Annual costs of invasive pests in California's top perennial crops

Karen Jetter, Research Economist,
Agricultural Issues Center

Introduction

Invasive exotic species have caused substantial ecological and economic damage to California's agricultural industries, urban and rural environments and ecosystems. The total cost of the entry and spread of these pests and diseases have been challenging to assess. Current assessments of the total cost of invasive species rely on extrapolating from previous studies that were completed at various points in time for select pests. No comprehensive multi-industry studies have been completed at a consistent point in time. This study presents preliminary results of the costs of invasive pests and diseases for California's top perennial crops including grapes, almonds, pistachios, walnuts and oranges.

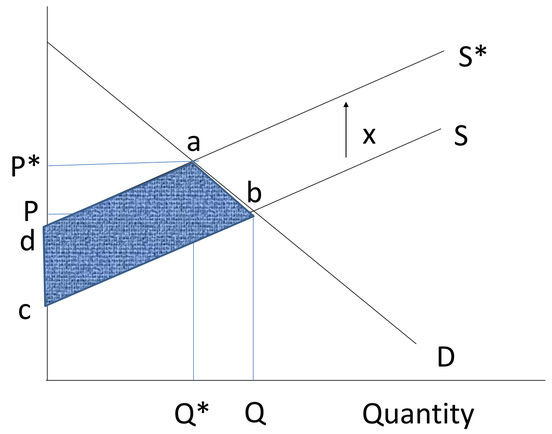

European grapevine moth


Glassywinged sharpshooter


BOT

Methods

A market model approach will be used to evaluate the costs of invasive pests and diseases. This method estimates how market equilibrium changes when the establishment and spread of a new pest causes production costs to increase. .



Market model

The entry of a new pest or disease causes the supply curve to shift up by x from S to S*.

Quantity produced falls from Q to Q*, and prices rise to from P to P*

Losses to producers and consumers are then estimated from the changes in prices, quantity and the supply curve shift m. In the graph total losses to both producers and consumers is equal to area abcd.

Data

Data on invasive species and their costs were obtained from a review of Sample Costs of Production budgets (https://coststudies.ucdavis.edu/en/), conversations with farm advisors and previous research. A weighted average was estimated to determine per acre cost for all of California.

Crop revenues and costs to treat invasive pests and diseases for California's top perennial crops.

Crop	2021 farm revenues (in $US billions)	Pests and diseases of economic importance	Weighted average per acre control costs
Grapes, all	5.23		
Grapes, raisin		Mealybugs, glassy-winged sharpshooter, phomopis, western flower thrips,	88
Grapes, table		Mealybugs, glassy-winged sharpshooter, phomopis, western flower thrips,	88
Grapes, wine		Vine mealybug, European grapevine moth, eutipa (north coast production areas), Mealybugs, glassy-winged sharpshooter, phomopis, western flower thrips, (Central valley production areas)	238
Almonds	5.03	Tranzschelia discolor rust, BOT	84
Pistachios	2.91	Gill's mealybug, BOT, Botrytis	171
Walnuts	1.02	Walnut husk fly, BOT, scale	240
Oranges	0.901	Citrus leafminer, California red scale, citricola scale	147
Total	15.091		

Annual costs to growers and buyers of farm production in $US millions.

Crop	Costs to producers	Costs to consumers	Total Costs
Grapes, all	228 - 247	65 - 84	293 - 331
Grapes, raisin	18 - 19	5 - 7	23 - 26
Grapes, table	15 - 16	4 - 5	19 - 22
Grapes, wine	195 - 212	56 - 72	251 - 284
Almonds	148 - 161	42 - 55	101 - 215
Pistachios	90 - 97	26 - 33	115 - 130
Walnuts	129 - 140	37 - 47	165 - 187
Oranges	18 - 20	5 - 7	23 - 26
Total	613 - 665	175 - 226	788 - 890


Walnut Husk Fly


Vine Mealybug

Other considerations

These costs represent just the permanent costs to growers and consumers of the farm product. Other considerations are:

Risk of damage: There are many pests and diseases that are threatening to cause damage. One notable example is the Asian citrus psyllid which vectors the causal agent of the plant disease Huanglongbing. This disease has almost wiped out the Florida citrus industry.

Public control costs. The economic costs for some invasive pests, such as the glassy-winged sharpshooter and Asian citrus psyllid are not as large as they could be due to areawide management programs. These programs have been successful in limiting the spread of invasive pests and diseases and the economic consequences of that spread. Often these programs are funded by the industry through check-off fees.

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