

## **V(A). Planned Program (Summary)**

### **Program # 1**

#### **1. Name of the Planned Program**

Global Food Security and Hunger

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	4%		0%	
133	Pollution Prevention and Mitigation	30%		0%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		10%	
205	Plant Management Systems	5%		16%	
206	Basic Plant Biology	0%		7%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		9%	
216	Integrated Pest Management Systems	6%		4%	
302	Nutrient Utilization in Animals	0%		10%	
308	Improved Animal Products (Before Harvest)	0%		12%	
311	Animal Diseases	0%		3%	
315	Animal Welfare/Well-Being and Protection	0%		2%	
402	Engineering Systems and Equipment	4%		0%	
601	Economics of Agricultural Production and Farm Management	33%		16%	
602	Business Management, Finance, and Taxation	9%		0%	
604	Marketing and Distribution Practices	3%		0%	
605	Natural Resource and Environmental Economics	3%		0%	
610	Domestic Policy Analysis	0%		2%	
723	Hazards to Human Health and Safety	3%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		4%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	28.0	0.0	4.1	0.0

<b>Actual Paid</b>	5.3	0.0	6.8	0.0
<b>Actual Volunteer</b>	7.4	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1102696	0	1139623	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1854275	0	1020847	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
3534399	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Project listed in bold followed by delivery methods:

- **Beginning Farmer Initiative.** Focus groups, learning circles, workshops, mini-courses and publications
- **Ag Business Management.** Conferences, courses, consultations and farm visits.
- **Agricultural safety.** Courses, consultations and farm visits
- **Community Preparedness.** Workshops, discussion group
- **Equine program.** Annual equine event, publications, workshops.
- **Farm and Forest Transfers.** Workshops, consultations, farm visits
- **Farm Viability.** Farm visits, consultations
- **Farming Alternatives.** Workshops, consultations, farm visits.
- **Farming Across Cultures:** Farm Visits, consultations
- **Forage and Pasture Management Education.** Conference, farm visits, consultations
- **Maple Program.** Conference, workshops, newsletter.
- **Nutrient Management Program.** Farm visits, consultations
- **Organic Grain Project.** Demonstrations, data gathering.
- **Pest Management Education.** IPM and Pesticide Education and Safety Program (PESP) training.
- **Horticulture for Private/Commercial Landowner and Industry Professional Education:** Tour and conference
  - **UVM Tax School.** conference, tax book
  - **Vegetable and Berry Growers.** Consultations, farm visits, meetings, various media, presentations, website.
  - **Vermont New Farmer Network.** Conference, networking, consultations
  - **Vermont Pasture Network.** Pasture walks, demonstrations and trials, conference, consultations, various media.
  - **Vermont Tourism and Recreation.** Research, conference.
  - **Extension Master Gardener.** Course, train the trainer
  - **Women's Agricultural Network.** Newsletters, website, classes, workshops, individual and small

group consultations.

- **GAP:** Consultations, workshops
- **Engineering for Food Production, Harvest and Storage** consultation, mass media, fact sheet, research, class/course

**AES efforts.**

- **Animal Manure Treatment Systems**
  - **Storm and Wastewater Management Systems**
  - **Perturbation of soil ecosystems by anthropomorphic interventions**
  - **Soil nutrient effect on forest ecosystem productivity and lake water quality**
  - **Soil fertility/chemistry/physical problems associated with waste disposal and bioremod**
- faction**
- **Economics of organic dairy, crop management and alternative energy**
  - **Heifer nutrition, rearing and management**
  - **Dairy nutritional immunology**
  - **Small ruminant production and management systems**
  - **Development of strategies to address applied equine issues**
  - **Biofuels from coconuts and other energy sources**
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- **Surveillance and prevention of spread of Asian Longhorned Beetle**
  - **Management of thrips pests in forests and greenhouses**
  - **Identification/control of fungal propagation**
  - **Fungal biological plant protection, collection and management**
  - **Explore microbial pesticides and fungal components as IPM strategies**
  - **Innate immunity, DNA-based vaccines and mastitis prevention**
  - **Hormonal regulation of glucose synthesis and milk production**
  - **Functional genomics and photoperiod effects on hormonal cycles/milk production**
  - **Explore ruminant lipid metabolism**
  - **Impact of global climate**
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- **Identification challenges of the national health care reform for the farmer population.**
  - **Studying alternative systems of maple crop management**
  - **Animal management production**
  - **Food Systems to contribute to increasing access to healthy food for all Vermonters**
  - **Resources to improve production methods for apple growers.**
  - **Environmentally friendly crop production systems**

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**2. Brief description of the target audience**

- 4-H: Camp Counselors
- Adults
- Agriculture/Natural Resources: Watershed Based Organizations
- Agriculture: CCA & Crop Consultants
- Agriculture: Crop Producers
- Agriculture: Dairy Producers
- Agriculture: Equine Producers/Owners
- Agriculture: Farm Employees
- Agriculture: Farm Families
- Agriculture: Farm Managers
- Agriculture: Farmers

- Agriculture: Goat & Sheep Producers
  - Agriculture: Greenhouse Ornamental Growers
  - Agriculture: Home Gardeners
  - Agriculture: Industry Professionals
  - Agriculture: Livestock producers
  - Agriculture: Maple Industry
  - Agriculture: Maple Sugar Producers
  - Agriculture: Non-Dairy Producers
  - Agriculture: Nursery operators
  - Agriculture: Ornamentals Industry Professionals
  - Agriculture: Service Providers
  - Agriculture: Small Fruit & Vegetable Growers
  - Agriculture: Veterinarians
  - Agriculture: Dairy Goat, Meat Goat and Dairy Sheep Producers
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- Agriculture: Organic agencies
  - Policymakers

### 3. How was eXtension used?

**Certified organic dairy agriculture has been the fastest growing sector of the organic market, yet there is an information gap among educators and other agriculture service producers regarding certified organic production systems.**

**Therefore, with funding from a USDA NIFA Organic Research and Extension Initiative grant, UVM Extension agronomist Heather Darby and staffer Deb Heleba led a national team of organic dairy experts in the development of an online course to help Extension educators and other agriculture service providers better understand certified organic dairy farming. "An Introduction to Organic Dairy Production" is a self-directed course housed on eXtension's online campus site. It is composed of ten modules on topics ranging from certification standards and pasture management to milk quality and herd health. Each module combines readings, narrated lessons, optional homework exercises and recommended resources, and end-of-module quizzes. The peer-reviewed course has also been checked for compliance with National Organic Program regulations to ensure high quality, accurate organic information.**

**During the 2012 fall semester, the course was piloted among a group of 57 undergraduate students at the California State University--Chico. Students took the course either entirely online, or online with supplemental, in-person instruction. An end-of-course survey revealed that all students gained knowledge on all topics covered through the course. One student said, "The information is solid. Being that I am headed back to my dairy, I will certainly use the knowledge I gained from this course." Another said, "Having this knowledge will really give me a "one-up" on a lot of other people in the industry, as the organic side of things is becoming more prevalent in farming." The course is now available to the public for a modest fee with the option to earn continuing education units. Since the beginning of 2014, 9 professionals across the U.S. have enrolled. Our goal is for UVM Continuing Education to offer this class for credit. It would be one of the only Organic Dairy Curriculums in the country.**

Website: eXtension-Horses ([www.extension.org/horses](http://www.extension.org/horses)) "eXtension-Horses: Keeping Equestrians Educated" The longterm efforts to create and present peer-reviewed, research based information to extension clientele through the national eXtension platform has received international recognition.

Women in Agriculture Learning Networks

CoP: Entrepreneurs and Their Communities

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**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	27965	446000	600	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
<b>Actual</b>	3	15	18

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Class/course

<b>Year</b>	<b>Actual</b>
2014	25

**Output #2**

**Output Measure**

- Conference

<b>Year</b>	<b>Actual</b>
2014	8

**Output #3**

**Output Measure**

- Consultation

<b>Year</b>	<b>Actual</b>
2014	2694

**Output #4**

**Output Measure**

- Consumer Publication

<b>Year</b>	<b>Actual</b>
2014	6

**Output #5**

**Output Measure**

- Demonstration

<b>Year</b>	<b>Actual</b>
2014	51

**Output #6**

**Output Measure**

- Discussion group

<b>Year</b>	<b>Actual</b>
2014	65

**Output #7**

**Output Measure**

- Educational/evaluation instrument

<b>Year</b>	<b>Actual</b>
2014	4

**Output #8**

**Output Measure**

- Electronic Communication/phone

<b>Year</b>	<b>Actual</b>
2014	1609

**Output #9**

**Output Measure**

- Field day/fair

<b>Year</b>	<b>Actual</b>
2014	3

**Output #10**

**Output Measure**

- Field site visit

<b>Year</b>	<b>Actual</b>
2014	43

**Output #11**

**Output Measure**

- Funding request

<b>Year</b>	<b>Actual</b>
2014	36

**Output #12**

**Output Measure**

- Presentation

<b>Year</b>	<b>Actual</b>
2014	178

**Output #13**

**Output Measure**

- Publication - Peer Reviewed

<b>Year</b>	<b>Actual</b>
2014	5

**Output #14**

**Output Measure**

- Publication - curriculum

<b>Year</b>	<b>Actual</b>
2014	2

**Output #15**

**Output Measure**

- Publication - fact sheet

<b>Year</b>	<b>Actual</b>
2014	64

**Output #16**

**Output Measure**

- Publication - magazine article

<b>Year</b>	<b>Actual</b>
2014	20

**Output #17**

**Output Measure**

- Publication - manual

<b>Year</b>	<b>Actual</b>
2014	6

**Output #18**

**Output Measure**

- Publication - newsletter

<b>Year</b>	<b>Actual</b>
2014	40

**Output #19**

**Output Measure**

- Publication - newsprint article

<b>Year</b>	<b>Actual</b>
2014	110

**Output #20**

**Output Measure**

- Research project

<b>Year</b>	<b>Actual</b>
2014	73

**Output #21**

**Output Measure**

- TV segment/ATF

<b>Year</b>	<b>Actual</b>
2014	25

**Output #22**

**Output Measure**

- Technical Publication

<b>Year</b>	<b>Actual</b>
2014	33

**Output #23**

**Output Measure**

- Tour(s)

<b>Year</b>	<b>Actual</b>
2014	4

**Output #24**

**Output Measure**

- Train the Trainer trainings

<b>Year</b>	<b>Actual</b>
2014	106

**Output #25**

**Output Measure**

- Website development and updates

<b>Year</b>	<b>Actual</b>
2014	134

**Output #26**

**Output Measure**

- Workshop - series

<b>Year</b>	<b>Actual</b>
2014	9

**Output #27**

**Output Measure**

- Workshop - single session

<b>Year</b>	<b>Actual</b>
2014	127

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	number of farmers that develop a nutrient management plan protecting water and soil
2	number of Master Gardener participants earning certification
3	number of farmers who implement best field management practices(s) crop/pasture, product, and/or soil productivity while protecting water, air and/or soil
4	Number of individuals who implement IPM practice(s) increasing the protection of water, air and/or soil
5	Number of individuals and business owners who implement recommended practice(s) that accomplish owner values and goals to improve/protect business sustainability
6	The number of individuals who complete a plan including preventative measures to secure animal health, food safety and public health protecting the food chain and market integrity
7	The number of growers who adopt new crop/plant variety(ies) resulting in maintaining or increasing sales
8	number of individuals who complete a business plan, start a business (within 18 months of planning) based on personal values, goals and business viability
9	number of participants who make an intentional, informed decision regarding starting a business based on feasibility, personal goals and values
10	Number passing the USDA GAPs audit to gain or maintain a market for their locally grown crop(s)
11	The number of growers growing organic crops increase revenues improving business sustainability
12	The number of producers who implement produce safety/food safety plans/practices to gain or maintain a market for their locally grown crop(s)
13	number of farmers who implement key element(s) of their nutrient management plan protecting water and soil
14	number of individuals who assess vulnerabilities and implement a practice to secure animal health, food safety, and/or public health protecting the food chain and market integrity
15	Number of individuals who implement recommended gardening practice(s) protecting water, air, and/or soil
16	Number of challenges that health care providers face as they seek to meet the needs of Vermont's migrant dairy workers.
17	Number of genetic factors that may independently or jointly contribute to insecticide resistance of beetle populations.

18	Number of research results which increase the understanding of a plants response to their environment.
19	Number of sustainable disease and arthropod pest management strategies for organic apple growers using less toxic pesticides.

**Outcome #1**

**1. Outcome Measures**

number of farmers that develop a nutrient management plan protecting water and soil

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2014	23

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Water quality is in the forefront of the Vermont Governor's agenda. Although farmers are actively working to address their contribution to the water quality problem there is more that needs to be done. Nutrient Management Planning (NMP) assists farmers to plan steps that minimize nutrient and soil losses to protect Vermont's water. UVM Extension assists farmers in completing their NMPs.

**What has been done**

In 2006, a course for livestock farmers was developed. The course has been taught for the past 9 years. The course has been upgraded with a companion user-friendly web-based application to assist farmers to keep accurate and complete records. This is important to effectively implement their NMP they develop.

**Results**

Since 2009, 180 farmers, representing 10% of all dairy farms in Vermont have completed NMPs. The companion application is available on an iPhone or iPad allowing for inputs of manure and fertilizer and yields on the go. Based on a 2010 survey of Vermont farmers, they have reduced phosphorus additions on their farms by 50% as a result of implementing NMP dairy their farms. This not only protects the environment but also saves input dollars spent,strengthening the viability of these farms.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
133	Pollution Prevention and Mitigation
601	Economics of Agricultural Production and Farm Management

#### Outcome #2

##### 1. Outcome Measures

number of Master Gardener participants earning certification

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2014	110

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems

### **Outcome #3**

#### **1. Outcome Measures**

number of farmers who implement best field management practices(s) crop/pasture, product, and/or soil productivity while protecting water, air and/or soil

#### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

#### **3a. Outcome Type:**

Change in Action Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	232

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

A high crop yield on every acre is essential to economic sustainability for Vermont farms. To do this without causing environmental degradation, it is necessary to manage the soils to improve quality and provide the plants with adequate nutrients without over application of phosphorus or nitrogen. Extension works with partners to create management practices that enhance healthy farm soils while protecting the environment.

##### **What has been done**

Extension conducted on-farm research and demonstrations on crop rotations, cover crops, soil amendments, reduced tillage, and soil aeration. Education was offered on these topics as well as nutrient management planning, pasture management, soil testing, irrigation and drainage, etc. In addition no-till drill equipment was acquired and made available to farms and help was provided in retrofitting farmers own planters.

##### **Results**

Last year UVM Extension staff documented the implementation of 232 recommended practices that protect air, water and soil on Vermont farms. Many positive impacts have resulted. After implementing these practices cover cropping acreage doubled in 5 counties in just one year. No-till farming has increased by almost 4,000 acres just in 2014. In another region of the state 62 farmers planted cover crops on 4,536 acres and completed aeration tillage for manure incorporation on 1,225 acres. This latest science and programming helps farmers understand the effects of these and other practices and supports them in their efforts to protect the environment while keeping a strong agriculture based business. The state benefits by having a healthier environment and strong agricultural economy and working landscape, high priorities in Vermont.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

#### **Outcome #4**

##### 1. Outcome Measures

Number of individuals who implement IPM practice(s) increasing the protection of water, air and/or soil

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2014	315

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems

## **Outcome #5**

### **1. Outcome Measures**

Number of individuals and business owners who implement recommended practice(s) that accomplish owner values and goals to improve/protect business sustainability

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	879

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Vermont's 7000+ farms' sales total \$673 million (USDA Ag Census). Just the dairy industry adds \$2.2 billion to Vermont's economy (Vt Dairy Promotion Council). Farming is a multifaceted and complicated business. Factors like keeping up with and applying new research and changing technology, aging farmers and a limited workforce, and environmental impact issues are just a few of the challenges. Extension is a non-regulatory, unbiased source for farmers to access the latest research for best recommended practices and information.

#### **What has been done**

Extension programs are accessible in multiple formats and topics ranging from one-on-one to national webinars. Topics are strongly influenced by stakeholders input. Last year UVM Extension agricultural programs completed 2,694 consultations, 51 demonstrations, 56 research projects, over 2200 mass media, social media and other publications, etc. Topics ranged from financial records and goal setting, agri-tourism, to cold storage for vegetable crops.

#### **Results**

Evaluation documented the implementation of 879 recommended practices that improve or protect business sustainability. Diversification is important to many Vermont farms. One Extension effort developed a locally based grain growing and processing system. This enhanced the capacity for farmers to produce high quality and yielding grains to meet the growing demand for this high value crop. Programming included research results from hundreds of varieties, outreach and market development. Farmers adopted at least one, but average three recommended practices and reported an average additional income of \$7000 per grain grower, \$35,000 for millers, and \$5-20,000 for bakers and distributors. Extension and its partners continue to support

and strengthen the agriculture industry with its 30 plus projects across Vermont.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
723	Hazards to Human Health and Safety

#### **Outcome #6**

##### 1. Outcome Measures

The number of individuals who complete a plan including preventative measures to secure animal health, food safety and public health protecting the food chain and market integrity

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2014	10

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

#### Outcome #7

##### 1. Outcome Measures

The number of growers who adopt new crop/plant variety(ies) resulting in maintaining or increasing sales

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	173

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Home gardeners want hardy, less resource-intensive plants. They are looking for new varieties that perform well, and greenhouse and nursery growers want to meet this demand. Appropriate choice of varieties results in more sustainable landscapes and less need for fertilizers and pesticides reducing the environmental impacts, expenses for home gardeners and increases sales for growers, contributing more than \$25,562,000 to Vermont's economy according to the 2012 Census for Agriculture.

###### **What has been done**

UVM Extension, in collaboration with other partners, conducts at least two bus tours annually for home gardeners. These sold out tours visit gardens and provide at least four hours of education through presentations and videos on new plants, design tips, production and products, and best practices for environmentally-friendly gardening practices. The participants are surveyed at the end of the tour to measure if they are taking new useful information, and if they attended a previous tour, they are asked if they acted on previous learning.

###### **Results**

These tours have provided education to over 500 home gardeners and industry professionals over the past 5 years. Of the 92% responding this year, 46% had been on a previous tour in the

past year. 72% had grown new varieties spending on average \$386 each. Most had reduced pesticide usage, changed other practices or were organic. This data is consistent with previous tours and results. Impacts include increased sales for the Vermont nursery industry, reduced loss of plants for home gardeners, as well as significantly reducing negative impacts on the environment by protecting pollinators and other beneficial insects by reducing pesticide use, or selecting pest and climate resistant plants. Responses also indicated gardeners were not sure if they were using native plants indicating future education needs in this area.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
604	Marketing and Distribution Practices

#### Outcome #8

##### 1. Outcome Measures

number of individuals who complete a business plan, start a business (within 18 months of planning) based on personal values, goals and business viability

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	42

##### 3c. Qualitative Outcome or Impact Statement

###### Issue (Who cares and Why)

Beginning farmers (< 10 years in operation) are a growing part of Vermont's agricultural economy. New farmers provide direct access to local food through farmers markets, CSAs and farmstands, and are increasingly servicing wholesale and institutional markets. Vermont's new farms now comprise about 28% of the total number, and have an aggregated market value of about \$129 million, or about 16% of Vermont's agricultural economy. Start-up farms typically are small in terms of market value, but the future of the working landscape depends on them.

###### What has been done

Funded by a USDA grant, the Vermont New Farmer Network (VNFN) is a multi-organization project offering education, technical assistance, coaching and mentoring for beginning farmers. The project's goal is to increase the number of profitable small and medium-sized farms. Farmers obtained assistance in multiple topic areas and in multiple formats, accessing classes, workshops, webinars and individual coaching. The most common topic areas were: business and financial management and planning, crop and livestock production techniques, and marketing.

#### **Results**

Of the 287 people who responded to an online survey by June 2014, 42 reported that the education and technical assistance they received helped them start a new business. One hundred percent of respondents said that project increased their knowledge and decision-making ability; 97% reported it increased skill level; and 95 % said it increased their confidence. One participant explained, "Having this planning and analysis so early in our farming career will significantly help us to create a sustainable business model."

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

#### **Outcome #9**

##### **1. Outcome Measures**

number of participants who make an intentional, informed decision regarding starting a business based on feasibility, personal goals and values

##### **2. Associated Institution Types**

- 1862 Extension

##### **3a. Outcome Type:**

Change in Action Outcome Measure

##### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	10

##### **3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

#### Outcome #10

##### 1. Outcome Measures

Number passing the USDA GAPs audit to gain or maintain a market for their locally grown crop(s)

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	19

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

#### Outcome #11

##### 1. Outcome Measures

The number of growers growing organic crops increase revenues improving business sustainability

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	25

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management

**Outcome #12**

**1. Outcome Measures**

The number of producers who implement produce safety/food safety plans/practices to gain or maintain a market for their locally grown crop(s)

Not Reporting on this Outcome Measure

**Outcome #13**

**1. Outcome Measures**

number of farmers who implement key element(s) of their nutrient management plan protecting water and soil

Not Reporting on this Outcome Measure

### **Outcome #14**

#### **1. Outcome Measures**

number of individuals who assess vulnerabilities and implement a practice to secure animal health, food safety, and/or public health protecting the food chain and market integrity

Not Reporting on this Outcome Measure

### **Outcome #15**

#### **1. Outcome Measures**

Number of individuals who implement recommended gardening practice(s) protecting water, air, and/or soil

Not Reporting on this Outcome Measure

### **Outcome #16**

#### **1. Outcome Measures**

Number of challenges that health care providers face as they seek to meet the needs of Vermont's migrant dairy workers.

#### **2. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	3

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

In the past ten years Hispanic workers have arrived in Vermont and have become a significant portion of the Vermont dairy labor force. In 2007 the Vermont Department of Health studied the health status and found a number of problems; primary care for childhood was inconsistent, for some there were no vaccinations, workers were not screened for tuberculosis, limited dental care, skin problems, and pain and injuries related to work.

**What has been done**

During 2014 results from migrant workers self reported health issues were compared with health clinic intake data. A statewide public opinion poll tracking changes in public perceptions of migrant farm workers was completed. The researcher participated in a study committee on farm worker housing and assisted with a preliminary assessment of farmworker housing standards.

**Results**

The result of the studies and poll indicated that fear of immigration, law enforcement, proximity to resources, outreach to farmers, public opinion(s), supported environments, and policy development were some of the barriers that prevented migrant workers to seek health care.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management

**Outcome #17**

**1. Outcome Measures**

Number of genetic factors that may independently or jointly contribute to insecticide resistance of beetle populations.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	2

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Potato Growers will be the ultimate beneficiaries of this research. It will help growers understand how beetles continue to resist insecticides so rapidly.

**What has been done**

Researcher tested genetic variation due to demographics, genetic diversity due to evolution, demographics history to determine if beetle populations are identical by descent.

**Results**

Genetic diversity does not differ between regions, genetic diversity does not differ among populations within regions. This information is essential to researchers as it begins to understand how the beetles continue to evolve resistance to all major insecticides.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

#### Outcome #18

##### 1. Outcome Measures

Number of research results which increase the understanding of a plants response to their environment.

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	1

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Plants are rooted to one spot their entire life. In order to survive, plants must sense even the smallest environmental change and respond rapidly, changing their physiology and modifying further development. Understanding the rapid molecular changes that underlie plant's responses to the environment can help optimize conditions or treatments that maximize plant yields under stressful conditions. Alfalfa and soybeans are important food crops for animals and humans because they store protein in their seeds and nitrogen in their roots. Understanding the development of these crops can help with crop production.

###### **What has been done**

The project looked at the effect of different salt treatments on plant roots. Plants were grown and inoculated in growth pouches which allowed the scientist to access and visualize root development.

###### **Results**

Evidence shows that a plants roots exchange molecular signals with soil bacteria to trigger legume to form nodules, which the bacteria then infects. Plant roots are sensitive to salt stress. Increased temperature, due to changes in overall climate, can lead to periodic stress, which results in accumulation of salts in the soil as water evaporates.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology

#### Outcome #19

##### 1. Outcome Measures

Number of sustainable disease and arthropod pest management strategies for organic apple growers using less toxic pesticides.

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	3

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Apple production in Vermont generates about 10 million dollars from about 3,000 acres of orchards and represents a significant component of the state's diversified agricultural industry. There has been a significant interest in growing organic apples in the state yet growers face challenges limiting adoption of organic production. Managing arthropod pests and diseases is one of the main challenges facing Vermont organic growers.

###### **What has been done**

Evaluated and compared disease and arthropod pest damage on three apple cultivars using three organic orchard management systems. The three systems used were the Standard Organic Management system use of copper, sulfur, lime sulfur and organic insecticides; Standard Organic Management with Reduced sulfur/lime sulfur system, and Holistic organic management system - use of agricultural biostimulants with no copper or sulfur products.

###### **Results**

Scientist found differences among cultivars and organic management systems in horticultural vigor, yield, fruit quality and arthropod pest incidence and damage. Out of the cultivars that were examined, 'Enterprise', 'Liberty', 'Redfree', and 'Goldrush' were the best cultivars for organic management.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

##### Brief Explanation

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

Participants from past year's NMP courses were surveyed as to changes implemented as a result of taking the course. Sixty percent of the farms increased yields while decreasing phosphorus fertilizer by 50% and nitrogen fertilizer by 25%. 100% of respondents felt they had a positive impact on water quality.

##### Key Items of Evaluation