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# A Detailed Analysis of US Organic Crops

Analysis Based on 2008 USDA-NASS Data

By

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# Table of Contents

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- [Background](#)
- [High Level Conclusions](#)
- [Discussion of Data Limitations](#)
- [Data Analysis National Level](#)
  - [National Overview](#)
  - [Commodity Pricing and Per Acre Gross Returns \(National by crop\)](#)
  - [Vegetable Crops](#)
  - [Fruit and Nut Crops](#)
  - [Row Crops](#)
  - [Animal Feed Crops](#)
- [Data Analysis State Level](#)
  - [Vegetable Crops](#)
  - [Fruit and Nut Crops](#)
  - [Row Crops](#)
  - [Animal Feed Crops](#)
- [About the Author](#)



**Click this button from any slide to return to the table of contents**

**Hyperlinks are only active in slide show mode**

# Background

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- As a follow-up to the 2007 Census of Agriculture, the National Agricultural Statistics Service ([USDA NASS](#)) conducted a first-ever, highly-detailed survey of Organic agriculture for the 2008 crop year. This [Organic Production Survey](#) included data in terms of acreage, production and value on a crop by state basis which is beyond what was available in the 5-year Census data.
- This analysis was completed by using the Organic Survey and comparing it to the same statistics for overall production (mainly “conventional”) in the same crop year (2008). These data were also from USDA-NASS. For row crops the data is available through [Quickstats 1](#). For citrus crops the data is available in the annual [Citrus Fruits Summary](#). For other fruit and nut crops the data is available in an annual summary of [Non-Citrus Fruits and Nuts](#). The vegetable crop data including strawberries and melons is available in the [Vegetables Annual Summary](#)
- Vocabulary for this analysis:
  - **Acreage** – the area in acres harvested for each crop or the percent of that area
  - **Production** – the total harvested output for a crop in bushels, tons, hundredweights etc
  - **Yield** – the harvested output for a crop on a per acre basis

# High Level Conclusions (1 of 3)

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- The 1.6 million acres of harvested Organic cropland in 2008 represented 0.52% of the total US cropland
  - Of that area, 546,000 acres were for hay or silage crops but none of those represented as much as 1% of the US total of each crop
  - Only three minor row crops (oats, flaxseed and rye) represented more than 1% of total acres for that crop
  - Of all fruit crops, only apples, avocados, figs, raspberries and blackberries had more than 4% Organic acres. Only apples and figs had more than 4% Organic production
  - Several vegetable crops (lettuce, carrots, spinach, sweet potato, squash, cauliflower, celery and artichoke) had more than 4% Organic acres, but of those only squash, sweet potatoes and spinach had as much as 4% Organic production
- Organic crop acres are highly concentrated in the dry, irrigated, Western states (43% vs 12% for non-Organic)
  - As an example, Organic apple acreage is 93% in the West vs 59% for all US apples
  - 97.5% of Organic apple production is in the West vs 71% for all US apples

## High Level Conclusions (2 of 3)

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- In the vast majority of cases national Organic average yields are moderately to substantially below those of the overall, national average
  - Examples for row crops include Winter Wheat (60% of overall average), Corn (71%), Soybeans (66%), Spring Wheat (47%) and Rice 59%
  - Examples for fruits include Grapes (51%), Apples (88%), Almonds (56%), Avocados (62%), Oranges (43%), Strawberries (58%)
  - Examples in Vegetables include Tomatoes (63%), Potatoes (72%), Sweet Corn (79%), Celery (50%) and Cabbage (43%)
- In many cases where comparisons can be made on a state/crop level outside of the West, Organic yields are dramatically lower
  - Examples include Squash, Strawberries, Apples and Cabbage
- These data do not address the question of whether the ratio of harvested to planted acreage is different for Organic and Conventional

# High Level Conclusions (3 of 3)

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- A theoretical, large-scale switch to Organic production would require substantially more land to be farmed
  - To have Organically produced the full output of 2008 US crops, it would have been necessary to harvest from an additional 131.8 million acres of cropland (based on 58 crops)
  - That additional area would represent a 43% increase over current US cropland
  - The theoretical, additional cropland needed (206,014 sq miles, 533,576 sq km) would be the equivalent of all the current cropland acres in Iowa, Illinois, North Dakota, Florida, Kansas, Minnesota and Oregon combined
  - On a land-area basis, this additional area would be 98% the physical size of France, 77% the size of Texas, 3.7 times the size of Iowa, or 1.3 times the size of California
- Growers generally receive a higher price/unit, but when lower yields are taken into account, the net income per acre is only marginally higher than for conventional
  - It is not; however, possible to quantify net grower economics from these data because of production cost differences

# Discussion of Data Limitations

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- The 2008 survey was an unprecedented opportunity to make comparisons to overall, “Conventional” production, but the comparisons are not without difficulties
- There are important scale differences between the 2008 Organic survey and standard USDA NASS statistics
  - The Organic study track even a few acres of a given crop in a given state while the normal USDA data drops such units below 1000 acres so in some cases there are no “conventional” numbers to compare with Organic
  - Many key Organic statistics are not reported because they would disclose too much information in cases where only a very small number of producers are involved in a given state/crop
- Production system differences
  - The Organic study only tracked “harvested cropland acres.” This can obscure the following differences that are sometimes detailed in the overall USDA NASS reports
  - Irrigated vs non-irrigated acres (tracked for major row crops in some, but not all states)
  - Fresh vs processed uses (tracked separately in the major producing regions on a national basis)
  - Planted vs harvested acres (tracked for most non-Organic row crops and major vegetable crops)
  - Prime land vs marginal land (not tracked in any statistics)
  - “Baby vegetable” systems (e.g. in spinach and leaf lettuce and carrots) are more common in Organic production and account for some of the yield differences because multiple crops/year are not captured in the statistics
- Where known (and based on feedback), these potentially confounding factors will be highlighted



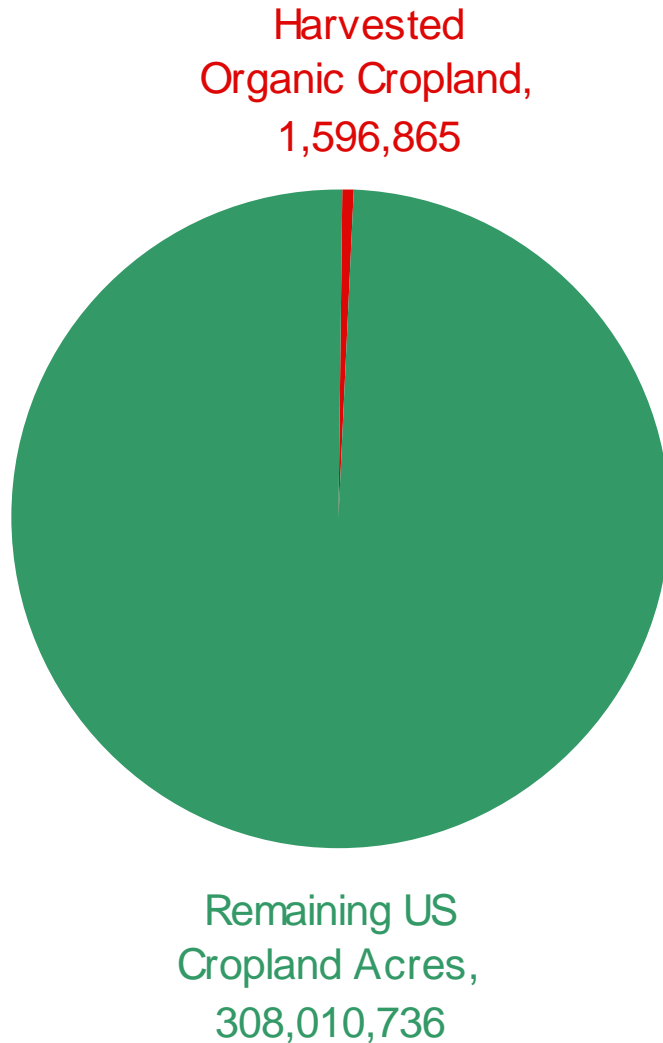
# National Overview





# Harvested Organic Cropland in 2008 Represented 0.51% of the US Total Cropland

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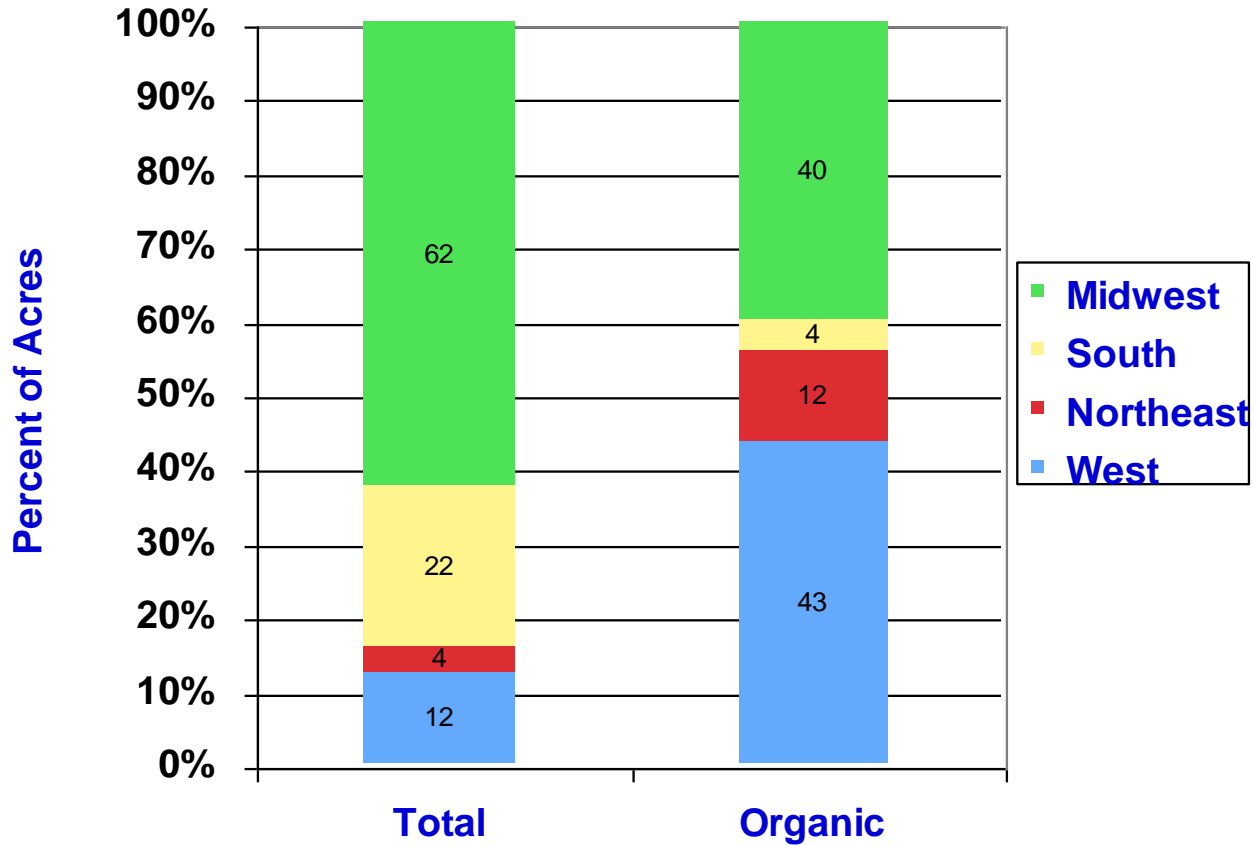


**In 2008 there were 2.2MM acres of USDA certified Organic cropland, but only 1.6MM of those were harvested. It is not clear from these data whether the remaining acres were unplanted parts of farms or planted acres not harvested. Since there were 309.6MM acres of total US cropland in 2008, the percent harvested as Organic represents only 0.516% of the total.**

**There were also 5.4MM acres of certified Organic pasture in 2008, but these are not part of the national “cropland” number**

# Organic Acreage By Region

## Geographic Distribution of Cropland and Organic Cropland

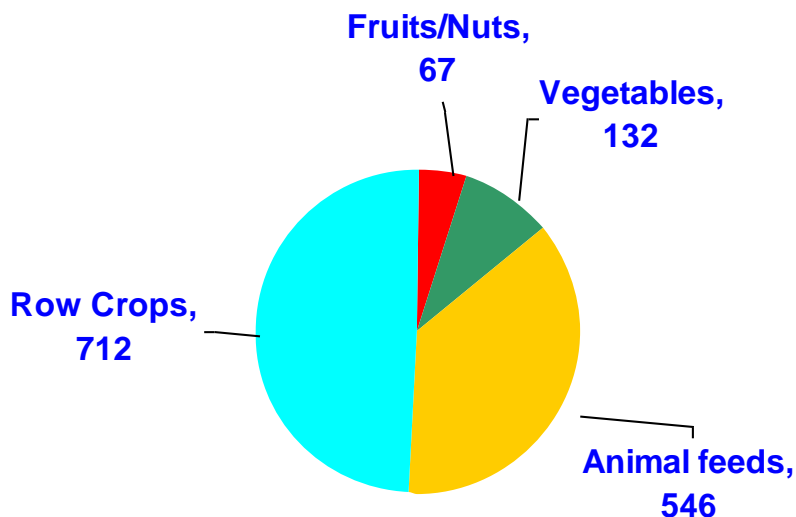


**Organic cropping is heavily weighted towards the irrigated, desert West, mainly because of disease pressures in wetter areas.**

**There is also a higher concentration of Organic in the Northeast, probably because of proximity to major population centers**

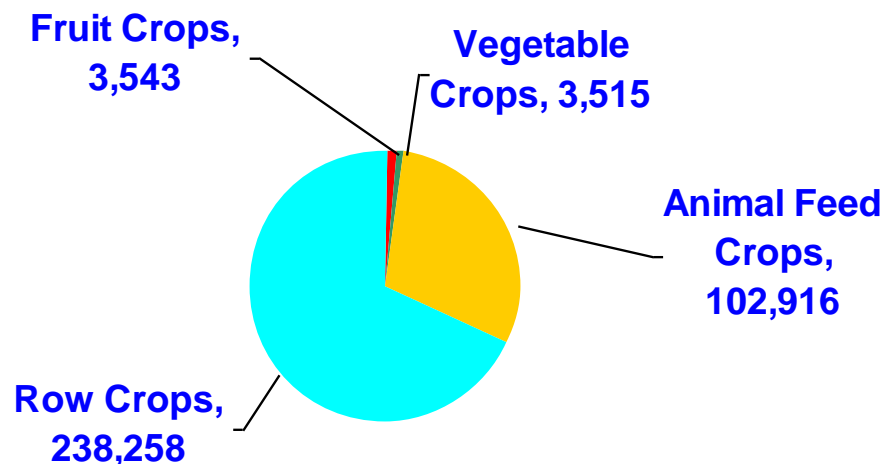
# Comparison of Crop Categories: Organic and Total

2008 Harvested Organic Acres x 1000



Compared to national plantings, 2008 Organic crops consisted of a much larger proportion of fruits and vegetables, a similar proportion of animal feed crops (hay, silage...), and a smaller proportion of row crops (corn, soy, wheat...)

2008 US Harvested Acres x 1000

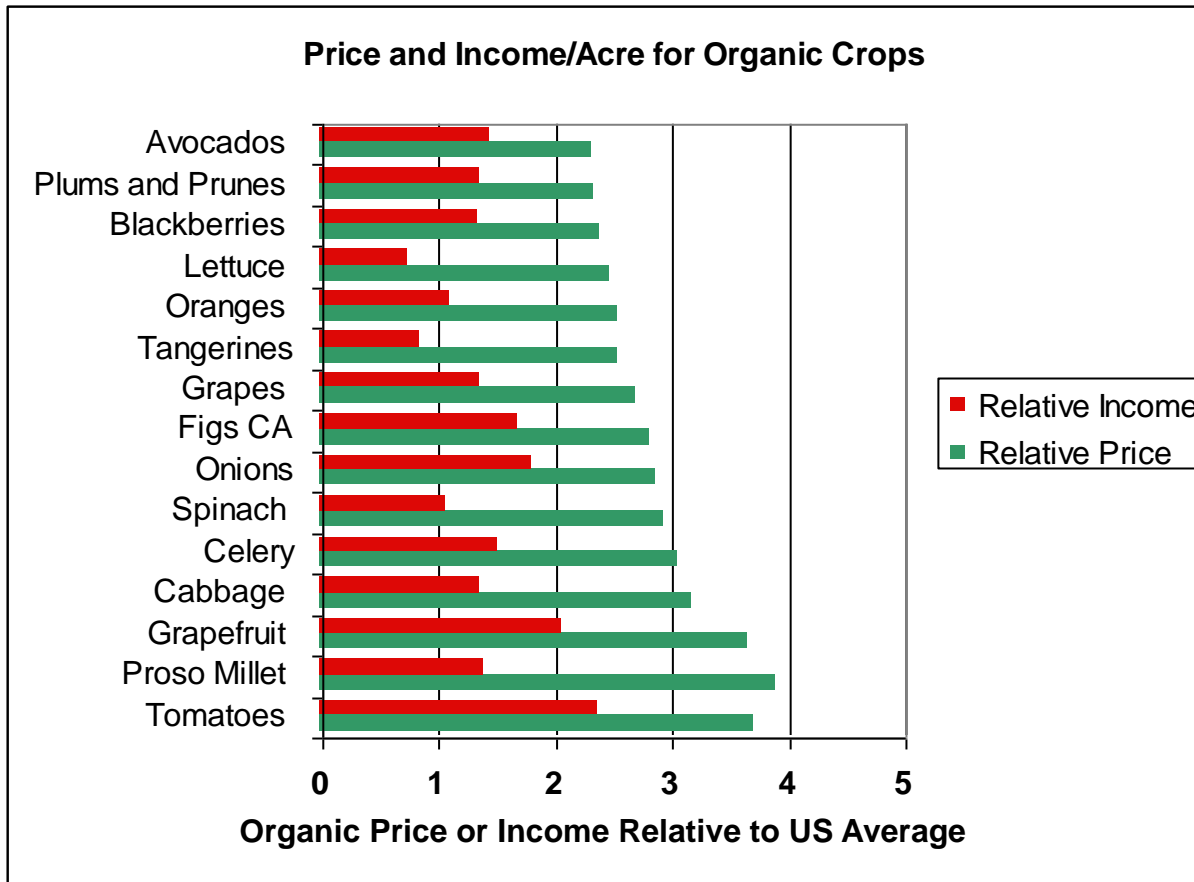




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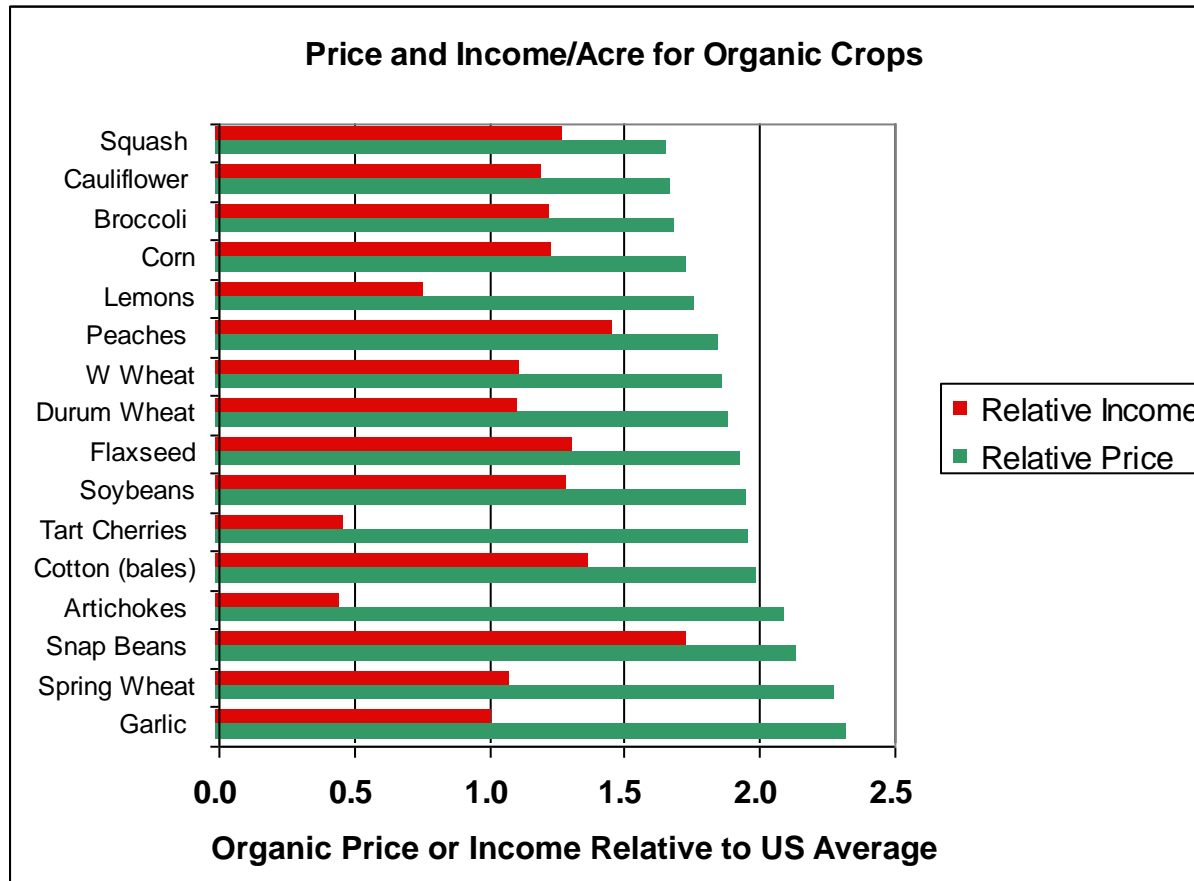
# Commodity Pricing and Per Acre Gross Returns

# Highest Priced Organic Commodities



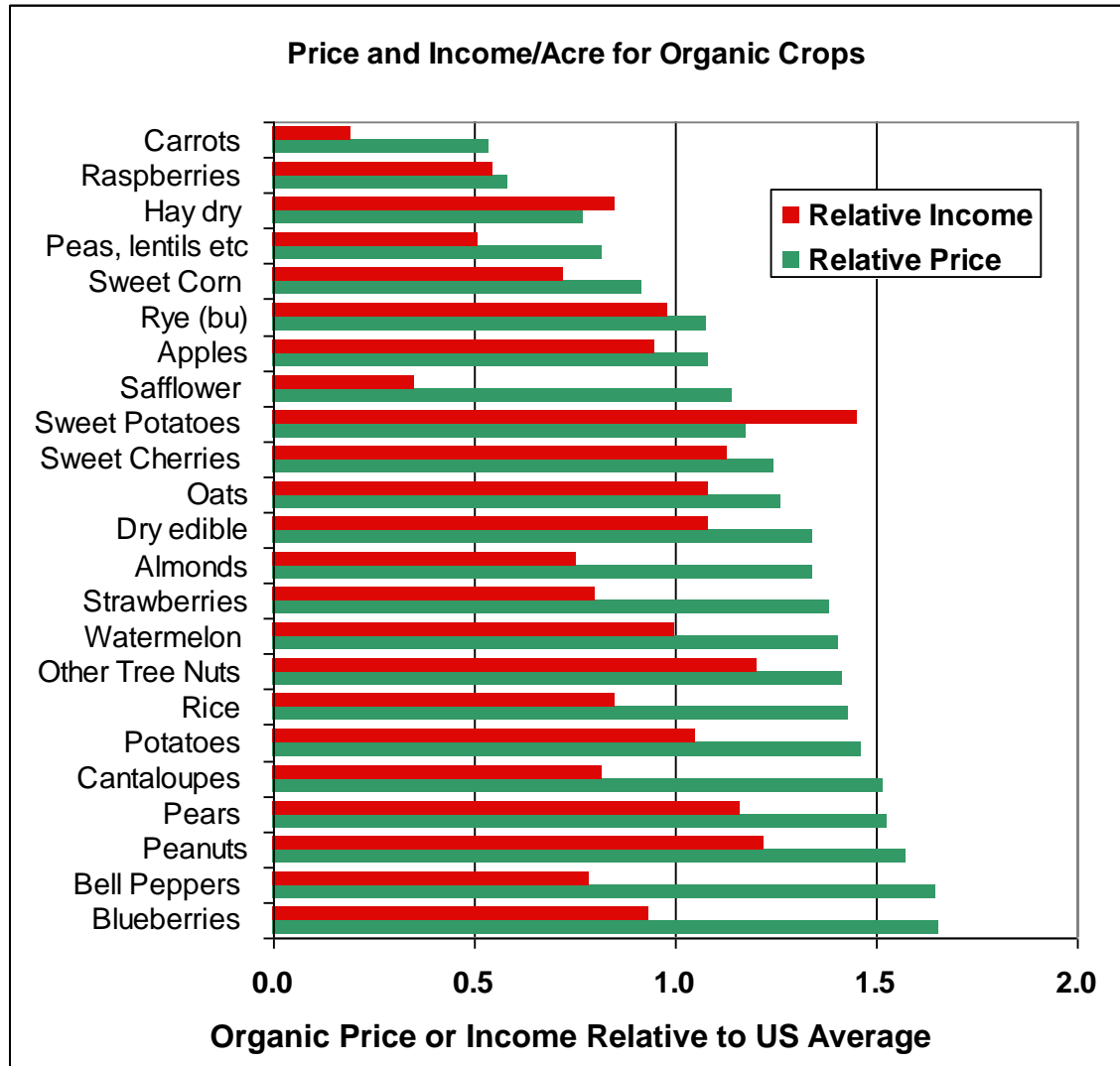
Relative income is  
relative price \*  
relative yield

# Moderately Priced Organic Commodities



**Relative income is relative price \* relative yield**

# Low Priced Organic Commodities



Relative income is  
relative price \*  
relative yield



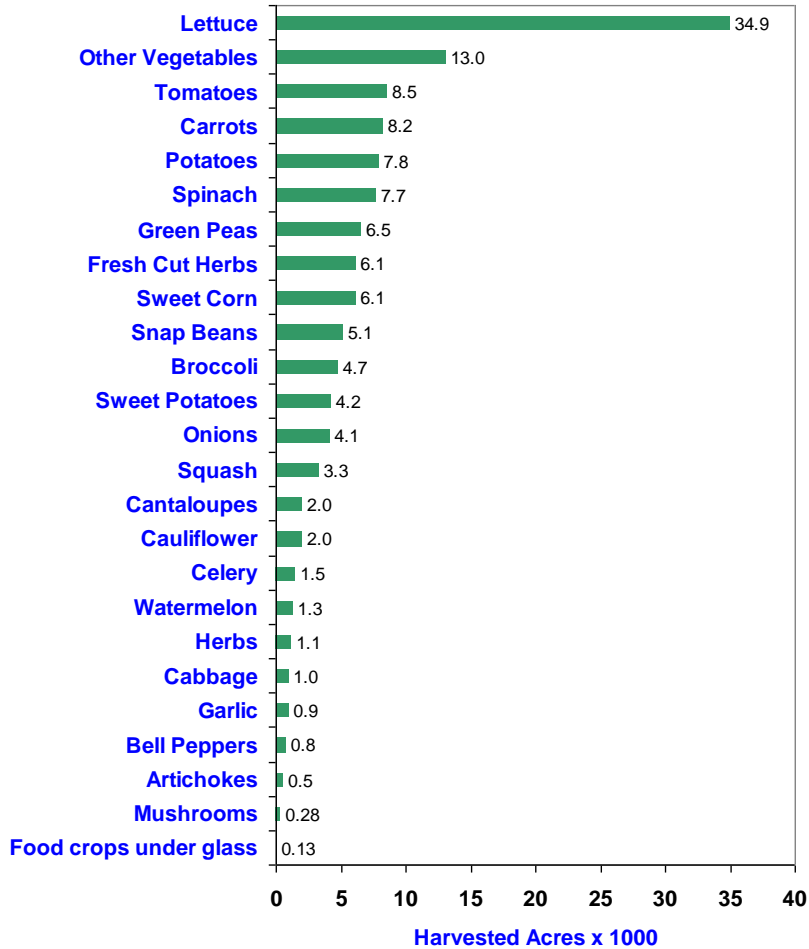
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# Vegetable Crops: National Level

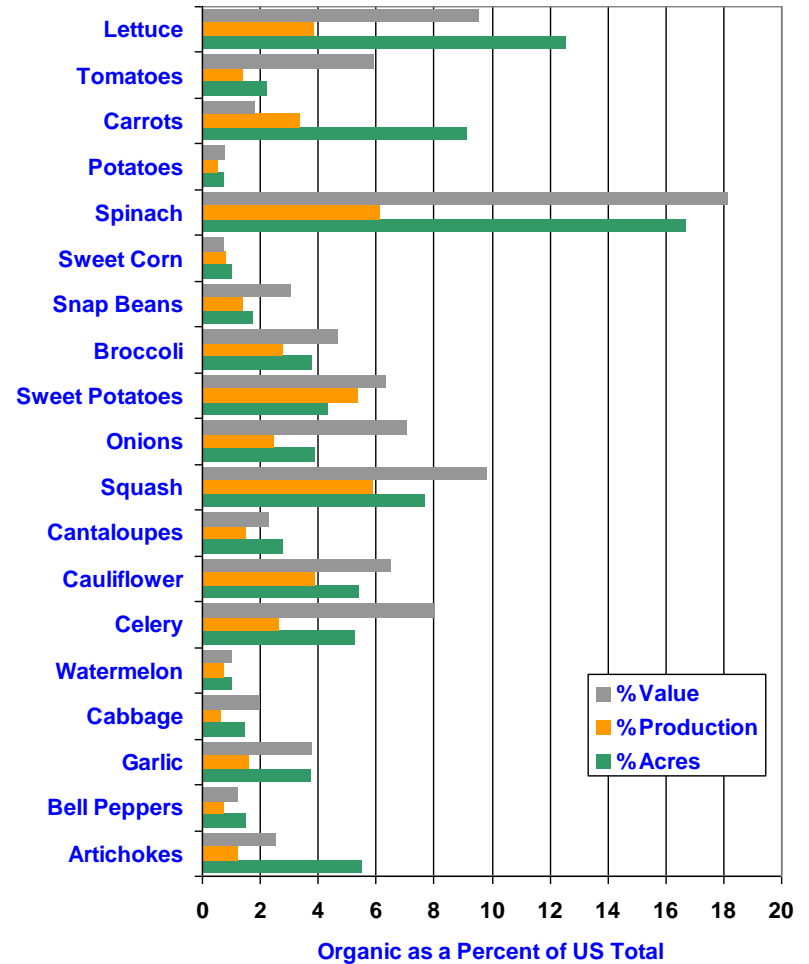


# Organic Vegetable Crops

Organic Vegetable Crops 2008

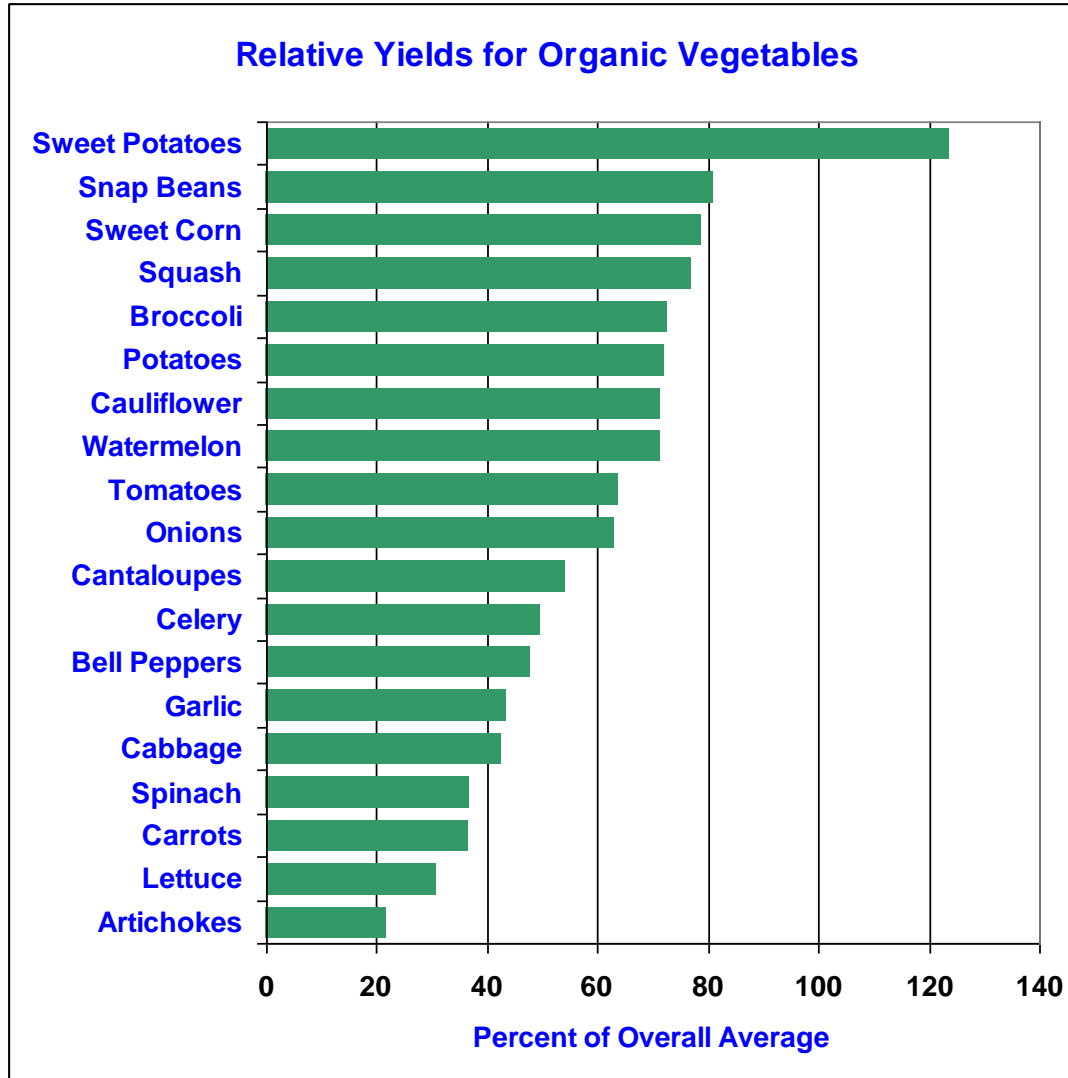


Organic Vegetable Crops 2008





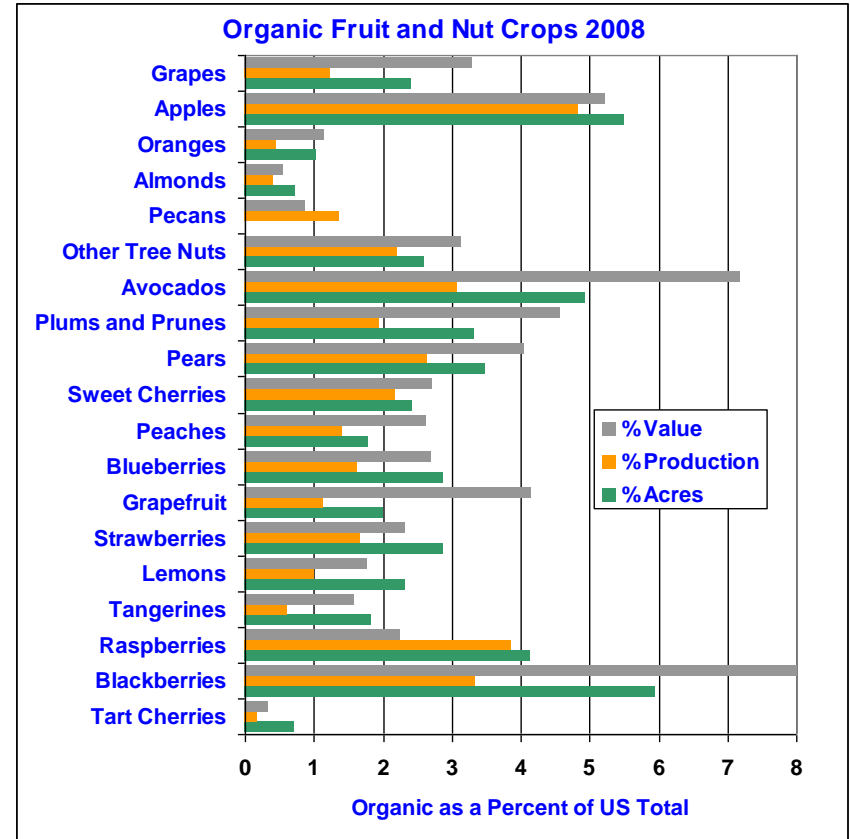
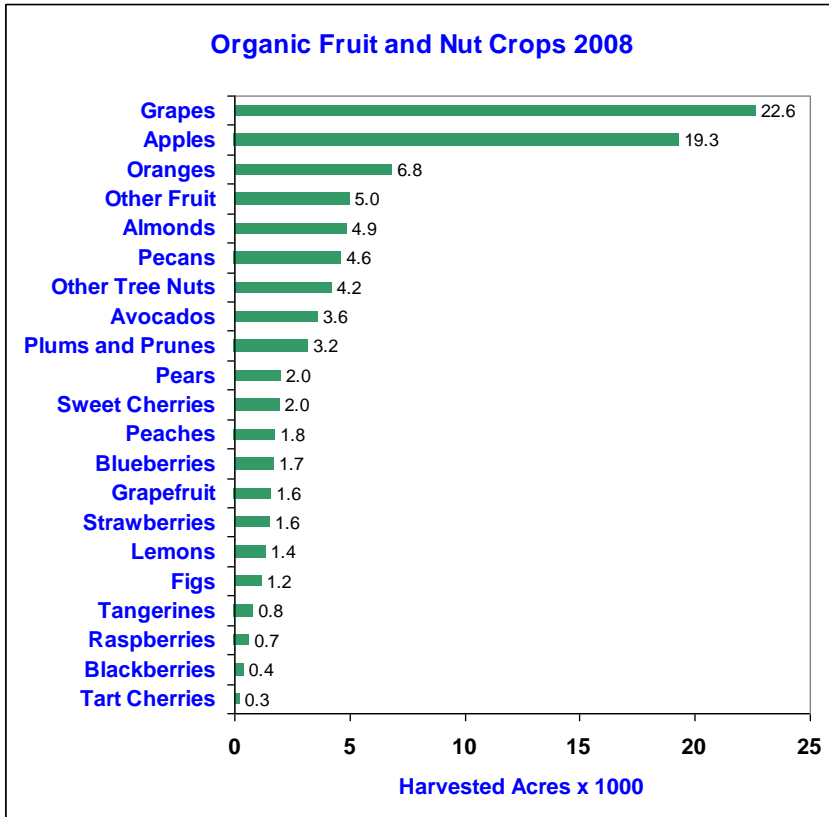
# Vegetable Crops: Relative Yields



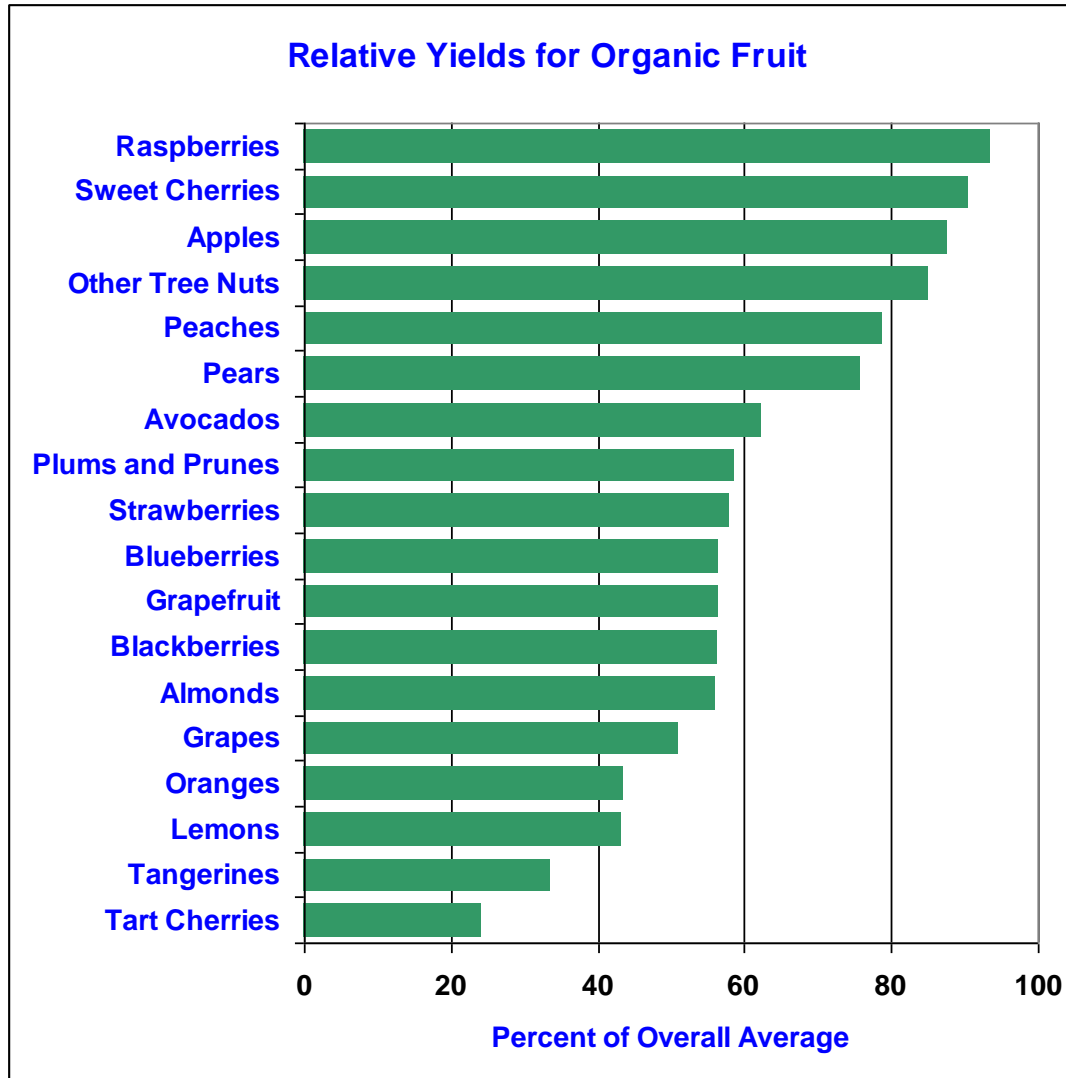


# Fruit and Nut Crops: National Level

# Organic Fruit and Nut Crops



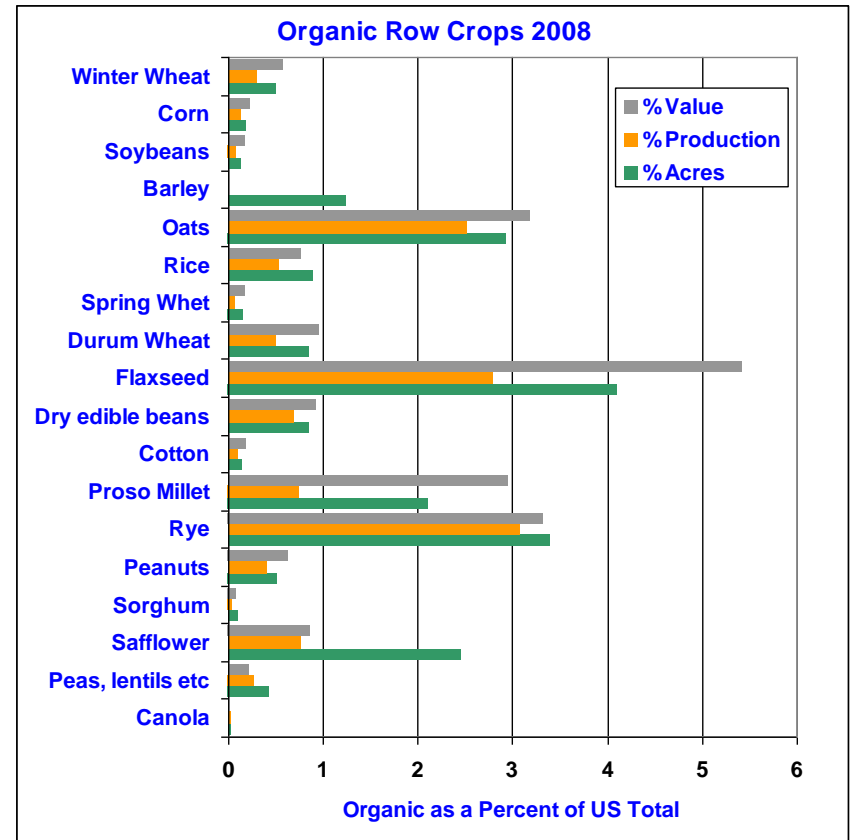
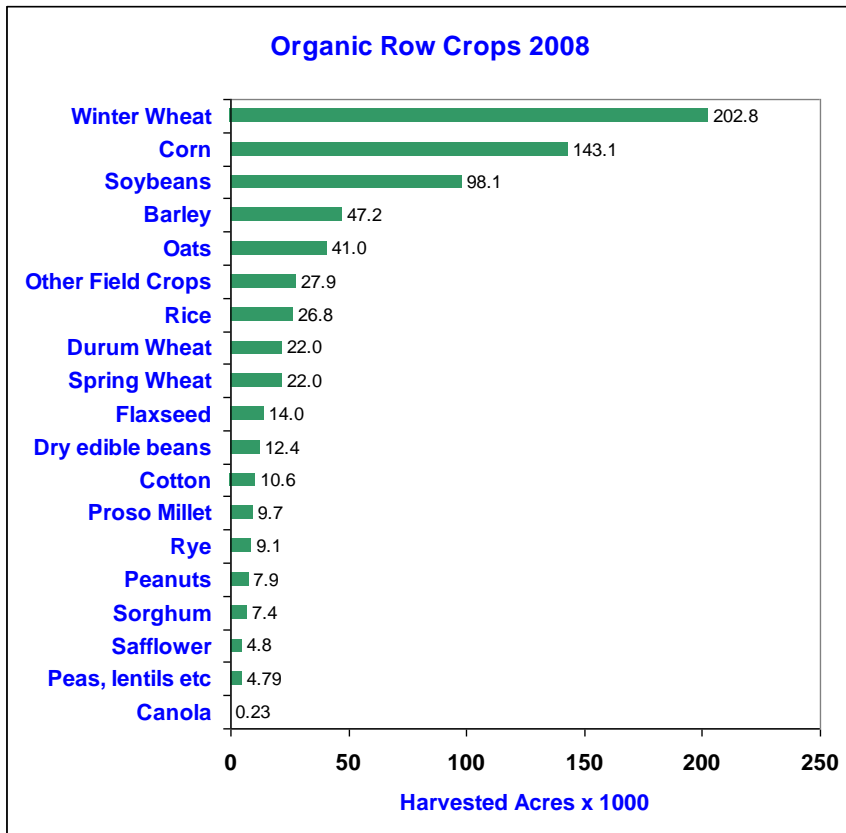
# Fruit and Nut Crops: Relative Yields



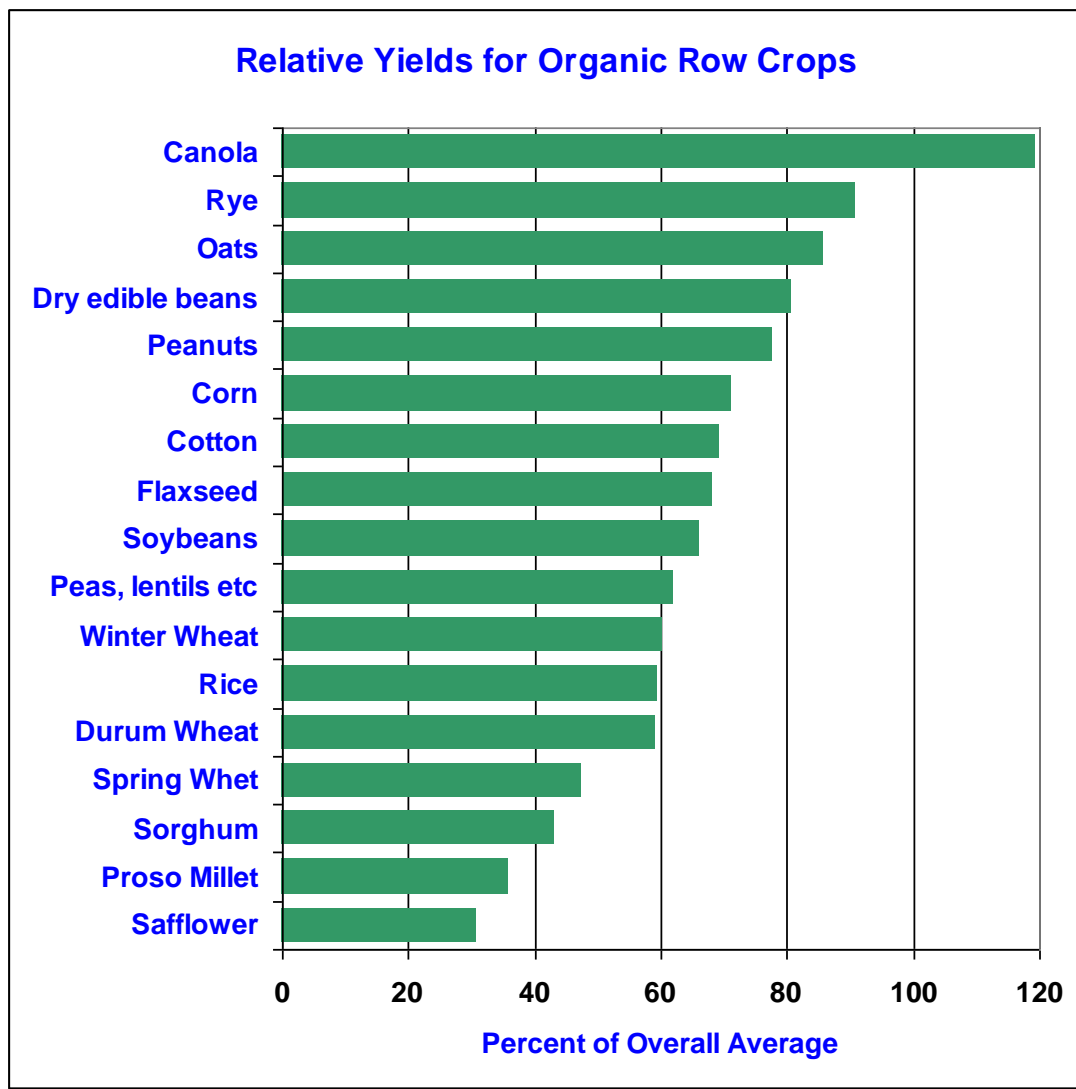


# Row Crops: National Level

# Organic Row Crops 2008



# Row Crops: Relative Yields







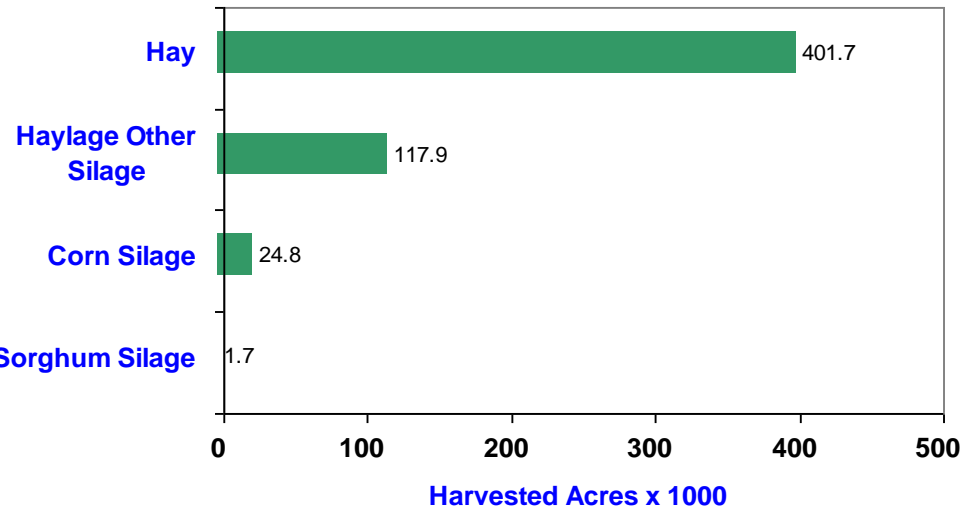
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## Animal Feed Crops: National Level

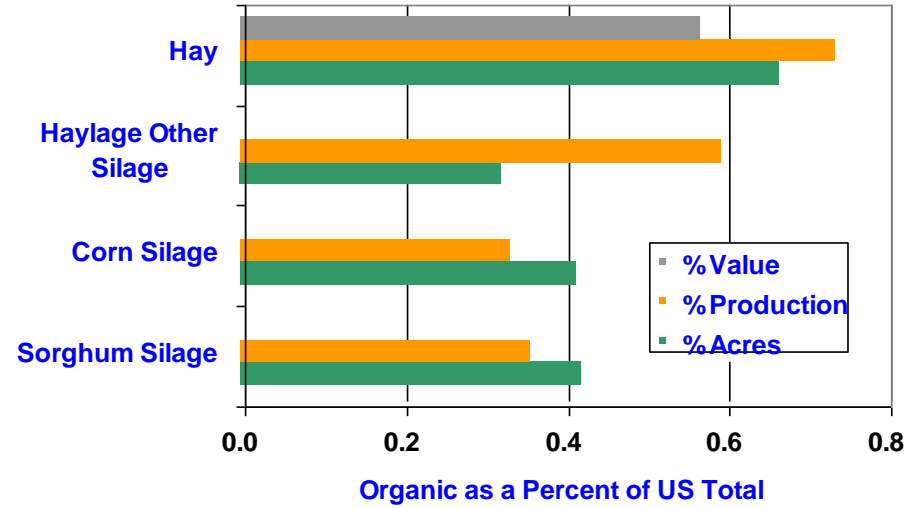


# Animal Feed Crops

Organic Animal Feed Crops 2008



Organic Animal Feed Crops 2008

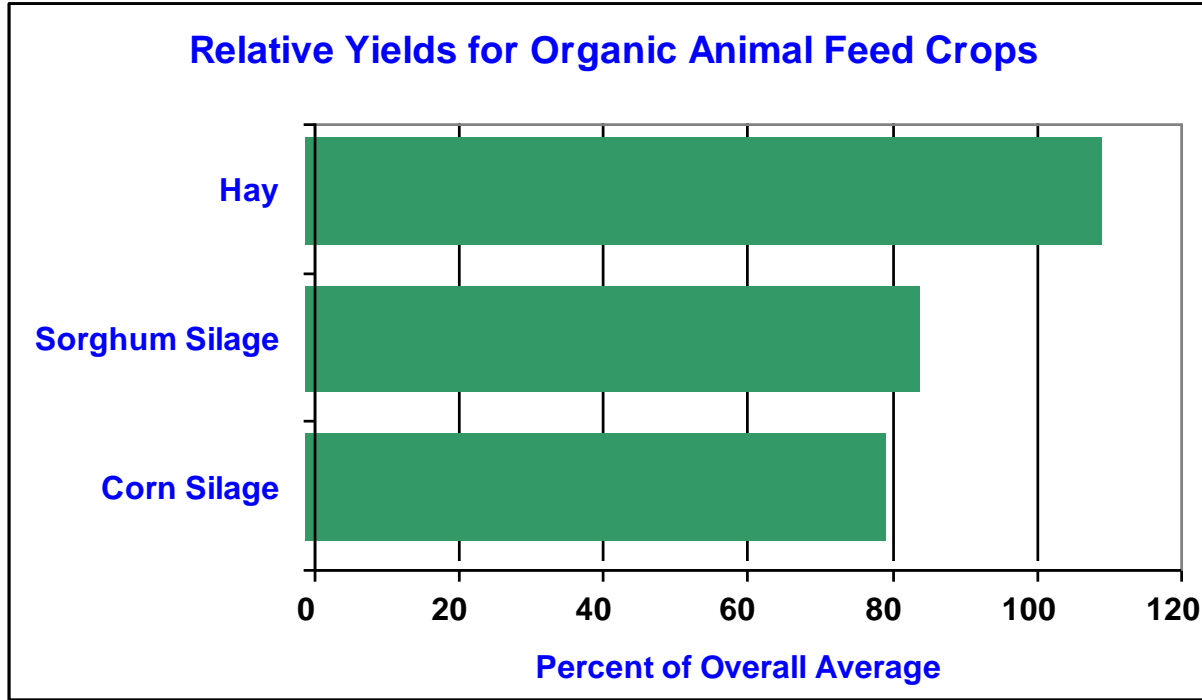


**Organic Hay is one of few crops which has a higher average US yield than the national average. Since all hay is low input, this difference may reflect the land quality or irrigation potential on the small amount of land devoted to Organic Hay (<0.7% of the total). Still, in terms of acreage, Hay is the largest single Organic crop.**



# Animal Feed Crops: Relative Yields

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## Vegetable Crops: State Level

Potatoes

Squash

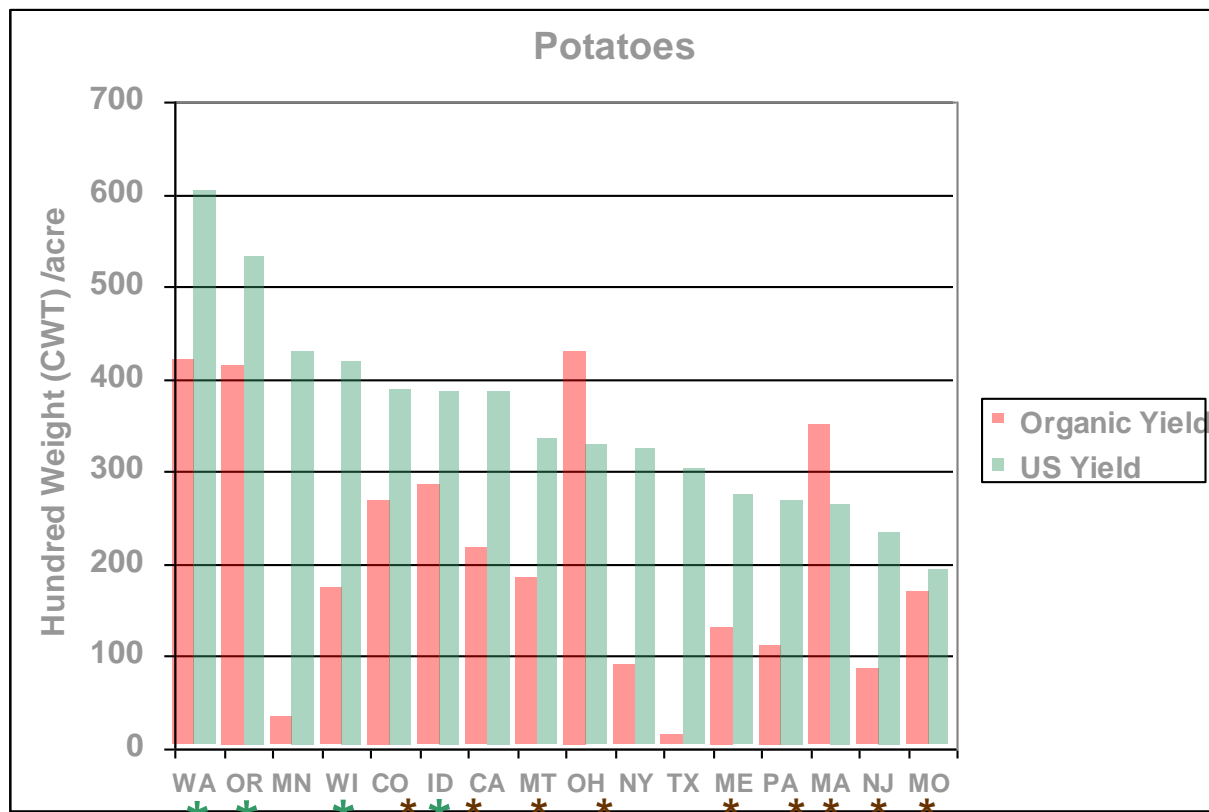
Cabbage

Sweet Corn

Peppers, Celery, Cantaloupe, Garlic

Watermelons, Cabbage, Carrots, Snap Beans, Spinach, Broccoli,  
Sweet Potatoes, Lettuce, Lentils

# Potatoes: Yields

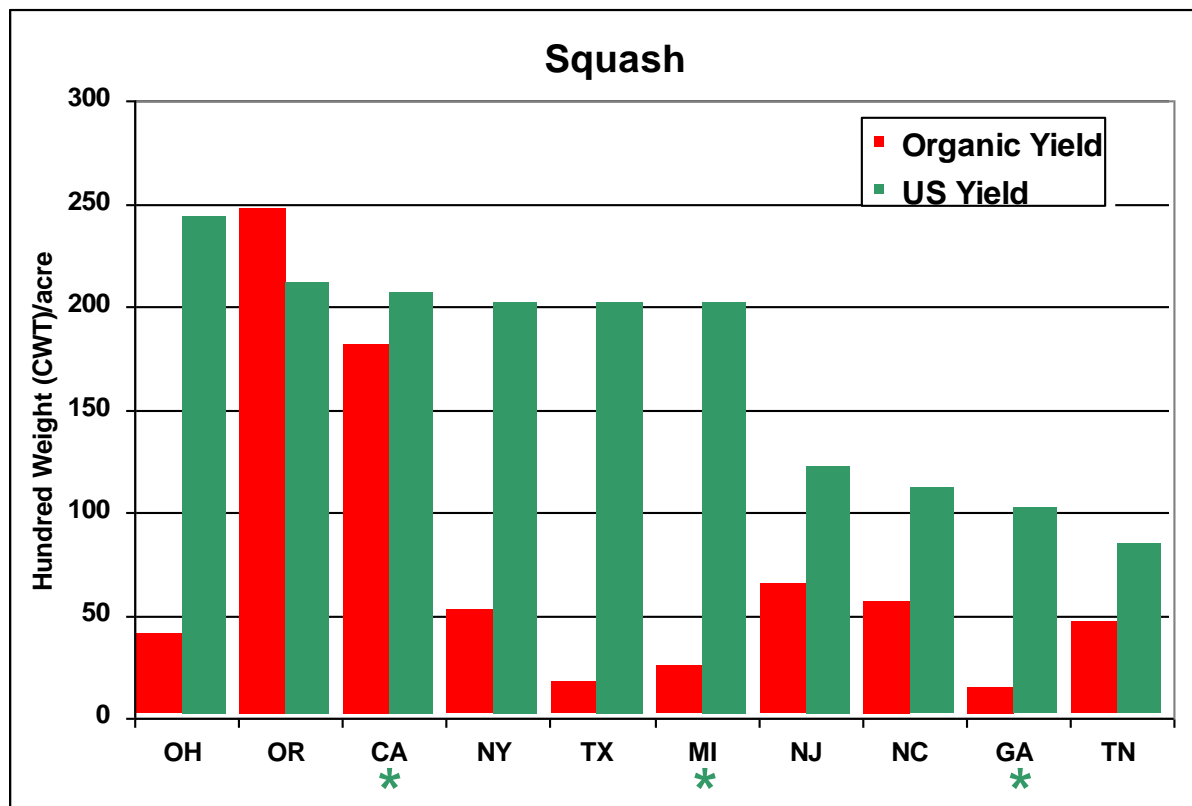


Organic Potatoes represented 7.5% of 2008 acres in the US, 5.4% of total production, but 7.9% of total potato payments. Organic potatoes sold at 1.5 times the price for conventional so with 72% of the yield that represented a net advantage of 1.05 times the gross per acre income. To have produced all the 2008 potatoes Organically would have required 408,000 additional acres – a 39% increase

\* Top Potato producing states (>50,000 acres harvested)

\* States with less than 100-acres of Organic potatoes

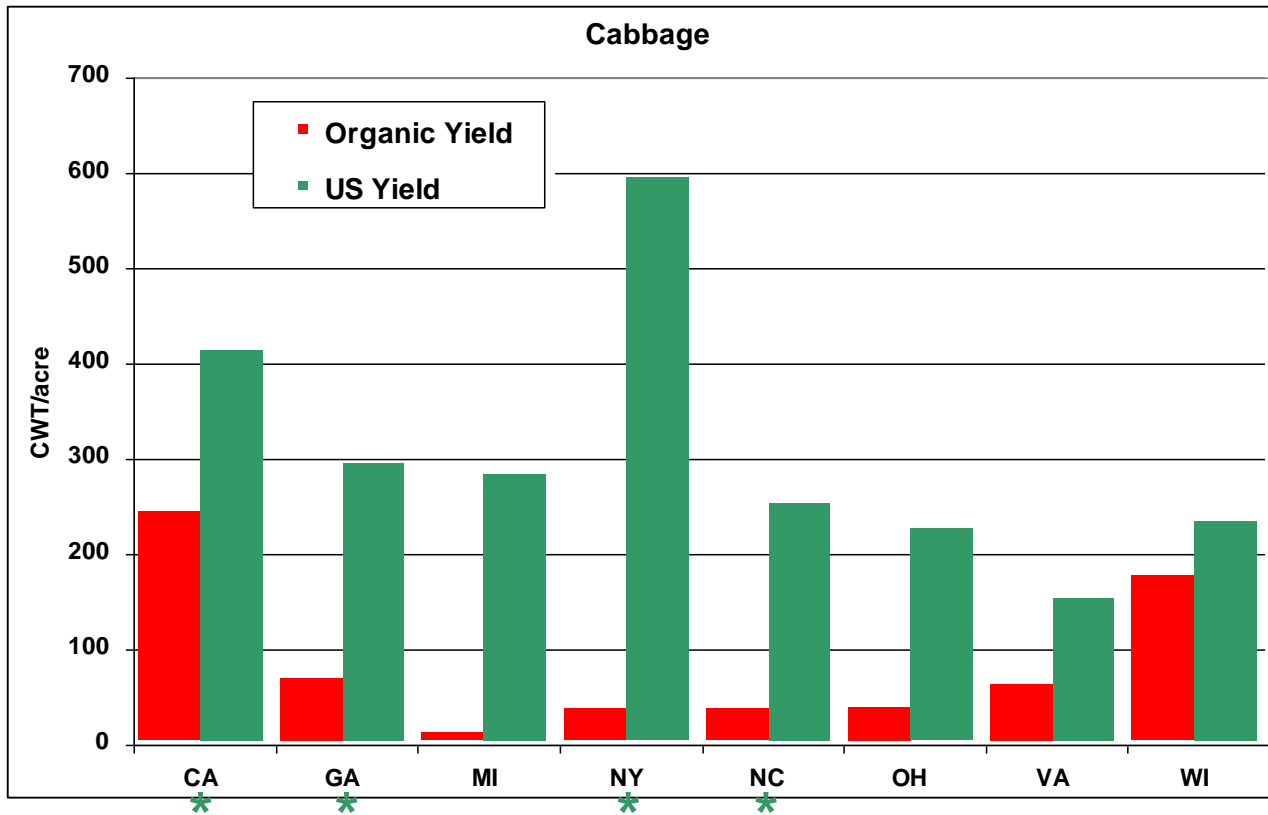
# Squash: Yields



Organic Squash represented 7.7% of 2008 acres in the US. For these states with complete data, Organic Squash represented 5.5% of acres and 4.7% of total production. 64% of Organic acres were in Oregon and California. In wetter areas, Organic yields averaged 29% of those in conventional

\* Top Squash producing states (>5,000 acres harvested)

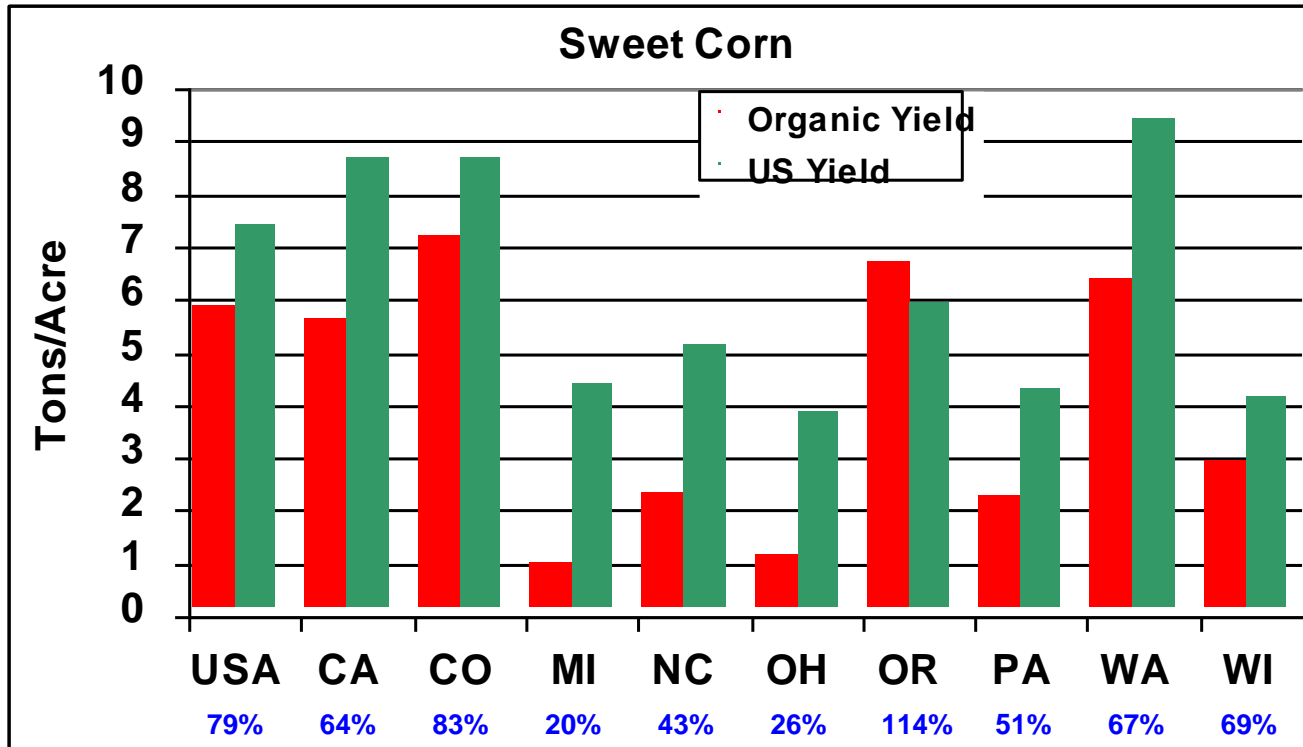
# Cabbage: Yields



Direct comparisons were only possible for the above states that represent 63% of all US Cabbage acres. For these states, Organic Cabbage represented 1.5% of acres, 0.7% of production and 2.7% of total payments. For these states average Organic yields were 46% of conventional but at 4.1 times the price/CWT the gross value per Organic acre was 1.9 times that of conventional. These values are similar to the national picture. To have produced all US 2008 US Cabbage organically would have required 88,400 additional acres, an increase of 143%

\* Top Cabbage producing states (>5,000 acres harvested)

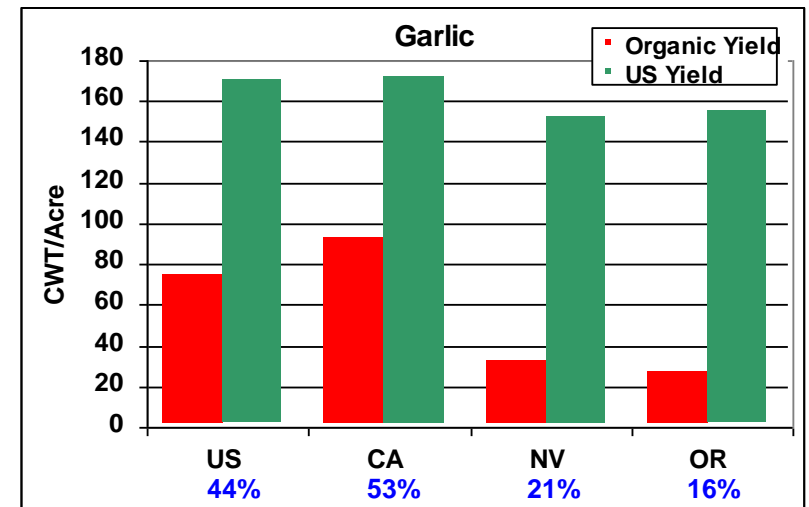
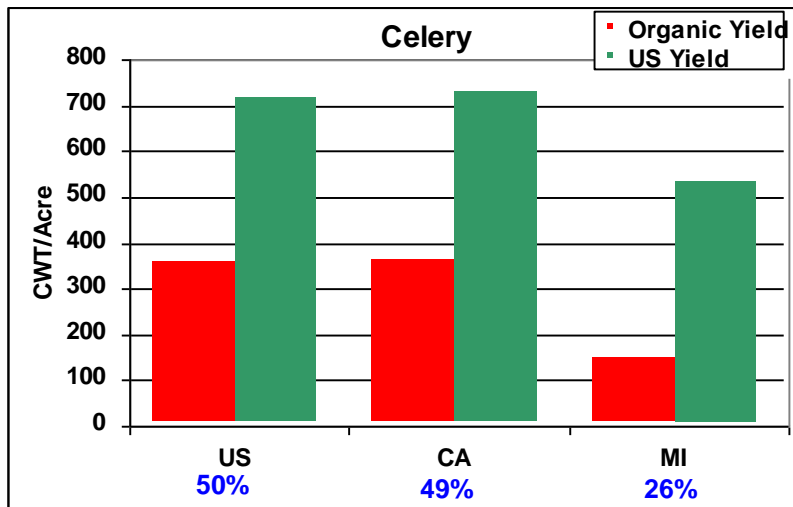
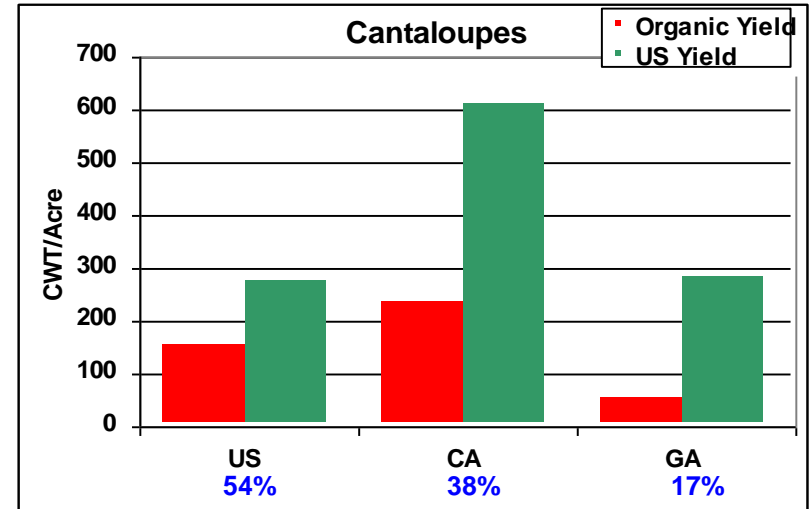
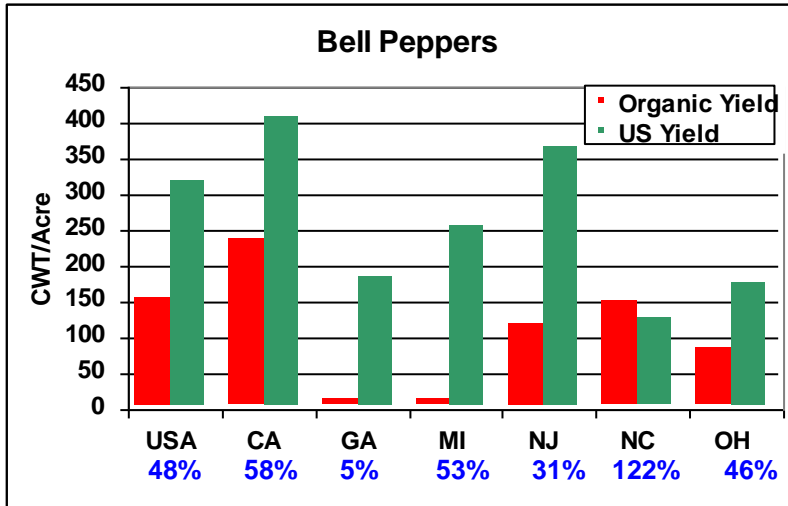
# Sweet Corn: Yields



Organic Yield as a Percent of US Average

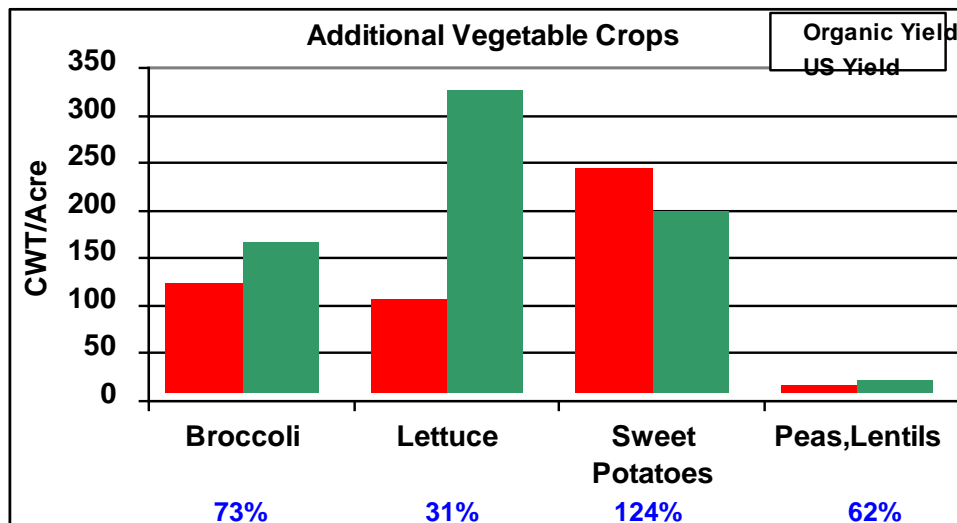
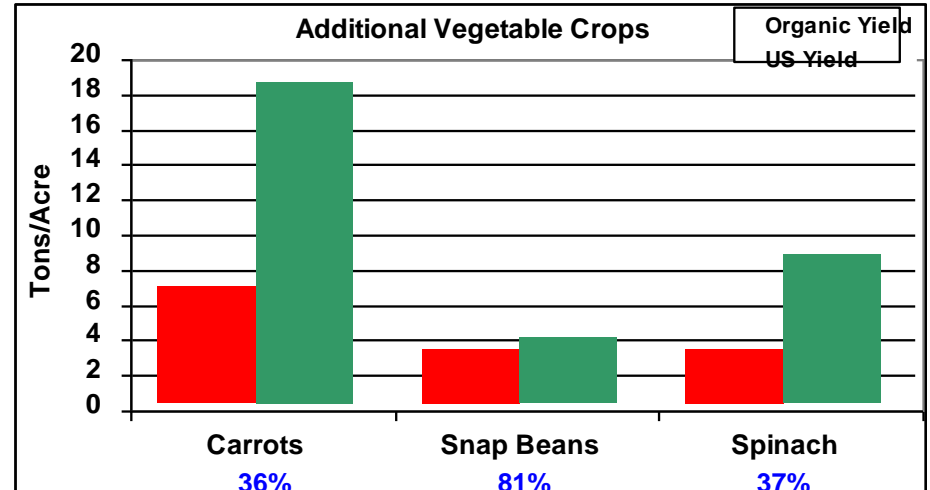
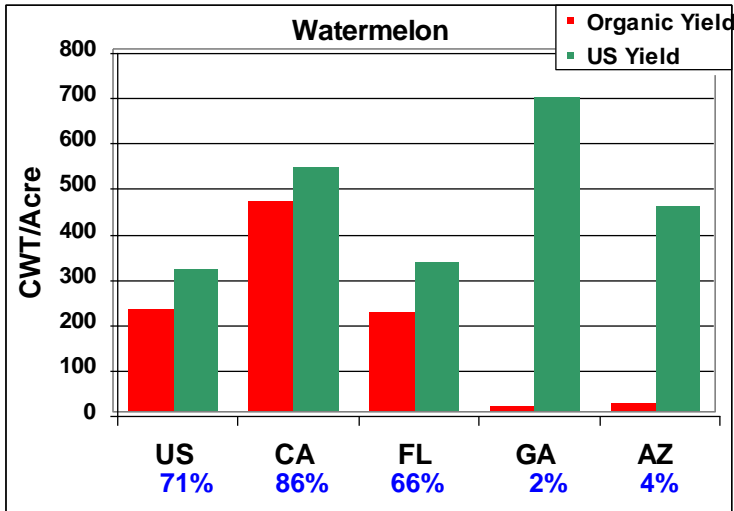


# Additional Vegetable Crops: Yields (1 of 2)



Organic Yield as a Percent of US Average

# Additional Vegetable Crops: Yields (2 of 2)



The seemingly low yields for carrots, spinach and lettuce are misleading because “baby” versions of those crops are commonly harvested for Organic and multiple crops can be harvested in a year

Organic Yield as a Percent of US Average



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## Fruit Crops: State Level

Apples

Strawberries

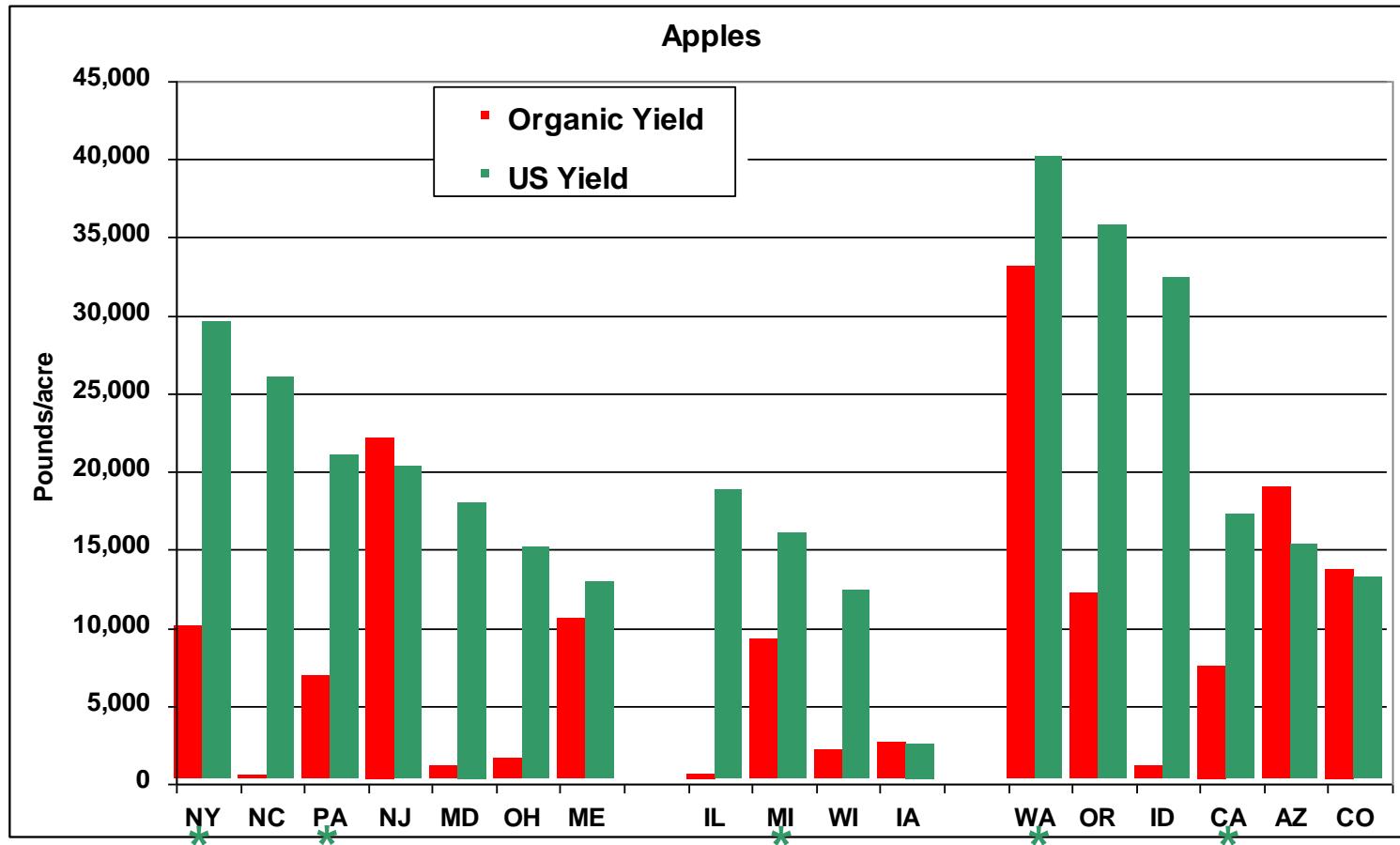
Avocados, Grapes, Other Berries, Grapefruit

Oranges, Peaches, Pears, Plums/Prunes

Raspberries, Cherries, Tangerines

Figs, Almonds

# Apples: Yields (1 of 2)



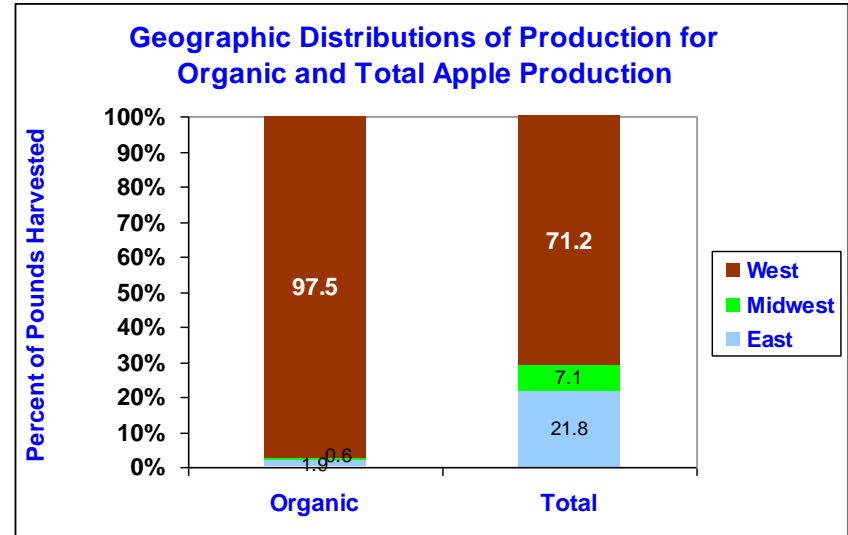
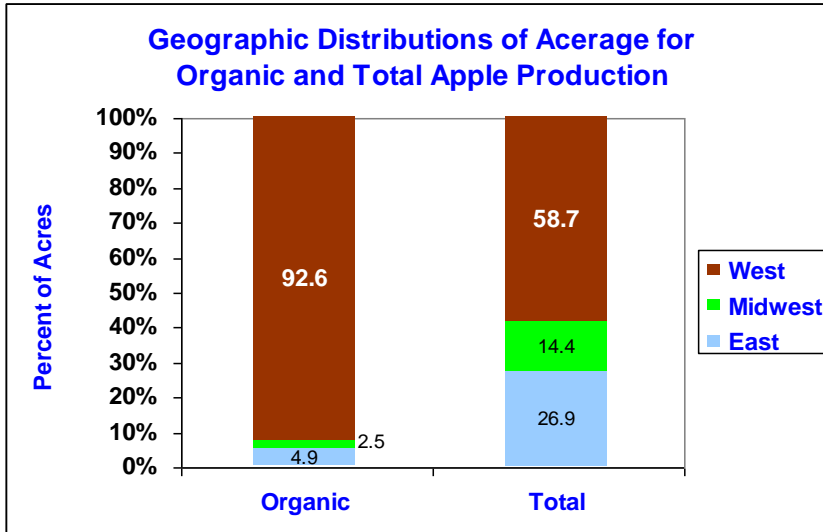
**East**  
 1.1% Organic Acres  
 0.44% Organic Production  
 0.62% Organic Value  
 Organic 39% Yield

**Midwest**  
 1.04% Organic Acres  
 0.47% Organic Production  
 0.61% Organic Value  
 Organic 45% Yield

**West**  
 9.6% Organic Acres  
 7.01% Organic Production  
 6.79% Organic Value  
 Organic 73% Yield

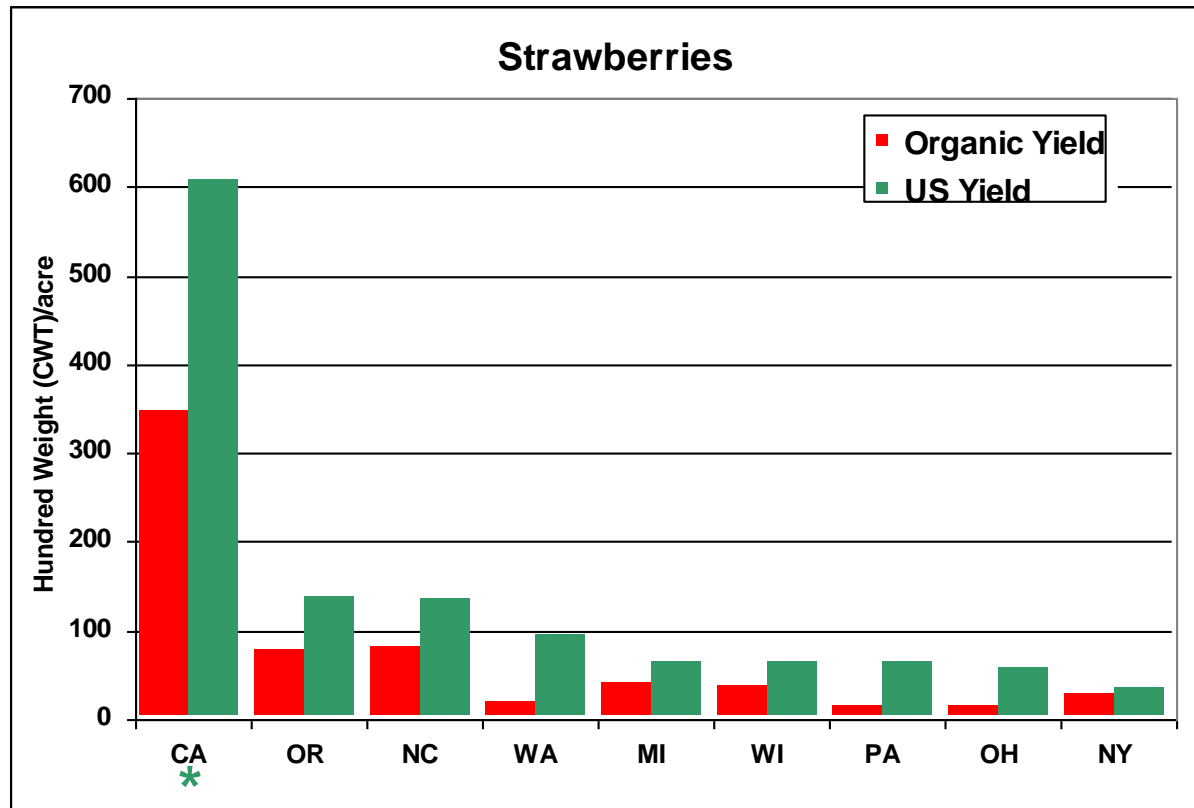
\* Top Apple producing states (>19,500 acres harvested)

# Apples (2 of 2)



**The Organic Apple industry is highly concentrated in the dry, irrigated West because of the difficulties controlling diseases and insects in the humid Midwest and East**

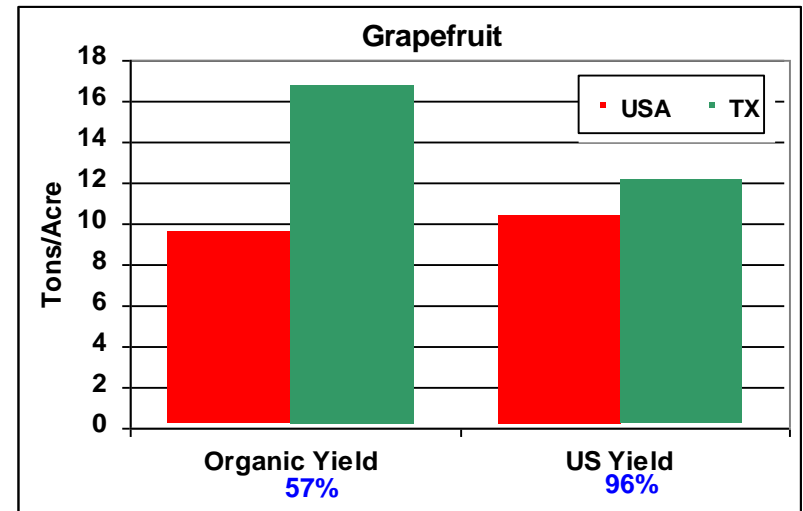
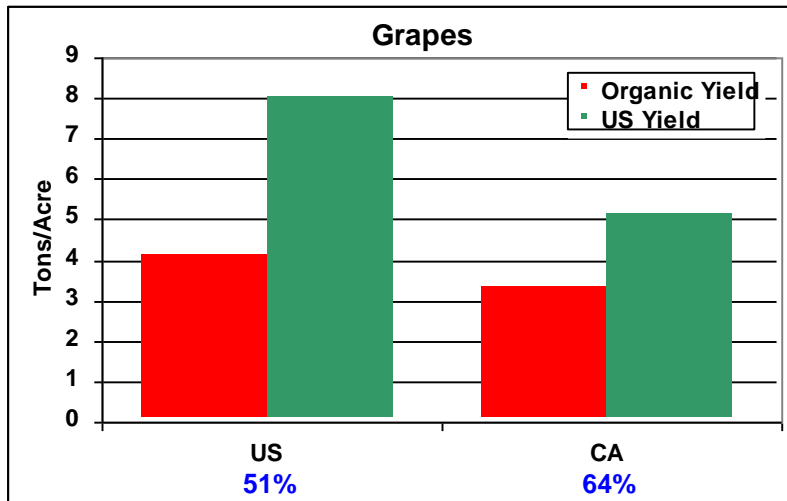
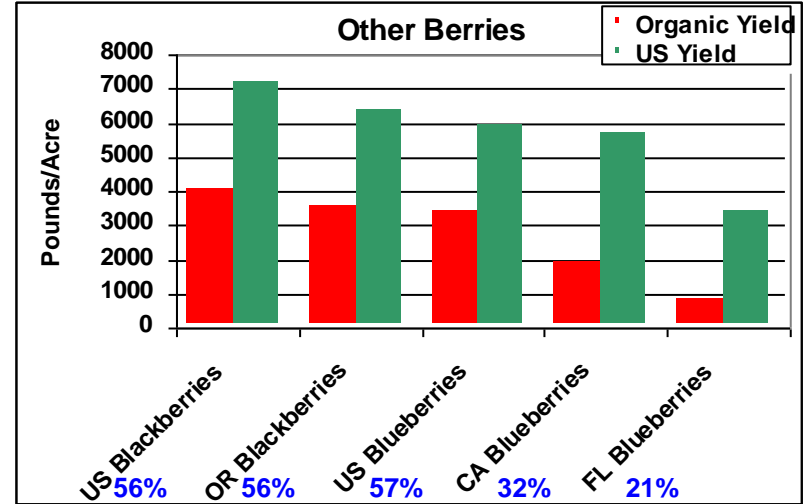
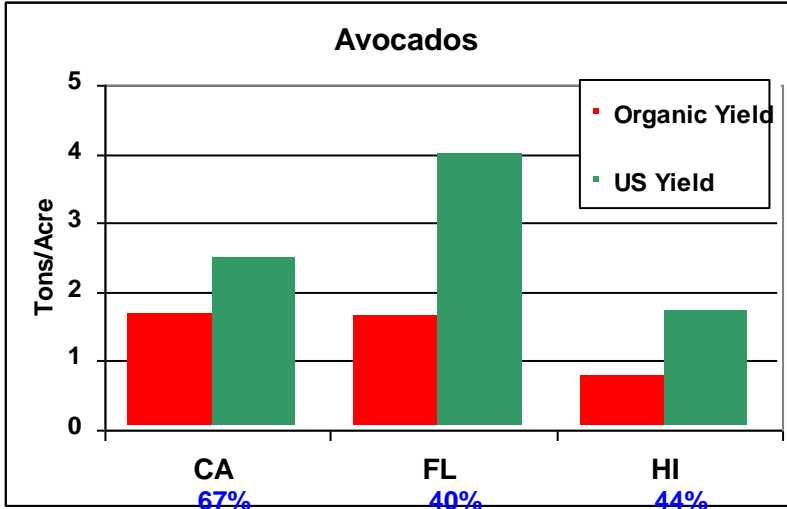
# Strawberries: Yields



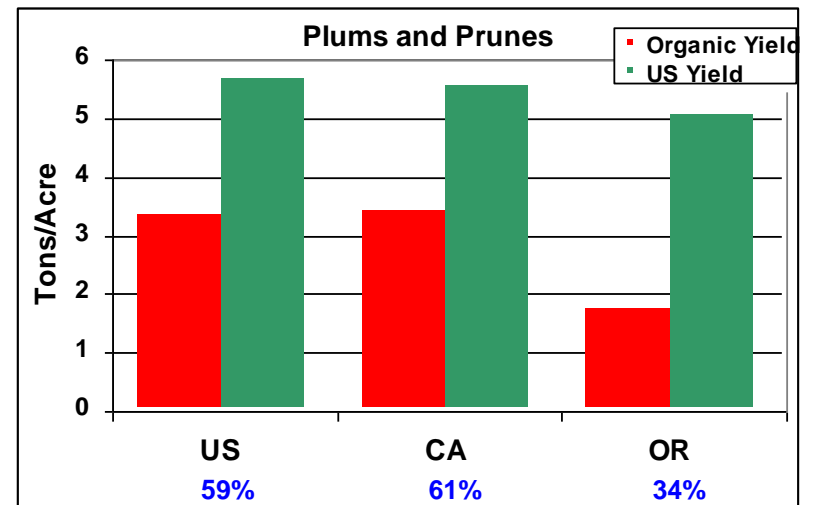
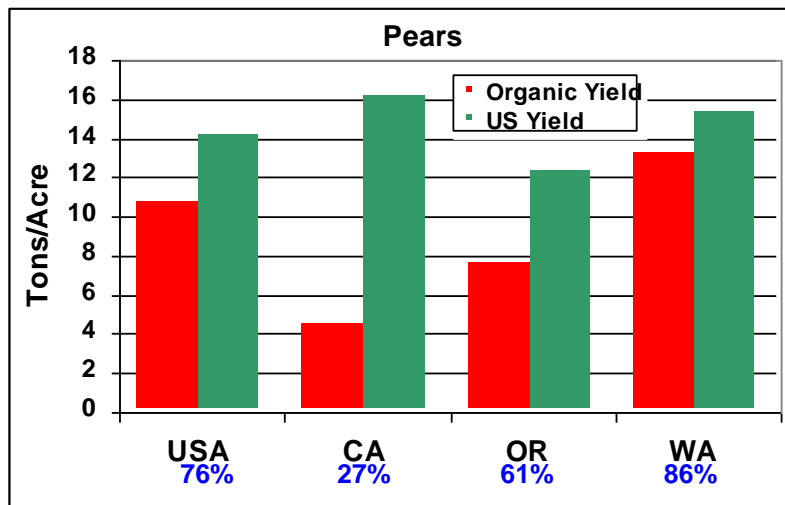
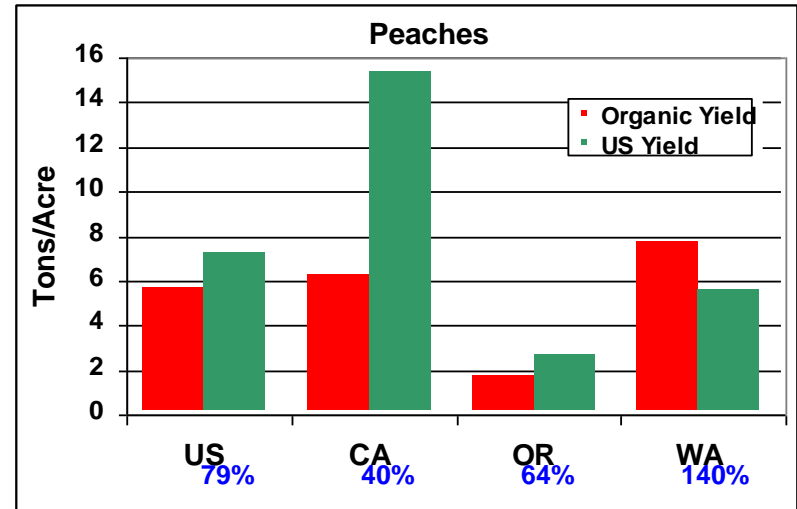
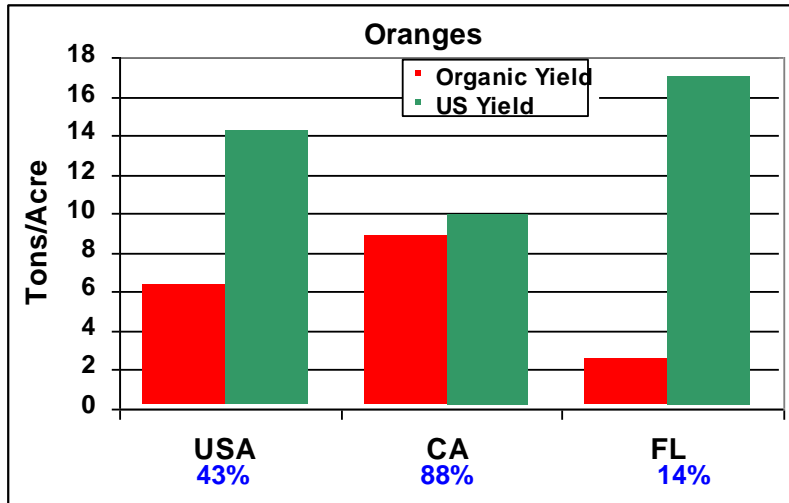
**Organic Strawberries represented 2.9% of 2008 acres in the US and 1.7% of total production. 75% of Organic acres were in California vs 67% on non-Organic acres. To convert to 100% Organic would require 46,624 additional acres – an 87% increase**

\* Top Strawberry producing states (>2,000 acres harvested)

# Additional Fruit Crops: Yields (1 of 4)

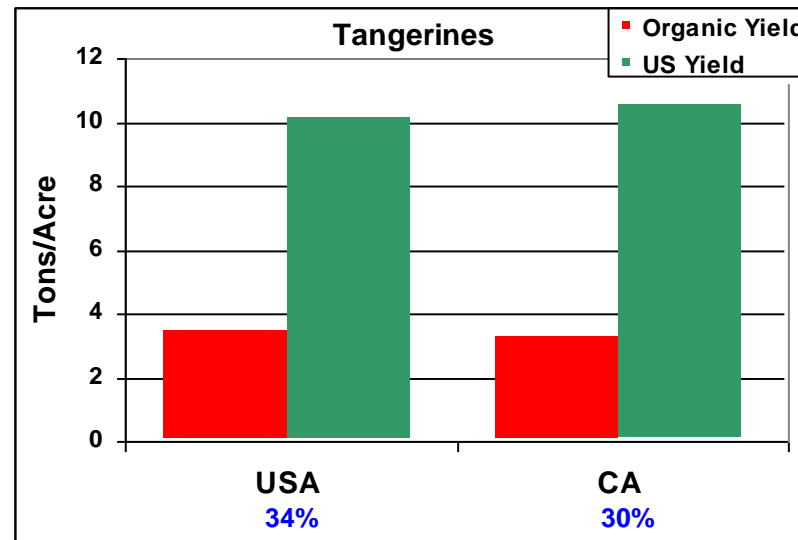
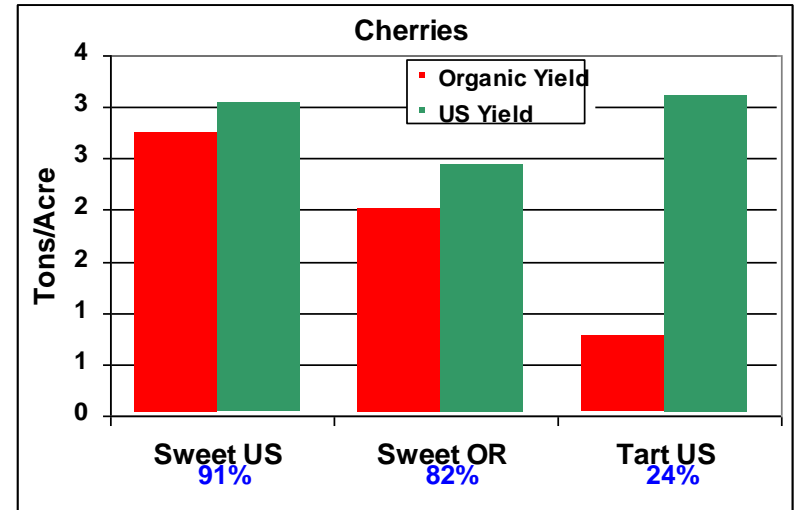
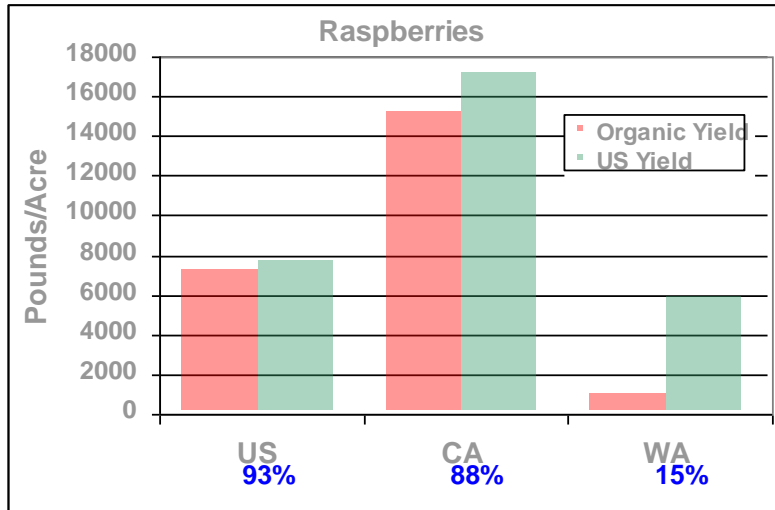


# Additional Fruit Crops: Yields (2 of 4)





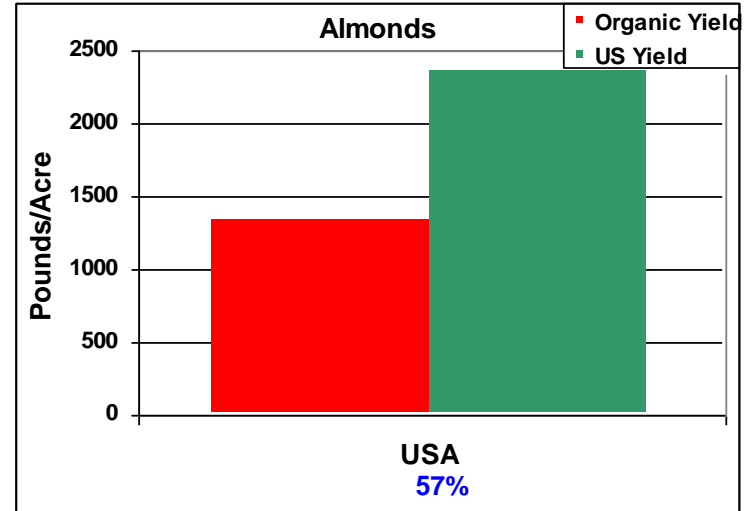
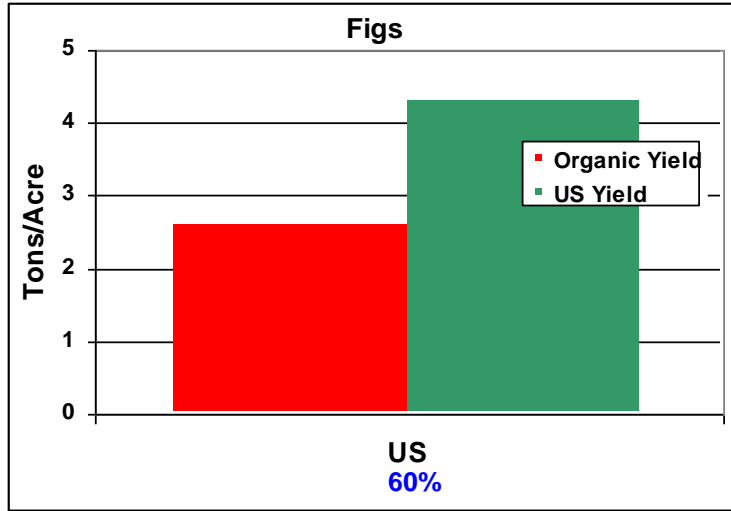
# Additional Fruit Crops: Yields (3 of 4)



Organic Yield as a Percent of US Average



# Additional Fruit Crops: Yields (4 of 4)





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## Row Crops: State Level

[Winter Wheat](#)

[Soybeans](#)

[Spring Wheat](#)

[Oats](#)

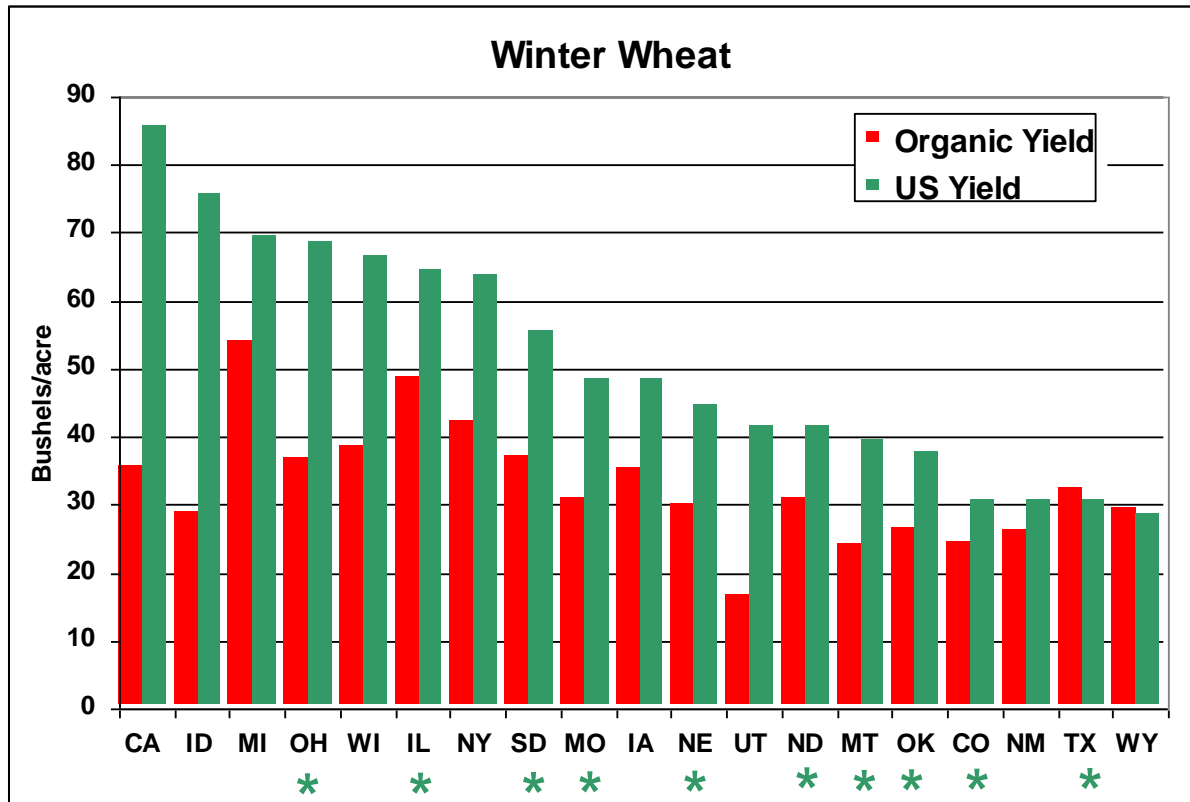
[Dry Edible Beans](#)

[Corn for Grain](#)

[Barley](#)

[Other Row Crops](#)

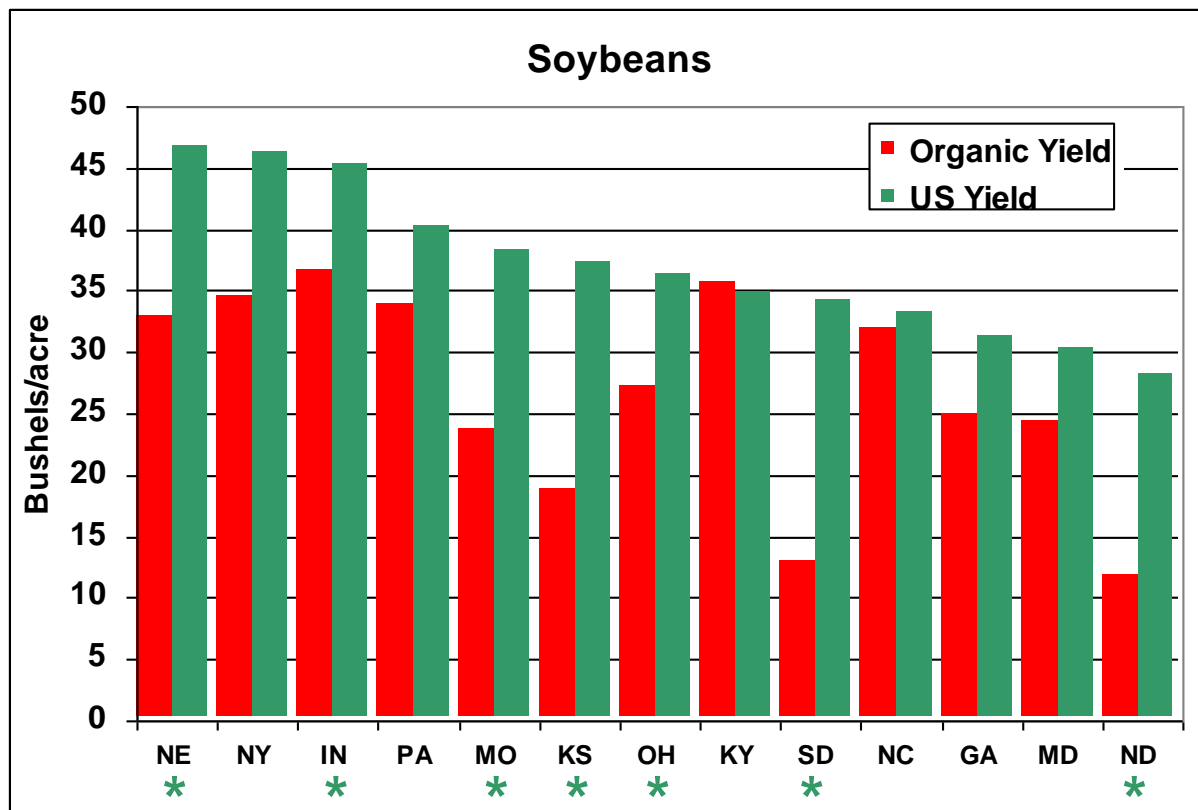
# Winter Wheat: Yields



**Organic Winter Wheat represented 0.8% of 2008 acres but only 0.5% of total production**  
**100% conversion to Organic would have required 10.4MM additional acres, a 49% increase**

\* Top Winter Wheat producing states, >1MM acres (Organic data not available for KS)

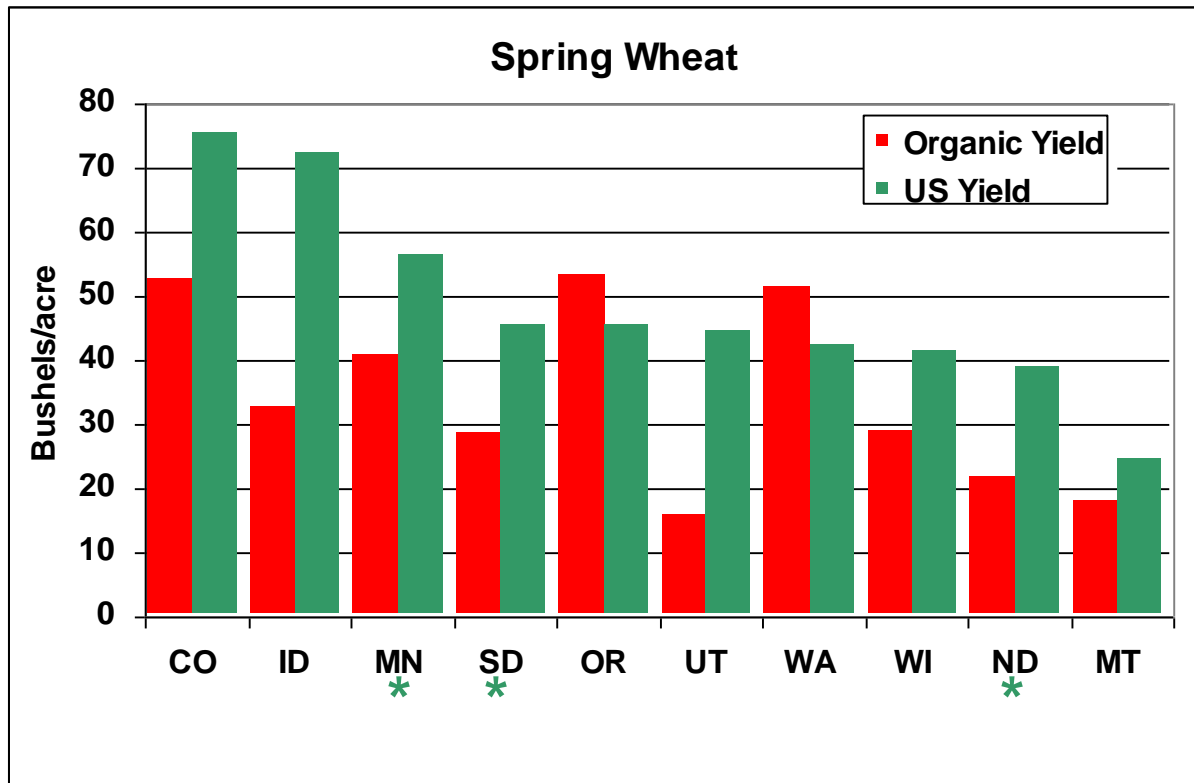
# Soybeans: Yields



Organic Soybeans represented 0.13% of 2008 acres in the US, 0.09% of total production, but 0.17% of total soybean payments. Organic soybeans sold at 2 times the price for conventional so with 66% of the yield that represented a net advantage of 1.3 times the gross per acre income. To have produced all the 2008 soybeans Organically would have required 38.2MM additional acres – a 51% increase

\* Top Soybean producing states (>3MM acres harvested)

# Spring Wheat: Yields

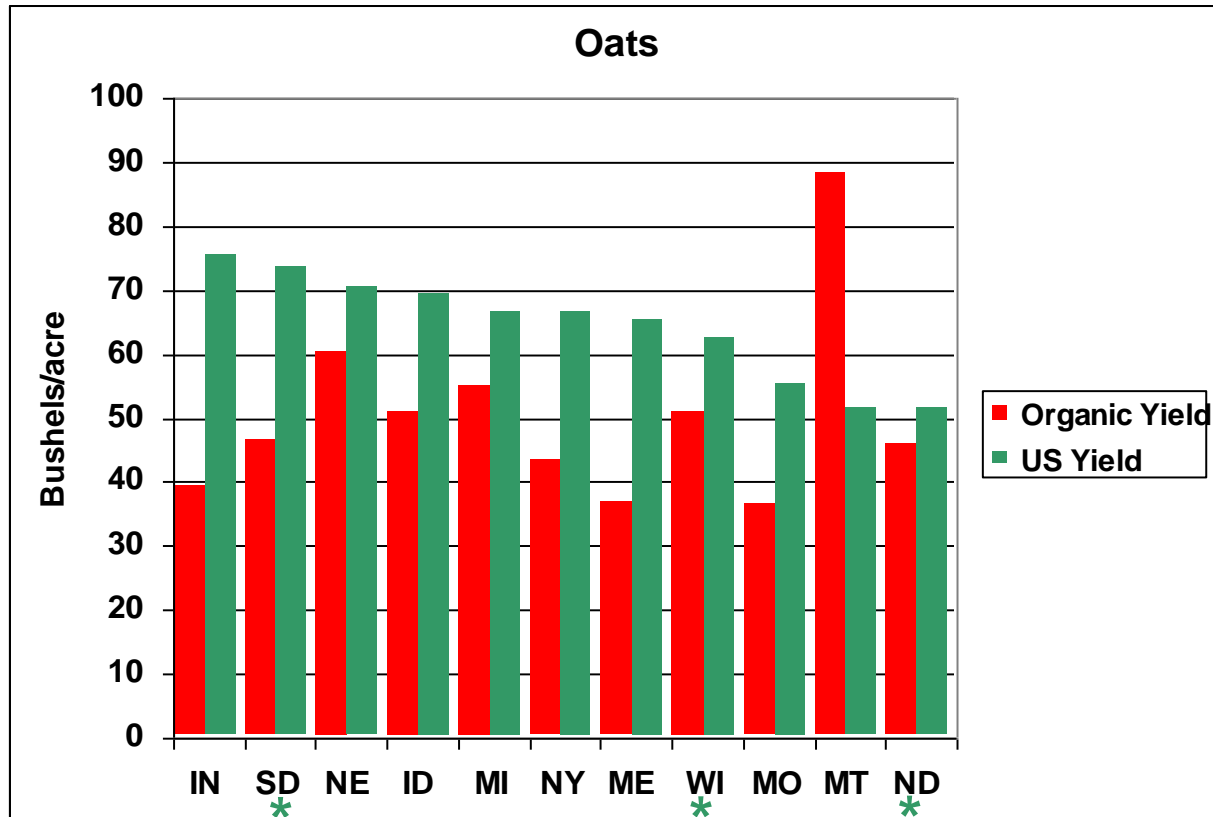


**Organic Spring Wheat represented 0.7% of 2008 acres but only 0.4% of total production. 100% conversion to Organic would have required 8.4MM additional acres, a 62% increase.**

**The higher Organic yields in OR and WA probably represent a different ratio of irrigated to rain-fed production**

**\* Top Spring Wheat producing states (>1MM acres harvested)**

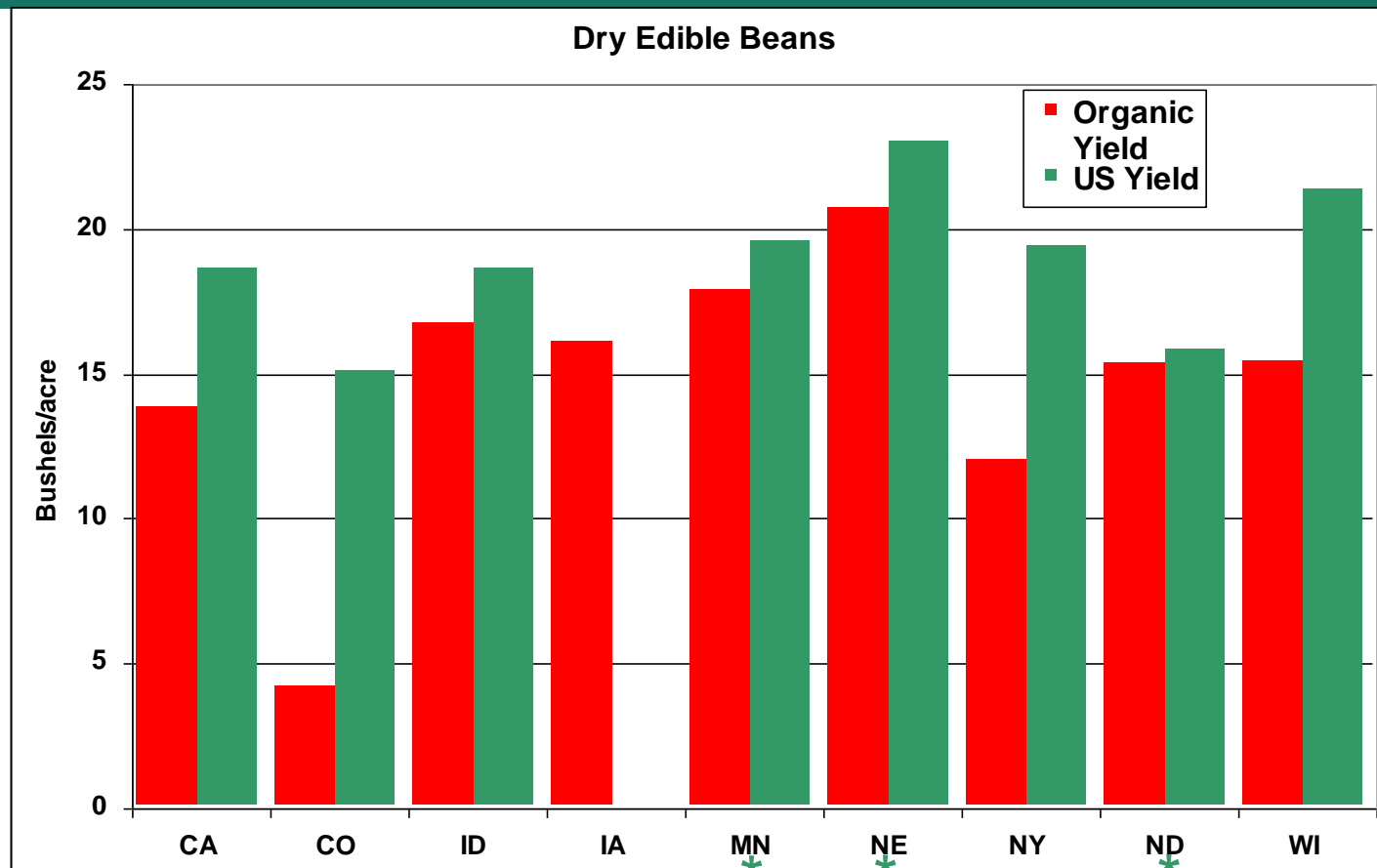
# Oats: Yields



Organic Oats represented 2.9% of 2008 acres in the US, 2.5% of total production, but 3.2% of total potato payments. Organic oats sold at 1.3 times the price for conventional so with 72% of the yield that represented a net advantage of 1.08 times the gross per acre income. To have produced all the 2008 oats in the states shown above Organically would have required 210,000 additional acres – a 30% increase

\* Top Oat producing states (>100,000 acres harvested)

# Dry Edible Beans: Yields

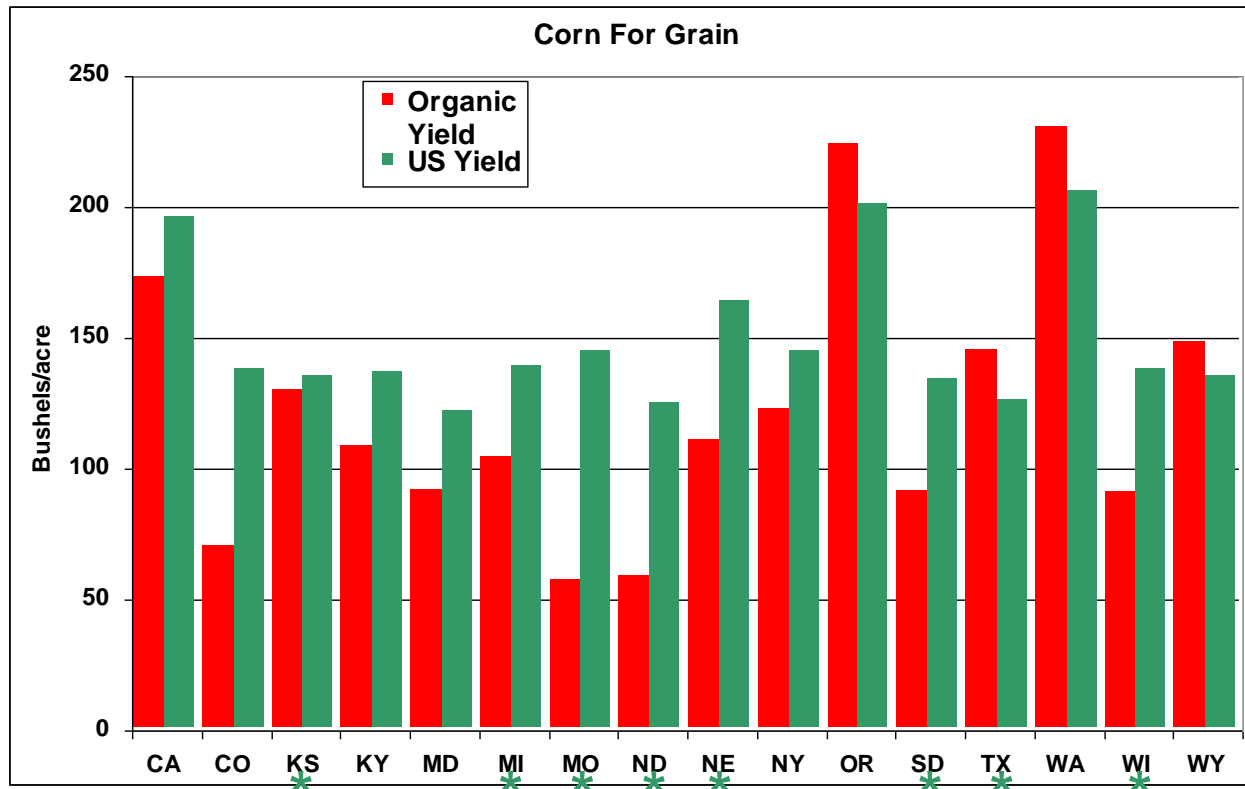


Organic Dry Edible Beans represented 0.86% of 2008 acres in the US, 0.69% of total production, but 0.93% of total payments. Organic Dry Beans sold at 1.34 times the price for conventional so with 81% of the yield, that represented 1.08 times the gross per acre income. To have produced all 2008 US Dry Beans organically would have required an additional 344,000 acres, a 24% increase

\* Top Dry Edible Bean producing states (>100,000 acres harvested)



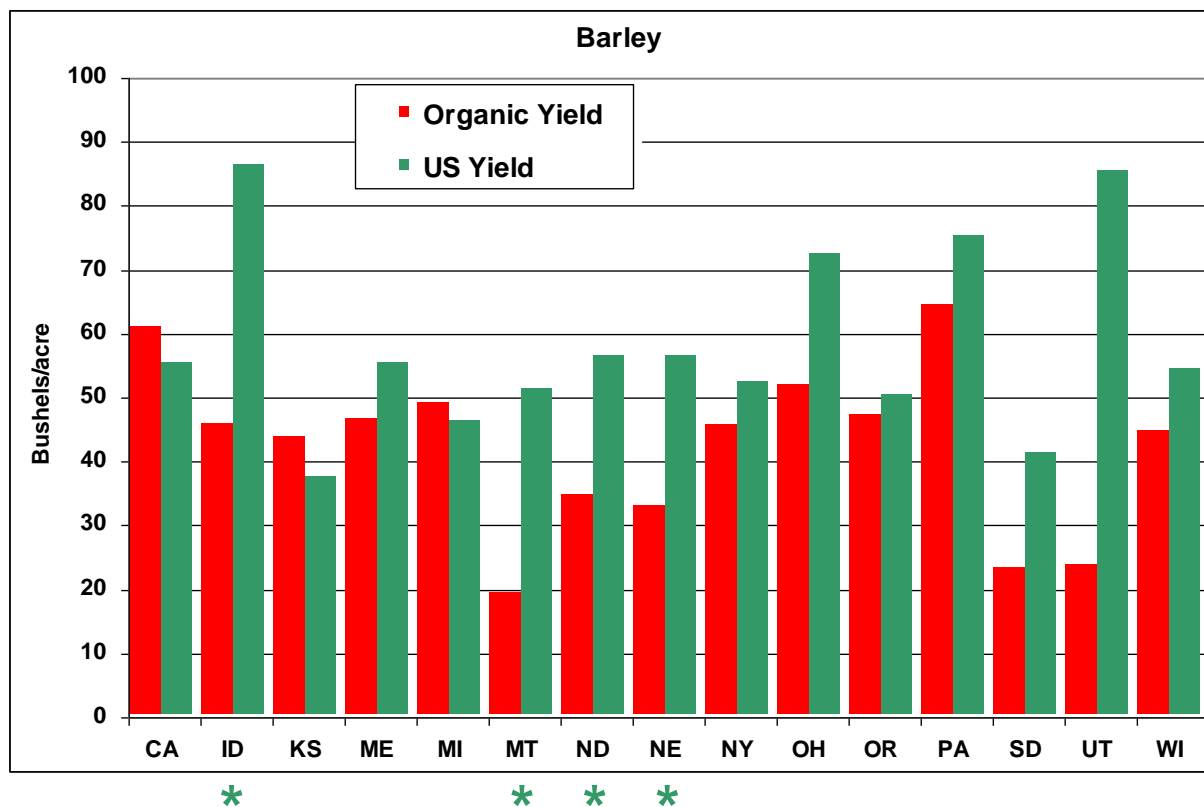
# Corn for Grain: Yields



Direct comparisons were only possible for the above states that represent 41% of all US Corn acres. For these states, Organic Corn represented 0.25% of acres, 0.19% of production and 0.2% of total payments. For these states average Organic yields were 77% of conventional so at 1.06 times the price/bu the gross value per Organic acre was only 82% of conventional. To have produced all US 2008 US Corn organically would have required 32MM additional acres, a 40% increase

\* Top Corn producing states (>2MM acres harvested)

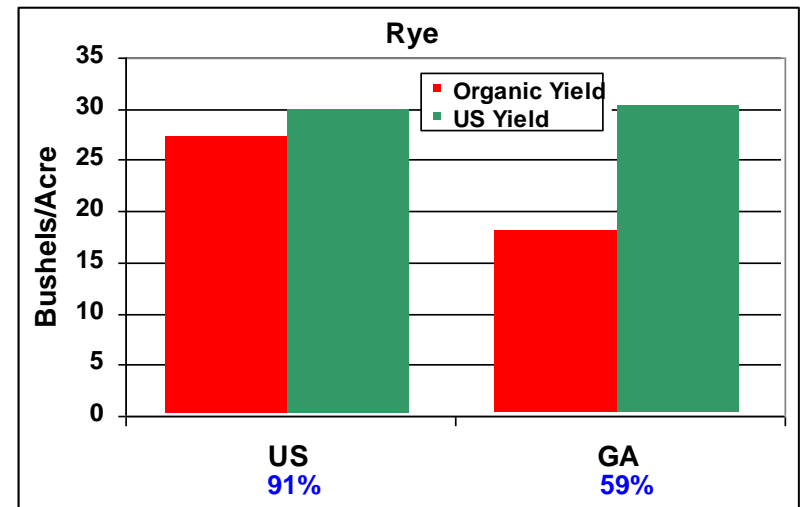
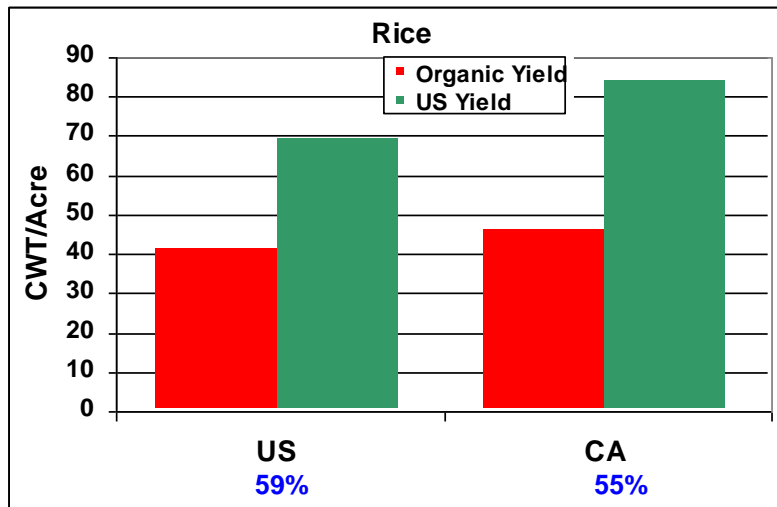
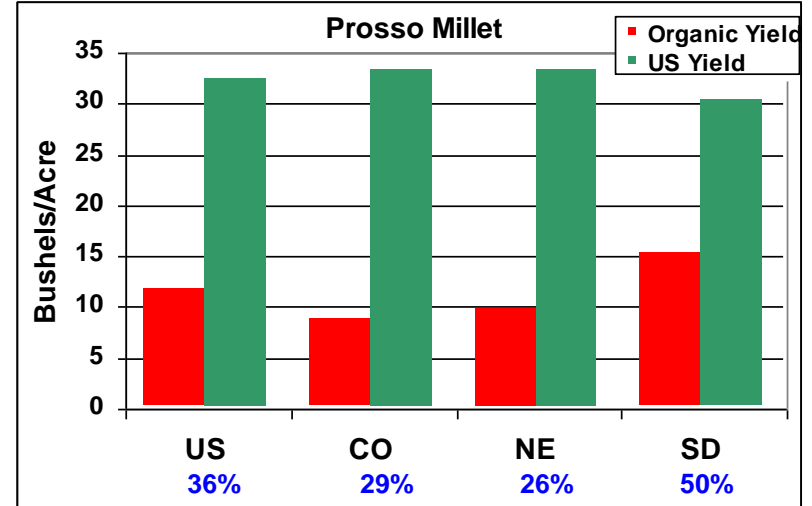
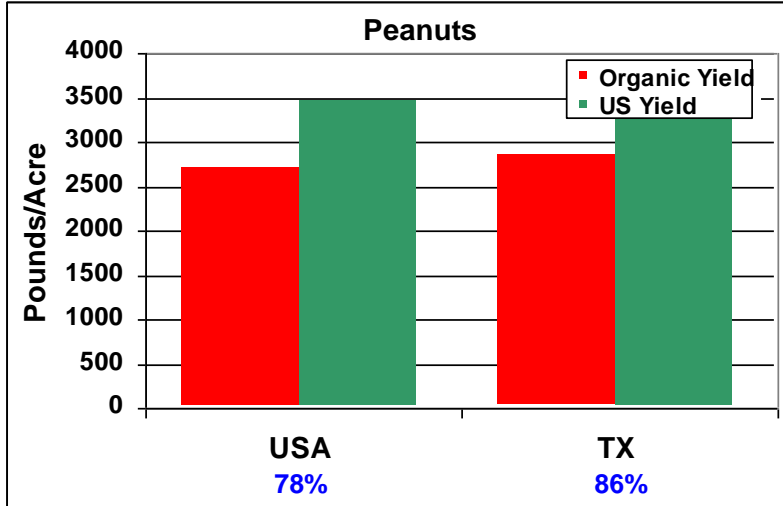
# Barley: Yields



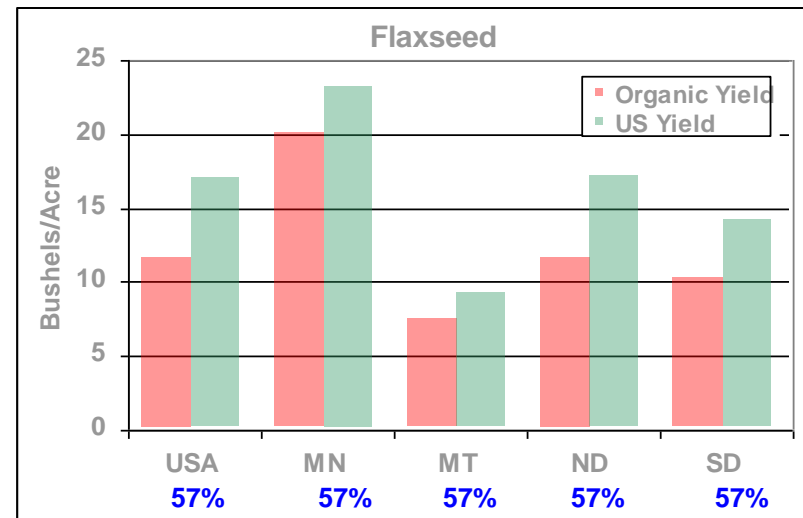
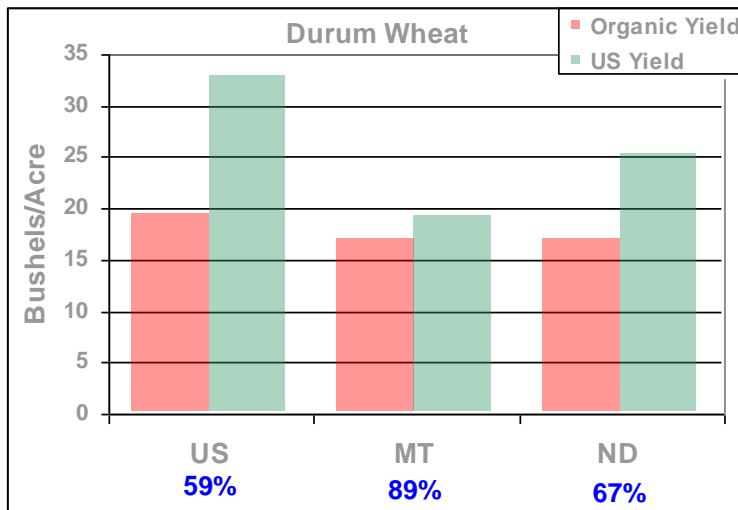
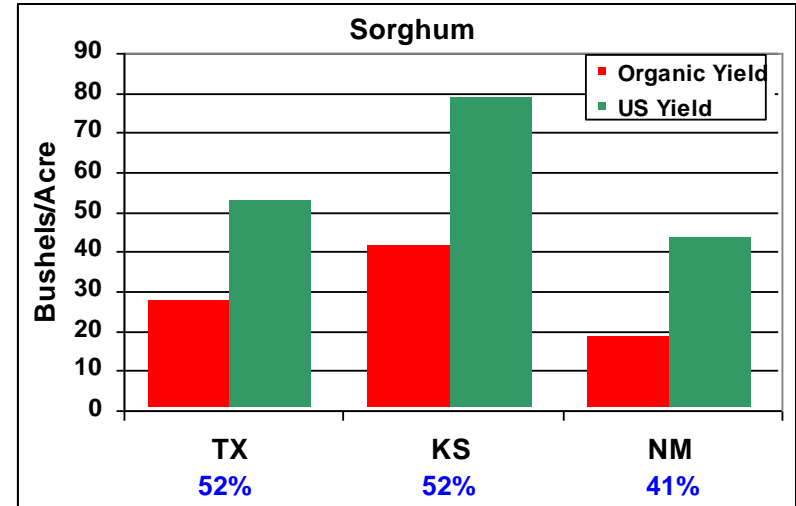
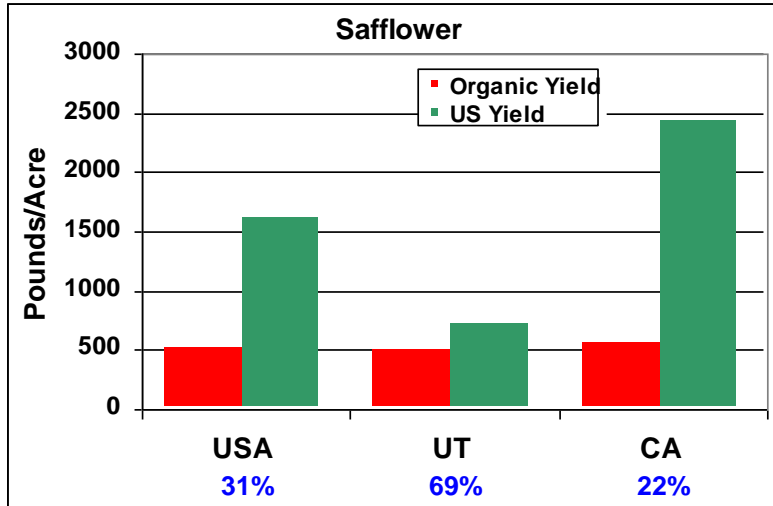
For these states, Organic Barley represented 0.83% of acres, 0.6% of production and 0.81% of total payments. For these states average Organic yields were 72% of conventional but at 1.36 times the price/CWT the gross value per Organic acre was 98% of that of conventional. To have produced all the 2008 Barley for these states Organically would have required 1.85MM additional acres, a 39% increase

\* Top barley producing states (>500,000 acres harvested)

# Additional Row Crops: Yields (1 of 3)

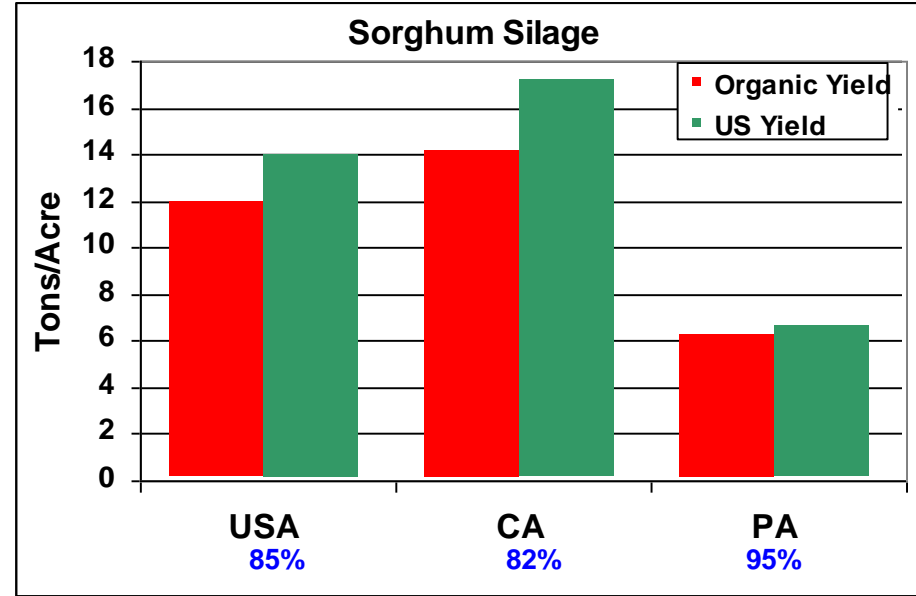
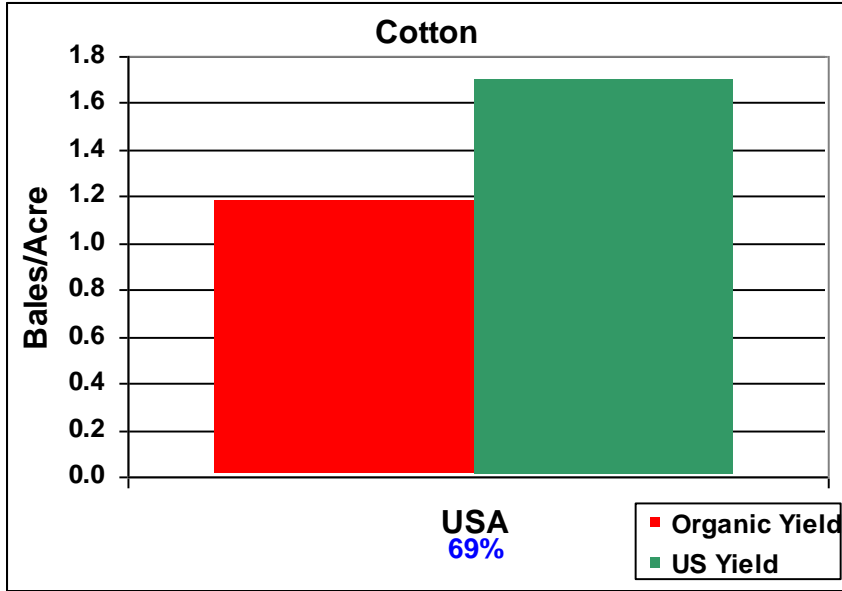


# Additional Row Crops: Yields (2 of 3)





# Additional Row Crops: Yields (3 of 3)





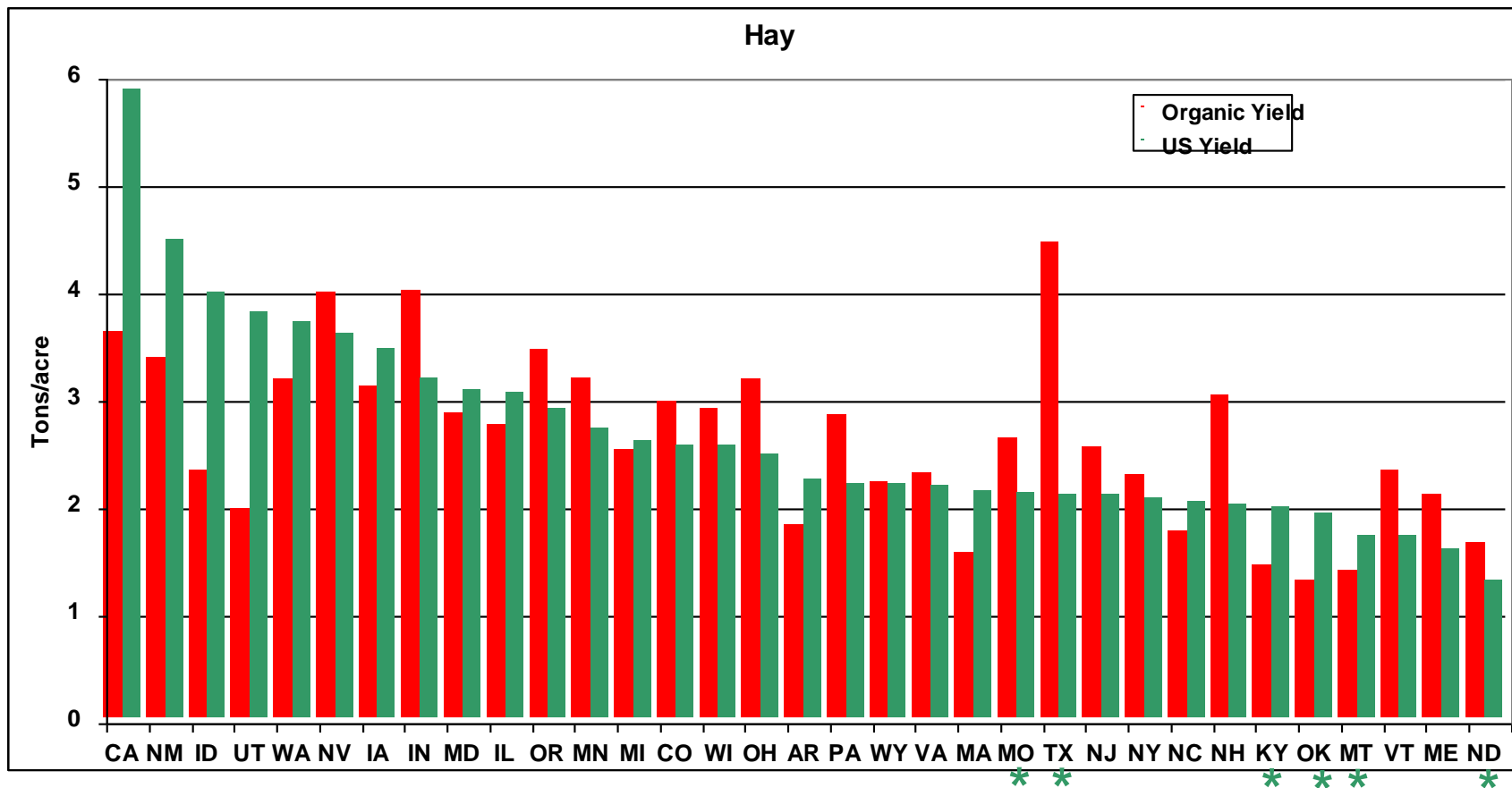
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# Animal Feed Crops: State Level

Hay

Corn Silage

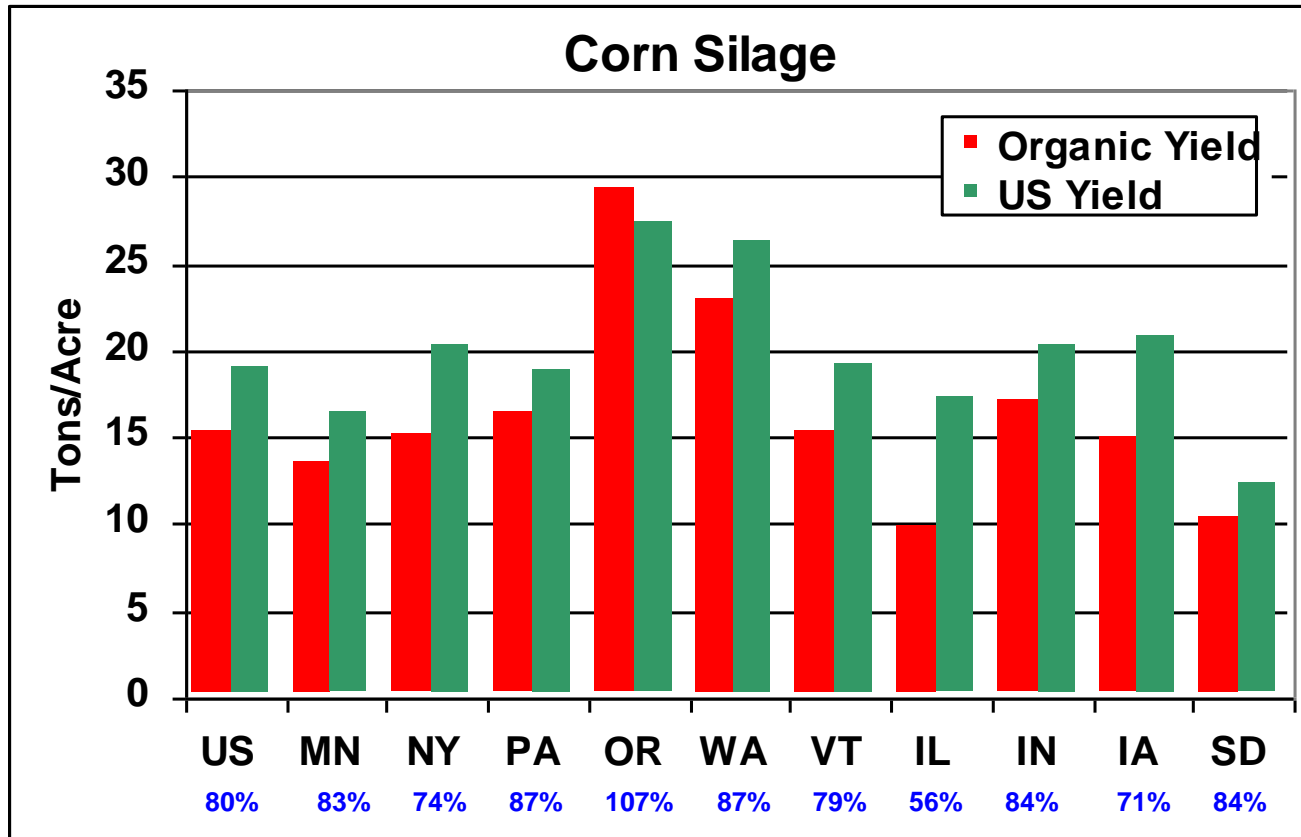
# Hay (all types) : Yields



Organic Hay represented 0.67% of 2008 acres in the US, 0.74% of total production, but 0.57% of total Hay payments. Organic hay sold at 0.77 times the price for conventional so with 110% of the yield, that represented a net of 0.85 times the gross per acre income.

\* Top Hay producing states (>2MM acres harvested)

# Corn Silage: Yields



**To have produced all 2008 US Corn Silage  
Organically would have required an additional  
6000 acres, a 25% increase**

Organic Yield as a Percent of US Average



# About the Author, Steve Savage

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I have been an independent agricultural technology consultant since 1996. I was originally trained as a Plant Pathologist (Ph.D. UC Davis 1981), but have worked broadly throughout agriculture since then. I have worked for Colorado State University (field research on tree fruit and grapes), DuPont (fungicide screening for global markets), and Mycogen (biological control and natural products). I have since consulted for many major and minor technology companies, grower groups, and academic institutions.

I first learned about Organic from my grandfather in the 1960s, assisting him as he gardened based on guidance from “Organic Gardening” magazine. I met some of the pioneers of the commercial Organic segment in the late 70s. I spent many years of my career working on the development of pest control products that would fit within the Organic guidelines. I have continued to track these technologies and the Organic market in a variety of consulting projects over the past 13 years. While I respect growers who are able to maintain a viable business in the Organic niche, I do not see it as a viable solution for the overall sustainability and production challenges we face on a global level.

In July of 2009 I began blogging about agriculture and agricultural technology on a variety of websites as well as my own site: [Applied Mythology \(http://appliedmythology.blogspot.com\)](http://appliedmythology.blogspot.com) ). The analysis presented in this slide set was done as part of this unpaid avocation, not for any client, commercial or otherwise.



Much of the data used for this analysis was in pdf format so there is the potential of manual entry error. I welcome corrections and feedback of any type at [feedback.sdsavage@gmail.com](mailto:feedback.sdsavage@gmail.com)