Journal of Extension

Volume 56 | Number 3

Article 11

6-1-2018

Word Cloud Analysis of Early Adopter No-Till Farmer Interviews

John M. Jemison *University of Maine*

Stephanie Welcomer University of Maine

Richard Kersbergen *University of Maine*

Carl Majewski University of New Hampshire

Recommended Citation

Jemison, J. M., Welcomer, S., Kersbergen, R., & Majewski, C. (2018). Word Cloud Analysis of Early Adopter No-Till Farmer Interviews. *Journal of Extension*, *56*(3). Retrieved from https://tigerprints.clemson.edu/joe/vol56/iss3/11

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June 2018 Volume 56 Number 3 Article # 3RIB3 Research In Brief

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Abstract

We interviewed early adopter no-till farmers in the New England region to assess why they changed tillage practices and what the perceived advantages and disadvantages of doing so were. We then generated word clouds from answers to key interview questions to convey the farmers' experiences. Most of these innovators were influenced to convert to no-till by the success of other "exemplary" farmers. Advantages noted included reductions in production time and fuel use. The greatest perceived disadvantage was pest management issues caused by cover crop residues. Yield losses were not mentioned, and many of the farmers experienced increased yields. Our findings suggest that Extension staff can increase adoption of new production techniques by identifying and conveying experiences of key farmer leaders.

Keywords: farmers, no-till, adoption, word clouds, qualitative research

John M. Jemison Jr. Extension Professor University of Maine Cooperative Extension Orono, Maine Jemison@maine.edu Stephanie
Welcomer
Professor
University of Maine
Orono, Maine
Stephanie.welcomer@
umit.maine.edu

Richard Kersbergen Extension Professor University of Maine Waldo, Maine Richard.Kersbergen@ maine.edu Carl Majewski
Extension Field
Specialist, Food and
Agriculture
Cheshire County Office
University of New
Hampshire Extension
Keene, New
Hampshire
Carl.majewski@unh.e
du

Introduction

Extension personnel who work with the agricultural community are frequently evaluated on how well they influence growers to adopt novel practices. From integrated pest management to no-till production, Extension educators strive to influence growers to adopt practices that can improve farm profitability and reduce environmental impact to natural resources (Malone, Herbert, & Pheasant, 2009). No-till forage production can provide growers with a more resilient production system in an increasingly variable weather environment as well as reduced cost of production (Derpsch, Friedrich, Kassam, & Hongwen, 2010). Soil organic carbon in soil's surface layers increases with no-till, making more water available for crop growth, and residues remain on the soil surface, protecting the soil from damaging rains and reducing surface runoff (Bronick & Lal, 2005; Rhoton, 2000); additionally, soil macropores remain intact, allowing for improved spring drainage (Blanco-Canqui, Wienhold, Jin, Schmer, & Kibet, 2017). Soil erosion in the United States has decreased 43% over 20 years, mostly due to the adoption of no-till methods (Huggins & Reganold, 2008).

In northern dairy production zones, however, adoption of no-till has been slow. Over the past 5 years, only 5% to 10% of dairy farmers in the region have adopted no-till forage production. The reluctance to adopt is due in part

to concerns over cool soil temperatures and short growing seasons. Manure management issues also have slowed adoption as leaving manure on the soil can increase nitrogen (N) loss and, therefore, the need for purchased fertilizer. However, no-till production encourages crop rotation, which should boost both productivity and profitability. Additionally, research has been conducted to show how no-till production can sequester carbon and reduce fuel usage, thereby reducing carbon emissions from farms (Blanco-Canqui & Lal, 2008). To determine the extent to which these issues affected the decision to convert to no-till and other factors that motivated farmers to change practices, we conducted a study of early adopter no-till dairy farmers in the New England region. Our study involved conducting one-on-one interviews with the early adopter no-till producers to identify key factors that led to early adoption and to explore the biggest advantages and disadvantages these farmers found related to no-till production. Specific quotes from these interviews were then used to encourage other growers to adopt no-till.

Methods

We developed a total of 17 questions to guide the interviews with growers, and these were submitted for human subjects review. Each farmer signed a release allowing us to discuss our findings with other growers and publish the study results. Each interview lasted between 90 and 160 min. Each of the 20 interviews was taped, transcribed, and analyzed through the use of NVivo 11 software. Word clouds were generated from farmer responses regarding why they adopted no-till and the key advantages and disadvantages they had found in doing so. The more frequently a word was used by the growers interviewed, the larger the word's size was in the corresponding graphic. The information generated was incorporated into educational programs to encourage other growers to adopt no-till.

Results

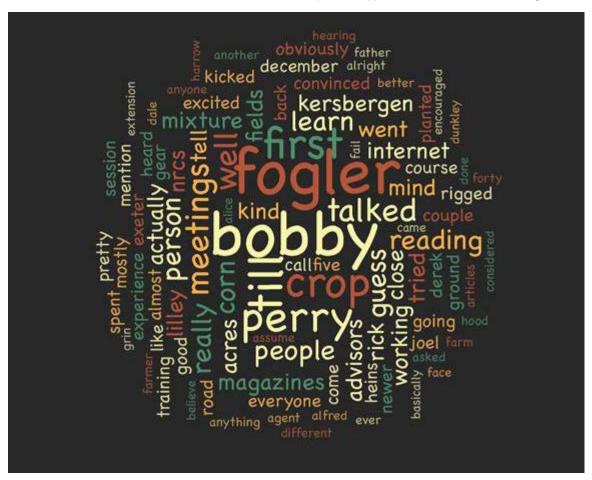
Reasons to Convert

Conversion to no-till can be thought of as a sequenced process of adoption based on perceived benefits of the innovation and perceived ability to manage uncertainty (Rogers, 2003). In this sequenced process, innovator farmers base their decisions on a range of factors that include economic and social benefits. Those who adopt an innovation after it has been well distributed—late adopters—are thought to weigh possible negative effects of adoption more heavily and therefore adopt the innovation after uncertainty and perceived risk have diminished.

When growers were asked why they converted to no-till, many identified other farmers' success as a key driver to change. As indicated in Figure 1, many farmers mentioned the use of no-till by two well-respected farmers in the dairy community, Bobby Fogler and Perry Lilley, as the main reason they tried to produce using no-till methods. The Fogler family had adopted no-till before the other farmers in the region experimented with it and realized several no-till benefits. Given his very early timing and positive experience with no-till, Fogler was a very early adopter who was open to innovation, willing to risk time and money to test the no-till innovation, and interested in sharing his insights with other next-wave adopters, including Lilley.

Figure 1.

Reasons Early Adopter Farmers Converted to No-Till Production



After adopting and practicing no-till, Fogler and Lilley promoted no-till by having one-on-one discussions with farmers at meetings, visiting dairy farms when they had time, and answering growers' production questions as part of panel discussions at Extension meetings and field days. Farmers also had other opportunities to learn about potential benefits and risk minimization at meetings—particularly those in which Extension educator Richard Kersbergen introduced no-till to growers as part of a Northeast Sustainable Agriculture Research and Education grant. Other influential sources of information included industry meetings, Internet and trade magazine articles, crop advisors, and Natural Resources Conservation Service staff. But key innovator no-till farmers appeared to have the greatest influence on other farmers considering adoption. The following quote from Lilley demonstrates the importance of farmers' influence on one another:

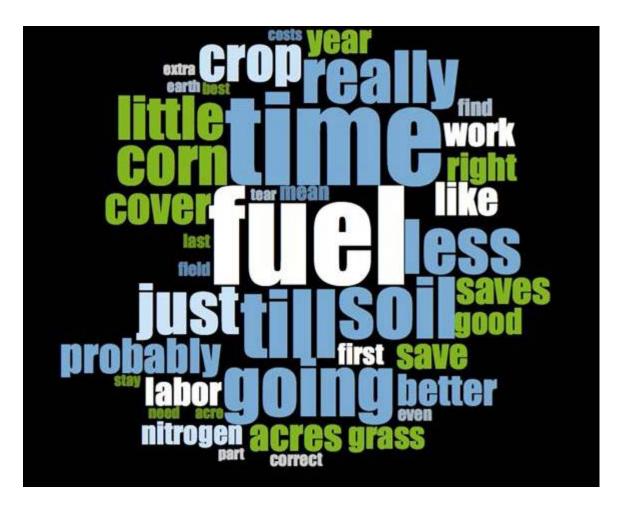
I had always had some interest in no-till . . . read about it once in a while, but what got me enthused about no-till [was that] I saw Bobby Fogler one day, and I knew he had something to tell me because you could tell by the grin on his face. So he proceeded to tell me about their experiment with no-till; I said, that's it—if Bobby can do it, I can do it.

Key Advantages Found with No-Till Production

Almost all growers mentioned saving time and fuel as primary advantages of converting to no-till; although not as important as time and fuel, labor savings was a closely related advantage (Figure 2). Consistent with diffusion of innovation theory (Rogers, 2003), these early adopters expressed interest in potential economic benefits, such as lower fuel and fertilizer costs.

Figure 2.

Greatest Advantages Found from Switching to No-Till Production



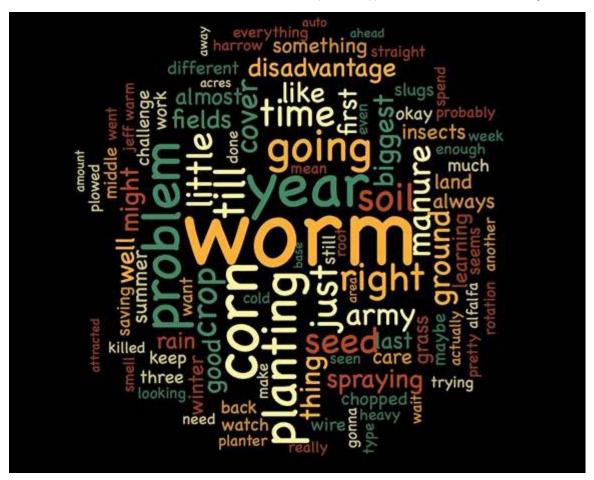
Most of the farmers (18 out of 20) used cover crops in some, if not all, of their fields to protect the soil from erosion and absorb manure nutrients applied in the fall. The words *nitrogen* and *grass* were used frequently as growers discussed advantages of no-till. Most farmers mentioned that they were able to cover more ground with manure and that the cover crops they used captured manure-N, improving overall N efficiency. Some farmers noted that no-till gave them the opportunity to increase overall forage production by converting low-yielding grass to no-till corn for a couple of years, and then replanting the field to alfalfa. Only a few farmers spoke about improved soils as an advantage of no-till production.

Key Disadvantages Found with No-Till Production

Compared to the advantages of no-till production, there was more diversity in responses to a question about specific disadvantages of no-till (Figure 3). The benefits to be gained from implementing new innovations are highly uncertain (Attewell, 1992), and thus those consider adoption weigh the potential benefits of adoption against possible high costs. With regard to no-till, these costs can relate to either increased pest pressure or disruptions to established routines, such as timing for spraying.

Figure 3.

Greatest Disadvantages Found from Switching to No-Till Production



One such example would be concern expressed over the issue of pests, particularly worm pests (armyworms and cutworms, among others). As expressed in Figure 3, *worm* was the single greatest concern mentioned. Cover crops and crop residues can create potential habitat for destructive pests, thereby requiring growers to spend time scouting, even if they are using Bt corn hybrids. Farmer Larry Ward described the concerns over insects: "We are perhaps being a bit more proactive about insects because you know the danger is there." Several growers who plant into standing cover crops also raised corn-planting issues. Manure management was raised as an issue. Many voiced concern over loss of ammonia N and odor issues. Other issues included planting and seed germination (from planting into cover crop residues) and timely spraying for weeds.

Discussion

Farmers use a variety of means and sources to learn about and adopt practices, but our study confirms reports from past research that farmers learn well and readily adopt ideas from other farmers (Dillman, Engle, Long, & Lamimam, 1989; Knowler & Bradshaw, 2007; Sudermeier, Fallon, Schmalzried, & Sudermeier, 2009). Competitiveness seems to be evident in many of the quotes from famers, including the one from Lilley in which he expressed the sentiment "if another farmer can do it, I can too." As Extension educators, we should work with growers in our programs to tap into that competitive drive and work with and learn from innovators willing to try new techniques. Following suggestions by Peterson, Cassman, and Cantrell (2002), Extension personnel should create more hands-on training opportunities that allow other farmers to interact with innovators. Connecting interested farmers with experienced farmers can create good opportunities to effect change—showing interested farmers that the adoption happened as well as *how* it was implemented is crucial. Educators and crop advisors will likely be seen as useful resources, but our study indicates that ideas from and practical hands-on experience with influential farmers appears to be one of the most successful means for effecting change.

Sometimes identifying specific words not seen in a given word cloud is instructive. Missing from the "reasons to convert" word cloud (Figure 1) is identification of how no-till might help with increasingly variable weather patterns or weather variability. There was no mention of this factor when growers were asked the associated question. No-till production increases crop water availability in dry years, and intact worm channels allow cold wet soils to warm and drain the soil, facilitating early planting (Blanco-Canqui & Lal, 2008). In particular, no grower used terms such as resilience or climate change or soil quality in discussing reasons for adoption. In a previous research project in Maine, dairy producers showed less concern about increasingly variable weather patterns than other commodity groups (Jemison, Hall, Welcomer, & Haskell, 2014). Many of the participating farmers in that study said they used irrigation and/or tile drainage systems as management measures for reducing short-term risk, but few said the measures were based on climate change or increasingly unpredictable weather patterns (Jemison et al., 2014). Similar trends were found in our study. Only two farmers, Ward and Fogler, discussed improved soils and reduced erosion as primary reasons to produce using no-till. In our presentations related to no-till production, we first focused on economic benefits related to how no-till with cover crops allows earlier planting, permitting farmers to harvest their grass at peak quality. After making this point, we discussed how no-till can reduce risk from variable weather and protect soils in an increasingly variable climate.

Another key issue we found is that no farmers mentioned a yield loss associated with converting to no-till, even in the first years. Yield drag has been mentioned as a drawback of no-till production (Baker et al., 2007). That none of the early adopter farmers interviewed reported yield losses and four specifically mentioned yield improvement is important, and Extension educators' promoting an improved understanding of the relationships between no-till and yield should result in increased adoption of the method.

Identification of time savings and fuel savings as the biggest advantages of no-till was not surprising and is consistent with previous literature (Sudermeier et al., 2009). Discussion of improved N management was surprising due in part to the reported no-till disadvantage related to manure management. One participant noted that Cooperative Extension has a credibility issue because after years of our educating farmers to incorporate manure as soon as possible after application, we are now advocating surface application without tillage. More research is needed to understand manure N status in no-till systems with cover crops. In fact, we have initiated research in Vermont and Maine to address this topic.

Though words such as *resilience* were absent from the word clouds, this does not necessarily mean that resilience is not important to farmers. It is important within the framework of farm survival. Sudermeier et al. (2009) stated that economic survival is key to farmer success and that growers often first make decisions to improve that bottom line. Improved soil and environmental quality are important to farmers, but we did not see those as the key issues driving farmer change.

References

Attewell, P. (1992). Technology diffusion and organizational learning: The case of business computing. *Organization Science*, *3*(1), 1–19.

Baker, C. J., Saxton, K. E., Ritchie, W. R., Chamen, W. C. T., Reicosky, D. C., Ribeiro, M. F. S., . . . Hobbs, K. E. (2007). *No-tillage seeding in conservation agriculture* (2nd ed.). London, UK: Food and Agriculture Organization of the United Nations and CAB International.

Blanco-Canqui, H., & Lal, R. (2008). No-tillage and soil-profile carbon sequestration: On-farm assessment. *Soil Science Society of America Journal*, 72(3), 693–701.

Blanco-Canqui, H., Wienhold, B. J., Jin, V. L., Schmer, M. R., & Kibet, L. C. (2017). Long-term tillage impact on soil hydraulic properties. *Soil and Tillage Research*, *170*, 38–42.

Bronick, C. J., & Lal, R. (2005). Soil structure and management: A review. Geoderma, 124(1), 3–22.

Derpsch, R., Friedrich, T., Kassam, A., & Hongwen, L. (2010). Current status of adoption of no-till farming in the world and some of its main benefits. *International Journal of Agriculture and Biological Engineering*, 3(1), 1–25.

Dillman, D., Engle, C. F., Long, J. S., & Lamimam, C. E. (1989). Others influencing others. *Journal of Extension*, 27(1), Article 1FEA5. Available at: https://joe.org/joe/1989spring/a5.php

Huggins, D. R., & Reganold, J. P. (2008). No-till: The quiet revolution. Retrieved from https://www.ars.usda.gov/ARSUserFiles/20902500/DavidHuggins/NoTill.pdf

Jemison, J. M., Jr., Hall, D., Welcomer, S., & Haskell, J. (2014). How to communicate with farmers about climate change: Farmers' perceptions and adaptations to increasingly variable weather patterns in Maine (USA). *Journal of Agriculture, Food Systems, and Community Development*, 4(4), 57–70.

Knowler, D., & Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: A review and synthesis of recent research. *Food Policy*, *32*(1), 25–48.

Malone, S., Herbert, D. A., & Pheasant, S. (2009). Determining adoption of integrated pest management practices by grain farmers in Virginia. *Journal of Extension*, *42*(4), Article 4RIB6. Available at: https://www.joe.org/joe/2004august/rb6.php

Peterson, J. M., Cassman, K. G., & Cantrell, R. (2002). Changes in cultural practices of farmers in southeast Nebraska as a result of their adoption of transgenic crops. *Journal of Extension*, *40*(1), Article 1FEA5. Available at: https://www.joe.org/joe/2002february/a5.php

Rhoton, F. E. (2000). Influence of time on soil response to no-till practices. *Soil Science Society of American Journal*, *64*(2), 700–709.

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). New York, NY: Free Press.

Sudermeier, A., Fallon, L. F., Schmalzried, H. D., & Sudermeier, L. (2009). Conservation tillage: Repackaging the message for farmers. *Journal of Extension*, *47*(2), Article 2RIB6. Available at: https://www.joe.org/joe/2004august/rb6.php

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