SIGNATURE PAGE

PROPOSAL TITLE: Examining the population dynamics of Wheat Head Armyworm on the wheat growing region of eastern Oregon.

SUBMITTED TO: AGRICULTURAL RESEARCH FOUNDATION FOR THE OREGON WHEAT COMMISSION

SUBMITTED BY:

_____ Date: _____
Principal Investigator(s) Silvia I. Rondon

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Principal Investigator(s) Mary K. Corp

APPROVED BY:

_____ Date: _____
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(Department Head, Superintendent, or County Chair)
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Agricultural Research Foundation

Research Proposal for the Agricultural Research Foundation
Oregon Wheat Commission

Title: Examining the population dynamics of Wheat Head Armyworm on the wheat growing region of eastern Oregon

Investigator(s): **Silvia I. Rondon**, Assistant Professor, Extension Entomologist Specialist, Oregon State University, Hermiston Agricultural Research and Extension Center, Hermiston, OR; phone (541) 567-8321 ext 108; email silvia.rondon@oregonstate.edu
Mary K. Corp, Associate Professor, Dryland Cropping Systems, Umatilla County Extension Office, Pendleton, OR; phone (541) 278-5403; email mary.corp@oregonstate.edu

Cooperator(s): **Diana Roberts**, Area Extension Agronomist, WSU Spokane/Lincoln County Extension, Spokane WA; **Keith S. Pike**, Entomologist, Washington State University, Prosser, WA; **Peter J. Landolt**, USDA-ARS Research Leader, Yakima Agricultural Research Laboratory, Wapato, WA. Drs. Roberts and Pike are our counterparts in Washington. They will be conducting similar project in several Washington counties. Dr. Landolt will provide the pheromone technology used to determine WHA distribution and relative densities in the region.

Funding History: Amount requested for fiscal year 2010-2011 **$ 13,545**
This is a 2-year project

Abbreviation(s): Wheat Head Armyworm, WHA; Hermiston Agricultural Research and Extension Center, HAREC; Pacific Northwest, PNW; Washington State University, WSU.

Abstract: Caterpillars of a species of armyworm in the genus *Faronta* can be a troublesome pest of cereal grains in the PNW. They caused crop damage in Idaho, Washington and Oregon from 2007 to 2009. This insect may be the same, or closely related to the WHA, which is a pest of cereal grains throughout the Midwest and Great Plains. Information about this pest in the PNW is incomplete at this time.WHA has the potential to be among the most injurious pests of small grains in the region since it feeds directly on kernels in the wheat head. Sometimes growers are often not aware of the damage until harvest when grain samples discover damaged kernels. Little is known about the pest or its control. We propose to study its

biology, field densities, distribution, damage, and management. At present, there are no insecticides labeled specifically for WHA.

Objective(s):

1. Identify the species of WHA present in eastern Oregon.
2. Determine the distribution, seasonal occurrence, and damage levels (wheat yield reductions) relative to larval densities in the main wheat production areas of eastern Oregon.
3. Determine if there is a relationship between WHA presence and production practices, neighboring crops and/or conservation plantings.
4. Communicate with the industry intensively about this pest both in person and via web-based tools.

Procedures:

Objective 1. The larvae of the "true" WHA, *Faronta diffusa* feed on wheat and various other grain and grass crops. The genus also includes *Faronta terrapictalis* which we have been referring to as the "false" WHA. The genus *Faronta* consists of 13 species. This species is native to the western USA, and its host range and pest status are not known. All *Faronta* larvae and moths look similar; thus there can be confusion as to which species are found feeding on wheat, grains or grass. A preliminary survey showed that, *F. diffusa* and *F. terrapictalis,* are present in wheat growing areas of Oregon and Washington but we are not certain about which species may be responsible for larval damage to wheat. Thus, correct identification is needed.

Objective 2. A region wide pheromone trapping system will be used to determine distribution and seasonal occurrence of WHA in eastern Oregon. Trap collections will be assessed weekly from mid May through late September. We will use one pheromone trap per 100 acres of wheat. Pheromones will be provided by Dr. Landolt (USA-ARS). Number of WHA adults per trap per week will be determined. At sites where WHA trap counts are high, fields will be further checked. At least 5 sites per field will be checked and larvae will be collected using beating sheets. Larvae collected will be brought back to the entomology laboratory at the HAREC for further studies. These studies include: 1) rearing larvae to obtain adults to identify species (Year 1); 2) once species have been identify we will study the life cycle of the pest (Year 2).

Objective 3. Aerial maps and field surveying will be used to collect data from the areas surrounding our trapping locations to evaluate if there is a correlation between field production practices, adjacent crops, grass water ways and/or other perennial grass plantings with the presence of WHA.

Objective 4. Upon completion of the project our findings will be made available to growers, extension agents, and crop consultants for immediate use. Information will be published in relevant articles in Cereal newsletter, Oregon Wheat magazines, and other journals. We will use the OSU Cereal Central website to post updates on cereal pests on a regularly basis and will continue to use the OSU Cereal-Central blog for weekly updates during the trapping season. We will present research results and information to grower and industry groups throughout the year at growers meetings, OWGL county meetings and the OWGL Annual Meeting (late October-early December).

Timeline:	**Months**											
Project Phase	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
1. Identify fields		x	x	x								
2. Set up pheromone traps					x							
3.Collect pheromone traps					x	x	x	x	x			
3. Collect larvae					x	x	x	x	x			
4. Process material (read traps, ID larvae, rear larvae)					x	x	x	x	x	x		
5. Analyze data									x	x		
6. Write report											x	
7. Communicate to industry	x	x	x	x	x	x	x	x	x	x	x	x

7 Ongoing activity

Justification:

Caterpillars of a species of armyworm in the genus *Faronta* can be a troublesome pest of cereal grains in the PNW (Rondon et al. 2009). They caused crop damage in Bonneville County, Idaho, in 2005 and 2006, in Lincoln County, Washington, in 2007 and 2008, and in Umatilla County, Oregon, from 2007 to 2009. Washington State University spring wheat and barley variety trials near Davenport Washington experienced a 35% yield loss due to this insect in 2007 and 2008. For an infested wheat crop normally averaging 60 bu/acre, that is a loss of 21 bu/acre or $105/acre at $5/bu wheat (Roberts 2008, 2009a, b). This insect may be the same, or closely related to, the WHA, *Faronta diffusa* (Walker) (Lepidoptera: Noctuidae), that is a pest of cereal grains throughout the Midwest and Great Plains. Information about this pest in the PNW is incomplete at this time.

Early instar WHA Larva

Seed damage caused by WHA

WHA has the potential to be among the most injurious pests of small grains in the region. It feeds directly on kernels in the wheat head. Sometimes growers are often not aware of the damage until harvest when grain samples discover damaged kernels. Little is known about the pest or its control. Field studies are needed on its biology, field densities, distribution, damage, and management. At present, there are no insecticides labeled specifically for WHA. Identify the species of WHA present in easte rn Oregon. We propose to determine the distribution, seasonal occurrence, and damage levels (wheat yield reductions) relative to larval densities in the main wheat production areas of eastern Oregon; to determine if

there is a relationship between WHA presence and production practices, neighboring crops and/or conservation plantings; and to communicate with the industry intensively about this pest both in person and via web-based tools.

Budget	Fiscal Year 2010-2011
Personnel	
[1]1 Hourly worker, 1080hr X $10/hr	$2,700
Benefits for Temporary Employees @ 8%	$216
[2]Biotechnical aid, 0.23 FTE (Directed by S.I. Rondon)	$3,750
Benefits for Biotech @ 70%	$2,625
Total Other Personnel	
Total Salary, Wages and Fringe Benefits	**$9,291**
D. Travel	
To field sites, 1,900 miles @ $.55/mi	$1045
[3]Partially cover cost to attend at least one grower meeting	$429
Mileage 780 mi @ $.55	
Total Travel	**$1,474**
F. Other Direct Costs	
1. Materials and Supplies	
Pheromone traps	$2,000
Sampling, rearing, preservation supplies	500
Canvas beating sheets ($34 each X 4)	150
Total Materials and Supplies	**$2,650**
2. Publications Costs	
Extension publication (full color) 100 copies X $1.30	$130
Total Publications Costs	**$130**
Total Other Direct Costs	**$13,545**

[1]One hourly student will help with field experiment including: setting traps, collecting traps and bringing them to HAREC. They will also help with laboratory experiments including rearing and mounting (20h per week/$10 per hour/6months)

[2] Biotech will provide labor for management and organization of tasks. He/she will also tabulate and analyze data, supervise students. He/she will report to Principal Investigators weekly.

[3] Frequent travel will be needed during the execution of the project. Investigators will be attending extension and scientific meetings such as Oregon Wheat Commission (Jan.) and Wheat Grower League Convention (Dec.).

Note: We will request less money year 2 (2011-2012), since some material and supplies will be purchased with funds obtained in year 1.

Relation to Other Research:This research builds on the preliminary data collected in 2009 in cooperation with WSU (Roberts, Pike and Landolt). It will follow the same protocol as WSU/USDA ARS plans to use in Washington State in 2010. It will build research-based information on a recurring pest and is complementary to our Insect Identification Train-the Trainers short courses being offered in 2010-2011 funded by a WSARE grant. Principal

Investigators have vast experience working on wheat production issues and related research. This work complements past efforts on the leaf-feeding sawfly, and more recently the cereal leaf beetle.

UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE

OMB Approved
0524-0039

CURRENT AND PENDING SUPPORT: Silvia I. Rondon

Instructions:
1. Record information for active and pending projects, including this proposal. (Concurrent submission of a proposal to other organizations will not prejudice its review by CSREES.)
2. All current efforts to which project director(s) and other senior personnel have committed a portion of their time must be listed, whether or not salary for the person involved is included in the budgets of the various projects.
3. Provide analogous information for all proposed work which is being considered by, or which will be submitted in the near future to, other possible sponsors including other USDA programs.

NAME (List/PD #1 first)	SUPPORTING AGENCY AND AGENCY ACTIVE AWARD/PENDING PROPOSAL NUMBER	TOTAL $ AMOUNT	EFFECTIVE AND EXPIRATION DATES	% OF TIME COMMITTED	TITLE OF PROJECT
	Active:				
Rondon, S.I., Hamm, P.B., D.A. Horneck,	USDA- Grass Seed System	$ 58,892	5/01/09 – 5/01/10	10%	Integrated Disease, Fertilizer, Weeds and Insects Management for Columbia Basin Grass Production
Rondon, S.I., G.H. Clough	IR-4	$21,637	04/01/09-12/31/10	1%	Managing rotation of biopesticides to control onion thrips
Rondon, S.I.	Washington State Potato Commission	$12,500	4/1/09-4/30/10	1%	Development of treatment threshold for the Beetleafhopper to better manage potato purple top disease in the Columbia Basin
Corp, M.K., S.I. Rondon	WSARE	$95,635	4/1/09-12/31/11	1%	Empowering Ag Professionals Through a Beneficial and Pest Insect Train the Trainer Short Course Program for Oregon, Washington and Idaho
Rondon, S.I.	Oregon Potato Commission	$8,773	04/01/09-12/31/09	1%	Treatment threshold for the beet leafhopper to manage potato purple top disease in the Columbia Basin
Rondon, S.I.	Oregon Potato Commission	$8,348	04/01/09-12/31/09	1%	Refining economic thresholds to control the potato tuberworm in the lower Columbia Basin
Rondon, S.I.	Oregon Potato Commission	$12,816	04/01/09-04/30/10	1%	Monitoring potato tuberworm, aphids, leafhoppers, and psyllids in Eastern Oregon

William E. Snyder, PI with 12 co-PIs	USDA-RAMP	2,000,005	Jan 2010-2014	1%	Area-wide management of potato pests (AWMPP) in the Pacific Northwest
Pending: Rondon, S.I., A. Goyer, P.B. Hamm, L. Xue	NIFA-WIPM	79,710	Apr.1,2010-Dec. 20,2011	1%	Developing and Implementing tactics for Managing the Beet Leafhopper in Potatoes
Rondon, S.I., Corp M.K.	ARF	11,910	Feb. 2010-Dec.2011	1%	Wheat Head Armyworm in Eastern Oregon: True or False?
Rondon, S.I., Corp M.K.	ARF-OWC	13,545	Feb. 2010-Dec.2010	1%	Examining the population dynamics of Wheat Head Armyworm in the wheat growing regions of the Columbia Basin
Rondon, S.I.	ARF	8,832	Apr. 2010-Dec. 2011	1%	Improved management of potato purple top disease: development of treatment threshold for the beet leafhopper in the Columbia Basin

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COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE
CURRENT AND PENDING SUPPORT: Mary K. Corp

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	Active:				
Corp, M.K., & S.I. Rondon	WSARE	95,635	4/1/09-12/31/11	1%	Empowering Ag Professionals Through a Beneficial and Pest Insect Train the Trainer Short Course Program for Oregon, Washington and Idaho
Corp, M.K., S. Machado & A. Azarenko	USDA- CSREES	21, 644	09/30/2009-06/30/2011	1%	Developing a Dryland Organic Cereal Production System
Corp, M.K., D. Horneck, D.Wysocki, & L. Lutcher	USDA-NRCS	12,000	10/1/2008-6/30/2010	1%	Flex Cropping Guide for Dryland Production
Corp, M.K., S. Machado & A. Azarenko	USDA-CSREES	21,644	09/01/2008-06/30/2010	1%	Developing a Dryland Organic Cereal Production System

Pending:					
Rondon, S.I., Corp M.K.	ARF	11,910	Feb. 2010-Dec.2011	1%	Wheat Head Armyworm in Eastern Oregon: True or False?
Rondon, S.I., Corp M.K.	ARF-OWC	13,545	Feb. 2010-Dec.2010	1%	Examining the population dynamics of Wheat Head Armyworm in the wheat growing regions of eastern Oregon