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Reducing pesticides use for control of powdery mildew in grapes

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Abstract: *A trial to produce grapes less contaminated with pesticides residues was conducted in a private farm in the desert area where expansion in fruit production is restricted to those areas. In this experiment the farm program of using chemical to control fungus diseases adopted in the farm was examined against a program suggested by BASF, and sulphur applications. The obtained results indicates that yield and fruit quality were slightly affected by the tested programs while SSC and acidity were affected as the quality of berries juice of the grapes received pesticides other than sulphur were inferior. Pesticides residues were move in the juice of grapes produced under the farm or BASF program. The sulphur program resulted in lower amounts of pesticides residues compared to the other two programs. These results indicates the effectiveness of using sulphur for protection and control of fungus diseases during the period from fruit set up to harvesting of the grapes. This also means less pollution of the fruits and production of grapes almost free from pesticides residues.*

I. Introduction

Grapes are the second main fruit grown in Egypt. They are export fruits that contributes much in the national income of the country. In Egypt few research has been carried out in the field of producing fruits free from pesticides residues. While in practice, the growers lack the knowledge or the knowhow in dealing with pesticides. Thus the quality of fruits is poor and can be highly contaminated with pesticides residues. In Europe and advanced countries much work has been carried out in all fruits since the consumers reject grapes which contain pesticides residues. Angela Berrie and Jerry Grors have been working for 20 years towards zero pesticides on apples and pear at East Malling International, UK. They published their first report in 2002 after achieving valuable results from implementing pests and disease control only after harvesting the fruits and pre-bloom. No pesticides are used at the time when fruits are developing on the trees. Stefano Boccaletti and Michaele Narddalla (1995) reported that consumers are wilting to pay more for fruits and vegetables free from pesticides. While David Bum *et al*. (1994) mentioned that consumers accept only pesticides fruits not contaminated with pesticides.

Under a section titled "Pesticide applications" **Tom Lavitt** (2009) stated that a protocol provision is made for the utilization of pesticides in non-cropping phases to reduce pesticides & diseases pressures during fruiting. The protocol also allowed to use chemicals in the soil before the fruit is grown, this is better than organic.

An article by **Crestine Russell** in the Washington Post (1991) mentioned that Americans continue to be concerned about the possible presence of pesticides in fresh fruits & vegetables, but are also reluctant to buy produce that is not aesthetically appealing, according to a survey presented at the Annual Meeting of the American Association for advancement of Science. But they highly value the cosmetic quality of fruits.

Therefore, the target of this experiment was to establish the best method for producing fruits free from pesticides. Also, to reduce fruit contamination and environmental pollution resulting from extensive use of pesticides. Eventually, the quality of fruits in improved and the demand of quality fruits will be increased by the foreign markets.

II. Materials And Methods

An experiment was carried out on Flame seedless grapevines at El-Shorouk farm, 70 km Cairo-Alexandria road. The treatments were applied beginning of December 2013 on 3-years-old grapevines spaced at 1.5 X 3 meters and trained to the Gable system. The experimental vines were healthy and almost uniform in vigor. They received the normal cultural practices adopted by the farm as for fertilization, weed control, irrigation and other managements. The soil is sandy, and drip irrigation is used in the farm. Pruning was carried out during December to spurs of 2 eyes and leaving an equal number of 40 eyes/ vine as the vines were young.

Each treatment consisted of 6 vines replicated 4 times, which means that the experimental vines were 24 for each program.

The applied treatments to examine the method of not using pesticides at the time the fruits being developing on the vines were as the following:

1- El-Shourok farm pests control program.
2- BASAF program.

3- Zero pesticides from fruit-set up to harvesting.

Treatment (1): El-Shorok farm program
The program for pesticides control adopted by El-Shourok farm for Flame Seedless grapevines was as the following ;
January , just after pruning , wet table sulpher
February, At bud swelling, wettable sulpher
Confidor for Mely bugs and Black rot.
March , Bud opening and 10 cm shoots Thiovit, Bestban for jacids , and Ropbigan for powdery mildew
April , after fruit set, Collis and Tobsin for powdery mildew
May , Bells for powdery mildew and fruit rot.
Lambada , for Aphids, Jacid and Trips' .
July , Copravit and Kocaide for downy mildew
Rodomil plus for downy mildew
August , Confidor for mely bugs

Treatment (2): BASF pests control program
February, At bud burst :
Korouls S 80% WG for Downey mildew
Polyram DF 80% for Powdery mildew
March , Cobrio Top 60 % WG for powdery mildew
April , at flowering, Cobrio 38 % SC for mildews
May , after fruit set , Cobrio Top 60 WG for powdery mildew
June , beginning of fruit maturity, Bells 38 WG for fruit rot.
July , after harvesting, Acrobat Copper 46 % WP for downy mildew
August , Acrobat copper 46% for downy mildew.

Treatment (3) : Zero pesticides at the time fruits are on the vines the sulphur programe:
January , Wettable sulpher after pruning
February , Wettable sulpher at bud swelling
March, Wettable sulpher on 10 cm shoots
April , Tobcin + Ortis for powdery mildew
May no pesticides
June no pesticides
July Kocide for downy mildew .
August , Confidore for mely bugs.

Data recorded:
- Harvesting of the grapes was in mid June of 2014 and 2015. Physical and chemical characteristics were examined for no. of bunches/vine, bunch weight and yield/vine. Also, chemical characteristics of the grape juice was carried for SSC, Acidity and SSC/acid ratio.
- For pesticide residues testing, representing samples of grape clusters were collected treatment wise and transported for analysis at the Central Laboratory of pesticides residues, Ministry of Agriculture, Dokki –Giza. They also examined Ethephone residues in the samples.

The obtained data was statistically analyzed.

III. Results And Dissuasion

No. of bunches, bunch weight and yield/vine of Flame Seedless grapevine as affected by the treatments

Treatment	No. of bunches	Bunch weight (g)	Yield/vine (kg)	SSC (%)	Acidity (%)	SSC/Acid ratio
	2014					
Shorouk	21.2	455	9.65	19.00	0.61	31.14
BASF	20.5	459	9.41	18.90	0.62	30.48
Sulphur	21.4	460	9.80	19.40	0.60	32.33
L.S.D at 5 %	0.62	1.7	0.02	0.33	N.S	0.45
	2015					
Shorouk	28.0	445	12.50	19.02	0.59	32.23
BASF	26.0	450	11.70	19.60	0.61	32.13
Sulphur	28.0	475	13.30	19.80	0.59	33.59
L.S.D at 5 %	0.78	3.85	0.96	N.S	0.02	0.16

It is clear from data in the table that yield and fruit quality were slightly affected by the tested programs of disease control. But, it is clear that SSC and Acidity were affected as the quality of berry juice of the grapes receiving pesticides was slightly inferior to those receiving the sulphur treatment.

Pesticide Residues in Grapes (mg/kg) *
(2014)

Compound	Shorouk program	BASF program	Sulphur program	MRL	
				CODEX	EU
Carbandazim	0.02	0.02	0.01	3	0.3
Methoxyfenozide	0.04	0.03	0.02	1	1
Dimethoate	0.05	0.06	0.01	---	0.02
Fludiozole	0.03	0.03	0.01	0.2	0.01
Lambada-cyhalothin	0.02	0.03	0.02	0.2	0.2
Thiophanate-methyl	0.33	0.30	0.20	3	0.1
Ethephone	0.77	0.77	0.70	1	1
(2015)					
Myclobutanil	0.02	0.02	0.01	1	1
Ethephone	0.5	0.5	0.5	1	1

* Carried at the Pesticides Laboratory, Ministry of Agriculture.

It is clear from the above table that more than one pesticide residue was found in the grape juice in the first season, But during the second season only Myclobutanil and Ethephon residues were detected. It is also noticed that pesticides residues are below the MRL according to the CODEX or EU standards. Also pesticides residues were more for Shorouk farm and BASF programs. The sulpher program resulted in lower amounts of pesticides residues compared to the other programs. These results indicate the importance of using sulpher for protection from fungus diseases during the period from fruit-set up to harvesting the grapes. This also means less pollution of the fruits and producing grapes almost free form pesticides residues.

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