DIAZINON (022)

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EXPLANATION

Diazinon was evaluated by the JMPR in 1993, 1999 and 2001 when an ADI of 0-0.002 mg/kg bw and ARfD of 0.03 mg/kg bw were established, and a number of maximum residue levels were estimated.

The cranberry industry performed a number of supervised trials within the Interregional Research Project No. 4 to provide data for the establishment of US tolerances for diazinon residues in cranberry. The relevant labels and reports of supervised trials were submitted for evaluation by the 2006 JMPR.

RESIDUE ANALYSIS

Analytical methods

The limit of quantification of the method (LOQ) was 0.01 mg/kg for each diazinon, diazoxon and 4-hydroxy-2-isopropyl-6-methylpyrimidine CGA-14128. No quantifiable residues were observed in the control samples. The recoveries obtained during the analysis of samples are summarised in Table 1.

Table 1. Summary of concurrent method recoveries of diazinon and its metabolites from cranberries

Analyte	Spike level (mg/kg)	Sample size (n)	Type of Recovery	Recoveries (%)[a]	Mean ± std. dev.
Diazoxon	0.016–0.40	7	Concurrent	70–00	82 ± 11
Diazinon	0.016–0.40	8	Concurrent	75–112	94 ± 14
CGA-14128	0.016–0.40	7	Concurrent	106–125	114 ± 8

a Range of recoveries.

Stability of pesticide residues in stored analytical samples

Samples were stored frozen from harvest to analysis for a maximum of 11 months. Freezer storage stability data included in the report indicated that residues of diazinon and CGA-14128 were stable for up to three months of frozen storage < -10 ^{o}C, and that residues of diazoxon were not (0% recovery at three months). The storage stability data previously submitted to JMPR (FAO 1994) indicated that diazinon and CGA-14128 residues were stable in/on frozen raw agricultural commodities for up to 26 months. Diazoxon was not stable (< 3 months).

USE PATTERN

The diazinon is registered in various formulations in the USA: AG 500 (4 lb/gal EC, EPA Reg. No. 100-461), 50 W (50% WP, EPA Reg. 100-460), and 14 G (14% G, EPA Reg. No. 100-469) and diazinon 4E, containing 48% active substance (EPA Reg. No. 10163-100).

They can be applied to protect cranberry as shown in Table 2:

Table 2. Use pattern of diazinon on cranberry

Application						PHI
Method	**No**	**Interval, days**	**Rate kg ai/hL**	**Water L/ha**	**Rate kg ai/ha**	**day**
Ground	Max 6	14	1.6	140	2.24	7

Application						PHI
Method	**No**	**Interval, days**	**Rate kg ai/hL**	**Water L/ha**	**Rate kg ai/ha**	**day**
Chemigation	Max 6	14	1.6	140	2.24	7
	Max 3	14	0.06	1514	3.36	7

Do not apply more than 10.1 kg ai/ha per season.

RESIDUES RESULTING FROM SUPERVISED TRIALS

During the 1988 and 1989 growing seasons, ten trials were conducted on cranberries in three regions of the USA (IR-4, 2006).

The cranberry crops (Early Black and Searles varieties) were grown and maintained according to typical agricultural practices for each geographical region.

At each test location, multiple broadcast foliar applications of diazinon were made using the 45% EC, 50% WP, and/or 14% G formulations at the rate of 3.36 kg ai/ha/application. Total seasonal application rates for all trials were 6.72, 13.45, and 20.17 kg ai/ha. Ground equipment was used at all trial locations except Carver, MA where applications were made aerially. When applied in water, spray volumes ranged from 46.8-2806 l/ha and no adjuvants were used. The granular formulation was applied dry followed by irrigation to wet the soil. Retreatment intervals were between 6 and 23 days.

Cranberry fruit samples were harvested at 7 or 31 days following the last application.

Four replicate samples were collected by hand from randomly chosen areas within the control and treated plots and placed in plastic bags.

The samples did not contain any detectable residues of diazoxon and CGA14128. The residue results from the supervised field trials are presented in Table 3.

Table 3. Residues of diazinon in/on cranberry fruits

Location (City, State)	Trial Start Year	Variety	EP [b?]	Single Rate, kg ai/ha (in litre)	No. of appl.	DAT [a]	Residues (mg/kg)	
							Diazinon	Average
East Wareham, MA (Plymouth County)	1988	Early Black	Diazinon (48% EC)	3.36 (2806)	4	7	0.17, 0.15, 0.07, 0.11	0.13
Chatsworth, NJ (Burlington County)	1988	Early Black	Diazinon (14% G)	3.36	2	7	0.04, 0.06, 0.02, 0.03	0.04
Madison, WI (Dane County)	1988	Searles	Diazinon 48% EC	3.36 (1871)	4	7	0.08, 0.05, 0.07, 0.06	0.07
			Diazinon (14% G)	3.36 (1871)	2	31	< 0.01, 0.02, < 0.01, < 0.01	0.01
			Diazinon (50% WP)	3.36 (1871)	4	7	0.06, 0.06, 0.04, 0.05	0.05
			Diazinon (50% WP + 14% G)	3.36 or 6.72 (1871)	4	7	0.15, 0.10, 0.17, 0.16	0.13
			Diazinon (48% EC + 14% G)	3.36 or 6.72 (1871)	4	7	0.05, 0.04, 0.07, 0.08	0.06
Carver, MA (Plymouth County)	1989	Early Black	Diazinon [c] (48% EC)	3.36 (46.8[c])	4	7	< 0.01, 0.02, < 0.01, < 0.01	0.01
			Diazinon [c] (50% WP)	3.36 (46.8[c])	4	7	≤ 0.01, < 0.01, < 0.01, < 0.01	≤ 0.01
Bandon, Oregon (Coos County)	1989	McFarlin	Diazinon 14 G	3.36	4	7	0.06, 0.10, 0.10, 0.06	0.08

a DAT = Days after treatment.

b Maximum combined residues reported in original study report.

c These were aerial applications.

APPRAISAL

Diazinon has been evaluated by the JMPR several times and a number of maximum residue levels were estimated. The residue was defined as diazinon for regulatory and dietary intake assessment purposes. The present Meeting established an ADI of 0-0.005 mg/kg bw but the ARfD of 0.03 mg/kg bw remained unchanged.

Results of supervised trials, carried out on cranberry according the US registered uses, were submitted for evaluation.

Results of supervised residue trials

During the 1988 and 1989 growing seasons ten trials were conducted on cranberries in three regions of USA. Samples were collected at 7 day PHI following the total seasonal application rates of 6.72–13.45 (GAP or 1.3 × GAP), and 20.17 (double rate) kg ai/ha.

Samples were stored frozen from harvest to analysis for a maximum of 11 months. Storage stability data submitted to the 1993 JMPR indicated that diazinon and CGA-14128 (4-hydroxy-2-isopropyl-6-methylpyrimidine) residues were stable in/on frozen raw agricultural commodities (< -10^{o} C) for up to 26 months. Diazoxon was not stable (< 3 months).

The harvested cranberry samples were analyzed by a method with an LOQ of 0.01 mg/kg for each residue component measured. The concurrent recoveries of diazoxon, diazinon and CGA-14128 from cranberries fortified at 0.016-0.40 mg/kg ranged between 70-100% (82 ± 11, n = 7), 75-112% (94 ± 14, n = 8), and 106-125% (114 ± 8, n = 7), respectively.

The average residues (mg/kg) from treatments carried out according to 1.5 times the individual treatment rate and at 1.3 times the total seasonal application rates specified in GAP were in rank order: < 0.01, 0.01, 0.04, 0.05, 0.07, 0.08 and 0.13mg/kg

The Meeting estimated a maximum residue level of 0.2 mg/kg, HR of 0.13 mg/kg and STMR of 0.05 mg/kg, respectively.

RECOMMENDATION

On the basis of the data from supervised trials, the Meeting concluded that the residue levels listed below are suitable for establishing maximum residue limits and for dietary intake assessment.

Summary of recommendations for MRLs, STMRs and HRs for diazinon

CCN	Commodity	MRL, mg/kg		STMR or STMR-P, mg/kg	HR or HR/P mg/kg
		New	Previous		
FB 0265	Cranberry	0.2		0.05	0.13

DIETARY RISK ASSESSMENT

Long-term intake

As the ADI of the compound was revised, the long-term intake was recalculated using the current Codex MRLs or the estimated STMR values. The summaries of calculations are included in Annex 3 of the 2006 JMPR report. The intake of diazinon residues calculated based on the 13 regional diets ranged from 7 to 50% of the maximum ADI (0.005 mg/kg bw).

The Meeting concluded that the long-term intake of residues from the use of diazinon on the commodities considered by the CCPR or JMPR is unlikely to present a public health concern.

Short-term intake

Since the ARfD was not changed the IESTI was only calculated for cranberries:

The GEMS/Food regional diet specifies the large portion sizes of cranberry of 3.53 g/kg bw for adults and 6.78 g/kg bw for children (both are from the USA).

The IESTIs of diazinon calculated on the basis of the large portion size and the estimated HR of 0.13 mg/kg are 1.53% and 2.9% of the ARfD for adults and children, respectively.

The Meeting concluded that the short-term intake of residues resulting from the use of diazinon on cranberry that have been considered by the JMPR is unlikely to present a public health concern.

REFERENCES

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