Jan.1-15	Feb.1	Feb.1-15	Feb.15	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.1-15	Feb.1-15	Feb.15
70g/L KNO3	A1	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1-15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.15	Feb.1-15	Feb.1-15
	A2	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1-15	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.15
	B1	Dec.1-15	Dec.1-15	Jan.1	Jan.1-15	Feb.1	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1
	B2	Dec.15	Dec.15-Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1-15	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1-15	Feb.1-15
25% BA	A1	Dec.15	Jan.1	Jan.15	Feb.1	Feb.1-15	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1
	A2	Dec.15	Jan.1-15	Jan.15	Feb.1	Feb.15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	B1	Dec.15	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	B2	Dec.15	Jan.1-15	Jan.15	Feb.1	Feb.15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Jan.1-15	Feb.15
2% paclobutrazole	A1	Dec.1-15	Jan.1	Jan.15	Feb.1	Feb.1-15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1
	A2	Dec.15	Jan.15	Feb.1	Feb.1-15	Feb.15	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	B1	Dec.1	Dec.1-15	Jan.1-15	Jan.15-Feb.1	Feb.1-15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1
	B2	Dec.15	Jan.1	Jan.15-Feb.1	Feb.1	Feb.15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
100 p.p.m NAA	A1	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1-15	Feb.15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.15
	A2	Jan.1-15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B1	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1-15	Feb.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B2	Jan.1-15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.1-15	Feb.15
Urea + KNO3 + NAA	A1	Dec.15	Jan.1	Jan.15	Feb.1	Feb.1-15	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	A2	Dec.15	Jan.1-15	Jan.15	Feb.1	Feb.15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B1	Dec.15	Jan.1	Jan.15	Feb.1	Feb.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	B2	Dec.15	Jan.1-15	Jan.15	Feb.1	Feb.15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
Urea + KNO3 + BA	A1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.15	Feb.1-15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.15	Feb.1	Feb.1-15
	A2	Dec.15	Jan.1	Jan.15	Feb.1	Feb.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15
	B1	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1-15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15
	B2	Dec.15	Jan.1	Jan.15	Feb.1	Feb.15	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.15
Paclobutrazole + KNO3 + BA + GA3	A1	Dec.1	Dec.15	Jan.1	Jan.15	Feb.1	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1
	A2	Dec.1-15	Dec.15-Jan.1	Jan.1	Jan.15	Feb.1	Dec.1	Dec.15	Jan.1-15	Jan.15	Jan.15-Feb.1	Jan.15-Feb.1	Feb.1	Feb.1-15
	B1	Dec.1	Dec.15	Jan.1	Jan.15	Feb.1	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1
	B2	Dec.1	Dec.15-Jan.1	Jan.1	Jan.15	Feb.1	Dec.1	Dec.15	Dec.15-Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15

Treatments	Season	Zebda 1	Zebda 2	Zebda 3	Zebda 4	Zebda 5	Zebda 6	Zebda 7	Zebda 8
Untreatment	A1	Dec.1-15	Dec.15	Dec.15-Jan.1	Dec.15-Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.15
	A2	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1-15	Feb.1-15	Feb.15
	B1	Dec.1-15	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.15
	B2	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1-15	Feb.1-15	Feb.15
Urea 2 %	A1	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	A2	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B1	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	B2	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
10 p.p.m. GA3	A1	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	A2	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	B1	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	B2	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
70g/L KNO3	A1	Nov.15	Dec.1	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1
	A2	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1
	B1	Nov.15-Dec.1	Dec.1	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1
	B2	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
25% BA	A1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15
	A2	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B1	Dec.1-15	Dec.15	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B2	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
2% paclobutrazole	A1	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15
	A2	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15	Feb.1-15	Feb.15
	B1	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1
	B2	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
100 p.p.m NAA	A1	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	A2	Dec.15	Dec.15-Jan.1	Jan.1	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	B1	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
	B2	Dec.15-Jan.1	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.1-15	Feb.15
Urea + KNO3 + NAA	A1	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15
	A2	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B1	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B2	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.1-15	Feb.15
Urea + KNO3 + BA	A1	Dec.1	Dec.1-15	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1	Feb.1-15
	A2	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15
	B1	Dec.1	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1-15
	B2	Dec.15	Dec.15-Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
Paclobutrazole + KNO3 + BA + GA3	A1	Nov.15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.15	Feb.1
	A2	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.1-15	Jan.15	Feb.1
	B1	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1
	B2	Nov.15-Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1-15	Jan.1-15	Jan.15-Feb.1	Feb.1

Treatments	Season	Hindy Be-Sunnara 1	Hindy Be-Sunnara 2	Hindy Be-Sunnara 3	Hindy Be-Sunnara 4	Hindy Be-Sunnara 5	Hindy Be-Sunnara 6	Hindy Be-Sunnara 7	Hindy Be-Sunnara 8	Hindy Be-Sunnara 9
Untreatment	A1	Nov.1	Nov.1-15	Dec.1	Dec.1-15	Dec.15-Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1-15	Feb.15
	A2	Nov.1-15	Nov.15-Dec.1	Dec.1	Dec.1-15	Jan.1	Jan.15	Feb.1	Feb.1-15	Feb.15
	B1	Nov.1	Nov.15	Dec.1	Dec.1-15	Jan.1	Jan.1-15	Jan.15	Feb.1-15	Feb.1-15
	B2	Nov.1-15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1	Feb.1-15	Feb.15
Urea 2 %	A1	Nov.1	Nov.15	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1	Feb.1-15	Feb.15
	A2	Nov.15	Dec.15	Dec.15	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B1	Nov.1-15	Nov.1-15	Dec.1	Dec.1-15	Dec.15-Jan.1	Jan.15	Jan.15-Feb.1	Feb.1-15	Feb.15
	B2	Nov.15	Dec.1-15	Dec.15	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
10 p.p.m. GA3	A1	Nov.1	Nov.15-Dec.1	Dec.1-15	Jan.1	Jan.15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	A2	Nov.15	Dec.1	Dec.15	Jan.1-15	Jan.15-Feb.1	Feb.1-15	Feb.1-15	Feb.1-15	Feb.15
	B1	Nov.1-15	Dec.1	Dec.15	Dec.15-Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1	Feb.1-15	Feb.15
	B2	Nov.15-Dec.1	Dec.1	Dec.15	Jan.1-15	Jan.15-Feb.1	Feb.1-15	Feb.1-15	Feb.1-15	Feb.15
70g/L KNO3	A1	Sep.15	Oct.1	Oct.1-15	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Jan.1
	A2	Sep.15	Oct.1	Oct.15	Nov.1	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1
	B1	Sep.15	Oct.1	Oct.15	Oct.15-Nov.1	Nov.1	Nov.1-15	Dec.1	Dec.1-15	Dec.15-Jan.1
	B2	Sep.15-Oct.1	Oct.1-15	Oct.15	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.15	Jan.1
25% BA	A1	Oct.15-Nov.1	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.15
	A2	Nov.1	Nov.15	Nov.15-Dec.1	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1
	B1	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15
	B2	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Jan.15-Feb.1
2% paclobutrazole	A1	Oct.1	Oct.1-15	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1
	A2	Nov.1	Nov.15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15-Feb.1
	B1	Oct.1-15	Oct.15	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1
	B2	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15	Feb.1
100 p.p.m NAA	A1	Nov.1	Nov.15	Dec.1	Dec.1-15	Jan.1	Jan.1-15	Jan.15	Feb.1	Nov.15
	A2	Nov.15	Dec.1	Dec.1-15	Dec.15-Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15	Feb.15
	B1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15
	B2	Nov.15-Dec.1	Dec.1	Dec.1-15	Dec.15-Jan.1	Jan.1	Jan.1-15	Jan.15	Feb.1	Feb.1-15
Urea + KNO3 + NAA	A1	Nov.1	Nov.1-15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1	Jan.15	Jan.15-Feb.1
	A2	Nov.1	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15-Feb.1	Feb.1
	B1	Oct.15-Nov.1	Nov.1	Nov.15	Dec.1	Dec.1-15	Dec.15	Dec.15-Jan.1	Jan.1-15	Feb.1
	B2	Nov.1	Nov.1-15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.15	Feb.1	Feb.1-15
Urea + KNO3 + BA	A1	Oct.15	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15
	A2	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15
	B1	Oct.15	Nov.1	Nov.15	Nov.15-Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15
	B2	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15	Dec.15	Jan.1	Jan.1-15	Jan.15
Paclobutrazole + KNO3 + BA + GA3	A1	Sep.1	Sep.1-15	Sep.15	Oct.1	Oct.1-15	Oct.15	Nov.1	Nov.15	Nov.15-Dec.1
	A2	Sep.1-15	Sep.15	Oct.1	Oct.1-15	Oct.15	Nov.1	Nov.1-15	Nov.15	Dec.1
	B1	Sep.1	Sep.1-15	Sep.15	Sep.15-Oct.1	Oct.1	Oct.1-15	Oct.15	Nov.1-15	Dec.1
	B2	Sep.15	Oct.1	Oct.1-15	Oct.15	Nov.1	Nov.1-15	Nov.15	Dec.1	Dec.1-15

A1 = "ON" - year of 1998 - 1999 season. A2 = "OFF" - year 1998 - 1999 season. B1 = "ON" - year of 1999 - 2000 season. B2 = "OFF" - year of 1999 - 2000 season.
Dabsha stages No 1 = undifferentiated bud, 2 = slight protrusion, 3 = active bud, 4 = early differentiation, 5 = axillary floral bud initiation.
Ewaise stages No 1 = appearance of active tissues, 2 = conical - shaped bud, 3 = rounded bud, 4 = conical like - shaped grown apex, 5 = developed floral leaves, 6 = stamens and carpel primordia, 7 = differentiated bud, 8 = preburst bud.
Zebda stages No 1 = flat flowery bud, 2 = pre - dome shaped flowery bud, 3 = slightly dome - shaped flowery bud, 4 = dome - shaped flowery bud, 5 = stamens primordia initiation, 6 = carpel initiation, 7 = closed differentiated flowery bud, 8 = developed ovary.
Hindy Be-Sunnara stages No 1 = bud primordium, 2 = scales initiation, 3 = flat flowery bud, 4 = slightly dome-shaped flowery bud, 5 = dome shaped flowery bud, 6 = stamens and carpel primordia, 7 = differentiation of stamens and carpel, 8 = differentiation of the upper part of carpel, 9 = differentiation of the lower part of carpel.

By mid-December the buds were well developed and the panicle emerged in early January.

The previous trends of the effects of the treatments on the starting dates of the histological stages of Dabsha cultivar, were noticed in all of the studied cultivars, but with differences in the starting dates specially in the first stages.Hindy Sinnara have numerous stages whome occurs in few time and hence the period of each stage was short compared with Dabsha cultivar ,which have only five stages and the period of each stage was long while the others cultivars were between them. The effect of treatments was more clear in the early flowering cultivar (Hindy Sinnara) than in the moderate flowering times cultivars (Ewais and Zebda) while in the late flowering cultivar (Dabsha) was less clear.Also, the effect the promoting treatments (KNO_3, GA_3+ KNO_3 + paclobutrazole and paclobutrazole) was limited in acceleration of these stages or shorting them and *vice versa* was right as for the retardant treatments (Urea, GA_3 and NAA).

Table (2) showed that great difference between the cultivars in their period from the first to the last morphological stage in season of 1998 -1999 as Dabsha cultivar have taken about 3-4 month, both Ewais and Zebda cultivars have taken about 2-3 month, while Hindy sinnara cultivar have taken 1-2 month.

Treatments of KNO_3, BA+ KNO_3+ urea and KNO_3+ BA+ GA_3+ paclobutrazole are giving more earlier dates of each stage for all of the studied cultivars.On the other hand, treaments of urea, GA_3& NAA in 'on'- and 'off' –year and treatment of paclobutrazol in 'on'- year had retardant effect on these stages or delay these stages and consequently increasing the period of these stages.

The previous trends were found in all cultivars and in the two studied seasons (Tables 2 & 3). These results were confirmed with those obtained by Usha *et al.*, 1995; Zora Singh and Dhillon, 1988 and Das *et al.* (1989) whose found that on Langra mango cultivar, GA_3 applied alone or with urea produeed a vagtative flush in both 'on'-and 'off' – year shoots and others while in some points, these results were objected with those obtained by El-Tomy, 1995 and Abou – Rawash *et al.* (1998) whose reported that sprayed Taimor mango trees of NAA at 200 ppm.+ ethephon at 500 ppm. once in November advanced the time of flower bud opening.

Table (4): results showed that the percentage of early initiated and differentiated terminal buds of mango cultivars were significantly affected by both of the cultivars, the treatments and the dates in 'on'- and 'off' – year of 1998-1999 seasons.Considering the cultivars, the highest percentages in 'on'- and 'off'- year (27.6 and 16.5 respectively) were recorded with Hindy Sinnara cultivar with significant difference by Zebda cultivar, which came in the second rank (21.7 and 15.8 in 'on'- and 'off'- year ,respectively), whilst Ewais and Dabsha cultivars came in the following ranks with significant differences by Zebda cultivar and without significant difference between them in 'on'- year ,while in 'off'- year, insignificant difference was noticed between Hindy Sinnara and Zebda cultivars, but the differences between the two previous cultivars and Dabsha and Ewais cultivars were significant ,while the difference between Dabsha and Ewais cultivars was significant.

As for the date of samples, there are significant differences between most of the dates, the percercentages of early initiated and differentiated buds were reached to the highest values in 'on'- and 'off' _ year (49.5 and 36.3%) on the last date (15th of February) and reached to the lowest values (0.3 and 0.0%) on the first date (first September).The pervious general effect or trend of dates was found in each studied cultivar (these results were in partial harmony with Ravishankar,1978 as mentioned before. On the other hand, the effect of the treatments was great variant but almost similar in all of the cultivars as follows: in respect of Hindy Sinnara cultivar, treatments of Urea; GA_3; NAA and mix of Urea +NAA+KNO_3 were resulted significantly lower percentages of early initiated and differentiated buds. Also the treatments of BA and paclobutrazol in 'off'- year only were gave the same previous results (gave the lower values with insignificant differences between them) whose lead to suggest that the previous treatments had insignificant effects or had retardant effects on the early initiation and differentiation stages of the terminal flowery bud in Hindy Sinnara cultivar.

These results were confirmed with those obtained by Das *et.al.*, 1989 as mentioned before,but the same results were in disharmony with those of Abou-Rawash *et.al.*,1998; Yamashita and Ogawa,1998 and EL-Tomy (1995) found that spraying of mango tree by ethephon and urea 1% treatment was increased hermaphrodite flower percentage..On the Contrary, the treatment of mix of GA_3+ BA+KNO_3+ paclobutrazole was gave the significantly highest percentage of early initiated and differntated buds with significant difference and followed by the treatments of KNO_3 and BA in 'on'- year and paclobutrazole in 'off'- year with being of significant differences between them.These results were in agreement with those obtained by Machado and Saojose, 2000; and Phayaphutanon *et.al.* (2000) whose reported that as vegetative growth of "Nam Dok Mai" mango was inhibited by paclobutrazol drench in June ,also it was induced "off" – season flowering in September, while the control still grew vegetatively.. The previous trends in respect of the effects of the treatments were noticed in all of the studied cultivars.Considering the effect of the interaction between the treatments and the dates, the results indicated the same trend in all of the cultivars as the treatments of mix of GA_3+BA+KNO_3+ paclobutrazol on first of January, 15th of January, first of February and on 15th Febrary were resulted the significantly highest values (in 'on'-and 'off'-year(88 and 55%) compared with the others, whilst almost all the treatments on the first of September were gave the significantly lower values in 'on'- and 'off'- year (0.0and 0.0%). The other treatments on the variant dates were came between the previous trend of treatments on the previous dates.The previous trends(in Hindy Sinnara) of the effect of the interaction between the treatments and the dates, were similar and noticed in all of the studied cultivars. In all cases, the 'on'- year values were superior to the 'off'- year values. These results were in agreement with Perez-Barraza *et al.*(2000) Who reported that paclobutrazol drench in June suppressed vegetative flushing during summer and autumn, allowing shoots to mature and initiate apical inflorescences earlier than shoots of control which had flushed during autumn (flower anthesis was 28 -35 days earlier in PBZ treat).

Table(2): The effect of some treatments on the date of the morphological stages of the terminal bud differentiation of the mango cultivars In "OFF" and " ON" - years of 1998-1999 seasons during the period of Dec.1st.until May.30th.

Cultivars	Dabsha				Zebda				Eiwessy				Hindy Be Sinnara			
Stages / Treatments	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Untreatment	21th Feb.	21th Mar.	7th Apr.	21th Apr.	15th Feb.	1st Mar.	7th Mar.	21th Mar.	7th Feb.	21th Feb.	7th Mar.	21th Mar.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
	1st Mar.	1st Apr.	15th Apr.	1st May.	21th Feb.	15th Mar.	21th Mar.	7th Apr.	15th Feb.	7th Mar.	21th Mar.	7th Apr.	21th Jan.	1st Feb.	7th Feb.	15th Feb.
Urea 2 %	7th Mar.	1st Apr.	15th Apr.	1st May.	21th Feb.	7th Mar.	21th Mar.	7th Apr.	15th Feb.	1st Mar.	7th Mar.	1st Apr.	21th Jan.	7th Feb.	15th Feb.	21th Mar.
	15th Mar.	7th Apr.	21th Apr.	7th May.	1st Mar.	21th Mar.	7th Apr.	15th Apr.	21th Feb.	15th Mar.	1st Apr.	15th Apr.	7th Feb.	21th Feb.	1st Mar.	7th Mar.
GA3 at 70 p.p.m.	1st Mar.	21th Mar.	1st Apr.	15th Apr.	21th Feb.	1st Mar.	7th Mar.	15th Mar.	21th Feb.	7th Mar.	15th Mar.	21th Mar.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
	1st Mar.	21th Mar.	7th Apr.	21th Apr.	1st Mar.	15th Mar.	21th Mar.	1st Apr.	21th Feb.	7th Mar.	15th Mar.	21th Mar.	21th Jan.	1st Feb.	7th Feb.	15th Feb.
KNO3 at 70 g/L	1st Feb.	21th Feb.	15th Mar.	21th Mar.	1st Feb.	15th Feb.	21th Feb.	7th Mar.	1st Feb.	15th Feb.	7th Mar.	15th Mar.	15th Dec.	21th Dec.	1st Jan.	7th Jan.
	7th Feb.	7th Mar.	1st Apr.	7th Apr.	1st Feb.	15th Feb.	21th Feb.	1st Mar.	7th Feb.	21th Feb.	1st Mar.	7th Mar.	15th Dec.	21th Dec.	1st Jan.	15th Jan.
BA at 25%	15th Feb.	1st Mar.	15th Mar.	1st Apr.	7th Feb.	15th Feb.	21th Feb.	1st Mar.	7th Feb.	21th Feb.	1st Mar.	15th Mar.	1st Jan.	7th Jan.	15th Jan.	21st Jan.
	21th Feb.	7th Mar.	21th Mar.	7th Apr.	15th Feb.	21th Feb.	1st Mar.	7th Mar.	7th Feb.	15th Feb.	21th Feb.	7th Mar.	7th Jan.	15th Jan.	21th Jan.	1st Feb.
paclobutrazole at 2%	1st Mar.	21th Mar.	21th Apr.	1st May.	21th Feb.	7th Mar.	21th Mar.	1st Apr.	15th Feb.	1st Mar.	21th Mar.	1st Apr.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
	15th Feb.	15th Mar.	1st Apr.	7th Apr.	1st Feb.	21th Feb.	1st Mar.	7th Mar.	7th Feb.	21th Feb.	1st Mar.	7th Mar.	7th Jan.	15th Jan.	21th Jan.	1st Feb.
NAA at 100 p.p.m	21th Feb.	21th Mar.	15th Apr.	1st May.	21th Feb.	7th Mar.	15th Mar.	1st Apr.	21th Feb.	7th Mar.	21th Mar.	7th Apr.	15th Jan.	21th Jan.	1st Feb.	15th Feb.
	1st Mar.	1st Apr.	15th Apr.	1st May.	21th Feb.	15th Mar.	21th Mar.	7th Apr.	21th Feb.	15th Mar.	1st Apr.	7th Apr.	21th Jan.	1st Feb.	7th Feb.	21th Feb.
Urea + KNO3 + NAA	21th Feb.	21th Mar.	15th Apr.	15th May.	21th Feb.	21th Mar.	1st Apr.	7th Apr.	21th Feb.	15th Mar.	1st Apr.	7th Apr.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
	1st Mar.	7th Mar.	21th Apr.	15th May.	1st Mar.	21th Mar.	7th Apr.	15th Apr.	1st Mar.	21th Mar.	7th Apr.	15th Apr.	21th Jan.	1st Feb.	15th Feb.	21th Feb.
Urea + KNO3 + BA	7th Feb.	7th Mar.	1st Apr.	7th Apr.	7th Feb.	15th Feb.	1st Mar.	7th Mar.	15th Feb.	1st Mar.	15th Mar.	21th Mar.	21th Dec.	1st Jan.	7th Jan.	15th Jan.
	15th Feb.	21th Mar.	7th Apr.	15th Apr.	7th Feb.	15th Feb.	1st Mar.	7th Mar.	15th Feb.	1st Mar.	15th Mar.	21th Mar.	1st Jan.	7th Jan.	15th Jan.	21th Jan.
KNO3 + GA3+ BA + Paclobutrazole	1st Feb.	15th Feb.	7th Mar.	15th Mar.	21th Jan.	7th Feb.	15th Feb.	21th Feb.	1st Feb.	15th Feb.	1st Mar.	7th Mar.	7th Dec.	15th Dec.	21th Dec.	1st Jan.
	1st Feb.	21th Feb.	7th Mar.	15th Mar.	1st Feb.	15th Feb.	21th Feb.	1st Mar.	7th Feb.	21th Feb.	7th Mar.	15th Mar.	7th Dec.	15th Dec.	1st Jan.	7th Jan.

Stage No.1= Fully swollen bud.
Stage No.2= Bud inception.
Stage No.3= Dev.panicle prior full bloom.
Stage No.4= Dev.panicle at full bloom.

Table(3): The effect of some treatments on the date of the morphological stages of the terminal bud differentiation of the mango cultivars in "OFF" and " ON" - years of 1999 - 2000 seasons during the period of Dec.1st.until May.30th.

Cultivars	Dabsha				Zebda				Elwessy				Hindy Be- Sinnara			
Stages / Treatments	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Control	15th Feb.	15th Mar.	7th Apr.	15th Apr.	7th Feb.	21th Feb.	1st Mar.	15th Mar.	7th Feb.	21th Feb.	7th Mar.	21th Mar.	7th Jan.	15th Jan.	21th Jan.	1st Feb.
	21th Feb.	21th Mar.	15th Apr.	24th Apr.	15th Feb.	7th Mar.	15th Mar.	1st Apr.	15th Feb.	1st Mar.	15th Mar.	1st Apr.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
Urea 2 %	1st Mar.	21th Mar.	7th Apr.	21th Apr.	15th Feb.	1st Mar.	15th Mar.	1st Apr.	15th Feb.	1st Mar.	7th Mar.	1st Apr.	15th Jan.	1st Feb.	7th Feb.	15th Feb.
	7th Mar.	1st Apr.	15th Apr.	1st May.	21th Feb.	15th Mar.	1st Apr.	7th Apr.	15th Feb.	7th Mar.	21th Mar.	7th Apr.	1st Feb.	15th eb.	21th Feb.	1st Mar.
GA3 at 70 p.p.m.	21th Feb.	15th Mar.	1st Apr.	7th Apr.	15th Feb.	21th Feb.	1st Mar.	7th Mar.	15th Feb.	1st Mar.	7th Mar.	15th Mar.	7th Jan.	15th Jan.	21th Jan.	1st Feb.
	1st Mar.	21th Mar.	1st Apr.	7th Apr.	21th Feb.	7th Mar.	15th Mar.	21th Mar.	21th Feb.	7th Mar.	15th Mar.	21th Mar.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
KNO3 at 70 g./L.	1st Feb.	21th Feb.	15th Mar.	21th Mar.	1st Feb.	15th Feb.	21th Feb.	7th Mar.	1st Feb.	15th Feb.	7th Mar.	15th Mar.	15th Dec.	21th Dec.	1st Jan.	7th Jan.
	7th Feb.	7th Mar.	1st Apr.	7th Apr.	1st Feb.	15th Feb.	21th Feb.	1st Mar.	7th Feb.	21th Feb.	1st Mar.	7th Mar.	15th Dec.	21th Dec.	1st Jan.	15th Jan.
BA at 25%	7th Feb.	21th Feb.	7th Mar.	21th Mar.	1st Feb.	7th Feb.	15th Feb.	21th Feb.	1st Feb.	15th Feb.	21th Feb.	7th Mar.	1st Jan.	7th Jan.	15th Jan.	21th Jan.
	15th Feb.	1st Mar.	15th Mar.	1st Apr.	7th Feb.	15th Feb.	21th Feb.	1st Mar.	1st Feb.	7th Feb.	15th Feb.	1st Mar.	1st Jan.	7th Jan.	15th Jan.	21th Jan.
paclobutrazole at 2%	21th Feb.	21th Mar.	15th Apr.	21th Apr.	15th Feb.	1st Mar.	15th Mar.	21th Mar.	15th Feb.	1st Mar.	21th Mar.	1st Apr.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
	7th Feb.	7th Mar.	1st Apr.	7th Apr.	1st Feb.	21th Feb.	1st Mar.	7th Mar.	7th Feb.	21th Feb.	1st Mar.	7th Mar.	1st Jan.	7th Jan.	15th Jan.	21th Jan.
NAA at 100 p.p.m	15th Feb.	15th Mar.	7th Apr.	21th Apr.	15th Feb.	1st Mar.	7th Mar.	21th Mar.	15th Feb.	1st Mar.	15th Mar.	1st Apr.	7th Jan.	15th Jan.	21th Jan.	7th Feb.
	21th Feb.	21th Mar.	7th Apr.	21th Apr.	15th Feb.	7th Mar.	15th Mar.	1st Apr.	15th Feb.	7th Mar.	21th Mar.	1st Apr.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
Urea + KNO3 + NAA	21th Feb.	21th Mar.	15th Apr.	7th May.	15th Feb.	15th Mar.	21th Mar.	1st Apr.	15th Feb.	7th Mar.	21th Mar.	1st Apr.	15th Jan.	21th Jan.	1st Feb.	7th Feb.
	7th Mar.	7th Mar.	21th Apr.	15th May.	21th Feb.	15th Mar.	1st Apr.	7th Apr.	21th Feb.	15th Mar.	1st Apr.	7th Apr.	15th Jan.	21th Jan.	7th Feb.	15th Feb.
Urea + KNO3 + BA	7th Feb.	1st Mar.	21th Mar.	21th Apr.	1st Feb.	7th Feb.	1st Mar.	7th Mar.	7th Feb.	21th Feb.	7th Mar.	15th Mar.	21th Dec	1st Jan.	7th Jan.	15th Jan.
	7th Feb.	15th Mar.	21th Mar.	7th Apr.	7th Feb.	15th Feb.	1st Mar.	7th Mar.	7th Feb.	21th Feb.	7th Mar.	15th Mar.	1st Jan.	7th Jan.	15th Jan.	21th Jan.
KNO3 + GA3+ BA + Paclobutrazole	21th Jan.	7th Feb.	1st Mar.	7th Mar.	21th Jan.	7th Feb.	15th Feb.	21th Feb.	1st Feb.	15th Feb.	1st Mar.	7th Mar.	7th Dec	15th Dec	21th Dec	1st Jan
	1st Feb.	21th Feb.	7th Mar.	15th Mar.	1st Feb.	15th Feb.	21th Feb	1st Mar.	1st Feb.	15th Feb.	1st Mar	7th Mar.	7th Dec	15th Dec	1st Jan	7th Jan

Stage No.1= Fully swollen bud.
Stage No.2= Bud inception.
Stage No.3= Dev panicle prior full bloom
Stage No.4= Dev panicle at full bloom.

[illegible]

Cultivars	Dates / Bearing years / Treatments	1st Sep A	1st Sep B	15th Sep A	15th Sep B	1st Oct A	1st Oct B	15th Oct A	15th Oct B	1st Nov A	1st Nov B	15th Nov A	15th Nov B	1st Dec A	1st Dec B	15th Dec A	15th Dec B	1st Jan A	1st Jan B	15th Jan A	15th Jan B	1st Feb A	1st Feb B	15th Feb A	15th Feb B	Means A	Means B
Hindy Be-Sinnara	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	2.2	1.1	2.2	1.1	3.3	1.1	3.3	2.2	4.4	2.2	5.5	2.2	20.2	9.2
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	2.2	1.1	2.2	2.2	3.3	3.3	3.3	3.3	3.3	3.3	14.7	12.8
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	2.2	1.1	2.2	1.1	2.2	2.2	2.2	2.2	2.2	2.2	11.9	9.2
	4	0.0	0.0	1.1	1.1	2.2	2.2	4.4	3.3	4.4	3.3	5.5	3.3	5.5	3.3	6.6	3.3	7.7	4.4	7.7	4.4	7.7	4.4	7.7	4.4	50.4	31.2
	5	0.0	0.0	0.0	0.0	1.1	0.0	1.1	0.0	2.2	1.1	3.3	1.1	3.3	1.1	3.3	2.2	4.4	2.2	4.4	2.2	4.4	2.2	4.4	2.2	26.6	11.9
	6	0.0	0.0	0.0	0.0	1.1	0.0	2.2	0.0	3.3	1.1	4.4	1.1	5.5	1.1	6.6	2.2	6.6	2.2	6.6	2.2	6.6	3.3	6.6	3.3	41.3	17.8
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	1.1	1.1	2.2	1.1	3.3	2.2	3.3	2.2	3.3	2.2	13.8	9.2
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	1.1	1.1	2.2	1.1	2.2	2.2	3.3	2.2	3.3	2.2	3.3	2.2	14.7	11.0
	9	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	1.1	2.2	2.2	3.3	2.2	4.4	3.3	4.4	3.3	4.4	3.3	4.4	3.3	27.9	18.5
	10	1.1	0.0	2.2	1.1	3.3	2.2	4.4	2.2	5.5	4.4	5.5	5.5	6.6	5.5	7.7	5.5	8.8	5.5	8.8	5.5	8.8	5.5	8.8	5.5	59.6	40.3
	Means	1.1	0.0	3.3	2.2	7.7	4.4	13.2	5.5	22.0	12.1	27.5	17.6	29.7	18.7	37.4	20.9	44.0	25.3	47.3	29.7	48.4	30.8	49.5	30.8	27.6	16.5
	L.S.D. 0.05 For Trs.(A)=3.811,(B)=4.365 L.S.D. 0.05 For Dat.(A)=3.061,(B)=4.118 L.S.D. 0.05 For Trs x Dat (A)=78.553,(B)=19.891																										
Dabsha	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	2.2	2.2	2.2	3.3	2.2	8.3	6.4
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	2.2	2.2	2.2	2.2	6.4	4.6
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	2.2	1.1	2.2	1.1	6.4	2.8
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	1.1	4.4	2.2	5.5	4.4	5.5	4.4	5.5	4.4	22.9	15.8
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	1.1	2.2	2.2	3.3	2.2	3.3	2.2	10.1	7.3
	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	1.1	3.3	2.2	4.4	2.2	4.4	2.2	15.6	7.3
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	1.1	2.2	1.1	5.5	2.6
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	2.2	1.1	2.2	1.1	2.2	1.1	7.3	4.6
	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	1.1	3.3	2.2	3.3	3.3	3.3	3.3	11.9	9.2
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	1.1	4.4	2.2	5.5	4.4	6.6	5.5	6.6	5.5	24.8	13.6
	Means	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	0.0	13.2	6.6	22.0	9.9	29.7	22.0	34.1	25.3	34.1	25.3	11.9	7.4
	L.S.D. 0.05 For Trs.(A)=6.838 ,(B)=3.496 L.S.D. 0.05 For Dat.(A)=5.081,(B)=6.154 L.S.D. 0.05 For Trs x Dat.(A)=9.361,(B)=8.039																										
Zebda	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	5.5	2.2	6.6	3.3	7.7	4.4	22.0	11.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	2.2	3.3	3.3	4.4	5.5	4.4	5.5	12.8	14.7
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	1.1	2.2	2.2	3.3	3.3	3.3	3.3	10.1	9.2
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	2.2	4.4	3.3	6.6	5.5	8.8	7.7	8.8	7.7	8.8	7.7	33.9	28.4
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	5.5	3.3	5.5	3.3	5.5	3.3	19.3	11.0
	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	3.3	2.2	6.6	3.3	8.8	4.4	8.8	4.4	8.8	4.4	31.2	15.6
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	2.2	3.3	2.2	4.4	3.3	4.4	3.3	12.8	10.1
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	2.2	3.3	2.2	4.4	3.3	4.4	3.3	12.8	10.1
	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	3.3	5.5	4.4	5.5	4.4	5.5	4.4	19.3	14.7
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	3.3	2.2	6.6	4.4	8.8	6.6	100	8.8	100	8.8	100	8.8	42.4	33.0
	Means	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	9.9	4.4	25.3	17.6	40.7	30.8	56.2	40.7	61.7	47.3	62.8	48.4	21.7	15.8
	L.S.D. 0.05 For Trs.(A)=6.619,(B)=9.965 L.S.D. 0.05 For Dat.(A)=7.519,(B)=3.885 L.S.D. 0.05 For Trs x Dat.(A)=10.905,(B)=10.116																										
Elwessy	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	2.2	1.1	3.3	2.2	3.3	2.2	10.1	5.5
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	2.2	3.3	3.3	3.3	3.3	9.2	8.3
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	2.2	3.3	2.2	3.3	2.2	9.2	6.4
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	3.3	2.2	4.4	4.4	6.6	5.5	7.7	6.6	7.7	6.6	26.6	21.1
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	1.1	3.3	2.2	4.4	2.2	4.4	2.2	13.8	7.3
	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	5.5	2.2	6.6	3.3	6.6	3.3	21.1	10.1
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	1.1	2.2	2.2	3.3	2.2	3.3	2.2	10.1	7.3
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	1.1	2.2	2.2	3.3	2.2	3.3	2.2	11.0	7.3
	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	2.2	2.2	4.4	2.2	5.5	3.3	5.5	3.3	15.2	11.0
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	2.2	4.4	3.3	6.6	4.4	8.8	6.6	8.8	8.8	8.8	8.8	33.9	28.4
	Means	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	3.3	17.6	11.0	27.5	19.8	39.6	28.6	49.5	36.3	49.5	36.3	16.0	11.5
	L.S.D. 0.05 For Trs.(A)=5.661,(B)=7.733 L.S.D. 0.05 For Dat.(A)=8.314,(B)=7.218 L.S.D. 0.05 For Trs x Dat.(A)= 8.835,(B)=7.199																										
Main means		0.3	0.0	0.8	0.6	1.9	1.1	3.3	1.4	6.6	3.0	7.7	4.4	14.8	6.8	23.4	13.4	33.1	21.5	43.2	30.3	44.4	34.9	49	35.2	19.3	12.8
	L.S.D. 0.05 For C.V.S.(A)=3.6 & (B)=2.355 L.S.D. 0.05 For Dates (A)=4.019 & (B)=4.585																										

1 = Control
2 = Urea 2%.
3 = GA3 at 70 p.p.m.
4 = KNO3 at 70 g/L.
5 = BA 25%.
6 = Paclobutrazole 2%.
7 = NAA at 100 p.p.m
8 = Urea + KNO3 + NAA
9 = Urea + KNO3 + BA
10 = GA3 + KNO3 + BA + paclobutrazole

* A = On - year.
** B = Off - year.

Table(5): the previous trends (in season 1998/1999)of the cultivars;treatments;the interaction between them and the dates were similar and found in season 1999/2000(as in table(5).

Histological features:

In longitudinal sections of Dabsha mango cultivars (Fig1) it could be obsereved 5 clear stages, during the period of Dec., 1st . till- Febr, 15th, through longitudinal sections of terminal buds as the first stages were occurred on December 1st and described by tiny conical- shape of bud which consists of outer compact scales to form the conical shape (acute apex) separated by space and surrounded by the inner compact scales which separated by inner space and surrounded by the inner tissue of bud founded inside the tissue of spring branch.

The stage name of undistinguished, inactive or initated bud as the outer surface of the terminal bud have not any protuberances or flat surface of the bud; the second stage is occurred on January 1st and called initiation of slight protrusion on the surface of terminal bud, the inner strucutre showed the outer compact scales, under the surface of meristematic grown apex,separated from the inner compact scales by slight space, small dome-shape of growh apex separated from the inner scales by small space,also the whole meristematic tissue of the bud could be distinguished; the third stage is named active bud which occurrd on January 15th and described by spread apart of outer scales while, inner scales were still closed to form small broadly conical shape and covered the rounded protuberance of meristematic grown apex, appearance of sepals primordia and slight elongation of the main axis of bud: the fourth stage is early differentiation stage which charactrised by further opening of the scales, initiation and elongation of both sepals, petals,stamens (androecium) and carpels (gyoecium) primordia and the stamens primordia are advanced the carpels primordia in their initiation.This stage occurred on February 1st The last stage is axillary florl bud initiation which occurred on February 15th and described by differentiating the carpels, complete the formation of ovary(appearance of ovary locule), further secondary floral branches of panicles follows and developing(from the axils of the mid scales)in the same manner of the main loral branch of panide so the complete differentiation of Dabsha panicles were not occurred yet on February 15th even with the treatments and caused late maturity.The stages 1&2 can not observed by the eye and the previous stages were more clear in the treatment of KNO3+GA3+BA+Paclobutrazol.On the other hand, the effect of treatments, on the previous stages was limited in one or more of these stages as this figure illustrate the different effect of treatments on the histological features of "Dabsha" terminal bud in " off" and "on"year seasons during the two studied seasons. The discussion was on the figure to give more understanding.

As for Ewais cultivar (fig3),eight clear stages of early initiation and differentiation during December 1st -February 15th,could be observed as follows: Stage-1 is beginning on December 1st almost ,name precursor of the bud and characterized by distinguishing the meristematic and parenchymatous tissues (active cells) of the terminal bud in detected region without founding any organs or specialized cells; stage 2 was occurred between December 1st and prior to December 15th which described by the ordinary strcture of early

Cultivars	Dates / Treatments	1st Sep		15th Sep		1st Oct.		15th Oct.		1st Nov.		15th Nov.		1st Dec.		15th Dec.		1st Jan		15th Jan.		1st Feb.		15th Feb.		Means	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Hindy Sw. Sinnara	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	2.2	1.1	2.2	1.1	3.3	1.1	3.3	3.3	6.6	2.2	5.5	2.2	20.2	9.7
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	2.3	1.1	2.2	1.1	2.2	2.2	3.3	2.2	3.3	2.2	13.8	8.2
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	1.1	1.1	2.2	1.1	2.2	2.2	2.2	2.2	9.2	7.3
	4	0.0	0.0	1.1	0.0	2.2	1.1	2.2	2.2	3.3	2.2	4.4	3.3	5.5	3.3	6.6	4.4	7.7	4.4	7.7	4.4	7.7	4.4	7.7	4.4	46.8	28.4
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	2.2	1.1	2.2	3.3	2.2	2.2	3.3	2.2	3.3	2.2	13.8	10.1
	6	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	0.0	2.2	1.1	2.2	1.1	3.3	2.2	3.3	2.2	3.3	2.2	3.3	2.2	3.3	2.2	21.5	11.0
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	2.2	1.1	2.2	1.1	2.2	2.2	2.2	2.2	10.1	7.3
	8	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	2.2	1.1	2.2	2.2	3.3	2.2	3.3	2.2	13.8	10.1
	9	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	2.2	1.1	2.2	2.2	3.3	2.2	4.4	3.3	4.4	3.3	4.4	3.3	20.2	14.7
	10	1.1	0.0	1.1	1.1	2.2	1.1	2.2	2.2	2.2	2.2	3.3	2.2	5.5	2.2	7.7	3.3	8.8	4.4	8.8	4.4	8.8	4.4	8.8	4.4	50.4	26.6
	Means	1.1	0.0	2.2	1.1	4.4	2.3	7.7	4.4	13.2	6.6	18.7	13.1	20.9	14.3	29.7	18.7	36.6	20.9	40.7	25.3	45.1	27.5	46.2	27.5	22.7	13.4
	L.S.D. (0.05) for Trs.=4.867 (A)& 3.272 (B) L.S.D.(0.05) for Dates=2.117(A)& 1.441(B) L.S.D.(0.05) for Trs & Dates=22.911(A)& 20.519(B)																										
Dalsha	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	2.2	2.2	2.2	3.3	2.2	8.3	6.4
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	2.2	2.2	2.2	2.2	6.4	4.6
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	1.1	1.1	3.7	2.6
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	2.2	3.3	3.3	5.5	4.4	5.5	6.4	5.5	4.4	19.3	15.6
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	2.2	1.1	2.2	2.2	2.2	2.2	7.3	6.4
	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	2.2	3.3	2.2	4.4	3.3	4.4	3.3	13.8	10.1
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	1.1	1.1	3.7	2.8
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	1.1	1.1	2.2	1.1	2.2	1.1	5.4	4.6
	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	1.1	1.1	2.2	1.1	3.3	2.2	3.3	2.2	9.2	6.4
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	2.2	4.4	3.3	6.6	4.4	6.6	4.4	6.6	4.4	22.9	16.5
	Means	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.1	9.9	8.8	17.6	13.2	27.5	19.8	30.8	24.2	31.9	24.2	10.1	7.6
	L.S.D. (0.05) for Trs. =3.110(A)&2.395(B) L.S.D.(0.05) for Dates=2.051(A)&4.511(B) L.S.D. (0.05) for Trs and Dates=11.851(A)&10.051(B)																										
Zelda	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	4.4	2.2	6.6	2.2	7.7	3.3	7.7	3.3	24.8	10.1
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	2.2	2.2	3.3	4.4	5.5	4.4	5.5	11.0	13.9
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	2.2	1.1	3.3	2.2	3.3	2.2	8.2	6.4
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	4.4	3.3	5.5	5.5	6.6	7.7	8.8	7.7	8.8	7.7	33.8	26.6
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	2.2	3.3	2.2	5.5	3.3	5.5	3.3	5.5	3.3	19.3	11.9
	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	3.3	2.2	5.5	3.3	6.6	5.5	6.6	5.5	6.6	5.5	31.2	16.3
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	3.3	3.3	3.3	3.3	11.0	8.3
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	4.4	3.3	4.4	3.3	12.0	8.3
	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	5.5	5.5	5.5	5.5	5.5	5.5	19.3	16.5
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	4.4	3.3	5.5	4.4	8.8	5.5	10.0	8.8	10.0	8.8	10.0	8.8	43.3	33.1
	Means	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	13.2	3.2	18.7	10.5	37.4	27.5	56.2	41.8	61.7	48.4	61.7	48.4	21.6	15.5
	L.S.D.(0.05) for Trs.=6.139(A)&6.936(B) L.S.D.(0.05) for Dates=3.153(A)&5.319(B) L.S.D.(0.05) forTrs. andDates=16.515(A)&16.954(B)																										
Giza 2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	2.2	1.1	3.3	2.2	3.3	2.2	10.1	5.5
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	1.1	2.2	1.1	3.3	2.2	3.3	2.2	8.2	5.5
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	1.1	3.3	2.2	3.3	2.2	8.3	5.5
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	3.3	3.3	5.5	4.4	7.7	6.6	7.7	6.6	7.7	6.6	28.4	22.8
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	2.2	1.1	3.3	2.2	4.4	3.3	4.4	3.3	11.0	8.2
	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	2.2	4.4	3.3	6.6	4.4	6.6	4.4	6.6	4.4	22.6	15.6
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	4.4	3.3	4.4	3.3	11.0	7.5
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	2.2	1.1	3.3	3.3	3.3	3.3	9.2	6.4
	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.2	1.1	3.3	2.2	4.4	3.3	5.5	4.4	5.5	4.4	20.3	12.8
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.3	4.4	3.3	6.6	5.5	8.8	7.7	8.8	7.7	8.8	7.7	33.9	26.4
	Means	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	3.3	17.6	13.1	35.4	28.0	47.8	39.7	48.4	37.4	48.4	37.4	16.1	11.7
	L.S.D.(0.05) for Trs.=6.325(A)&3.117(B) L.S.D.(0.05) for Dates=7.112(A)&6.134(B) L.S.D.(0.05) for Trs. And Dates=16.312(A)&17.061(B)																										
Main means		0.3	0	0.6	0.3	1.1	0.6	1.6	1.1	2.8	1.7	5.9	3	11.3	5.2	18	14	30.5	20.6	41.6	29.2	46.5	34.4	47.1	34.6	17.6	12.5
L.S.D.(0.05) for C.V S.=4.437(A)&3.510(B) L.S.D.(0.05) for Dates=3.715(A)&1.410(B)																											

1 = Control.
2 = Urea 2%.
3 = GA3 at 75 p.p.m.
4 = KNO3 at 70 g/L.
5 = BA 25%.
6 = Paclobutrazole 2%.
7 = NAA at 100 p.p.m.
8 = Urea + KNO3 + NAA.
9 = Urea + KNO3 + BA.
10 = GA3 + KNO3 + BA + paclobutrazole

* A = Oct. - year.
** B = Oct. - year.

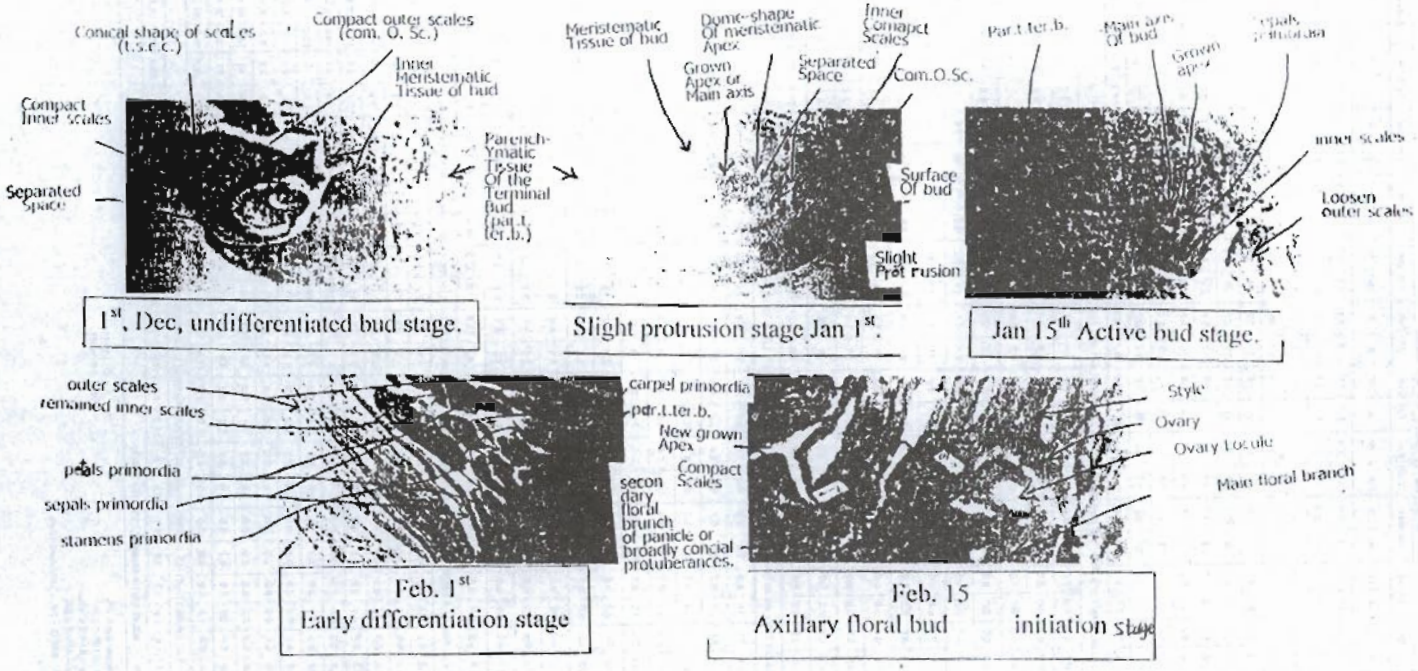


Fig. (1) Longitudinal sections through the terminal buds of mango CV. Dabsha showing the stages of early initiation and differentiation of flower bud in KNo_3 + GA_3 + BA + Pac, treatment during the two seasons in 'off' and 'on' year seasons.

Undifferentiated vegetative bud on 7th April. Due to treatment of NAA 100 PPm. (in off year mostly)(1)

Excessive differentiation, on 15th March, of scales due to treatment without development of flowery parts and see the elongation of grown apex (2)

Damage of grown apex and burning of ends of scales in some cases of urea + KNO_3+NAA treatment before any differentiation on 15th March in off year mostly. (3)

Early differentiated carpel without differentiation of stamens due to treatment of GA3 on 1st April (in of-year mostly) (4)

Slowly differentiation of grown apex due to treatment of urea + KNO_3 + NAA, it may be due to urea and NAA effects on 15th March (in off-year mostly). (5)

Burning of scales, some inner parts of bud and damage of grown apies due to treatment of urea 2% (in some cases) on 15th March and consequently founding of undifferentiation (in off-year mostly) (6)

Fig (2)
Different effects of treatments on histological features of "Dabsha" terminal bud in "off" and "on" - year seasons during the two studied seasons.

Fig (3) : Early initiation and differentiation stages of Fiwessy cultuivar terminal flower bud in longitudinal sections of Urea + KNO_3 + BA; KNO_3 and KNO_3+GA$_3$+Ba + Pac, treatments during the two seasonsin 'on' and 'off' -year seasons.

initiated bud as the outer scales were formed the broadly conical shape (acute apex), while the inner scales were opened and the grown apex was round ,outer scales were compact and separated from the inner scales by little space as well as the inner scales were separated from the rounded grown apex by another space,also the main axis was still short (conical-shaped bud),stage-3 was called rounded bud as the scales were formed round shape and included the growing apex of bud, which slightly elongated and form semi-spherically shape (it occurs on December 15th); stag -4 was named conical like-shape grown apex, accurred between December15 th. and January 1st, and described by a great elongation of grown apex, loosening of the most outer scales, beginning of secondary branch (bud) initiation which is developing in the same manner of the primary or main branch of the panicle; stage- 5 was named developed floral leaves, occurred on January 1st and described by slight opening of inner scales, elongation of sepals, petals and grown apex (all parts of bud were active); stage –6 was called sex parts initiation or stamens and carpel primordia, occurred on January 15th and described by differentiation of stamens into filaments and anthers and as well as differentiation of carpel into stigma, side style and intiation of ovary; Stag -7 was named differentiated bud, occurred on February 1st , described by further differentiation of carpel and stamens; stag -8 was called pre-burst bud, occurred on February 15th , as characterized by slight opened inner scales and development of microsporangia from one-two fertile anthers which were forming the pollen grains before the opening of flower while the petals were not openining yet.The stages from 1 to 3 could not observed by the eye as the bud was assumed in inactive case,the previous stages were more clear in the treatments of KNO3, Urea + KNO3+ BA and KNO3 + GA3 + BA + Paclobutrazole.These results were partial agreement with those of Raafat et al., 1995, Tongumpdi *et al.*, 1997; Osuna Enciso *et al.*, 2000 and Azzouz, 1961 whose described the stages of differentiation and the anatomical structure in mango flowery bud.

On the other hand, the effects of the treatments on the previous stages could be illustrated in.fige (4)which showed the effects of some treatments on the histological features of Ewais terminal bud in "off" and "on"- year seasons during the two studied seasons. The discussion was on the figure to give more under standing.

Fig (5) reveald that eight stages of early initiation and differentiation of Zebda(middle season)cultivar through the longitudinal sections of terminal bud,the most important histological features of these stages could illusrated as follows: 1) Flat flowery bud:It occurs on December 1st, it could be observed two types of the bud shapes; the first was false flat – shaped bud formed from the outer tisse of bud which connected with the stem tissue and surrounded by the true bud (the second type of bud) which has spherical shape and consisted of compact outer scales, compact inner scales, leaf primordia (finger-shape) and active or meristematic pulp of bud; also the flat- shaped bud was made a wide angle with the surtace of stem -tip. 2) Pre- dome- shaped flowery bud:it occurs during the period from December 15 st. to December 15th and described by the same previous structure in stage one except the angle between the false bud and the stem –tip becomes more narrow than the previous angle in stage one

due to the movement of the true bud towards the surface of the terminal bud because of the growth of it and as a result the tissues of the terminal bud surface were opening so slightly prominent on the surface of the bud could be observed, also there was slightly elongation in the true bud.3)Slightly dome-shaped flowery bud:it occurs during the period from December 1st.to December 15th. and described by appearance of clear dome-shaped grown apex,thick compact outer scales,compact inner scales and the size of the true bud was larger than the prvious size in the stag- 2, also the main axis was longer than the previous one and the surface of the terminal bud was prominent. 4) Dome- shaped flowery bud:this stage could be observed on December 15th, and its characters were the slightly opened outer scales from the dome- shaped of bud, while the inner scales were stil closed, and formed semi-spherical-shape below the outer scales ,beginning the appearance of the sepals primordia and petals primodia and the acute grown apex shape was found with long main axis.5) Stamens primordia initiation::It occurred on January 1st, and characterized by elongation of sepals and petals primordia, also the initiation of stamens primordia and could be observed the anther and fillaments primordia. 6) Carpel initiation:

It occurs on January 15th and described by sepals(calyx) and petals(corolla) were completely differentiated, continuous development of the anthers and fillaments meanwhile, the basal part of pistil primordia were elongated.7) Closed differentiated flowery bud:

it occurs on February 1st and described by stamens were almost completely differentiated, the upper portion of pistil elongated to form the primordia of stigma and style and the inner scales were stil closed, while the outer scales were almostly dropped. 8) Developed ovary stage:it occurs on February 15th, and described by complete differentiation of stamens, primordium of ovule integuments started to form with fine traces of vascular bundles through the tissues of both integuments and fillaments, little locules were found in the base part of ovary, nucellus tissue and placenta appeared, ovale was differentiated into two parts and attached to the ovary walls by placenta tissue at the base of ovary.

Also, the scales were almost dropped and the flower covered with calyx and corolla (pre-opening of the flower), The buds which in the stages from 1 to 3 ,can't see by the eye and the previous stages were more observed in the treatments of KNO_3, KNO_3 + BA + GA_3 + paclobutrazol and Urea + KNO3 + BA. As for the effects of the treatments(fig6) ,it could be observed that the effect of Urea,KNO3, BA, GA3, NAA, Pacloputrazole and their combinations on some histological features of the terminal bud of Zebda mango cultivar during the two seasons.The discussion was done on the figure to give more understanding.

Fig- 7 showing the most clear stages of early initiation and differentiation of flowery buds of Hindy Sinnara cultivar (early-season) as it could be detected nine stages through the longitudinal sections of terminal buds during the period of October 15th to February 15th. These stages were as follows: 1)-Bud primordium stage:it occurs on October 15th. and characterized by the appearance of meristematic tissue (condense stain) inside the terminal bud tissue (light stain)and make as the bud primordium.

Fig (4)
Effects of some treatments on histological features of "Elwessy" terminal bud in "off" and "on"-year seasons during the two studied seasons .

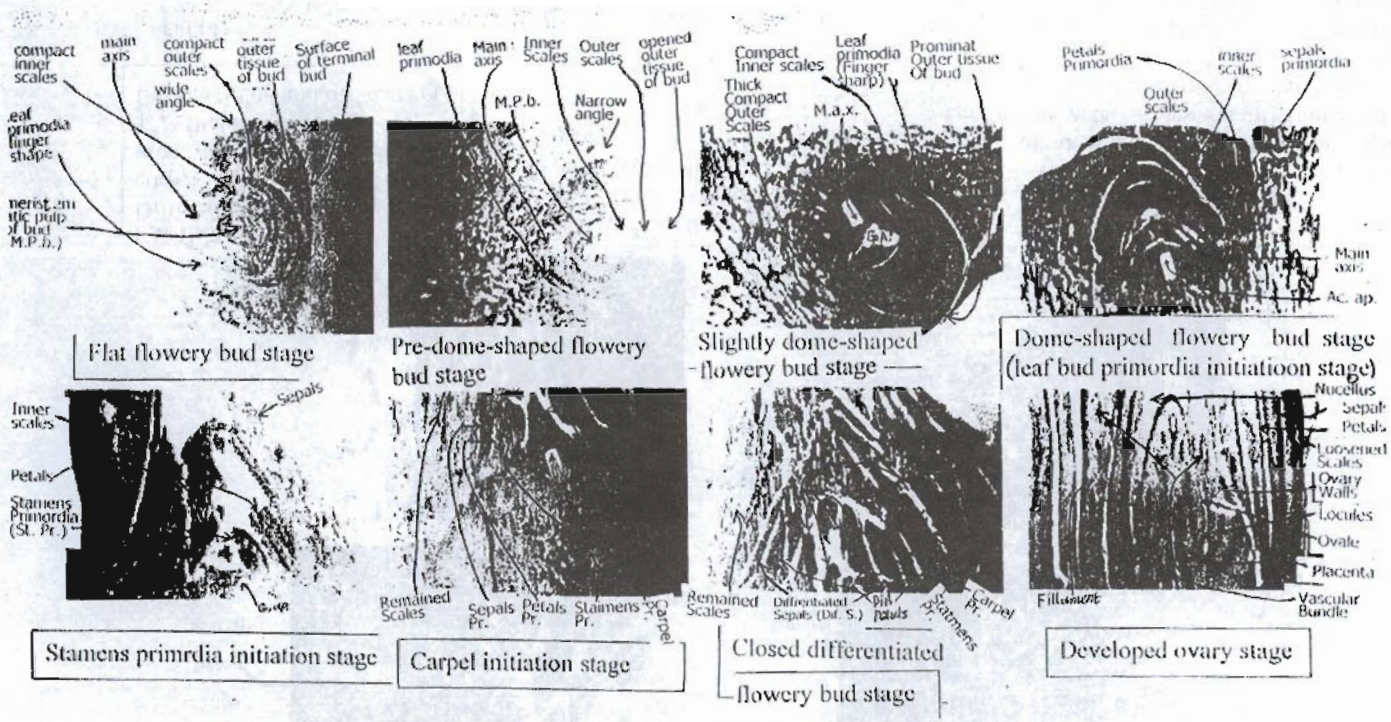
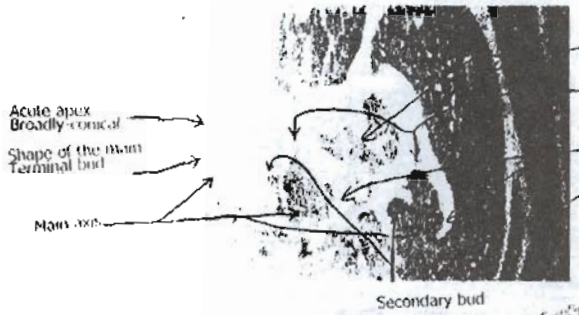
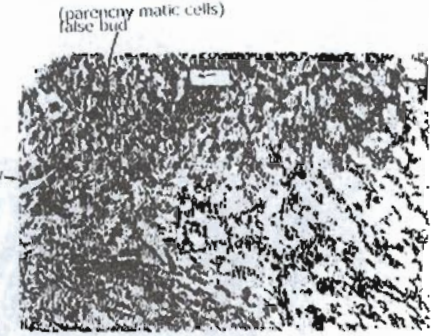


Fig. (5) : Longitudinal sections through Zebda terminal buds illustrate the different stages of histological development for early initiation of flowery buds treated by KNo_3; Urea + KNO_3 + BA and KNo_3 + GA_3 + BA + Paclobutrazole during the two seasons in 'off' and 'on' - year seasons.



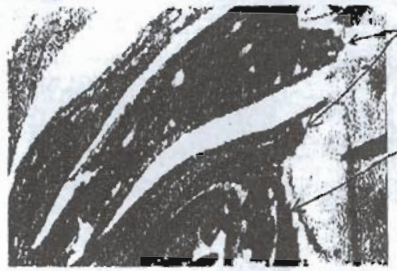
1



2

Further initiation of many primary and secondary buds arise from axilla of some scales as a result of urea+KNO_3 + BA and KNO_3 + GA_3 + BA + Pac. treatments (in on and off year mostly) during the period of 1st-15th December. (1)

Failure of flowery bud initiation and growing of divided parenchymatic cells without any differentiation into flowery bud as a result of NAA and GA3 treatments (in off-year mostly) on December 1st (2)



3

Burning of some parts of scales and stamens as a result of urea treatment (in off-year mostly) on February 1st. (3)

Fig. (6) Effect of some treatments of urea, KNO_3, BA, GA3, NAA and paclobutrazole on some histological features of the terminal bud of Zebda mango cultivar during the two seasons

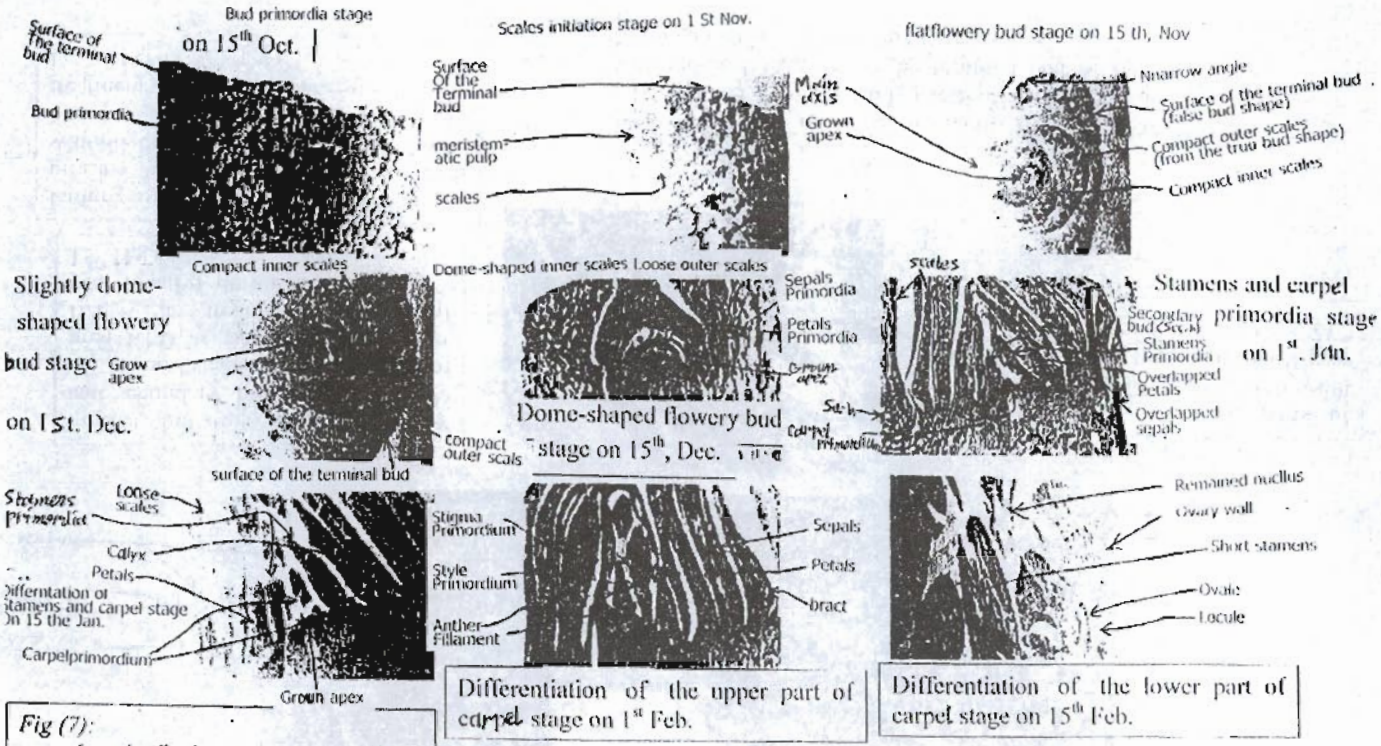


Fig (7):

Longitudinal section through Hindy Be-sinnara terminal bud showing the different stages of histological development for early initiation of flowery buds treated by KNO_3; Urea+KNO_3+BA and KNO_3+GA$_3$+BA$_3$ paclobutrazole during the two seasons in "off" and' on' - year - seasons.

2)-Scales initiation stage:it occurs on November 1st. and described by the bud primordium was characterized into meristematic pulp and scales(all parts were inside the tissue of the terminal bud). 3)-Flat flowery bud stage: it occurs on November 15th. and described by two forms of these terminal buds,the first was false bud which has flat shape as form from the tissue of apical stem which make narrow angle with the main surface of the terminal bud,while the second form was true bud which has spherical shape and consists of compact outer scales,compact inner scales,grown apex and main axis. The true bud grow towards the surface of terminal bud 4)-Slightly dome-shaped flowery bud stage:it occurs on December 1st. and described by the true bud(it has the same previous structure in stage 3) begins to protrude from the surface of terminal bud to form slightly dome shape as a result of the elongation of grown apex of the true bud towards the surface of terminal bud. 5)-Dome-shaped flowery bud stage: it occurs on December 15th. and described by the observation of elongated grown apex,sepals and petals primordia,the overlapped inner scales form the internal dome-shaped while the upper tissue of the terminal bud and outer scales begin to open. 6)-Stamens and carpel primordia stage:it occurs on Jnuary 1st. and characterized by the appearance of clear stamens primordia and initiation of carpel primordium,meanwhile the overlapped sepals and overlapped petals cover the internal parts,also the most outer scales were dried and dropped. 7)-Differentiation of stamens and carpel stage:it occurs on January 15th. and described by the appearance of ovary and style primordia,stamens primordia,sepals and petals were elongated meanwhile the remained scales were loosed. 8)-Differentiation of the upper part of carpel stage: it occurs on February 1st. and described by the continuous differentiation of stamens into anther and fillament (short stamens may be unfertile),the side style and stigma primordia were observed,also completion of the sepals and petals differentiation was observed. 9)-Differentiation of the lower part of carpel stage:it occurs on February 15th. And characterized by completion of the differentiation of stamens as the short stamens were unfertile and vice versa while the ovule structure,ovary walls,locules and part of the nucellus tissue could be observed in this stage to complete the differentiation of whole parts of the flower.The buds have to be in the stages of 1 to 3,cann't see with the eye as the bud assumes inactive or at rest stage and the previous stages were more observed in the treatments of KNO3,KNO3 + GA3 + BA + Paclobutrazole and Urea + KNO3 + BA. In regarding the effects of treatments on the previous hitological features as found in fige (8):it could be observed that the effect of GA3,urea and urea + KNO3 + NAA applications on some histological features of the terminal bud of Hindy Sinnara mango cultivar during the two seasons.The discuss was on the figure have given more understanding. It could be concluded that almostly in the all examined samples,the hermaphrodite flowers were initiated and differentiated firstly as they were observed in all samples.Also,there were short stamens having late differentiation accompanied by the appearance of early differentiation of one stamen at least in the flower;the flowery buds were assumed inactive and could not observed by the eye during the first histological stages of early initiation(stages 1 to 3 in Hindy Sinnara ;Ewais and Zebda cultivars and stages 1 and 2 in Dabsha cultivar) ;the histological stages were almost similar in Hindy

Sinnara ,Ewais and Zebda cultivars while in Dabsha,the first stages from 1 to 3 were more late than those of the others cultivars then the final stages were accelerated so we could not observed the previous clear final stages in the others cultivars and the complete differentiation of panicle in Dabsha was not occurred until February 15th even with any treatment and cause late maturity in Dabsha cultivar on the opposite of Hindy Sinnara,Ewais and Zebda cultivars as the initiation of new secondary buds from Dabsha panicle was continuous until February 15th. but with some treatments(KNO3 and...),the stamens and carpel initiation was observed on January 1st.for Hindy Sinnara cultivar,observed on January 15th. for Ewais and Zebda cultivars and observed on February 1st. for Dabsha cultivar.Considering the effects of treatments,the negative effects were occurred in 'off'-year season in the most cases and in all of the studied cultivars. In general,urea alone or its combinations treatments were cause damage and burning of bud scales and burning of some of the inner structure;paclobutrazol treatments were caused excessive growth of scales and in Hindy Sinnara cultivar caused undifferentiation of carpel in 'on'-year season;NAA and GA3 treatments were caused undifferentiation or retarded differntiation in all parts or in some parts of the flowery buds of the studied cultivars;BA and KNO3 treatments have often a positive effects on differntiation of the studied cultivars especially on the further regular differentiation of the stamens and the carpel and on a good initiation and development of primary and secondary branches of the panicles of the studied cultivars.Also,the mentioned stages of the studied cultivars were noticed in all treatments almostly with some differnces in the occurrence dates of each stage for the studied cultivars.

Morphological stages in figure(9) illustrated that there were four main morphological stages of mango terminal flowery bud;these stages were fully swollen bud which characterized by the swollen bud and spread the scales and appearance of the surface of the flowery bud;the second stage was bud inception as the bud become more swollen,slightly elongation and the scales become more loosen;the third stage was developing panicle prior to full bloom which described by increasing in elongation of the panicle,falling of the old scales,loosening of the new scales and the panicle like the flush shape and the fourth stage was fully developed panicle at the full bloom which the panicle was full development and some of them have fruit set and the flowers could be distinguish into male and hermaphrodite types.These results were confirmed with those of Usha *et. al*,1995 and Zora Singh and Dhillon,1988 whose mentioned the different morphological stages in mango flowery bud. It could be concluded that ther are four stages of mango flowery bud differntiation as follows:1-fully swollen bud. 2-bud inception. 3-developing panicle prior to full bloom. 4-fullydeveloped panicle at full bloom.

These results were obtained in 'on' and 'off'-year for the two studied seasons.

Fig. (8) Effect of some treatments of GA3, Urea and Urea + KNo3 + NAA on some histological features of the terminal bud of 11indy Be-Sinnara mango cultivar during the two seasons.

Burning of many parts of [illegible] bud due to the treatment of (in off-year mostly). Urea 2% during the period of 1st - 15th of December (1)

Undifferentiation of irregular shape secondary buds while others primary buds have normal growth as arcsuh (in on? and off year mostly) of GA3 treatment on February 15th (2)

Upnormal flowery bud structure showing undifferentiation of corpel due to some cases in the treatment of paclobutruzole (in on-year mostly)on January 15th. (3)

Burning of vegetative bud showing undifferentiation into flowery bud

In some cases of urea + KNO3 + NAA and urea treatments (in off-year mostly) (4)

Fig (9): The main detected morphological stages of mango terminal flower bud.

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تأثير بعض الكيماويات ومنظمات النمو على المراحل المورفولوجية والتشـــريحية للبرعم الزهري الطرفي في بعض أصناف المانجو

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أجريت هذه الدراسة أثناء مواسم 1999، 2000و 2001 على أربعة أصناف من المانجو (هندي بسنارة، دبشه، زبدة وعويسي) في سنوات الحمل الغزير والحمل الضعيف والنامية تحت ظروف محافظ الجيزة. أظهرت النتائج أن المراحل المورفولوجية والتشريحية تحت الدراسة لكل الأصناف تحت الدراسة كانت متشابهة في سنوات الحمل الغزير وسنوات الحمل الضعيف لكل مواسم الدراسة مع بعض البطئ والتأخير في هذه المراحل في مواسم الحمل الضعيف، الأصناف والمعاملات تحت الدراسة أثرت معنويا على توقيت البداية وفترة كلا من المراحل المورفولوجية والتشريحية تحت الدراسة في كل الأصناف السابقة كما أثرت على النسبة المئوية للبراعم الزهرية الطرفية، اختلفت الأصناف السابقة في تأثرها بالمعاملات تحت الدراسة من حيث تبكير أو تأخير التزهير، في كل الأصناف تحت الدراسة كانت النسبة المئوية للبراعم الزهرية الطرفية أعلى في سنوات الحمل الغزير من سنوات الحمل الضعيف، الأصناف تحت الدراسة اختلفت كثيرا في العدد والصفات الظاهرة لهذه المراحل التشريحية والمورفولوجية. أمكن تحديد أربعة مراحل مورفولوجية في كل الأصناف تحت الدراسة كما يلي: البرعم المكتمل الانتفاخ – بزوغ وظيور البرعم – النوره المتطورة قبل اكتمال التزهير – النوره الكاملة عند اكتمال التزهير. المراحل التشريحية لكل صنف تحت الدراسة كانت كما يلي: كان لصنف الهندي بسنارة تسعة مراحل تشريحية لتطور البرعم الزهري الطرفي (مبدئ البرعم – نشأة الحراشيف – تفلطح البرعم الزهري – البرعم الزهري شكل شبه القبه قليلا – البرعم الزهري شكل القبة الكاملة – ظهور مبادئ أعضاء التذكير والكربلة – تميز أعضاء التذكير والكربلة – تميز الجزء العلوي للكربلة ثم تميز الجزء السفلي للكربلة)، الزبده كان لها ثمانية مراحل تشريحية لتطور البرعم الزهري الطرفي (البرعم الزهري المتفلطح – البرعم الزهري قبل اتخاذه شكل القبه – البرعم الزهري شكل يشبه القبة قليلا – البرعم الزهري شكل القبة الكاملة – نشأة مبادئ أعضاء التذكير – نشأة الكربلة ثم البرعم الزهري المتميز وتطور المبيض)، البرعم الزهري الطرفي للعويسي تطور في ثمانية مراحل (ظيور الأنسجة النشيطة – البرعم شكل المخروط – البرعم المستدير – القمة النامية شكل شبه المخروط – الأوراق الزهرية المتطورة – مبادئ الكربلة وأعضاء التذكير – البرعم المتطور ثم البرعم قبل تمزق الحراشيف (انفجار البرعم)) أما البرعم الطرفي الزهري للدبشة فتطور في خمسة مراحل (البرعم غير المتكشف – النتوء البسيط – البرعم النشيط – التكشف المبكر ثم نشأة البراعم الزهرية الجانبية للنوره). في أغلب الحالات سببت معاملات اليوريا فقط أو مع مركبات أخرى احراق الحراشيف والأجزاء الأخرى للبرعم الزهري الطرفي، المعاملة بالباكلوبترازول تسبب زيادة تطور الحراشيف، معاملات نفثالين حمض الخليك والجبرالين والبنزيل أدنين تسبب بعض التطور الغير طبيعي في البرعم الزهري الطرفي لكل الأصناف تحت الدراسة. بالنسبة لتوقيت البداية وفترة المراحل التشريحية للبرعم الطرفي الزهري الناشئ والمتطور كان صنف الهندي بسنارة الأكثر تبكيرا والأقصر فترة في كل المراحل وأغلب الحالات بينما كان صنف الدبشة الأكثر تأخيرا والأطول فترة لكل المراحل أما صنفي الزبده والعويسي فكانا في درجة متوسطة بين صنف الهندي بسنارة وصنف الدبشة. تم الحصول على هذه النتائج في سنوات الحمل الغزير والحمل الضعيف لمواسم الدراسة.