

ECONOMIC IMPACTS *OF* INVASIVE SPECIES *IN* CA AGRICULTURE

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INVASIVE SPECIES CROP LOSSES *AND* RELATED CONTROL COSTS

	Percent Invasive	Percent Loss	Crop loss (\$ billion)	Control cost
Weeds	73%	12%	23	\$3 billion
Insects & mites	40%	13%	14	\$500 million
Plant pathogens	65%	12%	21	\$500 million
Total		37%	58	\$4 billion

Source: Pimentel, et al., 2000. [BioScience](#) (50:1),

ECONOMIC CONCEPTS

- ◆ **Public good** – Consumption by one person does not preclude or make more expensive consumption by another.
Example: national defense
- ◆ **External cost** – Occurs when producers or consumers do not incur the full cost of their actions.
- ◆ Example: Pesticide pollution of a stream

MARKET vs. POLICY SOLUTIONS

- ❖ **Market solution** – may be industry wide. Groups of individuals agree to change behavior for common good.
- ❖ **Public Policy Action** – Public good characteristics point to market failure but not the appropriate form of government action.
- ❖ Most pest management regulation of ag are related to environmental concerns.

POLICY OPTIONS *FOR* INVASIVES

- ◆ **Exclusion** or border measures – prohibit entry into the country or a region of the country.
- ◆ **Containment** – limit spread once the pest is established
- ◆ **Eradication** – eliminate a pest from a region.
- ◆ **Monitoring** – outbreaks and movement

ANIMAL *AND* PLANT INSPECTION SERVICE (APHIS)

- ◆ Charged with protecting the US against entry of new pests and diseases primarily of agricultural animals and plants.
- ◆ Border rules for imported farm products
- ◆ Control of accidental entry of farm pests brought to the US by travelers.
- ◆ Pest eradication programs.
- ◆ Now part of the Dept. of Homeland Security

PRIVATE SECTOR MANAGEMENT OF ESTABLISHED INFESTATIONS

Plant breeding

Solarizatoin

Crop rotation

Biological control

Cultural control

Resistance

PARTIES IMPACTED *BY* INVASIVE SPECIES

- ◆ Agricultural industries
 - ◆ Growers – lower income, higher costs, higher market price
 - ◆ Marketing sector – restrictions on exports
 - ◆ Input suppliers – demand for labor, fuel, seed, and other inputs may increase or decrease
- ◆ Consumers – increase in price
- ◆ Taxpayers – public funding for programs

RESEARCH EXAMPLES

Daniel Sumner, Editor. 2000. Exotic Pests and Diseases, Iowa State Press.

- “Risk assessment of plant - parasitic nematodes”, Ferris et al.
- ◆ “A rational regulatory policy: the case of Karnal bunt”, Glauber and Narrod.

RISK ASSESSMENT OF PLANT PARASITIC NEMATODES IN CA

Total value of production	\$30 billion
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Number of top 10 commodities impacted	7
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Value of affected commodities	\$18 billion
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Percent of total value	61%
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Major crops impacted: Grapes, nursery, lettuce, citrus, cotton, strawberries, alfalfa

GROWER COSTS *AND* BENEFITS *OF* ERADICATING NEMATODES

Nematode	Crop	Costs \$/Year	Benefits \$/Year
Rice foliar	Rice	\$473	\$320
Reniform	Cotton	\$473	\$163
	Wine grapes	\$465	\$170
	Oranges	\$401	\$152
Burrowing	Oranges	\$393	\$150

TOTAL COST *OF* WIDESPREAD NEMATODE ESTABLISHMENT 1,000 ACRES

Nematode	Crop	One pest \$ million	Both pests \$ million
Sting	Cotton	1	
Reniform	Cotton	2	3
Golden	Tomato	2	
Burrowing	Tomato	2	2

KARNAL BUNT DISEASE BRIEF HISTORY

1982 – Wheat disease found in Mexico.

1988 – USDA risk assessment found risk to be high due to border proximity.

1991 – USDA assessment; recommends quarantine in the event of an introduction.

1996 – Detection in AZ. USDA emergency quarantine in AZ, CA, NM, and TX.

IMPACT OF REDUCED EXPORTS FROM AN OUTBREAK OF KARNAL BUNT

Item	Unit	0%	10%	25%
Exports	Mil. Bu.	1,200	1,080	900
Price	\$/bushel	3.85	3.63	3.29
Income	\$ million	11,358	10,813	8,146
Grower losses	\$ million	--	-545	-1,397
Consumer gains	\$ million	--	284	747
Net impact	\$ million	--	-261	-650

COSTS DUE TO KARNAL BUNT REGULATIONS

Item	Cost (\$ million)
Plowdown of infected fields	1.2
KB + grain diverted to cattle feed	4.2
Railcar cleaning and disinfecting	.6
Restrictions on seed movement	6.0
Loss in value of seed	
Millfeed treatment	28.0
KB - negative grain value loss	

QUARANTINE BENEFITS *AND* COSTS (\$ MILLION)

	Reduction in Exports	
	10%	25%
Benefit over 10 years	\$1,979	\$5,095
Cost: Plowdown of fields	- 1.2	- 1.2
Cost: Diversion to cattle feed	- 4.2	- 4.2
Net benefit	\$1,973	\$5,090

ADDITIONAL COSTS *AND* BENEFITS OF ALTERNATIVE QUARANTINE OPTIONS

	Added Cost	Added Benefits Reduction in Exports	
		10%	25%
		----- \$ million -----	
Railcar cleaning	.6	115	285
Restrictions on seed movement	6.0	3	7.5
Millseed treatment	28	.1	.4