

Alteration in Fruit Setting and Quality of Sweet, Sour and Duke Cherries Using N-Phenyl-Phthalamic Acid

¹Sayed Zia Nosrati and ²Abdollah Khadivi Khub

¹Department of Biotechnology and Physiology of Horticultural Plant,

Iranian Academic Center for Education Culture and Research (ACECR), Karaj, Iran

²Department of Horticultural Sciences, Faculty of Agriculture, Arak University, Arak, Iran

Abstract: The major cherry species grown commercially for their fruit are sweet and sour cherry (*Prunus avium* L. and *Prunus cerasus* L., respectively). Annual world production of cherries is about 2.5 million tons, which is split relatively evenly between sweet and sour cherry and Iran is one of major cherry producing countries in the world. Sweet cherries are best eaten fresh and its fruits have either dark red skin and flesh or yellow skin with a pink and yellow flesh. Sour cherries are excellent for cooking and are used mainly in pies, jams, juices and pastry products, although certain sour cherries are also excellent fresh. In this study, influence of N-phenyl-phthalamic acid (Nevirol 60 WP) on fruit setting and fruit quality of three sweet cherry, two sour cherry and one duke cherry genotypes was evaluated. The research results show that by using Nevirol 60 WPT we can improve the fruit setting. As a result of this process, the yield amount will increase, but fruit quality parameters (weight, length, width and diameter) were decreased. There is a significant difference between the reactions of different cultivars. It can be concluded that Nevirol 60 WP has a great effect on the improvement of yield amount, especially by good nutrient supply. Also before using Nevirol 60 WP, we have to take into consideration that the increased yield needs a higher nutrient supply.

Key words: N-phenyl-phthalamic acid • Cherries (Sweet, Sour and Duke) • Fruit setting • Fruit quality

INTRODUCTION

Prunus was divided into five subgenera (*Prunophora*, *Amygdalus*, *Cerasus*, *Padus* and *Laurocerasus*). There are several kinds of taxonomic systems in *Prunus* subg. *Cerasus* [1]. Species of subg. *Cerasus* grow wild throughout the temperate climate zone in the Northern Hemisphere. *P. avium* includes sweet cherries, cultivated for human consumption and wild cherry trees grown for their wood [2]. This species is diploid (AA, $2n=2x=16$) and its natural range covers the temperate regions. *P. cerasus*, the sour cherry tree, is cultivated for fruit, used in jam or liquor. It is an allotetraploid species (AAFF, $2n=4x=32$), thought to result from natural hybridization between sweet and ground cherry. *P. × gondouinii*, duke cherry, is an allotetraploid species (AAFF, $2n=4x=32$) and is hybridization between sweet and sour cherry [3].

Pollination of certain horticultural species, because of climatic and genetic influences is not possible in many cases [4]. For sufficient yield amount and required yield

quality we have to interfere in pollination. With the help of N-phenyl-phthalamic acid, which is an agent of Nevirol 60 WP, it can be achieved this aim [5].

The N-phenyl-phthalamic acid is a regulator that increases the working life of stigma and supports the better pollination, which results in a higher yield [6]. The acid is not auxin, but it has a synergistic effect with auxin in biological tests. This has not caused any phytotoxicity or parthenocarpi [7]. Applying Nevirol 60 WP, the possible bad effects of the objective (agronomics, agrotechnics, species and weather) and subjective conditions of production can be reduced and yield fluctuation can be leveled, thus, crop safety can be considerably increased. The product, like other regulators and all synthetic pesticides, is not approved in the organic production system [4].

Its application is recommended for the flowering period in greenhouses and foilhouses, as well as in field (orchard) cultivation for some crops such as apple [5, 7], sour cherry [8], sweet cherry [9] and eggplant [10].

Table 1: Characteristics of the experimental cherries (sweet, sour and duke cherries) and the chosen cultivars.

Number	Cultivar	Region	Fruit skin color	Fruit size	Fruit shape
1	Sweet cherry 1	Iran	Blackish Red	Large	Heart
2	Sweet cherry 2	Iran	Blackish Red	Large	Heart
3	Sweet cherry 3	Iran	Blackish Red	Large	Heart
4	Sour cherry 1	Iran	Blackish Red	Medium	Round
5	Sour cherry 2	Iran	Blackish Red	Medium	Round
6	Duke cherry	Iran	Blackish Red	Medium	Round

The product may be mixed with insecticides, fungicides and foliar fertilizers, excepting alkaline products. Attention has to be paid to the phytotoxic effect of some scab fungicides in the full bloom period, which should be avoided [6]. The preparation of the spray liquid does not need any special measures, as the preparation contains the necessary constituents to ensure quick and thorough wetting. It is important to note that while a higher yield is aimed at through better fruit setting, a higher level of basic nutrition should be provided.

MATERIALS AND METHODS

The research was conducted in the years of 2009 and 2010, in collection experiments of seed and plant institute of Karaj, Iran. We selected three sweet cherry, two sour cherry and one duke cherry genotypes for this study. Some characteristics of genotypes are presented in Table 1. Trees were planted in north-south row direction. In our research, the usual cultivation and integrated plant protection was applied. For better fruit setting, we applied N-phenyl-phthalamic acid, which is an agent of Nevirol 60 WP in 0.4 kg/ha doses. It was sprayed at full bloom.

The observation and measurement were carried out on three trees per treatment. The total number of trees was 18. Tables contain the average of these data. Fifty fruits were randomly sampled from each tree for this evaluation, so that the total number was 150 per genotype.

In our investigations, we determined the following properties of each species:

Fruit Setting: This means the number of harvested fruits from 100 flowers per tree.

Fruit Weight: The weight of fruit was estimated in 0.1 grams with the help of digital analitic scales.

Fruit Diameter: This was measured in 0.1 millimeters with slide-gauge.

Fruit Length: This was measured similar to fruit diameter in 0.1 millimeters with slide-gauge.

Fruit Width: This was measured similar to fruit diameter in 0.1 millimeters with slide-gauge.

Analysis of variance was performed for all traits by SAS and MSTATC softwares.

RESULTS AND DISCUSSION

Results showed that fruit setting of studied cultivars increased in many cases, when N-phenyl-phthalamic acid (Nevirol 60 WP) was applied. This increase of fruit setting was detected for sweet cherries, sour cherries and duke cherries (Figure 1 and Table 2). However, it needs to mention that the increase of fruit setting was not significant in several cases. These results agreed with finding in apple [5, 7], sour cherry [8], sweet cherry [9] and eggplant [10]. The positive effect of Nevirol 60 WP on fruit setting was considerable for high setting genotypes. The fruit setting was the highest sweet cherry 1 (49%). The increasing on fruit setting increased the number of fruits per tree too. These results agreed with result in apple [5, 7], sour cherry [8] and sweet cherry [9].

Decreasing on fruit weight was considerable in all genotypes when Nevirol was applied (Table 2). The reason for this is that fruit set was high and fruit received not enough nutrition for growing up. Similar tendency was found for the diameter, length and width of fruit, but there were differences among genotypes. These results agreed with result in apple [5, 7], sour cherry [8] and sweet cherry [9]. Variance analysis of the effect of Nevirol 60 WP on quality parameters of fruit is shown in Table 3.

Table 2: Effect of Nevirol 60 WP on quality parameters of cherry fruits

	Fruit Set (%)			Fruit Length (mm)	
	Control	Treatment		Control	Treatment
Sweet cherry 1	43	49	Sweet cherry 1	19.35	18.68
Sweet cherry 2	44	47	Sweet cherry 2	19.78	18.85
Sweet cherry 3	40	45	Sweet cherry 3	19.1	18.4
Sour cherry 1	44	48	Sour cherry 1	18.7	17.93
Sour cherry 2	46	49	Sour cherry 2	18.9	17.9
Duke cherry	43	46	Duke cherry	19.04	17.96
	Fruit weight (gr)		Fruit Width (mm)		
Sweet cherry 1	4.32	3.56	Sweet cherry 1	19.44	18.62
Sweet cherry 2	4.37	3.69	Sweet cherry 2	18.9	18.3
Sweet cherry 3	4.23	3.57	Sweet cherry 3	18.8	18.2
Sour cherry 1	2.98	2.74	Sour cherry 1	16.26	15.53
Sour cherry 2	3.61	2.9	Sour cherry 2	16.77	16.08
Duke cherry	3.93	3.33	Duke cherry	16.94	16.29
	Fruit Diameter (mm)				
Sweet cherry 1	16.9	16.2			
Sweet cherry 2	16.33	15.82			
Sweet cherry 3	16.1	15.6			
Sour cherry 1	15.5	15.19			
Sour cherry 2	16.67	15.5			
Duke cherry	18	16.87			

Table 3: Variance analysis of effect of Nevirol 60 WP on quality parameters of cherry fruits

SOV	Trait			
	Fruit weight	Fruit diameter	Fruit length	Fruit width
Sweet cherry 1	2.86**	1.33 ^{ns}	4.33*	1.80 ^{ns}
Sweet cherry 2	2.32**	1.25 ^{ns}	2.55 ^{ns}	1.77 ^{ns}
Sweet cherry 3	2.21*	2.80*	2.22 ^{ns}	3.37*
Sour cherry 1	0.29 ^{ns}	0.49 ^{ns}	2.97 ^{ns}	2.62 ^{ns}
Sour cherry 2	2.56**	6.75**	4.99 ^{ns}	2.35 ^{ns}
Duke cherry	1.81 ^{ns}	6.45**	5.86 ^{ns}	2.12 ^{ns}
df	18	18	18	18

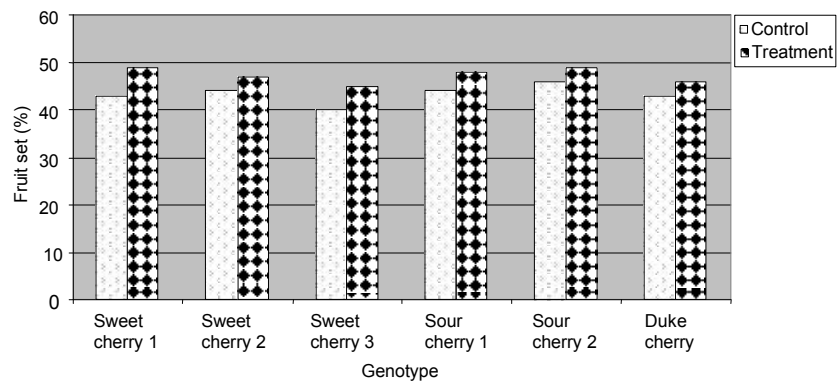


Fig. 1: Effect of Nevirol 60 WP on fruit setting of cherries

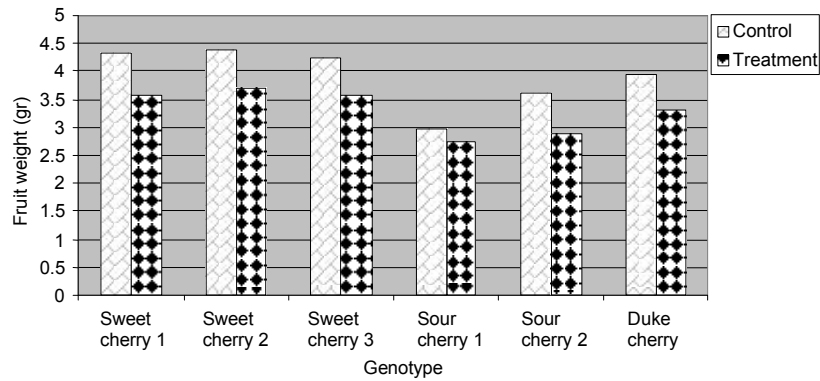


Fig. 2: Effect of Nevriol 60 WP on fruit weight of cherries

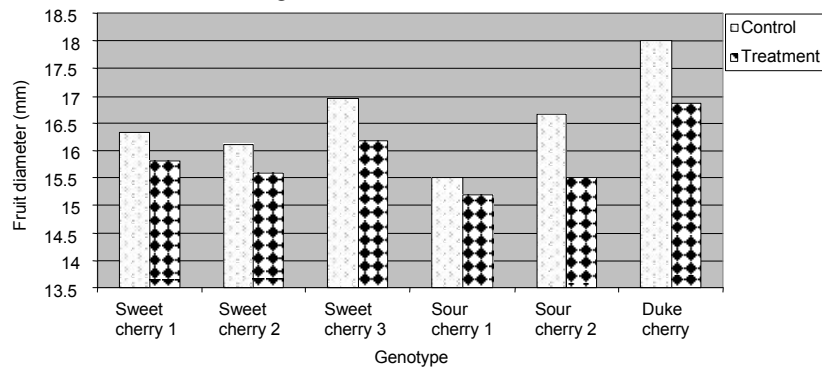


Fig. 3: Effect of Nevriol 60 WP on fruit diameter of cherries

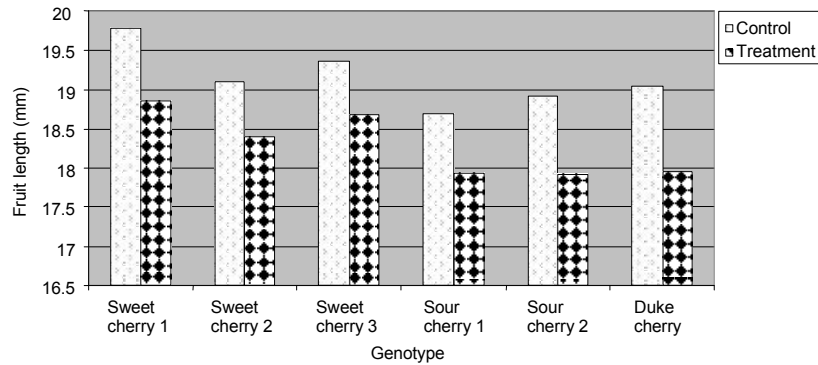


Fig. 4: Effect of Nevriol 60 WP on fruit length of cherries

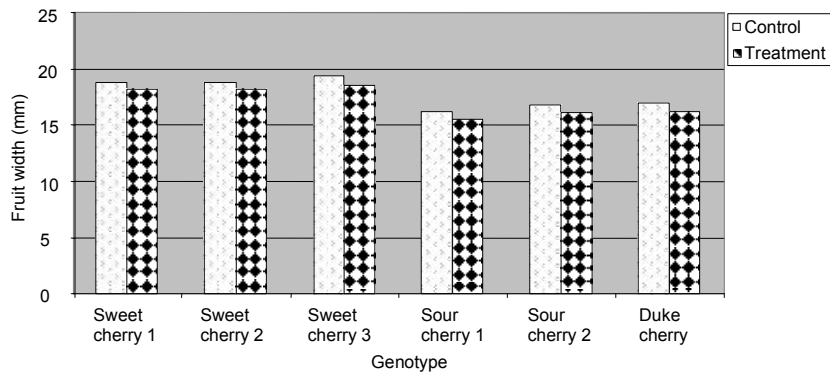


Fig. 5: Effect of Nevriol 60 WP on fruit width of cherries

CONCLUSION

Result showed that Nevirol 60 WP could increase fruit setting, which resulted in a yield increase too. Nevirol 60 WP treatment showed significant differences among genotypes. Nevirol 60 WP has a great effect on crop yield, especially when Nevirol 60 WP is applied with fertilizers. Before using Nevirol 60 WP we have to take into consideration that the increased yield needs nutrient supply, otherwise fruit mass, diameter, length and width will decrease and the yield frittered away.

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