



**US Environmental Protection Agency
Office of Pesticide Programs**

**Extension of the Protection
Period for Mesotrione
Exclusive Use Data
(Part 2 of 4)**

January 15, 2009

Table 1: FIFRA Exclusive Use Extension Criterion I: There Are Insufficient Efficacious Alternatives To Mesotrione on Perennial Ryegrass Grown For Seed.

		Mesotrione HRAC Group F2 / (WSSA Group 28)	O / (4)	C3 / (6)	O / (4)	C2 / (7)	N / (8)	C1 / (5)	E / (14)	
Perennial Ryegrass Grown For Seed		Callisto at 3.0- 6.0 fl. oz/A Plus Adjuvant*	2,4-D	Bromoxynil	Dicamba	Diuron	Ethofumesate	Metribuzin	Oxyfluorfen	Count of Als controlling species. S, PC, or Resistance not included.
Common Name	Scientific Name	Apply to weeds <5"								
Amaranth, palmer	<i>Amaranthus palmeri</i>	C	PC							0
Amaranth, Powell	<i>Amaranthus powellii</i>	C	PC							0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C	PC		C				C	2
Atriplex	<i>Chenopodium orach</i>	C								0
Broadleaf signalgrass	<i>Brachleria platphylla</i>	C								1
Buckwheat, wild	<i>Polygonum convolvulus</i>	PC		C	C				C	3
Buffalobur	<i>Solanum rostratum</i>	C			C					1
Burcucumber	<i>Sicyos angulatus</i>	PC		C	C					2
Carpetweed	<i>Mollugo verticillata</i>	C	C	C	C		C		C	4
Carrot, wild	<i>Daucus carota</i>	C	PC		C					0
Chickweed, common	<i>Stellaria media</i>	C	C	C	C					3
Cocklebur, common	<i>Xanthium strumarium</i>	C	C	C	C			C		4
Crabgrass, large	<i>Digitaria sanguinalis</i>	C					C		C	2
Dock, curly	<i>Rumex crispus</i>	PC	PC		C					1
Galinsoga	<i>Galinsoga parviflora</i>	C	C							1
Hemp	<i>Cannabis sativa</i>	C	C							1
Horse nettle	<i>Solanum carolinense</i>	C								0
Horseweed/Marestail	<i>Conyza canadensis</i>	PC								1
Jimsonweed	<i>Datura stramonium</i>	C	C	C	C				C	4
Knotweed, prostrate	<i>Polygonum aviculare</i>	PC		C	C				C	3
Kochia	<i>Kochia scoparia</i>	PC		C	C					1
Lambsquarters, common	<i>Chenopodium album</i>	C	C	C	C					3
Morningglory, entireleaf; ivyleaf	<i>Ipomoea hederacea</i>	PC	C	C	C				C	4
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC		C	C				C	2
Mustard, wild	<i>Brassica kaber</i>	C	C	C	C			C		5
Nightshade, black	<i>Solanum nigrum</i>	C		C	C				C	3
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C		C						1
Nightshade, hairy	<i>Solanum sarrachoides</i>	C		C					C	2
Nutsedge, yellow	<i>Cyperus esculentus</i>	PC								0
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C	PC	C	C				C	3
Pigweed, smooth	<i>Amaranthus hybridus</i>	C	PC		C					1
Pigweed, tumble	<i>Amaranthus albus</i>	C	PC		C					1
Pokeweed, common	<i>Phytolacca americana</i>	PC	C							1
Potatoes, volunteer	<i>Solanum spp.</i>	C								0
Pusley, Florida	<i>Richardia scabra</i>	C			C				C	2
Ragweed, common	<i>Ambrosia artemisiifolia</i>	PC	C	C	C				C	3
Ragweed, giant	<i>Ambrosia trifida</i>	C	C	C	C					3
Sesbania, hemp	<i>Sesbania exaltata</i>	C		C	C				C	3
Smartweed, ladsysthumb	<i>Polygonum persicaria</i>	C	PC	C	C				C	3
Smartweed, pale	<i>Polygonum lapathifolium</i>	C								0
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C	PC						C	1
Sunflower, common	<i>Helianthus annuus</i>	C		C						1
Velvetleaf	<i>Abutilon theophrasti</i>	C	C	C	C				C	4
Waterhemp, common	<i>Amaranthus rudis</i>	C	PC							0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C	PC	C						1

*Adjuvant = COC or NIS + UAN or AMS

† Apply before weed exceeds 2 inches in height.

Weeds Controlled With Preemergence Applications of Callisto									
Common Name	Scientific Name	Callisto at 6.0 fl. oz./A							
Amaranth, palmer	<i>Amaranthus palmeri</i>	C							0
Amaranth, Powell	<i>Amaranthus powellii</i>	C							0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C							1
Broadleaf signalgrass	<i>Brachiaria platyphylla</i>	C							1
Buffalobur	<i>Solanum rostratum</i>	C							0
Carpenterweed	<i>Mollugo verticillata</i>	C							1
Chickweed, common	<i>Stellaria media</i>	C							2
Cocklebur, common	<i>Xanthium strumarium</i>	PC							1
Crabgrass, large	<i>Digitaria sanguinalis</i>	C							3
Galinsoga	<i>Galinsoga parviflora</i>	C							0
Jimsonweed	<i>Datura stramonium</i>	C							1
Kochia	<i>Kochia scoparia</i>	PC							0
Lambsquarters, common	<i>Chenopodium album</i>	C							2
Morningglory, entireleaf; ivyleaf	<i>Ipomoea hederacea</i>	PC							2
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC							2
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C							0
Nightshade, hairy	<i>Solanum sarrachoides</i>	C							1
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C							1
Pigweed, smooth	<i>Amaranthus hybridus</i>	C							0
Pigweed, tumble	<i>Amaranthus albus</i>	C							0
Ragweed, common	<i>Ambrosia artemisiifolia</i>	C							1
Ragweed, giant	<i>Ambrosia trifida</i>	PC							1
Smartweed, ladysthumb	<i>Polygonum persicaria</i>	C							2
Smartweed, pale	<i>Polygonum lapathifolium</i>	C							1
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C							2
Sunflower, common	<i>Helianthus annuus</i>	C							0
Velvetleaf	<i>Abutilon theophrasti</i>	C							2
Waterhemp, common	<i>Amaranthus rudis</i>	C							0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C							0
Count of Species Controlled in Perennial Ryegrass Grown For Seed		58	13	21	23	11	4	2	34
Criteria I: Insufficient Efficacious Alternative To Mesotrione.			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Species not controlled by any alternative			Resistant biotypes per chemical class that controlled or partially controlled by mesotrione. A "C" within a pink shaded cell indicates that weed has resistant biotypes and is therefore not counted as controlled by that product.						
C = Control PC = Partial Control Est. = Estimated Control									

Table 2: FIFRA Exclusive Use Extension Criterion II: Alternative Registered Pesticides Pose Greater Risks To The Environment Or Human Health Than Mesotrione On Perennial Ryegrass Grown For Seed

Characteristic	Mesotrione AI Reduced Risk AI	24D	Bromoxynil	Dicamba	Duron	Ethofumesate	Metribuzin (24C)	Oxyfluorfen in Goal (24C) in WA 62719-424
EPA Reg. No.	100-1131	5905-504	42750-48	66330-276	19713-36	264-613	264-738	62719-424
Reduced Risk by EPA	Yes	No	No	No	No	No	No	No
Label Signal Word	Caution	Caution	Warning	Danger	Warning	Caution	Caution	Warning
Gene Toxicity	Negative	Negative	Positive	Positive	Positive	Negative	Negative	Positive
Teratogenicity	Negative	Negative	Positive	Negative	Negative	Negative	Negative	Negative
Reproductive Toxicity	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
Carcinogenic Potential	Not Likely	D	C	D	Known / likely	D	D	C
Acute Neurotoxicity	Negative	Positive	Unlikely ND	Positive	ND	ND	Negative	ND
Subchronic/Chronic Neurotoxicity	Negative	Positive	Unlikely ND	Positive	ND	ND	Positive	ND
REI in Hours*	12	12	24	24	12	12	12	24
PHI in Days*	14, 60	7, 30	Do not feed	NL	NL	Don't graze	28	365
**PPE*	Chem resist gloves	3	3	2	1	1	1	3
Applic. Method (Pre)	Pre	NL	NL	NL	Pre	Pre	NL	Pre
Pre lbs ai/A	0.188	NL	NL	NL	0.8-1.6	1.87	NL	0.13-0.38
Applic. Method (Post)	Post	Post	Post	Post	Post	Post	Post	Post
Post lbs ai/A	0.094-0.188	0.7-0.95	0.25-0.5	0.25-0.5	0.8-1.6	1.87	0.15-0.3	0.13-0.38
No. Applic. / year	1.0	1	1	1	1	1	1	1
Max. AI lbs./yr	0.188	0.95	0.5	1.0	1.6	1.87	0.3	0.375
US or Regional label	US	US	US	US	RL	RL	RL	RL
**Environmental Hazard	Surface Water	3	2	2	0	0	1	3
Criterion II: Alternative Poses Greater Human or Environmental Risk	Advisory, runoff	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Other registered active ingredients that are not considered as viable mesotrione alternatives: Dimethenamid, Dimethenamid-P, Fluroxypyr, Glyphosate, MSMA, Pendimethalin, S-metolachlor, and Tribenuron-methyl. Refer to Attachment "Active Ingredients Within The Analyses Across Crops taht Are Not Considered Viable Alternatives To Mesotrione"

* REI = Restricted Entry Interval. PHI = Pre Harvest Interval. PPE = Personal Protective Equipment

** = Ranking into 4 Classes: 0 = Better than mesotrione, 1 = similar to mesotrione, 2 = worse than mesotrione, 3 = much worse than mesotrione.

NL = None listed or not mentioned, or the application method is not labeled for a specific active ingredient.

Table 3: FIFRA Exclusive Use Extension Criterion III: Mesotrione Plays Or Will Play A Significant Part In Managing Pest Resistance on Perennial Ryegrass Grown For Seed

Characteristic	Mesotrione Reduced Risk AI	2,4-D	Bromoxynil	Dicamba	Duron	Ethofumesate	Metribuzin	Oxyfluorfen
EPA. Reg. No.	100-1131	5905-504	34704-885	66330-276	19713-36	264-613	264-738	62719-424
HRAC / WSSA Classification of Active Ingredient								
Chemistry Class by Mode of Action	F 2 / (28)*	O / (4)	C 3 / (6)	O / (4)	C 2 / (7)	N / (8)	C 1 / (5)	E / (14)
Total No. Weed Species With Resistant Biotypes Per Chemistry Class in US	0	8	1	8	7	5	23	2
No. of Biotypes Controlled or Partially Controlled by Mesotrione		2	0	2	3	0	14	2
Criterion III: Mesotrione will play role in managing Pest Resistance to this Active		Yes	No	Yes	Yes	No	Yes	Yes
Criterion III: Mesotrione will play a role in managing pest resistance in Perennial Ryegrass Grown For Seed	YES							
* Active Ingredient classification based on HRAC / WSSA. Mesotrione is WSSA 28 compared to the original classification of 27 used by EPA and currently on Syngenta's EPA labels.								

Table 4: Perennial Ryegrass Grown For Seed: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
2, 4 - D	No	Yes	Yes	Yes
Bromoxynil	No	Yes	Yes	No
Dicamba	No	Yes	Yes	Yes
Diuron	No	Yes	Yes	Yes
Ethofumesate	No	Yes	Yes	No
Metribuzin	No	Yes	Yes	Yes
Oxyfluorfen	No	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Grasses Grown For Seed: Kentucky Bluegrass

US Kentucky Bluegrass grown for seed is estimated to be 141,760 acres by Extension Weed Specialist at OR State University, qualifying it as a minor crop. Mesotrione was registered on Kentucky bluegrass grown for seed on March 17, 2008, which is within the first 7 years after the initial June 4, 2001 registration of mesotrione. On May 20, 2008 EPA granted mesotrione Reduced Risk status on Kentucky Bluegrass grown for seed.

Conclusion:

Mesotrione fulfils FIFRA Criteria I, II, and/or III compared to each registered alternative.

Criterion I: Mesotrione provides low rate (0.188 lbs.ai/A) preemergence or (0.094 – 0.188 lbs.ai/A) postemergence control of a large number of broadleaf weeds. Of the seven potential alternatives, none provide as broad a spectrum of weed control. As to the weeds included on mesotrione’s label, some are not controlled by any other product; most are controlled by only 1 to 3 other products, and only a few by multiple products. No one product provides a broad spectrum of weed control comparable to mesotrione.

Criterion II: Mesotrione is safer across the human safety, environmental impact and application criteria than any other alternative.

Criterion III: No weeds have developed resistant biotypes to the mesotrione family of chemistry. Thus, mesotrione will manage resistance that has developed for most of the alternative families of chemistry. The exceptions are bromoxynil and ethofumesate, whose resistant biotypes are not controlled by mesotrione.

Kentucky Bluegrass Grown For Seed: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
2, 4 - D	No	Yes	Yes	Yes
Bromoxynil	No	Yes	Yes	No
Dicamba	No	Yes	Yes	Yes
Diuron	No	Yes	Yes	Yes
Ethofumesate	No	Yes	Yes	No
Metribuzin	No	Yes	Yes	Yes
Oxyfluorfen	No	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Table 1: FIFRA Exclusive Use Extension Criterion I: There Are Insufficient Efficacious Alternatives To Mesotrione On Kentucky Bluegrass Grown For Seed.

		Mesotrione HRAC Group F2 / (WSSA Group 28)	O / (4)	C3 / (6)	O / (4)	C2 / (7)	Ethofumesate ¹ / (8)	C1 / (5)	E / (14)	
Kentucky Bluegrass Grown For Seed		Callisto at 3.0- 6.0 fl. oz/A Plus Adjuvant	2,4-D	Bromoxynil	Dicamba	Diuron		Metribuzin	Oxyfluorfen	Count of AIs controlling species. S, PC, or Resistance not included.
Common Name	Scientific Name	Apply to weeds <5"								
Weeds Controlled With Postemergence Applications										
Amaranth, palmer	<i>Amaranthus palmeri</i>	C	PC							0
Amaranth, Powell	<i>Amaranthus powellii</i>	C	PC							0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C	PC		C				C	2
Atriplex	<i>Chenopodium orach</i>	C								0
Broadleaf signalgrass	<i>Bracharia platphylla</i>	C ¹								1
Buckwheat, wild	<i>Polygonum convolvulus</i>	PC		C	C				C	3
Buffalobur	<i>Solanum rostratum</i>	C			C					1
Burcucumber	<i>Sicyos angulatus</i>	PC		C						2
Carpetweed	<i>Mollugo verticillata</i>	C	C		C		C		C	4
Carrot, wild	<i>Daucus carota</i>	C	PC		C					0
Chickweed, common	<i>Stellaria media</i>	C	C		C			C		3
Cocklebur, common	<i>Xanthium strumarium</i>	C	C	C	C				C	4
Crabgrass, large	<i>Digitaria sanguinalis</i>	C ¹					C		C	2
Dock, curly	<i>Rumex crispus</i>	PC	PC		C					1
Galinsoga	<i>Galinsoga parviflora</i>	C	C							1
Hemp	<i>Cannabis sativa</i>	C	C							1
Horse nettle	<i>Solanum carolinense</i>	C								0
Horseweed/Marestail	<i>Coryza canadensis</i>	PC							C	1
Jimsonweed	<i>Datura stramonium</i>	C	C	C	C				C	4
Knotweed, prostrate	<i>Polygonum aviculare</i>	PC		C	C				C	3
Kochia	<i>Kochia scoparia</i>	PC ¹		C	C					1
Lambsquarters, common	<i>Chenopodium album</i>	C	C	C	C					3
Morningglory, entrelleaf; ivyleaf	<i>Ipomoea spp.</i>	PC	C	C	C				C	4
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC		C					C	2
Mustard, wild	<i>Brassica kaber</i>	C	C	C	C			C	C	5
Nightshade, black	<i>Solanum nigrum</i>	C		C	C				C	3
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C		C						1
Nightshade, hairy	<i>Solanum sarrachoides</i>	C		C					C	2
Nutsedge, yellow	<i>Cyperus esculentus</i>	PC								0
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C	PC	C	C				C	3
Pigweed, smooth	<i>Amaranthus hybridus</i>	C	PC		C					1
Pigweed, tumble	<i>Amaranthus albus</i>	C	PC		C					1
Pokeweed, common	<i>Phytolacca americana</i>	PC	C							1
Potatoes, volunteer	<i>Solanum spp.</i>	C								0
Pusley, Florida	<i>Richardia scabra</i>	C ¹			C				C	2
Ragweed, common	<i>Ambrosia artemisiifolia</i>	PC	C	C	C				C	3
Ragweed, giant	<i>Ambrosia trifida</i>	C	C	C	C					3
Sesbania, hemp	<i>Sesbania exaltata</i>	C		C	C				C	3
Smartweed, ladysthumb	<i>Polygonum persicaria</i>	C	PC	C	C				C	3
Smartweed, pale	<i>Polygonum lapathifolium</i>	C								0
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C	PC						C	1
Sunflower, common	<i>Helianthus annuus</i>	C		C						1
Velvetleaf	<i>Abutilon theophrasti</i>	C	C	C	C				C	4
Waterhemp, common	<i>Amaranthus rudis</i>	C	PC							0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C	PC	C						1

¹Adjuvant = COC or NIS plus UAN or AMS
¹Apply before weed exceeds 2 inches in height.

Weeds Controlled With Preemergence Applications of Callisto									
Common Name	Scientific Name	Callisto at 6.0 fl. oz./A							
Amaranth, palmer	<i>Amaranthus palmeri</i>	C							0
Amaranth, Powell	<i>Amaranthus powellii</i>	C							0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C							1
Broadleaf signalgrass	<i>Brachiaria platyphylla</i>	C							1
Buffalobur	<i>Solanum rostratum</i>	C							0
Carpetweed	<i>Mollugo verticillata</i>	C							1
Chickweed, common	<i>Stellaria media</i>	C							2
Cocklebur, common	<i>Xanthium strumarium</i>	PC							1
Crabgrass, large	<i>Digitaria sanguinalis</i>	C							3
Gallinsoga	<i>Galinsoga parviflora</i>	C							0
Jimsonweed	<i>Datura stramonium</i>	C							1
Kochia	<i>Kochia scoparia</i>	PC							0
Lambsquarters, common	<i>Chenopodium album</i>	C							2
Morningglory, entireleaf; ivyleaf	<i>Ipomoea Spp.</i>	PC							2
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC							2
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C							0
Nightshade, hairy	<i>Solanum sarrachoides</i>	C							1
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C							1
Pigweed, smooth	<i>Amaranthus hybridus</i>	C							0
Pigweed, tumble	<i>Amaranthus albus</i>	C							0
Ragweed, common	<i>Ambrosia artemisiifolia</i>	C							1
Ragweed, giant	<i>Ambrosia trifida</i>	PC							1
Smartweed, ladysthumb	<i>Polygonum persicaria</i>	C							2
Smartweed, pale	<i>Polygonum lapathifolium</i>	C							1
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C							2
Sunflower, common	<i>Helianthus annuus</i>	C							0
Velvetleaf	<i>Abutilon theophrasti</i>	C							2
Waterhemp, common	<i>Amaranthus rudis</i>	C							0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C							0
Count of Species Controlled in KY Bluegrass Grown For Seed		58	13	21	23	11	4	2	34
Criteria I: Insufficient Efficacious Alternatives To			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spp. not controlled by any alternative	Resistant biotypes per chemical class that controlled or partially controlled by mesotrione. A "C" within a pink shaded cell indicates that weed has resistant biotypes and is therefore not counted as controlled by that product.								
C = Control PC = Partial Control									

Table 2: FIFRA Exclusive Use Extension Criterion II: Alternative Registered Pesticides Pose Greater Risks To The Environment Or Human Health Than Mesotrione On Kentucky Bluegrass Grown For Seed.

Characteristic	Mesotrione Reduced Risk AI 100-1131	Bromoxynil 24 5905-529	Dicamba 66330-276	Duron 19713-36	Ethofumesate 264-613	Metrubuzin 24C 264-738	Oxyfluorfen 62719-424
Reduced Risk by EPA	Yes	No	No	No	No	No	No
Label Signal Word	Caution	Warning	Danger	Warning	Caution	Caution	Warning
Gene Toxicity	Negative	Positive	Positive	Positive	Negative	Negative	Positive
Teratogenicity	Negative	Positive	Negative	Negative	Negative	Negative	Negative
Reproductive Toxicity	Negative	Negative	Negative	Negative	Negative	Negative	Negative
Carcinogenic Potential	Not Likely	C	D	Known / likely	D	D	Negative
Acute Neurotoxicity	Negative	Unlikely	Positive	ND	ND	Negative	C
Subchronic/Chronic Neurotoxicity	Negative	Unlikely	Positive	ND	ND	Positive	ND
REI in Hours*	12	12	24	12	12	12	24
PHI in Days*	14, 60	7, 30	NL	NL	Don't graze	28	365
**PPE*	Chem resist gloves	3	2	1	1	1	3
Applic. Method (Pre)	Pre	NL	NL	Pre	Pre	NL	Pre
Pre lbs ai./A	0.188	NL	NL	3.2	1.0	NL	0.13-0.38
Applic. Method (Post)	Post	Post	Post	NL	Post	Post	Post
Post lbs ai./A	0.094-0.188	0.7-0.95	0.25-0.5	NL	1.0	0.15-0.3	0.13-0.38
No. Applic. / year	1.0	1	1	1	1	1	1
Max. AI lbs./yr	0.188	1.0	1.0	3.2	1.0	0.3	0.375
US or Regional label	US	US	US	RL	RL	RL	RL
**Environmental Hazard	Surface Water Advisory, runoff	3	2	0	0	1	3
Criterion II: Alternative Poses Greater Human or Environmental Risk	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Other registered active ingredients that are not considered as viable mesotrione alternatives: Dimethenamid, Dimethenamid-P, Flucarbazone, Fluroxypyr, MSMA, Pendimethalin, Primisulfuron, S-metolachlor, and Tribenuron-methyl. Refer to Attachment "Active Ingredients Within The Analyses Across Crops That Are Not Considered Viable Alternatives To Mesotrione".

* REI = Restricted Entry Interval. PHI = Pre Harvest Interval. PPE = Personal Protective Equipment

** = Ranking into 4 Classes: 0 = Better than mesotrione, 1 = similar to mesotrione, 2 = worse than mesotrione, 3 = much worse than mesotrione.

NL = None listed or not mentioned, or the application method is not labeled for a specific active ingredient

Table 3: FIFRA Exclusive Use Extension Criterion III: Mesotrione Plays Or Will Play A Significant Part In Managing Pest Resistance on Kentucky Bluegrass Grown For Seed

Characteristic	Mesotrione Reduced Risk AI	2,4-D	Bromoxynil	Dicamba	Duron	Ethofumesate	Metribuzin	Oxyfluorfen
EPA. Reg. No.	100-1131	5905-504	34704-885	66330-276	19713-36	264-613	264-738	62719-424
HRAC/ WSSA Classification of Active Ingredient Chemistry Class by Mode of Action	F 2 / (28)*	O / (4)	C 3 / (6)	O / (4)	C 2 / (7)	N / (8)	C 1 / (5)	E / (14)
Total No. Weed Species With Resistant Biotypes Per Chemistry Class In US	0	8	1	8	7	5	23	2
No. of biotypes Controlled or Partially Controlled by Mesotrione		2	0	2	3	0	14	2
Criterion III: Mesotrione will play role in managing Pest Resistance to this Active		Yes	No	Yes	Yes	No	Yes	Yes
Criterion III: Mesotrione will play a role in managing pest resistance in Kentucky Bluegrass Grown For Seed	YES							

* Active Ingredient classification based on HRAC / WSSA. Mesotrione is WSSA 28 compared to the original classification of 27 used by EPA and currently on Syngenta's EPA labels.

Table 4: Kentucky Bluegrass Grown For Seed: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
2, 4 - D	No	Yes	Yes	Yes
Bromoxynil	No	Yes	Yes	No
Dicamba	No	Yes	Yes	Yes
Diuron	No	Yes	Yes	Yes
Ethofumesate	No	Yes	Yes	No
Metribuzin	No	Yes	Yes	Yes
Oxyfluorfen	No	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Grasses Grown For Seed: Tall Fescue

US Tall Fescue grown for seed is estimated to be 168,290 acres by Extension Weed Specialist at OR State University, qualifying it as a minor crop. Mesotrione was registered on tall fescue grown for seed on March 17, 2008, which is within the first 7 years after the initial June 4, 2001 registration of mesotrione. On May 20, 2008 EPA granted mesotrione Reduced Risk status for tall fescue grown for seed.

Conclusion:

Mesotrione fulfils FIFRA Criteria I, II, and/or III compared to each registered alternative.

Criterion I: Mesotrione provides low rate (0.188 lbs.ai/A) preemergence or (0.094 – 0.188 lbs. ai/A) postemergence control of a large number of broadleaf weeds. Of the seven potential alternatives, none provide as broad a spectrum of weed control. As to the weeds included on mesotrione’s label, some are not controlled by any other product; most are controlled by only 1 to 3 other products, and only a few by multiple products. No one product provides a broad spectrum of weed control comparable to mesotrione.

Criterion II: Mesotrione is safer across the human safety, environmental impact and application criteria than any other alternative.

Criterion III: No weeds have developed resistant biotypes to the mesotrione family of chemistry. Thus, mesotrione will manage resistance that has developed for most of the alternative families of chemistry. The exceptions are bromoxynil and ethofumesate, whose resistant biotypes are not controlled by mesotrione.

Tall Fescue Grown For Seed: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
2, 4 - D	No	Yes	Yes	Yes
Bromoxynil	No	Yes	Yes	No
Dicamba	No	Yes	Yes	Yes
Diuron	No	Yes	Yes	Yes
Ethofumesate	No	Yes	Yes	No
Metribuzin	No	Yes	Yes	Yes
Oxyfluorfen	No	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Table 1: FIFRA Exclusive Use Extension Criterion 1: There Are Insufficient Efficacious Alternatives To Mesotrione On Tall Fescue Grown For Seed

		Mesotrione HRAC Group F2 / (WSSA Group 28)	O / (4)	C3 / (6)	O / (4)	C2 / (7)	N / (8)	C1 / (5)	E / (14)	Count of AIs controlling species. S, PC, or Resistance not included.
Tall Fescue Grown For Seed		Callisto at 3.0- 6.0 fl. oz/A Plus Adjuvant*	2,4-D	Bromoxynil	Dicamba	Diuron	Ethofumesate	Metribuzin	Oxyfluorfen	
Common Name	Scientific Name	Apply to weeds <5"								
Weeds Controlled With Postemergence Applications										
Amaranth, palmer	<i>Amaranthus palmeri</i>	C	PC							0
Amaranth, Powell	<i>Amaranthus powellii</i>	C	PC							0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C	PC		C				C	2
Atriplex	<i>Chenopodium orach</i>	C								0
Broadleaf signalgrass	<i>Brachiaria platphylla</i>	C ¹							C	1
Buckwheat, wild	<i>Polygonum convolvulus</i>	PC		C	C				C	3
Buffelburr	<i>Solanum rostratum</i>	C			C					1
Burcucumber	<i>Sicyos angulatus</i>	PC		C	C					2
Carpetweed	<i>Mollugo verticillata</i>	C	C						C	4
Carrot, wild	<i>Daucus carota</i>	C	PC		C		C		C	0
Chickweed, common	<i>Stellaria media</i>	C	C		C			C		3
Cocklebur, common	<i>Xanthium strumarium</i>	C	C	C	C					4
Crabgrass, large	<i>Digitaria sanguinalis</i>	C ¹							C	2
Dock, curly	<i>Rumex crispus</i>	PC	PC		C					1
Galinsooga	<i>Galinsooga parviflora</i>	C	C							1
Hemp	<i>Cannabis sativa</i>	C	C							1
Horse nettle	<i>Solanum carolinense</i>	C								0
Horseweed/Marestail	<i>Conyza canadensis</i>	PC							C	1
Jimsonweed	<i>Datura stramonium</i>	C	C	C	C					4
Knotweed, prostrate	<i>Polygonum aviculare</i>	PC		C	C				C	3
Kochia	<i>Kochia scoparia</i>	PC ¹		C	C					1
Lambsquarters, common	<i>Chenopodium album</i>	C	C	C	C					3
Morningglory, entleaf; ivyleaf	<i>Ipomoea Spp.</i>	PC	C	C	C				C	4
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC		C					C	2
Mustard, wild	<i>Brassica kaber</i>	C	C	C	C				C	5
Nightshade, black	<i>Solanum nigrum</i>	C		C	C				C	3
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C		C						1
Nightshade, hairy	<i>Solanum sarrachoides</i>	C		C						2
Nutsedge, yellow	<i>Cyperus esculentus</i>	PC							C	0
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C	PC	C	C				C	3
Pigweed, smooth	<i>Amaranthus hybridus</i>	C	PC		C					1
Pigweed, tumble	<i>Amaranthus albus</i>	C	PC		C					1
Pokeweed, common	<i>Phytolacca americana</i>	PC	C							1
Potatoes, volunteer	<i>Solanum spp.</i>	C								0
Pusley, Florida	<i>Richardia scabra</i>	C ¹			C				C	2
Ragweed, common	<i>Ambrosia artemisiifolia</i>	PC	C	C	C				C	3
Ragweed, giant	<i>Ambrosia trifida</i>	C	C	C	C					3
Sesbania, hemp	<i>Sesbania exaltata</i>	C		C	C				C	3
Smartweed, ladythumb	<i>Polygonum persicaria</i>	C	PC	C	C				C	3
Smartweed, pale	<i>Polygonum lapathifolium</i>	C								0
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C	PC						C	1
Sunflower, common	<i>Helianthus annuus</i>	C		C						1
Velvetleaf	<i>Abutilon theophrasti</i>	C	C	C	C					4
Waterhemp, common	<i>Amaranthus rudis</i>	C	PC							0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C	PC	C						1

*Adjuvant = COC plus UAN or AMS

¹ Apply before weed exceeds 2 inches in height.

Weeds Controlled With Preemergence Applications of Callisto									
Common Name	Scientific Name	Callisto at 6.0 fl. oz./A							
Amaranth, palmer	<i>Amaranthus palmeri</i>	C							0
Amaranth, Powell	<i>Amaranthus powellii</i>	C							0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C						C	1
Broadleaf signalgrass	<i>Brachiaria platyphylla</i>	C						C	1
Buffalobur	<i>Solanum rostratum</i>	C							0
Carpetweed	<i>Mollugo verticillata</i>	C						C	1
Chickweed, common	<i>Stellaria media</i>	C				C	C		2
Cocklebur, common	<i>Xanthium strumarium</i>	PC				PC		C	1
Crabgrass, large	<i>Digitaria sanguinalis</i>	C				C	C	C	3
Galinsoga	<i>Galinsoga parviflora</i>	C							0
Jimsonweed	<i>Datura stramonium</i>	C						C	1
Kochia	<i>Kochia scoparia</i>	PC							0
Lambsquarters, common	<i>Chenopodium album</i>	C				C		C	2
Morningglory, entireleaf; ivyleaf	<i>Ipomoea Spp.</i>	PC				C		C	2
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC				C		C	2
Nightshade, eastern black	<i>Solanum pycnanthum</i>	C							0
Nightshade, hairy	<i>Solanum sarrachooides</i>	C						C	1
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C				C		C	1
Pigweed, smooth	<i>Amaranthus hybridus</i>	C							0
Pigweed, tumble	<i>Amaranthus albus</i>	C							0
Ragweed, common	<i>Ambrosia artemisiifolia</i>	C				C		C	1
Ragweed, giant	<i>Ambrosia trifida</i>	PC				C			1
Smartweed, ladysthumb	<i>Polygonum persicaria</i>	C				C		C	1
Smartweed, pale	<i>Polygonum lapathifolium</i>	C				C			1
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C				C		C	1
Sunflower, common	<i>Helianthus annuus</i>	C							0
Velvetleaf	<i>Abutilon theophrasti</i>	C				C		C	2
Waterhemp, common	<i>Amaranthus rudis</i>	C							0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C							0
Count of Species Controlled in Tall Fescue Grown For Seed		58	13	21	23	11	4	2	34
Criteria 1: Insufficient Efficacious Alternatives To Mesotrione			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Species not controlled by any alternative		Resistant biotypes per chemical class that controlled or partially controlled by mesotrione. A "C" within a pink shaded cell indicates that weed has resistant biotypes and is therefore not counted as controlled by that product.							
C = Control PC = Partial Control									

Table 2: FIFRA Exclusive Use Extension Criterion II: Alternative Registered Pesticides Pose Greater Risks To The Environment Or Human Health Than Mesotrione On Tall Fescue Grown For Seed

Characteristic	Mesotrione Reduced Risk AI	D 24D	Bromoxynil	Dicamba	Duron	Ethofumesate	Metrubuzin 24C	Oxyfluorfen
EPA Reg. No.	100-1131	5905-504	42750-48	66330-276	19713-36	284-613	264-738	62719-424
Reduced Risk by EPA	Yes	No	No	No	No	No	No	No
Label Signal Word	Caution	Caution	Warning	Warning	Warning	Caution	Caution	Warning
Gene Toxicity	Negative	Negative	Positive	Positive	Positive	Negative	Negative	Positive
Teratogenicity	Negative	Negative	Positive	Negative	Negative	Negative	Negative	Negative
Reproductive Toxicity	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
Carcinogenic Potential	Not Likely	D	C	D	Known / likely	D	D	C
Acute Neurotoxicity	Negative	Positive	Unlikely ND	Positive	ND	ND	Negative	ND
Subchronic/Chronic Neurotoxicity	Negative	Positive	Unlikely ND	Positive	ND	ND	Positive	ND
REI in Hours*	12	12	24	24	12	12	12	24
PHI in Days*	14, 60	7, 30	Do not feed	NL	NL	Don't graze	28	365
**PPE*	Chem resist gloves	3	3	2	1	1	1	3
Applic. Method (Pre)	Pre	NL	NL	NL	Pre	Pre	NL	Pre
Pre lbs ai/A	0.188	NL	NL	NL	1.6-3.2	1.87	NL	0.13-0.38
Applic. Method (Post)	Post	Post	Post	Post	Post	Post	Post	Post
Post lbs ai/A	0.094-0.188	0.7-0.95	0.25-0.5	0.25-0.5	1.6-3.2	1.87	0.25-0.38	0.13-0.38
No. Applic. / year	1.0	1	1	1	1	1	1	1
Max. AI lbs./yr	0.188	0.95	0.5	1.0	3.2	1.87	0.38	0.375
US or Regional label	US	US	US	US	RL	RL	RL	RL
**Environmental Hazard	Surface Water Advisory, runoff	3	2	2	0	0	1	3
Criterion II: Alternative Poses Greater Human or Environmental Risk	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Other registered active ingredients that are not considered as viable mesotrione alternatives: Dimethenamid, Dimethenamid-P, Fluroxypyr, Glyphosate, MSMA, Pendimethalin, S-metolachlor, and Tribenuron-methyl. Refer to Attachment "Active Ingredients Within The Analyses Across Crops That Are Not Considered Viable Alternatives To Mesotrione".

* REI = Restricted Entry Interval. PHI = Pre Harvest Interval. PPE = Personal Protective Equipment
 ** = Ranking into 4 Classes: 0 = Better than mesotrione, 1 = similar to mesotrione, 2 = worse than mesotrione, 3 = much worse than mesotrione.
 NL = None listed or not mentioned, or the application method is not labeled for a specific active ingredient.

Table 3: FIFRA Exclusive Use Extension Criterion III: Mesotrione Plays Or Will Play A Significant Part In Managing Pest Resistance on Tall Fescue Grown For Seed

Characteristic	EPA. Reg. No.	2,4-D	Bromoxynil	Dicamba	Duron	Ethofumesate	Metribuzin 24C	Oxyfluorfen
HRAC / WSSA Classification of Active Ingredient Chemistry Class by Mode of Action	100-1131	5905-504	34704-885	66330-276	19713-36	264-613	264-738	62719-424
Total No. Weed Species With Resistant Biotypes Per Chemistry Class in US	F 2 / (28)*	O / (4)	C 3 / (6)	O / (4)	C 2 / (7)	N / (8)	C 1 / (5)	E / (14)
No. of biotypes Controlled or Partially Controlled by Mesotrione	0	8	1	8	7	5	23	2
Criterion III: Mesotrione will play role in managing Pest Resistance to this Active		2	0	2	3	0	14	2
Criterion III: Mesotrione will play a role in managing pest resistance in Tall Fescue Grown For Seed	YES	Yes	No	Yes	Yes	No	Yes	Yes

* Active Ingredient classification based on HRAC / WSSA . Mesotrione is WSSA 28 compared to the original classification of 27 used by EPA and currently on Syngenta's EPA labels.

Table 4: Tall Fescue Grown For Seed: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
2, 4 - D	No	Yes	Yes	Yes
Bromoxynil	No	Yes	Yes	No
Dicamba	No	Yes	Yes	Yes
Diuron	No	Yes	Yes	Yes
Ethofumesate	No	Yes	Yes	No
Metribuzin	No	Yes	Yes	Yes
Oxyfluorfen	No	Yes	Yes	Yes
*Combined evaluation of human safety, application rate, and environmental impact.				

Rhubarb

US rhubarb production is estimated to be 1,800 acres by B. Zandstra (MI State University) and B. McReynolds (OR State University) qualifying it as a minor crop. Mesotrione was registered on rhubarb on March 17, 2008, which is within the first 7 years after the initial June 4, 2001 registration of mesotrione. On May 20, 2008 EPA granted mesotrione Reduced Risk status on rhubarb.

Conclusion:

Mesotrione fulfils FIFRA Criteria I, II, and/or III compared to each registered alternative.

Criterion I: Mesotrione provides low rate (0.188 lbs.ai/A) preemergence control of a large number of broadleaf weeds. Of the two potential alternatives, none provide as broad a spectrum of weed control. As to the weeds included on mesotrione's label, most are not controlled by any other product; and none are controlled by more than two products. No one product provides a broad spectrum of weed control comparable to mesotrione.

Criterion II: Mesotrione is safer across the human safety, environmental impact and application criteria than any other alternative.

Criterion III: No weeds have developed resistant biotypes to the mesotrione family of chemistry. Thus, mesotrione will manage resistance that has developed for the pronamide family of chemistry. It will not help the napropamide family whose resistant biotype is not controlled by mesotrione.

Rhubarb: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
Napropamide	No	Yes	Yes	No
Pronamide	No	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Table 1: FIFRA Exclusive Use Extension Criterion 1: There Are Insufficient Efficacious Alternatives To Mesotrione on Rhubarb

		Mesotrione HRAC Group F2 (WSSA Group 28)	K 3 / (15)	K1 / (3)	
Rhubarb		If Weeds Emerged: Callisto 6.0 fl. oz/A Plus Adjuvant Prior To Rhubarb Emergence	Napropamide	Pronamide	Count of AIs controlling spp. S, PC, Est., or Resistance not included.
Common Name	Scientific Name	Apply to weeds <5"			
Weeds Controlled With Postemergence Application					
Amaranth, palmer	<i>Amaranthus palmeri</i>	C			0
Amaranth, Powell	<i>Amaranthus powellii</i>	C			0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C			0
Atriplex	<i>Chenopodium orach</i>	C			0
Broadleaf signalgrass	<i>Brachiaria platphylla</i>	C ¹			0
Buckwheat, wild	<i>Polygonum convolvulus</i>	PC			0
Buffalobur	<i>Solanum rostratum</i>	C			0
Burcucumber	<i>Sicyos angulatus</i>	PC			0
Carpetweed	<i>Mollugo verticillata</i>	C			0
Carrot, wild	<i>Daucus carota</i>	C			0
Chickweed, common	<i>Stellaria media</i>	C			0
Cocklebur, common	<i>Xanthium strumarium</i>	C			0
Crabgrass, large	<i>Digitaria sanguinalis</i>	C ¹			0
Dock, curly	<i>Rumex crispus</i>	PC			0
Galinsoga	<i>Galinsoga parviflora</i>	C			0
Hemp	<i>Cannabis sativa</i>	C			0
Horse nettle	<i>Solanum carolinense</i>	C			0
Horseweed/Marestail	<i>Conyza canadensis</i>	PC			0
Jimsonweed	<i>Datura stramonium</i>	C			0
Knotweed, prostrate	<i>Polygonum aviculare</i>	PC			0
Kochia	<i>Kochia scoparia</i>	PC ¹			0
Lambsquarters, common	<i>Chenopodium album</i>	C			0
Morningglory, entireleaf, ivyleaf	<i>Ipomoea hederacea</i>	PC			0
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC			0
Mustard, wild	<i>Brassica kaber</i>	C			0
Nightshade, black	<i>Solanum nigrum</i>	C			0
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C			0
Nightshade, hairy	<i>Solanum sarrachoides</i>	C			0
Nutsedge, yellow	<i>Cyperus esculentus</i>	PC			0
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C			0
Pigweed, smooth	<i>Amaranthus hybridus</i>	C			0
Pigweed, tumble	<i>Amaranthus albus</i>	C			0
Pokeweed, common	<i>Phytolacca americana</i>	PC			0
Potatoes, volunteer	<i>Solanum spp.</i>	C			0
Pusley, Florida	<i>Richardia scabra</i>	C ¹			0
Ragweed, common	<i>Ambrosia artemisiifolia</i>	PC			0
Ragweed, giant	<i>Ambrosia trifida</i>	C			0
Sesbania, hemp	<i>Sesbania exaltata</i>	C			0
Smartweed, ladythumb	<i>Polygonum persicaria</i>	C			0
Smartweed, pale	<i>Polygonum lapathifolium</i>	C			0
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C			0
Sunflower, common	<i>Helianthus annuus</i>	C			0
Velvetleaf	<i>Abutilon theophrasti</i>	C			0
Waterhemp, common	<i>Amaranthus rudis</i>	C			0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C			0

¹ Apply before weed exceeds 2 inches in height.

*Adjuvant = COC or NIS							
Weeds Controlled With Preemergence Applications of Callisto							
Common Name	Scientific Name	6.0 fl. oz./A When Used Alone					
Amaranth, palmer	<i>Amaranthus palmeri</i>	C					0
Amaranth, Powell	<i>Amaranthus powellii</i>	C					0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C					0
Broadleaf signalgrass	<i>Brachiaria platyphylla</i>	C ¹					0
Buffalobur	<i>Solanum rostratum</i>	C					0
Carpetweed	<i>Mollugo verticillata</i>	C	C	C			2
Chickweed, common	<i>Stellaria media</i>	C	C	C			2
Cocklebur, common	<i>Xanthium strumarium</i>	PC					0
Crabgrass, large	<i>Digitaria sanguinalis</i>	C ¹	C	C			2
Galinsoga	<i>Galinsoga parviflora</i>	C					0
Jimsonweed	<i>Datura stramonium</i>	C					0
Kochia	<i>Kochia scoparia</i>	PC					0
Lambsquarters, common	<i>Chenopodium album</i>	C	C	C			2
Morningglory, entireleaf; ivyleaf	<i>Ipomoea hederacea</i>	PC		C - annual			1
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC					0
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C					0
Nightshade, hairy	<i>Solanum sarrachoides</i>	C		C			1
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C	C				1
Pigweed, smooth	<i>Amaranthus hybridus</i>	C					0
Pigweed, tumble	<i>Amaranthus albus</i>	C					0
Ragweed, common	<i>Ambrosia artemisiifolia</i>	C	S				0
Ragweed, giant	<i>Ambrosia trifida</i>	PC					0
Smartweed, ladysthumb	<i>Polygonum persicaria</i>	C					0
Smartweed, pale	<i>Polygonum lapathifolium</i>	C		C			1
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C					0
Sunflower, common	<i>Helianthus annuus</i>	C					0
Velvetleaf	<i>Abutilon theophrasti</i>	C					0
Waterhemp, common	<i>Amaranthus rudis</i>	C					0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C					0
Count of Species Controlled		58	5	7			
Criterion 1: Insufficient Efficacious Alternative to Mesotrione			Yes	Yes			
Resistant biotypes per chemical class that controlled or partially controlled by mesotrione. A "C" within a pink shaded cell indicates that weed has resistant biotypes and is therefore not counted as controlled by that product.							
Species not controlled by any alternative							
C = Control PC = Partial Control S = Suppression							

Table 2: FIFRA Exclusive Use Extension Criterion II: Alternative Registered Pesticides Pose Greater Risks To The Environment Or Human Health Than Mesotrione On Rhubarb

Characteristic	Mesotrione	Napropamide	Pronamide
EPA Reg. No.	100-1131	70506-36	62719-397
Reduced Risk by EPA	Yes	No	No
Label Signal Word	Caution	Danger	Caution
Gene Toxicity	Negative	Negative	Negative
Teratogenicity	Negative	Negative	Negative
Reproductive Toxicity	Negative	Negative	Negative
Carcinogenic Potential	Not Likely	E	B2
Acute Neurotoxicity	Negative	ND	ND
Subchronic/Chronic Neurotoxicity	Negative	ND	ND
REI in Hours*	12	12	24
PHI in Days*	21	NL	38
**PPE*	Chem resist gloves	Chem resistant gloves	More restrictive clothing, head gear
Applic. Method (Pre)	Dormant Pre	Dormant Pre	Dormant pre in established plantings.
Pre lbs ai./A	0.188	4.0	1.0 - 2.0
Applic. Method (Post)	NL	NL	NL
Post lbs ai./A	NL	NL	NL
No. Applic. / year	1	1	1
Max. AI lbs./yr	0.188	4.0	2.0
US or Regional label	US	Regional: Pacific Northwest Only	Regional: OR and WA only.
**Environmental Hazard	Surface Water Advisory, runoff	Standard	Standard
Criterion II: Alternative Poses Greater Human or Environmental Risk		Yes	Yes

Other registered active ingredients that are not considered as viable mesotrione alternatives: Cloethodim, Fluazifop-P-butyl, Glyphosate, Paraquat, Pelargonic acid, Sethoxydim, and S-metolachlor. Refer to Attachment "Active Ingredients Within The Analyses Across Crops That Are Not Considered Viable Alternatives To Mesotrione".

* REI = Restricted Entry Interval. PHI = Pre Harvest Interval. PPE = Personal Protective Equipment

** = Ranking into 4 Classes: 0 = Better than mesotrione, 1 = similar to mesotrione, 2 = worse than mesotrione, 3 = much worse than mesotrione.

NL = None listed or not mentioned, or application method is not labeled for a specific active ingredient.

Table 3: FIFRA Exclusive Use Extension Criterion III: Mesotrione Plays Or Will Play A Significant Part In Managing Pest Resistance on Rhubarb

Characteristic EPA. Reg. No.	Mesotrione Reduced Risk AI 100-1131	Napropamide 70506-36	Pronamide 62719-397
HRAC / WSSA Classification of Active Ingredient Chemistry Class by Mode of Action	F 2 / (28)*	K 3 / (15)	K 1 / (3)
Total No. Weed Species With Resistant Biotypes Per Chemistry Class in US	0	1	6
No. of biotypes Controlled or Partially Controlled by Mesotrione		0	1
Criterion III: Mesotrione will play role in managing Pest Resistance to this Active		No	Yes
Criterion III: Mesotrione will play a role in managing pest resistance in Rhubarb	YES		

* Active Ingredient classification based on HRAC / WSSA. Mesotrione is WSSA 28 compared to the original classification of 27 used by EPA and currently on Syngenta's EPA labels.

Table 4: Rhubarb: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.				
Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
Napropamide	No	Yes	Yes	No
Pronamide	No	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Pearl Millet

US production of all millets is estimated to be 275,000 acres in the 2002 National Pesticide Use Database qualifying each as a minor crop. Specific data are not available for pearl millet as a single crop. Mesotrione was registered on pearl millet on March 17, 2008, which is within the first 7 years after the initial June 4, 2001 registration of mesotrione. On May 20, 2008 EPA granted mesotrione Reduced Risk status on pearl millet.

Conclusion:

Mesotrione fulfils FIFRA Criteria I, II, and/or III compared to each registered alternative.

Criterion I: Mesotrione provides low rate (0.188 lbs.ai/A) preemergence control of a large number of broadleaf weeds. It is the only product that can be used preemergence. Of the two potential postemergence alternatives, none provide as broad a spectrum of weed control. As to the weeds included on mesotrione’s label, several are not controlled by any other product; and none are controlled by more than two products. No one product provides a broad spectrum of weed control comparable to mesotrione. While carfentrazone was granted reduced risk in 2000 on cereal grains, in 2007 its combined use on rice, barley, spring wheat, and winter wheat was less than 0.75% of the acres grown, showing that one or more factors limit it as a viable product in these crops. The limitation would also be operative in pearl millet.

Criterion II: Mesotrione is safer across the human safety, environmental impact and application criteria than any other alternative. Carfentrazone was registered in 2000 as a reduced risk product for small grains, including grain and forage millets. In the acute neurotoxicity comparison, it has a positive response compared to negative for mesotrione. Thus, mesotrione poses less human risk in at least one category.

Criterion III: No weeds have developed resistant biotypes to the mesotrione family of chemistry. Thus, mesotrione will manage resistance that has developed for the other alternative families of chemistry.

Pearl Millet: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
2,4-D	No	Yes	Yes	Yes
Carfentrazone	Yes	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Table 1: FIFRA Exclusive Use Extension Criterion 1: There Are Insufficient Efficacious Alternatives To Mesotrione On Pearl Millet

		Mesotrione HRAC Group F2 (WSSA Group 28)	O / (4)	E / (14)	
Pearl Millet		Mesotrione at 3.0 fl. oz/A Plus Adjuvant*	2,4-D	Carfentrazone Reduced Risk (Cereals)	Count of AIs controlling species. S, PC, Est., or Resistance not included.
Common Name	Scientific Name	Apply to weeds <5"			
Weeds Controlled With Postemergence Application					
Amaranth, palmer	<i>Amaranthus palmeri</i>	C	C	C	2
Amaranth, Powell	<i>Amaranthus powellii</i>	C	C	C	2
Amaranth, spiny	<i>Amaranthus spinosus</i>	C	C	C	2
Atriplex	<i>Chenopodium orach</i>	C			0
Broadleaf signalgrass	<i>Bracharia platphylla</i>	C ¹			0
Buckwheat, wild	<i>Polygonum convolvulus</i>	PC			0
Buffalobur	<i>Solanum rostratum</i>	C			0
Burcucumber	<i>Sicyos angulatus</i>	PC			0
Carpetweed	<i>Mollugo verticillata</i>	C	C	C	2
Carrot, wild	<i>Daucus carota</i>	C			0
Chickweed, common	<i>Stellaria media</i>	C			0
Cocklebur, common	<i>Xanthium strumarium</i>	C	C	C	2
Crabgrass, large	<i>Digitaria sanguinalis</i>	C ¹			0
Dock, curly	<i>Rumex crispus</i>	PC	C		1
Galinsoga	<i>Galinsoga parviflora</i>	C	C		1
Hemp	<i>Cannabis sativa</i>	C	C		1
Horse nettle	<i>Solanum carolinense</i>	C			0
Horseweed/Marestail	<i>Conyza canadensis</i>	PC	C		1
Jimsonweed	<i>Datura stramonium</i>	C	C		1
Knotweed, prostrate	<i>Polygonum aviculare</i>	PC	C		1
Kochia	<i>Kochia scoparia</i>	PC ¹	C	C	1
Lambsquarters, common	<i>Chenopodium album</i>	C	C	C	2
Morningglory, entireleaf; ivyleaf	<i>Ipomoea hederacea</i>	PC	C	C	2
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC		C	1
Mustard, wild	<i>Brassica kaber</i>	C	C		1
Nightshade, black	<i>Solanum nigrum</i>	C		C	1
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C		C	1
Nightshade, hairy	<i>Solanum sarrachoides</i>	C		C	1
Nutsedge, yellow	<i>Cyperus esculentus</i>	PC			0
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C	C	C	2
Pigweed, smooth	<i>Amaranthus hybridus</i>	C	C	C	2
Pigweed, tumble	<i>Amaranthus albus</i>	C	C	C	2
Pokeweed, common	<i>Phytolacca americana</i>	PC			0
Potatoes, volunteer	<i>Solanum spp.</i>	C			0
Pusley, Florida	<i>Richardia scabra</i>	C ¹	C		1
Ragweed, common	<i>Ambrosia artemisiifolia</i>	PC	C		1
Ragweed, giant	<i>Ambrosia trifida</i>	C	C		1
Sesbania, hemp	<i>Sesbania exaltata</i>	C		C	1
Smartweed, ladythumb	<i>Polygonum persicaria</i>	C	C		1
Smartweed, pale	<i>Polygonum lapathifolium</i>	C	C		1
Smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>	C	C	C	2
Sunflower, common	<i>Helianthus annuus</i>	C	C		1
Velvetleaf	<i>Abutilon theophrasti</i>	C	C	C	2
Waterhemp, common	<i>Amaranthus rudis</i>	C	C	C	1
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C	C	C	2

*Adjuvant COC plus UAN or AMS

¹ Apply before weed exceeds 2 inches in height.

Weeds Controlled With Preemergence Applications of Callisto					
Common Name	Scientific Name	6.0 fl. oz./A When Used Alone			
Amaranth, palmer	<i>Amaranthus palmeri</i>	C			0
Amaranth, Powell	<i>Amaranthus powellii</i>	C			0
Amaranth, spiny	<i>Amaranthus spinosus</i>	C			0
Broadleaf signalgrass	<i>Brachiaria platyphylla</i>	C ¹			0
Buffalobur	<i>Solanum rostratum</i>	C			0
Carpetweed	<i>Mollugo verticillata</i>	C			0
Chickweed, common	<i>Stellaria media</i>	C			0
Cocklebur, common	<i>Xanthium strumarium</i>	PC			0
Crabgrass, large	<i>Digitaria sanguinalis</i>	C ¹			0
Gallinsoga	<i>Galinsoga parviflora</i>	C			0
Jimsonweed	<i>Datura stramonium</i>	C			0
Kochia	<i>Kochia scoparia</i>	PC			0
Lambsquarters, common	<i>Chenopodium album</i>	C			0
Morningglory, entireleaf; ivyleaf	<i>Ipomoea hederacea</i>	PC			0
Morningglory, pitted	<i>Ipomoea lacunosa</i>	PC			0
Nightshade, eastern black	<i>Solanum ptycanthum</i>	C			0
Nightshade, hairy	<i>Solanum sarrachoides</i>	C			0
Pigweed, redroot	<i>Amaranthus retroflexus</i>	C			0
Pigweed, smooth	<i>Amaranthus hybridus</i>	C			0
Pigweed, tumble	<i>Amaranthus albus</i>	C			0
Ragweed, common	<i>Ambrosia artemisiifolia</i>	C			0
Ragweed, giant	<i>Ambrosia trifida</i>	PC			0
Smartweed, ladysthumb	<i>Polygonum persicaria</i>	C			0
Smartweed, pale	<i>Polygonum lapathifolium</i>	C			0
Smartweed, Pennsylvania	<i>Polygonum pensylvanicum</i>	C			0
Sunflower, common	<i>Helianthus annuus</i>	C			0
Velvetleaf	<i>Abutilon theophrasti</i>	C			0
Waterhemp, common	<i>Amaranthus rudis</i>	C			0
Waterhemp, tall	<i>Amaranthus tuberculatus</i>	C			0
Count of Species Controlled		58	27	19	
Criterion 1: Insufficient Efficacious Alternative to Mesotrione			Yes	Yes	
Species not controlled by any alternative	Resistant biotypes per chemical class that controlled or partially controlled by mesotrione. A "C" within a pink shaded cell indicates that weed has resistant biotypes and is therefore not counted as controlled by that product.				
C = Control PC = Partial Control					

Table 2: FIFRA Exclusive Use Extension Criterion II: Alternative Registered Pesticides Pose Greater Risks to The Environment Or Human Health Than Mesotrione On Pearl Millet.

Characteristic	Mesotrione (Reduced Risk AI)	2,4-D	Carfentrazone (Reduced Risk AI for Cereals)
EPA Reg. No.	100-1131	62719-9	279-3241
Reduced Risk by EPA	Yes	No	Yes (Cereals)
Label Signal Word	Caution	Caution/Danger	Caution
Gene Toxicity	Negative	Negative	Negative
Teratogenicity	Negative	Negative	Negative
Reproductive Toxicity	Negative	Negative	Negative
Carcinogenic Potential	Not Likely	D	Not Likely
Acute Neurotoxicity	Negative	Positive	Positive
Subchronic/Chronic			
Neurotoxicity	Negative	Positive	ND
REI in Hours*	12	12	12
PHI in Days*	NL	14	7
**PPE*	Chem resist gloves	3	0
Applic. Method (Pre)	Pre	NL	NL
Pre lbs ai./A	0.188	NL	NL
Applic. Method (Post)	NL	Fully tillered to before boot stage	Post to jointing
Post lbs ai./A	NL	0.24-0.95	0.031
No. Applic. / year	1	2	3
Max. AI lbs./yr	0.188	1.66	0.031
US or Regional label	US	US	US
**Environmental Hazard	Surface Water Advisory, runoff	3	1
Criterion II: Alternative Poses Greater Human or Environmental Risk		Yes	Yes

Other registered active ingredients that are not considered as viable mesotrione alternatives: Glyphosate and Pelargonic acid. Refer to Attachment "Active Ingredients Within The Analyses Across Crops That Are Not Considered Viable Alternatives To Mesotrione".

* REI = Restricted Entry Interval. PHI = Pre Harvest Interval. PPE = Personal Protective Equipment.

** = Ranking into 4 Classes: 0 = Better than mesotrione, 1 = similar to mesotrione, 2 = worse than mesotrione, 3 = much worse than mesotrione.

NL = None listed or not mentioned, or application method is not labeled for a specific active ingredient.

Table 3: FIFRA Exclusive Use Extension Criterion III: Mesotrione Plays Or Will Play A Significant Part In Managing Pest Resistance on Pearl Millet

Characteristic EPA Reg. No.	Mesotrione Reduced Risk AI 100-1131	2,4-D 62719-9	Carfentrazone (Reduced Risk in Cereals) 279-3241
HRAC / WSSA Classification of Active Ingredient Chemistry Class by Mode of Action	F 2 / (28)*	O / (4)	E / (14)
Total No. Weed Species With Resistant Biotypes Per Chemistry Class in US	0	8	2
No. of biotypes Controlled or Partially Controlled by Mesotrione		2	2
Criterion III: Mesotrione will play role in managing Pest Resistance to this Active		Yes	Yes
Criterion III: Mesotrione will play a role in managing pest resistance in Pearl Millet	YES		
* Active Ingredient classification based on HRAC / WSSA. Mesotrione is WSSA 28 compared to the original classification of 27 used by EPA and currently on Syngenta's EPA labels.			

Table 4: Pearl Millet: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
2,4-D	No	Yes	Yes	Yes
Carfentrazone	Yes	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.

Flax

US flax production is estimated to be 642,287 acres in the 2002 National Pesticide Use Database. Although this estimate exceeds the standard number of acres for a minor crop classification under FIFRA Section 2(II), Syngenta is requesting classification of mesotrione as a minor use in flax because, as provided by FIFRA Section 2(II)(2)(A) the use does not provide sufficient economic incentive to support the continuing registration of flax and insufficient alternatives are available. Mesotrione was registered on flax on January 9, 2008, which is within the first 7 years after the initial June 4, 2001 registration of mesotrione. On May 20, 2008 EPA granted mesotrione Reduced Risk status on flax. The broadleaf products primarily used in flax provide non-residual postemergence control after flax and weed emergence. Preemergence options are limited. Mesotrione is labeled for preemergence application after planting but before crop emergence. In order for preemergence applications to be effective, rainfall after application is needed, and mesotrione needs less activation moisture than alternatives, such as the recent Section 18 Spartan label. The use of mesotrione as a preemergence application is expected to be relative minor, relegated to niche areas. Thus, mesotrione will have use where kochia is a problem with current products but use will be limited when considering the entire flax crop, and the relatively high cost of the mesotrione product.

Conclusion:

Mesotrione fulfils FIFRA Criteria I, II, and/or III compared to each registered alternative.

Criterion I: Mesotrione provides low rate (0.188 lbs.ai/A) preemergence and postemergence control of a large number of broadleaf weeds. It is the only product registered for preemergence use prior to flax emergence. Of the four potential alternatives, none provide as broad a spectrum of weed control. Clopyralid is only used in combination with MCPA. As to the weeds included on mesotrione's label, some are not controlled by any other product; most are controlled by only 1 to 3 other products, and only a few by multiple products. No one product provides a broad spectrum of weed control comparable to mesotrione. In our Reduced Risk submission, 2,4-D and dicamba were included in the analysis of products being used on flax from the NPUD. An NPIRS run showed that these are not registered on flax, and therefore could not be included in this analysis.

Criterion II: Mesotrione is safer across the human safety, environmental impact and application criteria than any other alternative. As noted, an alternative, clopyralid, is better than mesotrione in one or more criteria, but not across all criteria.

Criterion III: No weeds have developed resistant biotypes to the mesotrione family of chemistry. Thus, mesotrione will manage resistance that has developed for the MCPA and clopyralid alternative family of chemistry. The exceptions are bentazon and bromoxynil, whose resistant biotypes are not controlled by mesotrione.

Flax: Mesotrione Meets FIFRA Section 3(c)(1)(F)(ii) Criteria I, II, and III.

Active Ingredient	EPA Classified As Reduced Risk	Criterion I: Insufficient Efficacious Alternative To Mesotrione	Criterion II: Alternative Poses Greater Human Or Environmental Risk*	Criterion III: Mesotrione Will Play Role In Managing Pest Resistance To This Active
Mesotrione	Yes			
Bentazon	No	Yes	Yes	No
Bromoxynil	No	Yes	Yes	No
MCPA	No	Yes	Yes	Yes
Clopyralid	No	Yes	Yes	Yes

*Combined evaluation of human safety, application rate, and environmental impact.