

Effect Of Using Extracts Of Mugwort, Chicken, Lupine Seeds And Licorice As Partial Replacement Of Dormex On Behaviour Of Buds, Blooming, Berry Setting, Growth And Vine Nutritional Status Of Superior Grapevines Grown Under Qena Conditions

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Abstract: During 2015 and 2016 seasons, Superior grapevines grown under Qena region were treated once (11 & 12 Jan) with dormex at 4% alone and dormex at 1 to 2% and/or any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) each at 10%. The study focused on the effect of these treatments on behaviour of buds, blooming, berry setting, growth and vine nutritional status. Subjecting the vines once to dormex at 4% alone and dormex at 1 to 2% and/or any one of the four plant extracts namely mugwort, chicken, lupine seeds and licorice each at 10% had an announced promotion on start and end of bud burst, blooming and berry setting, percentages of bud burst and fruiting buds, growth aspects, pigments and nutrients and a reduction on durations of bud burst, blooming and berry setting stages and percentage of dormant buds relative to the control. The best plant extracts in this respect were mugwort, chicken, lupine seeds and licorice each at 10%, in ascending order. Using dormex at 1 to 2% and/or any one of the four plant extracts were preferable than using dormex at 1 to 2% alone. For advancing bud break and enhancing fruiting buds, growth aspects and vine nutritional status, it is necessary to treat Superior grapevines grown under Qena region once (11 & 12 Jan.) with dormex at 4% or dormex at 2% plus extract of licorice at 10%.

[Faissal F. Ahmed; Mohamed M. A. Abada and Mohamed M. M. Osman. **Effect Of Using Extracts Of Mugwort, Chicken, Lupine Seeds And Licorice As Partial Replacement Of Dormex On Behaviour Of Buds, Blooming, Berry Setting, Growth And Vine Nutritional Status Of Superior Grapevines Grown Under Qena Conditions.** *N Y Sci J* 2018;11(2):24-34]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 4. doi: [10.7537/marsnys110218.04](https://doi.org/10.7537/marsnys110218.04).

Keywords: Dormex, mugwort, chicken, lupine seeds, licorice, breaking bud burst, blooming, berry setting, growth and vine nutritional status, Superior grapevines

1. Introduction

Growing grapevines (*Vitis vinifera* L.) in warm regions still poses agronomic challenges. Interest in bud dormancy breaking agents is closely related to commercial attempts to grow grapevines in mild winter locations, where chilling requirements are not necessarily met and, in absence of chemical bud breaking agents, the results are uneven bud break and low bud break rates, which lead to management problems later in the growth season, resulting in reducing yield (Erez, 1987), uneven maturity and delayed harvests are problems as well (Shulman *et al.*, 1986).

Recently, more efforts were done to eliminate using of synthetic substances throughout agricultural practices for improving bud break. Using natural plant extracts were the new alternative compounds for improving fruiting buds, growth and nutritional status of fruit orchards as safety agents for human and environment.

However, the use of natural products in horticultural practice instead of other synthetic chemical products is becoming a main target for many fruit crop producers, where, the world market

has been growing rapidly in recent years for organic fruit production (Dimitri and Oberholtzer, 2006).

Using natural rest breakages as replacement of chemical ones in sustainable agriculture system for breaking dormancy and promoting yield and quality of the berries in different grapevines cvs. was reviewed by many authors (Abdalla, 2007; Botelho *et al.*, 2010; Corrales- Maldonado *et al.*, 2010; Eshghi *et al.*, 2010; Ahmed *et al.*, 2014; Osman, 2014; Ebrahim-Rehab, 2016; Carvalho *et al.*, 2016 and El-Saman, 2017)..

The target of this study was examining the effect of using four plant extracts (mugwort, chicken, lupine seeds and licorice) as partial replacement of dormex on behaviour of buds, growth and vine nutritional status of Superior grapevines grown under Qena region.

2. Materials and Methods

This study was carried out during the two consecutive seasons of 2015 and 2016 on ninety-six uniform in vigour 10-years old Superior grapevines grown in a private vineyard located at El-Makhatma Village, Qena district, Qena Governorate where the

soil texture is clay and well drained water since water table depth is not less than two meters (Table 1). The chosen vines are planted at 2 x 3 meters apart. Cane pruning system was followed at the first week of Jan. leaving 84 eyes per vine (on the basis of six fruiting canes x 12 eyes plus six renewal spurs x two eyes) with the assistance of Gabel shape supporting system. The vines were irrigated through drip irrigation system using Nile water.

The goal of this study was examining the impact of some natural and chemical rest breakages on behavior of buds, growth aspects, leaf chemical components and fruiting of Superior grapevines grown under Qena region conditions.

Soil analysis was done according to **Piper, (1950) and Wilde et al., (1985)** and the obtained data are shown in Table (1).

Table (1): Analysis of the tested soil

Constituents	values
Particle size distribution	
Sand %	5.0
Slit %	20.0
Clay %	75.0
Texture %	Clay
pH (1:2.5 extract)	7.7
O.M. %	2.50
CaCO ₃ %	1.92
Total N%	0.10
Available P (Olsen method, ppm)	6.3
Available K (ammonium acetate, ppm)	490
EDTA extractable micronutrients (ppm):	
Zn	2.2
Fe	2.4
Mn	2.5

All the chosen vines received regular and horticultural practices that already applied in the vineyard except those dealing with the application of natural and chemical rest breakages. These practices included hoeing, pest control management, irrigation and fertilization with 20m³ farmyard manure (0.3% N, 0.4% P₂O₅ and 1.2% K₂O), 200 kg ammonium sulphate (20.6% N), 250 kg calcium triple superphosphate (37.5% P₂O₅) and 250 kg potassium sulphate (48% K₂O). Farmyard manure was added once at the first week of Jan. in both seasons. Ammonium sulphate was added at four unequal batches 30% at the first week of Feb. 10% at the first week of Mar. 30% at the first week of Apr. 20% at one month later (1st week of May) and 10% after harvesting. Phosphate fertilizer was added twice at two equal batches, the first with farmyard manure and the second at the first week of Mar. Potassium fertilizer was applied at two equal batches, the first at

the first week of Feb. and the second at the first week of Apr.

This study consisted from the following sixteen treatments from natural and chemical rest breakages:

- 1- Control (which vines were sprayed with water only).
- 2- Spraying mugwort extract at 10 %
- 3- Spraying chicken extract at 10 %
- 4- spraying lupine seed extract at 10 %
- 5- Spraying licorice at 10 %
- 6- Spraying dormex at 1 %
- 7- Spraying dormex at 1 % + mugwort extract at 10 %
- 8- Spraying dormex at 1 % + chicken extract at 10 %
- 9- Spraying dormex at 1 % + lupine seed extract at 10 %
- 10- Dormex at 1 % + licorice at 10 %
- 11- Spraying dormex at 2 %
- 12- Spraying dormex at 2 % + mugwort extract at 10 %
- 13- Spraying dormex at 2 % + chicken extract at 10 %
- 14- Spraying dormex at 2 % + lupine seed extract at 10 %
- 15- Spraying dormex at 2 % + licorice at 10 %
- 16- Spraying dormex at 4 %

Each treatment was replicated three times, two vines per each. Dormex and the four plant extracts were sprayed once (11th and 12th Jan.) when the vines received 125 and 130 chilling hours at equal or below 7.2 °C during both seasons, respectively in the periods from Nov. 1st till dates of spraying (11th or 12th Jan.). These accumulated chilling hours (125 or 130) at equal or below 7.2 °C were calculated by using temperature data obtained by Luxor airport Meteorological station.

Table (2): Chemical composition of mugwort (% or dry weight basis) (according to Wright, 2002)

Components	Values
N %	1.61
P %	0.22
K %	1.00
Mg %	0.59
Ca %	0.22
Active ingredient (Mg/100 g dry weight)	
a- thujone	20
Camphor	29
b- thujone	61
Artemisia Ketone	64
Borneol acetate	71
Bornyl acetate	21
Cineole	39

Triton B as a wetting agent at 0.05% was added to all chemical and natural rest breakages before application and the buds were received solutions till runoff (0.25 L/vine).

Chemical composition of four oils (mugwort, chicken, licorice and lupine extracts are shown in Tables (2 to 5).

Table (3): Chemical composition of chicken (%) (according to Ekor, 2014).

Components	Values
N %	1.11
P %	0.25
K %	1.00
Mg %	0.41
Glycosides %	4.11
Argline %	1.10
Total flavonoids%	5.11
Campheral %	1.11
Total tannins %	2.59
Cardinoles %	1.09
Beta citocitrol %	0.60
Alpha silica %	0.30
Beta silica %	0.28

Table (4): Chemical composition of lupine seeds (% or dry weight basis) (according to Lampart *et al.*, 2003)

Components	Values
N %	4.8
P %	0.5
K %	1.5
Mg %	0.5
Proteins %	30.0
Tannins %	2.0
Amino acids (mg/100 g dry weight)	
Leucine	20.5
Tyrosine	23.0
Cysteine	30.0
Phenyl alanine	34.0
Fatty acids (mg/100 g dry weight)	
Oleic	23.3
Linoleic	25.0
Linolenic	27.0
Palmatic	29.0
Stearic acid	31.0
Vitamins	195.9

Table (5): Chemical composition of licorice (% or dry weight basis) (according to Fenwickie *et al.*, 1990).

Components	Values
Ash %	5.42
Protein %	7.97
Crude fiber %	37.6
Moisture %	9.04
(Mg/100 g dry weight)	
Mg	174.7
Zn	0.4
Mn	0.4
Fe	1.19
Ca	104.55
K	341.5
Cu	0.18
Total phenols	405.2
Total flavonoids	114.91
Total tannins	47.54
Total saponius	27.99
Total carotenoids	11.78
Vitamin C	1.20
Polyphenols and flavonoids (Mg/ g dry weight)	
Resrocenol	9.22
Protocatechaic acid	11.5
Benzoic acid	14.4
Phenol	18.4
Vanillin	20.43
P-coumaric	21.67
Ferulic acid	22.84
Myrcetin	27.62
Cinnamic acid	31.22
Apignin	29.97
Kaempherol	32.95

The experimental design was randomized complete block with sixteen treatments, with three replicates, two vines per each.

During both seasons, the following parameters were recorded:

1- Start and end of bud burst, bud burst durations (days) and percentages of bud burst, dormant buds and fruiting buds.

2- Start, end and durations of blooming and berry setting (days).

3- Total phenols, ABA, total soluble sugars and total indoles (mg/1g F.W) according to the procedures of **Gordon and Weber (1951)** and **Forcat et al., (2008)**

4- Vegetative growth characteristics namely main shoot length (cm), number of leaves/shoot, leaf area (cm)² (**Ahmed and Morsy, 1999**), wood ripening coefficient (**Bouard, 1966**), average cane thickness (cm) and pruning wood weight (kg/vine)

5- Chlorophylls a & b and total carotenoids (**Von-Wettstein, 1957**) (mg/1g F.W).

6- Percentages of N, P and K in the leaves (on dry weight basis). According to **Peach and Tracey (1968)**, **Chapman and Pratt (1965)** and **Wilde et al., (1985)**.

Statistical analysis was done and different treatment means were compared using new L.S.D. at 5% (**Mead et al., 1993** and **Rao, 2007**).

3. Results and Discussion

1. Behavior of buds

1.1. Bud burst start:

Bud burst start ranged from **7 Feb.** when the vines treated with dormex at 4% to **10 Mar.** in the untreated vines in the first season as shown in Table (6). In the second season, it was ranged from 9 Feb. in treated vines with dormex at 4% to 11 Mar. in the control vines. Treating the vines with dormex at 1 to 4% besides any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) each at 10% materially was accompanied with advancing bud start compared to using dormex at 1 to 2% alone. The advancement in bud burst start was appreciably increased with increasing dormex concentrations from 1 to 4%. The hastening in bud burst start was accompanied with using extracts of mugwort, chicken, lupine seeds and licorice, in ascending order. Using dormex with any plant extracts was preferable than using plant extracts alone in advancing bud burst start. The great advancement on bud burst start (**7 & 9 Feb.**) was achieved on the vines that treated with dormex at 4% followed by those treated with dormex at 2% plus licorice extract at 10% (**9 & 10 Feb.**) during both seasons, respectively. The untreated vines produced

great delays in bud burst start (**10 & 11 Mar.**) during 2015 & 2016 seasons, respectively.

1.2. Bud burst end:

It was greatly advancement by using dormex at 1 to 2% along with any plant extracts (mugwort, chicken, lupine seeds and licorice) rather than using dormex at 1 to 2% or any plant extract alone (Table 6). Increasing concentrations of dormex caused a gradual promotion on bud burst end. The four plant extracts regarding their advancing effect on bud burst end could be arranged as follows in descending order, licorice, lupine seeds, chicken and mugwort. Treating the vines with dormex at 4% gave an obvious hastening on bud burst end. Vines under dormex at 4% treatment ended bud burst on **16 & 17 Feb.**, while those untreated ended bud burst on **4 & 6 Apr.** during both seasons, respectively. Bud burst end was **19 & 20 Feb.** in the vines that treated with dormex at 4%+ licorice extract at 10% during 2015 & 2016 seasons, respectively.

1.3. Bud burst durations:

As shown in Table (6) bud burst durations was varied significantly among the sixteen dormex and plant extract treatments. It was ranged from **9 & 8 days** in the vines that treated with dormex at 4% to **25 & 26 days** in the untreated vines during both seasons, respectively. Combined applications of dormex at 1 to 2% and any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) significantly was followed by reducing bud burst durations compared with using dormex or plant extracts alone. The reduction on bud burst durations was significantly associated with using extracts of mugwort, chicken, lupine seeds and licorice each at 10%, in ascending order. Bud burst durations were 10 days in the vines that treated with dormex at 2% plus licorice extract at 10% during both seasons.

1.4. Bud burst and fruiting buds:

Data in Table (6) declared that single and combined applications of dormex at 4%, dormex at 1 to 2% and extracts of mugwort, chicken, lupine seeds and licorice each at 10% significantly was responsible for enhancing the percentages of bud burst and fruiting buds relative to the control. The promotion was significantly associated with increasing concentrations of dormex. The best plant extracts regarding the promotion on percentages of bud burst and fruiting buds could be arranged as follows in descending order, licorice, lupine seeds, chicken and mugwort. Using dormex at 1 to 2% besides any plant extracts (mugwort, chicken, lupine seeds and licorice) was significantly favourable than using dormex or plant extracts alone, in this respect. The maximum percentage of bud burst (**88.2 & 90.0%**) and fruiting buds (**36.8 & 37.6%**) were recorded on the vines that treated with dormex at 4%

alone during both seasons, respectively. The percentages of bud burst reached **87.1 & 88.6%** and fruiting buds reached **36.1 & 36.8%** in the vines treated with dormex at 2% plus extract of licorice at 10% during both seasons, respectively. The untreated vines produced the minimum values of bud burst (**64.0 & 66.0%**) and fruiting buds (**26.6 & 27.0%**) during 2015 and 2016 seasons, respectively. These results were true during both seasons.

1.5. Percentage of dormant buds:

As illustrated in Table (6) dormant buds was significantly reduced by using dormex at 4%, dormex at 1 to 2% and/or any plant extracts of mugwort, chicken, lupine seeds and licorice each at 10% relative to the control. The reduction was significantly related to the increase in dormex concentrations from 0.0 to 4%. Using dormex at 1 to 2% and/or any plant extracts (mugwort, chicken, lupine seeds and licorice) had significant reduction on dormant buds relative to the control. Combined applications of dormex at 1 to 2% plus any one of the four plant extracts were significantly superior than using each alone in reducing the percentage of dormant buds. The lowest percentage of dormant buds (**11.8 & 10.0%**) was recorded on the vines that treated with dormex at 4%, followed by those vines that treated with dormex at 2%+ licorice extract at 10% in which percentage of dormant buds reached **12.9 & 11.4%** during both seasons, respectively. The highest percentages of dormant buds (**35.1 & 34.0%**) were recorded on untreated vines during 2015 and 2016 seasons, respectively. These results were true during both seasons.

2. Start, end and durations of blooming and berry setting:

2.1. Blooming start:

It is clear from the obtained data in Table (7) that blooming start was greatly varied among dormex and plant extract treatments. Using dormex at 4%, dormex at 1 to 2% alone or with any plant extracts (mugwort, chicken, lupine seeds and licorice) each at 10% had an obvious promotion on blooming start relative to the control. The promotion was clearly associated with increasing concentrations of dormex from 1 to 4%. Using any plant extract with dormex at 1 to 2% was superior than using each alone in enhancing blooming start. Blooming was started on **20 & 19 Feb.** in the vines that treated with dormex at 4% alone during both seasons, respectively. Vines treated with dormex at 2% plus licorice extract at 10% started to bloom on **25 & 26 Feb.** during 2015 & 2016 seasons, respectively. The untreated vines started to bloom on **24 & 25 March.** during both seasons, respectively.

2.2. Blooming end:

It was advanced with treating the vines with dormex at 4% alone or when the vines received dormex at 1 to 2% and/or any one of the four plant extracts namely mugwort, chicken, lupine seeds and licorice relative to the control as shown in Table (7). Combined applications of dormex at 1 to 2% and any one of the four plant extracts were preferable than using each alone in accelerating blooming end. Dates of blooming end were **26 & 25 Feb.** in the vines received dormex at 4% alone, while were **3 & 4 Mar.** in the vines that sprayed with dormex at 2%+ licorice extract at 10% during both seasons, respectively. Dates of blooming end in the untreated vines were **10 & 11 April** during 2015 and 2016 seasons, respectively.

2.3. Blooming durations:

Blooming durations were significantly varied among the sixteen dormex and plant extract treatments as illustrated in Table (7). It was reduced significantly with using dormex at 4% alone or dormex at 1 to 2% and/or any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) relative to the control. The reduction on blooming durations was significantly associated with increasing dormex concentrations. The best plant extracts in reducing blooming durations were mugwort, chicken, lupine seeds and licorice each at 10%, in ascending order. The lowest blooming durations (**6.0 & 6.0 days**) were recorded on the vines that treated with dormex at 4% alone and those vines that received dormex at 2% + licorice extract at 10% during both seasons, respectively. Durations of blooming were **15 & 14 days** in the untreated vines during 2015 and 2016 seasons, respectively.

2.4. Berry setting start:

Dates of berry setting start were greatly varied among the sixteen dormex and plant extract treatments as shown in Table (7). Exposing the vines once to dormex at 4% alone, dormex at 1 to 2% and/or any plant extract (mugwort, chicken, lupine seeds and licorice) each at 10% had an obvious promotion on berry setting start relative to the control. The promotion was greatly associated with increasing concentrations of dormex. Using extracts of mugwort, chicken, lupine seeds and licorice each at 10%, in ascending order was essential for hastening berry setting start. Berry setting started on **25 & 24 Feb.** in the vines that treated with dormex at 4% alone and on **2 Mar.** in the vines that received dormex at 2% plus licorice extract at 10% during both seasons, respectively. The untreated vines started to berry setting on **30 Mar. and 1 Apr.** during 2015 and 2016 seasons, respectively.

2.5. Berry setting end:

Dates of berry setting end were greatly varied among the sixteen dormex and plant extract

treatments as illustrated in Table (7). They were obviously enhanced with using dormex at 4% alone, dormex at 1 to 2% and/or any plant extract (mugwort, chicken, lupine seeds and licorice) each at 10% relative to the control. The promotion was accompanied with increasing concentrations of dormex. Using dormex at 1 to 2% besides any plant extract (mugwort, chicken, lupine seeds and licorice) was favourable than using each alone in enhancing berry setting end. Berry setting end in the vines that treated with dormex alone at 4% was **2 Mar. & 29 Feb.** and was **7 Mar.** in the vines that treated with dormex at 2% plus extract of licorice at 10% during 2015 & 2016 seasons, respectively. Dated of berry setting end in the untreated vines were **15 & 16 Apr.** during both seasons, respectively.

2.6. Berry setting durations:

It is clear from the obtained data in Table (7) that treating the vines with dormex at 4% alone and dormex at 1 to 2% and/or any plant extract (mugwort, chicken, lupine seeds and licorice) significantly reduced berry setting durations relative to the control. The reduction on berry setting durations was significantly related to the increase in dormex concentrations. The best plant extracts in reducing berry setting durations were extracts of licorice, lupine seeds, chicken and mugwort, in descending order. Using dormex at 1 to 2% in combined with any plant extract was significantly favourable than using each alone in decreasing berry setting durations. The lowest berry setting durations (**5.0 days**) were recorded on the vines that received dormex at 4% alone, vines received dormex at 2% + licorice extract at 10% or vines treated with dormex at 2% + lupine seeds extract at 10% during both seasons, respectively. The durations of berry setting in the untreated vines reached **16 & 15 days**, during 2015 and 2016 seasons, respectively.

3. Bud content of total phenols, ABA, total indoles and total soluble sugars just after bud burst

It is evident from the obtained data in Table (8) that exposing the vines to dormex at 4% and dormex at 1 to 2% and/or any one of the four plant extracts namely mugwort, chicken, lupine seeds and licorice each at 10% significantly was responsible for enhancing total indoles and total soluble sugars and reducing both total phenols and ABA in the buds just after bud burst relative to the control. The promotion was significantly in proportional to the increase in concentrations of dormex. Using extracts of mugwort, chicken, lupine seeds and licorice each at 10% either alone or in combinations with dormex at 1 to 2% had significant effect on increasing total indoles and total soluble sugars and in reducing ABA and total phenols compared with the control. Using

dormex at 1 to 2% and/or any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) significantly increased total indoles and total soluble sugars and reduced ABA and total phenols compared to using each material alone. The best plant extracts in enhancing total indoles and total soluble sugars and reducing ABA and total phenols were mugwort, chicken, lupine seeds and licorice extracts each at 10%, in ascending order. The highest values of total soluble sugars (**7.8 & 7.2 mg/1g F.W**) and total indoles (**8.7 & 8.4 mg/1 g F.W**) and the lowest values of total phenols (**0.8 & 1.0 mg/1 g F.W**) and ABA (**0.4 & 0.8 mg/1 g F.W**) were recorded on the vines that treated with dormex at 4% alone during 2015 & 2016 seasons, respectively. The untreated vines produced the lowest values of total soluble sugars (**2.6 & 2.4 mg/1g F.W**) and total indoles (**3.1 & 2.9 mg/1 g F.W**) and the highest values of total phenols (**5.1 & 5.4 mg/1 g F.W**) and ABA (**4.1 & 4.4 mg/1 g F.W**) during both seasons, respectively. These results were true during both seasons.

4. Vegetative growth characteristics

It is clear from the obtained data in Tables (8 & 9) that varying dormex and plant extract treatments had significant effect on the six vegetative growth aspects namely main shoot length, number of leaves/shoot, leaf area, wood ripening coefficient, pruning wood weight and cane thickness. Single and combined applications of dormex at 4% and dormex at 1 to 2% and/or any one of the four plant extracts namely mugwort, chicken, lupine seeds and licorice each at 10% significantly stimulated the six growth aspects and the promotion was significantly associated with increasing concentrations of dormex. Using extracts of mugwort, chicken, lupine seeds and licorice each at 10%, in ascending order was very effective in stimulating these growth aspects. Using dormex at 1 to 2% plus any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) was significantly superior than using dormex alone at 1 to 2% in enhancing these growth attributes. The maximum values were recorded on the vines that received dormex at 4% alone and also in the vines that treated with dormex at 2% plus extract of licorice at 10%. The lowest values were recorded on the untreated vines. Similar results were announced during both seasons.

5. Leaf chemical composition

It is obvious from the obtained data in Table (9 & 10) that subjecting the vines once with dormex at 4% alone or dormex at 1 to 2% and/or any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) was significantly favourable in enhancing chlorophylls a & b, total carotenoids, N, P and K in the leaves relative to the control. The

increase in these pigments and nutrients was significantly correlated with increasing concentrations of dormex. The maximum values were recorded when the vines treated with mugwort, chicken, lupine seeds and licorice each at 10%, in ascending order. Using dormex at 1 to 2% plus any one of the four plant extracts (mugwort, chicken, lupine seeds and licorice) was significantly superior to using dormex alone at 1 to 2% in enhancing these leaf components. The maximum values were recorded on the vines that treated with dormex at 4% alone as well as when the vines treated with dormex

at 2% plus licorice extract at 10%. The lowest values were recorded on the untreated vines. These results were true during both seasons.

4. Discussion

The positive action of chemical rest breakages on breaking dormancy and improving productivity of Superior grapevines might be attributed to one or more the following reasons (Pinto *et al.*, 2007; Grappa and Benvides, 2008 and Dong-Mei *et al.*, 2011):

Table (6): Effect of using extracts of Mugwort, Chicken, Lupine seed and Licorice as partial replacement of dormex on the start, end and duration of bud burst and percentages of berry burst setting, dormant buds and fruiting buds of Superior grapevines growing under Qena conditions during 2015 and 2016 seasons.

Treatments	Bud burst start		Bud burst end		Bud burst duration (days)		Bud burst %		Fruiting buds %		Dormant buds %	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	10Mar	11Mar	4Apr	6Apr	25	26	64.9	66.0	26.6	27.0	35.1	34.0
Mugwort extract at 10 %	7Mar	8Mar	31Mar	2Apr	24	25	66.0	67.5	27.3	28.0	34.0	32.5
Chicken extract at 10 %	4 Mar	5Mar	27Mar	28Mar	23	23	67.2	68.8	28.0	28.7	32.8	31.2
Lupine seed extract at 10 %	3 Mar	3Mar	25Mar	25 Mar	22	22	68.4	69.9	28.6	29.3	31.6	30.1
Licorice at 10 %	1 Mar	1Mar	22Mar	22 Mar	21	21	69.6	71.1	29.2	29.9	30.4	28.9
Dormex at 1 %	27Feb	27Feb	19Mar	18 Mar	20	20	70.9	72.5	29.9	30.8	29.1	27.5
Dormex at 1 % + Mugwort extract at 10 %	24 Feb	24Feb	15Mar	14Mar	19	19	72.0	73.6	30.6	31.3	28.0	26.4
Dormex at 1 % + Chicken extract at 10 %	22 Feb	22Feb	12Mar	11Mar	18	18	74.0	75.7	31.3	32.0	26.0	24.3
Dormex at 1 % + Lupine seed extract at 10 %	21 Feb	21Feb	10Mar	9Mar	17	17	75.9	77.4	32.0	32.7	24.1	22.6
Dormex at 1 % + Licorice at 10 %	19 Feb	19Feb	7Mar	6Mar	16	16	77.1	78.6	32.6	33.2	22.9	21.4
Dormex at 2 %	16 Feb	15Feb	4Mar	1Mar	16	15	79.8	81.6	33.2	33.9	21.0	18.4
Dormex at 2 % + Mugwort extract at 10 %	13 Feb	13Feb	28Feb	27Feb	15	14	80.9	82.7	34.0	34.7	19.1	17.3
Dormex at 2 % + Chicken extract at 10 %	11 Feb	11Feb	25Feb	24Feb	14	13	82.9	84.7	34.7	35.5	17.1	15.3
Dormex at 2 % + Lupine seed extract at 10 %	10 Feb	10Feb	22Feb	22Feb	12	12	84.8	86.8	35.5	36.3	15.2	13.2
Dormex at 2 % + Licorice at 10 %	9 Feb	10Feb	19Feb	20Feb	10	10	87.1	88.6	36.1	36.8	12.9	11.4
Dormex at 4 %	7 Feb	9Feb	16Feb	17Feb	9	8	88.2	90.0	36.8	37.6	11.8	10.0
NEW L.S.D at 5 %	----	----	----	-----	1.2	0.9	1.1	0.9	0.6	0.7	0.9	0.8

Table (7): Effect of using extracts of Mugwort, Chicken, Lupine seeds and Licorice as partial replacement of dormex on start, end and duration of blooming and berry setting of Superior grapevines grown under Qena conditions during 2015 and 2016 seasons

Treatments	Blooming start		Blooming end		Blooming duration (days)		Berry setting start		Berry setting end		Berry setting duration (days)	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	24Mar	25Mar	10Apr	11Apr	15	14	30Mar	1Apr	15Apr	16Apr	16	15
Mugwort extract at 10 %	22Mar	23Mar	7Apr	9Apr	16	17	27Mar	28Mar	10Apr	11Apr	14	14
Chicken extract at 10 %	20Mar	20Mar	5Apr	5Apr	16	16	25Mar	25Mar	6Apr	6Apr	12	12
Lupine seed extract at 10 %	19Mar	18Mar	3Apr	3Apr	15	16	24Mar	23Mar	4Apr	3Apr	11	11
Licorice at 10 %	18Mar	18Mar	1Apr	1Apr	14	14	23Mar	23Mar	3Apr	3Apr	11	11
Dormex at 1 %	16Mar	16Mar	30Mar	29Mar	14	13	21Mar	21Mar	31Mar	31Mar	10	10
Dormex at 1 % + Mugwort extract at 10 %	15Mar	15Mar	28Mar	28Mar	13	13	20Mar	20Mar	30Mar	30Mar	10	10
Dormex at 1 % + Chicken extract at 10 %	13Mar	14Mar	25Mar	26Mar	12	12	18Mar	19Mar	27Mar	28Mar	9	9
Dormex at 1 % + Lupine seed extract at 10 %	10Mar	10Mar	21Mar	21Mar	11	11	15Mar	15Mar	23Mar	23Mar	8	8
Dormex at 1 % + Licorice at 10 %	8Mar	8Mar	19Mar	19Mar	11	11	13Mar	13Mar	20Mar	20Mar	7	7
Dormex at 2 %	6Mar	6Mar	16Mar	16Mar	10	10	11Mar	11Mar	17Mar	17Mar	6	6
Dormex at 2 % + Mugwort extract at 10 %	4Mar	3Mar	13Mar	12Mar	9	9	9Mar	8Mar	16Mar	14Mar	6	6
Dormex at 2 % + Chicken extract at 10 %	2Mar	2Mar	10Mar	10Mar	8	8	7Mar	7Mar	14Mar	14Mar	6	6
Dormex at 2 % + Lupine seed extract at 10 %	27Feb	27Feb	6Mar	5Mar	7	7	5Mar	3Mar	10Mar	8Mar	5	5
Dormex at 2 % + Licorice at 10 %	25Feb	26Feb	3Mar	4Mar	6	6	2Mar	2Mar	7Mar	7Mar	5	5
Dormex at 4 %	20Feb	19Feb	26Feb	25Feb	6	6	25Feb	24Feb	2Mar	29Feb	5	5
NEW L.S.D at 5 %	----	-----	-----	-----	1.4	1.6	----	----	-----	-----	1.0	0.9

Table (8): Effect of using extracts of Mugwort, Chicken, Lupine seeds and Licorice as partial replacement of dormex on the bud content of total phenols, ABA, total indoles and total soluble sugars just after bud burst as well as main shoot length and number of leaves/shoot of Superior grapevines growing under Qena conditions during 2015 and 2016 seasons.

Treatments	Bud total indoles (mg/ 1g FW)		Bud ABA (mg/ 1g FW)		Bud total phenols (mg/ 1g FW)		Bud total soluble sugars (mg/ 1g FW)		Main shoot length (cm)		No. of leaves/shoot	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	3.1	2.9	4.1	4.4	5.1	5.4	2.6	2.4	101.0	100.0	14.0	13.0
Mugwort extract at 10 %	3.5	3.2	3.9	4.1	4.8	5.1	2.9	3.1	102.6	103.0	16.0	15.0
Chicken extract at 10 %	4.0	3.7	3.7	3.8	4.6	4.9	3.2	3.5	104.0	104.5	18.0	16.0
Lupine seed extract at 10 %	4.3	4.0	3.4	3.5	4.3	4.6	3.5	3.8	105.9	106.4	20.0	18.0
Licorice at 10 %	4.7	4.9	3.1	3.2	4.0	4.4	4.0	4.1	108.0	108.6	22.0	20.0
Dormex at 1 %	5.0	4.7	2.8	2.9	3.9	4.3	4.3	4.4	110.0	110.7	24.0	22.0
Dormex at 1 % + Mugwort extract at 10 %	5.3	5.0	2.6	2.7	3.6	3.9	4.6	4.7	112.0	112.8	26.0	24.0
Dormex at 1 % + Chicken extract at 10 %	5.6	5.3	2.4	2.5	3.3	3.6	5.0	5.0	113.0	115.0	28.0	26.0
Dormex at 1 % + Lupine seed extract at 10 %	6.0	5.7	2.2	2.3	3.0	3.3	5.3	5.3	116.0	117.9	30.0	28.0
Dormex at 1 % + Licorice at 10 %	6.3	6.0	2.0	2.1	2.9	3.2	5.7	5.5	118.0	119.9	32.0	30.0
Dormex at 2 %	7.0	6.7	1.9	1.9	2.4	2.7	6.0	5.8	121.0	122.8	33.0	32.0
Dormex at 2 % + Mugwort extract at 10 %	7.4	7.1	1.7	1.6	2.0	2.3	6.3	6.1	124.0	125.8	34.0	33.0
Dormex at 2 % + Chicken extract at 10 %	7.8	7.5	1.5	1.3	1.6	2.0	6.6	6.4	126.0	127.8	35.0	34.0
Dormex at 2 % + Lupine seed extract at 10 %	8.1	7.8	1.3	1.0	1.4	1.7	7.0	6.6	127.9	129.7	35.0	34.0
Dormex at 2 % + Licorice at 10 %	8.4	8.1	1.1	0.7	1.2	1.4	7.4	7.0	130.0	131.9	35.0	34.0
Dormex at 4 %	8.7	8.4	0.9	0.4	0.8	1.0	7.8	7.2	133.0	135.0	35.0	34.0
NEW L.S.D at 5 %	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.2	1.1	1.3	1.6	1.9

Table (9): Effect of using extracts of Mugwort, Chicken, Lupine seed and Licorice as partial replacement of dormex on some vegetative growth characteristics and Chlorophylls a & b in the leaves of Superior grapevines grown under Qena conditions during 2015 and 2016 seasons

Treatments	Leaf area (cm ²)		Wood ripening coefficient		Cane thickness (cm)		Pruning wood weight (vine / kg)		Chlorophyll a (mg/ 1 g FW)		Chlorophyll b (mg/ 1 g FW)	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	105.0	104.1	0.64	0.62	1.07	1.11	1.55	1.50	4.1	3.8	1.1	1.0
Mugwort extract at 10 %	108.3	109.0	0.67	0.67	1.11	1.14	1.66	1.73	5.0	5.3	1.4	1.4
Chicken extract at 10 %	110.5	111.2	0.70	0.69	1.15	1.17	1.76	1.83	5.6	6.0	1.8	1.8
Lupine seed extract at 10 %	112.6	113.3	0.72	0.72	1.18	1.20	1.87	1.94	6.3	6.9	2.1	2.1
Licorice at 10 %	114.9	115.6	0.75	0.74	1.22	1.24	1.98	2.05	7.0	7.6	2.4	2.6
Dormex at 1 %	117.0	117.7	0.77	0.76	1.26	1.28	2.11	2.18	7.7	8.3	2.8	3.0
Dormex at 1 % + Mugwort extract at 10 %	119.0	119.6	0.80	0.79	1.30	1.31	2.21	2.28	8.5	9.2	3.1	3.7
Dormex at 1 % + Chicken extract at 10 %	121.0	121.7	0.82	0.83	1.34	1.34	2.31	2.38	9.4	10.0	3.4	4.4
Dormex at 1 % + Lupine seed extract at 10 %	123.0	123.8	0.84	0.85	1.40	1.37	2.41	2.48	10.0	10.5	3.8	5.0
Dormex at 1 % + Licorice at 10 %	125.0	125.7	0.87	0.88	1.44	1.40	2.51	2.58	10.7	11.2	4.2	5.3
Dormex at 2 %	127.0	127.7	0.90	0.89	1.49	1.43	2.61	2.68	11.5	12.0	4.5	5.6
Dormex at 2 % + Mugwort extract at 10 %	129.0	129.8	0.92	0.91	1.55	1.46	2.76	2.83	12.3	12.7	4.6	6.0
Dormex at 2 % + Chicken extract at 10 %	130.8	131.5	0.92	0.92	1.60	1.50	2.87	2.94	13.0	13.4	4.9	6.2
Dormex at 2 % + Lupine seed extract at 10 %	132.0	132.7	0.92	0.92	1.64	1.53	2.99	3.06	13.6	14.0	5.0	6.4
Dormex at 2 % + Licorice at 10 %	134.0	134.7	0.94	0.95	1.68	1.56	3.08	3.15	14.2	14.7	5.3	6.5
Dormex at 4 %	136.0	137.3	0.94	0.95	1.73	1.71	3.19	3.26	15.0	15.5	5.6	6.8
NEW L.S.D at 5 %	1.8	2.1	0.03	0.02	0.03	0.03	0.07	0.09	0.6	0.7	0.3	0.3

Table (10): Effect of using extracts of Mugwort, Chicken, Lupine seed and Licorice as partial replacement of dormex on total carotenoids, percentages of N, P and K in the leaves, berry setting % and number of clusters per vine of Superior grapevines grown under Qena conditions during 2015 and 2016 seasons

Treatments	Total carotenoids (mg/ 1 g FW)		Leaf N %		Leaf P %		Leaf K %	
	2015	2016	2015	2016	2015	2016	2015	2016
Control	0.9	1.1	1.59	1.55	0.115	0.111	1.05	1.09
Mugwort extract at 10 %	1.2	1.4	1.67	1.70	0.126	0.120	1.10	1.14
Chicken extract at 10 %	1.5	1.7	1.74	1.77	0.137	0.129	1.16	1.15
Lupine seed extract at 10 %	1.7	2.1	1.80	1.82	0.148	0.140	1.22	1.21
Licorice at 10 %	1.9	2.4	1.86	1.88	0.159	0.151	1.30	1.26
Dormex at 1 %	2.1	2.8	1.93	1.95	0.169	0.164	1.35	1.31
Dormex at 1 % + Mugwort extract at 10 %	2.3	3.1	1.99	2.01	0.180	0.171	1.41	1.39
Dormex at 1 % + Chicken extract at 10 %	2.5	3.5	2.07	2.10	0.191	0.188	1.50	1.47
Dormex at 1 % + Lupine seed extract at 10 %	3.0	3.8	2.15	2.18	0.209	0.201	1.56	1.53
Dormex at 1 % + Licorice at 10 %	3.3	4.1	2.25	2.22	0.220	0.209	1.62	1.60
Dormex at 2 %	4.0	4.4	2.36	2.27	0.233	0.229	1.70	1.69
Dormex at 2 % + Mugwort extract at 10 %	4.2	4.5	2.51	2.41	0.244	0.241	1.76	1.75
Dormex at 2 % + Chicken extract at 10 %	4.7	4.8	2.57	2.52	0.256	0.251	1.81	1.70
Dormex at 2 % + Lupine seed extract at 10 %	5.0	5.1	2.64	2.61	0.266	0.261	1.85	1.82
Dormex at 2 % + Licorice at 10 %	5.2	5.3	2.71	2.66	0.280	0.276	1.90	1.89
Dormex at 4 %	5.4	5.6	2.79	2.74	0.290	0.286	1.96	1.98
NEW L.S.D at 5 %	0.2	0.3	0.06	0.04	0.010	0.008	0.04	0.05

- 1- Removing bud scales.
- 2- Increasing free water, IAA, GA₃, cytokines, soluble sugars, amino acids, total indoles, oxidative process, peroxidase, H₂O₂ and polyamines.
- 3- Reducing ABA, total phenols, catalase enzyme and glutathione.

- 4- Changing respiratory key enzymes activities such as phosphohexase isomerase, acidehydrogenase and glucose-6- phosphate dehydrogenase in favour of termination of bud dormancy.

- 5- Changes the balance between promoters (IAA, GA₃ and cytokinins) and inhibitors (ABA) in

favour of termination of rest as well as gene expression.

These results are in agreement with those obtained by Abdalla, (2007); Ahmed *et al.*, (2014); Osman, (2014); Carvalho *et al.*, (2016) and Ebrahim-Rehab (2016).

The promoting effect of these plant extracts on the biosynthesis of GA₃ could result in enhancing bud breaking suggested that water and nutrients may be also be mobilized to the growing points. The transition of buds from the dormant stage to the bursting process is related to an increase in the water content in the tissues, mobilization of nutrients and activation of hydrolytic enzymes and intensification of respiration Kubota *et al.*, (2000).

The present effect of plant extracts on ending dormancy and improving bud burst, fruiting buds, growth aspects and vine nutritional status in Superior grapes cv. was supported by the results of Abdalla, (2007); Botelho *et al.*, (2010); Corrales- Maldonado *et al.*, (2010); Eshghi *et al.*, (2010); Ahmed *et al.*, (2014); Osman, (2014); Carvalho *et al.*, (2016); Ebrahim-Rehab, (2016) and and El- Saman, (2017).

Conclusion

For advancing bud break and enhancing fruiting buds, growth aspects and vine nutritional status, it is necessary to treat Superior grapevines grown under Qena region once (11 & 12 Jan.) with dormex at 4% or dormex at 2% plus extract of licorice at 10%.

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2/13/2018