

Persistence of Fungicide Euparen on Strawberry and/or in Some Canned Products of Strawberry

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Euparen, a commercial preparation with dichlofluanid /N-(dichlorofluoromethylthio)-N,N'-dimethylbenzensulfonamide/ as an active component, exhibits good properties in the protection of strawberry against fungi, especially against *Botrytis cinerea* (GREWE, 1968). Some attention has been devoted to the study of the persistence of this fungicide (EADES and GARDINER, 1967).

In this paper the persistence of Euparen on strawberry and, or in some canned products of strawberry has been studied. Besides the chemical analysis the samples were evaluated sensorically, too.

Experimental

Treatment of strawberry with fungicide. Strawberry (var. Senga Sengana) were treated with a 0.2% solution of Euparen (Bayer AG) in the quantity of 2 200 l/ha. The first spray was carried out the tenth day after strawberry in bloom, the second and the third one after 10 and 29 days, respectively.

The leaves of strawberry were collected just after the first spray of fungicide. Strawberry were started to be analyzed 7 days prior consumer ripeness. Strawberry thermosterilized in different types of cans and, or purée were analyzed as the representatives of canned products.

Determination of Euparen residues. The residues of Euparen were determined by the enzyme method (DAVÍDEK et al., 1976).

Sensoric analysis. The taste and flavor of strawberry were evaluated sensorically using pair one-tail and, or ranking test (ANONYMUS, 1970).

One- and, or two-tail pair test (ANONYMUS, 1970) were applied for canned strawberry and purée, respectively.

Results and Discussion

The decay of dichlofluanid on strawberry leaves proceeds according to the first-order kinetics in the initial 21 days (Fig. 1a, 1b). The half-time of the decay is 7.6 day^{-1} , the first-order rate constant 0.909 day^{-1} , respectively. The content of dichlofluanid residues on the leaves of strawberry treated with two sprays of fungicide has decreased to 2 ppm after 35 days. The 55th day after the first spray the level of residues has still varied to around 1.5 ppm.

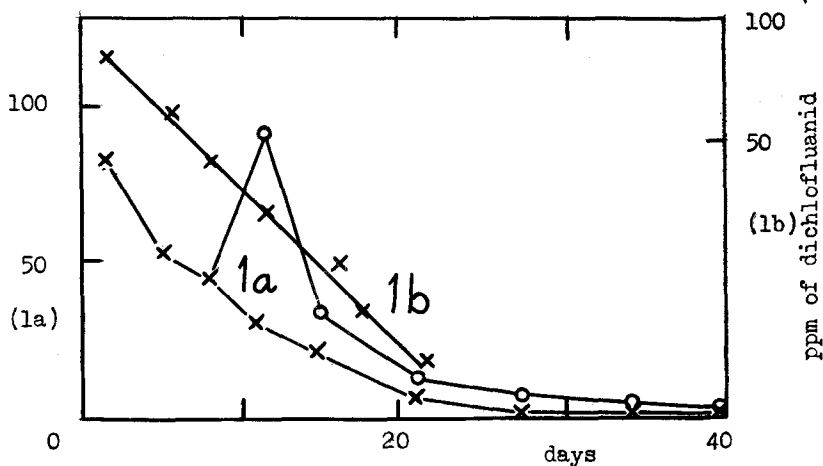


Fig. 1a, 1b Persistence of Euparen on the leaves of strawberry

Strawberry were treated with 0.2% solution of Euparen (2 200 l/ha). The residues of dichlofluanid were determined by the enzyme method.

o - strawberry treated with two sprays, x - strawberry treated with one spray of Euparen.

Thin layer chromatography (VOGELER and NIESSEN, 1967) proved N,N-dimethylbenzensulfonamide as the major product of Euparen degradation on strawberry leaves.

The content of dichlofluanid residues on strawberry treated with two sprays has varied from 0.5 to 1.0 ppm, while on the three-times sprayed strawberry from 1.0 to 2.0 ppm, respectively (Fig. 2).

The highest content of dichlofluanid residues in canned strawberry found was 0.5 ppm. Mostly it was in the limit of the sensitivity of the analytical method employed (Table 1).

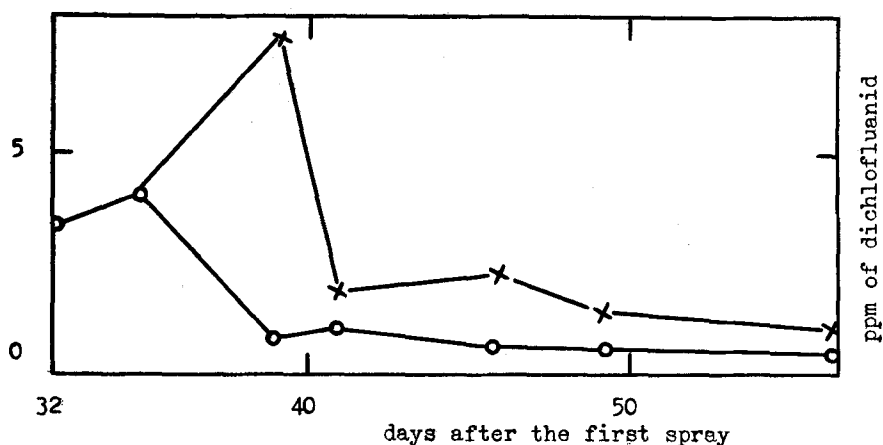


Fig.2 Persistence of Euparen on strawberry

Strawberry were treated with 0.2% solution of Euparen (2 200 l/ha).The residues of dichlofluanid were determined by the enzyme method.

o - strawberry treated with two sprays,x - strawberry treated with three sprays of Euparen.

Table 1

Residues of dichlofluanid in canned products of strawberry

The residues of dichlofluanid were determined by the enzyme method. Samples 1 were treated with three sprays of 0.2% solution of Euparen (2 200 l/ha),samples 2 with two sprays,respectively.

product analyzed		sample dichlofluanid residues ppm	
strawberry thermo-sterilated in glass	strawberry	1	0.10
	sirup	1	0.25
	strawberry	2	0.10
	sirup	2	0.05
strawberry thermo-sterilated in enamel cans(alluminium pigment)	strawberry	1	0.22
	sirup	1	0.20
	strawberry	2	0.10
	sirup	2	0.12
strawberry thermo-sterilated in enamel cans	strawberry	1	0.55
	sirup	1	0.19
	strawberry	2	0.58
	sirup	2	0.19
purée		1	0.10
		2	0.10

The technological procedures applied for the preparation of canned strawberry and, or purée have caused a substantial decrease of the dichlofluamid residues (Table 2).

Table 2

Effect of the technological procedures on the content of dichlofluamid residues in some canned products of strawberry

The dichlofluamid residues were determined by the enzyme method.

product	procedure	loss of dichlofluamid residues in %
strawberry thermosterilized in glass	washing; thermosterilization 5 min at 85°C; stocking 5 weeks at 0-4°C	93-99
strawberry thermosterilized in enamel cans (alluminium pigment)	washing; thermosterilization 5 min at 85°C; stocking 9 weeks at 0-4°C	86-99
strawberry thermosterilized in enamel cans	washing; thermosterilization 5 min at 85°C; stocking 7 weeks at 0-4°C	64-76
purée	washing; homogenisation; boiling 5 min at 100°C; thermosterilization 5 min at 85°C; stocking 6 weeks at 0-4°C	86-99

The taste and flavor of strawberry treated twice with fungicide spray do not exhibit any differences against the control. On the other hand, strawberry treated with three sprays are characterized by a sulphur off-flavor the first day after the third treatment. Though after four days the off-flavor has disappeared, the strawberry, however, remains without its typical aroma. The reversion of organoleptic properties occurred after eight days. Aroma of strawberry treated in this way was evaluated by panel as the best from all samples analyzed (i.e. strawberry treated with two and three sprays, respectively, and control). A similar phenomenon has been observed at wine grapes sprayed with Euparen, as well (CASSIGNARD, 1973). It might be caused by inhibition of some enzyme systems responsible for the formation of aroma.

The sensoric analysis of the canned products of strawberry has not proved any differences in taste and flavor compared to the con-

Summary

There was studied the persistence of Euparen(dichlofluanid) on strawberry and in some canned products of strawberry, respectively. The rate of decrease of dichlofluanid residues on the leaves of strawberry is proceeding according to the first-order reaction kinetics in the initial 21 days. The content of dichlofluanid residues on strawberry treated twice with fungicide varies from 0.5 to 1.0 ppm, for strawberry sprayed three times from 1.0 to 2.0 ppm, respectively. The significant decay of dichlofluanid residues occurs during the technological procedures applied. The sensoric analysis of strawberry has proved the negative influence of the third spray of fungicide in the initial days. No significance differences between strawberry treated with fungicide and control has been found in flavor and taste of the canned products investigated.

References

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