
Crop Insurance & Biodiversity

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Why Crop Insurance & Biodiversity?

- Farming is high risk, necessitating farmer and food system risk mitigation
- Biodiversity & crop insurance are key mitigation tools
- To what extent does crop insurance in the farm bill support or undermine biodiversity?



The Importance of Crop Biodiversity

Nutrition & Health: What We('ve) Know(n)

Arch Intern Med. 2009 Aug 10;169(15):1355-62. doi: 10.1001/archinternmed.2009.237.

Healthy living is the best revenge: findings from the European Prospective Investigation Into Cancer and Nutrition-Potsdam study.

Ford ES¹, Bergmann MM, Kröger J, Schienkiewitz A, Weikert C, Boeing H.

Association Between Dietary Factors and Mortality From Heart Disease, Stroke, and Type 2 Diabetes in the United States

Renata Micha, RD, PhD¹; Jose L. Peñalvo, PhD¹; Frederick Cudhea, PhD¹; et al

► [Author Affiliations](#) | [Article Information](#)

JAMA. 2017;317(9):912-924. doi:10.1001/jama.2017.0947

Prevention and management of type 2 diabetes: dietary components and nutritional strategies

Sylvia H Ley, PhD, Osama Hamdy, MD, Viswanathan Mohan, MD, Prof Frank B Hu, MD  

Published: 07 June 2014

Circulation. 2016 Jan 12;133(2):187-225. doi: 10.1161/CIRCULATIONAHA.115.018585.

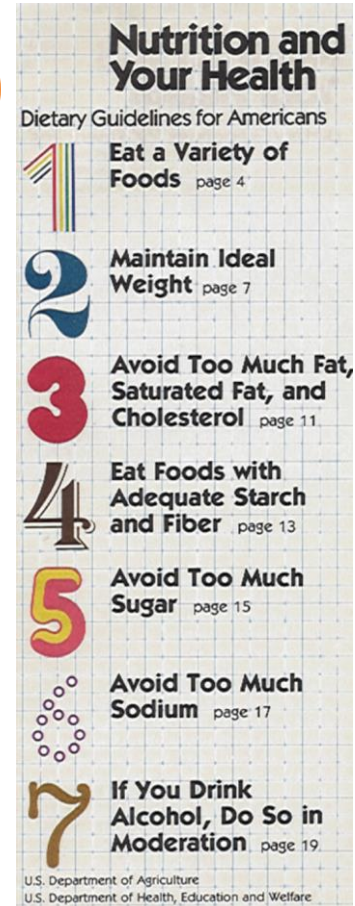
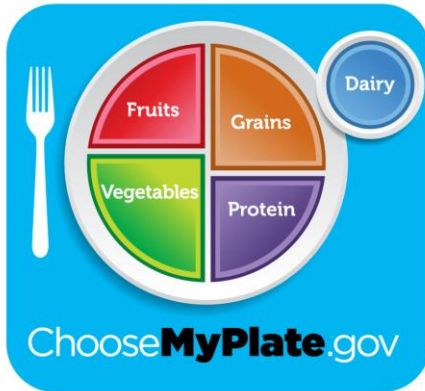
Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity: A Comprehensive Review.

[Mozaffarian D](#)¹.

Arch Intern Med. 2010 Apr 26;170(8):711-8. doi: 10.1001/archinternmed.2010.76.

Influence of individual and combined health behaviors on total and cause-specific mortality in men and women: the United Kingdom health and lifestyle survey.

Kvaavik E¹, Batty GD, Ursin G, Huxley R, Gale CR.



Crop Diversity & Nutrition

Nearly half of deaths caused by cardiometabolic diseases, which account for 23.4% of deaths overall, in the US in 2012 were associated with 10 dietary factors:

1. Excess sodium intake (9.5%),
2. Low intake of nuts/seeds (8.5%)
3. High intake of processed meats (8.2%)
4. Low seafood omega-3 fats (7.8%)
5. Low intake of vegetables (7.6%)
6. Low intake of fruits (7.5%)
7. High intake of sugar-sweetened beverages (7.4%)
8. Low intake of whole grains (5.9%)
9. Low intake of polyunsaturated fats (2.3%)
10. High intake of unprocessed red meats (0.4%)

Association Between Dietary Factors and Mortality From Heart Disease, Stroke, and Type 2 Diabetes in the United States

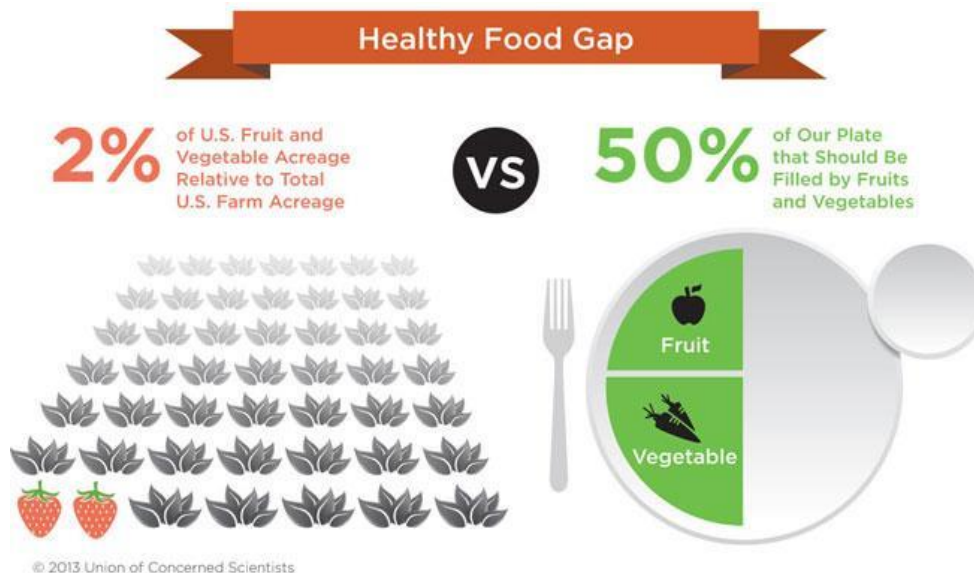
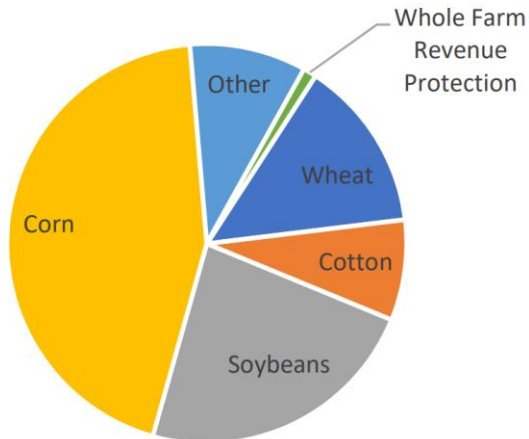
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Crop Insurance, Production & Nutrition

Total RMA Insurance Premiums, 2016

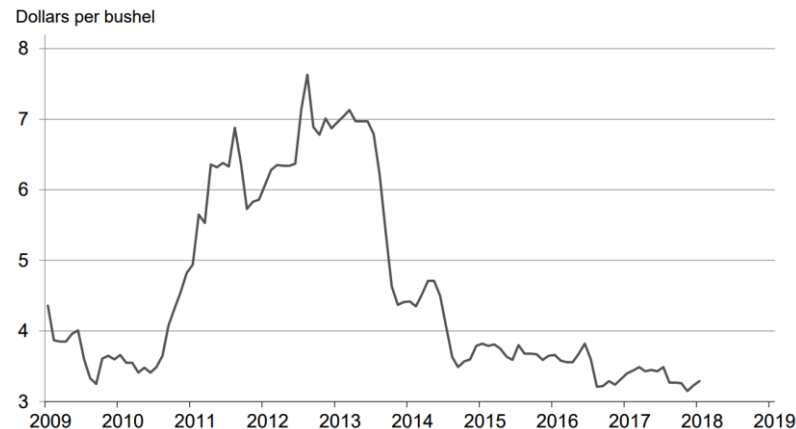


Crop Diversity: Farm & Farmer Resilience

- Crop (and genetic) diversity lowers risk due to:
 - Price fluctuations in individual crops
 - Crop failure due to pest & disease outbreak
 - Nutrient depletion from monocropping
 - Certain natural disasters



Prices Received for Corn by Month – United States



Systemic Risks of Uniformity: Natural Disaster

- Regional uniformity increases disruption risks and hurts dietary nutrition
- High systemic vulnerability to disease, pest, and natural disaster
 - Irish Potato Famine
 - Imminent Death of the Cavendish due to Panama Disease (which had replaced the Gros Michel killed by the same disease)



Systemic Risks of Uniformity: Malicious Attack

- High vulnerability to biological attack

“I cannot understand why the terrorists have not attacked our food, supply, because it is so easy to do” - Tommy Thompson, Secretary of Health and Human Services, 2004

- At least 9 countries have had agricultural bioweapons programs in the 20th century
- In addition to containment and repair costs, economic cost could be devastating

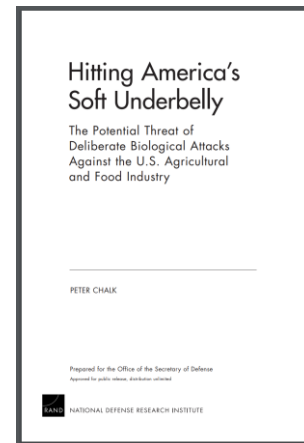
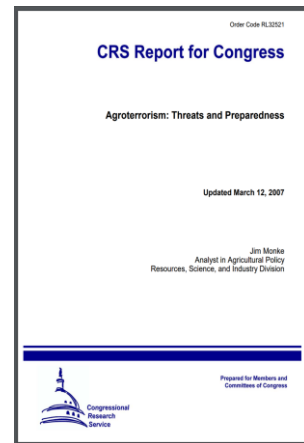
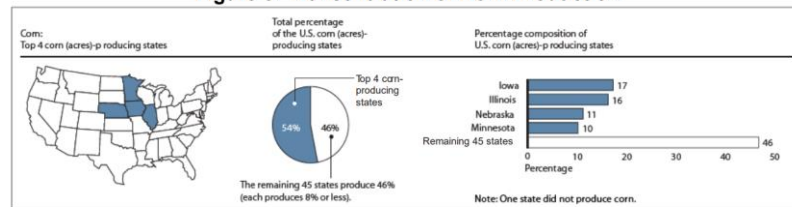


Figure 5. Concentration of Corn Production

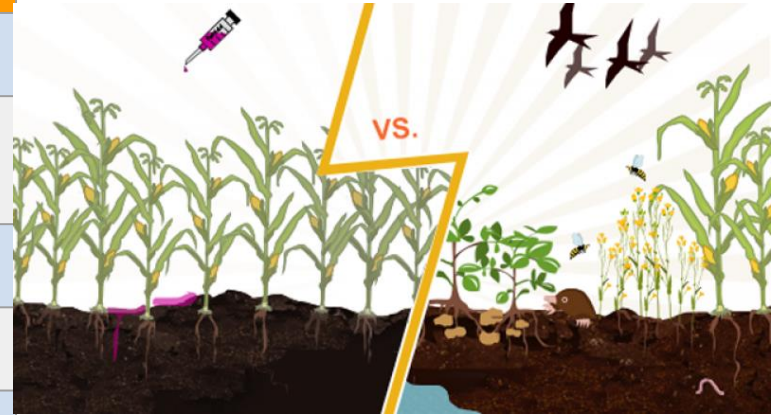


Source: U.S. Department of Agriculture, 2002 Census of Agriculture

The Importance of Non-Crop Biodiversity

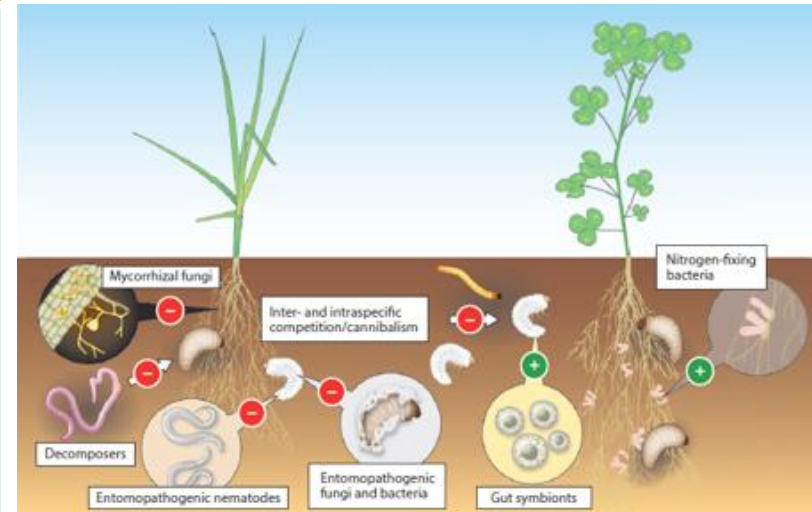
Monocultures and Biodiversity

Type of biodiversity affected	Mechanism of destruction
Crops (species and variety)	Definition of monoculture
Arthropods (insects, spiders)	Insecticide application
Native plants	Herbicide application, land use
Soil (micro)biome	Chemical inputs, tilling, erosion
Vertebrates (birds, reptiles, amphibians, fish, mammals)	Chemical inputs, habitat destruction



Non-Crop Biodiversity and the Food System

Biodiversity	Ecosystem function	Impacts on food system
Native plants	Resources for beneficial organisms Pest/disease buffer	Production Sustainable land use Nutrition and quality
Pollinators	Fruit and seed creation	
Natural enemies	Pest/disease control	Food safety Public health
Soil (micro)biome	Nutrient retention, growing medium Pest/disease control	



Example: Natural Pest Control

Higher non-crop plant diversity
and natural enemy biodiversity

- Fewer pest outbreaks
- Lower pesticide use
- Less crop damage



Consumers

- health effects of pesticide residue

Farmers

- Escape from the pesticide treadmill
- Long term: lower input costs
- Sustainable land stewardship

Farmworkers and Communities

- CHAMACOS study: effects of pesticide exposure on birth weight, IQ

Crop Insurance & Biodiversity in the Farm Bill

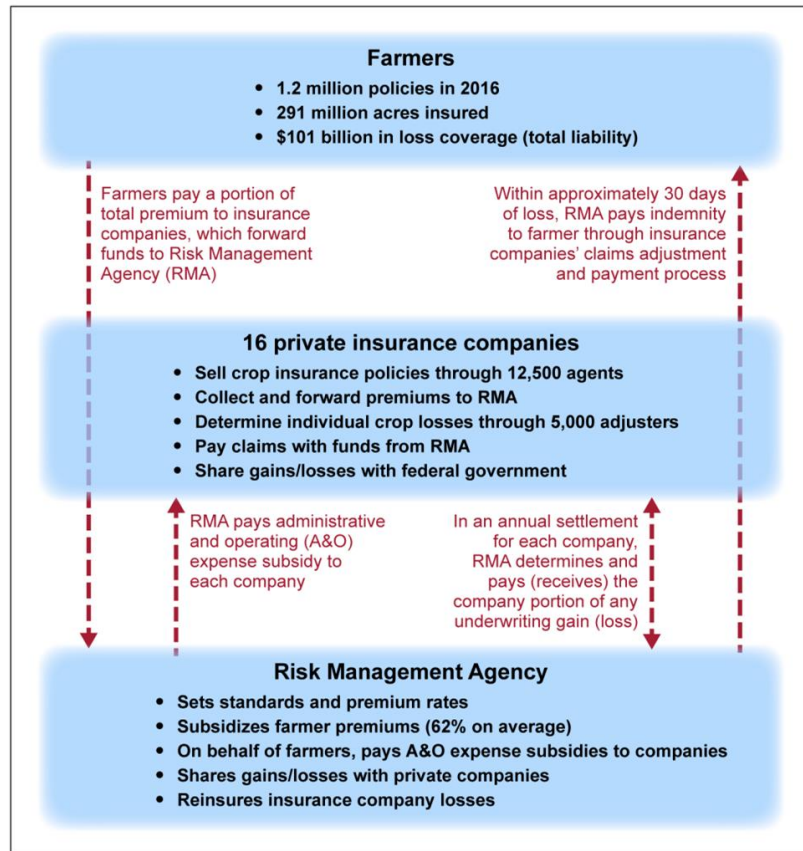
Crop Insurance & Biodiversity in the Farm Bill

- Title XI: Crop Insurance
 - Standard Crop Insurance
 - Noninsured Crop Disaster Assistance Program
 - Whole Farm Revenue Protection Program
- Title I: Commodities
- Title II: Conservation
- Title VII: Research
- Title V: Credit

Title XI: Crop Insurance

How Crop Insurance Works

- Policies sold and served by private insurance companies
- Government covers ~62% of premium, pays administrative and operating costs, reinsurance companies' losses (*goal is to avoid ad-hoc disaster assistance*)
- Private agents paid based on value of deal



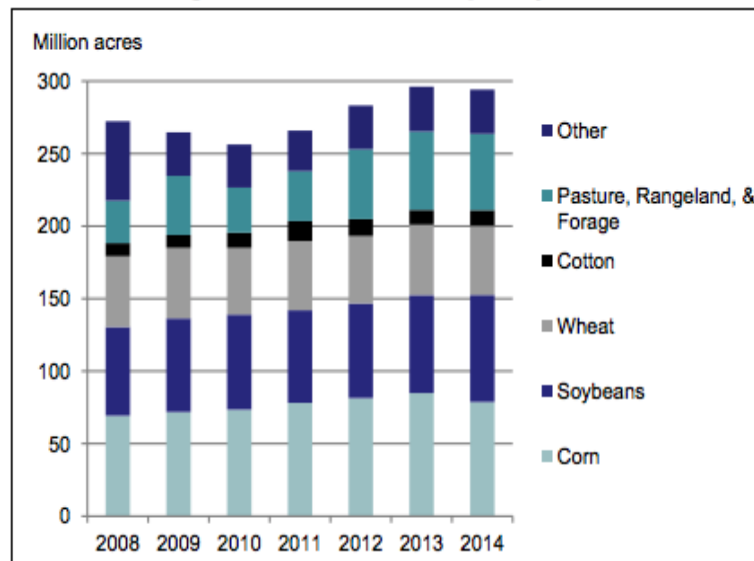
Sources: GAO, adapted from the Congressional Research Service, and analysis of RMA data. | GAO-17-501

Note: The number of acres insured and the amount of loss coverage are as of 2016. The number of insurance companies is as 2017. The numbers of agents and adjusters and the percentage of farmer premiums subsidized by RMA are as of 2014.

Crop Insurance Coverage and Biodiversity

- Four crops - corn, cotton, soy, wheat - account for 70% of enrolled acreage and 80% of premium subsidies
- 84-96% of total acreage for these crops is covered
- 73% of total fruits/nuts acreage is covered
- 32% of total vegetable acreage is covered

Figure 2. Insured Acres by Crop Year



Source: U.S. Department of Agriculture, Risk Management Agency.

What prevents some crops from being insured?

- Crop Insurance coverage decisions are made on a crop-by-crop and county-by-county basis
- Developing new coverage is costly, obtaining sufficient data for actuarially sound product is challenging. Therefore many crops are not covered and farmers are incentivized to grow the limited # of crops that are covered
- Sometimes producers lobby against insurance because they worry that insurance will reduce risk → farmers will plant more → price will drop (this explains low coverage for vegetables)
- A higher subsidy rate (up to 80%) is provided for policies using enterprise units (all land for a single crop in a county)

Whole Farm Revenue Protection

- Implemented in 2014
- Designed for small, highly diverse farms
 - Covers all commodities on a farm under one insurance policy
 - Max total coverage per farm is \$8.5m
 - Rewards diversification - premium discounts for crop diversity, at least 3 commodities required for 80-85% coverage levels
 - Organic crops can receive higher value
 - Acres covered by Title I: Commodities ARC not eligible
- Agents not incentivized to work with farmers on this because they are compensated based on value, and WFRP tend to be smaller value and require more effort to execute¹
- USDA required to conduct research on WFRP

Crop Insurance Implications

- **Conservation** - 2014 Farm Bill links eligibility for crop insurance premium subsidies to compliance with wetland and conservation requirements, crop insurance subsidies are reduced for plantings on native sod acreage
- **Costs** - Cost \$8b last year, ~2x more than commodity supports
- **Outlook for Crop Insurance** - generally supported by legislators because benefits farmers, institutions that lend to farmers, insurance providers
 - **Supporters:** prevents large amounts of ad-hoc disaster spending
 - **Critics:** covers too much producer risk, inappropriately subsidizing large farms and encouraging crop production on environmentally fragile lands
 - No upper limit on subsidies

Title I: Commodities

Not technically crop insurance, but have similar effects of reducing farmer risk. Applies only to certain commodity crops, and those farmers essentially have extra insurance

- PLC - Price Loss Coverage
 - Payment made when market price fall below reference price set in farm bill
 - Covered commodities (wheat, corn, sorghum, barley, oats, rice, soybeans, oilseeds, dry peas, lentils, chickpeas, peanuts)
- ARC - Agriculture Risk Coverage
 - Payment made when price drops below benchmark (5 year Olympic average)
 - Must have base acres of covered commodities
 - Eligible payment acreage is reduced when fruits, vegetables, or wild rice are planted in excess of 15% of base acres (or 35% depending upon a farmer's program choice)

Title II: Conservation

- Farmers with highly erodible land must adhere to conservation requirements to be eligible for federal crop insurance
- Conservation compliance focuses on approved soil conservation system on erodible land, and prevention of wetlands draining
- Compliance incentives (i.e., the value of production subsidies from the commodity and crop insurance programs) vary based on the types of land where individual farms are located and different commodity price scenarios
- Only a 5% spot check rate (nationally) is maintained by NRCS

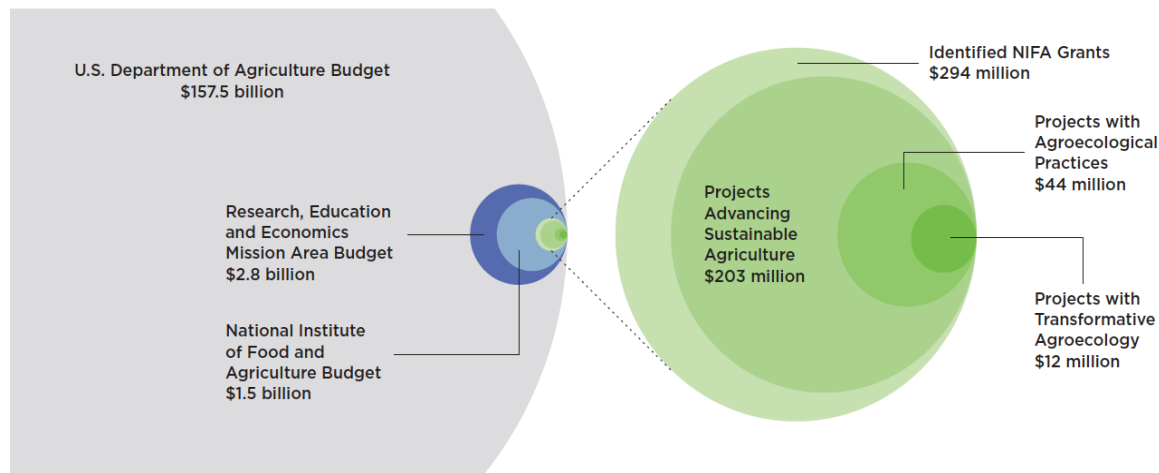


Runoff from a heavy rain carries farm chemicals as well as topsoil from a crop field in southern Iowa. Photo credit: NRCS

Title VII: Research

- 0.2% of Farm Bill budget
- NIFA: 4% to agroecology
- Sustainable Agriculture Research and Education (SARE) only program focused on farmer-driven research
- Agribusinesses fill funding void
- Ex: Ensia article

Agroecology Funding in the Context of Total USDA Budget, 2014



Source: Union of Concerned Scientists. *Counting on Agroecology: Why We Should Invest More in the Transition to Sustainable Agriculture* (2015).

Federal Jurisdiction of Crop Insurance

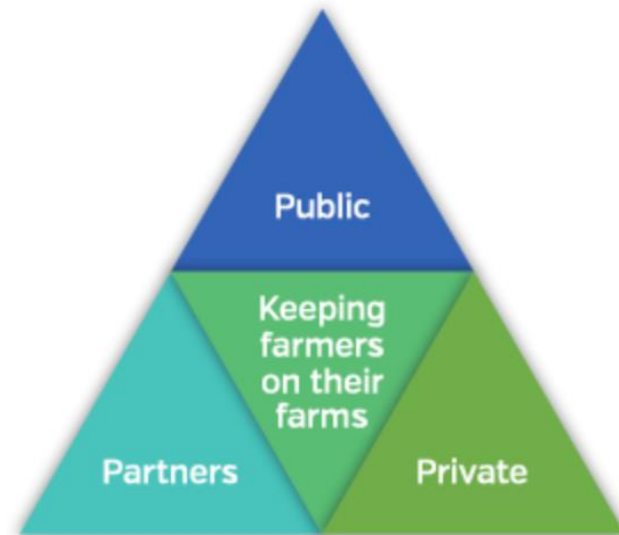
Public - Private Partnership

USDA

- Federal Crop Insurance Corporation (FCIC) establishes premium rates and insurance terms and conditions
- Risk Management Agency (RMA) manages the FCIC programs

Private Insurance Companies

- 16 private-sector Approved Insurance Providers (AIPs)



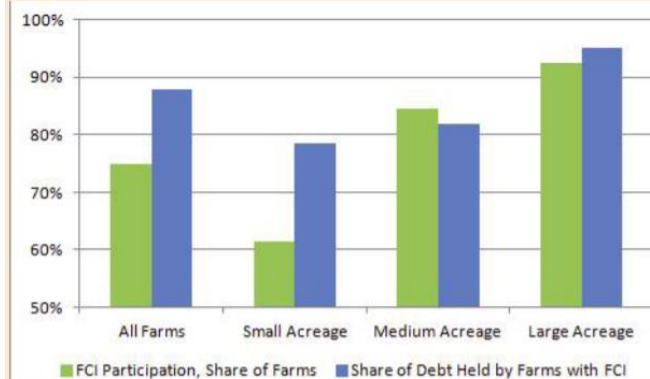
Source: USDA. Risk Management Agency.

Title V: Credit

- Access to insurance directly relates to access to credit (see graphs)
- Caveat: Study focuses on field crops (more data available for FCI).
One bias it could introduces is that the farms with insurance may be the riskier ones (the lender may have requested The insurance)

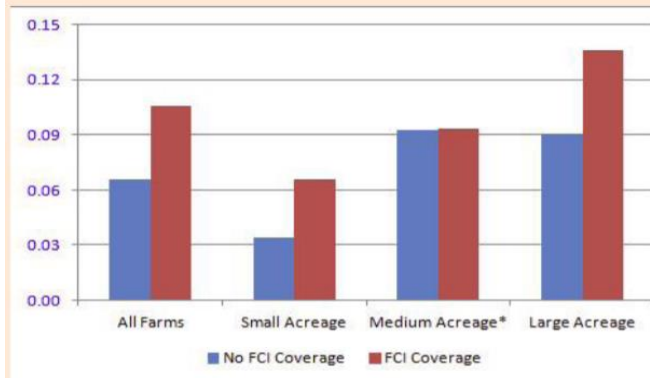
Source: *Farm Debt Use by Farms with Crop Insurance*, J. Ifft, T. Kuethe, M. Morehart, The magazine of food, farm, and resource issues, 3rd Quarter 2013 • 28(3)

Figure 1: Field Crop Farm Business and Federal Crop Insurance Participation



Source: USDA Agricultural Resource Management Survey (2011)

Figure 2: Debt-to-Asset Ratios for Field Crop Farm Businesses, by Acreage Class and Federal Crop Insurance Participation



Note: * Debt-to-asset ratios for farms with and without FCI coverage are not statistically different for this acreage class

Source: USDA Agricultural Resources Management Survey

Recommendations - Insurance title

- Ease access:
 - Make WFRP easier to use and less resource intensive
 - Expand Access to better insurance options (Choice + geography)
 - Remove barriers for small to mid-sized producers (e.g., national market participation)
- Improve methodology:
 - Develop a pricing index (-> Simplify process for farmers and better accounting of risk)
 - Collect data on soil health management methods and link to claims in order to adjust premiums accordingly over time
- Better transparency:
 - Increase transparency and accountability (currently little data on claims paid to whom)
 - Payment equity: Adopt reasonable premium subsidy caps, target subsidies to working farmers, means testing to not subsidize the wealthy (-> 20% of all crop insurance subsidies go to largest one percent of farms)

Recommendations - Other

- Expand **conservation compliance insurance requirements** to include biodiversity measures
- Move guidelines on cover crops to **Good Farming Practice** - it currently appears as a risk of losing insurance to farmers
- Fund **research** on risk reduction properties of diversified farms and biodiversity
- Improve access to **credit** for non-insured:
 - Outreach campaign, tools and trainings for farmers to gather data and prove farm sustainability to lenders
 - mandate an evaluation of credit constraints for diversified farms

Appendix

Commodity Crops

Covered commodities	Reference prices
Wheat	\$5.50/bushel
Corn	\$3.70/bushel
Grain sorghum	\$3.95/bushel
Barley	\$4.95/bushel
Oats	\$2.40/bushel
Long-grain rice	\$14.00/cwt
Medium-grain rice	\$14.00/cwt
California medium-grain rice (temperate japonica)	\$16.10/cwt*

Covered commodities	Reference prices
Soybeans	\$8.40/bushel
Other oilseeds	\$20.15/cwt
Dry peas	\$11.00/cwt
Lentils	\$19.97/cwt
Small chickpeas	\$19.04/cwt
Large chickpeas	\$21.54/cwt
Peanuts	\$535.00/ton

Types of Crop Insurance

- Yield-based

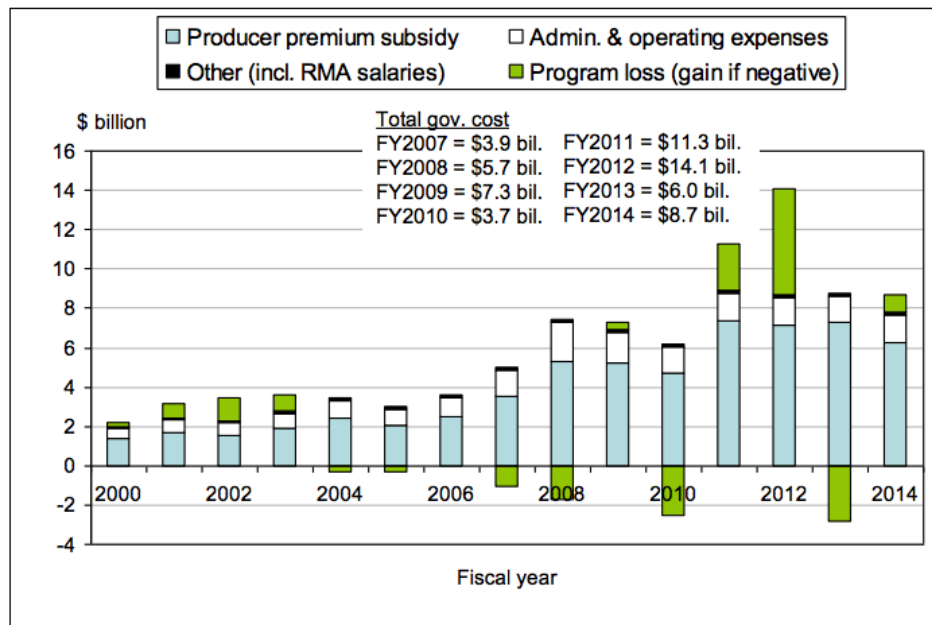
- Producer is assigned (1) a “normal crop yield” based on producer’s actual production history and (2) a price for commodity based on market conditions
 - Farmer must provide actual crop yields for last 4-10 years or can use avg county
- Producer selects a % of yield to be insured and % of price to be covered

- Revenue Protection

- Producer is assigned target level of revenue based on (1) producer’s yield history and (2) expected market prices
- Insurable crops are barley, canola/rapeseed, corn, cotton, grain sorghum, peanuts, rice, soybeans, sunflowers, and wheat
- *Whole Farm Revenue Protection, passed in 2014, allows insurance on entire farm

Government Cost of Federal Crop Insurance

Figure 10. Government Cost of Federal Crop Insurance



Source: CRS using data from U.S. Department of Agriculture, Risk Management Agency, <http://www.rma.usda.gov/aboutrma/budget/costsoutlays.html>.

Title XI: Disaster Assistance

- Noninsured Crop Disaster Assistance Program (NAP) for non-eligible crops, covers crop loss in excess of 50%
- When crop insurance is not available, USDA's noninsured crop disaster assistance program (NAP) provides the equivalent of catastrophic coverage (for yield losses greater than 50%) if purchased by the producer. Additional coverage (for yield losses greater than 35%) has been made available by the 2014 farm bill. To be eligible for a NAP payment, a producer first must apply for coverage under the program by the application closing date, which varies by crop, but is generally about 30 days prior to the final planting date for an annual crop. As with catastrophic crop insurance, NAP applicants pay an administrative fee (currently \$250 per crop). No premiums are required