



**IR-4 NORTH
CENTRAL REGION
RESEARCH CENTER**

MICHIGAN STATE UNIVERSITY



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2016 ANNUAL REPORT

A. Mission and Goals of the North Central Region IR-4 Program

The mission of the NC Region IR-4 program is to ensure that safe and effective pest management tools are available for growers of specialty crops, including ornamental crops, and for minor uses on major crops through the generation of high quality field and laboratory data.

The goals of the program are to identify pest management needs for these crops in the region, to participate in the prioritization of these needs at the national level, to conduct field research and analytical studies that develop the information to obtain clearances and label additions from USEPA to meet these needs, and, finally, to make information available on the status and progress of these studies and their final outcome to growers and other interested parties.

B. Background and Justification

The IR-4 Minor/Specialty Crop Pest Management Project (IR-4 Project) is a comprehensive, national program that consists of six units working together on a common mission to meet the nationally defined goals and objectives presented above. The national program is currently comprised of: IR-4 National Headquarters (IR-4 HQ), four Regional IR-4 Centers (Northeast, North Central, Southern and Western), and the USDA Agricultural Research Service (USDA-ARS) Office of Minor Uses. The North Central Region (NCR) program is responsible for the operations of the program in the 12 states of the region (IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD and WI) and has been located at Michigan State University (MSU) since the inception of the regional programs in 1967. The NCR program, while located at MSU, has developed three field research centers in Michigan and Wisconsin, and works with other field research cooperators around the region, has established an advanced laboratory unit at MSU, and, in response to the Good Laboratory Practice (GLP) requirements of EPA, has developed a group of Quality Assurance personnel to serve the region. The NC program also works co-operatively with the USDA-ARS IR-4 field research unit located at Wooster, OH. Each of the 12 states of the Region (with the current exception of Missouri) has one or more State Liaison Representatives who identify research needs in their state and transmit back the activities of the program to interested parties within their state.

In the NCR program, needs are identified and prioritized by research and extension personnel, farmers, grower organizations and others at a regional meeting, and prioritized at a National Food Use Workshop. Field trials in which pest management chemicals are applied to food crops are conducted and crop samples are collected and analyzed for the magnitude of residues. All food use research is conducted under the

requirements for Good Laboratory Practice issued by the USEPA. The analytical reports, after Quality Assurance checks, are forwarded to USEPA as petitions for the development of clearances for these materials. Efficacy (performance) studies on key pests that are currently difficult to control are also funded where this is deemed necessary to obtain later clearances for these pests. Like food uses, ornamental projects are prioritized at a specific workshop and assigned to collaborators in the NCR. The ornamentals projects focus on efficacy and crop safety (phytotoxicity) with primary emphasis on pests for which no satisfactory controls currently exist. The reports are sent to the registrants of the chemicals to assist in obtaining label amendments to include new crops and pests. Projects to conduct research and efficacy demonstrations with biopesticides are also solicited and prioritized nationally at the annual Biopesticide Workshop.

The plant protection industry has limited economic incentive to conduct the research necessary to obtain registrations for most specialty crops. To fill this pest management gap, IR-4 develops the data that provide legal, effective, safe and IPM-compatible pest control agents. Without this program, many specialty crops could no longer be produced in the USA with severe economic implications for American agriculture, food processors, and consumers. Specialty crop growers and food processors are the primary beneficiary of the IR-4 Project by having legal access to effective pest management products, but the general public also benefits by having a safe, healthy, and reasonably priced food supply.

C. Budget

Funding for the NCR IR-4 program comes primarily from USDA/NIFA as an annual competitive research grant. We received \$1,989,874 for FY16 at similar level as FY15. The starting date for the FY16 funding is August 15, 2016.

D. Overview of Productivity in 2016

This was a productive year for the IR-4 North Central Region. Field Research Directors (FRD) effectively worked around weather-related events, such as frosts and flooding, to carry out field trials to completion. The NC lab has worked hard to overcome backlogs associated with unexpected problems and difficult studies. In the food program 63 food crop field residue trials and 9 efficacy studies were submitted for the region. In the ornamentals program, a total of 60 trials to assess the safety of pesticides and 4 efficacy studies were submitted from the region. A downward trend of trial completions is in part reflective of fewer project assignments for NCR, however the costs of completion continue to rise for the field and lab because of expanding demands and greater analytical complexity of test substances. There were 3 EPA compliance inspections conducted in the NC Region thus far in 2016, and all were closed without adverse findings. This illustrates the continuing effectiveness of our region's FRDs, Laboratory and Quality Assurance personnel. More details of these results are provided below.

E. Future Challenges

The IR-4 program continues to face significant challenges in relation to the budgetary constraints on completing its mission. Based on projections from the US Congressional Agriculture committee, we again are anticipating flat funding for this next year's NIFA grant proposals. This will add continued pressures on the NC Region for maintaining our facilities, field and lab personnel, while providing the highest possible outputs to the specialty crop growers of the region. In addition, the IR-4 Project Management Committee is investigating a shift from the current NIFA competitive grant to a USDA Cooperative Agreement funding line as a way to address the need to recover the indirect costs (IDC) (also referred to as Facilities and Administration) associated with host institutions and granting timelines. If successful, this avenue would provide IR-4 with a four year grant and 10% IDC.

In 2016 the IR-4 Project underwent an Organization Assessment to review their existing organizational structure and its operational efficiencies within the organization. The Organization Assessment Committee (OAC)(members representing USDA, Specialty Crop industry, AgroChemical

industry, and Land Grant Universities) made final recommendations in May 2016, for IR-4 headquarters and regional programs engage in “process improvement” to help identify efficiencies and cost savings, and continue efforts to find additional funding, but they did not recommend organizational re-structuring. The OAP noted that IR-4 Project continues to be a productive and responsive program for the specialty crop and minor uses communities, and a significant contributor to U.S. agriculture. The PMC met in July 2016 and affirmed the OAC’s recommendations, and initiated plans to hold facilitated meetings at the National Planning meeting (February 2017) to assess processes in the IR-4 laboratory and field programs.

F. Personnel Changes/Additions in 2016

Ms. Eileen Nelson replaced Dr. Bryan Jensen as the new QAO for the IR4 Wisconsin Research Center. Eileen completed the GLP/QA training in addition to the eQA system training. She started the new role in Fall 2015.

Dr. Kirk Howatt, Fargo, ND is a new FRD for ND. He is an NDSU weed science professor and has been assisting IR-4 GLP field trials for FRD Mr. Mark Ciernia who is retiring at the end of 2016.

Dr. Doug Doohan and Chengsong Hu, OARDC, OH started IR-4 GLP field trials for herbicides. They have been previously conducting IR-4 performance (efficacy/phytotoxicity) studies, but now are added GLP trials for their repertoire. Doug is also the NC IR-4 Ohio liaison.

G. Regional IR-4 Activities:

Field Research

(Dr. Satoru Miyazaki)

Food Uses: As a result of the 2015 NC Regional IR-4 Advisory Committee Meeting in East Lansing, MI, the subsequent IR-4 Food Use Workshop, and the National Research Planning Meeting followed by inevitable adjustments, 77 food use field studies (69 GLP residue trials and 8 Efficacy/Crop safety studies) were assigned in 2016 while 69 field studies (59 GLP and 10 Efficacy/Crop safety) were conducted in 2015 (up 12%). However, the trial increase is mainly in field crops and fruits. Michigan and Wisconsin field research centers are conducting the trials about 30% below the optimal project capacity. In the future more fruit projects may be considered in Wisconsin. From 1/1/2016 through 12/31/2016 the region completed and sent to IR-4 HQ the field data packages for 66 food use field trials (56 GLP trials and 10 Efficacy/Crop safety trials). See Table 4 of this report for the distribution of the funded 2016 field research projects and the 2015 projects completed during this period. Fig. 1 provides a graph of all projects completed for the 2007-2016 period as a 3-year moving average (food, ornamentals and lab) as of December 31, 2016.

Ornamental Horticulture: NCR has been conducting 99 efficacy/crop safety trials in the area of controlling insects, diseases and weeds. In the ornamentals program conducted in 2016, 81 studies of pesticide efficacy and crop safety were completed and the reports were forwarded to IR-4 HQ. See the Table 4 for details.

Table 1. 2016 NCR ORNAMENTAL HORTICULTURE PROJECTS

ProjectTitle	Protocol	#PR	State	Cooperator
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Foliar Feeding Beetle Efficacy	16-007	5	KS	Ray Cloyd Kansas State University
New Pest Products Crop Safety: Foliar Applications	16-008	5	KS	Ray Cloyd Kansas State University
Pre-emergent Herbicide Crop Safety	16-010	9	IA	Diana Cochran Iowa State University
Ornamental Grasses Herbicide Crop Safety	16-011	1	IA	Diana Cochran Iowa State University
Thrips Efficacy	16-006	3	MI	Terry Davis, Michigan State University
New Pest Products Crop Safety: Foliar Applications	16-008	7	MI	Terry Davis, Michigan State University
Botrytis Efficacy: Greenhouse Crops	16-001	9	OH	Francesca Hand, Ohio State University
Fungicide Crop Safety	16-004	5	OH	Francesca Hand, Ohio State University
Botrytis Efficacy: Greenhouse Crops	16-001	9	MI	Mary Hausbeck, Michigan State University
New Disease Products Crop Safety: Foliar Application	16-004	5	MI	Mary Hausbeck, Michigan State University
Pre-emergent Herbicide Crop Safety	16-010	12	OH	Hannah Mathers, Mathers Environmental Science Service
Ornamental Grasses Herbicide Crop Safety	16-011	6	OH	Hannah Mathers, Mathers Environmental Science Service
New Pest Products Crop Safety: Foliar Applications	16-008	5	OH	Anand Persad, Davey Tree Experts Co. Ltd
Pre-emergent Herbicide Crop Safety	16-010	5	OH	Anand Persad, Davey Tree Experts Co. Ltd

Biopesticides: In 2016, the NCR conducted the following biopesticide projects (Table 2). These projects seek to advance the registration and demonstrate the efficacy of naturally occurring pest management agents. These materials often have particular importance for organic growers.

Table 2. Biopesticide Research Projects in the NC Region in 2016

Title	Principal Investigator
Efficacy and Phytotoxicity of Bio pesticides for management of Spotted Wing Drosophila (SWD) in blueberry	Rufus Isaacs, Michigan State University
Efficacy and Phytotoxicity of Bio pesticides on Apple for the Control of Fire Blight	George Sundin, Michigan State University
Efficacy and Phytotoxicity of Hypovirulent CHV3-GH2 on Chestnut for the control of Chestnut blight.	Dennis Fulbright, Michigan State University

Efficacy and Phytotoxicity of Biopesticides on tomato for the control of Clavibacter	Sally Miller, Ohio State University
Root and Foliar Disease of Ginseng	Mary Hausbeck, Michigan State University

Outreach and Collaborative Activities

Canadian Biopesticides and Minor Use Pesticides Priority Setting Workshops: Satoru Miyazaki participated in the 2016 Canadian Biopesticides and Minor Use Pesticides Priority Setting Workshops in Gatineau, Quebec, March 22-24, 2016. Much of the NC Region is contiguous with Canada and we have many pest management problems in common and IR-4 was often asked for input to assist in reaching a final determination, as needed. They prefer registration candidate products to be developed jointly with IR-4.

Interactions with specialty crop growers:

Wisconsin Ginseng Growers: The NCR is home to a unique specialty crop, ginseng. Marathon County, Wisconsin, produces 90% of the cultivated American ginseng grown in the United States. To date through IR-4 14 fungicides are labeled for ginseng since the research started in 2002. On-going ginseng research includes 10 fungicides and one biopesticide demonstration project. On April 2, 2016, along with MSU's Mary Hausbeck, Department of Plant, Soil and Microbial Sciences and Satoru Miyazaki attended the 2016 Spring Wisconsin Ginseng Growers' meeting to present ginseng research results as well as provide information on the petition status of fungicides for ginseng. The ginseng growers are awaiting new labels for ginseng disease control and are very active in getting the word out to the Wisconsin federal and state legislators.

The 2016 Ginseng Research Field Day was held on August 6 in Marathon County, Wisconsin. Over 90 growers, industry representatives, policy makers, and researchers were in attendance. Wisconsin Secretary of Agriculture Ben Brancel made comments on Wisconsin ginseng that can show an appellation of origin, i.e., Wisconsin that serves to designate ginseng that originates from that area. The quality and characteristics of ginseng are exclusively due to Wisconsin. As an example he used Mexican tequila for geographical indications. Mary Hausbeck and her staff highlighted the ongoing research trials in the various ginseng gardens of the cooperating growers. Satoru Miyazaki presented a progress report of the IR-4 ginseng research on new product registrations. Mary Hausbeck showed the evaluation results of various new and experimental products for control of ginseng diseases. They could see and hold the infected samples and learned the most important aspect of having a healthy ginseng crop for their gardens.

Iowa Nutraceutical Crops Growers: Kemin Industries, Des Moines, Iowa is very active in the nutraceutical ingredient manufacturing from specialty crops like monarda, marigold, rosemary, oregano, Chinese lantern, etc. They may be a largest grower of these crops in Iowa. Satoru Miyazaki visited their facility and the fields to familiarize with the pest problems in September. They need help of IR-4 and sent a representative to the food-use workshop in Orlando, FL. A Pendimethalin /monarda field project will be conducted in 2017.

Michigan Blueberry Growers: Through Dave Trinka, Michigan Blueberry Growers Association and cooperation with MSU entomologists, IR-4 has approved a biopesticide project for 2017 on controlling the blueberry stem gall wasp for which currently there is no effective means to control (PPWS).

Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, MI, December 8-10, 2016:

The NCR IR-4 program joined the MSU AgBioResearch and Extension as exhibitor at the Great Lakes Expo to promote and publicize the IR-4 Project to fruit and vegetable growers, farm marketers and greenhouse operators. With the cooperation of IR-4HQ, a poster was set up depicting how the IR-4 project helps specialty crop growers with emphasis on Michigan and other NCR crops. The IR-4 brochure, “How IR-4 Helps Michigan Growers” was well received.

Laboratory Program

(Dr. Susan Erhardt)

Since the last NRPM meeting in October of 2015, the emphasis for the lab has been to meet the 30 month turn around while at the same time maintaining overall quality. To this end, we were able to hire a full time temporary employee, Robin Chinnery, who came to us with bench chemistry experience. Robin, while working under the guidance of Wayne Jiang was able to complete two studies that had languished, resulting in the reporting of 10 trials, with an additional 4 trials at analytical completion for a third study. We were able to leverage two student aides to work with the analysts on several projects, especially, dinotefuron/basil and cherry and fluroxypyr + florasulam/grasses. Their work resulted in the completion of an additional 23 trials. We found that pairing the right student with the right project and analyst helped to expedite completion of various projects. We hope to utilize this type of approach in the future as personnel and projects allow. It is a real win-win for both the lab and the students, helping us expedite projects as well as giving the students some hands on experience at the lab bench. Over the last year, we have generated 17 reports describing the results of 121 field trials.

Quality Assurance Program

(Dr. Zhongxiao Michael Chen)

The Quality Assurance Unit (QAU) in 2016 monitored 86 field trials and 91 laboratory analytical trials that were conducted in the region including the USDA ARS facility at Wooster, OH. QAU conducted periodic in-life inspections of the GLP studies to assure the management that the study protocol and appropriate Standard Operation Procedures (SOPs) were followed in compliance with the EPA GLP standards (40 CFR 160), and audited the field data books, analytical raw data, analytical summary report, and draft final report of each study to assure the data quality and integrity for GLP compliance. As part of the GLP requirements, QAU also conducted facility inspections to assure that the personnel, equipment, and test facilities were properly set up and adequate for conducting the requested GLP studies.

The personnel in the QAU that were involved in NCR studies in 2016 are:

<u>Quality Assurance Officers</u>	<u>Area of Responsibility</u>
Dr. Zhongxiao Michael Chen	Regional QAU management, inspections, and audits
Ms. Lisa Latham	Inspections and audits
Dr. Derek Killilea	ND/SD Field Sites
Ms. Eileen Nelson	UW-Madison IR-4 Research Center

QAU Performance in Last 5 Years with current update: In 2016, the QAU performed a total of 225 inspections and audits (Table 3). This workload had steady increases since 2009 after the

closure of the Cornell University analytical lab. In 2014, the draft final report audits dropped considerably due to uncontrollable external reasons. For calendar year of 2016, we completed the highest number of inspections and audits in last 5 years with a tally of 225 QA reports generated in our region.

Table 3. Numbers of Quality Assurance Reports Accomplished in Last 5 Years.

Inspections or Audits	2012	2013	2014	2015	2016
Draft Final Report Audit	24	14	4	14	9
Analytical Raw Data & Report Audit	38	42	23	33	34
Field Data Book Audit	91	76	76	74	117
Lab and Field In-life Inspection	47	52	40	63	59
Facility Inspection	4	8	4	10	6
Total QA Reports	204	192	147	194	225

EPA Inspection: We had three EPA inspections in NCR in 2016. On April 21 – 22, 2016, EPA Inspector, Mr. Dan Myers, led the two inspections in WI. Two trials conducted by Dr. Scott Chapman (10474.12-WI07 Flonicamid/Bean and 10665.11-WI29 Difenconazole + Cyprodinil/Cucumber-GH) were selected for the EPA audits. On the site, Mr. Myers selected to audit an on-going trial, A2063.15-WI474 Sethoxydim/Basil, conducted by Mr. Dan Heider. There were no findings after the inspections. On September 9, 2016, we received a notification of upcoming EPA inspections at Dr. Sharon Clay’s field site at SDSU, Brookings, SD, scheduled for the week of September 26, 2016. The inspection would be led by Mr. Mark Lehr and follow the old-school scheme which meant that all raw data would be reviewed on site. In the letter EPA selected the studies of PR10472.13-SD01 (Flonicamid/pea (edible potted & succulent shelled)), 10473.12-SD02 (Flonicamid/ pea(dry)), and 10932.13-SD03 (Pyroxasulfone/ sunflower). Mr. Lehr completed the listed audits plus one on-going trial, PR09777.16-SD442 (Novaluron/Pea), on September 29, 2016. There were also no findings after the inspections.

Up to date, our region has received 34 EPA inspections in total. There are no compliance issues reported by EPA inspectors since 2000.

International Activities: Michael Chen separately gave two GLP/Quality Assurance Trainings in Bangkok, Thailand, January 20 – 22, 2016 and Nairobi, Kenya, May 11 - 13, 2016 as part of the IR-4 International Capacity Building. Additionally, our QAU hosts a Chinese short-term visiting scholar, Dr. Huimin Wu, Zhejiang Agricultural and Forestry University, Hangzhou, China. Dr. Wu participated in lab/field inspections and audits as part of his activities and experiences. He returned to China on August 9, 2016.

International Activities:

(Drs. Wayne Jiang, Michael Chen and John Wise)

Several NC IR-4 personnel have been involved in USDA FAS and TASC-funded international capacity building efforts in 2016.

Dr. Wayne Jiang continued his 2015 work with the Central Laboratory Pesticide Laboratory (CAPL), Cairo by completing initial GLP training, helping CAPL to set up storage stability samples, and completed

the method validation GLP training. In January 2016, Wayne and Mr. Joe DeFrancesco (Study Director, OR State U.) worked with CAPL lab to complete method validation (MV) and then start sample analysis.

In March/April 2016 Wayne traveled to Morocco and Ghana to do GLP training and facility inspection, respectively. Wayne traveled to CAPL, Cairo, Egypt in April, 2016, for the Azoxystrobin+Difenoconazole/Guava study.

In May 2016 Drs Wayne Jiang and Michael Chen, along with Dr. Michael Braverman (IR-4 HQ) participated in the FAS and African Union-funded IR-4 International Capacity Building event in Nairobi, Kenya, where Wayne lectured on laboratory GLPs and Michael on GLP/Quality Assurance.

Dr. Michael Braverman (IR-4 HQ) invited Michael Chen to give two GLP/Quality Assurance Trainings in Bangkok, Thailand, January 20 – 22, 2016 as part of the IR-4 International Capacity Building. Additionally, our QAU hosts a Chinese short-term visiting scholar, Dr. Huimin Wu, Zhejiang Agricultural and Forestry University, Hangzhou, China. Dr. Wu has participated in lab/field inspections and audits as part of his activities and experiences. He will return to China on August 9, 2016 after spending six months at MSU.

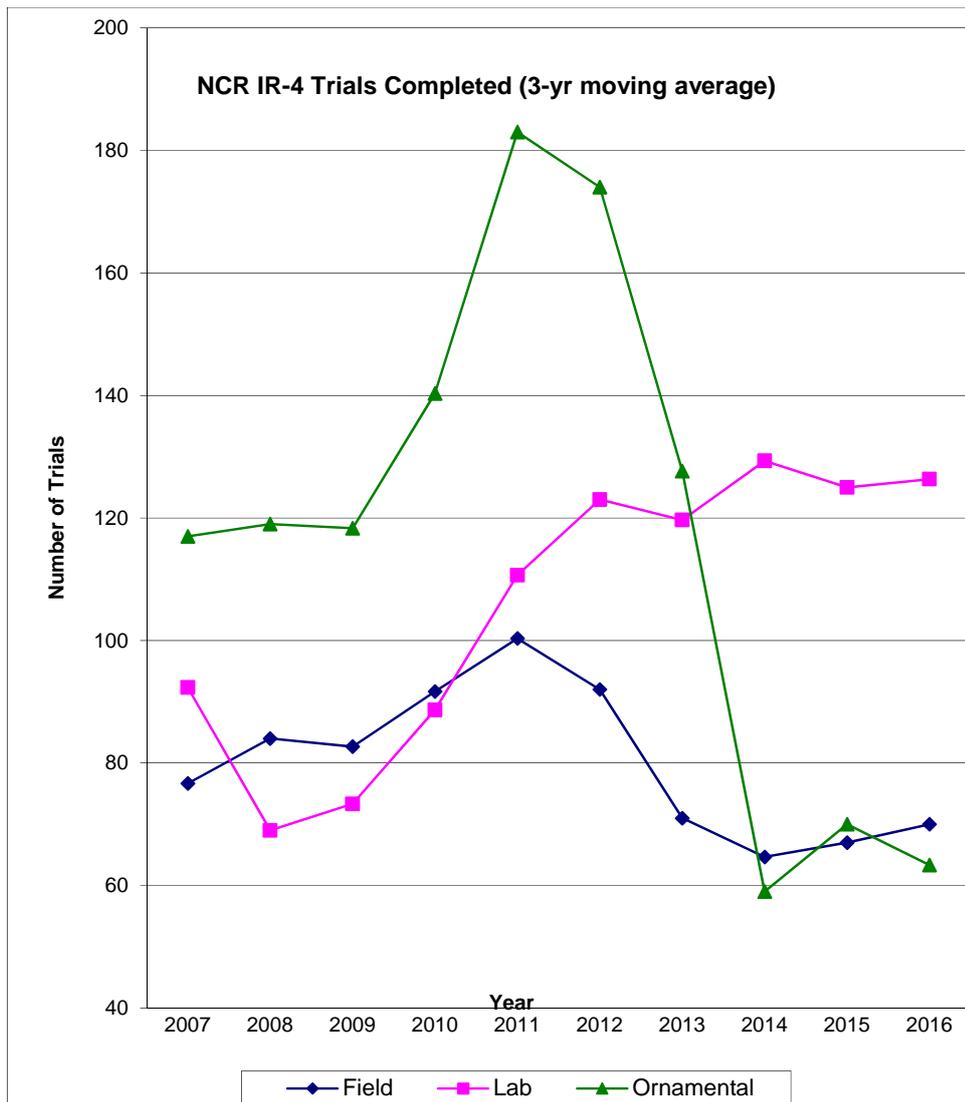
MSU IR-4 hosted three Egyptian scientists, and one post-doc to attend a field and laboratory GLP training at Michigan State University in East Lansing, MI. Dr. Wayne Jiang worked with NC IR-4 personnel, including Dr. Sue Erhardt and Mrs. Lisa Latham, and Ms. Nicole Soldan the training in July 2016 at MSU.

Table 4. Distribution of 2016 Projects (Initiated/Completed*)

State	Food Use			Ornamental Use		
	Field	Efficacy	Lab	Fungicide	Herbicide	Insecticide
IL						
IN						0/8
IA					10/9	
KS						10/0
MI	33/21	5/5	90/122	17/17		10/7
MN						
MO						
NE						
ND	14/4					
OH		3/5		14/6	28/34	10/0
SD	8/5					
WI	14/10					
TOTAL	69/40	8/10	90/122	31/23	38/43	30/15

*For 1/1/16 – 12/31/16 In some cases, the year of project initiation was not 2016.

Figure 1. Record of Project Completions in the NC Region*



*as of December 31, 2016

NCR State Researchers Participating in the IR-4 Program for 2016

(* indicates State Liaison Representative)

ILLINOIS D. Williams*	MICHIGAN S. Miyazaki* T. Davis M. Hausbeck	MINNESOTA V. Krischik *	OHIO D. Doohan* H. Mathers A. Persad F. Hand J. Siefer S. Miller	WISCONSIN D. Heider* S. Chapman R. Groves*
INDIANA D. Egel* C. Sadof	J. Wise A. VanWoerkom B. Zandstra R. Isaacs G. Sundin D. Fulbright	NEBRASKA S. Kamble*	NORTH DAKOTA R. Zollinger* M. Ciernia B. Jenks	SOUTH DAKOTA S. Clay*
IOWA R. Hartzler* D. Cochran				
KANSAS R. Cloyd *	MISSOURI Open*			

NC Liaison Committee Officers

J. Wise - Chairperson
D. Heider - Vice Chairperson
S. Clay - Secretary

NC Region Administrative Advisor

D. Buhler - Administrative Advisor

MSU Leader Lab

J. Wise - NC Region Director
S. Miyazaki - Regional Field Coordinator
S. Erhardt - Regional Lab Coordinator
W. Jiang - Associate Regional Lab Coordinator
L. Geissel - Research Assistant
S. Kumar - Research Assistant
E. Gomaa - Research Assistant
R. Fader - Laboratory Technologist
R. Othoutd - Part time Analyst
Z. Chen - QAU Coordinator
L. Latham - QAU associate

Field Research Center Directors

MI: B. Zandstra (15 veg. and tree fruit crop use trials)
MI: A. VanWoerkom (13 tree fruit use trials)
WI: S. Chapman and D. Heider (14 veg. crop use trials).

Field QA

Z. Chen, MI/L.Latham
D. Killilea, ND
E. Nelson, WI