Department of Agriculture, Trade and Consumer Protection

Division of Marketing

Agricultural Development & Diversification Program (ADD)

2000 Grant Project Final Report

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Grant Project Title: Community Supported Agriculture

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Agricultural Development and Diversification Grant Program

Final Report

(January 1, 2002)

Project Name: Community Supported Agricultural Diversification

Grant Recipient: Golden Sands Resource Conservation and Development (RC&D) Council, Inc.

Original Intent of Project…

The original intent of this project is to:

A) Help interested farmers learn more about groundwater-friendly alternative crops that are suited to this climate.

B) Connect farmers with the technical resources necessary to grow these alternative crops.

C) Bring the economic development and lending entities together with the farmers to create local markets for their products.

D) Develop agro-ecosystem diversification plans with 10 area farmers.

E) Foster one model partnership between farmers, lenders and economic development personnel.

Introduction....

This project was funded through an Agricultural Development and Diversification (ADD) Program grant from the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) to address the need to bolster farm economics through diversification while addressing water quality issues. The grant was awarded to and administered by the Golden Sands Resource Conservation and Development (RC&D) Council, Inc., a 501(C) 3, non-profit corporation working in nine Central Wisconsin counties since 1972. The project addressed the following objectives of the Marketing Division of the Wisconsin Department of Agriculture, Trade and Consumer Protection: *a) Diversification of the production of agricultural products, b) Market development for agricultural products, and c) "Production models that speak to sustainable practices and enhance economic returns to farmers*".

History...

In the Central Sands area of Wisconsin, it has been determined that growing the typical vegetable crops (potatoes, sweet corn and snap beans) results in nitrate contamination of groundwater beyond drinking water standards, even with so-called BMP's like irrigation scheduling and following UWEX fertilizer recommendations. The consensus among groundwater "experts" is that the type of crop grown has a greater impact on groundwater contamination than do the cultural practices used in crop production. Growing low nitrogen-demanding crops would result in the greatest reduction in nitrate contamination. In the case of municipalities that get their drinking water from deep wells located within their city, the groundwater recharge area is often in close proximity to the city's economic center. Hence, it makes sense that municipalities would be willing to protect the quality of their drinking water supply by helping farmers market groundwater-friendly crops that can be grown within the recharge area and marketed to businesses in town. Preliminary discussions with officials from Stevens Point and Plover indicated that they supported this theory. In addition, a meeting with local area growers indicated that they were interested as well.

Goal...
The goal of the project is to facilitate the creation of a new, value-added process that fosters community support for diversified, sustainable, groundwater-friendly agriculture and results in a model organizational structure where interested farmers can enter into a partnership with economic development entities, gain community support and solidify local markets to add value to the crops they raise.

Project Description...
1. Develop a list of alternative crops that serve the growing consumer demand and can be grown in this geographic area.
2. Meet with 15-20 area farmers and gather their ideas about the theoretical production of the crops listed in #1 above. Get 10 farmers to agree on 4-5 crops that may be infused into their current operation.
3. Develop diversified crop plans for 10 cooperating farmers.
4. Bring farmers, lenders and economic development staff together to develop market strategies and a business start-up plan.
5. Submit final report to DATCP.

Results...

A grower meeting was set up for 12/19/00 in Stevens Point. The invitees were mainly vegetable growers from the Stevens Point/Plover area. There was one local dairy farmer. The project was outlined to them and they were asked for general input. There seemed to be genuine interest in the general scope of the project. Many items were discussed related to the project. There was discussion regarding dry edible beans, alfalfa, alternative fiber crops, soybeans and others. One participant felt that whole systems would be the way to go. For instance; incorporate a large dairy operation with a soybean processing facility so there is a place to go with the excess meal. The same could be done with alfalfa. The perception of large-scale agriculture was also discussed. It was felt that the public needs to be educated and perceptions changed for some projects to work.

A meeting was set up with Roger Hilliard of Soyco, LLC. He went through the process used to extract the oil and produce the meal. They are interested in providing the raw materials to others, but realize that they may need to add value on their own. The oil seems to have a good market, but at this point does not seem to have enough value to be able to carry the meal if the meal is sold at commodity prices. At this time they need $30-60/ton over commodity price and the local livestock/dairy will not pay it. They produce some value-added products and have some small markets but they need to be expanded. The main problem that they face is in marketing, especially the meal at a price to break even.

A second meeting was set up with two of Soyco's board of directors. They were asked about their feelings, and their sense of the rest of the members feelings, about expanding the size of the operation and the number of grower members. This would give them some capital to explore more product uses and markets. I got the feeling they would be happy to explore this possibility, they want to see the business succeed. After this meeting, contact was made with growers that participated in the original grower meeting on 12/19/2000. They were asked their opinion about a large scale operation of this nature in the area. Again, the feedback was positive. When asked if they would be willing to serve on a committee to explore possibilities like this, they were not willing to participate.

So far soybeans have been the main focus of investigation. This is a crop that many growers are

familiar with and are comfortable growing. This crop fits the goals of the grant and is an expanding use crop, especially in the human food products area and in the industrial area as biofuels, adhesives, inks, etc. There is also work being done to use soybean meal to replace some of the fish meal in feeds for the rapidly growing aquaculture industry. Barriers for this crop include widespread competition in the marketplace, and growers in this area that do not have a basis for LDP payments.

The second area of research has been in alfalfa. Again, this is a crop that area growers are comfortable with. This is a nice crop for the area and also fits very well into the scope of the project. Again, the uses for alfalfa are ever expanding. It has the standard value as a widely-used forage, but the value can be increased if it is pelleted or cubed. The crop can be wet fractionated and there are estimates that the liquid portion has a value of $1000/A. This can be in the form of protein concentrates for humans and animals, other feed supplements, cosmetics, industrial enzymes, etc. The fiber portion also has many uses such as custom fiber content feeds, building materials such as fiberboard, pulp for paper, using for direct combustion to generate electricity or use emerging modern technologies for cellulose digestion to render the fiber available for ethanol production. One question for this crop with vegetable growers is will it fit into their existing rotation? At least two years are needed for efficient alfalfa production and maybe three.

Other ‘alternative’ crops are out there and would fit well into the scope of the grant. These are mostly legumes that would reduce nitrogen use the most. Barriers are mainly in the limited market available for these crops, knowledge in the agronomic needs, and specialized equipment that may be needed. Research into the practicality of hemp fiber for paper is ongoing, However, from the limited agronomic information found on hemp suggests that it requires fairly high fertility and is a poor user of nitrogen. If this is true, it would not be a suitable crop.

Alfalfa

Alfalfa is widely grown in this region and area growers are familiar and comfortable with growing this crop. Alfalfa is one of the best crops that would fit well into the program for reducing nitrates in the groundwater and also for reducing area pesticide usage.

The main use for alfalfa has been a hay and silage crop for livestock, and personal communications with crop consultants from around the state indicate that there is a good demand for good quality alfalfa for livestock. Alfalfa can also be dried, ground and pelleted and marketed as a feed for other animals such as rabbits and small pets. Larger cubes can be made to produce a feed for horses and cattle that is more easily shipped and stored. All of these products produce some increased value opportunities but the cost of production also goes up.

Nontraditional Uses for Alfalfa

There are many new or non-traditional being developed for alfalfa. Wet fractionation is a process where fresh alfalfa is pressed and the wet or liquid fraction is separated from the dry or fiber fraction. There are more and more uses for each fraction being developed. Estimates for the value of products utilizing the liquid portion, which include enzymes, carotenoids and protein, are up to $1000/A gross. These products can be in the form of protein concentrates for humans and animals, other feed supplement extracts, cosmetics, industrial enzymes, etc. Alfalfa may be important in biotechnology since it is easily grown and regenerated in cell culture and is receptive to genetic modification.

Research is well under way to use alfalfa to produce industrial enzymes in this manner which would be recovered by fractionation and extraction.

The fiber portion also has many uses such as custom fiber content feeds, building materials such as fiberboard, pulp for paper, direct combustion to generate electricity. New enzyme technologies are emerging for cellulose digestion to render the fiber available for ethanol or lactic acid production. Lactic acid is used in the manufacture of plastics. 100 pounds of fiber can produce 60# of lactic acid with a value of $1.00/#. However, the cost would need to be 1/3 of that before the major manufacturers like Cargill or Dow would purchase it. With both ethanol and lactic acid production from fiber, the cost of the enzymes needed at this time are too expensive to economically produce these materials. Research and time are needed before it becomes feasible. However, an existing ethanol production facility could easily be converted from corn to fiber with minor modification.

Soybeans

Soybeans are a crop that many area growers are familiar with and are comfortable growing. This crop is a great fit for the goals of reducing groundwater nitrate levels. Soybeans are inoculated with nitrogen fixing bacteria before planting and many are grown with little or no additional nitrogen application. The pesticide usage is also minimal compared to some of the other crops grown in this area, making it fit the goals even better.

The uses for this crop are rapidly expanding. especially in the areas of human food products and in industrial uses. As the nutritional benefits of soy as a quality food product are becoming better known, the demand for high quality food grade soybeans is increasing. Much of the demand is for export but local demand is also increasing and may become a significant share of the demand. These are in addition to the traditional soybean oil market.

Industrial uses of the oil include biofuels, adhesives, inks, resins, detergents and many others. Examples of other products derived from soy include building boards, cosmetics, wood binders, etc.

Of course, soybean utilization for animal feed products are widely recognized, but uses in this area are also increasing. For example, there is work being done to use soybean meal to replace some of the fish meal in feeds for the rapidly growing aquaculture industry. This has been done in the feeds used for herbivorous fish, but lately research has been expanded into feeds for carnivorous species also.

Barriers for growing this crop profitably include widespread competition in the marketplace for standard commodity soybeans, and many growers in this area that have not grown this crop do not have a basis for LDP payments. The small food-grade niche markets are where the value is high enough to make this an attractive crop for the Central Sands area, but growers must be willing to find these markets.

There is one local example of a small cooperative where several growers got together to process their soybeans themselves. They mechanically extract the oil without solvents, leaving a high quality meal that can be marketed to local dairy or livestock operations or processed into any number of nutritious products for human consumption. The problem this small group is having is in marketing. They are mainly interested in providing the raw meal and oil to others, but realize that they may need to add value on their own. The oil seems to have a good market, but at this point does not seem to have enough value to be able to carry the meal if the meal is sold at commodity prices. At this time they need $30-60/ton over commodity price for the soybean meal and the local livestock/dairy industry will

not pay this. They produce some value-added products and have some small markets but they need to be expanded.

Fiber and Pulp Crops

Several crops have been investigated for use in producing fiber for pulp for paper production and other fiber products. The three main fiber crops that have been researched for this project are hemp, kenaf and hybrid poplar. Cereal grains such as wheat, barley and corn have also been looked at for fiber production and will be briefly mentioned below.

Hemp

Hemp is the fiber crop that has had the most publicity lately, probably as much from the legal status as from its value as a fiber crop. Hemp is a form of Cannibis sativa or marijuana. Even though the form that is referred to as industrial hemp has virtually none of the compound responsible for the psychoactive properties of marijuana, federal drug agencies are against letting this fiber crop become legal. Part of the resistance is because they say they would not be able to tell the difference between marijuana the drug, and hemp the fiber crop. This really is not a valid argument because the two crops must be planted and grown differently to maximize the production of each. Hemp is a tall crop planted with a very close spacing so as to maximize the size and number of stems from which the fiber is derived, marijuana is grown much shorter and planted with a wide spacing to maximize leaves and blooms.

Hemp has been used historically as a source of strong fiber, mainly in the manufacture of rope. The seeds have long been used as an oil source and are still used in bird seed. Uses for the fiber now include textiles, paper, and composite wood products. The oil can be used as most seed oils can for cooking oil, detergents, and dietary supplements. The meal that remains is used for feed, flour, snack foods and many other useful products.

As the strong history of industrial hemp growing in Wisconsin confirms, the climate here is very suitable for the production of hemp. It prefers a moderate climate with adequate rainfall. A fine seedbed, easily done in this area, is important for good germination. The location of the area papermaking facilities is a big plus for growing industrial hemp in this area. The major drawback for hemp for this area is the nutrient requirements. Information gathered indicates that this crop requires moderate amounts of nitrogen and it may be a poor user of N. Hemp may not, therefore, be a good crop to use to reduce nitrates in the groundwater, but could be a valuable alternative crop for area growers.

Kenaf

Kenaf is a more recent addition in the U. S. fiber crop industry. This crop is related to okra and cotton. It grows like hemp, usually with a single stem to a height of 12 -14 feet. It has traditionally been processed in a similar manner, by retting. After retting, the long fibers are mechanically separated from the short fibers. Most of the uses have centered around the short soft fibers, or bast. Bast fiber can be used in paper, blended with plastics for molding, used in textiles and many other products. The core, or long fibers are used as oil absorbents and soil-less potting mixes.
The growing conditions in Wisconsin may limit maximum production but varieties are being developed that may do very well in this part of the country. Kenaf, like hemp, would be a nice addition

to the crops available to Wisconsin farmers, but probably would not fit well into a plan for reducing groundwater nitrates in the Central Sands.

Hybrid poplar

The growing of hybrid poplar for pulp and paper production or for structural and/or fiberboard manufacture has been studied in Wisconsin for some time. Whether this crop would ever be a viable one for the high value vegetable production areas of Central Wisconsin remains to be seen. Changing over to a long (8-15 year) rotation crop is difficult for area growers. Concerns over the returns are probably the main hindrance, but with new varieties that mature in less than 8 years, there may be some new interest in taking a look at this crop. Also attractive is the proximity of the paper mills that could utilize this crop.

Hybrid Poplar would be one of the best crops for groundwater nitrate reduction in central Wisconsin. This is a long term crop that would require little or no fertilizer inputs and would probably mine nitrates from the water table.

Grain Straws

Wheat, barley, corn and other cereal straws have also been studied for fiber production. The advantage of using agriculture residues is that there is already a return to the grower for the grain produced. However, the fiber is not the best available for paper production but it has been used for lower quality papers. The fibers are also higher in silica, which can be a problem for paper production. There are several plants in the upper mid-west that are already using the grain straws in the manufacture of fiberboard and other building materials.

Central Wisconsin has a good climate for cereal grain production. The nitrogen input requirements vary depending on the crop, but they are generally less than the currently grown vegetable crops. Increasing the acreage of grains would be a positive step in the reduction of nitrates in our area groundwater.

Please use the following questions as a guide for your grant project final report. Answer each question that relates to your grant project. Please type the final report and mail it to the ADD office along with your final invoice.

1) Describe the original intent of the grant project.

- **How was it projected to benefit Wisconsin Agriculture?** We hoped that this project would place irrigated agriculture at the forefront of innovative discussions and partnerships that would allow its economic growth while protecting and improving groundwater quality.
- **Was it necessary to adjust the objectives during the project?** Yes - the farmers that originally agreed to cooperate with us and who identified certain crops as having potential changed their philosophies and outlook based on commodity prices and (what I felt was) peer pressure. This forced us to focus more on gathering data about alternative crops and producing hypothetical scenarios that might have value for municipalities who wish to work with farmers to grow groundwater-friendly crops.

2) Describe the work conducted in this project.

- **How did the grant funds assist you in this project?** The grant funds allowed us to contract with Pest Pros., Inc., a well known entity that has experience and credibility working with vegetable growers in Central Wisconsin and facilitated their ability to explore alternative agriculture options and discuss them with growers.
- **What successes did you achieve with this grant project?** Our successes were in two areas: 1) We explored and documented which alternative crops are suited to this climate, have economic viability and will minimize non-point source pollution of nitrates to groundwater; 2) We were able to convince Village of Plover officials that a viable way of reducing nitrate contamination of their drinking water supply is to attract and nurture markets for groundwater-friendly crops that farmers can grow within their municipal groundwater recharge area.
- **What challenges did you face with your grant project?** We faced two major challenges: 1) The challenge of getting farmers to work collectively to form co-ops or similar composite organizations that can combine resources to find markets and add value to their crops; and 2) the fact that the irrigated agriculture economy in Central Wisconsin is apparently strong enough to support farmers' current systems and therefore reduce their incentive to diversify.

3) Describe the public outreach efforts of this project.

- **What literature or educational materials were produced through this project?** A fact sheet entitled, *"Groundwater Friendly Agricultural Alternatives"* was developed and will be made available to municipalities, farmers and the public.
- **What presentations, field days or other events were given related to this project?** A presentation was given to the Portage County Forage Club, the Village of Plover Board, Plover's Groundwater Aquifer Committee, and to the Portage County Groundwater Citizens Advisory Committee.

- **What media outreach did you conduct through this project? Please identify specific papers or stations.** Newspaper articles appeared twice in the Stevens Point Journal, once in the Portage County Gazette and once in The Country Today.

4) Describe the results of this project.

- **Did the grant project results meet your original expectations? Why or why not?** No - because the farmers that originally told us that they were interested in exploring alternative crops, reversed their interest and told us that "if we think they're going to grow something other than potatoes, sweet corn and snap beans, we're living in a dream world".
- **What new agricultural products, technologies or production methods were developed through this project?** None
- **What did you learn from your grant project? What conclusions can you make?** I learned that in order for the agricultural environment (crops, markets, futures) to change, it has to be driven by farmers.
- **How will the grant results affect your business?** In the future, I will not make the mistake of assuming that I know what farmers desire to do, unless I am approached by a large contingent of farmers that are all in agreement.
- **How will this project benefit the Wisconsin family farm?** It will give them some ideas on the potential uses and market feasibility of alternative crops suited to this area.
- **What impact will this grant project have on the future of Wisconsin agriculture?** None to very little.

5) How will the Wisconsin agriculture industry be able to use the information from this project?
The information learned from this project will help the agriculture industry understand some of the current uses and potential of alternative crops.

6) Include an analysis of the information gained from this project.

7) Please include any other information you feel is appropriate.
(Examples: Samples of educational materials produced through this project
Clippings and/or audio/video tapes
What other research could be done to further this enterprise or activity?
Can an industry leader make a statement as to the value of this grant project?, etc.)

Conclusions...

Municipalities with a dominance of vegetable fields in their municipal well's recharge area understand that the amount of nitrogen fertilizer applied to the land is directly related to the amount of nitrates that end up in their drinking water. They also understand that some crops cannot be grown profitably without resulting in excessive groundwater contamination. As a result of this project, they now understand that the type of crop grown in these areas is the single biggest factor related to non-point

source nitrate contamination and that seeking ways to encourage farmers to grow groundwater-friendly crops in these municipal groundwater recharge areas will have a huge impact on the future quality of their drinking water supply. The challenge lies with those who are willing to put in the time and effort to facilitate a productive relationship between farmers and their interest in protecting their freedom and pocketbook, and municipalities and their interest in protecting their drinking water supply. Or is it easier to let groundwater become contaminated and ask users to pay huge costs to treat it?

For more information, contact:

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Fact Sheet

Groundwater - Friendly Agricultural Alternatives

Alfalfa is one of the best crops for reducing nitrates in the groundwater and also for reducing area pesticide usage.

The main use for alfalfa has been hay silage for livestock, and crop consultants from around the state indicate that there is a good demand for good quality alfalfa for livestock. Alfalfa can also be dried, ground, pelletized and marketed as a feed for other animals such as rabbits and small pets. Larger cubes can be made to produce a feed for horses and cattle that is more easily shipped and stored. All of these products produce some increased value opportunities but the cost of production also goes up.

There are many new or non-traditional uses being developed for alfalfa. Wet fractionation is a process where fresh alfalfa is pressed and the wet or liquid fraction is separated from the dry or fiber fraction. There are more and more uses for each fraction being developed. Estimates for the value of products utilizing the liquid portion, which include enzymes, carotenoids and protein, are up to $1000/A gross. These products can be in the form of protein concentrates for humans and animals, other feed supplement extracts, cosmetics, industrial enzymes, etc. Alfalfa may be important in biotechnology since it is easily grown and regenerated in cell culture and is receptive to genetic modification. Research is well under way to use alfalfa to produce industrial enzymes in this manner.

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Cereal straws, such as wheat, barley and corn have also been studied for fiber production. The advantage of using agriculture residues is that there is already a return to the grower for the grain produced. However, the fiber is not the best available for paper production but it has been used for lower quality papers. The fibers are also higher in silica, which can be a problem for paper production. There are several plants in the upper mid-west that are already using the grain straws in the manufacture of fiberboard and other building materials.

* Produced by Alec Linde and Bill Ebert, through a grant from the ADD Program, Division of Marketing, Wisconsin DATCP. 12/01