

## **Project Relevance Document**

### **A. Project Directors: John M. Jemison, Jr. and Heather Darby**

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### **B. Project Title: Winter grain and short-season corn double crop forage systems: an integrated weed management strategy for organic dairy producers**

### **C. Project Type: Joint Research and Extension Project**

### **D. Project Summary:**

As a result of this multi-state research and extension project, organic dairy producers will adopt an environmentally sustainable winter grain, short-season corn double crop forage production system as an alternative to intensively cultivated full-season silage corn. Organic dairy production is a strong growth area of Northeast agriculture, but sustainability of this growth is largely dependent on production of high quality feed while minimizing weed pressure. Due to high feed costs, producers must maximize on-farm forage and grain production. Field trials will be conducted at two university experiment stations and two organic dairy farms. The weed management IPM program that is the product of this work is primarily designed for northeast organic dairy producers, but it is applicable to all dairy producers. This project meets many goals identified by NE IPM including working with underserved audiences, and the development of easily implemented IPM systems and non-chemical pest management strategies where few alternatives exist. Growers will understand and implement this production system through involvement in an effective extensive Extension outreach program. Organic producers will attend grower field day presentations, on-farm twilight meetings, and other educational meetings. Production system fact sheets and a web site will be developed for this project, and information will be incorporated into an eXtension organic communities of practice led by co-PI Heather Darby. Within two years of project completion, 40% of organic dairy growers that grow corn will use this system, improve weed management, and produce high quality forages which will lead to increased milk production and improved economic and environmental sustainability.

### **E. Project Description, Background and Justification**

Over the past three decades, many conventional dairy farms in the Northeast US have been forced out of business due to poor farm profitability. However, Maine and Vermont milk production remains close to historical levels because a majority of the remaining dairy farms have increased in size. As farm animal numbers increase, the potential for negative environmental impacts increase. In contrast, organic production milk price premiums have allowed some farms to remain profitable with fewer animal numbers. Organic dairy production is one of the strongest growth areas of New England agriculture. There are over 280 certified organic dairies in Maine and Vermont, and more farms are transitioning to certified organic production each year. Organic production offers a way to reduce human and grower exposure to synthetic pesticides compared to conventional forage production practices, but fertilization and pest management constraints make production of high quality forages with manageable weed pressure extremely challenging. Feed is the single largest expense for organic dairies, and organic growers must maximize on-farm production of energy and protein. While many organic

producers grow corn and hay-based rotations, other growers are looking for alternative cropping systems that make better use of crop ecology to compete with weeds.

Small successful farms have the potential to be more sustainable. With more on-farm forage and grain production, there will be less imported feed, thus reducing nutrient loading. Organic production systems may prove to be more sustainable because: 1) reduced purchased inputs (fertilizer and pesticides) and increased milk premiums may improve overall profitability; 2) diverse rotations reduce weed pressure and improve soil quality; and 3) there is reduced human exposure to synthetic pesticides through food and water. Given these benefits, Cooperative Extension and university research programs should explore ways to improve the effectiveness of organic dairy systems in New England. A stated goal of the Northeast IPM pest management priorities is to develop and implement integrated pest management (IPM) practices, tactics, and systems for specific pest problems while reducing human and environmental risks. This project will meet this goal by improving weed management in organic forage production.

While most conventional Northeast US dairy producers rely on silage corn and hay for their feed programs, organic producers frequently rely on a variety of cropping systems, rotations, and planting strategies to better manage weeds. While weeds have always been a problem for corn growers, organic farmers produce a higher value commodity and have to fight pests with new tools and methods. Many growers have expressed the need for information on alternative forage systems that can utilize narrow rows, early emergence, or delayed planting times to miss weed flushes. We recently completed a three-year winter grain / summer annual grass double crop forage experiment where we compared forage yield and quality and weed competition in the double crop system compared to organic silage corn cultivated four times. We found that the double crop forage system had significantly (three to four times) lower total weed biomass with no cultivation than full-season organic silage corn cultivated four times. But, the double crop forage energy content was significantly lower than the organic corn silage. Growers need high energy feed to have productive milking animals. A possible solution to the low feed energy would be to double crop winter grains with a short-season corn. Compared to full-season organic corn, winter small grains would have full canopy closure during the summer annual weed flush. Later planted corn should emerge much faster than corn planted in middle to late May making it more competitive with emerging weeds. Research is needed to see if late-planted corn (following winter grains harvested at the boot or soft dough stage) would have similar weed competition as normally planted full-season corn. While many agronomists and university staff promote full season corn, we rarely find that full-season corn significantly out yields short-season corn in our climate, and in most years, feed quality of short-season corn is equivalent or better than full-season corn. If the winter grain short-season corn (WGSSC) double crop is effective, we can provide growers with a cost effective cover crop, improved yields, reduced weed pressure, and improved forage quality. This interdisciplinary research needs to be conducted in diverse environments, soils, and fields with different weed species. If it is shown that weed competition is reduced in this double crop system, it is easily adaptable by any producer growing organic or convention corn. It is conceivable to expect high rates of adoption of the practice due to its wide potential applicability across much of the Northeast US.

Project success will depend on successful technical transfer of the research results. The projects extension component will involve development of an information package focused on

alternative methods of weed control in organic corn. This will include information on the WGSSC double cropping system, summary of the strengths and weaknesses of past double crop research, cultivation timing and frequency information in field corn, and other factors influencing weed management. This educational outreach will help northeast organic dairy producers learn and adopt the most effective weed management options. The research information generated in this work will be made available through the internet through the University of Maine and University of Vermont websites and to growers through eXtension.

**D. Regional Priorities: How this project meets Northeast IPM Center goals:**

The Northeast IPM Center ([http://northeastipm.org/regu\\_regional.cfm](http://northeastipm.org/regu_regional.cfm)) recently identified and prioritized pest management issues. In addition to being a previously identified Vermont priority, this project specifically addresses several of the following identified priorities:

**General IPM Priorities for the Northeast – 2006:**

Weed IPM: Research/extension demonstrations of weed management in sustainable/organic crop systems.

**Northeast Research, Extension and Academic Program Committee for IPM:**

Use of web-based technologies for IPM decision making  
IPM packages for diversified, high value crop producers

**Pest Management Alternative Practices - 2007:**

Develop or improve IPM options for weed management, including weed identification, for agricultural settings  
Assess, develop, and distribute new or improved methods for pest monitoring systems

**2006 Livestock/Field Crop IPM Priorities – NY state:**

C. Integrated Management of Significant Pests Affecting Field Corn - Research on organic weed control methods

F. Integrated Management of Significant Weed problems in Field Crop Systems - improve efficacy, economics, and information on weed control methods including those appropriate for organic.

**Additional ways project addresses Northeast IPM Center goals:**

In addition to this, the Maine Organic Milk Producers (MOMP) have identified alternative weed management practices as a high priority issue. This group and other organic producers are underserved in New England as they have traditionally received less support than commodity farmers from USDA. This type of research support can help their farms become more sustainable. In summary, Northeast US organic dairy producers will adopt the WGSSC double crop forage production system that will reduce weed pressure, provide winter cover, and yield high quality feed for long-term dairy herd productivity and health as a result of this project. Compared to the traditional silage corn/hay feed production programs, these alternative systems take advantage of cultural practices (narrow rows) and crop ecology (planting timing and rapid growth to miss annual weed flush) to produce high quality/energy forages with lower weed pressure. Farmer use of the WGSSC double crop system will result in reduced human exposure to pesticides, improved water quality, and improved long-term farm sustainability.