

Determinants of Scab Management Technique Adoption

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Motivation

- Common scab management practices
 - planting scab resistant varieties
 - cultural practices
 - crop rotations within the same crop field
 - planting varieties with a range of flowering dates;
 - Chemical application
 - Fungicides
- Behavioral factors
 - sources of information
 - costs
 - wealth

Research Question

- What determines how many scab management techniques adopted
 - Number of techniques
 - Determinants change with number of techniques?
 - More not necessarily better than less

Conceptual Model

- Assumptions
 - Decision maker aware of potential for infection
 - Do not assume decision maker believes treatment threshold will be achieved
 - Decision makers aware of options for scab management
 - No best technique implied
 - Decision maker consistently uses (adopted) only one set of techniques
 - “Consistently” left to interpretation of respondent

- Number of techniques a function of
 - Economies of scale in scab management
 - Ownership structure
 - Ownership vs. rental of **any** land
 - Cultivated **wheat** land **owned** by respondent
 - **Fraction** of **any** land planted as wheat
 - Availability of information
 - Familiarity (frequency of use; ease of use)
 - Professional and/or Cooperative Extension

- Farm workforce size
- Education
- Experience
- Expected economic benefits of management
- Geographic variation

Hypotheses

- Farmers with larger operations, in terms of acreage, will attempt to reduce long-run average costs
- Farmers who own greater fractions of the land they cultivate wheat may have different scab management preferences from those who cultivate wheat on rented land

- Significant effect from trusted or familiar sources of information
- Greater experience significant predictor of number of techniques used
- Workforce size significant predictor of number of techniques
- Significant effect from number of benefits
 - Economic size of benefits not measured
- Geography a significant factor for number of techniques chosen

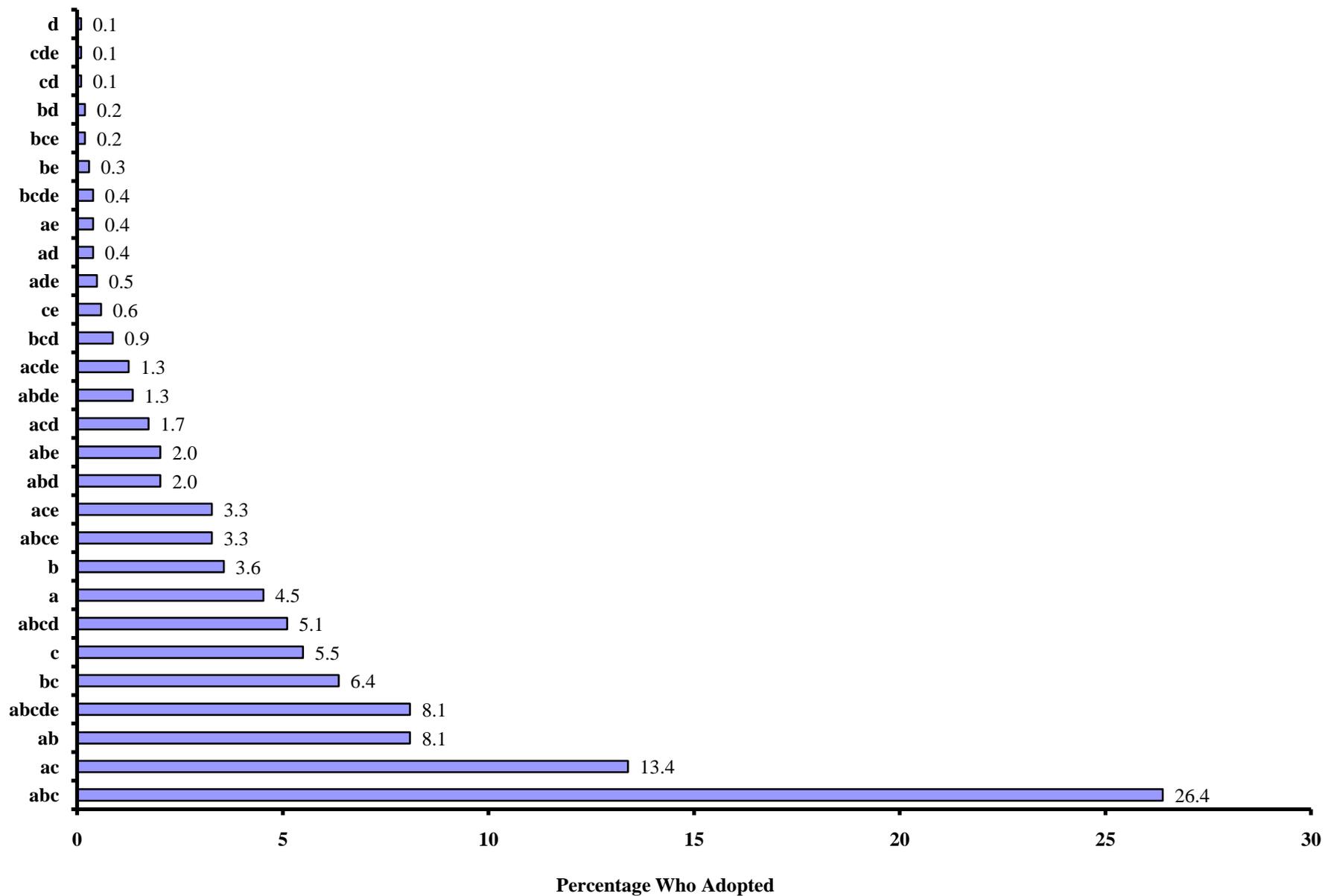
Method

- Mail survey
 - MN and ND wheat growers with at least 100 ac.
Wheat in 2010
 - 5150 producers
 - NASS
- 1038 usable responses (20%)
- Logit regression
 - Number of techniques

General Statistics - Modes

- Acres farmed: 1000-2000 ac
- Percent cultivated land owned: 25%-50%
- Average annual wheat acreage (5 yrs): < 500 ac
- Fraction of farmed land as wheat: 25%-50%
- Average annual wheat yield (5 yrs): 50 bu/ac
- FHB problem: once in 5 yrs

- Management methods:
 - Resistant varieties: 81%
 - Recommended fungicide at heading: 68%
 - Source of recommendation unknown
 - Rotate crops: 76%
 - Varieties with different flowering dates: 22%
 - Stagger planting dates: 22%



- Expected benefits
 - Increased yield: 91%
 - Increased profitability: 87%
 - Fewer DON discounts: 74%
 - Prevent spread of scab: 22%
 - Benefit doesn't justify cost: 11%
 - Unaware of control practices: 2.1%

- How many times in the past five years (2005-2009) have you sprayed fungicide on at least some of your wheat fields for scab control?
 - Every year
- Hire custom applicator: always
- Do policies affect management choices: no

- Attended field days: yes (56%)
- Extension service meetings: hardly ever (36%)
- Most important source of information
 1. Crop consultants (36%)
 2. Field days (15.3%)
 3. Publications prepared by extension (16.6%)
 4. Extension meetings (10.1%)

- What technologies used
 - Blogs: 24.2%
 - Facebook: 5.1%
 - Listserv: 24.4%
 - Twitter: 1.9%
 - Youtube: 4.4%
 - None: 54.4%
- Internet connection speed: high speed
- Internet used to
 - E-mail: 76.3%
 - Extension: 34.7%
 - Company sites: 30.6%
 - Search (farm practices): 52.8%
 - Extension bulletins: 24.1%
 - Scab prediction: 18.4%

- Highest education: two-year degree
- Degree related to ag? 50% no
- Age: 51-60
- Years farming: 31-40

Multivariate Logit Regression

- Model: Number of techniques =
 - Land
 - Owned wheat
 - Extension
 - Benefits

	One technique	Two techniques	Three techniques	Four techniques	five techniques
Intercept	0.4921	2.5000**	3.3531**	2.5203**	0.8191*
	1.3727	0.4020	0.3736	0.3621	0.4245
Land	-0.1577	-0.1895**	-0.2379**	-0.1555**	-0.045
	0.3883	0.0759	0.0690	0.0626	0.0717
Owned wheat	0.0157	0.0499**	0.0437**	0.0396**	0.0143
	0.1398	0.0267	0.0246	0.0227	0.0262
Extension	-0.4266	-0.4116**	-0.3519**	-0.1779**	-0.1128
	0.3845	0.0856	0.0768	0.0735	0.0866
Benefits	-1.8179*	-0.1299**	-0.1165**	-0.0203	-0.0131
	1.038	0.0571	0.0493	0.0447	0.0531

** indicates statistical significance with 95% confidence
* indicates statistical significance with 90% confidence
Numbers in small type are standard errors

Discussion

- Intercept, *land*, *owned wheat*, *extension*, and *benefits* are significant predictors of the number of scab management techniques used.
 - *Land*: variable increases when
 - Percentage of cultivated land owned
 - Average annual wheat acreage in last five years
 - *Owned wheat*: variable increases when
 - Total acres farmed
 - Fraction of farmed acreage planted as wheat
 - Percentage of cultivated land owned

- *Extension*: variable increases when attendance at Cooperative Extension events increases
- *Benefits*: variable increases when number of expected benefits increases
- variables are primarily significant when two, three, or four techniques are selected
 - additional information has no value when one technique is being used or all techniques are being used
 - effect of land ownership and use practices of decreasing importance as more techniques are used

- land ownership, extension information, and increasing number of expected benefits dissipates likelihood of any additional techniques being used
 - producer prefer to concentrate their benefits into a smaller number of techniques, allowing them to take maximum advantage of the benefits from any one technique
 - producers to select a narrow set of techniques

- Additional techniques may be a source of loss prevention in assets for which they bear the risk of that loss
 - Opposite when loss shared through a rental contract?
- Farm workforce size, producer education and experience, and regional differences in production were not statistically significant in this model.

Conclusions

- Farmers with larger operations, in terms of acreage, will attempt to reduce long-run average costs
- Producers owning greater fractions cultivated land wheat may have different scab management preferences from those who cultivate wheat on rented land

- Significant effect from trusted or familiar sources of information: cooperative extension
- Greater experience not a significant predictor of number of techniques used
- Workforce size not a significant predictor of number of techniques
- Significant effect from number of benefits
 - Economic size of benefits not measured
- Geography not a significant factor for number of techniques chosen