

EFFECT of SOME DORMANCY BREAKING AGENTS ON BUD BEHAVIOUR , VEGETATIVE GROWTH , FRUIT SET AND YIELD OF " CANINO " APRICOT.

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ABSTRACT

"Canino" apricot (*Prunus armeniaca* L.) fruiting trees were sprayed with different bud dormancy breaking compounds on January 20th at different concentrations. Dormex (hydrogen cyanamide) was sprayed at 1,2 and 3% each alone , zinc sulphate at 5% and urea at 6% alone or combined with 3% mineral oil.All Dormex concentrations alone or combined with mineral oil increased floral and vegetative bud opening and increased retained fruits and yield as compared with the untreated trees. Moreover, total indoles and total free amino acids in shoot buds were increased by all treatments compared with the control.The highest values were obtained by using Dormex at 3% followed by Dormex at 2% . Also , all experimental treatments increased leaf content of nitrogen(N) , phosphorus(P) and potassium(K) comparing with the control , especially in treatments of Dormex 3% followed by Dormex 3% + mineral oil 3% ; however , urea at 6% alone or mixed by mineral oil 3% did not have reliable effect .The most effective treatment was spraying Dormex at 3% alone , which gave the highest percentage of opened floral and vegetative buds and the highest yield (kg/tree) .

INTRODUCTION

Apricot (*Prunus armeniaca* L.) is a deciduous fruit tree related to Rosaceae family, subfamily *Prunoideae*, which produces stone fruits (Drupe).Apricot fruits are delicious used as fresh, dried and canned .Apricot "Canino" cultivar is an introduced cultivar producing high yield in newly reclaimed lands. It is described by a distinct period of bud endo-dormancy (rest) , which extends from late fall till early spring.Vegetative and flower bud opening in the next spring needs overcoming such dormancy (Westwood, 1993).

In warm winter regions, the most of deciduous fruit tree species as apricot, plum, peach and pome fruits need the application of bud breaking agents to produce high percentages of bud opening and good yield (Erez and lavi, 1985).

The hydrogen cyanamide (H_2CN_2) was sprayed by many researchers at different concentrations (0-5%) and times (during January and February) for different apricot cultivars. Stadler, *et al.* (1991) and Shaltout, *et al.* (1993) promised using Dormex (hydrogen cyanamide) on 'Canino' apricot and Santa Rosa Plum at 2%. The promised concentration of Dormex on 'Canino' apricot was 3% (Shakweer, 2004 and Fathi, *et al.*, 2008).

Aksoy, *et al.* (1995) used potassium nitrate and hydrogen cyanamide for breaking bud dormancy of apricot. Stone fruits were sprayed by oil plus DNOC for bud breaking dormancy (Erez, *et al.*, 1995). Shakweer (2004) used mineral oil at 5% for bud dormancy breaking of 'Canino' apricot. However, Fathi, *et al.* (2008) sprayed mineral oil at 3% plus Dormex at 3% for 'Canino' apricot bud breaking dormancy.

Thiourea was sprayed at 1% on 'Canino' apricot and some apricot varieties on 5 February for breaking bud dormancy (Küden, *et al.*, 1995 a & b on apricot, peach and nectarine and Küden, *et al.*, 1997 on apricot).

The aim of the present investigation was to study the effect of some dormancy breaking agents (hydrogen cyanamide 'Dormix', urea, zinc sulphate, either alone or combined with mineral oil) on bud behaviour, vegetative growth and fruit yield of "Canino" apricot cultivar.

MATERIALS AND METHODS

This study was conducted during two successive seasons of 2006 and 2007 on fruiting 'Canino' apricot trees (12 years old) grafted on apricot seedlings and grown at 6 x6 meters apart in clay soil of a private orchard at Fedemeen, Fayoum governorate. Thirty-six nearly uniform trees were selected for the investigation. The trees were subjected to the ordinary orchard management. Each treatment consisted of three replicates with one tree for each replicate and twelve shoots and twelve spurs were selected on each replicate around the perimeter of the tree. At bud swelling, the trees were sprayed on January 20th each season with one of the following treatments:

1. control (sprayed with water).
2. Dormex at 1% .
3. Dormex at 1% + mineral oil at 3%.
4. Dormex at 2% .
5. Dormex at 2% + mineral oil at 3%.
6. Dormex at 3% .
7. Dormex at 3% + mineral oil at 3%.
8. Mineral oil at 3% .
9. Zinc sulphate (ZnSO₄) at 5% .
10. Zinc sulphate at 5% + mineral oil at 3%.
11. Urea [CO(NH)₂] at 6% .
12. Urea at 6% + mineral oil at 3%.

Dormex is a commercial name of hydrogen cyanamide (49% H₂CN₂).

Experiment measurements:

1. Bud activity:

The percentages of dormant, opened flower and vegetative buds were calculated at the end of the bursting period .

2. Vegetative growth:

Ten current season's shoots were selected at random from each replicate for determining the following measurements.

- Shoot thickness (cm), was measured on September 1st from the base of shoot by using vernier caliper.

- Shoot length (cm), was measured on September 1st from the base of shoot to the top of shoot by using metric measure.
- The number of leaves/shoot, was measured on September 1st by counting the number of leaves for each shoot.
- leaf area (cm²) was measured in mature leaves (5-6-7-8-) from the top on July 15th by using leaf area meter.

3. Final fruit set:

Percentages of fruit set on shoots and spurs were calculated after one month of petal fall in relation to the total number of flowers according to the equation cited by Westwood (1993):

$$\text{Fruit set (\%)} =$$

4. Fruit yield:

At the commercial picking time of the 'Canino' cultivar, yield (Kg/tree) was recorded.

$$\frac{\text{No of fruit set}}{\text{No of flowers}} \times 100$$

5. Determination of bud content of total indoles and total free amino acids .

Samples of 1g of shoot buds of each replicate on Sept.15th of the 1st season were freshly grained and extracted with 80% methyl alcohol for 72hrs, the alcohol being changed every 24 hrs .The compined extract was filtered for estimation of :

5.1. Total indoles :

P-dimethyl amino Benzaldehyde test (Larsen *et al.* , 1962) was followed .The concentration was calculated from a standard curve of indole actic acid as mg/100 g dry weight.

5.2. Total free amino acids :

Total free amino acids (g/100g dry weight) were determined according to Rosein (1957).The concentration was calculated from a standard curve of glutamic acid .

6. Determination of leaf mineral content:

Leaf mineral content was determind only in the 1st season (2007). Samples of shoot mature leaves (5-6-7-8-) from the top were collected in Sept.15th and 0.5 of eash sample was digested using the H₂ SO₄ and H₂O₂ as described by Cottenie (1980). To determine the following minerals:

- ◇ Nitrogen content (g/100 g D Wt) was determined in the digested solution by the modified microkjeldahl method as described by Plummer (1971).
- ◇ Phosphorus content (g/100 g D Wt) was determined colorimetrically according to the method of Jackson (1958).
- ◇ Potassium content (g/100 g D Wt) was determined using flame photometer (Piper, 1950).

STATISTICAL ANALYSIS:

The treatments were arranged in a randomized complete block design with three replicates.Each replicate consisted of one tree. Obtained data were subjected to analysis of variance according to the methods described by Snedecor and Cochran (1990).Means were compared using the Duncan multiple range test at 5% level (Duncan, 1955).

RESULTS AND DISCUSSION

1. Effect of different dormancy breaking agents on percentages of dormant, floral and vegetative buds open of shoots:

1.1 Dormant buds%:

Dormant bud percentages of "Canino" apricot as affected by different dormancy breaking agents are presented in Table 1. In the first and second seasons, all treatments reduced significantly dormant bud percentage/shoot as compared with the control (untreated trees). The lowest dormant bud percentage/shoot (4.68 and 1.07%) resulted from spraying Dormex alone at 3% in the first and second seasons, respectively, followed by 6.54 and 2.43%, which were obtained from the treatment of Dormex 3% + mineral oil 3% as compared with the highest percentages of dormant buds/shoot were recorded with the control (45.89 and 40.58%) in the first and second seasons, respectively. The other treatments recorded in between values of dormant buds/shoot percentages.

1.2 Opened floral buds%:

Opened floral bud percentages of "Canino" apricot as affected by different dormancy breaking compounds are presented in Table 1. In the first season, all treatments increased significantly opened floral bud percentage/shoot as compared with the control. However, in the second season the treatments of Dormex alone or combined with mineral oil at all concentrations in addition to mineral oil alone at 3% increased significantly opened floral bud percentage/shoot but the other treatments of zinc sulphate 5% + mineral oil 3%; urea 6% alone or combined with mineral oil did not increase significantly the floral bud percentage as compared with the control. The highest opened floral bud percentage/shoot (34.10 and 33.43%) in the first and second seasons, respectively, resulted from spraying Dormex alone at 3% followed by (33.40 and 32.47%) resulted from the treatment of Dormex 3% + mineral oil 3% . while the lowest percentage recorded with the control (18.49 and 16.80%) in the first and second seasons, respectively.

1.3 Opened vegetative buds%:

Opened vegetative bud percentages of "Canino" apricot as affected by different dormancy breaking compounds are presented in Table 1. In the first season, all treatments increased significantly opened vegetative bud percentages as compared with the control, however, in the second season the treatments of Dormex alone or combined with mineral oil at all concentrations in addition to mineral oil alone at 3% significantly increased opened vegetative bud percentages but the other treatments of zinc sulphate 5% + mineral oil 3%; urea 6% alone or combined with mineral oil did not increase significantly the vegetative bud percentage as compared with the control. The highest vegetative bud percentage/shoot (61.22 and 65.50%) in the first and second seasons, respectively, resulted from spraying Dormex alone at 3% followed by 60.06 and 65.10% were obtained from the treatment of Dormex 3% + mineral oil 3% as compared with the lowest percentage of the control (35.62 and 42.62%) in the first and second seasons, respectively.

The present results of dormant, open floral and vegetative buds/shoot are in agreement with the previous results obtained by many investigators on apricot (Stadeler, *et al.* 1991; Aksoy, *et al.* 1995; Forlani and Vaio, 1997; Shakweer, 2004; Mahrous and El-Fakhrani. 2006 and Fathi, *et al.* 2008).

2. Effect of different dormancy breaking agents on "Canino" apricot vegetative growth:

2.1 Shoot thickness:

Shoot thickness of "Canino" apricot as affected by different dormancy breaking agents are presented in Table 2. All treatments did not differ significantly than the untreated trees (control). The highest insignificant shoot thickness were recorded by using Dormex 3% (0.40 and 0.41 cm) as compared with the control (0.36 and 0.36 cm) in the first and second seasons, respectively.

2.2 Shoot length:

Results in Table 2 indicate the effect on shoot length of "Canino" apricot. All treatments of different dormancy breaking compounds significantly increased shoot length than the untreated trees (control) except the treatments of urea 6% and urea 6% + mineral oil 3% which recorded insignificant increment than the control. The highest significant shoot lengths values (29.6 and 30.2 cm) were recorded by using Dormex 3% followed by the treatment of Dormex 3% + mineral oil 3% (27.4 and 28.2 cm) as compared with the lowest shoot lengths of the control (16.1 and 17.2 cm) in the first and second seasons, respectively. The other treatments recorded in between shoot length values.

2.3 Number of leaves/shoot:

The number of leaves/shoot of "Canino" apricot as affected by different dormancy breaking agents are presented in Table 2. All treatments significantly increased the numbers of leaves/shoot as compared with the control in the two studied seasons except the treatments of urea 6% and 6% + mineral oil 3% in the second season. The highest numbers of leaves/shoot (23.0 and 23.6) were recorded by using Dormex 3% alone followed by the treatment of Dormex 3% + mineral oil 3% (22.3 and 23.2) as compared with the lowest numbers (12.1 and 13.3), which resulted from the control in the first and second seasons, respectively. The other treatments gave in between values of numbers of leaves/shoot in the two studied seasons.

2.4 Leaf area:

Results in Table 2 show the effect of different dormancy breaking compounds on leaf area (cm²). All treatments significantly increased the shoot leaf area as compared with the control in the two successive studied seasons. The highest leaf area values (66.91 and 71.09 cm²) were obtained by spraying Dormex alone at 3% followed by the treatment of Dormex at 3% + mineral oil 3%, which recorded 65.95 and 69.95 cm² in the first and second seasons, respectively as compared with the lowest leaf area which resulted from the control trees (49.1 and 55.32 cm²). The other treatments gave in between values of shoot leaf area in the two successive studied seasons.

3. Effect of different dormancy breaking compounds on final fruit set:

3.1 Final fruit set% on shoots:

Final fruit set percentage on shoots of "Canino" apricot as affected by different dormancy breaking compounds is presented in Table 3. In the first and second seasons, all treatments significantly increased final fruit set percentage/shoot as compared with the control (untreated trees) except the treatment of urea 6% + mineral oil 3% which was insignificant. The highest significant final fruit set percentage/shoot 15.95 and 33.08% in the first and second seasons, respectively, were resulted from spraying Dormex alone at 3% followed by 15.92 and 32.81% which were obtained from the treatment of Dormex 3% + mineral oil 3% as compared with the lowest percentages of final fruit set%/shoot of the control (7.00 and 11.27%) in the first and second seasons, respectively. The other treatments recorded in between values of final fruit set percentages /shoot.

3.2 Final fruit set% on spurs:

Final fruit set percentage on spurs of "Canino" apricot as affected by different dormancy breaking compounds is presented in Table 3. In the first and second seasons, all treatments increased significantly final fruit set percentage/spur as compared with the control (untreated trees) except the treatments of urea 6% alone in the second season and urea 6%+ mineral oil 3% in the two studied seasons, which were insignificant. The highest significant final fruit set percentage/spur (25.49 and 32.47%) in the first and second seasons, respectively, resulted from spraying Dormex alone at 3% followed by 25.20 and 31.12%, which were obtained from the treatment of Dormex 3% + mineral oil 3% as compared with the lowest percentages of final fruit set%/spur of the control (14.61 and 18.637%) in the first and second seasons, respectively. The other treatments recorded in between values of final fruit set/spur percentages.

The present results agree with those obtained by many investigators on apricot (Stadeler, *et al.* 1991; Aksoy, *et al.* 1995; Forlani and Vaio, 1997; Shakweer, 2004; Mahrous and El-Fakhrani. 2006 and Ftahi, *et al.* 2008). Who stated that using dormancy breaking agents increased percentage of final fruit set as compared with the untreated trees.

4. Effect of different dormancy breaking agents on "Canino" apricot (Kg/tree) :

The fruit yield (Kg/tree) of "Canino" apricot as affected by different dormancy breaking agents during 2006 and 2007 seasons is presented in Table 3. All treatments of different dormancy breaking compounds significantly increased fruit yield (Kg/tree) than the untreated trees (control) except the treatment of urea 6% + mineral oil 3% which recorded insignificant increment in yield than the control. The highest yield (Kg/tree) values (75.53 and 100.33 Kg/tree) were obtained by using Dormex alone at 3% followed by the treatment of spraying Dormex at 3% + mineral oil 3% ,which recorded 65.33 and 95.14 kg/tree in the first and second seasons, respectively as compared with the lowest yield (Kg/tree), which resulted from the control trees (35.14 and 50.16 Kg/tree). The other treatments gave in between values of yields (kg/tree) in the two successive studied seasons as compared with the control.

Many investigators on apricot (Stadeler, *et al.* 1991; Aksoy, *et al.* 1995; Forlani and Vaio, 1997; Shakweer, 2004; Mahrous, *et al.* 2006 and Ftahi, *et al.* 2008) stated that using dormancy breaking agents increased fruit yield (as number of fruits/tree or Kg./tree) as compared with the untreated trees and these results are in harmony with the present obtained results as regard with fruit yield

Table (3): Effect of different dormancy breaking agents on final fruit set percentages on shoots and spurs and total yield (kg / tree)

Treatments	Final fruit set on shoots (%)		Final fruit set on spurs(%)		Yield (Kg/tree)	
	2006	2007	2006	2007	2006	2007
Control	7.00 D	11.27 E	14.61 E	18.63 I	35.14 H	50.16 H
Dormex 1%	13.79 B	22.83 C	19.75 B	28.03 CDE	55.21 D	83.27 CD
Dormex 1% + Mineral oil at 3%.	13.65 B	22.71 C	19.49 B	26.23 DE	53.10 D	80.55 CD
Dormex 2%	15.87 A	27.21 B	25.05 A	30.05 ABC	65.12 B	90.11 CD
Dormex 2%+ Mineral oil at 3%.	14.50 AB	26.33 B	24.89 A	28.78 BCD	60.34 C	87.20 BC
Dormex 3%	15.95 A	33.08 A	25.49 A	32.47 A	75.53 A	100.33 A
Dormex 3% +Mineral oil at 3%.	15.92 A	32.81 A	25.20 A	31.12 AB	65.33 B	95.14 AB
Mineral oil at 3%.	13.04 B	22.44 C	19.21 BC	25.51 EF	50.24 E	75.67 DE
Zinc Sulphate 5%	12.98 B	20.32 CD	18.88 BC	23.06 FG	45.27 F	65.10 EF
Zinc Sulphate 5%+ Mineral oil at 3%.	12.87 B	19.43 D	18.04 C	21.61 GH	41.20 G	60.77 FG
Urea 6%	9.32 C	18.79 D	16.36 D	19.41 HI	40.56 G	60.11 FG
Urea 6% + Mineral oil at 3%.	8.97 C	13.06 E	15.09 DE	19.38 HI	38.68 G	55.43 GH

of "Canino" apricot in 2006 and 2007 seasons .

5. Effect of different dormancy breaking agents on total indoles and free amino acids of "Canino" apricot buds:

5.1. Total indoles :

Total indoles (mg/100 g FW) of "Canino" apricot fresh buds as affected by different bud dormancy breaking compounds during 2007 season are shown in Table 4. Total indoles values were increased by all different dormancy breaking compounds as compared with the control, except the treatment of mineral oil 3% alone. The highest bud indoles values (53.43 mg/100 gFW) were obtained by using Dormex at 3% followed by the treatment of spraying Dormex at 2%, which recorded 51.67 mg/100 gFW) as compared with the lowest indoles values , which resulted from the control treatment (35.51 mg/100 gFW). The other treatments gave in between values of bud total indoles content in 2007 season as compared with the control.

5.2 Total free amino acids:

Total free amino acids of buds (mg/100 gFW) of "Canino" apricot fresh buds as affected by different bud dormancy breaking compounds during 2007 season are presented in Table 4. Total free amino acids values were increased by all different dormancy breaking compounds as compared with the control. The highest bud total free amino acid values (0.204 mg/100 gFW)

were obtained by using Dormex at 3% followed by both treatments of spraying Dormex at 2% and Dormex 3% + mineral oil, which recorded 0.189 mg/100 gFW as compared with the lowest total free amino acid values which resulted from the control treatment (0.092 mg/100 gFW).

Table (4): Effect of different dormancy breaking agents on total indoles and total free amino acids content in fresh buds and mineral content in dry leaves of "Canino" apricot in 2007 season.

Treatments	Total indoles (mg/100g fw)	Total free amino acid(mg/100g fw)	N (%)	P (%)	K (%)
Control	35.51 I	0.092 K	1.276 F	0.157 G	1.522 E
Dormex 1%	46.13 F	0.159 D	2.224 C	0.455 D	2.122 BCD
Dormex 1% + Mineral oil at 3%.	38.33 H	0.137 F	1.956 D	0.27 E	2.115 BCD
Dormex 2%	51.67 B	0.189 B	2.73 AB	0.805 B	2.270 AB
Dormex 2%+ Mineral oil at 3%.	50.93 BC	0.180 C	2.557 B	0.788 B	2.267 AB
Dormex 3%	53.43 A	0.204 A	2.86 A	1.053 A	2.538 A
Dormex 3% +Mineral oil at 3%.	47.74 E	0.189 B	2.845 A	0.835 B	2.512 A
Mineral oil at 3%.	38.63 H	0.143 E	1.875 DE	0.557 C	2.218 ABC
Zinc Sulphate 5%	50.39 C	0.134 G	1.757 DE	0.258 E	2.055 BCD
Zinc Sulphate 5%+ Mineral oil at 3%.	45.77 F	0.121 H	1.728 DE	0.226 EF	1.908 BCD
Urea 6%	49.02 D	0.114 I	1.680 DE	0.224 EF	1.864 CDE
Urea 6% + Mineral oil at 3%.	44.26 G	0.107 J	1.603 E	0.197 FG	1.768 DE

6. Effect of different dormancy breaking agents on N, P and K contents in leaves:

Nitrogen (N%). phosphorus (P%) and potassium (K%) content in dry shoot leaves of "Canino" apricot as affected by different bud dormancy breaking compounds during 2007 season are presented in Table 4. As regard to nitrogen content (%), all treatments significantly increased significantly N content as compared with the control. The highest N content (2.86%) was recorded by the treatment of Dormex at 3% followed by the treatment of Dormex 3% + mineral oil 3%, which recorded (2.845%) as compared with the lowest N content value (1.276%) resulted from the control. The other treatments gave in between values of N content in dry leaves as compared with the control.

As regard to P content (%), all treatments increased significantly P content as compared with the control except the treatment of urea 6% + mineral oil 3%. The highest P content (1.053%) was recorded by the treatment of Dormex at 3% followed by the treatment of Dormex 3% + mineral oil 3% which recorded (0.835%) as compared with the lowest P content value (0.157%) resulted from the control. The other treatments gave intermediate values of P content in leaves as compared with the control.

Regarding K content (%), all treatments significantly increased K content as compared with the control except the treatments of urea 6% alone and urea 6% + mineral oil 3%. The highest K content (2.538%) was

recorded by the treatment of Dormex at 3% followed by the treatment of Dormex 3% + mineral oil 3% which recorded (2.512%) as compared with the lowest K content value (1.522%) resulted from the control. The other treatments gave in between values .

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تأثير بعض المواد الكاسره للسكون على سلوك البراعم والنمو الخضري والعقد وكمية المحصول في المشمش صنف الكانيو .

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**** قسم فاكهة متساقطة - معهد بحوث البساتين - مركز البحوث الزراعيه - الجيزه.**

تم رش اشجار المشمش صنف " كانيو " بمواد مختلفه كاسره لسكون البراعم فى ٢٠ يناير خلال الموسمين ٢٠٠٦ و ٢٠٠٧ بتركيزات مختلفه .دورمكس (سيناميد الهيدروجين) بتركيز ١ و ٣% وسلفات الزنك بتركيز ٥% واليوريا ٦% بمفردها أو مخلوط بزيت معدنى بتركيز ٣%. جميع تركيزات الدورمكس التى رشت مفردة أو مخلوطه مع الزيوت المعدنيه زودت تفتح البراعم الزهرية والخضريه والعقد النهائى والمحصول بالمقارنه بالمعاملات الاخرى وعلاوه على ذلك الاندولات الكلية والاحماض الامينيه الحره الكلية فى براعم الفرع زادت فى كل المعاملات بالمقارنه بالكنترول . أعلى القيم تم الحصول عليها برش الدورمكس ٣% يليه الدورمكس ٢% . كذلك جميع المعاملات المستخدمه زودت محتوى الأوراق من النيتروجين والفسفور والبوتاسيوم بالمقارنه بالكنترول وخاصتا فى الدورمكس ٣% يليه الدورمكس ٣% + ٣% زيت معدنى بينما اليوريا ٦% بمفردها أو مختلطه بالزيت المعدنى ٣% لا يوجد لهم تأثير . وكانت المعامله أكثر فاعليه هى المعامله الدورمكس ٣% بمفرده .التى اعطت أعلى نسبه تفتح للبراعم الزهرية والخضريه .وأعلى محصول (كجم / للشجره) بالمقارنه بالكنترول.

Table (1): Effect of different dormancy breaking agents on percentages of dormant, opened floral and vegetative buds/shoot of 'Canino' apricot in 2006 and 2007 season.

Treatments	Dormant buds(%)		Opened floral buds (%)		Opened vegetative buds(%)	
	2006	2007	2006	2007	2006	2007
Control	45.89 A	40.58 A	18.49 G	16.80 E	35.62 H	42.62 E
Dormex 1%	15.61 G	6.7 G	29.12 B	31.03 B	55.27 C	62.27 AB
Dormex 1% + Mineral oil at 3%.	17.06 F	10.61 F	28.83 B	29.28 B	54.11 CD	60.11 AB
Dormex 2%	11.66 I	3.88 HG	29.21 B	32.44 AB	59.13 AB	63.68 AB
Dormex 2%+ Mineral oil at 3%.	13.49 H	5.63 GH	29.19 B	31.24 B	57.32 B	63.13 AB
Dormex 3%	4.68 K	1.07 J	34.10 A	33.43 A	61.22 A	65.50 A
Dormex 3% +Mineral oil at 3%.	6.54 J	2.43 IJ	33.40 A	32.47 AB	60.06 A	65.10 A
Mineral oil at 3%.	18.78 E	16.92 E	28.12 BC	24.98 C	53.10 D	58.10 ABC
Zinc Sulphate 5%	22.76 D	23.26 D	26.83 CD	21.33 D	50.41 E	55.41 BCD
Zinc Sulphate 5%+ Mineral oil at 3%.	29.11 C	32.09 C	25.30 DE	18.36 DE	45.59 F	49.55 CDE
Urea 6%	19.49 C	31.18 C	24.40 EF	17.70 E	46.11 F	51.12 CDE
Urea 6% + Mineral oil at 3%.	36.09 B	34.49 B	22.79 F	17.41 E	41.12 G	48.10 DE

Means within each column which have similar letters are not significantly different according to Duncan test at 5% level.

Table (2): Effect of different dormancy breaking agents on "Canino" apricot shoot thickness and length, the number of leaves/shoot, and leaf area in 2006 and 2007 seasons.

Treatments	Shoot thickness (cm)		Shoot length (cm)		Number of leaves/shoot		leaf area (cm ²)	
	2006	2007	2006	2007	2006	2007	2006	2007
Control	0.36 A	0.36 A	16.1 D	17.2 F	12.1 H	13.3 G	49.1 F	55.32 G
Dormex 1%	0.39 A	0.39 A	25.7 B	26.2 B	19.7 CD	20.10 ABCD	57.92 B	66.97 CD
Dormex 1% + Mineral oil at 3%.	0.38 A	0.37 A	24.9 B	25.7 BC	18.4 D	19.3 BCDF	55.91 C	64.96 DE
Dormex 2%	0.39 A	0.40 A	26.8 AB	27.3 AB	19.6 CD	21.7 ABC	59.22 B	67.86 BC
Dormex 2%+ Mineral oil at 3%.	0.39 A	0.39 A	26.1 B	26.8 B	17.9 DE	20.4 ABCD	58.97 B	67.52 C
Dormex 3%	0.40 A	0.41 A	29.6 A	30.2 A	23.0 A	23.6 A	66.91 A	71.09 A
Dormex 3% +Mineral oil at 3%.	0.39 A	0.39 A	27.4 AB	28.2 AB	22.3 AB	23.2 AB	65.95 A	69.95 AB
Mineral oil at 3%.	0.38 A	0.37 A	21.1 C	22.7 CD	16.3 EF	18.3 CDEF	54.36 CD	63.33 E
Zinc Sulphate 5%	0.38 A	0.37 A	21.7 C	21.9 DE	21.1 BC	18.1 DEF	53.16 D	59.59 F
Zinc Sulphate 5%+ Mineral oil at 3%.	0.38 A	0.37 A	21.2 C	21.7 DE	17.8 DE	17.4 DEF	52.46 DE	59.50 F
Urea 6%	0.37 A	0.37 A	19.0 CD	20.4 DEF	14.6 FG	15.2 EFG	51.14 E	58.97 F
Urea 6% + Mineral oil at 3%.	0.38 A	0.37 A	16.30 D	19.0 EF	14.2 G	14.8 FG	51.0 E	57.65 F

