

FENTIN (040)

Fentin residue data were evaluated in 1970, 1972 and 1991, with brief reviews in 1986 and 1993. The 1991 Meeting required residue data from supervised trials according to current GAP on crops for which the use of fentin compounds was still registered, including celeriac, celery, peanuts and pecans, together with information on current GAP in the countries concerned.

This request was reiterated by a Circular Letter (CL 1992/12-PR).

The manufacturer submitted residue data on pecans, and informed the CCPR that the use on other commodities would not be supported. Consequently, the CXLs for these commodities were deleted by the 1993 CCPR.

Information on current use patterns has been provided by Germany, The Netherlands and the EU. The new residue data and the information on GAP are summarized in this evaluation.

USE PATTERN

The reported registered uses are summarized in Table 1. For pecans up to 10 treatments are recommended in the USA. The last application should be just before shuck split.

Table 1. Registered or approved uses of fentin compounds.

Crop	Country	Application				PHI, days
		Form. and notes ¹	No. (interval)	kg ai/hl	kg ai/ha	
Apple	Netherlands	FH, WP 47.5% (a)	2	0.095	0.95-1.42	
Celeriac	Belgium	FA, FH; WP 11.5% WP 20% SC 500 g/l	intervals of 14 days		0.2-0.3	28
	Netherlands	FH; WP 11.5% FA; WP 11.5% FA; SC 11.5 g/l	1-5 (10-14 days)		0.24 0.28	28
Celery	Belgium	FH; WP 11.5% FH; WP 20% FA; SC 500 g/l	intervals of 14 days		0.2-0.3	28
	Ireland	FH; WP 20%	6 (10-14 days)		0.28-0.34	42
	GR	WP 54%	1-3	0.054	0.27-0.32	21
Fodder beets	Germany	FA; WP 54%	3	0.08	0.32	49
Hops	Germany	FA, WP 54%	2 (21 days)		0.54	
Peanuts	GR	FA; WP; 54% (b)	1-2		0.22-0.27	15
Pecans	USA	FH; SC 480g/l	10		4.21 (maximum total amount)	56
Potato	Germany	FA; WP 54% FH; SC 502 g/l	6	0.08 0.033-0.05	0.32 0.2	7
	Netherlands	FA; WP 11.5% (c) EC 11.5% (c) WP 10% (c)	4-15 (7-14 days)		1st 0.2-0.23 2-3rd 0.2-0.26 from 4th 0.29	
		FA; WP 9% (d)	4-15 (7-14 days)		1st 0.16 2nd 0.18 3rd 0.2 from 4th 0.23	
Sugar beets	Germany	FA; WP 54%	3	0.08	0.32	49

¹(a) Apple trees are treated after harvest and in leaf fall period

(b) Greenhouse application

(c) Ware, starch and seed potatoes

FH: fentin hydroxide

FA: fentin acetate

RESIDUES RESULTING FROM SUPERVISED TRIALS

A study was conducted in Georgia, which provides approximately 34% of the US pecan production, to determine the residues of total tin in or on pecans harvested from trees treated with a flowable formulation of triphenyltin hydroxide (TPTH). The test plots were located in an orchard with 30-year-old trees planted at about 18 m square. For ground applications 6 trees were selected in a row, while the plot for aerial treatments consisted of 5 trees in two rows. Between the treated plots were untreated control plots of 2 x 2 trees. The distance between the control and aerially treated plots was about 54 m. The pesticide was applied 11 times at 0.42 kg ai/ha at 14-day intervals. The total amount of pesticide applied was therefore 4.62 kg ai/ha which is slightly higher than the maximum permitted amount (4.21 kg ai/ha). Duplicate samples were taken from each plot 48 and 56 days after the last application.

The total organotin residues (triphenyltin hydroxide, tetraphenyltin, diphenyltin oxide, phenylstannic acid) were determined by acidifying the samples with HBr in the presence of methanol, extracting the solution with 0.05% tropolone in toluene, and measuring the tin content of the extract by atomic absorption spectrometry (AAS) using a graphite furnace. The limit of determination was 0.005 mg/kg expressed as tin. The conversion factors are 3.09 and 2.96 to calculate triphenyltin hydroxide and fentin respectively. The recovery was 79%.

The quantitative determination of the phenyltin species ($(Ph_nX_{4-n})Sn$), is effected by derivatizing an aliquot of the toluene extract with butylmagnesium chloride, separating the derivatives by HPLC, and determining tin in the relevant fractions by AAS.

The residues of total tin in or on pecans treated by ground or air application and in the untreated control samples were as shown below.

Days after last application	Residues as mg tin/kg sample		
	Untreated	Ground	Aerial
48	0.005, <0.005	0.005, 0.005	<0.005, 0.008
56		0.005, <0.005	<0.005, 0.005

NATIONAL MAXIMUM RESIDUE LIMITS

In addition to the limits included in the 1991 evaluation, Australia reported MRLs of 0.1 mg/kg for cacao beans, coffee beans and rice, and The Netherlands 0.1* mg/kg for rice in husk.

APPRAISAL

Fentin residue data were evaluated in 1970 and 1972 and then re-evaluated in 1991. The 1991 Meeting required residue data from supervised trials according to current GAP on crops for which the use of fentin compounds is still registered, including cacao beans, carrots, celeriac, celery, coffee beans, peanuts and pecans, to be accompanied by current information on GAP in the countries concerned.

The manufacturer submitted residue data on pecans, and informed the CCPR that the use on other commodities would not be supported. Consequently, the CXLs for these commodities were recommended for withdrawal by the 1993 CCPR.

The US registered use pattern allows up to 10 treatments on pecans with a maximum application rate of 4.2 kg ai/ha in the season. The last application should be just before shuck split. A trial was reported from Georgia, USA. The test plots, consisting of a row of 6 trees for ground treatment and 5 trees in two rows for aerial application, were located in an orchard with 30-year-old trees planted at about 18 m square. An untreated control plot of 2 x 2 trees was located between the treated plots. The distance between the control and aerially treated plots was about 54 m. Triphenyltin hydroxide in a flowable formulation was applied 11 times to both plots at 0.42 kg ai/ha at 14-day intervals. The total amount of pesticide applied was 4.6 kg ai/ha. Duplicate samples were taken from each plot at 48 and 56 days after the final application. The total organotin residues were determined by atomic absorption spectrometry. The limit of determination expressed as tin was 0.005 mg/kg. The conversion factors are 3.09 and 2.96 to calculate triphenyltin hydroxide and fentin respectively. The recovery was 79%.

The levels of total tin in or on pecans treated by ground or air application and in the untreated control samples were at or below the limit of determination (≤ 0.005 mg/kg) with the exception of one sample (0.008 mg/kg) taken 48 days after last aerial treatment. This residue corresponds to 0.024 mg fentin/kg or 0.03 mg triphenyltin hydroxide/kg.

The Meeting noted that in one replicate sample a detectable residue was present indicating that the previous assumption that there were no residues was not valid. The Meeting further concluded that the residue data from two trials conducted at one site in one year were insufficient to estimate a maximum residue level, and consequently withdrew the previous recommendation of 0.05* mg/kg.

RECOMMENDATIONS

On the basis of the available information from supervised trials the Meeting recommended the withdrawal shown below.

Definition of the residue: fentin, excluding inorganic tin and di- and mono-phenyl tin

Commodity		Recommended MRL (mg/kg)	
CCN	Name	New	Previous
TN 0672	Pecan	W	0.05*

REFERENCES

Bookbinder, M.G., 1989. Triphenyltin hydroxide: Magnitude of the residue in or on pecans treated by ground and aerial equipment in Georgia, 1988. Griffin Corp. File No. 40-TPT/89142.

European Union, 1994. Summary of Good Agricultural Practices for Pesticide Uses.

Germany, 1994. Summary of Good Agricultural Practices for Pesticide Uses.

Netherlands, 1994. Information of The Netherlands on pesticides to be considered by the 1994 JMPR.