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Can Conventional Crop Producers Also Benefit From Bt Technology?

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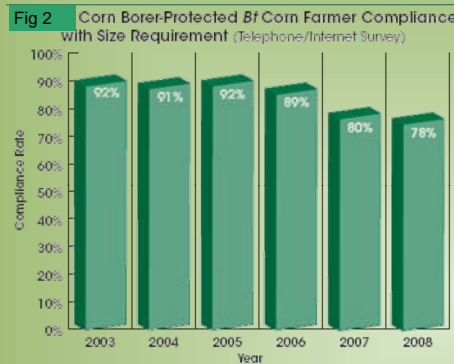
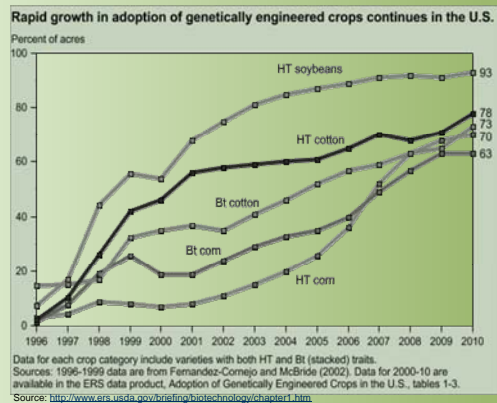
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Introduction

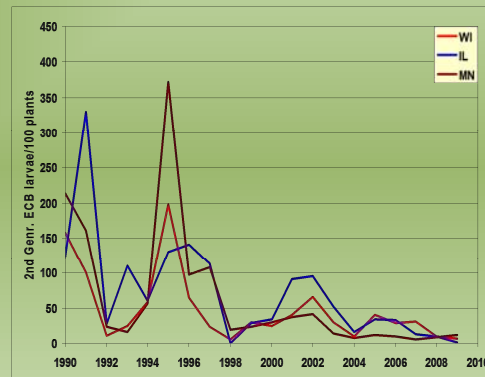
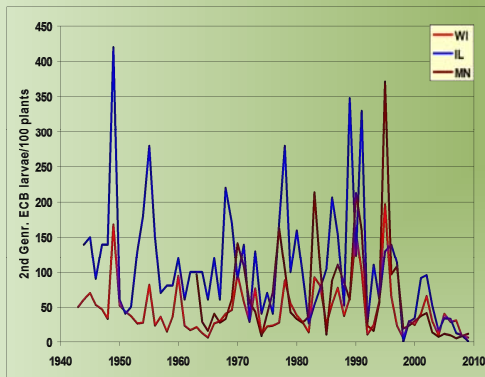
Transgenic plants producing insecticidal protein derived from *Bacillus thuringiensis* (Bt) have been widely adopted since their commercial introduction in 1996.

The conventional wisdom is that Bt crop producers are winners while conventional growers lose due to lower yields. This outcome makes producers skeptical of the benefits for allowing pests to survive in non-Bt crop refuge and is at the root of the refuge compliance problem.



Source: Center for Science in the Public Interest (CSPI) report

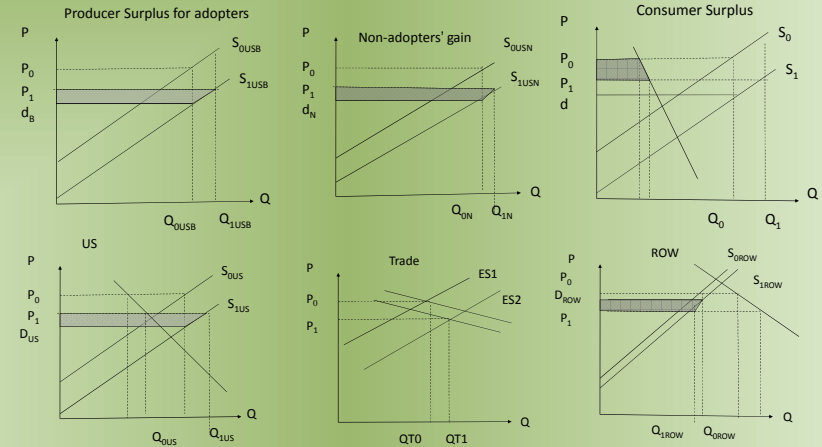
Hutchison et al. (2010) showed that European corn borer (ECB) populations have declined relative to the pre-Bt and that this population decline is closely tied to the increased planting of Bt corn. This area wide ECB suppression creates benefits for both Bt and non-Bt growers.



Source: Hutchison et al. 2010. Areawide suppression of European corn borer with Bt maize reaps savings to non-Bt maize growers. *Science* 330:222-225.

Method

We treat the area wide suppression of ECB from planting Bt corn as a positive externality to conventional corn growers and model the positive externality of Bt corn on conventional corn as a type of "technology spillover".



Results

We apply the above model to analyze the distribution of gains from planting Bt corn in year 2010.

Parameter	Value	Economic Surplus	\$ Million	
			w/o externality	w/ externality
Year	2010	US Consumer Surplus Δ	66.7	86.3
Bt corn adoption rate	0.63	US Producer Surplus Δ	240.0	307.4
World price (\$/bu)	3.83	US Bt Producer Surplus Δ	268.5	253.8
U.S. elasticity of supply	0.23	US non-Bt Producer Surplus Δ	(28.6)	53.6
U.S. demand elasticity	-0.5	ROW Consumer Surplus Δ	125.9	162.9
ROW excess demand elasticity	1.727	ROW Producer Surplus Δ	(113.8)	(147.3)
US excess supply elasticity	0.924	World surplus	318.7	409.3
ROW demand elasticity	-0.5	US surplus	306.6	393.8
ROW supply elasticity	0.23	ROW surplus	12.1	15.6

Conclusion

Conventional crop growers can also benefit from Bt technology due to the positive externality resulting from area-wide suppression of pest population by Bt. Our finding that both Bt and non-Bt acres can benefit from Bt crops will help encourage growers that the refuge/conventional crops that they plant can also benefit from Bt technology.