Appendix F: T-REX Modeling: Terrestrial Exposure Estimates and Risk Quotients

The following tables provide calculations for the avian and mammalian chronic RQs associated with the use of Mancozeb and Maneb on a variety of agricultural crops.

Detailed Terrestrial Risk Quotients (T-REX)

The following tables provide calculations for the avian and mammalian chronic RQs associated with the use of Mancozeb and Maneb on a variety of agricultural crops.

T-REX EECs and RQs for Joint Mancozeb/Maneb Uses

Turf

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Mancozeb/Maneb
Use	Turf
Formulation	0
Application Rate	17.4 lbs a.i./acre
Half-life	20 days
Application Interval	7 days
Maximum # Apps./Year	4
Length of Simulation	1 year

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	0.00
	Bobwhite quail	LC50 (mg/kg-diet)	0.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Bobwhite quail	NOAEC (mg/kg-diet)	20.00
Mammals		LD50 (mg/kg-bw)	0.00
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	3.75
		NOAEC (mg/kg-diet)	75.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	12039.93
Tall Grass	5518.30
Broadleaf plants/sm Insects	6772.46
Fruits/pods/seeds/lg insects	752.50

Avian Chronic RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	602.00
Tall Grass	#DIV/0!	275.92
Broadleaf plants/sm Insects	#DIV/0!	338.62
Fruits/pods/seeds/lg insects	#DIV/0!	37.62

Mammalian Dietary and Dose based RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	1392.79	#DIV/0!	1189.71	#DIV/0!	637.73
Tall Grass	#DIV/0!	638.36	#DIV/0!	545.28	#DIV/0!	292.29
Broadleaf plants/sm insects	#DIV/0!	783.44	#DIV/0!	669.21	#DIV/0!	358.72
Fruits/pods/lg insects	#DIV/0!	87.05	#DIV/0!	74.36	#DIV/0!	39.86
Seeds (granivore)	#DIV/0!	19.34	#DIV/0!	16.52	#DIV/0!	8.86

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	160.53
Tall Grass	#DIV/0!	73.58
Broadleaf plants/sm insects	#DIV/0!	90.30
Fruits/pods/seeds/lg insects	#DIV/0!	10.03

Cucumbers

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Mancozeb/Maneb
Use	Cucumbers
Formulation	0
Application Rate	2.4 lbs a.i./acre
Half-life	20 days
Application Interval	7 days
Maximum # Apps./Year	8
Length of Simulation	1 year

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	2289.96
Tall Grass	1049.56
Broadleaf plants/sm Insects	1288.10
Fruits/pods/seeds/lg insects	143.12

Avian Dietary Chronic RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	114.50
Tall Grass	#DIV/0!	52.48
Broadleaf plants/sm Insects	#DIV/0!	64.41
Fruits/pods/seeds/lg insects	#DIV/0!	7.16

Mammalian Dose-based and Dietary Based Chroic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	264.90	#DIV/0!	226.28	#DIV/0!	121.29
Tall Grass	#DIV/0!	121.41	#DIV/0!	103.71	#DIV/0!	55.59
Broadleaf plants/sm insects	#DIV/0!	149.01	#DIV/0!	127.28	#DIV/0!	68.23
Fruits/pods/lg insects	#DIV/0!	16.56	#DIV/0!	14.14	#DIV/0!	7.58
Seeds (granivore)	#DIV/0!	3.68	#DIV/0!	3.14	#DIV/0!	1.68

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	30.53
Tall Grass	#DIV/0!	13.99
Broadleaf plants/sm insects	#DIV/0!	17.17
Fruits/pods/seeds/lg insects	#DIV/0!	1.91

Ornamentals (other)

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Mancozeb/Maneb
Use	Ornamentals (other)
Formulation	0
Application Rate	1.2 lbs a.i./acre
Half-life	20 days
Application Interval	7 days
Maximum # Apps./Year	3
Length of Simulation	1 year

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	691.25
Tall Grass	316.82
Broadleaf plants/sm Insects	388.83
Fruits/pods/seeds/lg insects	43.20

Avian Chronic
RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	34.56
Tall Grass	#DIV/0!	15.84
Broadleaf plants/sm Insects	#DIV/0!	19.44
Fruits/pods/seeds/lg insects	#DIV/0!	2.16

Mammalian Dose and Dietary based Chronic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	79.96	#DIV/0!	68.30	#DIV/0!	36.61
Tall Grass	#DIV/0!	36.65	#DIV/0!	31.31	#DIV/0!	16.78
Broadleaf plants/sm insects	#DIV/0!	44.98	#DIV/0!	38.42	#DIV/0!	20.60
Fruits/pods/lg insects	#DIV/0!	5.00	#DIV/0!	4.27	#DIV/0!	2.29
Seeds (granivore)	#DIV/0!	1.11	#DIV/0!	0.95	#DIV/0!	0.51

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	9.22
Tall Grass	#DIV/0!	4.22
Broadleaf plants/sm insects	#DIV/0!	5.18
Fruits/pods/seeds/lg insects	#DIV/0!	0.58

T-REX EECs and RQs for Mancozeb Uses (only)

Shallot

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Mancozeb
Use	Shallot
Formulation	0
Application Rate	2.4 lbs a.i./acre
Half-life	20 days
Application Interval	7 days
Maximum # Apps./Year	10
Length of Simulation	1 year

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	0.00
	Bobwhite quail	LC50 (mg/kg-diet)	0.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	125.00
Mammals		LD50 (mg/kg-bw)	0.00
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	6.00
		NOAEC (mg/kg-diet)	120.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	2437.56
Tall Grass	1117.21
Broadleaf plants/sm Insects	1371.13
Fruits/pods/seeds/lg insects	152.35

Avian Dietary based Chronic RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	19.50
Tall Grass	#DIV/0!	8.94
Broadleaf plants/sm Insects	#DIV/0!	10.97
Fruits/pods/seeds/lg insects	#DIV/0!	1.22

Mammalian Dose and Dietary based Chronic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	176.24	#DIV/0!	150.54	#DIV/0!	80.70
Tall Grass	#DIV/0!	80.77	#DIV/0!	69.00	#DIV/0!	36.99
Broadleaf plants/sm insects	#DIV/0!	99.13	#DIV/0!	84.68	#DIV/0!	45.39
Fruits/pods/lg insects	#DIV/0!	11.01	#DIV/0!	9.41	#DIV/0!	5.04
Seeds (granivore)	#DIV/0!	2.45	#DIV/0!	2.09	#DIV/0!	1.12

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	20.31
Tall Grass	#DIV/0!	9.31
Broadleaf plants/sm insects	#DIV/0!	11.43
Fruits/pods/seeds/lg insects	#DIV/0!	1.27

Fennel

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Mancozeb
Use	Fennel
Formulation	0
Application Rate	1.6 lbs a.i./acre
Half-life	20 days
Application Interval	7 days
Maximum # Apps./Year	8
Length of Simulation	1 year

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	1526.64
Tall Grass	699.71
Broadleaf plants/sm Insects	858.73
Fruits/pods/seeds/lg insects	95.41

Avian Dietary based Chronic RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	12.21
Tall Grass	#DIV/0!	5.60
Broadleaf plants/sm Insects	#DIV/0!	6.87
Fruits/pods/seeds/lg insects	#DIV/0!	0.76

Mammalian Dose and Dietary based Chronic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	110.38	#DIV/0!	94.28	#DIV/0!	50.54
Tall Grass	#DIV/0!	50.59	#DIV/0!	43.21	#DIV/0!	23.16
Broadleaf plants/sm insects	#DIV/0!	62.09	#DIV/0!	53.03	#DIV/0!	28.43
Fruits/pods/lg insects	#DIV/0!	6.90	#DIV/0!	5.89	#DIV/0!	3.16
Seeds (granivore)	#DIV/0!	1.53	#DIV/0!	1.31	#DIV/0!	0.70

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	12.72
Tall Grass	#DIV/0!	5.83
Broadleaf plants/sm insects	#DIV/0!	7.16
Fruits/pods/seeds/lg insects	#DIV/0!	0.80

Grains (barley, oats, rye, triticale, and wheat)

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Mancozeb
Use	Grains (barley, oats, rye, triticale, and wheat
Formulation	0
Application Rate	1.6 lbs a.i./acre
Half-life	20 days
Application Interval	7 days
Maximum # Apps./Year	3
Length of Simulation	1 year

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	921.66
Tall Grass	422.43
Broadleaf plants/sm Insects	518.43
Fruits/pods/seeds/lg insects	57.60

Avian Dietary based Chronic RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	7.37
Tall Grass	#DIV/0!	3.38
Broadleaf plants/sm Insects	#DIV/0!	4.15
Fruits/pods/seeds/lg insects	#DIV/0!	0.46

Mammalian Dose and Dietary based Chronic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	66.64	#DIV/0!	56.92	#DIV/0!	30.51
Tall Grass	#DIV/0!	30.54	#DIV/0!	26.09	#DIV/0!	13.98
Broadleaf plants/sm insects	#DIV/0!	37.48	#DIV/0!	32.02	#DIV/0!	17.16
Fruits/pods/lg insects	#DIV/0!	4.16	#DIV/0!	3.56	#DIV/0!	1.91
Seeds (granivore)	#DIV/0!	0.93	#DIV/0!	0.79	#DIV/0!	0.42

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	7.68
Tall Grass	#DIV/0!	3.52
Broadleaf plants/sm insects	#DIV/0!	4.32
Fruits/pods/seeds/lg insects	#DIV/0!	0.48

T-REX EECs and RQs for Maneb Uses (only)

Almonds

Chemical Name:	Maneb
Use	Almonds
Formulation	0
Application Rate	6.4 lbs a.i./acre
Half-life	20 days
Application Interval	7 days
Maximum # Apps./Year	4
Length of Simulation	1 year

Endpoints

Avian	Mallard duck	LD50 (mg/kg-bw)	0.00
	Bobwhite quail	LC50 (mg/kg-diet)	0.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	20.00
Mammals		LD50 (mg/kg-bw)	0.00
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	3.75
		NOAEC (mg/kg-diet)	75.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	4428.48
Tall Grass	2029.72
Broadleaf plants/sm Insects	2491.02
Fruits/pods/seeds/lg insects	276.78

Avian Dietary Based Chronic RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	221.42
Tall Grass	#DIV/0!	101.49
Broadleaf plants/sm Insects	#DIV/0!	124.55
Fruits/pods/seeds/lg insects	#DIV/0!	13.84

Mammalian Dose and Diet Based Chronic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	512.29	#DIV/0!	437.59	#DIV/0!	234.57
Tall Grass	#DIV/0!	234.80	#DIV/0!	200.56	#DIV/0!	107.51
Broadleaf plants/sm insects	#DIV/0!	288.16	#DIV/0!	246.15	#DIV/0!	131.94
Fruits/pods/lg insects	#DIV/0!	32.02	#DIV/0!	27.35	#DIV/0!	14.66
Seeds (granivore)	#DIV/0!	7.12	#DIV/0!	6.08	#DIV/0!	3.26

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	59.05
Tall Grass	#DIV/0!	27.06
Broadleaf plants/sm insects	#DIV/0!	33.21
Fruits/pods/seeds/lg insects	#DIV/0!	3.69

Beans (dried)

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Maneb
Use	Beans (dried)
Formulation	0
Application Rate	1.6 lbs a.i./acre
Half-life	20 days
Application Interval	5 days
Maximum # Apps./Year	6
Length of Simulation	1 year

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	1560.21
Tall Grass	715.10
Broadleaf plants/sm Insects	877.62
Fruits/pods/seeds/lg insects	97.51

Avian Dietary based Chronic RQs

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	#DIV/0!	78.01
Tall Grass	#DIV/0!	35.75
Broadleaf plants/sm Insects	#DIV/0!	43.88
Fruits/pods/seeds/lg insects	#DIV/0!	4.88

Mammalian Dose and Dietary based Chronic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	180.49	#DIV/0!	154.17	#DIV/0!	82.64
Tall Grass	#DIV/0!	82.72	#DIV/0!	70.66	#DIV/0!	37.88
Broadleaf plants/sm insects	#DIV/0!	101.52	#DIV/0!	86.72	#DIV/0!	46.49
Fruits/pods/lg insects	#DIV/0!	11.28	#DIV/0!	9.64	#DIV/0!	5.17
Seeds (granivore)	#DIV/0!	2.51	#DIV/0!	2.14	#DIV/0!	1.15

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	20.80
Tall Grass	#DIV/0!	9.53
Broadleaf plants/sm insects	#DIV/0!	11.70
Fruits/pods/seeds/lg insects	#DIV/0!	1.30

Figs (single application)

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Maneb
Use	Figs
Formulation	0
Application Rate	2.4 lbs a.i./acre
Half-life	20 days
Application Interval	N/A days
Maximum # Apps./Year	1
Length of Simulation	1 year

Endpoints			
Avian	Mallard duck	LD50 (mg/kg-bw)	0.00
	Bobwhite quail	LC50 (mg/kg-diet)	0.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Bobwhite quail	NOAEC (mg/kg-diet)	20.00
Mammals		LD50 (mg/kg-bw)	0.00
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	3.75
		NOAEC (mg/kg-diet)	75.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	576.00
Tall Grass	264.00
Broadleaf plants/sm Insects	324.00
Fruits/pods/seeds/lg insects	36.00

Avian Dietary Based Chronic RQs

RQs	
Acute	Chronic
#DIV/0!	28.80
#DIV/0!	13.20
#DIV/0!	16.20
#DIV/0!	1.80

Mammalian Dose and Dietary Based Chronic RQs

Dose-based RQs (Dose-based EEC/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	#DIV/0!	66.63	#DIV/0!	56.92	#DIV/0!	30.51
Tall Grass	#DIV/0!	30.54	#DIV/0!	26.09	#DIV/0!	13.98
Broadleaf plants/sm insects	#DIV/0!	37.48	#DIV/0!	32.02	#DIV/0!	17.16
Fruits/pods/lg insects	#DIV/0!	4.16	#DIV/0!	3.56	#DIV/0!	1.91
Seeds (granivore)	#DIV/0!	0.93	#DIV/0!	0.79	#DIV/0!	0.42

Dietary-based RQs (Dietary-based EEC/LC50 or NOAEC)	Mammal RQs	
	Acute	Chronic
Short Grass	#DIV/0!	7.68
Tall Grass	#DIV/0!	3.52
Broadleaf plants/sm insects	#DIV/0!	4.32
Fruits/pods/seeds/lg insects	#DIV/0!	0.48