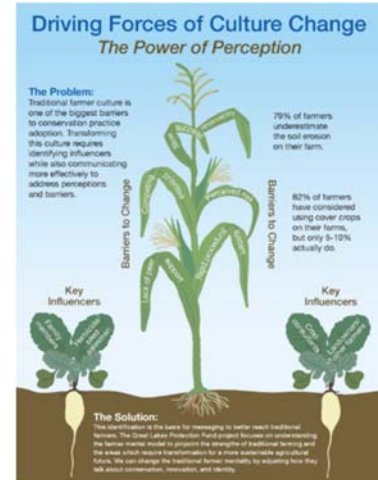


Perceived Perception Gaps between Adopters and Non-Adopters of Benefits and Costs of Conservation Practices



Jason Bergtold and Calder McCollum



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Purpose and Objectives

To assess the perception gap between adopters and non-adopters on the benefits and costs for four intensive conservation practices in Kansas

Objectives

1. Assess the level of adoption of conservation practices for different crops in Kansas.
2. Assess farmer perceptions about the costs and benefits of adoption of conservation practices on-farm.
3. Determine if perception gaps between adopters and non-adopters exists for different conservation practices used in Kansas.

Motivation

- Adoption of conservation practices is heavily influenced by perceptions about the benefits and costs of the practice (Munguia and Llewellyn, 2020; Toskana et al., 2010).
- In interviews with farmers, Reimer et al. (2012) found that high levels of perceived relative advantage (e.g. lower costs, time-savings, returns), compatibility, and observed effects are the most significant indicators of conservation practice adoption.



Focus

In-field conservation practices



Continuous No-Till



Conservation Crop Rotation



Cover Crops



Variable Rate Technology

Continuous No-Till

- Consists in planting crops directly into the crop residue, which remains on the soil surface without disturbing the soil with tillage.
 - Disturbance is limited to nutrient injection and planting of crops.
- No-till across all the crops planted in a field.



Conservation Crop Rotation

- Implementation of a 3+ year crop rotation with three or more crop types. (Could also include a 2-year rotation with double cropping.)
- The rotation should include a combination of high residue crops, grasses and/or legumes.



Cover Crops

- Single or multiple cover crop species planted between regular cash crops to protect the soil and improve soil organic matter.
- Cover crops species :
 - Legumes: winter peas, hairy vetch, cowpeas, crimson clover, sunn hemp, etc.
 - Cereal: rye, oats, millet, etc.
 - Grass: sorghum-sudangrass hybrid, etc.
 - Mixtures
- Variable costs of planting and managing cover crops in Kansas range from \$40/acre to \$100/acre.



Variable-Rate Application of Inputs

- Varying rates of inputs (e.g. fertilizer, lime, herbicides) within a field based on field requirements (e.g. changes in soil, high/low yielding areas).
 - Map-based
 - Sensor-based



Data Collection



Conservation Workshops



- Workshops were conducted in 2013/2014 in 12 locations around Kansas to talk with farmers about conservation practices on-farm and collect farm data.
- Farmers answered surveys about conservation practice adoption and their perceptions about these practices.
- Attendees were compensated for their time and travel.

Survey Questions



No-till: Please indicate if you have used no-till in producing the following crops and indicate whether you have perceived any yield increase, yield decrease or no change in yields. If you do not grow one of the crops listed, please leave that row blank.

Crop	Have you adopted No-till in this crop?	If Yes, what was the yield impact?
Corn	<small>3035</small> <input type="checkbox"/> Yes ¹ <input type="checkbox"/> No ³	<small>3036</small> <input type="checkbox"/> Increase ¹ <input type="checkbox"/> Decrease ² <input type="checkbox"/> No change ³
Soybean	<small>3037</small> <input type="checkbox"/> Yes ¹ <input type="checkbox"/> No ³	<small>3038</small> <input type="checkbox"/> Increase ¹ <input type="checkbox"/> Decrease ² <input type="checkbox"/> No change ³
Wheat	<small>3039</small> <input type="checkbox"/> Yes ¹ <input type="checkbox"/> No ³	<small>3040</small> <input type="checkbox"/> Increase ¹ <input type="checkbox"/> Decrease ² <input type="checkbox"/> No change ³
Sorghum	<small>3041</small> <input type="checkbox"/> Yes ¹ <input type="checkbox"/> No ³	<small>3042</small> <input type="checkbox"/> Increase ¹ <input type="checkbox"/> Decrease ² <input type="checkbox"/> No change ³
Other (<i>Specify</i>): _____	<small>3043</small> <input type="checkbox"/> Yes ¹ <input type="checkbox"/> No ³	<small>3044</small> <input type="checkbox"/> Increase ¹ <input type="checkbox"/> Decrease ² <input type="checkbox"/> No change ³

Asked this type of question for all conservation practices examined. If a farmer did not grow a specified crop, then they did not report information for that practice for this question.

Survey Questions



For each practice, indicate whether you have observed changes for each category provided to be lower, higher or if they did not change after adoption of the specified practice. **If you have not adopted each of these practices, indicate whether you believe these values would be lower, higher or would not change if you were to adopt them.**

<u>Continuous No-Till</u>		<u>Lower¹</u>	<u>No Change²</u>	<u>Higher³</u>
a.	Weed pressures..... <small>3075</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Insect and disease pressures..... <small>3076</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Soil erosion..... <small>3077</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Soil fertility..... <small>3078</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Management intensity..... <small>3079</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Time spent managing the crop.... <small>3080</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Off-site environmental impact.... <small>3081</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Crop yields..... <small>3082</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Production costs..... <small>3083</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a.	Net returns..... <small>3084</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Asked this type of question for all conservation practices examined. All participants were asked to answer these questions.

Workshops

Table 1: Workshop locations and attendees

Workshop location	Attendees
1 Salina	39
2 Great Bend	32
3 Colby	19
4 Dodge City	14
5 Wellington	21
6 Hiawatha	13
7 Topeka	25
8 Manhattan	14
9 Parsons	31
10 Pratt	10
11 Garnett	16
12 Hays	14
Total	248

- Sample was obtained from the Kansas Farm Management Association (KFMA)
- Timing: December 2013 to March 2014
- Many participants are already involved with conservation on their farm.
- Recall, we are interested in the intensification of conservation on-farm. Looking at what it would take to do more conservation.

Farm Characteristics

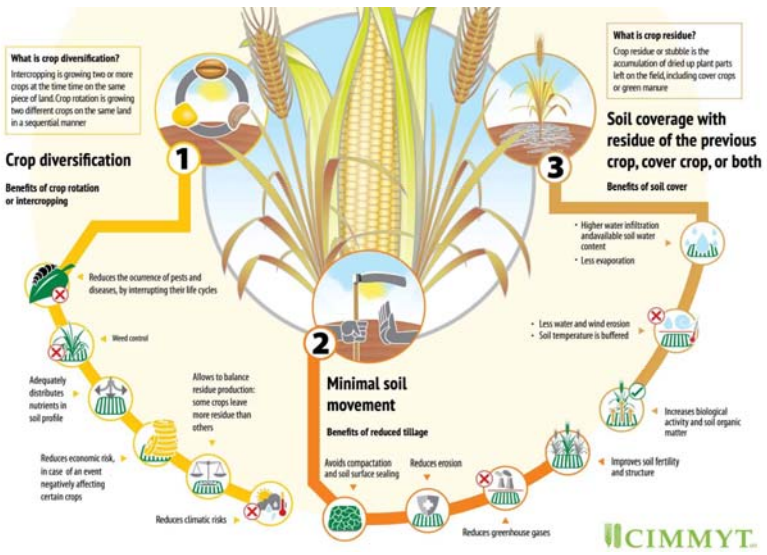
Table 2. Average farm characteristics

Variable	N	Mean	Min	Max	Census of Agriculture
Age	248	57.13	20	90	56.2 years
Average farm size	247	2,460	40	14,875	981 acres
Average sales value	242	6.2 ^b	1	9	\$ 438,020

^a Source: National Agricultural Statistics Service, USDA (2007) (> \$50K in Sales)

^b Mean sales of 6.20 corresponds to the sales category of \$400,000 to \$599,999

Findings

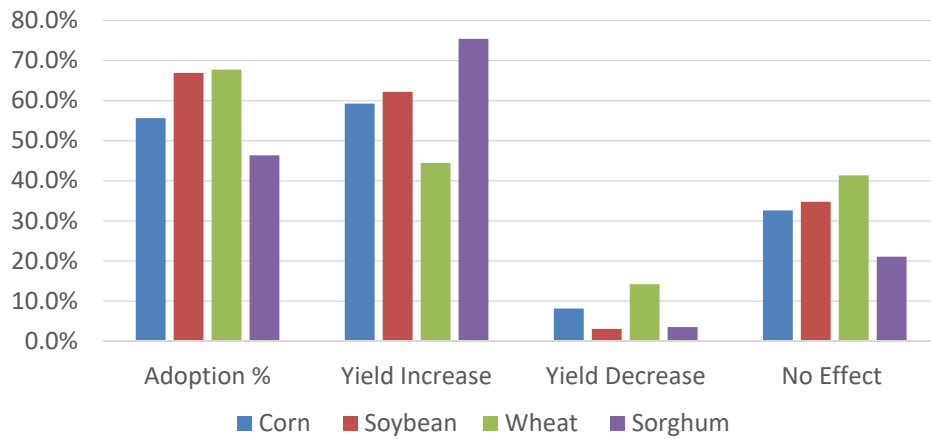


Continuous No-Till



Continuous No-Tillage Adoption

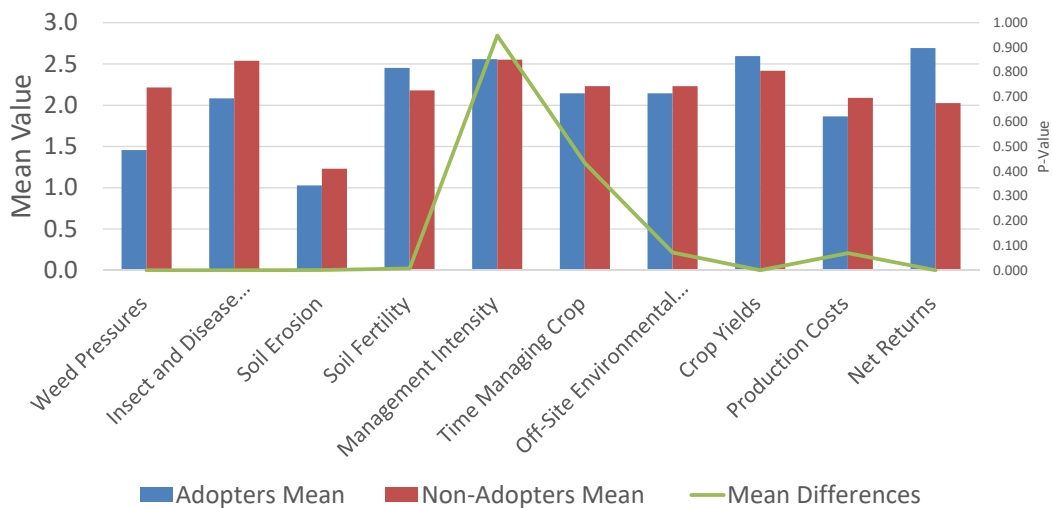
Continuous No-Till Adoption and Yield Perceptions (of Adopters)



- Use of no-tillage in Kansas is crop dependent (Canales et al., 2018)
- Adopters find on average that continuous no-tillage has no adverse effect on yields or increases crop yields of primary crops grown in Kansas.

Continuous No-Tillage Perceptions

Continuous No-Till Perceptions

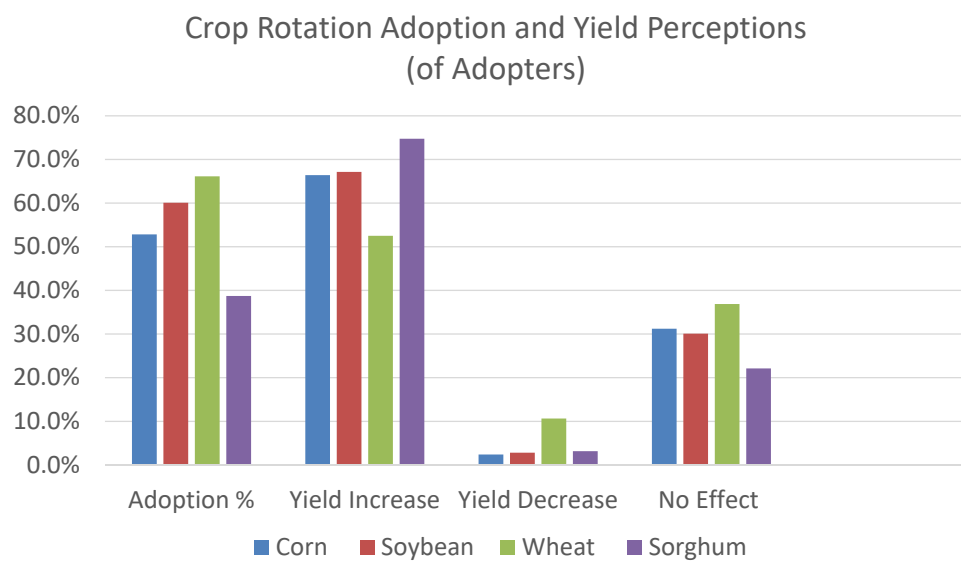


Significant perception gaps exist with respect to **weed pressure, insect and disease pressure, soil erosion, soil fertility**, off-site environmental impacts, **crop yields, production costs, and net returns**.

Conservation Crop Rotation

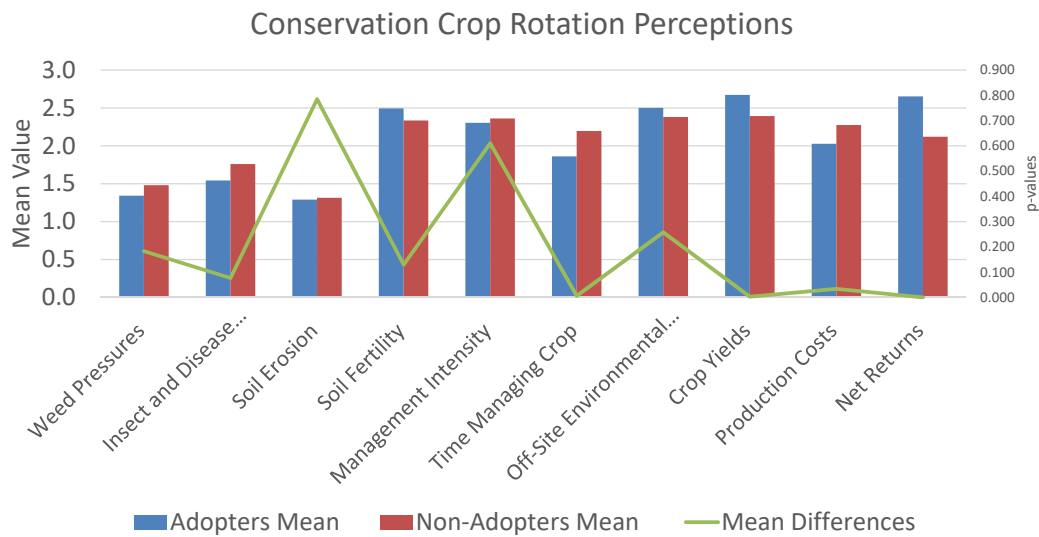


Conservation Crop Rotation Adoption



- Adopters find on average that conservation crop rotations have no adverse effect on yields or increases crop yields of primary crops grown in Kansas.

Conservation Crop Rotation Perceptions

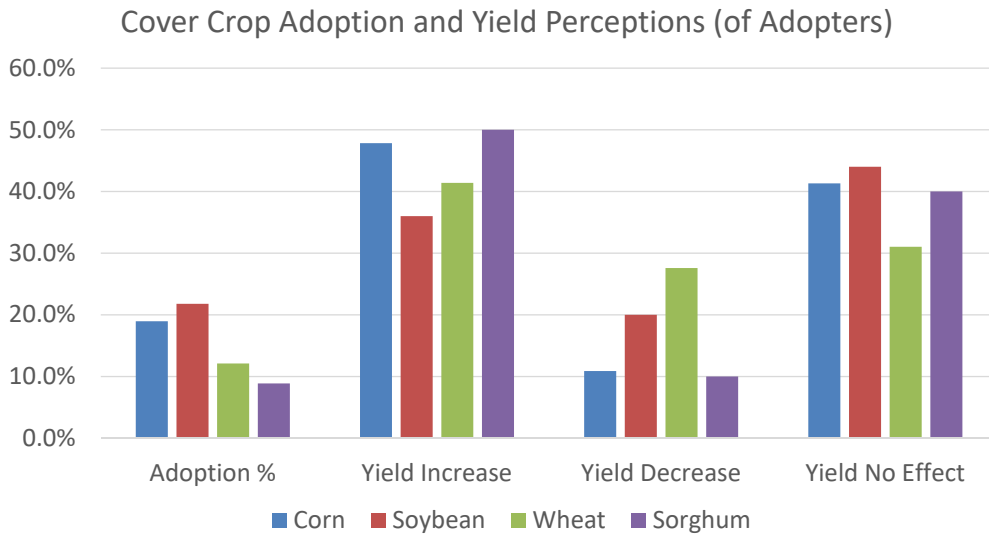


Significant perception gaps exist with respect to insect and disease pressure, **time managing crop, crop yields, and net returns.**

Cover Crops

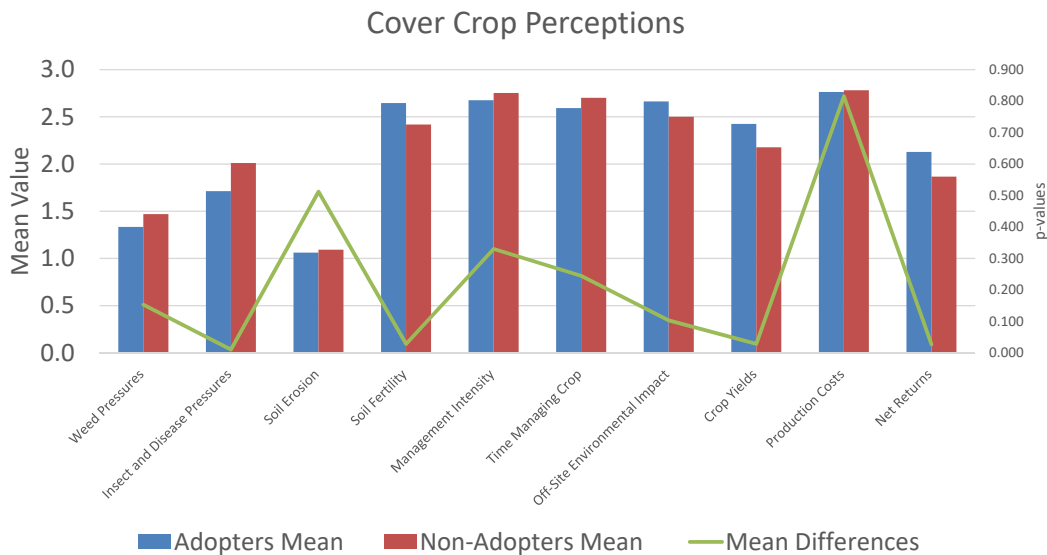


Cover Crop Adoption



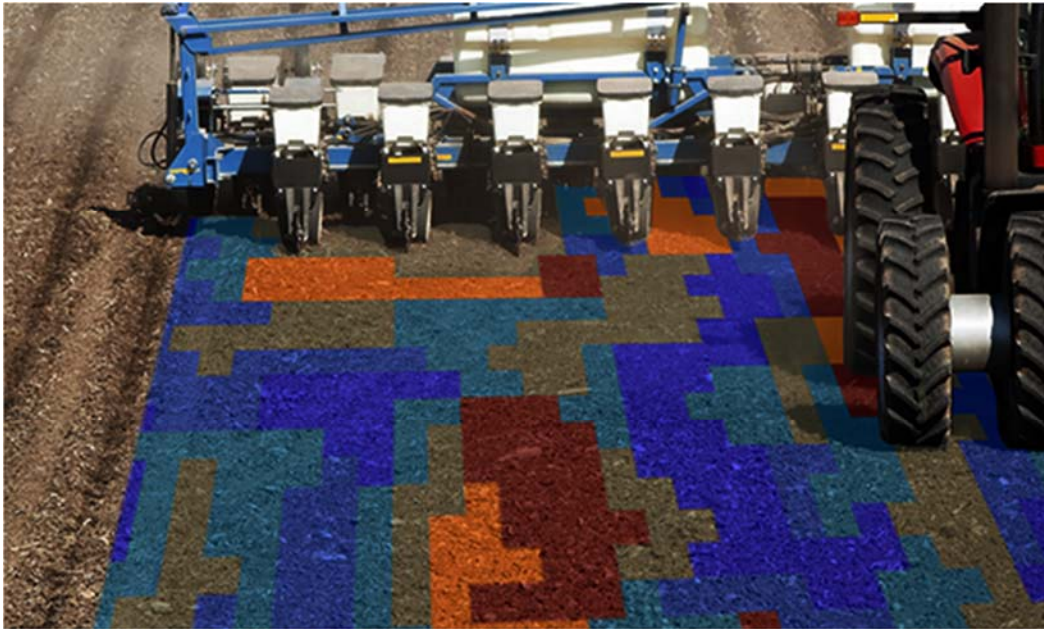
- Cover crop adoption is still low across much of the Great Plains (Bergtold et. al., 2019).
- The impact on crop yields from use of cover crops is mixed. Much of this may be due to the type of cover crop adopted and management of the cover crop.

Cover Crop Perceptions

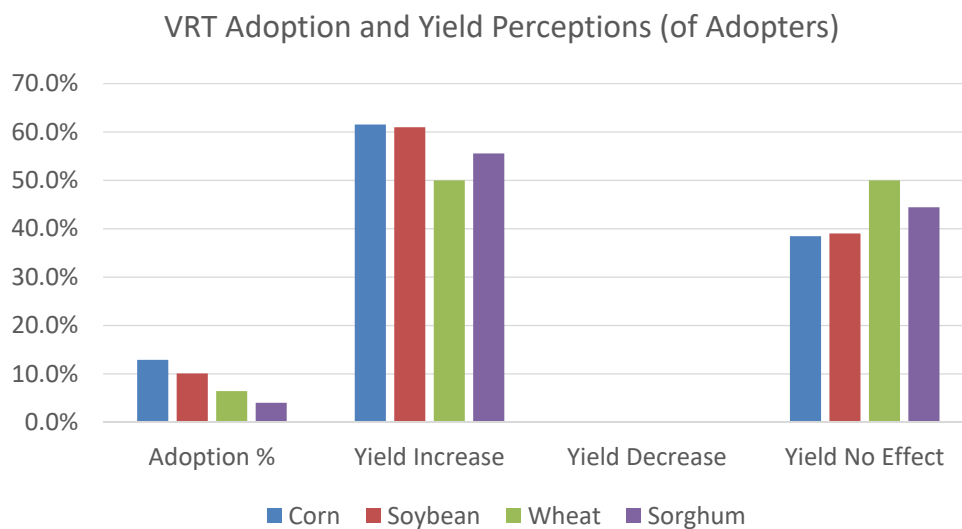


Significant perception gaps exist with respect to **insect and disease pressure**, soil fertility, off-site environmental impacts, crop yields, and net returns.

Variable Rate Technology (VRT)

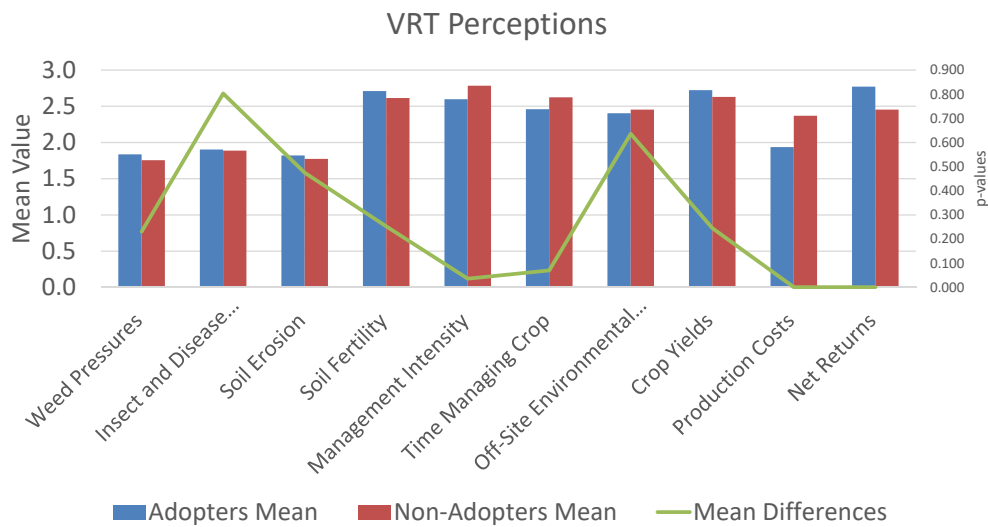


Variable Rate Technology Adoption



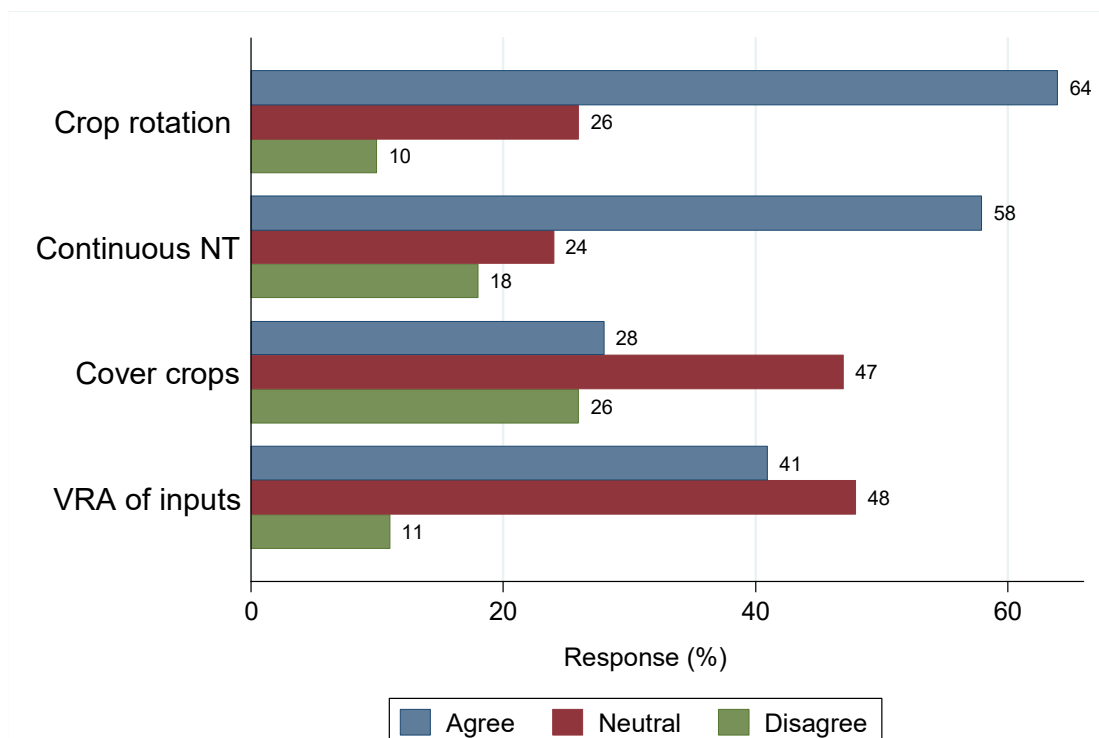
- Much VRT application is done as custom by operators/businesses who own the equipment. Availability of VRT custom services has been mixed and spotty across Kansas over time.
- Adopters find on average that VRT has no adverse effect on yields or increases crop yields of primary crops grown in Kansas.

Variable Rate Technology Perceptions



Significant perception gaps exist with respect to time managing crop, **production costs**, **net returns**.

Do these practices reduce risk?



Discussion

- There exists significant differences in perceptions about conservation practices between adopters and non-adopters.
- On average, non-adopters perceived lower relative benefits (e.g. crop yield and net return) and higher relative costs for the conservation practices examined.
- Being able to translate the actual benefits, costs and risks perceived by adopters to non-adopters may improve adoption and uptake of these practices, improving conservation on the landscape.



Discussion

- Gaps can be reduced through mentoring programs (connection to farmers), farmer led field days, better technical assistance in conservation programs, and further education (Arbuckle and Roesch-McNally, 2015; Baumgart et al., 2012).
- Production costs, impact on crop yields, economic returns, compatibility, management effort, uncertainty, and risk management have all been identified as barriers to adopting conservation practices. Better and/or more applicable information is needed on these aspects of the conservation practices examined (Ranjan et al., 2019)



Questions or Comments?