

## **BEARING REGULATION OF "LANGRA" MANGO TREES.**

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### **ABSTRACT**

This study was conducted on "Langra Cv." mango trees growing in a private orchard, Tema, Sohag governorate. The residual effect of paclobutrazol (PBZ) was investigated on "Langra Cv." mango during the "On" and "Off" years (2011 and 2012) after its application in October 2010 and 2011 years to regulate the alternate bearing, enhanced yield and improved fruit quality.

The result showed that (PBZ) application at 30 or 40 gm / tree as a soil drench reduced the vegetative growth however; it induced the early flowering and yield in comparison with alternate bearing. Also, it increased the fruit weight and yield as well as improved the fruit quality in both "On" and "Off" years. In addition, this treatment leads to increasing the number of panicles per tree, number of hermaphrodite flowers per panicle, number of fruits per panicle and number of remaining fruits per tree in comparison with control trees on "Off " year during the two seasons of study. However, application of (PBZ) had no effect on seed weight %, pulp/seed ratio, acidity % and V.C traits in both "On" and "Off" years.

Therefore, the study recommends that treating of "Langra Cv." mango trees in both "On" or "Off" years by (PBZ) at 30 or 40 gm / tree is effective for reducing the alternate bearing and improving the yield and fruit quality.

### **INTRODUCTION**

Many studies were conducted to overcome the alternate bearing of some mango cultivars by using several growth regulators, and paclobutrazol (PBZ). Thus, (PBZ) applied to the mango cultivar "Alphonso" as a soil drench have induced regular fruiting (Burondkar and Gunjate, 2000). Also, Yeshitela and Robbertse (2004) reported that treated mango "Tommy Atkins Cv." trees by (PBZ) at rates of 5.50 and 8.25 gm / tree as a soil drench increased the number of panicles, percentages of hermaphrodite flowers, yield and fruit quality compared to the control. Likewise, Ferrari and Sergent (1996) found that (PBZ) significantly reduced the vegetative growth, induced early & profuse flowering and increased the number & fruit weight of "Haden" mango cultivar. In addition, Singh and Dhillon (1992) found that (PBZ) applied on mango cultivar "Dashehari" as a foliar spray or as a soil drench at 10-60 gm / tree during the first week of October increased the yield and improved the fruit quality compared to untreated trees. Ahmed *et al.* (1998) found that spraying panicles with (PBZ) at 125 to 250 ppm during full bloom was very effective in improving yield and chemical properties of fruits in six mango cultivars.

The present study aimed to investigate the effect of (PBZ) on the vegetative growth, flowering and fruiting of "Langra" mango Cv. to regulate the alternate bearing, increase the yield and improve fruit the quality.

## **MATERIALS AND METHODS**

This study was conducted during two successive seasons 2011 and 2012 on "Langra" mango Cv. (*Mangifera indica* L.) growing at a private orchard in Tema district belongs to Sohag governorate. Fifteen healthy trees with uniformed vigor and state of "On" year and other 15 trees state of "Off" year according to recent field observations were selected and submitted for this study. The 15 trees in "On" year fruiting during 2011 season turned to state of "Off" year in 2012 season; on the contrary, the 15 trees of "off" year during 2011 season turned to state of "On" year in 2012 season. All selected trees were at 15 years old, budded on seedling rootstocks and planted as a square system at 6 meters farm distances in a loamy sand soil and subjected to the same and common orchard management. The experiment was arranged as a complete randomized design (CRD) including five paclobutrazol (PBZ) treatments of three trees (replicates) state of "On" year and others stat of "Off" year. Paclobutrazol was applied as a soil drench at 0, 10, 20, 30 and 40 gm per tree during the first week of October at 2010 and 2011 years to study the residual effect on vegetative growth, flowering, fruiting and yield of "Langra" mango cultivar during 2011 and 2012 seasons as follows:

### **1- Vegetative flushes:**

Eight limbs on each tree to represent the tree aspects (North, South, East and West) were chosen to study the number of shoots starting of Spring, Summer and Autumn. This was determined by labeling the new vegetative shoots.

### **2 – Flowering:**

**2-1- Blooming date:** The beginning of blooming was recorded when near of 5-10% of the terminal buds reached to their burst stage (Shawky *et al.*, 1978).

**2-2- Total number of panicles / tree:** The total number of panicles per tree was counted.

**2-3- Total number of hermaphrodite flowers:** Five panicles from each tree (replicate) were randomly chosen at full bloom time and the number of perfect flowers was counted.

### **3- Fruiting:**

#### **3-1- Yield:**

Final yield (kg / tree) was estimated as number of fruits x average of fruit weight at harvest. To study the fruit quality, 10 fruits at stage of maturity were picked randomly from all directions of each tree (each replicate) at harvest time of each season. All fruit samples were tested for:

#### **3-2- Physical and chemical characteristics:**

**3-2-1- The physical properties of fruits:** The physical properties of fruits were included: a) Fruit weight (gm), b) Seed weight (gm) and c) Pulp / seed ratio.

**3-2-2- The chemical properties of fruits:** The chemical properties were included: a) Total soluble solids percentage (TSS%) was determined by using the hand refractometer.; b) Total acidity was determined by direct titration of 0.1 N NaOH using phenolphthalein as an indicator and expressed as citric acid /100 gm fruit pulp, according to A.O.A.C., 1985.; c) Ascorbic

acid content (mg vitamin C / 100 gm fruit pulp) was done using of 2,6-dichlorophenol indophenol as outlined in A.O.A.C., 1985.

This experiment was designed as a complete randomized design (CRD). The analysis of variance (ANOVA) was conducted according to Snedecor and Cochran, 1980. The differences were compared using LSD at (0.05).

## RESULTS AND DISCUSSION

### 1-Effect of (PBZ) on vegetative flushes:

Data presented in Table (1) indicated that lowest percentages of vegetative flushes was produced during spring, summer and autumn during "On" and "Off" years (2011 and 2012 seasons) after application in October 2010 and 2011 at 30 or 40gm (PBZ) /tree as compared to other treatments (0, 10 and 20 gm (PBZ) / tree). These results were in agreement with those reported by Ferrari and Sergent (1996); Burondkar and Gunjate (2000) and Yeshitela and Robbertse (2004). They reported that (PBZ) reduced the vegetative growth.

**Table (1): Vegetative flushes (%) during "On" and "Off" years (2011 and 2012 seasons) of "Langra" mango cultivar as affected by (PBZ) application during October 2010 and 2011.**

Treatments	" On" year			" Off" year		
	Spring	Summer	Autumn	Spring	Summer	Autumn
	<b>First season (2011)</b>					
Control	9.14	42.80	1.30	11.74	71.50	1.90
10 g PBZ/tree	9.60	39.90	1.25	11.45	65.12	1.50
20 g PBZ/tree	8.90	40.20	1.00	9.90	56.32	0.80
30 g PBZ/tree	7.80	36.20	0.75	6.75	49.82	0.80
40 g PBZ/tree	7.44	36.10	0.75	6.62	48.88	0.50
L.S.D. 0.05	1.68	3.18	0.30	1.88	4.12	0.30
	<b>Second season (2012)</b>					
Control	8.75	40.90	1.25	11.74	74.10	1.00
10 g PBZ/tree	8.00	39.80	1.00	11.50	73.00	1.00
20 g PBZ/tree	6.84	36.00	1.00	9.66	60.50	0.00
30 g PBZ/tree	6.50	32.20	0.80	7.00	52.40	0.80
40 g PBZ/tree	6.00	31.70	0.00	6.88	50.80	0.00
L.S.D. 0.05	1.76	2.50	0.18	1.80	4.92	0.21

### 2- Effect of (PBZ) on flowering:

Data presented in Table (2) showed that (PBZ) application at 30 or 40 gm / tree as a soil drench had induced early flowering (17-19 days earlier than the control) during "On" and "Off" years (2011 and 2012 seasons). In addition it increased the number of panicles per tree and number of hermaphrodite flowers per panicle in "Off" year during 2011 and 2012 seasons. On the other hand, application of (PBZ) during "On" year had no effect on the number of panicles / tree and number of hermaphrodite flowers / panicle during 2011 and 2012 seasons. Such findings are accordance with those reported by

Kurian and Layer (1993); Ferrari and Sergent (1996); Barraza *et al.* (2000); Burondkar and Gunjate (2000); Phavaphutanon *et al.* (2000); Cardenas and Rojas 2003; Blaikie *et al.* (2004) and Yeshitela and Robbertse (2004). They reported that (PBZ) decreased the vegetative growth which assimilated the carbohydrates to induce profuse and early flowering.

**Table (2): Date of flowering, number of panicles/tree and number of hermaphrodite flowers/panicle during "On" and "Off" years (2011 and 2012 seasons) of "Langra" mango cultivar as affected by (PBZ) application during October 2010 and 2011.**

Treatments	Date of flowering		No. panicles/tree		No. hermaphrodite flowers/panicle	
	"On" year	"Off" year	"On" year	"Off" year	"On" year	"Off" year
	First season (2011)					
Control	2/3	2/3	255.50	51.60	308.50	213.20
10 g PBZ/tree	1/3	1/3	254.20	57.80	315.70	228.30
20 g PBZ/tree	1/3	25/2	260.00	105.50	320.40	232.50
30 g PBZ/tree	11/2	12/2	265.50	220.80	336.50	267.00
40 g PBZ/tree	11/2	12/2	257.61	218.60	329.20	265.60
L.S.D. 0.05	-	-	NS	19.3	NS	18.1
Second season (2012)						
Control	3/3	1/3	254.30	57.00	325.00	209.00
10 g PBZ/tree	3/3	1/3	260.80	61.20	319.20	217.40
20 g PBZ/tree	1/3	28/2	258.10	112.00	321.60	246.7
30 g PBZ/tree	12/2	10/2	270.70	237.20	332.80	290.20
40 g PBZ/tree	12/2	10/2	253.90	229.40	326.50	285.60
L.S.D. 0.05	-	-	NS	18.9	NS	16.6

### 3 - Effect of (PBZ) on fruiting:

Data presented in Tables (3&4 and 5) showed that "Langra Cv." trees which treated by (PBZ) at 30 or 40 gm / tree induced early fruiting (about two weeks earlier than control), heavy fruit weight & yield and improved TSS% content of "Langra Cv." fruits during "On" and "Off" years of 2011 and 2012 seasons. Moreover, application of (PBZ) at 30 or 40 gm / tree increased the number of fruits per panicle and number of fruits per tree during the two seasons of study. These results are in agreement with those found by Singh and Dhillon (1992); Ferrari and Sergent (1996); Ram (1999) and Burondkar and Gunjate (2000) who found that (PBZ) induced early & regular fruiting, increased yield and improved fruit quality.

On the other hand, application of (PBZ) during "On" and "Off" years had no effect on seed weight%, pulp/seed ratio, acidity % and V.C (mg /100 gm pulp) during the two seasons of study.

From the previous results it could be concluded that the application of (PBZ) at 30 or 40 gm / tree as a soil drench during the first week of October leads to early and regular bearing, increased the fruit weight & yield and improved the fruit quality of "Langra" mango cultivar.

**Table (3): Date of harvesting, number of fruits per /panicle, and number of fruits /tree and yield (Kg/ tree) during "On" and "Off" years (2011 and 2012 seasons) of "Langra" mango cultivar as affected by (PBZ) application during October 2010 and 2011.**

Treatments	Date of harvesting		No. fruits/panicle		No. fruits/tree		Fruit yield (kg/tree)	
	On	Off	On	Off	On	Off	On	Off
<b>First season (2011)</b>								
Control	7/8	7/8	2.07	0.70	457.60	34.00	140.62	10.32
10 g PBZ/tree	7/8	7/8	2.05	0.73	449.40	39.20	139.22	11.90
20 g PBZ/tree	1/8	1/8	2.10	1.02	454.00	98.90	148.10	31.71
30 g PBZ/tree	25/7	25/7	2.17	1.87	456.00	324.80	158.00	108.19
40 g PBZ/tree	25/7	25/7	2.12	1.82	452.20	333.50	155.51	112.79
L.S.D. 0.05	-	-	NS	0.17	NS	20.93	8.87	6.00
<b>Second season (2012)</b>								
Control	10/8	10/8	1.98	0.65	430.70	29.80	129.49	9.05
10 g PBZ/tree	10/8	10/8	2.10	0.70	428.20	38.60	127.90	11.67
20 g PBZ/tree	7/8	7/8	2.07	1.10	425.00	107.80	136.83	35.23
30 g PBZ/tree	27/7	27/7	2.10	1.90	420.80	350.20	148.38	122.30
40 g PBZ/tree	27/7	27/7	2.06	1.87	422.50	346.40	189.28	119.39
L.S.D. 0.05	-	-	NS	0.16	NS	18.90	9.08	6.17

**Table (4): Fruit physical properties during "On" and "Off" years (2011 and 2012 seasons) of "Langra" mango cultivar as affected by (PBZ) application during October 2010 and 2011.**

Treatments	Fruit weight (g)		Stone weight (%)		Pulp/Stone ratio	
	"On" year	"Off" year	"On" year	"Off" year	"On" year	"Off" year
<b>First season (2011)</b>						
Control	307.3	303.5	11.29	11.41	7.98	8.08
10 g PBZ/tree	309.8	305.4	11.20	11.33	8.02	7.96
20 g PBZ/tree	326.2	320.6	11.15	11.22	8.00	7.94
30 g PBZ/tree	346.5	333.1	11.07	11.12	7.96	8.02
40 g PBZ/tree	343.9	338.2	11.25	11.30	8.12	8.00
L.S.D. 0.05	15.22	14.8	NS	NS	NS	NS
<b>Second season (2012)</b>						
Control	300.66	303.52	11.12	11.16	8.04	7.96
10 g PBZ/tree	298.68	302.40	11.05	11.10	8.10	8.03
20 g PBZ/tree	321.95	326.84	11.00	11.16	8.04	7.98
30 g PBZ/tree	352.60	349.20	10.98	11.08	7.92	7.90
40 g PBZ/tree	448.00	344.66	11.14	11.22	8.10	8.00
L.S.D. 0.05	17.01	16.52	NS	NS	NS	NS

**Table (5): Fruit chemical properties during "On" and "Off" years (2011 and 2012 seasons) of "Langra" mango cultivar as affected by PBZ application during October 2010 and 2011.**

Treatments	TSS (%)		Acidity (%)		V.C. mg/100g pulp	
	"On" year	"Off" year	"On" year	"Off" year	"On" year	"Off" year
	First season (2011)					
Control	15.34	14.8	0.121	0.120	57.98	58.08
10 g PBZ/tree	15.80	15.1	0.119	0.119	56.02	57.96
20 g PBZ/tree	15.24	14.6	0.119	0.121	58.00	56.94
30 g PBZ/tree	16.52	15.8	0.121	0.120	57.96	58.02
40 g PBZ/tree	16.30	15.4	0.120	0.119	58.12	58.00
L.S.D. 0.05	8.22	7.80	NS	NS	NS	NS
Second season (2012)						
Control	14.66	14.82	0.120	0.120	56.84	57.96
10 g PBZ/tree	14.68	15.02	0.119	0.121	57.10	58.03
20 g PBZ/tree	14.95	15.21	0.120	0.119	58.04	57.98
30 g PBZ/tree	15.60	16.20	0.121	0.120	57.92	57.90
40 g PBZ/tree	15.32	16.30	0.119	0.121	58.10	58.00
L.S.D. 0.05	7.78	7.96	NS	NS	NS	NS

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### تنظيم الحمل لأشجار المانجو صنف "لانجرا"

ايهلب سعد بشرى

معهد بحوث البساتين □ مركز البحوث الزراعية □ مصر

أجريت هذه الدراسة على أشجار المانجو صنف "لانجرا" المنزرعة ببستان خاص بمنطقة طما، محافظة سوهاج. حيث تم معاملة الأشجار في عامى الحمل الغزير و الحمل الخفيف بالباكلوبترازول بتركيزات صفر، 10، 20، 30، 40 جم/ شجره وذلك بإضافته حول جذع الشجرة خلال الأسبوع الأول من أكتوبر (2010 & 2011) وذلك لدراسة الأثر المتبقي له خلال الموسمين (2011 & 2012) لتنظيم الحمل وزيادة المحصول وتحسين جودة الثمار. وقد أظهرت النتائج أن معاملة الأشجار في عامى الحمل الخفيف و الحمل الغزير بالباكلوبترازول بمعدل 30 أو 40 جرام/ شجره أدت إلى تقليل كل من النموات الخضرية والتبكير فى التزهير والمحصول وزيادة متوسط وزن الثمرة والمحصول وزيادة نسبة المواد الصلبة الذائبة للثمار خلال موسمي الدراسة بالمقارنة بأشجار معاملة المقارنة. أيضاً أدت تلك المعاملتان إلى زيادة عدد الثماريخ الزهرية لكل شجرة، عدد الأزهار الخنثي لكل شمراخ زهرى، عدد الثمار المتبقية على الشمراخ الزهرى وعدد الثمار بكل شجرة وذلك بالمقارنة بأشجار معاملة المقارنة في سنة الحمل الخفيف خلال موسمي الدراسة. ولكن لم يكن للمعاملة بالباكلوبترازول تأثير سواء في موسمي الحمل الغزير أو الحمل الخفيف على صفة وزن البذرة، نسبة وزن اللب/ البذرة، الحموضه و فيتامين ج.

لذا توصى هذه الدراسة بضروره معاملة أشجار المانجو صنف "لانجرا" في سنة الحمل الخفيف أو الحمل الغزير بالباكلوبترازول بمعدل 30 أو 40 جرام / شجره لتقليل تبادل الحمل وتحسين المحصول والصفات الثمريه.

قام بتحكيم البحث

كلية الزراعة – جامعة المنصورة  
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