2-6-96

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 6 1996

OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

MEMORANDUM:

SUBJECT: Iprodione (109801), Reregistration Case No. 2335. Special Review, Anticipated Residues, Provisional. CBRS No. 16636, DP Barcode No. 221735, No MRID No.

FROM: John Abbotts, Chemist
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TO: Vivian Prunier, PM Team 60
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CBRS previously determined anticipated residues for iprodione (CBRS 15099, 5/1/95, J. Abbotts). Instructions for this assignment are to calculate anticipated residues for cancer risk if there is a feeding restriction placed on peanut hay and if there is a label restriction placed on cowpeas (beans). We have also surveyed Chemistry Branch files for information on whether changes in application parameters might lead to reductions in iprodione residues. The Conclusions here provide data that may assist SRRD in considering options, and we therefore make no Recommendations at this time.

Tolerances are established for the combined residues of the fungicide iprodione parent, its isomer, and one metabolite in or on plant commodities, food commodities, and feed commodities (40 CFR 180.399(a) and (c), 185.3750, 186.3750). Tolerances are established for the combined residues of iprodione parent, its isomer, and two metabolites, all expressed as iprodione equivalents, in or on animal commodities (40 CFR 180.399(b)). Chemical structures and full chemical names of residues in tolerance expressions are given in Figure 1. Iprodione is a List B Chemical; Phase 4 Review was completed 3/15/91.

Conclusions

1. Revised combined iprodione anticipated residues in whole milk for cancer risk, based on changes in Livestock Feeds Table, Table II, September 1995, and on potential label restrictions, are the following. These values were based on calculated animal dietary burdens that have taken percent crop treated data into account:
National milkshed, 0.0080 ppm;
National milkshed, label restrictions against grazing or feeding peanut foliage, 0.0003 ppm;
Local milkshed, label restrictions against grazing or feeding peanut foliage, 0.0009 ppm;
Local milkshed, label restrictions against grazing or feeding peanut foliage and excluding use on cowpeas, 0.0007 ppm.

2. Available residue data on stone fruits that allow comparisons of the effects of application parameters on residues at the same sites and under the same conditions are very limited, and firm conclusions cannot be drawn. Data that are available suggest that as the number of foliar applications is reduced from 7 to 5 x 1.0 lb ai/A, iprodione residues on peaches and cherries may be reduced.

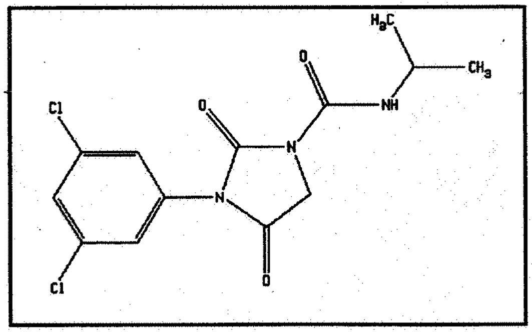
3. Data available on stone fruits indicate that residues from preharvest plus postharvest treatment may be lower than residues from preharvest treatment alone, due to rinsing steps that are part of the postharvest treatment. Data also indicate that as postharvest spray is reduced from 1X to 0.5X, residues are reduced proportionately, although this relationship is not always demonstrated. Postharvest dips are also registered, but there appear to be no residue data on dips.

4. Field trial data on grapes indicate that an increase in PHI from 0 to 25 days can cause a decrease in residues of 30-50% in NY, and an increase in PHI from 0 to 7 days can cause a decrease in residues of 30-60% in CA (three sites), although in one CA trial residues increased with PHI.

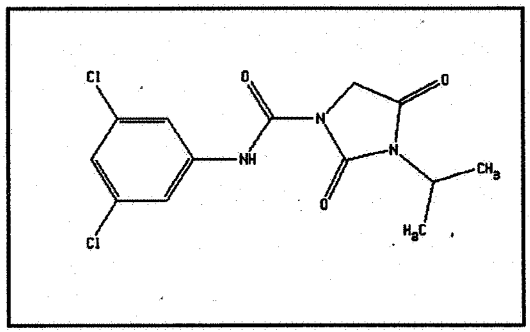
5. Field trial data on carrots indicate consistently that with 8 applications and a 0 day PHI, reducing the application rate from 2 lb ai/A to 1 lb ai/A (1X) causes combined iprodione residues to be reduced by approximately half.

Figure 1. Iprodione Tolerance Residues:

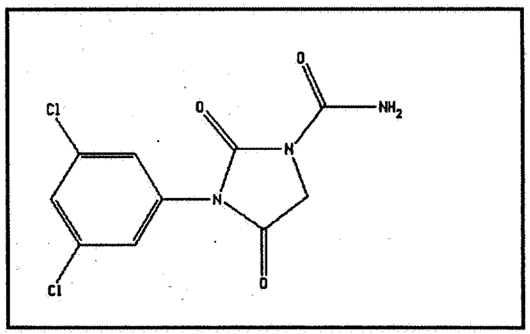
Iprodione parent;
3-(3,5-dichlorophenyl)-
N-(1-methylethyl)-2,4-dioxo-
1-imidazolidine-carboxamide



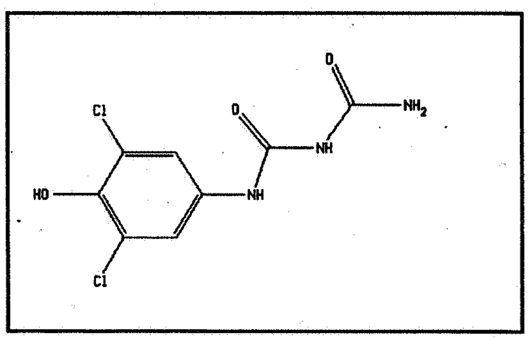
Iprodione isomer, RP30228;
3-(1-methylethyl)-
N-(3,5-dichlorophenyl)-2,4-dioxo-
1-imidazolidine-carboxamide



Iprodione metabolite RP32490
(animals and plants);
3-(3,5-dichlorophenyl)-2,4-dioxo-
1-imidazolidine-carboxamide



Iprodione metabolite RP36114
(animals); N-(3,5-dichloro-
4-hydroxyphenyl)-ureido-carboxamide



Feed items

The determination of anticipated residues for animal commodities was based on assumed animal diets and data from animal feeding studies (CBRS 15099, 5/1/95, J. Abbotts). The major contributor of iprodione anticipated residues in the diets of beef and dairy cattle was peanut hay. Subsequent review concluded that peanut hay should be considered a commodity in national commerce, and anticipated residues for milk should therefore be considered potential values for national consumption (CBRS 16038, 9/12/95, J. Abbotts). For the present assignment, we have been asked to evaluate whether anticipated residues in milk would be reduced by label restrictions on peanut hay and/or beans.

It should also be noted that anticipated residues were previously determined on the basis of Livestock Feeds Table, Table II, June 1994. The present version is Table II, September 1995. This analysis will therefore use the most recent edition of Table II in determining anticipated residues.

The Introduction to Table II, September 1995, describes commodities that have been added or removed since June 1994. For crops with iprodione tolerances, livestock feedstuffs removed are: bean (except for cowpea) seed, forage, straw/hay; all grape commodities; and peanut hulls. For crops with iprodione tolerances, the only feedstuff added is rice bran. Cowpea is the only bean crop considered for livestock feeding. Peanut hay is one of a few commodities where label restrictions prohibiting feeding and harvesting for feed are considered practical.

Rice bran was inadvertently omitted from Table II in June 1994. Consequently, anticipated residues were not previously determined. Rice processing data were reviewed as part of a petition (PP6F3443, 3/17/87, R.W. Cook). Concentration factors during processing of treated rice grain for bran were 2.46X during treatment at the 1X rate, and 1.81X during treatment at the 2X rate. The maximum theoretical concentration factor for rice bran is 7.7X (Pesticide Reregistration Rejection Rate Analysis, Residue Chemistry: Follow-Up Guidance, Publication EPA 737-R-93-001, February 1993); the higher factor from the processing study, 2.5X, will therefore be used for anticipated residues. Anticipated residues on rice, grain and rice, rough, were previously determined at 0.57 ppm, based on field trial data; applying the concentration factor of 2.5X gives anticipated residues, cancer risk, of 1.42 ppm for rice bran.

In the previous determination, anticipated residues based on monitoring data were adjusted for percent crop treated data, as were calculated dietary burdens for livestock; where percent crop treated data were available as a range, the higher limit of the range was used (CBRS 15099, 5/1/95, J. Abbotts). BEAD has issued a revised memo on percent crop treated data (Memo, 12/95, Alan

Halvorson). Table 1 indicates the original and revised values for those crops with iprodione tolerances which can still provide feed commodities, based on Table II, September 1995:

Table 1. Original and revised percent crop treated, feed crops.

Feed item crop	Percent crop treated, higher limit, based on BEAD memo of:	
	3/95	12/95
Almond	56	60
Bean	1	1
Carrot	18	50
Peanut	3	3
Potato	8	11
Rice	8	8

Table notes: Memos in each case were from Alan Halvorson, BEAD, to SRRD for iprodione.

Percent crop treated data have changed for almond, carrot, and potato, and anticipated residues for feed items from these crops will be changed accordingly. In the initial determination, anticipated residues for cancer risk were calculated from monitoring data using the equation derived (CBRS 15099, 5/1/95, J. Abbotts):

$$a = [(np-d)(0.005) + \Sigma]/n \quad (1), \text{ where}$$

a = average anticipated residues in ppm,
p = the portion of the crop treated, expressed as a decimal,
d = the number of samples with detectable residues,
(0.005) = half the combined limit of quantitation for iprodione residues in ppm,
Σ = the sum of all residues in ppm over d samples, and
n = the total number of samples (counts), with or without detectable residues.

Sufficient monitoring data were available for carrot and potato. Substituting the original values for carrot (Ibid.) and adjusting for the revised percent crop treated data gives:

$$a = [\{(345+173)(0.50)-36\}(0.005) + (2.32+8.048)]/(345+173)$$
= 0.022 ppm, which is little different from the previous value of 0.021 ppm. The same value will be used for anticipated residues for the feed item, cull carrots.

Adjusting the original values for potato gives:

a = [{(897+174)(0.11)-2}(0.005) + 2.04]/(897+174) = 0.0024 ppm, which is little different from the previous value of 0.0023 ppm. Residues did not concentrate during potato processing, so the same value will be used for the feed items cull potatoes and potato processed waste.

Anticipated residues for the feed item almond hulls were 1.25 ppm, based on field trial data; adjusting directly for the revised percent crop treated value gives 0.75 ppm.

Adjusting the value determined above for rice bran, 1.42 ppm, by percent crop treated gives 0.114 ppm in the feed item.

Dairy cattle diets

For the initial determination of anticipated residues, feed items and the maximum percent of livestock diets they could represent were arranged in a table (CBRS 15099, 5/1/95, J. Abbotts, Table 11). Reproducing that table and adjusting for new values for dairy cattle diets in Table II, September 1995, gives the data in Table 2 below:

Table 2. Dietary burden, cancer risk, from Iprodione feed commodities.

Crop	Feed item (Combined anticipated Residues, ppm)	% Dry Matter	Percent diet for ~~dairy cattle~~ [animal dietary burden, ppm]
Almond	Hulls (0.75)	90	10 [0.082]
Carrot	Culls (0.022)	12	25 [0.046]
Cowpea	Seed (0.0016)	88	20 [<0.001]
	Hay (0.133)	86	40 [0.062]
	Forage (0.0884)	30	40 [0.118]
Peanut	Meal (0.00036)	85	15 [<0.001]
	Hay (2.00)	85	50 [1.18]
Potato	Culls (0.0024)	20	40 [0.005]
	Processed waste (0.0024)	15	40 [0.006]
Rice	Grain (0.046)	88	40 [0.021]
	Straw (0.153)	90	10 [0.017]
	Hulls (0.205)	90	10 [0.023]
	Bran (0.114)	90	15 [0.019]

Table notes: Cattle dietary burdens are calculated on a dry weight basis, based on Livestock Feeds Table, Table II, September 1995. Anticipated residues in feed items were determined previously (CBRS 15099, 5/1/95, J. Abbotts), unless calculated/revised in this review.

The initial determination of anticipated residues (Ibid.) was based on information in Ensminger and Olentine, Feeds and Nutrition, 1978, which identifies three major categories for beef and dairy cattle feed: 1) grains, byproduct feeds, roots and tubers; 2) protein supplements; and 3) dry forages and silages. The preferred feed item for the first category is corn grain, with the following feed items with iprodione tolerances identified as substitutes: almond hulls, cull beans, cull carrots, potatoes, and rice grain. The preferred item for protein supplements is soybean meal, with the following feed items with iprodione tolerances as substitutes: legume screenings and peanut meal. For the third category, the preferred item is alfalfa hay, with the following feed items with iprodione tolerances as substitutes: bean straw, grass-legume mixed hay, and rice straw.

Of commodities with iprodione tolerances, those expected to have the most widespread commercial distribution would be grains and legumes. Reasonable cattle diets can be constructed with commodities of rice and peanuts. Other commodities, such as almond hulls, may contribute to local cattle diets; production of cowpeas is sufficiently limited that its commodities should be considered for local cattle diets only (B. Schneider and J. Stokes, personal communication). However, the iprodione dietary burden contributed by any local commodity is small compared to the burden from peanut hay (see Table 2); separate local diets, using single local commodities with the highest residues, will therefore be calculated only if peanut hay is eliminated as a feed item. As noted above, label restrictions on peanuts prohibiting grazing and harvesting plants for feed are considered practical. Moreover, if use on beans specifically excludes cowpeas, then cowpea commodities will be eliminated as feed items. Table 3 gives anticipated residues for dairy cattle diets with each major feed category described above represented, and with various label restrictions:

Table 3. Dairy cattle diets, cancer risk

Commodity	Anticipated residues, ppm	% dry matter	% of animal diet	Dietary burden, ppm
National diet				
Rice grain	0.046	88	40	0.021
Peanut meal	<0.001	85	10	<0.001
Peanut hay	2.00	85	50	1.18
Total:			100	1.20
National diet, label restrictions against peanut hay:				
Rice grain	0.046	88	40	0.021
Peanut meal	<0.001	85	15	<0.001
Rice straw	0.153	90	10	0.017
Total:			65	0.038
Local diet, label restrictions against peanut hay:				
Rice grain	0.046	88	40	0.021
Peanut meal	<0.001	85	15	<0.001
Cowpea forage	0.0884	30	40	0.118
Total:			65	0.139
Local diet, label restrictions against peanut hay and excluding use on cowpeas:				
Almond hulls	0.75	90	10	0.082
Peanut meal	<0.001	85	15	<0.001
Rice straw	0.153	90	10	0.017
Total:			35	0.099

The previous determination of anticipated residues used a transfer ratio, residues in milk:residues in feed, of 0.0067, based on animal feeding data. As noted before, this ratio applies to whole milk, and separate data are not available for milk fractions (CBRS 15099, 5/1/95, J. Abbotts). Using each of the diets above gives anticipated residues in milk, respectively, of 0.0080, 0.0003, 0.0009, and 0.0007 ppm. These considerations lead to the following comment:

Conclusion 1: Revised combined iprodione anticipated residues in whole milk for cancer risk, based on changes in Livestock Feeds Table, Table II, September 1995, and on potential label

restrictions, are the following. These values were based on calculated animal dietary burdens that have taken percent crop treated data into account:
National milkshed, 0.0080 ppm;
National milkshed, label restrictions against grazing or feeding peanut foliage, 0.0003 ppm;
Local milkshed, label restrictions against grazing or feeding peanut foliage, 0.0009 ppm;
Local milkshed, label restrictions against grazing or feeding peanut foliage and excluding use on cowpeas, 0.0007 ppm.

Field trial data

SRRD has indicated that potential risk reduction measure may include changes in application rates or other parameters. Accordingly, we have surveyed Chemistry Branch files for data on changes in residue levels with application rates/patterns, for representative crops of the groups stone fruits, small fruits and berries, and tubers.

Where Phase 4 Review (3/15/91, C. Olinger) required new field trial data, requirements were for the purposes of reassessing tolerances based on maximum label rates. It appears that new data submitted in support of reregistration have been limited to rates at or near maxima. For example, field trial data on caneberries were all based on applications at 1.25X the maximum seasonal rate, and data on raspberries were based on 1X the maximum seasonal rate (CBRS 13955, 14497, 1/24/95, S.A. Knizner). Field trial data on grapes were all based on applications at 1X the maximum seasonal rate (CBRS 13863, 8/1/94, S.A. Knizner).

Iprodione tolerances for stone fruits are based on preharvest and postharvest treatments. Residue data for both treatments were submitted as part of a petition on behalf of the IR-4 project (PP8E3645, RCB 3946, 7/22/88, R.W. Cook). Field trials were conducted in CA, one each on peaches, nectarines, and plums. Peaches receiving 5 foliar applications at 1 lb ai/A (foliar 1X) showed residues of 0.61 to 1.5 ppm iprodione, and no detectable residues (≤0.025 ppm) of isomer RP30228 or metabolite RP32490 (see Figure 1). Peaches receiving foliar 1X plus one postharvest wax spray at 0.5 lb ai/100 gal (spray 0.5X) showed 0.16 to 0.43 ppm iprodione, and no detectable isomer or metabolite. Peaches receiving foliar 1X plus one postharvest wax spray 1X showed three samples with 0.35 to 0.51 ppm iprodione and one sample with 0.66 ppm iprodione and 0.04 ppm isomer; isomer and metabolite were otherwise nondetectable.

Nectarines receiving foliar 1X showed residues of 1.1 to 1.3 ppm iprodione. Nectarines receiving foliar 1X plus one postharvest spray 0.5X showed 0.20 to 0.37 ppm iprodione. Nectarines receiving foliar 1X plus one post-harvest spray 1X showed 0.21 to

0.30 ppm iprodione. No residues of isomer or metabolite were detected in any sample.

Plums receiving foliar 1X showed residues of 0.2 to 0.23 ppm iprodione and no detectable isomer or metabolite. Plums receiving foliar 1X plus one postharvest spray 0.5X showed 0.07 to 0.09 ppm iprodione. Plums receiving foliar 1X plus one postharvest spray 1X showed one sample with 0.09 ppm iprodione plus 0.04 ppm metabolite, and three samples with 0.1 to 0.24 ppm iprodione. No residues of metabolite were detected in any other sample; no residues of isomer were detected in any sample.

With each set of field trials, residues were generally lower with both foliar and postharvest applications. This seems counter-intuitive, but an explanation may lie with the description of the entire postharvest treatment (Ibid.):

Fruit are dumped into a conveyor belt which takes it into rotating brushes with overhead nozzles spraying chlorinated water (50-70 ppm), rinsed with fresh water, partially dried on sponge rollers, sprayed with a mixture of fungicide in wax by an overhead nozzle, sponge rolled to remove excess, then packed into boxes. Residue samples are taken after the fungicide in wax has dried on the fruit.

The rinsing steps of the post-harvest treatment may therefore have the effect of removing some of the residues from pre-harvest treatment. With the post-harvest treatments, residues at the 0.5X rate were approximately half those at the 1X rate, but this relationship did not always hold (see data for nectarines). Phase 4 review (3/15/91) noted that registered postharvest treatments include dips or sprays; the IR-4 submission described above did not include data on dips.

Residue data from stone fruit field trials based on foliar applications only were also submitted as part of a petition (PP2F2596, 5/13/82, R.B. Perfetti). Although data were submitted on numerous sites with different numbers of applications and different PHIs, only with a few trials are data available that allow comparisons at the same site and at the same times of the effect on residues of altering application parameters. Table 4 summarizes those cases where direct comparisons can be made:

Table 4. Variations in residues with application rates.

Site	No. applications x lb ai/A	Crop	PHI, days	Iprodione residues, ppm:		
				Parent	RP30228	RP32490
OH	5 x 1.0	Peaches	0	13.76	0.29	≤0.05
	7 x 1.0		0	13.39	0.30	≤0.05
NJ	5 x 1.0	Peaches	1	3.70	0.10	≤0.05
	7 x 1.0		1	16.06	0.30	≤0.05
NY	5 x 1.0	Cherries	0	1.46	0.17	≤0.05
	7 X 1.0		0	2.74	0.38	≤0.05

Data source: PP2F2596

The available data lead to the following comments:

Conclusion 2: Available residue data on stone fruits that allow comparisons of the effects of application parameters on residues at the same sites and under the same conditions are very limited, and firm conclusions cannot be drawn. Data that are available suggest that as the number of foliar applications is reduced from 7 to 5 x 1.0 lb ai/A, iprodione residues on peaches and cherries may be reduced.

Conclusion 3: Data available on stone fruits indicate that residues from preharvest plus postharvest treatment may be lower than residues from preharvest treatment alone, due to rinsing steps that are part of the postharvest treatment. Data also indicate that as postharvest spray is reduced from 1X to 0.5X, residues are reduced proportionately, although this relationship is not always demonstrated. Postharvest dips are also registered, but there appear to be no residue data for dips.

With one set of field trial data on grapes submitted as part of a petition, the treatment rate was 0.75X in all cases (PP3F2964, 2/21/84, R.W. Cook). With field trial data submitted as part of another petition, treatment rates were 1.25X at some CA sites, and 1X at all other sites (PP3G2787, 3/21/83, N. Dodd). These latter studies also included residue decline data in NY and CA with increasing PHIs. These data are summarized in Table 5:

Table 5. Residue decline data on grapes.

Site	No. applications x rate, lb ai/A	PHI, days	Iprodione residues, ppm:		
			Parent	RP30228	RP32490
Geneva NY, 1	4 x 1.0	0	44.23	0.15	0.85
		7	43.56	0.17	1.30
		15	35.18	0.13	1.40
		25	20.16	0.14	0.77
Geneva NY, 2	4 x 1.0	0	32.00	0.07	0.58
		8	29.95	0.07	0.41
		18	16.24	0.08	1.63
Dressden NY	4 x 1.0	1	36.44	0.13	1.10
		8	33.60	0.21	1.89
		22	25.68	0.11	1.90
St. Helena CA, 1	4 x 1.0	0	24.74	0.07	0.10
		7	16.30	0.07	≤0.05
St. Helena CA, 2	4 x 1.0	0	16.57	≤0.05	≤0.05
		7	24.34	0.07	0.11
Madera CA	4 x 1.0	0	35.59	0.18	≤0.05
		7	24.76	0.06	0.24
Greenfield CA	5 x 1.0	0	4.19	≤0.05	≤0.05
		6	1.68	≤0.05	≤0.05

Data source: PP3G2787

These data lead to the following comment:

Conclusion 4: Field trial data on grapes indicate that an increase in PHI from 0 to 25 days can cause a decrease in residues of 30-50% in NY, and an increase in PHI from 0 to 7 days can cause a decrease in residues of 30-60% in CA (three sites), although in one CA trial residues increased with PHI.

Field trial data on carrots were submitted in support of a petition for use at up to 1 lb ai/A with no more than 8 applications per season, and a 0 day PHI (PP7E3474, RCB 1631, 4/6/87, V.F. Boyd). For all field trials, two different rates of applications were used. The states where field trials were conducted represent approximately 80 percent of U.S. carrot production. These residue data are summarized in Table 6:

Table 6. Residue data on carrots with application rate.

Site	No. applications x rate, lb ai/A	Iprodione residues, ppm:		
		Parent	RP30228	RP32490
AZ	8 x 1.0	2.80	0.10	≤0.05
	8 x 2.0	6.84	0.10	≤0.05
CA-1	8 x 1.0	3.13	0.05	≤0.05
	8 x 2.0	7.22	0.17	≤0.05
CA-2	8 x 1.0	2.52	0.05	≤0.05
	8 x 2.0	4.40	0.08	≤0.05
CA-3	8 x 1.0	0.63	0.10	≤0.05
	8 x 2.0	0.77	0.14	≤0.05
FL	8 x 1.0	0.61	≤0.05	≤0.05
	8 x 2.0	2.41	0.08	≤0.05
MI	8 x 1.0	0.64	≤0.05	≤0.05
	8 x 2.0	1.34	0.05	≤0.05
NJ	8 x 1.0	2.13	≤0.05	≤0.05
	8 x 2.0	3.13	0.05	0.05
OR	8 x 1.0	1.67	≤0.05	≤0.05
	8 x 2.0	3.06	0.06	≤0.05
TX-1	13 x 1.0	1.32	0.31	≤0.05
	13 x 2.0	2.24	0.55	≤0.05
TX-2	8 x 1.0	0.49	≤0.05	≤0.05
	8 x 2.0	0.87	≤0.05	≤0.05

Data source: PP7E3474, 4/16/87, V.F. Boyd. PHI was 0 days in all cases.

These data lead to the following comment:

Conclusion 5: Field trial data on carrots indicate consistently that with 8 applications and a 0 day PHI, reducing the application rate from 2 lb ai/A to 1 lb ai/A (1X) causes combined iprodione residues to be reduced by approximately half.

cc:Circ, Abbotts, RF, Iprodione List B File, SF
RDI:ARRathman:1/26/96:RBPerfetti:2/1/96:EZager:2/1/96
7509C:CBII-RS:JAbbotts:CM-2:Rm805A:305-6230:2/6/96
JA16\iprodion.7