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New Hampshire
Department of Agriculture, Markets & Food

Shawn N. Jasper, Commissioner

March 7, 2018

His Excellency, Governor Christopher T. Sununu
and the Honorable Council
State House
Concord, New Hampshire 03301

REQUESTED ACTION

Authorize the New Hampshire Department of Agriculture, Markets and Food, Division of Pesticide Control to grant funds and enter into a Cooperative Project Agreement, in the amount of $38,716, with the University of New Hampshire Office of Sponsored Research, vendor #177867, for the advancement of agricultural research and to assist in the promotion of Integrated Pest Management practices in New Hampshire, for the period from Governor and Council approval through March 31, 2019. 100% Other Funds.

Funding is available in account, Integrated Pest Management, as follows:
02-18-18-183010-21820000 INTEGRATED PEST MANAGEMENT

OBJECT CLASS	ACCOUNT	FY 2018	Total
075-500590	Integrated Pest Mgmt	$38,716	$38,716

EXPLANATION

The New Hampshire Department of Agriculture, Markets and Food (NHDAMF), Division of Pesticide Control in fulfilling its responsibilities under the Integrated Pest Management (IPM) Program, RSA 430:50; to promote the principles of IPM and assist New Hampshire citizens to advance the practice of such principles, has reviewed the project, "*2018 IPM Program for Vegetable Growers/Farmers in New Hampshire*", and finds it exemplifies good practices associated with Integrated Pest Management. The research and educational aspects associated with this project and the efforts of the University of New Hampshire Cooperative Extension identify and establish the presence and treatment methods for pests common to sweet corn and vine crops. Experience and results of this project serve the benefit of all citizens of New Hampshire. The attachment includes a summary of the project and the dollar amount associated with each component.

Respectfully submitted,

Shawn N. Jasper
Commissioner

COOPERATIVE PROJECT AGREEMENT
between the
STATE OF NEW HAMPSHIRE, **Department of Agriculture, Markets & Food**
and the
University of New Hampshire of the UNIVERSITY SYSTEM OF NEW HAMPSHIRE

A. This Cooperative Project Agreement (hereinafter "Project Agreement") is entered into by the State of New Hampshire, **Department of Agriculture, Markets & Food**, (hereinafter "State"), and the University System of New Hampshire, acting through **University of New Hampshire**, (hereinafter "Campus"), for the purpose of undertaking a project of mutual interest. This Cooperative Project shall be carried out under the terms and conditions of the Master Agreement for Cooperative Projects between the State of New Hampshire and the University System of New Hampshire dated November 13, 2002, except as may be modified herein.

B. This Project Agreement and all obligations of the parties hereunder shall become effective on the date the Governor and Executive Council of the State of New Hampshire approve this Project Agreement ("Effective date") and shall end on **3/31/19**. If the provision of services by Campus precedes the Effective date, all services performed by Campus shall be performed at the sole risk of Campus and in the event that this Project Agreement does not become effective, State shall be under no obligation to pay Campus for costs incurred or services performed; however, if this Project Agreement becomes effective, all costs incurred prior to the Effective date that would otherwise be allowable shall be paid under the terms of this Project Agreement.

C. The work to be performed under the terms of this Project Agreement is described in the proposal identified below and attached to this document as Exhibit A, the content of which is incorporated herein as a part of this Project Agreement.

Project Title: **2018 IPM Program for Vegetable Growers/Farmers in New Hampshire**

D. The Following Individuals are designated as Project Administrators. These Project Administrators shall be responsible for the business aspects of this Project Agreement and all invoices, payments, project amendments and related correspondence shall be directed to the individuals so designated.

State Project Administrator	**Campus Project Administrator**
Name: David J. Rouuseau	Name: Cheryl Moore
Address: State House Annex 25 Capitol Street P.O. Box 2042 Concord, NH 03301	Address: University of New Hampshire Sponsored Programs Administration 51 College Road Durham, NH 03824
Phone: 603 271-3640	Phone: 603 862-1992

E. The Following Individuals are designated as Project Directors. These Project Directors shall be responsible for the technical leadership and conduct of the project. All progress reports, completion reports and related correspondence shall be directed to the individuals so designated.

State Project Director	**Campus Project Director**
Name: David J. Rousseau	Name: George Hamilton
Address: State House Annex 25 Capitol Street P.O. Box 2042 Concord, NH 03301	Address: UNH Cooperative Extension Hillsborough Country 329 Mast Road, Room 101 Goffstown, NH 03045
Phone: 603 271-3640	Phone: 603 641- 6060

Campus Authorized Official KJ
Date 2/28/18

F. Total State funds in the amount of **$38,716** have been allotted and are available for payment of allowable costs incurred under this Project Agreement. State will not reimburse Campus for costs exceeding the amount specified in this paragraph.

Check if applicable

☐ Campus will cost-share % of total costs during the term of this Project Agreement.

☐ Federal funds paid to Campus under this Project Agreement are from Grant/Contract/Cooperative Agreement No. from under CFDA# . Federal regulations required to be passed through to Campus as part of this Project Agreement, and in accordance with the Master Agreement for Cooperative Projects between the State of New Hampshire and the University System of New Hampshire dated November 13, 2002, are attached to this document as Exhibit B, the content of which is incorporated herein as a part of this Project Agreement.

G. Check if applicable

☐ Article(s) of the Master Agreement for Cooperative Projects between the State of New Hampshire and the University System of New Hampshire dated November 13, 2002 is/are hereby amended to read:

H. ☒ State has chosen **not to take** possession of equipment purchased under this Project Agreement.
☐ State has chosen **to take** possession of equipment purchased under this Project Agreement and will issue instructions for the disposition of such equipment within 90 days of the Project Agreement's end-date. Any expenses incurred by Campus in carrying out State's requested disposition will be fully reimbursed by State.

This Project Agreement and the Master Agreement constitute the entire agreement between State and Campus regarding this Cooperative Project, and supersede and replace any previously existing arrangements, oral or written; all changes herein must be made by written amendment and executed for the parties by their authorized officials.

IN WITNESS WHEREOF, the University System of New Hampshire, acting through the **University of New Hampshire** and the State of New Hampshire, **Department of Agriculture, Markets & Food** have executed this Project Agreement.

By An Authorized Official of:
University of New Hampshire

Name: Karen M. Jensen
Title: Manager, Sponsored Programs Administration
Signature and Date: 2/28/18

By An Authorized Official of:
Department of Agriculture, Markets & Food

Name: Shawn N. Jasper
Title: Commissioner
Signature and Date: 3/7/18

By An Authorized Official of: the New Hampshire Office of the Attorney General

Name: Thomas R. Broderick
Title: Assistant Attorney General
Signature and Date: 3/16/18

By An Authorized Official of: the New Hampshire Governor & Executive Council

Name:
Title:
Signature and Date:

Campus Authorized Official KS
Date 2/28/18

EXHIBIT A

A. Project Title: 2018 IPM Program for Vegetable Growers/Farmers in New Hampshire

B. Project Period: Upon Governor and Council Approval through March 31, 2019

C. Objectives: The objectives of the University of New Hampshire are to assist the Department of Agriculture, Markets & Food in the promotion and advancement of Integrated Pest Management in New Hampshire

D. **Scope of Work:** A detailed scope of work is on file with the Department of Agriculture, Markets & Food and described in Attachment A of this agreement.

E. **Deliverables Schedule:** A detailed description with schedule for each project is on file with the Department of Agriculture, Markets & Food and described in Attachment A of this agreement.

Major Project Components:

On Farm Monitoring: April 2018 through October 2018
Insect/Crop: Corn Earworms/sweet corn
Fall Armyworm/sweet corn
European Corn Borer/sweet corn
Western Bean Cut Worm/sweet corn
Squash Vine Borer/vine crops, giant pumpkin
Brown Marmorated Stink Bug/fruit and vegetables

Final Report: March 31, 2019

F. Budget and Invoicing Instructions: Campus will submit an invoice on regular Campus invoice form for $38,716 at the time of Governor and Council approval. State will pay Campus within 30 days of receipt of the invoice. Any unused funds must be returned to the State after the project end date.

Budget Items	State Funding	Cost Sharing (if required)	Total
1. Salaries & Wages	$18,284	0	$18,284
2. Employee Fringe Benefits	4,128	0	4,128
3. Travel	4,815	0	4,815
4. Supplies and Services	3,500	0	3,500
5. Equipment	0	0	0
6. Facilities & Admin. Costs	7,989	0	7,989
Subtotals		0	$38,716
In Kind Contribution		0	0
Total Project Costs			$38,716

G. Other

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A representative of the Department of Agriculture, Markets & Foods reserves the right to attend seminars and audit any work performed by the grant recipient.

Attachment A: Project Proposal - "2018 IPM Program for Vegetable Growers/Farmers in New Hampshire"

I. Itemized Budget

Funding can only be used for items detailed in your budget. Requests for the purchase of non-consumable equipment that may serve a broader purpose than the IPM project will be rejected. Itemized budget must be specific.

Expense Account	TOTAL
Personnel	
George Hamilton, Extension Field Specialist	$7,924
Additional Labor	
120 days @ 8 hours/day@ $17.00/hr.	$10,360
Benefits	$4,128
Mileage: 120 miles/day @ 150 days @ $0.535/mile	$4,815
Supplies	$3,500
Subtotal:	$30,727
Indirect Costs at 26%	$7,989
Total	$38,716

Personnel: $18,284

George Hamilton, UNH CE - Extension Field Specialist, (.0833 FTE) is the primary person conducting the project and will be managing the finances of the grant. All recommendations that are given to the farmers will be approved through the primary person conducting the project and may be delivered through the IPM scouts hired for the project. The primary person conducting the project will make follow-up farm visits when problems occur with the IPM scouting during the growing season.

Additional Labor:

IPM Scout for Insect Monitoring and Scouting

One IPM Scout will be hired for insect monitoring and scouting from April through November for various vegetable insect pests; 70 days for the IPM scout. The IPM scout, with participating growers/farmers/orchardists, will set-up traps, check the traps and monitor the crop weekly to record and collect data throughout the growing season. The scout will collect the traps at the end of the season, clean and inventory the good traps and dispose of the traps that are no longer usable. The scout will collect the end of season grower/farmer/orchardist surveys.

Benefits Rate(s): $4,128

The Employee Benefit Rates are based on UNH's most current Rate Agreement with the U. S. Department of Health and Human Services, as required under OMB Circular A-21. A copy of the Rate Agreement is provided annually to the NH Department of Administrative Services. The full Employee Benefits rate applies to salaries and wages, except for hourly and college work

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study wages, graduate student salaries, and faculty summer salaries. The partial rate applies to non-student hourly wages, FICA-eligible graduate student pay, faculty summer salaries, and other exceptions to faculty and staff contract pay.

Travel: $4,815

Over the previous two years, the IPM scouts averaged approximately 100 miles per day conducting the weekly farm visits for checking traps and monitoring crops. The total mileage is based on the 70 days additional labor (IPM Scout) and 20 days for George Hamilton, UNH CE Extension Field Specialist.

Mileage and per diem expenses will be reimbursed at the current federal rates. Travel expenses will include instate travel to farms participating in the IPM program and attending planning sessions and events/meetings/workshops dealing with this IPM program.

Supplies & Services: $3,500

This application is requesting $3,500 for the purchase of project supplies/services directly related to the support of this project. Funds will be used for purchasing traps (projected at $1,230), trap supplies (i.e. cups, tops, wires, fasteners, etc.), attractants/lures (projected at $1,770) and paper, ink, ink cartridges, and printing for forms used by the IPM scout and the PI (projected at $500).

Facilities and Administrative Costs Rate: $7,989

The Facilities and Administrative Cost Rate is based on UNH's most current Rate Agreement with the U. S. Department of Health and Human Services, as required under OMB Circular A-21, unless capped by the State of New Hampshire or Federal Sponsor. A copy of the Rate Agreement is provided to the NH Department of Administrative Services when rates change.

II. Project Description (3 lines or less, to be used for publicity purposes):

Insect pests of vegetables will be trapped and monitored on a minimum of fifteen (15) farms weekly through the summer of 2018. Insects include European corn borer (ECB), corn earworm (CEW), fall armyworm (FAW), western bean cutworm (WBCW), brown marmorated stink bug (BMSB) and squash vine borer (SVB).

III. Project Objectives (be sure to include how this project serves the concepts of IPM):

Sweet corn

- Monitoring European corn borer, corn earworm, fall armyworm and western bean cutworm with pheromone traps to determine need, frequency and timing for insecticide control applications.

- Reduce damage caused to sweet corn by the European corn borer, corn earworm, fall armyworm and western bean cutworm by application of properly timed insecticide applications.

Vine crops

- Determine when squash vine borer is active on vegetable farms in New Hampshire and giant pumpkin patches in the state of New Hampshire.

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- Work with vegetable and giant pumpkin growers on monitoring squash vine borer using Heliothis traps with the Pacific Biocontrol Squash Vine Borer lure to determine need, frequency and timing for insecticide applications.

- Reduce damage caused to cucurbit crops by the squash vine borer thru application of properly timed insecticide applications.

Vegetables

Determine if BMSB is feeding on fruit and vegetables in New Hampshire

Teach fruit and vegetable growers to monitor BMSB using 4 foot tall pyramid trap with an attractant lure.

BMSB population data will yield information on seasonal activity and relative abundance of the insect, which is necessary for development of an IPM strategy.

IV. Economic and Environmental Impact

Considering the pattern and severity of fall armyworm and corn earworm populations in 2013, sweet corn IPM saved participating growers $15,615 in pesticide and $18,728 in labor and equipment costs, along with an increase of $102,354 in retail crop sales due to the reduction in sweet corn cull rate from insect damage following the IPM program recommendations. We anticipate there could be positive impacts from our sweet corn work on chrysanthemum and pepper crops. European corn borer also hits these crops, and our monitoring and reporting alerts these growers as well. To avoid fatiguing clientele with questionnaires, we have not measured this impact, but several growers have reported their crops have avoided significant injury because of our notifications.

In 2014 sweet corn growers using the IPM program sprayed 3.10 fewer sprays than before involvement in the current IPM program. This savings is valued at $19,082 in pesticide and $22,898 in labor and equipment costs. The reduction in sweet corn cull rate from insect damage due to the IPM program, as reported by the participating growers resulted in increase of $82,168 in retail crop sales. Total annual impact of sweet corn IPM program: $124,148.

In 2015, 35 sweet corn growers using the IPM program sprayed 2.05 fewer sprays than before involvement in the current IPM program. This savings is valued at $16,347 in pesticide and $19,616 in labor and equipment costs. The reduction in sweet corn cull rate (9.73%) from insect damage due to the IPM program, as reported by the participating growers resulted in increase of $212,241 in retail crop sales. Total annual impact of sweet corn IPM program: $248,204.

In 2016, 35 sweet corn growers using the IPM program sprayed 2.77 fewer sprays than they did priot to the current IPM program. This savings was a value of $25,842 for pesticides and $35,892 for labor and equipment costs. The reduction in sweet corn cull rate (throwing away insect-damaged ears) due to the IPM program as reported by the participating growers resulted in an increase of $174,361. In retail crop sales based on a difference of 14.62% more sweet corn produce compared to prior to using current IPM practices (farmers stated actual cullage percerntage of 3.63% this year versus 14.62% prior to using IPM practices). Total sweet corn impact: $236,096.

In past years, participating growers reported the vine crop IPM work saved $5,000 on insecticides to control the squash vine borer. Neither our clientele nor we have been able to measure reduction in

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crop losses from the squash vine borer work, but observation indicates it is effective, especially on bush-type crops of Cucurbita pepo or Cucurbita maxima.

In 2014, the 14 growers participating in the squash vine borer IPM program, reported they sprayed less than they usually did prior to the IPM program. An average of 1.90 sprays on 270 acres of summer squash, winter squash and pumpkins were not applied based on the IPM program. Growers noted no plant loss due to squash vine borer. This savings equaled over 67.4 gallons of pesticides not applied, saving $5,372 in materials and $12,790 in labor and equipment costs.

In 2015, the 31 growers participating in the squash vine borer IPM program, reported they sprayed less than they usually did prior to the IPM program. An average of 1.85 sprays on 306 acres of summer squash, winter squash and pumpkins were not applied based on the IPM program. Growers noted no plant loss due to squash vine borer. This savings equaled over 83.3 gallons of pesticides not applied, saving $6,348 in materials and $15,115 in labor and equipment costs.

In 2016, squash vine borer numbers were high, and they started flying earlier that we normally expect. The growers participating in the squash vine borer IPM program, reported they sprayed less than they usually did, prior to the IPM program. An average of 2.02 sprays on 275.13 acres of summer squash, winter squash and pumpkins were not applied based on the IPM program. Growers noted no plant loss due to squash vine borer. This savings equaled over 68.78 gallons of pesticides that were not applied saving $9,998 in pesticide expense, and $23,885 for labor and equipment costs.

In addition to dollar savings, reduced insecticide application protects populations of beneficial insects including predators, parasitoids, and pollinators. Fewer spray applications also reduces farm worker exposure to pesticides, in particular those involved with pesticide mixing and loading. Reduced spraying also reduces the opportunity for drift and the risk of environmental contamination. It contributes to farm profitability, which ensures a supply of locally produced food to meet the rising demand for these products. Finally, while on weekly farm visits, our scouts provide valuable early warning information to farmers about other pests. As an example, over the past three years, IPM scouts were the first individuals in NH to notice Northern Corn Leaf Blight and consequently warnings were made to the agricultural community.

The brown marmorated stink bug (BMSB), Halymorpha halys, is an invasive stink bug native to Japan, Korea, China, and Taiwan, which is now well-established throughout the mid-Atlantic region of the United States.

BMSB is a polyphagous species, meaning it can feed on a wide range of hosts; therefore, BMSB is a pest of many crops where it is established. Host crops include tree fruit, vegetables, shade trees, and leguminous crops. In 2010, populations of this invasive species increased dramatically, causing widespread injury to many crops throughout the mid-Atlantic region. Tree fruit, in particular, was hit hard with some growers losing entire crops of stone fruit. Among apple growers, losses were totaled in excess of $37 million in the region. In several Mid-Atlantic States, BMSB is now the most costly pest for peach and apple growers to manage.

Within the United States, native stink bugs generally have been classified as secondary pests of tree fruit and have been successfully managed with broad-spectrum insecticide applications typically directed at other key pests. When BMSB populations increased dramatically, this led to devastating levels of fruit injury and BSMB quickly replaced pests such as codling moth and oriental fruit moth as the key pest driving management decisions in the mid-Atlantic region of the United States. Because BMSB is a newly established invasive species, management programs for this pest are still being developed.

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BMSB is not known to have caused any damage on fruit and vegetable farms in New Hampshire thus far. However, in 2014 through 2016, significant damage was documented on fruit and vegetable farms in Massachusetts and Connecticut.

Maintaining a network of pherome-bated traps is the most efficient means of monitoring this insect, which spends a lot of time in the canopy of forest and shade trees. The traps also tell us where BMSB population buildup is occurring, before agricultural damage begins. We anticipate it could begin in New Hampshire in 2018 or 2019.

BMSB damage on tree fruit does not become visible until 2 to 4 weeks after feeding occurred, so monitoring by only visual checking for injury could result in our detecting it too late to prevent economic losses to apples or peaches.

By monitoring for it now, UNH CE will be able to inform farmers when it begins to arrive in their regions, and we hope to help them prepare to manage the pest using the least amount of pesticide. Work is currently being done by researchers at Mid-Atlantic States and New York to help farmers learn which pesticides are most effective, along with determining if there are any cultural or biological options effective for controlling this pest.

V. How will your goals be accomplished? (i.e., experimental design)

• One IPM scout will be hired with NHDAM&F – IPM Grant funds to conduct on-farm monitoring and scouting.

• We will work with up to fifteen growers/farmers in New Hampshire on weekly monitoring of insect pests, check traps to determine need, frequency and timing for insecticide control applications.

Sweet Corn

o European Corn Borer - two Heliothis traps with Scentry E-strain or 'New York' type pheromone lures and the Scentry Z- strain or 'Iowa' type pheromone lures changed every four to six weeks from May through October.

o Corn Earworm - Heliothis trap with Hercon pheromone luretapes and the luretapes changed every two weeks from July through October.

o Fall Armyworm - bucket or canister trap with Scentry FAW four component pheromone lures and the lures changed every four to six weeks from July through October.

o Western Bean Cut Worm - bucket or canister trap with Trece pheromone lures changed every four to six weeks from May through October.

Vine Crops

o Squash Vine Borer - Heliothis trap with the Pacific Biocontrol SVB pheromone lures changed every four to five weeks from June through September.

Vegetables

o Brown Marmorated Stink Bug - 4 foot tall pyramid trap with an attractant lure (Stink Bub Xtra Combo). The lures are changed according to recommendations form the manufacturer (5-7 week lure) from the manufacturer (AgBio).

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- We will check traps throughout the 2018 growing season. Some insects are blown into NH on wind currents, so growers/farmers do not know when the insects arrive until damage appears or the growers/farmers apply unnecessary sprays for prevention.

- Work with the new UNH CE IPM Coordinator and Extension Entomology Specialist, to determine if any special news releases need to be made on the status of any insect outbreaks.

- If there are major insect outbreaks, we will consider disseminating alerts through additional means, including Weekly Market Bulletin.

- At the end of the season, growers/farmers in the program will complete a survey dealing with the project.

VI. Sampling Methods (if applicable):

- On-farm monitoring for insect pests will be conducted during the 2018 growing season on a minimum of fifteen operations in New Hampshire with UNH CE personnel assisting.

- Weekly trap counts will be reported to the growers/farmers and we hope growers/farmers will participate in the monitoring.

- Any pheromone lures or baits used in the trap will be changed according manufacturer recommendations.

- Working with the growers/farmers, some traps will be moved according to crop conditions and maturity.

- Depending on how the traps are used in the field, material breakdown of the traps during growing season and storage of the traps; traps may have a life of two or more years and will need to be replaced.

VII. How will your data be evaluated?

- At the end of the season, growers/farmers in the program will complete a program evaluation survey to be reviewed by the UNH CE IPM Coordinator and/or other UNH CE personnel. Number of sprays per sweet corn field applied will be compared to trap counts and grower's concept of the amount of sweet corn ears damaged due to insect damage will be evaluated.

- Based on the monitoring counts collected during the season, UNH CE can decide if additional educational programming needs to be developed for vegetable growers/farmers in the state.

VIII. Explain how the results of your project will be shared/publicized.

All published literature (papers, presentations, publications, advertisements, etc.) must contain a statement attributing funding to the New Hampshire Department of Agriculture, Markets and Food IPM Grant Program. Publications must be submitted with the final report.

- A weekly visit to each grower will be made to monitor trap counts where the grower will be provided the information on need, frequency and timing for insecticide control applications.

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- Updates on insect pest situations will be given at scheduled grower twilight meetings throughout the growing season.

- Pending agreement by participating growers, trap catches will posted on UNHCE's website, for anyone to access whenever he/she wishes. This will support decision-making by growers beyond those directly involved, and by other agricultural workers.

- If there are any major insect outbreaks, we will consider disseminating alerts through additional means, including Weekly Market Bulletin.

- A presentation on the results of this project will be developed and presented to vegetable growers/farmers upon request.

IX. Detail how other groups may adopt some of the information you learn or develop:

- The UNH CE Extension specialists will be available to present the information described above.

Provide a complete list of all persons involved in the proposed project; include the names, addresses and phone numbers of the individuals.

George Hamilton, Extension Field Specialist
Mailing Address:
UNH Cooperative Extension – Hillsborough County
329 Mast Road – Room 101
City: Goffstown State: NH Zip: 03045
Telephone: day: (603)641-6060
Fax: (603)645-5252
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