



Agriculture and Human Values **18**: 391–401, 2001.

© 2001 Kluwer Academic Publishers. Printed in the Netherlands.

IN THE FIELD

Farming systems research: Flexible diversification of a small family farm in southeast Michigan

Michael Mascarenhas

Michigan State University, Department of Sociology, 316 Berkey Hall, East Lansing, Michigan, USA

Accepted in revised form April 1, 2001

Abstract. In an era where the dominant implicit farming policy has been “get big or get out,” Titus Farms provides an exemplar to the contrary. This paper explains the success story behind a medium-sized 145-acre fruit and vegetable family farm in southeast Michigan. Using agroecosystems analysis, this case study demonstrates a rigor and holism essential to farming systems research and analysis. In-depth interviews with the principal farm manager and owner were conducted during the fall and winter of 1999. Data, presented in the form of vignettes, provide context and ascribe meaning to the rich and imaginative voice of the small family farmer.¹ It is concluded that this success is directly attributed to the concept of flexible diversification. It is through flexible diversification that Titus Farms has imbued stability and sustainability seldom seen by similar family farms of this type, and for that reason alone, Titus Farms is a successful enterprise. As such, it presents a unique case study and opportunity for farming systems research analysis.

Key words: Alternative agriculture, Case study and sustainable agriculture, Farming systems research, Local knowledge

Michael Mascarenhas is a doctoral student in the Department of Sociology at Michigan State University. His interests include sociology of the environment, rural sociology, and science, technology, and society studies. Previous research involved evaluations of land and resources management planning processes in various forest communities in British Columbia, Canada.

Introduction

Agriculture in Michigan, and elsewhere in rural America, is in a state of flux and transformation. Technological innovations and industrialization of agricultural processes have profoundly altered the business, occupation, and traditional farming lifestyle in America. Wendell Berry (1995) explicates that the shift from a small scale labor-intensive lifestyle to a large scale, highly mechanized business has called for a reliance on chemical fertilizers, large capital outlays in equipment and machinery, and large farm sizes to justify the economies of scale. The “get big or get out” philosophy and implicit policy advocated by former Secretary of Agriculture Earl L. Butz seems to be a reality in rural America today: the result has been a proclivity towards bigger farms and fewer farms.

In 1900, the State of Michigan had 19 million acres of productive farmland. From 1952 to 1992, productive farmland acreage decreased by 39% to slightly over 10 million acres. In 1900, there were

approximately 203,000 farms in the state: currently there are only 46,500, one half the number in 1964 and less than a quarter of the number in 1940. Furthermore, nearly 70% of all the farmland lost has been concentrated in the southern half of the state, which ironically is also the most productive farmland (Skjaerlund and Norberg, 1994). Figure 1 potently illustrates the rate of decline of Michigan farms during the twentieth century.

Rates of decline, however, have not been the same for all farm sizes. The number of farms with acreage from 1–9 and 10–49 declined from 1954 to 1974 but have steadily increased since 1974. The largest decline has been from farms with 50–179 acres. These farms have markedly declined by 79% since 1954. Skjaerlund and Norberg (1994) attribute this decline to both mergers by larger, so-called more efficient operations and fragmentation into smaller residential tracts or subdivisions. Larger farms (500–900 acres and 1,000 acres or more), however, have steadily increased since 1970. Figure 2 provides a reasonable illustration of this bi-modal increase in small (1–9 and 10–49 acres) and

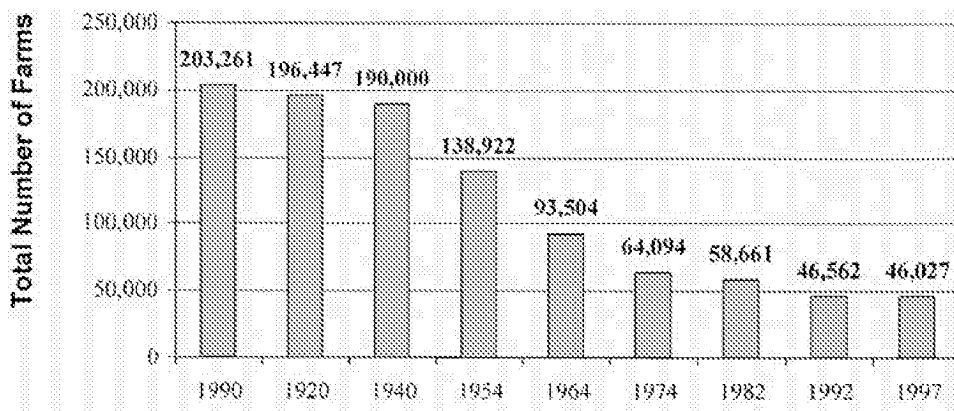


Figure 1. Michigan farms, 1900–1992.

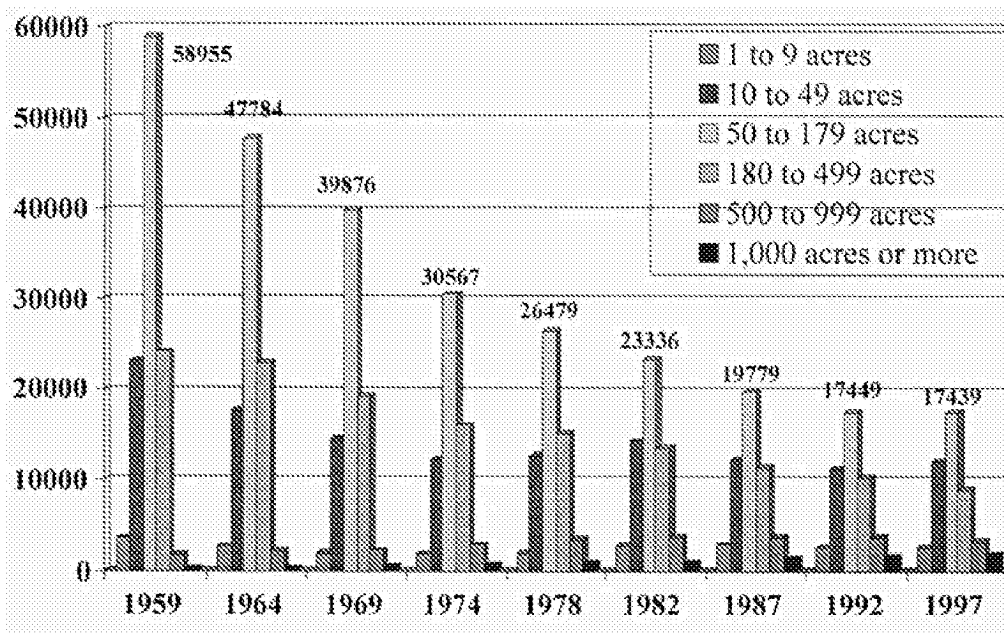


Figure 2. Number of farms in Michigan, by size of farms, 1959–1997 (US Bureau of the Census, Census of Agriculture).

large (500–900 and 1,000 acres or more) farm sizes and the drastic decrease of medium size farms (50–179 acres) from 1959 to 1997 (numbers denote the amount of medium size farms for that year).

The financial consequences associated with farming in Michigan are equally astounding. In 1992, the average value per farm of machinery, equipment, land, and buildings was over \$300,000, with average annual production expenses of more than \$55,000. However, in 1992, 57% of farms reported a net loss while only 21% of all farms reported a net income above \$10,000. Furthermore, in 1992, 60% of all farmers reported off-farm employment to augment their on-farm income (Skjaerlund and Norberg, 1994).

Titus Farms represents a unique aberration to these dominant agricultural trends in Michigan, and

elsewhere in America, of capital accumulation and corporate concentration. Despite being within the largest declining farm size group (50–179 acres) and located in an area with the greatest amount of farmland loss (nearly 70%), *Titus Farms* remains a highly profitable, stable, and successful second-generation 145-acre family farm. Much of this success can be attributed to what I will refer to as *flexible diversification*: the ability to recognize, understand, and accommodate the complex demands and pernicious shocks that impact the stability and sustainability of the farming system. It is through flexible diversification that this farming system has engendered stability and sustainability seldom seen by other farms of this type and for that reason *Titus Farms* is successful. As such, it presents a unique case study and opportunity

for farming systems research analysis. Furthermore, it provides a compelling alternative vision for the future of farming in America from a rich and imaginative alternative voice: the farmer's (Kloppenborg, 1991).

Method

In his review of a methodology for commodity systems analysis, William H. Friedland (1984) claimed that there was no single, specific, methodological procedure associated with farming systems research. My approach to farming systems research combines case study methodology with agroecosystem analysis. This strategy was specifically chosen to demonstrate a holistic approach and understanding essential to farming systems research. Consequently, this case study represents one of several ways of doing such social science research specific to farming systems research and analysis.

Unique to this case study approach, however, is the focus and application of local "farming" knowledge. According to Kloppenborg (1991), "knowledge is *local* in the sense that it is derived from the direct experience of a labor process which is itself shaped and delimited by the distinctive characteristics of a particular place with a unique social and physical environment." Similarly, Wendell Berry (1977) suggests that it is local knowledge that enables the competent farmer to master the "intricate formal patterns in ordering his work within the overlapping cycles – human and natural, controllable and uncontrollable – of the life of a farm." Furthermore, Kloppenborg (1991) advocates that a truly alternative agriculture requires at a minimum "the knowledge production capabilities of farmers who by their very survival outside conventional agriculture have already demonstrated their capacity for the generation of useful and workable alternatives."

The data used in the analysis was captured from two, semi-structured, in-depth interviews with Paul Titus, the principal owner and farmer of Titus Farms. The interviews were augmented with many informal conversations with Paul at the East Lansing Farmers Market and several phone calls to clarify ambiguities and answer specific questions during the data analysis process. The recorded interviews and notes compiled during the interview process were transcribed and analyzed using categorical aggregation. This data analysis procedure consists of moving from reading and memoing of the transcriptions to describing, classifying, and interpreting the data (Creswell, 1998).

The Titus Farms system

Titus Farms, located south of Mason, Michigan, has been in the family since 1865. Paul and Rose Titus share a partnership of 120 acres and farm an additional adjacent 25-acre plot located south of the main farm, owned by Paul's brother. The farming system owned and operated by the Titus family is characterized by many small plot units with significant variability in the size of production. Paul is the principal farm manager: he is responsible for all vegetable and fruit planting, farm equipment maintenance, chemical buying and seed production, and marketing and distribution. Rose is responsible for all business aspects of the farm and assists with the production of dried flowers, hanging baskets, Indian corn, and decorative wreaths.

Labor

Labor on Titus Farms is comprised of two groups of employees: full-time and part-time seasonal. The full-time staff is normally comprised of family members who reside near the farm: a brother-in-law, a sister-in-law, and another external family member, usually a cousin. These people are hired in early May and work until late October: the entire season. In the springtime when preparation, maintenance, and planting occur, these employees are paid on an hourly basis; however, for picking, which occupies most of the year, labor is strictly piecework. Titus Farms normally employs 11 part-time workers exclusively for picking from July to October. These seasonal employees are normally high school and college students and other surplus labor groups from the surrounding area interested in working flexible hours and/or temporary durations on a piece rate basis. Furthermore, in the fall months, neighbors often pick at the farm for "extra cash." Given the size of the farming operation and duration of the harvesting season Paul has refused to employ migrant workers in the past. However, this may change in the future. "It is really a mess as far as finding full-time help (pickers) through the summer and everyone (other farmers in the area) is in the same situation. Stuff (crops) just stays in the field sometimes. We lose crop sometimes because pickers don't show up."

This lack of a skilled and steady labor force has been a source of much consternation for Paul and a continuing problem of social relations of production for this farming system. In spite of adhering to piece-rate recommendations provided by the State of Michigan, Paul is unable to maintain a stable workforce. For example, the State rate for tomatoes is \$1 per bushel and the average person should be able to pick fifteen bushels per hour. According to Paul, "a person could make between \$25–\$30 per hour if they wanted"

(picking tomatoes); however, “most people cannot take the heat and physical labor and leave after one or two days.” This has provoked Paul to consider mechanically based harvesting procedures. Paul explains this decision in this way:

... the vegetable, apples, and cherry farmers are moving to shakers to harvest their crops. We have friends up north (with a cherry farm) that have gone to a shaker, where they shake the trees. It cuts out labor. They have sweet corn (harvesters), they got tomato harvesters and they got string bean harvesters, (and) as we [the small family farmer] stay in it we [the small family farmer] will just mechanize more and more.

Yet hand picking is a lot nicer. You get a lot nicer produce (with hand picking). Furthermore, any time you run a machine (on the land) you get vibrating and damage to branches, and you get more throw-away. But on the other hand, you may have 10% throw-away but that cuts out three (pickers), you add this up, and oh boy, we can afford to throw this away, that 10%, for this production

Although Titus Farms has not moved to a mechanized harvesting practice as of yet, it is an option they may consider in the future. Paul forecasts the following about the production component of this farming system:

If the economy continues to be as good as it has been, we may have to mechanize. Because in this economic climate there are a lot of jobs that will pay much more than people can make picking fruits and vegetables. However, if the economy slows a little, we may be able to keep enough pickers employed and not have to acquire harvesting machinery. It's hard to say.

The issue of labor has also affected the duration and scheduling of the Titus harvesting operation. Paul has his employees harvest a field for a specific period of time, usually three pickings of two or three weeks, and then they move to another field. The rationale for this strategy is further given as follows:

That way, you do not discourage your pickers, either. Towards the end of these fields, they are not making as much money as they are used to and then they don't want to come to work. They want to make at least \$10 an hour and so would I. This way it keeps their [the employees] production up and when they move into a new field they get that high production. You get more waste, but that is the name of the game. But you kind of write that off, as far as stuff left in the fields. And all the farmers are doing it. We probably waste at least 10%.

Paul's ability to understand and anticipate economic fluctuations allows Titus Farms to forestall labor shortages and maintain adequate harvesting levels. Moreover, it increases the predictability and overall stability of the labor component of this farming system. On the other hand, his inability to maintain a skilled and steady workforce provides a powerful illustration of the continuing problems of social relations of production on family farms and their dependency on surplus labor, and other aspects of market capitalism.

Production

The diversity and integration of Titus Farms is very intelligent and imbues flexible diversification. There are four distinct product groupings that are comprised of thirteen different vegetables, five types of fruit, wheat, and a variety of value added products, such as fresh cut and dried flowers, hanging baskets, pine trees, Indian corn, and decorative wreaths. Figures 3, 4, and 5 show the specific varieties and corresponding acreage.

Production is organized around crop diversity, harvesting efficiency, and employee issues. Automated greenhouse growing occurs from February to April. The typical calendar year begins in early February with *startings* of flowers, tomatoes, and peppers. Then in March, other types of flowers and more tomatoes are planted. Finally in April, there is a third planting of tomatoes, along with other faster ripening vegetables. The greenhouse planting is staggered and scheduled so that specific fields will harvest together. In addition, Paul uses *determinant tomatoes*, which all harvest at the same time, thereby shortening the harvest duration and minimizing employment costs.

Soil samples are taken each year and analyzed by Michigan State University's Agricultural Extension and fertilizer is added to ground in the fall. “We use a lot of compost,” states Paul. This is generated from the organic waste produced on the farm, which is mixed with cattle and horse manure from nearby farms to produce an economical and highly effective composting system. The variation in soil composition is described by Paul in the following way:

... we probably have eight to ten different types of soil. It will vary, on this little chunk here. This is sand, that is the reason why the (pine) trees are there. When you get into the back half (of the field) there are 7–10-acres of lake-bottom and that is black muck. And over in that corner where the pumpkins are: that is blue clay. We have got red clay over on another 20 acres. We almost have to have it. We raise potatoes, cabbage, and onions all in that loose muck:

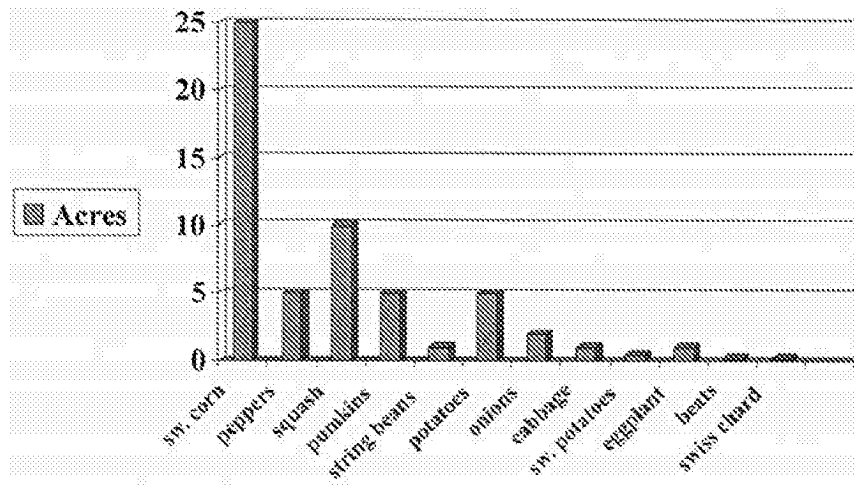


Figure 3. Vegetable varieties.

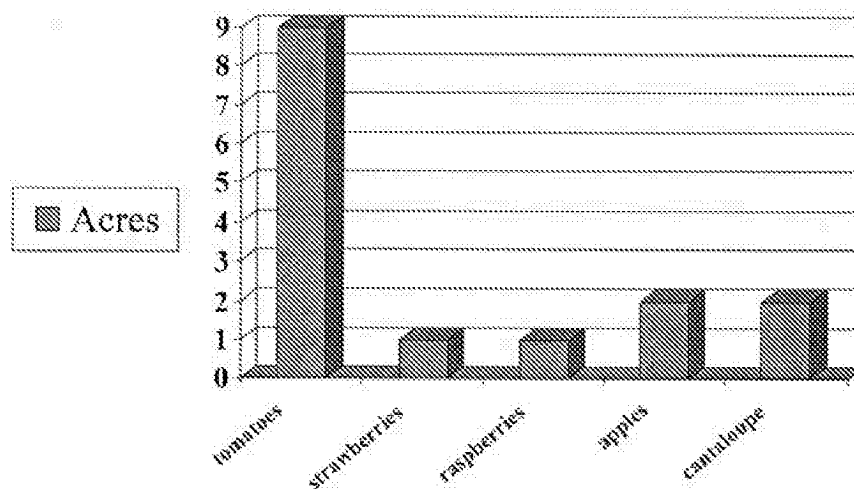


Figure 4. Fruit varieties.

that is lake bottom beds, with seashells, (you have) a nice high acid, excellent, and there is plenty of water.

Currently irrigation occurs on approximately half of the farm. "Next year we want to go to 70% irrigation," states Paul. This strategy will secure greater flexibility of the farming system, in terms of production scheduling and crop varieties, and imbue more resilience to minor meteorological changes and droughts.

By producing a large amount of the fertility and energy to sustain the farming operation on the farm, Titus Farms has been able to minimize their dependence on industrial supplies and purchased goods and services. This approach to production corresponds to what Wendell Berry (1995) refers to as "appropriate agricultural technology." This technology enables the diversification of economies, methods, and species to

conform to the diverse kinds of lands and aspire to make each farm as far as possible the source of its own operating energy (Berry, 1995).

Figure 6 provides a simplified representation of the energy flow through all the relevant components of the Titus Farms ecosystem. The symbols used in this diagram are those employed by H. T. Odum (1971).

This representation of the energy flow of the Titus Farm ecosystem is purely descriptive, since specific empirical data was not collected during this research. However, the value of this approach is that it provides the reader with a sense of the general flow of energy in this system. Comprehension of these diagrams is engendered not only from the words and arrows but also by knowing the conventional meanings of the symbols. The legend below explains the relevant symbols.

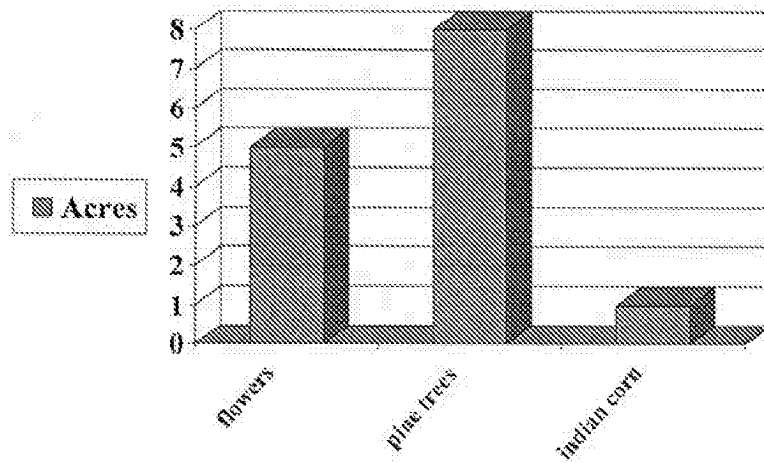


Figure 5. Value-added varieties.

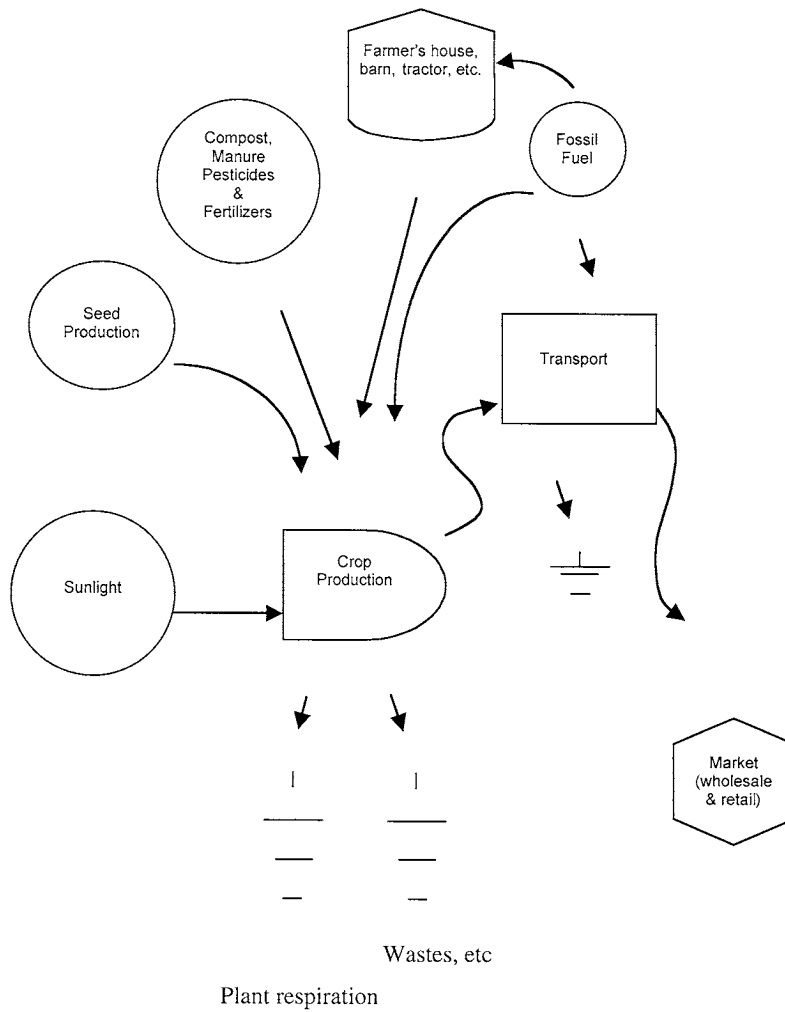


Figure 6. Simplified representation of the energy flow of the Titus Farms ecosystem.


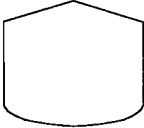

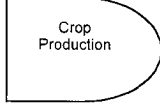
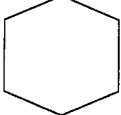
Symbol	Meaning
	Energy source from outside system such as sunlight or fossil fuel
	Energy storage. Dead wood and litter are types of energy of energy storage in ecosystems
	Heat Sink. This symbol represents the loss of maintenance energy as heat. Depending on the system it can also be used as wasted energy, such as unharvested grain in the human food system.
	Production subsystem
	Consumption subsystem

Figure 7. The symbols and meanings of the H. T. Odum's energy flow diagrams.

Marketing and distribution

Wendell Berry (1977) states that "if farmers hope to exercise any control over their markets, in a time when a global economy and global transportation make it possible for the products of any region to be undersold by the products of any other region, then they will have to look to local markets." Titus Farms has done just that: supplying Mid-Michigan restaurants, small retail markets, local farmers markets, and roadside stands in adjacent towns and cities. Paul claims

... you need a broker to deal with larger retail chains, such as, Meijers, Kroger, etc. You didn't need one 20 years ago. The broker takes a percentage, therefore, lowering the profitability. So we ship directly to retail or market.

Figure 8 illustrates the external linkages of Titus Farms.

Titus Farms distribute their products to retail farmers' markets in Okemos, Howell, Jackson, and Ann Arbor, a geographic range of five to sixty miles, respectively. Approximately, 70% of production is sold at retail farmers' markets and roadside stands while 30% is sold at wholesale to the small retail stores such as Horrocks, Van Houtans, and Lansing Gardens. On average, a box of tomatoes yields between three to five dollars from wholesale buyers and twenty five to thirty dollars at retail. This has motivated Paul to "deal with it from beginning to end."

We make up our own prices. We usually determine that (the price) on how the (local) gardeners [hobby farmers] are doing. As dry as it has been (that means) the gardens are not doing well this year. So that means there is going to be a shortage of local produce. So people will be down to the markets more buying produce. So we can keep our prices

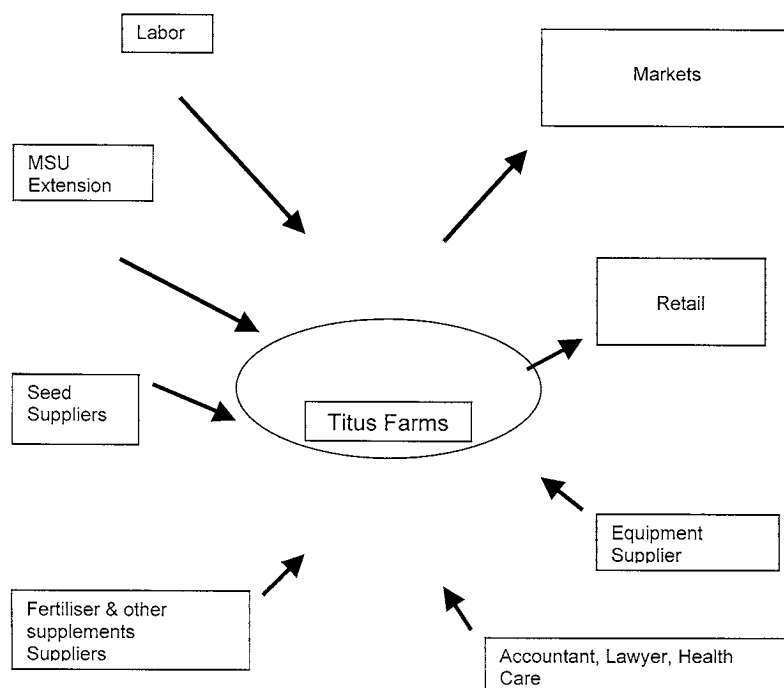


Figure 8. External linkages of Titus Farms.

up. It is supply and demand when it comes down to it.

Paul makes the following comment in regard to the role of product diversity:

... we gross more (with) sweet corn and tomatoes, however profit-wise flowers are the best. She [Rose Titus] can move just about all the flowers that we take and that is a very low labor (when compared to other crops, fruits, or vegetables produced on the farm). Usually we hire just one girl that helps us out during the summer (to prune, pick, and arrange them). The biggest (most time consuming and hence most costly) thing is arranging them.

By looking to local retail and wholesale markets, Titus Farms have been able to control and determine the distribution and marketing of their products. This control has empowered the small family farm to carve out niche markets in an otherwise standardized and concentrated market sector.

Agroecosystem analysis

According to Conway (1994), common notions of sustainable agriculture, as defined in the Bruntland Report (WCDE, 1987), are too abstract for farming systems research because they do not provide a framework and approach that is scientific, open to

hypothesis testing and experimentation, and practicable. Conway (1994) claims that an interdisciplinary approach and analysis, essential to farming systems research, can be expressed in four agroecosystem properties: productivity, stability, sustainability, and equitability. Stability and sustainability are of particular relevance to this case study and are examined further in understanding and interpreting the success of the Titus family farm.

Stability

Stability refers to the constancy of production in the face of relatively minor and commonplace disturbing forces arising from the normal fluctuations and cycles in the surrounding environment (Conway, 1994). Defenses adopted by Titus Farms to instill an element of constancy against these minor stresses include maintenance ownership, experimentation and adaptive management practices, crop diversity, and a healthy business acumen. With regards to maintenance, Paul stated the following:

I do all the maintenance. We have a shop and we can do everything except grind out our own heads. You got to now, you can't afford not to. Farmers now can't afford to take things in to get repaired at fifty to sixty dollars per hour. (To have a mechanic) take a rear-end out of a tractor, even a smaller one, it would cost you \$3,000. A big one would cost you \$9,000, just the rear end gears. We have done it for

so long. We do all our own truck maintenance and tire changing. (We have) portable welders, we have everything hooked up so we can go right out into the field with them. You have to, if you don't, you don't stay in business. You just can't afford not to do that because (the) costs (of paying someone) are so high.

Paul says the following about his adaptive management style:

You do a lot of experimental work. This year we used red plastic (to reflect the sunlight and incubate the plant) on some of our steak tomatoes. That helped us: it boosted us up about five days earlier. Any time you can get to the market earlier you can get those premium prices. So we put in five rows. You always want to learn, any time you are in business, you want to listen, try it small and then (you make a decision) . . . Everybody is out there to sell you something . . . this plastic is \$140–\$150 a roll and they want to sell you 500 rolls. I said you just give me two rolls and we will try it and if it works I will buy a little more. You could go out there and spend \$10,000 and find out that this didn't help me a bit. You learn that in a hurry. The same with seeds. When you go to these big conferences around (in January and February). Every seed company says their seeds (are) the best.

Paul's business philosophy is summarized well in the following quote:

This type of operation you have got to be in a lot of different things and not just put all your eggs in one basket and say I am just going to raise sweet corn, I am going to do 50 acres of sweet corn and I am going to make all this money because you just don't anymore. That is a hard way to go. You do all these small things. You may not make \$50,000 on one thing, but each time you do \$10,000 here and \$5,000 there and \$9,000 here and then you go, boy, this all adds up in a hurry.

Paul's healthy business acumen is further expressed in the following comment:

The last two-years have been real good. People got money and when people got money, they spend money. And we have got out of more tomatoes and sweet corn because people expect that to be cheap. Flowers and decorative stuff: people never say anything about the price. The same thing with hanging baskets and flower arrangements. Even if it is \$30. We make these huge wreaths out of grape veins and stuff for \$50 to \$75 and we sell thousands of dollars of them in the fall and spring with arrangements and stuff in them.

This is playing the game. We have learned that over the last 20 years. You have to out guess that customer. We go to Hudson's, we go out east and places where other markets are (located) and we watch what the customers are buying. We watch the color schemes. We have to watch that because we need to know what color they (the customer) will want (in the dried flower arrangements and wreaths).

Maintenance and reparation of farming equipment, experimentation and adaptive management practices, crop diversity, and a healthy business acumen contribute to the flexible diversification of this farming system. This strategy has engendered stability in the face of relatively minor and commonplace disturbing forces arising from the normal fluctuations and cycles in the surrounding environment.

Sustainability

According to Conway (1994), agroecosystems can be subject to major disturbing forces that can cause productivity to fall well below its previous level. "If productivity does fall, it may recover either to its original level or to a new lower level, or in extreme circumstances it may cease altogether" (Conway, 1994). Sustainability is the ability of the farming system to maintain productivity when subject to such major disturbing forces or shocks (Conway, 1994). Flexible diversity is Titus Farms' key defense to major shocks.

Paul states the following about two previous shocks: the drought in 1986 and the farming depression during the seventies.

In 1986: that drought year, it took us two years to recover from that. It hit us hard. (But) we lived through the seventies when things were really slow here. People were moving out of this state fast. You could buy things (land and farming equipment) really cheap (because so many farmers were foreclosing their operations). We went back (and started to produce basic fruits and vegetables) and we made good money. People were not willing to spend a lot but they needed the basics. Then people decided that they were going to can (fruits and vegetables because they were too expensive in the stores). So we went back to tomatoes, sweet corn, and the basic fruits and vegetables (popular canning varieties). So we really diversified (and were able to take advantage of these shocks).

Paul explains further:

We were strictly all crop years ago and I said, this is not a good idea. And that was the best thing we've ever done. That was about 20 years ago. We started

going into more and more produce and I am sure glad we did now. We would have been in rough shape if we didn't. So we diversified and we can change really quickly from year to year. If we know about it (a shock) by April, we could change right back again. For example, if the stock markets go down and things slow a little bit, we would push the vegetables and stay down on the flowers. We can do that right up until April for that summer.

Paul's ability to understand major disturbing forces and shocks and maintain productivity when subject to them has engendered a sustainable farming system. Through flexible diversification, Paul is able to forestall major changes in consumer demand by maintaining adequate product variety, and diversifying or curtailing specific harvesting levels. In certain instances, a response can be implemented within the particular growing season in which the shock or disturbance occurs. This sort of sustainability is rarely seen in commercial farming systems, of any size, in North America.

This agroecosystems analysis has defined stability and sustainability in terms of both their biophysical and their socio-economic components and consequently helps to foster a genuine interdisciplinary approach to agricultural systems analysis (Conway, 1990). This approach was necessary in order to understand the alternative agricultural approach, "in all its idiosyncratic complexity" (Kloppenburg, 1991), of the Titus family farm.

Summary

Despite being within the largest declining farm size group and located in an area with the greatest amount of farmland loss in Michigan, Titus Farms remains a highly successful second generation family farm. Much of this success can be attributed to what I referred to as flexible diversification: the ability to recognize, understand, and accommodate the complex demands and pernicious shocks that impact the stability and sustainability of the farming system in a global market economy. It is through flexible diversification that this farming systems has engendered a paragon of stability and sustainability seldom seen by other farms of this type and for that reason Titus Farms is successful. The following quote by Paul Titus epitomizes the aberrance of this success story:

Most of the crop farmers borrow money in the Spring. We are strictly cash. We pay everything in cash. Buy our equipment in cash. Pay our taxes even in cash. We buy all our fuel once a year and we are the only ones who pay cash (for it).

Wendell Berry identifies two complementary components of a successful family farm. First, farmers must farm in ways that minimize their dependence on industrial supplies and second, farmers must look to local markets (Berry, 1995). Titus Farms is successful because they have learned to farm in ways that minimize their dependence on industrial supplies; to increase production without increasing costs; to produce fertility and energy on the farm; and to diversify. Furthermore, they have re-established the lines between farmland and local markets, thereby creating a niche for local, quality produce and crafts.

Titus Farms represents an alternative, sustainable, regenerative, low-input, diversified agricultural system (Kloppenburg, 1991). The concept of flexible diversification has been essential in elucidating these nuances. For that reason, it can be a very potent and effective concept to social scientists engaged in farming systems research. Flexible diversification also challenges the dominant farming paradigm of "get big or get out" by profiling a refreshing alternative in the form of a successful example that opposes the doom and gloom theme that typifies farming and the farm industry in America.

Note

1. This term was first suggested to me by William Friedland during our conversation about successful family farms at the Rural Sociological Society Annual Meeting, Washington, DC, August 13–17, 2000.

References

- Berry, W. (1977). *The Unsettling of America*. San Francisco: Sierra Club Books.
- Berry, W. (1995). *Another Turn of the Crank*. Washington, DC: Counterpoint.
- Brewer, R. (1988). *The Science of Ecology*. San Diego, California: Saunders College Publishing.
- Conway, G. R. (1990). "Agroecosystems." In J. G. Jones and P. R. Street (eds.), *Systems Theory Applied to Agriculture and the Food Chain* (pp. 205–233). New York: Elsevier Science Publishing.
- Conway, G. R. (1994). "Sustainability in agricultural development: Trade-offs between productivity, stability and equitability." *Journal of Farming Systems Research Extension* 4(2): 1–14.
- Creswell, J. W. (1998). *Qualitative Inquiry and Research Design; Choosing Among Five Traditions*. Thousand Oaks, California: Sage Publications.
- Friedland, W. H. (1984). "Commodity systems analysis: An approach to the sociology of agriculture." *Research in Rural Sociology and Development* 1: 221–235.

- Kloppenborg, J. (1991). "Social theory and the de/reconstruction of agricultural science: Local knowledge for an alternative agriculture." *Rural Sociology* 56(4): 519–548.
- Odum, H. T. (1971). *Environment, Power, and Society*. New York: Wiley-Interscience Publishing.
- Skjaerlund, D. and D. Norberg (1994). *Agriculture Trends Michigan Society of Planning Officials Trend Future Project*. Rochester, Michigan: Planning and Zoning Center.

World Commission on Environment and Development (WCED) (1987). *Our Common Future* London: Oxford University Press.

Address for correspondence: Michael Mascarenhas, Michigan State University, Department of Sociology, 316 Berkey Hall, East Lansing, MI 48824-1111, USA
Phone: +1-517-337-2889; E-mail: mascare5@msu.edu

