

2003 Sustainable Agriculture Demonstration Grant Program

Development of a Five-Year Crop Rotation Incorporating Cover Crops and Specialty Crops

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This project is intended to examine a multi-year crop rotation that includes cover crops and specialty crops. Three cropping seasons will be required to initiate the proposed program. All aspects of the outlined tasks will be complete by December, 2005.

Describe the problem your project will address:

I currently farm part-time with my father in Pettis and Saline County. In addition to my farming activity, I also work with the Thomas Jefferson Agricultural Institute with specialty crops and have an intense desire to expand cropping options for Missouri producers that will generate superior income while decreasing soil erosion and the use of herbicides and synthetic fertilizers.

I have experimented with several specialty crops, incorporating oilseed sunflowers into the farm's rotation for a number of years, and would like to incorporate additional crops that will help spread my price and economic risk. In addition, I believe that many Missouri farmers are missing out on the opportunity to use cover crops to reduce erosion as well as dependence upon herbicides and synthetic fertilizers.

The following five-year rotation would be initiated with this project. Year 1 would include planting oilseed sunflowers in late April. Planting sunflowers at an early date should allow for harvest prior to soybeans or corn in our area and thus allow for sowing and good establishment of red clover as a cover crop. In addition, harvesting sunflowers at an early date may allow for additional value-added opportunities. Specifically, cleaning and bagging oilseed sunflowers for birdseed in September will provide "new crop" product prior to the primary US harvest.

During year 2 of the rotation, the red clover will be utilized as a nitrogen source for grain amaranth. Red clover will not generate large quantities of nitrogen such as hairy vetch, however grain amaranth is a relatively low-nitrogen crop (requiring only 50 to 70 lbs/acre). Because grain amaranth is typically planted in June, the question remains whether or not one cutting of red clover can be harvested and if sufficient nitrogen can be generated from the re-growth. Therefore, this project will examine two treatments; baling red clover in mid-May and utilizing the re-growth as a nitrogen source compared to no baling. Winter rye will be drilled after amaranth harvest.

Although I have not previously received a Missouri Sustainable Agriculture Demonstration Award, my father received an award in 2000 to investigate the use winter rye as a method to reduce erosion and herbicides. My father and I both considered this project a success, although questions remain regarding the best way to utilize winter rye as a livestock feed. Therefore, year 3 of this project is intended to

determine the best way to utilize winter rye as both a cover crop (after the amaranth) and a livestock feed source.

My father determined from his previous work that winter rye can help to suppress weed pressure and economic returns were similar to conventional rotations. Forage value of the baled rye was low however and it is possible that more economic value can be attained thru either spring grazing or baling the rye at high moisture and ensiling in a plastic wrapped bale. It needs to be noted that rye forage value will decrease substantially if harvested too late. Therefore, this project would compare spring grazing to baling rye (before head formation) to ensiling high moisture rye in a wrapped bale.

The winter rye will be followed by no-til soybeans (without a burn-down as proven by the previous Missouri Sustainable Award) and winter wheat in the Fall. Year 4 of the rotation (not part of this grant submission) would include either a wheat-frost seeded clover-buckwheat-hairy vetch planting or wheat-double crop sunflowers or soybeans-hairy vetch. The hairy vetch will provide a significant nitrogen source for corn in year 5.

If successful this rotation would allow for six crops and two forage crops in five years of crop production. This is in addition to utilizing cover crops as a nitrogen source and a method to reduce soil erosion and less utilization of herbicides. Even if successful from an agronomic perspective, the most important question to address with this project will be how the rotation compares from an economic and labor perspective.

What are the objectives of this project? How will this reduce your reliance on non-renewable resources, increase your profits, or support family farms and rural communities?

My primary objective of this project is to refine a long-term crop rotation that includes cover crops and specialty crops to increase net profits. Successful implementation of the proposed rotation would allow fields to have a crop or cover crop at almost all times as well as reduce dependence upon herbicides and synthetic fertilizers. Specific objectives are as follows:

- Determine if red clover can be established after oilseed sunflowers to provide sufficient nitrogen for grain amaranth the following season
- Determine if sufficient nitrogen can be generated from red clover to raise grain amaranth after one cutting has been harvested (versus no harvesting of a first cutting of red clover)
- Quantify and compare the economic and feed value of winter rye as a forage for beef cattle under three different treatments; spring grazing, baling prior to flowering, and ensiling at high moisture in a plastic wrapped bale
- Compare the economic viability of the proposed crop rotation to traditional rotations

Describe in detail how you would use this grant to address the problem. Include:

Work Activities and Timetable:

The following is a list of activities (and associated timetable) that will occur with this project:

- Plant 25 acres of oilseed sunflowers in April, 2003
- Harvest sunflowers and seed red clover in September, 2003
- Mow and bale 15 acres of red clover in mid-May, 2004
- Plant 10 acres of grain amaranth first week of June, 2004
- Plant remaining 15 acres of grain amaranth 30 days after baling red clover
- Document weed pressure (amount and type of weeds) of two different treatments
- Harvest grain amaranth in October, 2004
- Sow winter rye in late October, 2004
- Document costs and returns for the previous crop year (comparing yields and net returns of the two treatments)
- Rent 10 acres of rye for grazing in Spring, 2005
- Bale 10 acres of rye in Spring, 2005
- Bale 5 acres of high moisture rye and wrap in plastic in Spring, 2005
- Document forage value of rye
- Plant no-till soybeans in late May/early June, 2005
- Harvest soybean in October, 2005
- Document economics of the three treatments and overall economics of the project
- Summarize all activity in final report to the Missouri Department of Agriculture in December, 2005

Production and financial information to be documented:

Production and economic information for all crops will be kept including data such as the following; seeding rate, seed cost, fertilizer and chemical costs, machinery cost, labor, seeding depth, weed pressure, etc.).

How will you measure your project's success:

Success of the project will be measured in a number of ways. The field where this project will be implemented was recently purchased and has not yet been terraced or tilled. Gentle slopes exhibit mild to serious soil erosion. The inclusion of cover crops in this multi-year rotation should help curb erosion. In addition, successful implementation of this multi-year rotation should reduce both fertilizer and herbicide inputs. However the overall success of the project will be determined by a comparison of the economic returns of the proposed crop rotation to traditional rotations. Accurate financial records from previous crops planted adjacent to this field have been maintained and will allow for a direct comparison.

How will you share information from your project with other producers:

In addition to the reporting requirements of the grant program that will be submitted to the Missouri Department of Agriculture, a concise final summary will be also forwarded to the Jefferson Institute for distribution in their education programs. The Jefferson Institute is a not for profit organization that assists farmers with crop diversification strategies. A number of producers contact the Institute for information and this report will be available for distribution. In addition, I would be more than willing to speak at farmer's forums or other events if the rotation proves viable.

Describe your farm operation (include acreage, number of head of livestock, crops raised, etc.):

I currently farm part-time; owning/operating 35 acres (25 tillable acres) and renting an additional 360 acres of row crops with my father. Our current rotations include soybeans, grain sorghum, corn, wheat, and sunflowers. We have also experimented with crops such as grain amaranth, black beans, and pearl millet. Most of the farm has been terraced and tilled if needed. Conservation tillage and no-till practices are utilized on all acres.