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# EVALUATION OF POWDERY MILDEW FUNGICIDES IN CHOICE AND DISSIPATION OF CARBENDAZIM AND DINICONAZOLE RESIDUES IN GRAPE BERRIES

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## ABSTRACT

Six commercial fungicides (Amistar, Topas, Flint, Sumi – eight, Kemazid and Punch) were used in this investigation to study their effect, on Flame and Thompson seedless grapevine, powdery mildew caused by *Uncinula necator* (schw.). Among the tested fungicides Punch and Amistar were superior and recorded the lowest disease severity on Flame seedless during 2007 and 2008; The application resulted in a pronounced increase in yield/ vine that ranged between (41.46- 60.97%) in the year 2007 on Flame seedless and (40.82- 63.18%) in 2008on the same cultivar. The corresponding figures on Thomposon seedless were (29.20- 65.69%) and (28.27- 62.07). Punch and Amistar recoded maximum increase in yield during the two seasons. Carbendazim and Diniconazole residues were aforementioned determined that showed gradual degradation in residues during the examination periods. The residues of carbendazim were not detected in fruits 13 days after application. While the residues of Diniconazole were not detected in the two cultivars 19 days after application.

**Key word:** grapevine, Powdery mildew, *Uncinula necator* (schw), fungicides, dissipation, fungicides residues, carbendazim, diniconazole.

# INTRODUCTION

Grapevine (*Vitis vinifera* Linn.) is considered as one of the most important fruit crops in Egypt as well as over the world around, being the second fruit crop preceded citrus in Egypt (Anonymous, 2005[a] ).

Grapevine is subject to powdery mildew infections caused by *Uncinula necator* (schw.) Burr. which is a worldwide important disease on grapevine that causing serious losses on highly susceptible cultivars under certain circumstances (English- Loeb *et al*.; 2005 and Narayana *et al* .; 2006). Different control erasures are to be taken though chemical control, being the most effective means of control on grapevine. (Godet *et al*;1997; Liguori *et al*, 2000;Thind *et al* ., 2001;, Desai *et al* ., 2002; Magee *et al* ., 2002) and Thind and Arora 2002), along with the fact that their application to control grapevine diseases is usually practiced to increase the total yield. (Delen and Onogur, 1987; Thind and Arora 2002 and Narayana *et al* ., 2005). Hazardous, however as a consequence of fungicides application, the presence of residues is unavoidable. The placement, timing and type of fungicides that affect the likelihood of terminal residues are of paramount importance. Therefore, selecting short persistence fungicides as well as adjusting the time of application are very important to resolve this problem (Mahapatra *et al* ., 1998 ; Hegazy *et al* ., 1999; Minelli *et al*., 1996; Abada *et al*., 2005 and Mahmoud and Eissa 2007).

The aim of this investigation is to evaluate six different fungicides against grapevine powdery mildew disease under field conditions, their effects on yield/ vine and to determine the residues of Carbendazim and Diniconazole in fruits periodically after the last application of the fungicide in concern.

# MATERIALS AND METHODS

**Chemical control:**

Six fungicides were tested for their effect on powdery mildew disease. Chemical composition, common name, commercial name, and the rate of application are shown in table (1).

**Table (1): Commercial names, chemical composition and application rates of fungicides.**

| Commercial name | Common name | Chemical composition | Application rate |
|---|---|---|---|
| **Amistar 25% SC** | Azoxystrobin | Methyl (E)-2-(2(6-(2-cyanophenoxy) pyrimidin-4-yloxy)3-methoxyacrylate. | 50ml/100L. |
| **Punch 40% EC** | Flusilazole | 1((bBis(4-fluarophenyl)methylsilyl) methyl)- 1H- 1,2,4- triazole | 3ml /100L |
| **Topas 10% EC** | Penconazole | 1-(2,4-dichloro–Bpropylphenethy) - 1H-1,2,4- triazole | 10 ml/100L. |
| **Kemazid 50% WP** | Carbendazim | Methyl-benzimidazol-2-ylcarbamate | 75 g/100L |
| **Sumi-eight 5% EC** | Diniconazol M | ((IUPAC) E)- (RS)-1-(2, 4, -dichlorophenyl) -4, 4-dimethyl-2-(1H-1, 2, 4-triazol-1-yl)-pent-1-en-3-ol. | 35 ml /100L |
| **Flint 50% WG** | Trifloxystrobin | (IUPAC) Methyl (E)-methoxyimino-{(E)-α-[1-(α. α, α-trifluoro-m-tolyl)ethylideneaminooxy]-o-tolyl} acetate | 20 g /100L |

**Experimental design:**

The experiments were carried out in vineyards at El- Khatatba region, Menofyia governorate during 2007and 2008 on ten years old, Flame and Thompson seedless varieties. The vines were raised in a light calcareous sandy soil with spacing distance of 1, 5 m (between vines in the row) x3m in Flame and x2.75m in Thompson (between rows). The vines were trained to the modified cane training and supported by telefon trellis system. Five canes, 14 buds each, and approximately five renewably spurs, two spurs, two buds each, were retained on each vine at winter pruning in the middle of January in both seasons according to Fawzi et al ., (1984). The vines were drip irrigated and fertilized with macro- and micro-nutrient through fertigation. All vines received the same agricultural practices routinely applied in the vineyard.

One hundred and two greening vines were chosen from each variety (Flame and Thompson) several weeks prior to anthesis on the basis of uniformity of foliage and cluster development.

Vineyard experiments were arranged in a randomized complete block design with four replications for each variety, four vines for each replicate.

**Disease assessment:**

Powdery mildew assessment, was made 15 day after last application. Bunch infection was evaluated accoding to Delen *et al*., (1987), based on 0-5 modified scale on 40 bunches for each replication. The efficiency of fungicidal treatments was calculated by the following formula:

Efficacy of treatment = ((control – treatment) / control) x 100.

**Estimation of Carbendazim and Diniconazole residues in fruits:**

Spraying of fungicides was at fruiting stage with carbendazim (kemazid) and diniconazol ( sumi – eight ) using a knapsack sprayer; untreated area was left as control.

Random samples of each treated variety were collected in polyethylene bags one hour after application (Initial deposit) and then after 1, 3, 5, 7,9,11,13,15,17,19 and 21 days, respectively. The collected samples were chopped and thoroughly mixed before taking a subsampling portion of 100g in triplicates in polyethylene bags, labeled and kept at -18$^{o}$C until analysis, which was carried out according the following procedure:

**Analytical procedures:**

**(1) Extraction of carbendazim:** Extraction procedures for all samples were done according to Mestres et al., (1977) Frozen samples were left until reach room temperature then three replicates of chopped grape subsamples (50 gm) were each blended with 100 ml ethyl acetate and 5 ml ammonia for two minutes. The filter cake was re-extracted twice with 50 ml ethyl acetate, blended for 2 minutes and filtered again on the same vaccum flask. The blender jar was washed with 50 ml ethyl acetate and then transfer to 250 ml flask. The vaccum flask was washed with 3x12 ml ethyl acetate. The combined filtrates were evaporated to 50 ml. The remain extract (50 ml) was transferred to separatory funnel and washed with 20 ml 1 N NaOH (3.6) and then with 5 ml deionized water, partitioning. Solvents and reagents were used according to Mestres *et al* (1977). The apparatus used was UNICAM-UV/VIS Spectrophotometer software Unicom UV2-100V3.50. AND Silica cells 2 cm thick.

**(2) Extraction and partitioning for diniconazol:** Extraction procedures for all samples were done according to Luke *et al.* (1981). Frozen samples were left until reach room temperature then three replicates of chopped grape sub samples (100 gm) were each blended with 200 ml acetone in a blender jar for 3 min. at high speed and then filtered through a funnel with a dry pad of cotton into a graduated cylinder. Eighty ml of the sample filtrate was transferred into a reparatory funnel and partitioned with a mixture of 100 ml petroleum ether and 100 ml dichloromethane. For separation, the upper organic layer was decanted in a 500 ml flask through a funnel with a dry pad of cotton and anhydrous sodium sulfate, and then 5 gm of sodium chloride was added to the aqueous layer, which was further extracted with two 100 ml volumes of dichloromethane. The combined dichloromethane (organic layer) was dried with anhydrous sodium sulfate and then collected in the same flask and evaporated to dryness at 40$^{o}$C under reduced pressure using rotary evaporator and then for gas liquid chromatography determination. HP 6890 gas chromatograph instrument was used at the following conditions:

Injector temperature = 225°C and Detector temperature = 300°C. Other conditions are shown in the following tables:

| | |
|---|---|
| A) Hewlett Packard PAS-5<br>(ECD tested Ultra 2 Silicone) | B) Hewlett Packard PAS-1701<br>(ECD Tested 1701 Silicone) |
| Column ID: 0.32 mm<br>Film thickness: 0.52 um<br>Column length: 25 m | Column ID: 0.32 um<br>Film thickness: 0.25 um<br>Column length: 30 m |
| Flow rate of nitrogen: 1.5 ml/min carrier, total flow (carrier + makeup): 55 ml/min | Flow rate of nitrogen: 1.3 ml/min carrier, total flow (carrier + makeup): 55 ml/min |

Septum purge: 3 ml/min, purge flow 50 ml/min, purge time 0.7 min
Oven program:
Initial temp: 90°C Initial time: 2 min.

| Level | Rate (°C/min) | Temp (°C) | Time (min) |
|---|---|---|---|
| (1) | 20 | 150 | 0 |
| (2) | 6 | 270 | 15 |

**Statistical analysis:**

All data obtained were subjected to the proper statistical analysis using the MSTAT statistical software and comparison was made following Fishers. L.S.D (P< 0.05).

# RESULTS AND DISCUSSION

Data in tables (2 and 3), showed that spraying grapevine (Flame seedless and Thompson seedless) with six different fungicides during seasons 2007 and 2008

**Table (2) Efficiency of different fungicides against powdery mildew on Flame seedless grapevine, at the season 2007 and 2008.**

| Fungicide | Season 2007 | | Season 2008 | | means | |
|---|---|---|---|---|---|---|
| | D.S | Eff % | D.S | Eff % | D.S | Eff % |
| Amistar | 3.75 | 91.48 | 3.25 | 92.07 | 3.50 | 91.77 |
| Topas | 5.75 | 86.93 | 5.00 | 87.80 | 5.75 | 87.36 |
| Flint | 4.50 | 89.77 | 4.00 | 90.24 | 4.25 | 90.00 |
| Sumi-eight | 7.00 | 84.09 | 6.00 | 85.36 | 6.50 | 84.72 |
| Kemazid | 8.75 | 80.11 | 8.00 | 80.49 | 8.37 | 80.30 |
| Punch | 3.00 | 93.18 | 2.75 | 93.29 | 2.87 | 93.23 |
| Control | 44.00 | | 41.00 | | 42.50 | 100.00 |
| means | 10.96 | | 10.00 | | | |

D.S =Disease severity% , Eff% = efficiency%

Efficiency% = {(control – observation) /control} x100

L. S. D. at ( P < 5 % ): Fungicides ( F ) = 0.86 , Seasons ( S ) = 0.46, Interaction (F *S) = 1.22

resulted in significant reduction in disease severity of powder mildew. All tested fungicides provided a good protection against the disease, though punch and amistar were the most effective. They recorded the lowest disease severity during 2007, being. 93.18 and 91.48% efficiency on Flame seedless and 91.13 and 89.16 efficiency on Thompson seedless. The corresponding efficiency in 2008 was 93.29 and 92.07% on flame seedless; 92.63 and 88.42% efficiency on Thompson seedless. Followed by flint, topas and sumi-8 respectively. Whereas kemazid was the least effective fungicide during the two seasons

**Table (3) Efficiency of different fungicides used against powdery mildew on Thompson seedless grapevine, at the season 2007 and 2008.**

| Fungicide | Season 2007 | | Season 2008 | | means | |
|---|---|---|---|---|---|---|
| | D.S | Eff % | D.S | Eff % | D.S | Eff % |
| Amistar | 5.50 | 89.16 | 5.50 | 88.42 | 5.50 | 88.79 |
| Topas | 8.00 | 84.24 | 7.25 | 84.47 | 7.62 | 84.35 |
| Flint | 7.00 | 86.21 | 6.00 | 87.37 | 6.50 | 86.79 |
| Sumi-eight | 9.50 | 81.28 | 8.25 | 82.63 | 8.87 | 81.95 |
| Kemazid | 11.50 | 77.34 | 10.00 | 78.95 | 10.75 | 78.14 |
| Punch | 4.50 | 91.13 | 3.50 | 92.63 | 4.00 | 91.88 |
| Control | 50.75 | | 47.50 | | 74.12 | |
| means | 13.82 | | 12.75 | | | |

D.S =Disease severity% , Eff% = efficiency%

Efficiency% = {(control – observation) /control} x100

L. S. D. at ( P < 5 % ): Fungicides ( F ) = 1.05 , Seasons ( S ) 0.56, Interaction (F *S ) = NS

Data in tables (4 and 5), showed that spraying grapevine cultivars under investigation with different fungicides during the seasons 2007 and 2008 resulted in significant increases in yield weight / vine, compared with untreated control.

**Table (4) Effect of used different fungicides against powdery mildew in Flame seedless grapevine, on yield/vine (kg) at season 2007 and 2008.**

| Fungicide | Season 2007 | | Season 2008 | | means | |
|---|---|---|---|---|---|---|
| | Yield/vine (kg) | Increase % | Yield/vine (kg) | Increase % | Yield/vine (kg) | Increase % |
| Amistar | 13.20 | 60.97 | 13.50 | 58.82 | 13.35 | 59.89 |
| Topas | 12.45 | 51.83 | 12.92 | 52.00 | 12.82 | 51.91 |
| Flint | 12.80 | 56.10 | 13.20 | 55.29 | 13.00 | 55.69 |
| Sumi-eight | 12.10 | 47.56 | 12.45 | 46.47 | 12.27 | 47.01 |
| Kemazid | 11.60 | 41.46 | 11.97 | 40.82 | 11.78 | 41.14 |
| Punch | 13.75 | 67.68 | 13.87 | 63.18 | 13.81 | 65.43 |
| Control | 8.20 | | 8.50 | | 8.35 | |
| means | 11.98 | | 12.35 | | | |

Increase % = {(observation – control yield) / control yield} x100

L. S. D. at ( P < 5 % ): Fungicides ( F ) = 0.41 , Seasons ( S ) =0.22, Interaction (F *S ) = NS

Application of punch and Amistar resulted in a maximum increase in Flame seedless yield/vine, being 67.68 and 60.97% increase in 2007 and 63.18 and 58.82% increase in 2008. The same fungicides recorded 72.26 and 65.69% increase and 70.34 and 62.07% increase on Thompson seedless during seasons 2007 and 2008 respectively. Meanwhile, kamazid recorded less increase in yield/vine being 41.46 and 40.82% on Flame seedless during seasons 2007 and 2008, respectively. The corresponding increase in Thompson seedless was 29.20 and 28.27% during seasons 2007 and 2008, respectively. Other tested fungicides (flint, topas and sum-8) showed an increase in yield that ranged between 57.66 and 37.93% in both Flame seedless and Thompson seedless varieties, in the years of experimentation (Table 4 and 5).

**Table (5) Effect of fungicides on powdery mildew in Thompson seedless grapevine, on yield/vine (kg) at season 2007 and 2008.**

| Fungicide | Season 2007 | | Season 2008 | | means | |
|---|---|---|---|---|---|---|
| | Yield/ vine(kg) | Increase % | Yield/vine (kg) | Increase % | Yield/ vine(kg) | Increas e% |
| Amistar | 11.35 | 65.69 | 11.75 | 62.07 | 11.55 | 59.38 |
| Topas | 10.40 | 51.82 | 10.65 | 46.90 | 10.52 | 49.36 |
| Flint | 10.80 | 57.66 | 11.10 | 53.10 | 10.95 | 55.38 |
| Sumi eight | 9.50 | 38.69 | 10.00 | 37.93 | 9.75 | 38.31 |
| Kemazid | 8.85 | 29.20 | 9.30 | 28.27 | 9.07 | 28.73 |
| Punch | 11.80 | 72.26 | 12.35 | 70.34 | 12.07 | 71.31 |
| Control | 6.85 | | 7.25 | | 7.05 | |
| means | 9.93 | | 10.34 | | | |

Increase % = {(observation – control yield) / control yield}*100
L. S. D. at ($P < 5$ %): Fungicides (F) = 0.50 , Seasons (S) = 0.26, Interaction (F *S ) = NS

**Estimating fungicide residues:**

Estimating carbendazim residues in fruits samples of Thompson and Flame cultivars during 2007 and 2008, at different intervals after the last application, showed a gradual decrease (Table 6). At zero time the estimated carbendazim content was much higher in Thompson cultivar (4.16 mg) than Flame cultivar (3.99 mg). One day after application the residue of fungicide in Thompson cultivar recorded 2.50 mg with dissipation rate 39.9%. Then the residues decreased gradually from 1.37 mg after 3 days of application to 0.03 mg at 7 days with dissipation ranged from 67.1 – 92.8%. Traces of residue were detected in fruits 9, 11 and 13 days after application being 0.09, 0.05 and 0.03 mg, respectively. No residues were detected in fruits samples 15 days after application.

The residues in Flame cultivar fruits showed approximately similar trend. The residue decreased to 2.0 mg after one day of application with dissipation rate 49.9% during 3, 5 and 7 days after application the residues decreased to 1.0, 0.35 and 0.23 mg respectively, with dissipation rate ranged from 74.9 – 94.2%. Trace residues were detected 9 and 11 day after application. Then, no residues were detected in samples 13 day after application.

**Table (6): Estimation of carbendazim residue in fruits of two Flame seedless and Thompson seedless at different intervals after the last application.**

| **Time of sampling(day)** | **Cultivars** | | | |
|---|---|---|---|---|
| | **Thompson seedless** | | **Flame seedless** | |
| | **mg / kg** | **%dissipation** | **mg / kg** | **%dissipation** |
| **Zero time** | 4.16 | - | 3.99 | - |
| **1** | 2.50 | 39.9 | 2.00 | 49.9 |
| **3** | 1.37 | 67.1 | 1.00 | 74.9 |
| **5** | 0.41 | 90.1 | 0.35 | 91.2 |
| **7** | 0.30 | 92.8 | 0.23 | 94.2 |
| **9** | 0.09 | 97.8 | 0.08 | 97.9 |
| **11** | 0.05 | 98.8 | 0.03 | 99.3 |
| **13** | 0.03 | 99.3 | n.d | 100 |
| **15** | n.d | 100 | n.d | 100 |
| **17** | n.d | 100 | n.d | 100 |
| **19** | n.d | 100 | n.d | 100 |
| **PHI** | 8 days | | 7 days | |

PHI =preharvest intervals

Data presented in table (7), showed gradual degradation in Diniconazole residues in samples Flame and Thompson cultivars during the examination periods.

**Table (7): Estimation of Diniconazole residue in fruits of two grapevine cultivars (Flame and Thompson) after different time interval from last application.**

| Time of sampling(day) | Grapevine cultivars | | | |
|---|---|---|---|---|
| | Thompson | | Flame | |
| | mg / kg | %dissipation | mg / kg | %dissipation |
| **Zero time** | 2.15 | - | 2.68 | - |
| **1** | 1.96 | 8.8 | 2.10 | 21.7 |
| **3** | 1.12 | 47.9 | 1.88 | 29.9 |
| **5** | 0.90 | 58.1 | 1.56 | 41.8 |
| **7** | 0.55 | 74.4 | 0.98 | 63.4 |
| **9** | 0.39 | 81.9 | 0.78 | 70.8 |
| **11** | 0.16 | 92.6 | 0.56 | 79.1 |
| **13** | 0.09 | 95.8 | 0.28 | 89.1 |
| **15** | 0.05 | 97.7 | 0.17 | 93.7 |
| **17** | 0.02 | 99.1 | 0.03 | 98.9 |
| **19** | n.d | 100 | n.d | 100 |
| **PHI** | 11 days | | 15 days | |

*n.d=not detected

Regarding Diniconazole, the residues at the zero time were higher in Flame cultivar (2.68 mg/kg) than Thompson cultivar (2.15 mg/kg). One day after application the residues recorded 1.96 mg/kg in fruits of Thompson cultivar with dissipation rate 8.8%. Then the residues decreased gradually during 3-11 days after application with dissipation rate increase from 47.9 to 92.6%. After 13, 15 and 17 day of application, traces of residues were detected (0.09, 0.05 and 0.02 mg/kg respectively). The residues of fungicide not detected 19 days after application.

The residues of Diniconazole in fruits samples of Flame cultivar decreased to 2.10 mg/kg after one day of application with dissipation rate 21.7% then, the residues decreased gradually from 1.88 mg to 0.28 mg/kg during 3 -13 days after application with dissipation rate increased from 29.9 – 89.1% . After 15 – 17 days of application the residues recorded 0.17 and 0.03 mg/kg respectively. No residues were detected in fruits samples 19 day after application.

## Discussion

Amistar, Topas, Flint, Sumi – eight, Kemazid and Punch were used as foliar application on two grapevine cultivars Flame seedless and Thompson seedless, during (2007) and (2008) seasons to evaluate their effectiveness on grapevine powdery mildew control under field conditions.

Obtained data showed that all tested fungicides significantly decreased disease severity of powdery mildew. Excellent control of powdery mildew was achieved by punch and amistar during the two seasons. They recorded maximum efficacy over other tested fungicides. The obtained results were agreement with those reported by Godet *et al*., (1997) who indicated that amistar (azoxystrobin) is among one of the fungicide giving good control of 5 main diseases on grape, including powdery mildew ( *Uncinula necator*.) and downy mildew (*Plasmopara viticola).* Different fungicides including captan, azoxystrobin and benomyl were tested by Magee *et al* (2002) against foliage and berry disease. They found that all fungal foliage and berry diseases were significantly reduced by these fungicides. On the same subject Takanor (1986), indicated that Diniconazole showed good control against pathogens of grapevine and apple especially powdery mildew. Liguori *et al*., (2000) reported that on grapes, excellent control of powdery mildew is achieved when trifloxystrobin was applied as 6.25 – 7.5 g / 100 L. Thind *et al*., (2001) evaluated 5 fungicides against grape powdery mildew. They found that all tested fungicides controlled the disease effectively, and the maximum disease control was provided by topas (Penconazole). Desai *et al*., (2002) evaluated Penconazol (topas 10 Ec) at 0.1% compared with carbendazim (0.1%) and an untreated control against powdery mildew disease of grapevine. They indicated that peneconazol is effective in reducing powdery mildew of grapevine without any phytotoxicity. Also, Thind and Arora (2002) found that spraying grape cultivars perlette (susceptible) with three Triazole fungicides, Topas (Penconazole) 0.05%, cont of Ec (hexaconazole) (0.05%) and Bayleton 25 wp (triadimefon) 0.05%) reduced disease severity of powdery mildew, and Topas was the most effective fungicide, followed by Contaf and Bayleton.

Significant increase in yield/vine was found during 2007 and 2008 on the two tested cultivars as a result of fungicide application. Punch and amistar were superior and recorded highest increase in yield/vine compared with other tested fungicides. This increase reached 58.42 and 54.35% during season (2007) and 56.58 and 52.63% during (2008) on Flame seedless. While on Thompson seedless the same fungicides recorded 63.05 and 57.32% increase during (2007) season and 61.81 and 54.55% increase during season (2008) respectively. The increase in grapevine yield following application of fungicides was also reported by Delene and Onogur (1987) who tested sulphur, Penconazole, Pyrazoplose and triadimefon against grapevine and indicated that the tested fungicides reduced the disease and improved grape yield and quality. Thind and Arora (2002) evaluated three triazole fungicides i.e. Penconazol, hexaconazole and triadimefon for efficacy against powdery mildew disease on susceptible grape cultivar Perletter. They found that, beside the reduction in disease severity, the tested fungicides increased yield / vine. Penconazole recorded the highest average of fruit yield followed by hexaconazole and Triadimefon. Narayana *et al*., (2005) indicated that among different systemic fungicide used to control grape powdery mildew hexaconazole provided the highest reduction in disease incidence and increased crop yield.

Residues of carbendazim and Diniconazole were estimated in fruits samples of grapevine cultivars under investigation. The obtained results showed that, the residue of carbendazim decreased gradually in fruit samples of the two tested cultivars following the time elapsed. The initial deposit was 4.16 and 3.99mg/kg samples of Thompson and flame cultivars respectively. The residues decreased slowly to record 1.37 and 1.0 mg/kg fruits of Thompson and flame 3 days after application, respectively. Then the residue decreased rapidly to 0.41, 0.30, 0.09, 0.05 and 0.03 mg/kg fruits in Thompson cultivar and 0.35, 0.23, 0.08, 0.03 and 0.00 mg/kg in Flame cultivar 5,7,9,11 and 13 day following application, respectively. The Codex maximum residue limit for carbendazim 0.03 mg /kg (Anonymous, 2005[b]) which indicated that the pre-harvest (PHI) of 8 days for the two tested cultivars would be safe for human consumption of grapevine fruits treated with carbendazim.

Regarding the Diniconazole residues in fruits the obtained data showed gradual decrease during the examination periods in the two cultivars tested. the zero time content was much higher 2.15 and 2.68 mg/kg in fruit of Thompson and flame cultivars respectively. The residue decreased slowly 5 days after application. Faster dissipation of residue was occurred between 7-17 days following application, being 0.90, 0.55, 0.39, 0.16, 0.09, 0.05 and 0.02mg/kg fruits in Thompson cultivar, and 0.98, 0.78, 0.56, 0.28, 0.17 and 0.03 mg/kg in Flame cultivar at the intervals 7, 9, 11, 13,15 and 17 days after application. The Codex maximum residue limit for Diniconazole is 0.2 mg/kg (Anonymous, 2005[b]) indicating that the pre- harvest intervals (PHI), 11 days for Thompson cultivar and 15 days for Flame cultivar would be safe for human consumption of grape vine fruits.

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# تقييم بعض المبيدات الفطرية على اصابة العنب بالبياض الدقيقى ودراسة الأثر المتبقى لمبيدي الكربندازيم والداينيكونازول فى ثمار صنفين من العنب

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تم استخدام 6 مبيدات ( أمستار ، توباز ، فلنت ، سومى- ايت ، كيمازيد و بانش ) لدراسة تأثيرها على مرض البياض الدقيقى فى العنب المتسبب عن *Uncinula necator* وذلك على صنفي تومسون وفليم خلال موسمى 2007- 2008.

أوضحت النتائج أن المبيدين أميستار وبانش كانت أفضل المبيدات المستخدمة في تقليل شدة الإصابة مقارنة بالمبيدات الأخرى. ولقد وصلت كفاءة المبيدين على الصنف فليم إلى .93.18 % ، 91.48 على التوالي خلال موسم 2007 في حين كانت كفاءة المبيدين 93.29 % ، 92.07 % خلال موسم 2008 على نفس الصنف. أما على الصنف تومسون وصلت كفاءة المبيدين 91.13 ، 89.16 % على التوالي خلال موسم 2007 بينما وصلت الكفاءة الى 92.63 ، 88.42 % على التوالي خلال موسم 2008.

بالإضافة إلى الانخفاض الملحوظ في شدة الإصابة أدى رش المبيدات إلى زيادة ملحوظة في محصول العنب/ شجرة وذلك مقارنة بالكنترول الغير معامل في كل من الصنفين المستخدمين. وكانت الزيادة تتراوح بين (.29.20 - 72.26 %) ، ( 28.27 – 70.34 % ) بالنسبة للصنف تومسون خلال موسيمى 2007-2008 على التوالي، في حين كانت الزيادة تتراوح ما بين (..67.68-41.46 %) ، (40.82 – 63.18 %) بالنسبة للصنف فليم خلال موسيمى 2007، 2008 على التوالي.ولقد حقق المبيد بانش وأمستار أقصى زيادة فى المحصول خلال موسمى 2007، 2008.

عند تقدير الأثر المتبقي للمبيدين (الكاربندازيم والداى نيكونازول) على فترات مختلفة بعد أخر رشة للمبيدين وذلك فى ثمار العنب (صنفي تومسون ، الفليم). أوضحت النتائج أن هناك انخفاض تدريجى للأثار المتبقية لكل من المبيدين فى ثمار العنب خلال فترات الاختبار. ولم يلاحظ أى أثار متبقية لمبيد الكاربندازيم في ثمار العنب لكل من الصنفين تومسون ، فليم بعد 13 يوم من الرش فى حين لم يظهر أى أثار متبقية لمبيد الداى نيكونازول في ثمار العنب لكل من الصنفين السابقين بعد 19 يوم من الرش.