

New Studies Submitted in Support of the Full Registration Application for Cry3Bb Transgenic Corn

	Number of Studies	Protein Tested or Corn Line
Characterization and/or Expression of the Protein		
Molecular Analysis	1	Mon 853
Protein Levels	1	Mon 853 and 860
Protein Characterization	2	Protein 11098 and 11231
Total Characterization	4	
Health Oriented		
Acute Oral -- Mice	2	Protein 11098 and 11231
Digestibility --model study	1	Protein 11098 and 11231
Bioinformatics -- toxins*	1	Protein 11098 and 11231
Bioinformatics -- allergens*	1	Protein 11098 and 11231
Catfish Feeding trial	1	Mon 853 and 859
Total Health Oriented	6	
Non-Target Organisms		
Coleoptera (beetles)	1	Protein 11231
Honey Bees	2	Protein 11231
Water flees	1	Protein 11098
Other insect orders	4	Protein 11231
Total Non-Targets	8	
Ecological Impacts		
Bobwhite feeding	1	Protein 11231
Total All New Studies	19	
* Structural similarity of the Cry3Bb proteins were checked against public databases of known toxins and allergens. These were not feeding studies.		

Appendix Table 1. Percent National Corn Acres Treated with Insecticides by Target Pest ("ECB" is the European corn borer) [Cells are percents; 1.62 is 1.62%]

Active Ingredient	Likely Target Pest	1971	1982	1991	1995	1998
lambda-cyhalothrin	ECB					2.00
permethrin	ECB			2.00	4.00	2.00
dimethoate	ECB		0.00	0.28		1.00
propargite	ECB			0.18		0.50
Bt	ECB			0.40	1.00	
carbaryl	ECB	1.62	0.17			
diazinon	ECB	2.50	0.18	0.20		
esfenvalerate	ECB			0.44		
fenvalerate	ECB		0.07			
malathion	ECB	0.20				
methomyl	ECB		0.40			
methoxychlor	ECB	0.08				
Subtotal ECB		4.4	0.8	3.5	5.0	5.5
One-half Acreage Treated with Rootworm + ECB Products		1.4	2.4	5.7	5.5	5.0
Total % Acreage Treated for ECB		5.8	3.3	9.2	10.5	10.5
terbufos	Rootworm		9.40	8.00	6.00	6.00
tefluthrin	Rootworm			2.00	5.00	5.00
cyfluthrin + tebupirimfos	Rootworm					3.00
carbofuran	Rootworm	4.97	6.66	3.00	2.00	1.00
chlorethoxyfos	Rootworm					1.00
fonofos	Rootworm		6.88	4.00	1.00	1.00
phorate	Rootworm	4.53	4.57	2.00	1.00	0.50
aldrin	Rootworm	10.18				
bufencarb (RE-5353)	Rootworm	5.98				
chlordane	Rootworm	0.72				
DDT	Rootworm	0.01				
endrin	Rootworm	0.10				
ethoprophos	Rootworm		0.84			
flucythrinate	Rootworm			0.15		
heptachlor	Rootworm	2.57				
isofenphos	Rootworm		1.15			
paraquat dichloride	Rootworm		0.25			
toxaphene	Rootworm	0.19	0.37			
trimethacarb	Rootworm			0.17		
Subtotal Rootworm		29.2	30.1	19.3	15.0	17.5
One-half Acreage Treated with Rootworm + ECB Products		1.4	2.4	5.7	5.5	5.0
Total % Acreage Treated for Rootworm		30.6	32.5	25.0	20.5	22.5
chlorpyrifos	Rootworm + ECB		4.13	9.00	7.00	6.00
bifenthrin	Rootworm + ECB			0.34	1.00	2.00
fipronil	Rootworm + ECB					1.00
parathion-methyl	Rootworm + ECB	0.06	0.19	2.00	3.00	1.00
disulfoton	Rootworm + ECB	0.70	0.01			
monocrotophos	Rootworm + ECB		0.07			

Active Ingredient	Likely Target Pest	1971	1982	1991	1995	1998
oxydemeton-methyl	Rootworm + ECB		0.47			
parathion	Rootworm + ECB	2.06				
Subtotal Dual Target		2.8	4.9	11.3	11.0	10.0
Sum of % Acres Treated with All Chemicals, All Pests*		36.4	35.8	34.2	31.0	33.0
* Total percent acres treated with all insecticides overstates the percent of total national corn acreage to a small degree since some acres are treated with an insecticide targeted for ECB control as well as a rootworm insecticide.						
Source: Compiled by Benbrook Consulting Services from field crop agricultural chemical use data, National Agricultural Statistics Service, USDA, multiple years.						

Appendix Table 2. Pounds Applied of Corn Insecticides by Year and Target Pest ("ECB" is the European corn borer)

Active Ingredient	Likely Target Pest	1971	1982	1991	1995	1998
dimethoate	ECB		1,916	78,000		244,000
propargite	ECB			146,000		173,000
permethrin	ECB			207,000	237,000	129,000
lambda-cyhalothrin	ECB					23,000
Bt	ECB			3,430	6,410	
carbaryl	ECB	1,649,000	166,027			
diazinon	ECB	1,991,000	174,034	116,000		
esfenvalerate	ECB			12,000		
fenvalerate	ECB		8,505			
malathion	ECB	114,000				
methomyl	ECB		155,181			
methoxychlor	ECB	92,000				
Subtotal ECB Only		3,846,000	505,663	562,430	243,410	569,000
One-half Pounds Applied with Rootworm + ECB Products		828,000	2,085,992	3,771,000	2,797,500	2,229,500
Total Pounds Applied for ECB		4,674,000	2,591,655	4,333,430	3,040,910	2,798,500
terbufos	Rootworm		8,660,113	5,986,000	4,277,000	5,043,000
carbofuran	Rootworm	2,681,000	5,205,320	2,278,000	946,000	542,000
fonofos	Rootworm		5,101,382	2,890,000	786,000	499,000
tefluthrin	Rootworm			244,000	286,000	368,000
tebupirimfos	Rootworm					249,000
phorate	Rootworm	2,661,000	3,777,715	1,306,000	750,000	158,000
chlorethoxyfos	Rootworm					122,000
cyfluthrin	Rootworm					12,000
aldrin	Rootworm	7,759,000				
bufencarb (RE-5353)	Rootworm	3,575,000				
chlordane	Rootworm	842,000				
DDT	Rootworm	4,000				
endrin	Rootworm	30,000				
ethoprophos	Rootworm		675,705			
flucythrinate	Rootworm			6,000		
heptachlor	Rootworm	1,104,000				
isofenphos	Rootworm		1,329,418			
paraquat dichloride	Rootworm		73,826			
toxaphene	Rootworm	182,000	601,335			
trimethacarb	Rootworm			121,000		
Subtotal Rootworm		18,838,000	25,424,814	12,831,000	7,045,000	6,993,000
One-half Pounds Applied with Rootworm + ECB Products		828,000	2,085,992	3,771,000	2,797,500	2,229,500
Total Pounds Applied for Rootworm		19,666,000	27,510,806	16,602,000	9,842,500	9,222,500

Active Ingredient	Likely Target Pest	1971	1982	1991	1995	1998
chlorpyrifos	Rootworm + ECB		3,885,190	6,716,000	4,531,000	4,008,000
parathion-methyl	Rootworm + ECB	15,000	28,090	812,000	1,024,000	275,000
bifenthrin	Rootworm + ECB			14,000	40,000	113,000
fipronil	Rootworm + ECB					63,000
disulfoton	Rootworm + ECB	312,000	4,917			
monocrotophos	Rootworm + ECB		60,172			
oxydemeton-methyl	Rootworm + ECB		193,615			
parathion	Rootworm + ECB	1,329,000				
Subtotal Dual Target		1,656,000	4,171,983	7,542,000	5,595,000	4,459,000
Pounds Applied for All Chemicals, All Target Pests		24,340,000	30,102,460	20,935,430	12,883,410	12,021,000

Source: Compiled by Benbrook Consulting Services from field crop agricultural chemical use data, National Agricultural Statistics Service, USDA, multiple years.