THE EFFICIENCY OF 3,5,6-TPA USED IN APPLE AND PEAR AGAINST PREHARVEST FRUIT DROP

Alina Basak [1] and Maria Buczek[2]

ABSTRACT

The results of preliminary trials on the use of the preparation TOPS against preharvest fruit drop are presented here. The preparation, a product of the Belgium firm Agriphar S.A., contains 3% of 3,5,6-TPA (synthetic auxin) and is intended for use on apple, pear and citrus trees in orchards. Six experiments were conducted in 2005 in two orchards located in different climatic and agrotechnical conditions. The preparation TOPS was used by spraying apple tree cultivars 'Šampion' and 'Ligol' at doses of 15 and 20 tablets/ha, and trees of the pear cultivar 'Conference' at 10 and 15 tablets/ha 5 weeks before harvest time. The tablets, which contain 1 g of the active ingredient/tablet are easily soluble in water. The dose of the preparation was calculated for 1000 litres of water per ha, but the quantity of the preparation per tree depended on the number of trees per ha. The Polish preparation Pomonit Super 050 SL (containing 5% NAA in salt with triethanolamine) served as a reference and was used in the same way as in commercial orchards (40 ml/100 L at 10 days before harvest). The untreated trees were used as a control for both preparations. The effects of the preparations on the dynamic fruit drop, fruit quality at harvest and after storage, as well as on shoot growth and subsequent blooming were recorded and evaluated according to the methods described by Basak (2000).

Each treatment was tested on 6 trees (tree = replication) of similar height and bloom intensity. The results were statistically analyzed using analysis of variance and the significance of differences was assessed using Duncan *t* test at 95% probability level.

RESULTS AND DISCUSSION

TOPS inhibited preharvest fruit drop in all the experiments, which was particularly evident in pear trees of the cultivar 'Conference'. In 4 out of the 6 experiments, the effect of the preparation was significant in comparison with the untreated control trees (Table 1). In 1 experiment, TOPS was found to inhibit fruit drop to a greater extent than the reference preparation Pomonit Super 050 SL, or to a similar degree in other experiments.

The mean fruit weight (apples and pears) for the trees sprayed with TOPS was similar to that for the control trees. However, in 3 experiments the fruits were significantly smaller than when Pomonit Super 050 SL was applied. The effect of the preparation TOPS on the distribution of apples in diameter-based size classes and on fruit size uniformity was small and ambiguous. The preparation TOPS, as well as Pomonit Super, did not have any effect on the total fruit yield.

The treatments with TOPS resulted in a definite improvement in the extent of red colour development on apples and an increase in the number of best coloured apples (those with >75% of surface coloured), especially after the preparation had been applied at the higher dose (Table 2). In that respect, TOPS worked better or much the same as the reference preparation Pomonit

[1] Research Institute of Pomology and Flor., Pomologiczna 18, 96-100 Skierniewice, Poland
[2] Station of Research Institute of Pomology and Flor., Brzezna, 33-386, Podegrodzie, Poland

Super 050 SL. There was no evidence of a significant effect of the two preparations on fruit russeting.

The internal quality of the fruit was evaluated by determining the firmness of the flesh and soluble solids content soon after harvest and after some time in cold storage. In a few cases, the values of these parameters depended on the size of the dose of the preparation TOPS and the fruit tree species and cultivar. TOPS, in the same way as Pomonit Super 050 SL, did not have a significant effect on the firmness of 'Conference' pears, both at harvest and after storage. In the case of the apple cultivar 'Ligol', TOPS either did not change this parameter or made it increase after storage in comparison with the control and the treatment with Pomonit Super 050 SL. In contrast, the firmness of 'Šampion' apples treated with TOPS was often lower than or similar to the control apples and those treated with Pomonit Super 050 SL when measured at harvest time, but after storage these apples were found to have a higher firmness than the control, as was the case when Pomonit Super 050 SL was used.

TOPS did not have a clear effect on the soluble solids content. In most cases, it did not affect that parameter in comparison with the apples from the control trees and sometimes, particularly in the cultivar 'Ligol', it caused greater refraction than Pomonit Super 050 SL.

TOPS reduced or did not affect rotting of the fruit during storage, and limited to a small extent the occurrence of other diseases, e.g. core flush or internal breakdown.

Sometimes, the preparation TOPS, especially at the lower concentration, stimulated the growth of shoots, increasing both their number per tree and their average length. Only in one experiment, TOPS significantly improved the subsequent blooming of pear trees, especially in comparison with those treated with Pomonit Super. However, when used at the larger dose in another experiment, it reduced the intensity of subsequent blooming of 'Šampion' trees.

In one orchard, delayed abscission of apple tree leaves was observed in autumn. No phytotoxic effect was noticed in the trees sprayed with TOPS.

Table 1. Effect of treatments on the number of dropped fruits
(*in % of the total no.fruits per tree)*

Cultivar/Location of orchard	Control – untreated	Pomonit Super 050 SL	TOPS low dose	TOPS high dose
Apple cv. ŠAMPION				
Brzezna	8.23 c	4.17 b	1.67 a	1.51 a
Skierniewice	4.67 a	4.42 a	3.07 a	3.39 a
Apple cv. LIGOL				
Brzezna	25.20 a	14.57 a	15.45 a	16.04 a
Skierniewice	5.82 b	4.13 ab	2.54 ab	1.73 a
Pear cv.CONFERENCE				
Brzezna	16.88 b	0.23 a	0.20 a	0.95 a
Skierniewice	24.89 b	5.21 a	4.31 a	4.92 a

Explanations: Means for each experiment marked with the same letters do not differ significantly, according to Duncan's test, P=0,05.

Table 2.Effect of treatments on the colour index and % of apples with red colour >75% surface *(in parenthesis)*

Cultivar/Location of orchard	Control – untreated	Pomonit Super 050 SL	TOPS low dose	TOPS high dose
Apple cv. ŠAMPION				
Brzezna	643 (35 a)	706 (46 a)	705 (49 a)	742 (60 a)
Skierniewice	688 (33.8 ab)	618 (18.3 a)	767 (53.5 b)	729 (41.8 b)
Apple cv. LIGOL				
Brzezna	375 (4.6 a)	367 (3.0 a)	385 (7.3 ab)	508 (16.2 b)
Skierniewice	398 (57.0 b)	483 (42.9ab)	486 (41.4 ab)	488 (35.8 a)

Red colour index= [n1 x 1(class 1) = n2 x 33(class 2) + n3 x 5(class 3) + n4 x 7(class 4) + n5 x 9(class 5)]; n = fruit number in classes: 1=0%,2=<25%,3=26-50%,4=51-75%,5=>75% surface of red colour ; Other explanations as in Table 1.