



August 19, 2004

Ref: 2004-11-1

Kent Smith, Ph.D.
Plant Pathologist
Office of Pest Management Policy (OPMP)
Agricultural Research Service (ARS)
United States Department of Agriculture (USDA)
1400 Independence Ave, SW
Room 3859, South Ag Building
Washington, DC 20250-0315

The following information is provided to you from the Western Integrated Pest Management (IPM) Center regarding the use of thiram in the Pacific Northwest region. This information is being sent in response to your August 5th e-mail to Rick Melnicoe, Director of the Western IPM Center.

I am attaching to this letter the completed questionnaires that I have received thus far in response to your request for information about the use of thiram on specific crops in specific states. Normally I would consolidate the information I received but because your request asked people to respond directly to you, I am assuming that you wish to see individual responses. Because of my schedule, I asked people to respond directly to you if they were unable to get information to me by August 17, therefore you may be getting additional replies after receiving this letter. I apologize ahead of time if this proves inconvenient.

The most important use of thiram in our region is as a seed treatment. In the attached information you will see that thiram is critical in the successful production of many crops in the Pacific Northwest. In addition to food and feed crops, our area is also home to a very important vegetable seed industry. Seventy-five percent of U.S. spinach seed (50% of the world's seed crop) is produced in Washington's Skagit Valley. Table beet seed grown in Oregon and Washington accounts for 95% of U.S. and 50% of world production. Sugarbeet seed grown in Oregon's Willamette Valley accounts for nearly 100% of U.S. sugarbeet seed production. Not only is thiram important in the commercial production of the vegetable crops that you have asked about, but it is also very important to the successful production of vegetable seed that supports world-wide vegetable production.

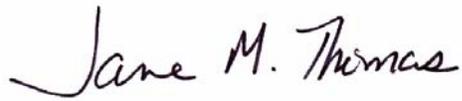
Attached to this cover is information on Washington's vegetable seed industry provided by both Dr. Lindsey DuToit, Washington State University's (WSU) Vegetable Seed Pathologist, and Milo Lyons with Alf Christianson Seed Company. Note that the questionnaires completed by

Mr. Lyons all refer to crops grown for seed production. Also, to get some sense of the use of thiram-treated seed in commercial vegetable production I spoke to Dan Felton, one of the owners of Logan-Zenner Seed Company. This company markets vegetable seed to commercial growers. He stated that between 95% and 99% of all the seed that they market is treated with thiram. I am also attaching information I received regarding thiram use in onion, sugarbeet, and barley production.

In general, the responses I have received indicate that no good replacement exists for thiram. While there are other seed treatments available, none are effective for the range of diseases controlled by thiram. Thiram also plays an important role in disease resistance management. The loss of thiram would lead to yield losses and would have negative consequences for seed export markets.

I hope that you find the information provided here to be helpful. I am also attaching a contact list to this letter, should you have follow-up questions for any of the people who provided me with information.

Sincerely,

A handwritten signature in black ink that reads "Jane M. Thomas". The signature is written in a cursive, flowing style.

Jane M. Thomas
Pacific Northwest Coalition Comment Coordinator
Washington State Pest Management Resource Service
Washington State University Tri-Cities
2710 University Drive
Richland, WA 99354
phone: 509-372-7493 fax: 509-372-7491
e-mail: jmthomas@tricity.wsu.edu

Thiram Contact List

Crop:	Last Name:	First Name:	Organization:	Title:	Work Ph:	Email:	Responsible State:
barley	Paulitz	Tim	Washington State University	Research Plant Pathologist	(509) 335-7077	paulitz@wsu.edu	Washington
beet, sugar	Jacobsen	Barry	Montana State University	Professor Plant Sciences & Plant Pathology	(406) 994-5161	UPLBJ@montana.edu	Montana
beet, sugar	Steiger	Andrew	Western Sugar	Agriculturist	(406) 247-8013	apsteiger@westernsugar.com	Montana
beet, sugar	Zitterkopf	Tony	Western Sugar	Fieldman	(406) 247-8018	ajzitterkopf@westernsugar.com	Montana
onion, dry bulb	Jensen	Lynn	Oregon State University	Chairman, Malheur County Extension Service	(541) 881-1417	lynn.jensen@oregonstate.edu	Oregon
vegetable seed	DuToit	Lindsey	Washington State University	Vegetable Seed Pathologist	(360) 848-6140	dutoit@wsu.edu	Washington
vegetable seed	Brown	Philip	Alf Christiansen	Pathologist	(360) 661-2190	philip_brown@alfseed.com	Washington
vegetable seed	Felton	Dan	Logan-Zenner Seed Company	Owner	(509) 545-0552	d.felton@loganzenner.com	Washington
vegetable seed	Pelter	Gary	Washington State University	Area Extension Educator - Vegetables/Vegetable Seed	(509) 754-2011 Ext. 413	peltergq@wsu.edu	Washington
vegetables	McReynolds	Bob	Oregon State University	Extension Horticulturist	(503) 678-1264	bob.mcreynolds@oregonstate.edu	Oregon
All	Blodgett	Sue	Montana State University	Western IPM Center State Liaisons/ Representatives	(406) 994-2402	blodgett@montana.edu	Montana
	Daniels	Catherine	Washington State University		(509) 372-7495	cdaniels@wsu.edu	Washington
	Deer	Howard	Utah State University		(435) 797-1602	howardd@ext.usu.edu	Utah
	Hirnyck	Ronda	University of Idaho		(208) 364-4046	rhirnyck@uidaho.edu	Idaho
	Jahns	Tom	University of Alaska Fairbanks		(907) 262-5824	fftrj@uaf.edu	Alaska
	Jenkins	Jeff	Oregon State University		(541) 737-5993	jenkinsj@ace.orst.edu	Oregon

Jane Thomas

From: Lindsey du Toit [dutoit@wsu.edu]
Sent: Monday, August 16, 2004 7:01 PM
To: Jane Thomas
Cc: Gary Q. Pelter; Dyvon Havens; Debra Ann Inglis; Erik J. Sorensen
Subject: Re: Thiram Questionnaire

Jane,

I took a close look at the USDA questionnaire on thiram use in Washington, particularly for the onions and vegetable crops, as I work on the seed crops for small-seeded vegetables. Based on the PICOL database, thiram is registered as a seed treatment for at least 36 vegetable crops in Washington in 2004, if you include the various types of onions as vegetables. The specific formulations of thiram registered on vegetables in Washington include:

Thiram 42-S - on 36 different vegetable crops as well as coriander seed and parsley seed to be exported to Mexico,

Thiram 50 WP - on 34 vegetable crops,

Vitavax-Thiram Seed Protectant Fungicide - on bean,

Prosper Flowable - on rape greens,

Thiram Granuflo Agricultural Fungicide - on 36 vegetable crops.

I know of at least one seed company that will be sending the completed questionnaire to me tomorrow (Tuesday) for about 20 vegetable seed crops they grow in Washington and for which they treat their stock seed and/or harvested seed with thiram. I spoke with the pathologist for this company, who indicated concern about losing thiram as a seed treatment, particularly for the minor, minor acreage vegetable crops for which there are no (or limited) alternative seed treatments. I will forward the information to you as soon as I receive it from the pathologist. He asked whether the details of the information he will be providing to you will be distributed publicly. If so, they are not able to share this information.

I am not able (time-wise) to go through the detailed questionnaire for all 36 vegetable crops on which thiram is used as a seed treatment, but I can make some general statements regarding the use of thiram that might help you answer at least some of the questions presented by the USDA. Hopefully a few more growers or seed companies will respond to the email Dyvon and Gary sent out. However, please realize that most seed companies and growers to which this questionnaire applies are in the midst of harvesting their crops and planting the next season's biennial seed crops, so it doesn't surprise me that we've had a limited response from the parties that could be affected by a USDA/EPA action on thiram. Also, you might be aware that information provided by seed companies in Washington may apply primarily to the stock seed planted for seed crops, and information relevant to the harvested seed may be for seed that is exported to other states and/or countries.

For the **Crop Information** section of the USDA questionnaire (region covered, acreage, planting techniques and equipment), the following resources should provide the necessary information:

"Washington Minor Crops" by Schreiber and Ritchie

Various USDA Crop Profiles: <http://pestdata.ncsu.edu/cropprofiles/Cropprofiles.cfm>

USDA NASS website: <http://www.usda.gov/nass/>, particularly the vegetables section at

<http://www.nass.usda.gov:81/ipedb/vegetables.htm>

Various extension websites:

- 1) The Skagit County Extension agriculture website at: <http://skagit.wsu.edu/Agriculture/home.htm> - see the PDF file with crop acreage at <http://skagit.wsu.edu/Agriculture/images/matrix.acres%201988-2001.pdf> and the PDF file with farmgate values at <http://skagit.wsu.edu/Agriculture/images/matrix.dollar%20values%201988-2001.pdf>
- 2) Grant/Adams Counties extension website: <http://grant-adams.wsu.edu/agriculture/index.htm>

For the question related to observation of birds feeding on freshly planted seed: I have received reports of birds such as crows feeding on young vegetable seedlings (e.g. cabbage and lettuce seedlings) in western WA, but not directly on vegetable seed.

Thiram Usage questions:

I do not have access to details on crop acreage treated in 2003, but I suspect that if thiram is the only, or one of the few, seed treatments registered for a particular vegetable crop, that most companies or growers will use thiram for seed treatment. The rates of application will be determined by the specific vegetable and label. All the labels I could find on PICOL indicated seed treatment (method and timing of application). I am not aware of any foliar uses of thiram in small-seeded vegetable crops in WA. The predominance of cool and wet spring conditions in western Washington increases the need for seed treatments to protect the germinating seedlings from pathogens that are more problematic with slow germination and emergence under such conditions.

Plant Diseases Managed by Thiram:

Almost all labels for seed treatment of vegetable crops include various seedling blight and damping-off fungi (Rhizopus, Fusarium, Alternaria, ...) except the Oomycete type of pathogens such as Pythium, Aphanomyces, and Phytophthora.

Alternatives to Thiram:

The two other fungicide seed treatments of which I am aware are relatively widely used by the vegetable seed industry in Washington include Maxim (fludioxonil, a Syngenta product) and Rovral (iprodione - primarily on carrot seed). In addition, many seed companies use hot water seed treatment or chlorine seed treatment. However, the latter two types of seed treatment assist with some seedborne pathogens but do not provide protection against soilborne pathogens that might be controlled by thiram seed treatment. In addition, the latter types of treatment can result in reduced shelf-life of seed lots for certain vegetables because of the potential for damage to the embryo. Hot water seed treatments are particularly useful for some seedborne bacterial pathogens, for deep-seated seedborne inoculum, and for organically certified seed lots.

Benefits of Continued Thiram Usage:

Disease resistance: Thiram is a valuable combination seed treatment with Rovral, the latter against which many fungal pathogens have been shown to develop fungicide resistance. In addition, Maxim has a site-specific mode of action with potential for fungicide resistance.

Other benefits: 1) Thiram is relatively inexpensive for seed treatment.

2) Thiram seed treatment is required for some companies to be able to export seed (e.g., parsley and coriander seed exported to Mexico).

3) Thiram is an important seed treatment for some seedborne pathogens associated with quarantines, e.g., *Phoma lingam* on brassicas was controlled using benomyl seed treatment, but the recent loss of all benomyl registrations in agriculture has left thiram as the sole seed treatment for this fungal pathogen. Crucifer seed lots that test positive for *P. lingam* cannot be sold or exported. *Phoma betae* on table beets is another example of a 'quarantine' seedborne pathogen for which thiram is the only current fungicide available that has some efficacy at preventing seed transmission.

Risk Mitigation Suggestions:

Question 1: Maxim and Rovral are effective alternative seed treatments to thiram for some diseases, but are not as broad-spectrum as thiram and have the risk of fungicide resistance developing in pathogen populations.

Question 2: Thiram is very important as a seed treatment for many of the minor minor acreage vegetables for which there are no, or few, alternative seed treatments.

Question 3: Are birds as attracted to pelleted seed as they might be to naked (raw) seed? If not, more vegetable seed could be pelleted prior to planting to reduce the risk of birds feeding on the treated seed. Most of the onion and carrot seed (plus the seed of many other small-seeded vegetables) planted in Washington is pelleted for precision planting. If birds are as attracted to pelleted seed as they are to raw seed, could some kind of repellent be added to the seed treatment (thiram or the pelleting material) to discourage birds from feeding on the seed?

I hope this information is of some assistance in your effort to respond to the USDA/EPA. Thanks for pulling all the details together!

Regards,
Lindsey

Lindsey du Toit, Vegetable Seed Pathologist, PhD
Washington State University - Northwest Washington R.E.C.
16650 State Route 536
Mount Vernon, WA 98273
USA
Tel: (360) 848-6140
Fax: (360) 848-6159
Email: dutoit@wsu.edu

Visit the WSU Vegetable Pathology Team Website
http://mtvernon.wsu.edu/path_team/vegpath_team.htm

Jane Thomas

From: Gary Pelter WSU Grant/Adams Extension [peltegq@wsu.edu]
Sent: Thursday, August 19, 2004 1:32 PM
To: pnn@tricity.wsu.edu
Cc: Lindsey du Toit
Subject: Thiram Questionnaire

Jane,

I've briefly read over Lindsey's response to your Thiram query. I agree that Thiram is likely applied to much of the seed planted for vegetable seed production in WA. Maxim seed fungicide is a possible alternative for many current uses but is more expensive and some may question its effectiveness across the spectrum of diseases encountered. The seed industry would not embrace use of coated (pelletized) seed, in my opinion, as they need very high plant populations (thus more expensive) and are not set up to plant this type of seed (again, more expensive). I too appreciate your efforts on the project as well as Lyndey's contribution.

Best Regards,
G. Q. Pelter

~~~~~\*~~~~~  
Gary Q. Pelter  
Area Extension Educator - Vegetables/Vegetable Seed  
WSU - Grant/Adams Area Extension  
Courthouse, PO Box 37  
Ephrata, WA 98823  
(509) 754-2011 Ext. 413, Fax: (509) 754-0163  
Email: peltegq@wsu.edu  
<http://www.grant-adams.wsu.edu>  
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USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information

Crop: Arugula
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage: (This usage information is for seed production fields and does not include commercial seed lots that may have been treated for customers)

Crop acreage treated in 2003: 10
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Arugula is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS (chemical).
Identify the rationale for why or when they are used? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens; One. Maxim 4FS is not currently used.
If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline, Maxim 4FS would be used on seed application 100%.
Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; Maxim \$1.00 - \$2.50 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? No
What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective. Depending upon seed quality and environmental factors we could anticipate a 5-10% reduction in seed yield.
How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available to meet quarantine regulations.
How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
B. Chemical repellent – are there any chemical repellents that work on birds?
C. Colored seed - do birds have a preference for certain colored seed.
D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: **Milo Lyons**
Organization: **Alf Christianson Seed Co.**
Phone: **360 419-3021**
Email: milo_lyons@alfseed.com

Crop Information:

Crop: **Basil**
State: **Washington**
Planting Techniques: **Row**
Have birds been observed feeding on freshly planted seed: **No**

Thiram Usage:

Crop acreage treated in 2003: **5**
Average rate (lb ai/acre) per application: **Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)**
Average seeding rate for Basil is **1-1/2 lbs. per acre.**
Method of application: **Slurry or polymer coated**
Timing of Application: **Applied to seed prior to planting.**

Plant Disease Managed by Thiram:

Specific Diseases managed: **Damping-off, seed decay, seedling blight**
Are there any different rate requirements for these diseases: **No**

Alternatives to Thiram:

1. Are there any alternatives? **Yes** What are they: **Maxim 4FS (chemical).**
2. Identify the rationale for why or when they are used ? typical number of applications of each per season: **Not currently used.**
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. **Maxim 4FS 100%**
4. Approx. treatment costs/applications/acre for thiram and alternatives? **\$6.50 - \$13.00 per 100 lbs. of seed for Thiram; Maxim \$1.00 - \$2.50 per 100 lbs of seed.**

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? **No.**
2. What other disease management benefits does thiram provide? **Thiram is the only efficacious control for some diseases. Maxim 4FS is not a complete alternative to Thiram.**

Risk Mitigation Suggestions:

5. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? **Maxim 4FS is not as effective. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.**
6. How important is thiram for the foliar and seed treatment uses? **Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.**
7. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
8. How can EPA reduce occupational risks posed by Thiram? **As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.**

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Beet
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No.

Thiram Usage:

Crop acreage treated in 2003: 225
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Beet is 1-1/2 lbs. acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting.

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens. 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline, Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

5. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Apron XL to increase the spectrum of pathogens controlled.
6. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and not sure about Maxim XL (relatively new product). Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Broccoli-Raab
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 3
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Broccoli-Raab is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting.

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

3. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS (chemical).
4. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, One; Maxim 4FS is not currently used.
5. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline, Maxim 4FS would be used on seed application 100%
6. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; Maxim \$1.00 - \$2.50 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? No.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Cabbage
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 100
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Cabbage is 2 oz. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Carrot
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 539
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Carrot is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: Chlorine:hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Chlorine:hot water, only used for some seed borne pathogens and not for any soil borne pathogens, 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline, Maxim 4FS or Maxim XL would be used on seed application 100%.
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with Thiram utilized? Thiram incorporated on seed coating with Rovral to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Chinese Cabbage
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 7
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Chinese Cabbage is 1 lb. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, Seed decay
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 2; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Collards
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 48
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Collards is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, Seed Decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 2; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Coriander
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: Yes, Crows

Thiram Usage:

Crop acreage treated in 2003: 129
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Coriander is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting.

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Stem gall, Seed decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 2; Maxim 4FS is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? No.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Dill
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 24
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Dill is 3-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: Chlorine:hot water, Maxim 4FS (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Chlorine:hot water, only used for some seed borne pathogens and not for any soil borne pathogens, 6; Maxim 4FS is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because chlorine:hot water is not used as a replacement treatment due to germination decline, Maxim 4FS would be used on seed application 100%.
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with Thiram utilized? Thiram incorporated on seed coating with Rovral to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: India Mustard
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 31
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for India Mustard is 1 lb. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, Seed Decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate and Apron XL to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Kale
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 55
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Kale is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, Seed Decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Kohlrabi
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 2
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Kohlrabi 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, Seed Decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Parsley
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 20
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Parsley is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting.

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Stem gall, Seed decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: chlorine, Maxim 4FS (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Chlorine treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 3; Maxim 4FS is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because chlorine is not used as a replacement treatment due to germination decline. Maxim 4FS would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? No.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Parsnip
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 4
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Parsnip is 3-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting.

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: Maxim 4FS (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season: Not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Maxim 4FS 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; Maxim \$1.00 - \$2.50 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? No.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Radish
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 350
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Radish is 3-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting.

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens. 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline, Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Apron XL to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and not sure about Maxim XL (relatively new product). Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Rutabaga
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No.

Thiram Usage:

Crop acreage treated in 2003: 18
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Rutabaga is 3-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, Seed Decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 1; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate and Apron XL to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Spinach
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 475
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Spinach is 3-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, Seed Decay, Seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens, 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline. Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate and Apron XL to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating utilized machines with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Swiss Chard
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 175
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Swiss Chard is 3-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting.

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: hot water (non-chemical), Maxim 4FS or Maxim XL (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Hot water treatment is only used for some seed borne pathogens and not for any soil borne pathogens. 6; Maxim 4FS or Maxim XL is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Because hot water is not used as a replacement treatment due to germination decline, Maxim 4FS or Maxim XL would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Apron XL to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases. Maxim 4FS or Maxim XL is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and not sure about Maxim XL (relatively new product). Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Respondent:

Name: Milo Lyons
Organization: Alf Christianson Seed Co.
Phone: 360 419-3021
Email: milo_lyons@alfseed.com

Crop Information:

Crop: Turnip
State: Washington
Planting Techniques: Row
Have birds been observed feeding on freshly planted seed: No

Thiram Usage:

Crop acreage treated in 2003: 60
Average rate (lb ai/acre) per application: Not applied in field. Applied as seed treatment at rate of 3 oz. ai/per 100 lbs. seed (label rate is 2-4 oz. per 100 lbs. seed)
Average seeding rate for Turnip is 1-1/2 lbs. per acre.
Method of application: Slurry or polymer coated
Timing of Application: Applied to seed prior to planting

Plant Disease Managed by Thiram:

Specific Diseases managed: Damping-off, Alternaria leaf spot, seed decay, seedling blight
Are there any different rate requirements for these diseases: No

Alternatives to Thiram:

1. Are there any alternatives? Yes What are they: Maxim 4FS (chemical).
2. Identify the rationale for why or when they are used ? typical number of applications of each per season? Maxim 4FS is not currently used.
3. If thiram is lost, percent of acreage presently treated with thiram would be replaced by each alternative. Maxim 4FS would be used on seed application 100%
4. Approx. treatment costs/applications/acre for thiram and alternatives? \$6.50 - \$13.00 per 100 lbs. of seed for Thiram; and Maxim \$1.16 – \$6.00 per 100 lbs of seed.

Benefits of Continued Thiram Usage:

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? Thiram incorporated on seed coating with Benlate to increase the spectrum of pathogens controlled.
2. What other disease management benefits does thiram provide? Thiram is the only efficacious control for some diseases especially now that only the existing inventory of Benlate can be used. Maxim 4FS is not a complete alternative to Thiram.

Risk Mitigation Suggestions:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Maxim 4FS is not as effective and Benlate is no longer available. Depending upon seed quality and environmental factors could see a 5-10% reduction in seed yield.
2. How important is thiram for the foliar and seed treatment uses? Extremely important to us as a seed treatment. For some seed borne pathogens Thiram is the only treatment available especially for meeting some quarantine regulations.
3. How can EPA reduce bird-feeding risks posed by Thiram-treated seed?
 - A. Look at pelleted seed – do birds prefer pelleted seed less than non-pelleted seed or same?
 - B. Chemical repellent – are there any chemical repellents that work on birds?
 - C. Colored seed - do birds have a preference for certain colored seed.
 - D. Housekeeping – making sure spilled seed in the field, in vehicles, around warehouses, etc. is cleaned so birds are less attracted
4. How can EPA reduce occupational risks posed by Thiram? As a seed treatment there is minimal risk posed by Thiram and much of the seed treating is mechanized with minimal risk to the applicator. Making sure any spilled seed that was treated with Thiram is cleaned up immediately. Follow label instructions.

THE MESSAGE BELOW IS EXCERPTED FROM AN 8/16/04 E-MAIL
CORRESPONDENCE FROM OSU'S BOB MC REYNOLDS

Jane,

All vegetable seed (I'm pretty sure) is treated with thiram for damping-off diseases or diseases in general. The only other product used at planting for diseases is ridomil. It is specific for the water molds pythium species. And is not widely used, but when specific problems are anticipated. Ancient research on the benefits of thiram exists, but most of us these days take it for granted. No thiram is used foliar. Fluazinam is an untested alternative, not used much because of the difficulty of this research, lack of funds and lack of interest, not to mention the high cost of the product. It is used only when requested by the grower. Thiram is an automatic addition unless requested otherwise.

Bob

Robert B. McReynolds
Extension Agent
North Willamette Research and Extension Center Oregon State University
15210 NE Miley Rd Aurora, OR 97002 bob.mcreynolds@oregonstate.edu
503-678-1264 office
503-678-5986 fax
503-789-9300 cell

Jane Thomas

From: Jensen, Lynn [lynn.jensen@oregonstate.edu]
Sent: Monday, August 16, 2004 2:44 PM
To: Jane Thomas
Subject: RE: Thiram Questionnaire

Jane, Here is the information that you asked for.

Thiram usage on onions:

Used essentially on all onion seed in the PNW (and probably in the US) except organic production.

Crop acreage in 2004 = Idaho - Eastern Oregon 23600 acres
Oregon (other) 5200 acres
Washington 20750 acres

99.5 % of acreage Average rate = 6 lbs formulated material / cwt
of seed 42% ai / formulated product = 2.5 lb ai / cwt of seed seed is planted at a rate of
1.25 - 1.5 lb / acre Thiram ai / acre is .4 to .5 oz / acre

Application is by seed coating

Application is in the early spring when onions are planted (Mar / April) No foliar application are used

Diseases managed are:

Damping off (pythium, fusarium)

Alternaria

Botrytis

Stemphylium

Aspergillus

The only two alternatives are Maxim and Apron. They are specific to damping off, but do not control alternaria, botrytis, stemphylium or aspergillus.

Neither of the alternatives is very effective, but if thiram was lost, probably most of the onion seed would be treated with Apron.

Jane, I hope this is the information you needed. Please call if you have any questions. I am glad you are working on this.

Lynn Jensen

USDA Thiram Usage & Benefits Questionnaire – August 2004

Please fill out and return to: Kent Smith, USDA/ARS, Office of Pest Management Policy,
202-720-3186 (voice), 202-720-3191 (fax), ksmith@ars.usda.gov

Respondent Information:

Your Name: Andrew Steiger
Organization: The Western Sugar Cooperative
Phone: 406-247-8013
Email: apsteiger@westernsugar.com

Crop Information:

 (fill out a separate form for each crop)

For turf uses, address golf courses, sod farms, and sports fields/parks/residential uses separately.

For seed treatments, list spring and fall crops on separate forms.

For vegetable crop uses, list under the general category of vegetable seeds.

Crop: Sugarbeet

State or Region covered: Montana, Wyoming, Nebraska, and Colorado. Sidney Sugars has additional acreage in Montana and Wyoming Sugar Company has additional acreage in Wyoming.

Acreage in 2003 or latest year with figures (may simply cite NASS data): 121,286 acres

Planting techniques (row, broadcast, etc.) and equipment: 22, 24, and 30 inch row widths

Have birds been observed feeding on freshly planted seed? If so, what types of birds?

Birds have not been observed feeding on freshly planted seed. However in rare circumstances what appears to be evidence of bird feeding has been noted.

Thiram Usage:

 (on this crop in your area)

Crop acreage (or percent of acreage) treated in 2003: 100%

Average rate (lb ai/acre) per application: Liquid thiram is applied to seed at the rate of 2 ounces per unit of seed (100,000 seeds). This converts to 0.1 ounce of formulated product per acre or 0.042 ounces active ingredient per acre.

Method(s) of application: Planting (seed treatment)

Timing of application(s): Planting (seed treatment)

For foliar uses, average number of applications per treated acre:

Plant Diseases Managed by Thiram:

 (on this crop in your area)

Specific diseases managed (common name sufficient): Pythium, Rhizoctonia, Phoma

Are there any different rate requirements for these diseases? No

Alternatives to Thiram:

 (on this crop in your area)

1. Are any alternatives (chemical and nonchemical) used for the same pests that thiram controls? What are they? We use multiple methods of control for these diseases. None of these controls are effective by themselves. Examples are planting soil temperatures, seeding

depth, and some varieties with more resistance. See attached letter.

2. Identify the rationale for why or when they are used. Also indicate the typical number of applications of each per season. One application per season. Treatment is applied to all seed because those diseases occur in all field soils at varying levels.

3. If thiram is lost, what percent of the acreage presently treated with thiram by seed treatment (or percent of thiram treatments for foliar treatments) would each alternative replace? Please estimate, recognizing that None is a possible alternative. Ranges or point estimates can be used, but should total about 100%. There are no suitable alternatives for the use of thiram on sugarbeet seed. See attached letter.

4. What are the approximate treatment costs/application/acre for thiram and its alternatives? Thiram applied to sugarbeet seed typically costs \$.21 per acre. Information provided by Betaseed.

Benefits of Continued Thiram Usage: (on this crop in your area)

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? (Provide details of any tank-mix and/or rotation used.) The continued use of thiram creates a base for our other control methods to be effective. Without thiram our other methods of control would not provide adequate control. See attached letter.

2. What other disease management benefits does thiram provide? Please elaborate. (Examples: only efficacious control, effective IPM material, inexpensive) Thiram helps us establish adequate stands that are not only necessary for optimum yields; but also help keep in check other diseases such as Curly Top, Rhizomania, and other diseases carried by insects and warm soil temperatures. Adequate stands are also our first line of defense against weeds. See attached letter.

Risk Mitigation Suggestions: EPA has identified the areas of risk posed by thiram as it is currently labeled and seeks stakeholder input on how thiram use and usages can be modified to reduce these risks without impacting agriculture. In addition to the above, EPA encourages stakeholder input on the following items to assist in developing a risk mitigation plan:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? Please see attached letter for questions 1 & 2.

2. How important is thiram for the foliar and seed treatment uses?

3. How can EPA reduce bird-feeding risks posed by thiram-treated seed? Sugarbeet seed is very small; this is probably the reason bird feeding is rare if it occurs at all. More research and testing on new products and speedier registrations would help bring about a suitable alternative to thiram.

4. How can EPA reduce occupational risks posed by thiram (e.g., sewing bags of commercially treated seed or applying thiram with high pressure hand wand)? Bulk Handling and automation.



Barry Jacobsen – Professor
Department of Plant Sciences and Plant Pathology
205 Ag. BioSciences Building.
P.O. Box 173150
Montana State University
Bozeman, MT 59717-3150

Phone: (406) 994-5161

Fax: (406) 994-7600

UPLBJ@montana.edu

<http://agadsrv.msu.montana.edu/plantsciences/>

Plant Pathology

Plant Genetics
Plant Biology
Crop Science
Horticulture

August 12, 2004

TO: Public Information and records Integrity Branch
Office of Pesticide Programs
EPA
Via [email: opp-docket@epa.gov](mailto:opp-docket@epa.gov)
Attention: Docket ID Number OPP-2004-0183

FROM: Barry J. Jacobsen, Ph.D, Professor of Plant Pathology

RE: Docket ID number OPP-2004-0183
Thiram; Availability of Revised Risk Assessments

I am writing in regard to the use of thiram as a sugarbeet seed treatment fungicide. This material is used on nearly 100% of the commercial acreage of sugarbeets in the USA. Actual survey data from 1998 and 1999 indicate that 84.7% of 1,248, 494 acres reported in nationwide surveys were planted to seed treated with thiram. Thiram 42 S or 50 WP were the most common formulations used and these were applied at 6-8 oz product/100 lbs of seed. Typically this would be 0.06-0.08 oz product/A (0.03-0.032 oz ai./A). Sugarbeets are all precision planted at approximately 30,000-45,000 seeds per acre depending on spacing and row width. Based on this, the use of thiram per acre is minimal. Seed predation by birds is very uncommon based on personal observations and in 12 years of trouble shooting poor stands. In addition exposure of planter operators is minimal because there is little dust released during planter loading operations. Where pelleted seed is used there is virtually no dust off of seed treatment materials. Because hybrid sugarbeet seed is so expensive there is very little lost to spillage that might provide exposure to birds.

Thiram is so widely used because it has a long history of effective control of seedborne and soilborne fungi that cause damping-off and seed decay and because it has shown no seed safety concerns either used alone or with other pesticides. Also, it is relatively effective against seedborne *Phoma betae*, a widespread seedborne pathogen that causes damping-off and decay of roots both in the field and in storage. When wet seasons occur in the Oregon seed producing area, this pathogen can cause devastating damping-off if not controlled. Thiram is the only effective registered seed treatment fungicide with proven efficacy on this pathogen. Metalaxyl (Allegiance/Apron) is commonly used with Apron to improve *Pythium* control. *Pythium* damping-off is a problem on all acreage and is one of the most common causes of stand reductions that result in replanting or reduced stands. Thiram is a contact fungicide with multiple modes of action that is effective against *Pythium* and its use is an important step in preventing development of metalaxyl resistant *Pythium* strains. *Pythium* resistance to the single site of action fungicide metalaxyl has been shown in many situations in other crops when this fungicide is used alone. Dry seed rot caused by *Penicillium* and *Aspergillus* species is often a problem where dry conditions following seeding occur and Thiram has excellent activity on these fungi. Dry seed bed conditions are common throughout the furrow irrigated regions of the western USA and an effective seed protectant is critical to achieving economically acceptable

stands without expensive thinning operations.

Captan and fludioxonil (Maxim) provide an alternative for control of damping-off caused by *Pythium* sp., *Fusarium* sp. and *Rhizoctonia solani* but are less effective on the dry seed rot pathogens and are not effective on *Phoma betae*. Without the use of an effective seed treatment for all these diseases, seeding rates and herbicide use would increase. In some years increased seeding rates would result in excessive stands and would require thinning to achieve economically viable stands. Herbicide use would increase because of the reduced crop competition in thin stands where damping-off and seed rot reduce stands.

While alternative fungicides are conceptually available that might replace thiram if they were registered, it will take years of research to achieve the registration and track record of seed safety and compatibility with other pesticides (fungicides, insecticides and herbicides) used in sugarbeet production. In addition, the use of thiram has proven safe in steeping operations use in seed priming in Europe and in some situations in the USA. Finding replacements with the proven safety of thiram will be difficult and will again require research time.

In closing, at the present time there are no replacement seed treatment fungicides available for thiram and because of low use per acre, proven safety with other pesticides and in seed priming and lack of avian or human exposure, I request that seed treatment uses of thiram be retained. Also, I request that EPA ask USDA-CSREES to include thiram replacements as a priority in the Pest Management Alternatives research Program and in IR-4 programs.

USDA Thiram Usage & Benefits Questionnaire – August 2004

Please fill out and return to: Kent Smith, USDA/ARS, Office of Pest Management Policy,
202-720-3186 (voice), 202-720-3191 (fax), ksmith@ars.usda.gov

Respondent Information:

Your Name: **Timothy Paulitz**

Organization: **USDA-ARS, Root Disease and Biological Control Unit, Pullman, WA**

Phone: **509 335-7077**

Email: **paulitz@wsu.edu**

Crop Information: (fill out a separate form for each crop)

For turf uses, address golf courses, sod farms, and sports fields/parks/residential uses separately.

For seed treatments, list spring and fall crops on separate forms.

For vegetable crop uses, list under the general category of vegetable seeds.

Crop: **Winter and spring wheat, spring barley**

State or Region covered: **Eastern Washington**

Acreage in 2003 or latest year with figures (may simply cite NASS data):

2004- 2.4 million acres of wheat and 290 thousand acres of barley in the state

Planting techniques (row, broadcast, etc.) and equipment: **applied with seed drills**

Have birds been observed feeding on freshly planted seed? If so, what types of birds? **I have not observed this in my plot work, although pheasants may occasionally feed on germinated seeds and seedlings.**

Thiram Usage: (on this crop in your area)

Crop acreage (or percent of acreage) treated in 2003: **I do not have numbers, but most of the wheat acreage in Washington uses treated seed, primarily to control smut diseases, *Rhizoctonia*, and *Pythium*. This is unlike other areas of the country that use more grower-saved seed. Most seed treatments contain Dividend or Raxil, along with a fungicide to protect against *Pythium*, such as Apron or Allegiance. Both metalaxyl and mefenoxam have the same mode of action, which is highly specific, and *Pythium* has been shown to develop resistance to these chemicals- eg. in potatoes. Resistance is most likely to develop when the product is drenched on the soil in irrigation systems or sprayed for control of foliar diseases. But resistance development could be a real problem in crops rotated with potatoes, under irrigated circles. Thiram is marketed as a product with Raxil, and many farmers use this product because of its cheaper price. Thiram is active against both *Rhizoctonia* and *Pythium*, unlike Apron and Allegiance, which only work against *Pythium*. Another thing about seed treatment, as opposed to foliar application, is that the environmental risks are much less or minimal. Much less chemical is applied and it is confined to the soil, where it is broken down by microbes..**

Average rate (lb ai/acre) per application: **3.5-4.6 fl. Oz/hundred weight of seed**

Method(s) of application: **Seed treatment**

Timing of application(s): **seed treatment**

For foliar uses, average number of applications per treated acre:

Plant Diseases Managed by Thiram: (on this crop in your area)

Specific diseases managed (common name sufficient): **Rhizoctonia and Pythium seed rot**

Are there any different rate requirements for these diseases? **no**

Alternatives to Thiram: (on this crop in your area)

1. Are any alternatives (chemical and nonchemical) used for the same pests that thiram controls? What are they? **For *Pythium*, metalaxyl and mefenoxam can be used. For *Rhizoctonia*, Maxim has been effective, and Raxil and Dividend also have activity against it, although the primary use of Raxil and Dividend is for smut control. However, because of the potential of resistance developing in *Pythium*, I think it is a good idea to have an alternative broad-spectrum fungicide such as thiram that can be used in rotation with metalaxyl and mefenoxam, to reduce the chances of resistance developing. The lower cost is also a factor in this use of this chemical.**

2. Identify the rationale for why or when they are used. Also indicate the typical number of applications of each per season. **Used once per season. Applied to seed.**

3. If thiram is lost, what percent of the acreage presently treated with thiram by seed treatment (or percent of thiram treatments for foliar treatments) would each alternative replace? Please estimate, recognizing that **None** is a possible alternative. Ranges or point estimates can be used, but should total about 100%. **Thiram would be replaced by other seed treatments.**

4. What are the approximate treatment costs/application/acre for thiram and its alternatives?

Benefits of Continued Thiram Usage: (on this crop in your area)

1. To delay the development of disease resistance in thiram alternatives, is any application regimen or combination treatment with thiram utilized? (Provide details of any tank-mix and/or rotation used.) **Seed treatments could be rotated, using Raxil-thiram one year and a product with metalaxyl or mefenoxam the next year.**

2. What other disease management benefits does thiram provide? Please elaborate. (Examples: only efficacious control, effective IPM material, inexpensive) **Thiram is inexpensive**

Risk Mitigation Suggestions: EPA has identified the areas of risk posed by thiram as it is currently labeled and seeks stakeholder input on how thiram use and usages can be modified to reduce these risks without impacting agriculture. In addition to the above, EPA encourages stakeholder input on the following items to assist in developing a risk mitigation plan:

1. How effective are the alternatives to thiram? What impact, if any, do you observe to quality or yield? **The alternatives to thiram are effective, but not if resistance develops.**

2. How important is thiram for the foliar and seed treatment uses? **I consider it important for the seed treatment market, primarily to have another mode of action against *Pythium*.**

3. How can EPA reduce bird-feeding risks posed by thiram-treated seed? **Deeper**

planting of seed, or use a bird repellent on the seed. I have seen this used in corn, which has a bigger problem with bird feeding.

4. How can EPA reduce occupational risks posed by thiram (e.g., sewing bags of commercially treated seed or applying thiram with high pressure hand wand)? **For commercially treated seed, I would think OSHA regulations would be in place at the seed treatment plant. For growers who treat their own seed, use of respirators, protective clothing, etc. The usual requirements for a pest applicator's license.**