

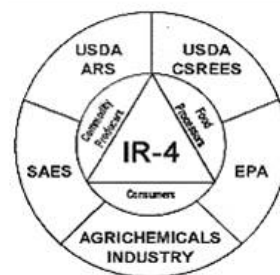
IR-4: 50 Years and Counting!

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IR-4 has reached a milestone: 2013 is the 50th anniversary for this USDA funded project to aid growers by facilitating the registration of tools to manage diseases, pests and weeds. We will cover some of the highpoints in IR-4 history, including the start of the Ornamental Horticulture Program in 1977. The recent activities of this program will be highlighted such as developing efficacy data for Hachi-Hachi and collaborating with scientists throughout the country on Q biotype whitefly and gladiolus rust. We will also discuss some of the current impacts to the program and a vision for the future.

Introduction. Pest, disease, and weed issues for specialty crops and minor uses on major crops are not fully addressed by the crop protection companies during product development because it is more economical to focus on large row crops rather than these niche markets. As early as the late 1950's, the Directors of the State Agricultural Experiment Stations, university extension personnel, and USDA recognized the need for developing mechanisms to register crop protection tools for specialty crops and for minor uses on major crops. In 1962, numerous growers faced crop failures and significant economic hardships due to lack of registered crop protection technology.

1963 The IR-4 Project was established by the Directors of the State Agricultural Experiment Stations to create a program to assist growers of fruits, vegetables, herbs and other specialty crops with their critical pest management needs. The IR-4 Project officially began on July 1, 1963 with a budget of \$25,000, and an organization meeting was held in New Orleans, LA.



1975 The Technical Committee (precursor to the current Project Management Committee) established the four IR-4 Regional offices and residue laboratory system to more quickly address the long list of priority minor use needs.

1976 USDA-ARS recognized the need to augment the existing capacity at the state experiment stations and developed a companion program to address the growing backlog of project requests.

In the early to mid1970's, awareness was growing for the need to register materials for non-food uses (foliage and flowering plants in the greenhouse and out of doors; bedding plants; woody ornamentals; shade trees; and turf). These specialty crops were also underserved, and growers and landscape maintenance personnel needed an adequate supply of registered tools to manage pests, diseases and weeds. The seeds for an Ornamentals Program were planted...

1963

President: John F. Kennedy
Vice President: Lyndon B. Johnson
Population: 189,241,798
Life expectancy: 69.9 years

Dow-Jones High: 767
Dow-Jones Low: 646

Federal spending: \$111.32 billion
Federal debt: \$310.3 billion
Inflation: 1.7%
Consumer Price Index: 30.6
Unemployment: 5.5%

Cost of a new home: \$19,300
 Cost of a first-class stamp: \$0.04
 Cost of a gallon of regular gas: \$0.30
 Cost of a dozen eggs: \$0.55
 Cost of a gallon of milk: \$0.49

1977

President:	James Earl Carter, Jr.
Vice President:	Walter F. Mondale
Population:	220,239,425
Life expectancy:	73.3 years
Dow-Jones High:	999
Dow-Jones Low:	800
Federal spending:	\$409.22 billion
Federal debt:	\$706.4 billion
Inflation:	11%
Consumer Price Index:	60.6
Unemployment:	7.7%

Cost of a new home:	\$54,200
Median Household Income:	\$13,572
Cost of a first-class stamp:	\$0.13
Cost of a gallon of regular gas:	\$0.62
Cost of a dozen eggs:	\$0.82
Cost of a gallon of milk:	\$1.68

1977 And germinated in 1977 with the 1st IR-4 /USDA-ARS Workshop held in April 1977 in St Louis, MO. More than 10,000 needs for ornamental horticulture were condensed into 5621 distinct project requests. The Second Workshop was held later that year in December in Dallas, TX and prioritized these requests. Ray Frank, Dick Lindquist and Chuck Powell led the prioritization with legendary marathon sessions lasting late in the evenings.

Researchers throughout the U.S. provided efficacy and crop safety reports for research conducted as early as 1967 on many of these project requests. This supporting data was compiled and sent to registrants for seven insecticides, five herbicides, and one fungicide. Dick Guest coordinated these activities. Charles. C. Compton retired after 14 years of service as IR-4 Project Coordinator.

Active Ingredients Screened by IR-4 during the 1970's

Fungicides	Herbicides	Insecticides	PGRs
Anilazine (FRAC M8)	Alachlor (WSSA 15)	Acephate (IRAC 1B)	Dikegulac sodium
Benomyl (FRAC 1)	Asulam (WSSA 18)	Aldicarb (IRAC 1A)	NAA
Captafol (FRAC M4)	Bentazon (WSSA 6)	Azinphos methyl (IRAC 1B)	
Captan (FRAC M4)	Chloramben (WSSA 4)	Carbofuran (IRAC 1A)	
Chloroneb	Chlorpropham	Chlorpyrifos (IRAC 1B)	
Chlorothalonil (FRAC M5)	DCPA (WSSA 3)	Diazinon (IRAC 1B)	
Copper hydroxide (FRAC M1)	Dichlobenil (WSSA20)	Dienochlor	
EBDC (FRAC M3)	Diphenamid (WSSA 15)	Diflubenzuron (IRAC 15)	
Ethazole (FRAC 14)	Diuron (WSSA 7)	Dimethoate (IRAC 1B)	
Etridiazole (FRAC 14)	Glyphosate (WSSA 9)	Disulfoton (IRAC 1B)	
Fenitrothion (IRAC 1B)	Hexazinone (WSSA 5)	Fensulfothion (IRAC 1B)	
Ferbam (FRAC M3)	Metolachlor (WSSA 15)	Kinoprene (IRAC 7A)	
Mancozeb (FRAC M3)	Napropamide (WSSA 15)	Malathion (IRAC 1B)	
PCNB (FRAC 14)	Nitrofen	MBC PHOSPHATE	
Potassium azide	Oryzalin (WSSA 3)	Methomyl (IRAC 1A)	
Streptomycin (FRAC 25)	Oxadiazon (WSSA 14)	Oxamyl (IRAC 1A)	
Thiabendazole (FRAC 1)	Oxyfluorfen (WSSA 14)	Permethrin (IRAC 3A)	
Thiophanate methyl (FRAC 1)	Paraquat (WSSA 22)	Resmethrin (IRAC 3A)	
Triadimefon (FRAC 3)	Prodiamine (WSSA 3)		
Triforine	Prometryn (WSSA 5)		
Zineb (FRAC M3)	Pronamide (WSSA 3)		
	Simazine (WSSA 5)		
	S-Metolachlor (WSSA 15)		
	Trifluralin (WSSA 3)		

1978 The first IR-4 supported new uses of Banrot, glyphosate, and Ronstar were registered by EPA – a turnaround time of less than 18 months from data receipt to registrant submission to approval!

1981 A special project was initiated to determine which products were efficacious and should be labeled to control black vine weevil. Six products were tested on 20 ornamental species.

1982 This year marked the 5 year point of the Ornamental Program. Up to this point, over 8,900 different requests were received, 7,200 research trials were funded for efficacy and crop safety, 7,300 research reports were completed, and 1501 crop uses were registered based on these data.

1986 IR-4 data helped expand registered uses for Bayleton, Devrinol, Fusilade 4E, Kerb 50WP, KnoxOut, Ornalin, and Pydrin 2.4EC. The planned Ornamentals Workshop was cancelled due to budget cut-backs from the passage of the Gramm-Rudman-Hollings Act. The precursor to the American Nursery & Landscape Association (ANLA) presented the following testimony to the U.S. House of Representatives:

“For the past eight years, this Cooperative State Research Service special research grant program of pesticide clearance has greatly assisted in obtaining more prompt pesticide registrations for nursery crops when such pesticides are already registered for use on food or feed crops. Cancellation of the IR-4 Program, which costs approximately \$1.4 million per year, will make it necessary for nurserymen and florists to wait six to ten years for needed pesticide registrations – if they are granted at all.

We strongly urge the Congress to provide the necessary \$1.2 million to maintain the IR-4 pesticide clearance program. We also request \$2 million for the National Agriculture Pesticide Impact Assessment program. This request is made with the understanding that a fair share of the funding is used for ‘ornamental’ pesticide uses.”

1987 Ten years after the start of the Ornamental Program, IR-4 met with ANLA and Society of American Florists (SAF) representatives to review the program’s progress. Despite budgetary constraints which led to about 25% fewer trials, IR-4 remained committed to this industry as demonstrated by the continued registrations approved for ornamental horticulture uses supported by IR-4 data.

1992 DuPont indicated they will no longer support uses in ornamental horticulture markets; a call was made for Project Requests for new products to replace uses removed by DuPont. Additional ornamental horticulture crops were added to the Pendulum and Barricade labels based on IR-4 crop safety data.

1986	
President:	Ronald W. Reagan
Vice President:	George Bush
Population:	240,132,887
Life expectancy:	74.7 years
Dow-Jones High:	1,955
Dow-Jones Low:	1,502
Federal spending:	\$990.34 billion
Federal debt:	\$2,120.6 billion
Inflation:	1.9%
Consumer Price Index:	109.6
Unemployment:	7.2%
Cost of a new home:	\$111,900
Median Household Income:	\$24,897
Cost of a first-class stamp:	\$0.22
Cost of a gallon of regular gas:	\$0.93
Cost of a dozen eggs:	\$0.87
Cost of a gallon of milk:	\$2.22

Active Ingredients Screened by IR-4 during the 1980's

Fungicides/Nematicides	Herbicides	Insecticides/Miticides	PGRs
<i>Agrobacterium radiobacter</i> (FRAC NC)	Alachlor (WSSA 15)	Abamectin (IRAC 6)	Chlormequat chloride
Anilazine (FRAC M8)	Asulam (WSSA 18)	Acephate (IRAC 1B)	Gibberellic Acid
Bendiocarb (IRAC 1A)	Bifenox (WSSA 14)	Aldicarb (IRAC 1A)	NAA
Benomyl (FRAC 1)	Carbaryl + Cacodylic acid (IRAC 1A +)	Aldoxycarb (IRAC 1A)	
Captafol (FRAC M4)	Chloramben (WSSA 4)	Ancymidol	
Captan (FRAC M4)	Chlorazifop	Azadirachtin (IRAC UN)	
Chlorothalonil (FRAC M5)	Chlorimuron (WSSA 2)	Azinphos methyl (IRAC 1B)	
Copper basic (FRAC M1)	Chlorpropham	Carbofuran (IRAC 1A)	
Copper hydroxide (FRAC M1)	Clopyralid (WSSA 4)	Chlorpyrifos (IRAC 1B)	
Copper sulfate (FRAC M1)	DCPA (WSSA 3)	Cyfluthrin (IRAC 3A)	
Dodemorph (FRAC 5)	Dicamba (WSSA 4)	Cyromazine (IRAC 17)	
Etridiazole (FRAC 14)	Diphenamid (WSSA 15)	Daminozide	
Fenamiphos (IRAC 1A)	Diuron (WSSA 7)	DDVP (VAPORIZATION) (IRAC 1B)	
Ferbam (FRAC M3)	EPTC (WSSA 8)	Diazinon (IRAC 1B)	
Fosetyl Al (FRAC 33)	Fluazifop-p-butyl (WSSA 1)	Dienochlor	
Imazalil (FRAC 3)	Glufosinate (WSSA 10)	Diflubenzuron (IRAC 15)	
Iprodione (FRAC 2)	Glyphosate (WSSA 9)	Dimethoate (IRAC 1B)	
Lactofen (WSSA 14)	Haloxfop methyl (WSSA 1)	Disulfoton (IRAC 1B)	
Mancozeb (FRAC M3)	Isoxaben (WSSA 21)	Esfenvalerate (IRAC 3A)	
Mefenoxam (FRAC 4)	Linuron (WSSA 7)	Fenitrothion (IRAC 1B)	
Metalaxyl (FRAC 4)	Metolachlor (WSSA 15)	Fenpropathrin (IRAC 3A)	
Oxycarboxin (FRAC 7)	Napropamide (WSSA 15)	Fenthion (IRAC 1B)	
Oxytetracycline (FRAC 41)	Oryzalin (WSSA 3)	Fonofos (IRAC 1B)	
PCNB (FRAC 14)	Oxadiazon (WSSA 14)	Formetanatehydrochloride (IRAC 1A)	
Ethazole (FRAC 14)	Oxyfluorfen (WSSA 14)	Hexythiazox (IRAC 10A)	
Rotenone + Piperonyl butoxide (IRAC 21 + IRAC 27A)	Pendimethalin (WSSA 3)	Horticultural Oil (FRAC NC)	
Sethoxydim (WSSA 1)	Prodiamine (WSSA 3)	Isofenphos (IRAC 1B)	
Streptomycin (FRAC 25)	Prometryn (WSSA 5)	Kinoprene (IRAC 7A)	
Thiabendazole (FRAC 1)	Pronamide (WSSA 3)	Malathion (IRAC 1B)	
Thiophanate methyl (FRAC 1)	Sethoxydim (WSSA 1)	Methamidophos (IRAC 1B)	
Triadimefon (FRAC 3)	S-Metolachlor (WSSA 15)	Methomyl (IRAC 1A)	
Triflumizole (FRAC 3)	Sulfometuron-methyl (WSSA 2)	Mycar	
Triforine	Triclopyr (WSSA 4)	Naled (IRAC 1B)	
Vinclozolin (FRAC 2)	Trifluralin (WSSA 3)	Oxamyl (IRAC 1A)	
		Oxydemetonmethyl (IRAC 1B)	
		Oxythioquinox	
		Permethrin (IRAC 3A)	
		Phosalone (IRAC 1B)	
		Phosmet (IRAC 1B)	
		Resmethrin (IRAC 3A)	

1993 IR-4 turned 30! In September, J. Ray Frank assumed responsibilities for the Ornamental Program. Heavy emphasis was placed on developing crop safety data to aid in adding new crops to existing labels.

1996 A joint Food Use and Ornamentals Workshop occurred in Orlando, FL. The Society of American Florists, American Floral Endowment, Horticulture Research Institute and the American Nursery & Landscape Association provided funding to support the Ornamentals Workshop.

1997 Twenty years after being instrumental in founding the program, Ray Frank was recognized for productivity in the ornamentals program (more than 4,900 new crop uses); Neal Thompson presented him with a new license plate. Ray responded it made a fine addition to his collection of over 3,000 plates!

1999 A successful 10th workshop was held in Portland, OR, which started a series of annual workshops continuing through 2007.

2003 IR-4 turned 40! Broadstar, Flagship, Heritage and Sureguard received EPA registration.

2004 Bob Herrick became Ornamentals Manager and succeeded in bringing about two key changes: renaming the program to Ornamental Horticulture Program and enabling dedicated funding for ornamental horticulture research projects. Ely Vea started compiling the traditional format for sending research reports to registrants and continued to read and summarize data until the present time. The concept of 'Super A' priorities was introduced into the 2003 Workshop so that urgent related research activities could be tracked together.

2005 Cristi Palmer became the Ornamental Horticulture Program Manager and introduced a grower and extension survey to augment the project request process as means to gauge industry needs without focusing on specific active ingredients.

IR-4 dove into invasive species research by accepting an invitation to participate in the Technical Advisory Committee of the USDA Interagency Task Force for Q-Biotype Whitefly (Q-TAC).

The workshop format was revised so that participants discussed and prioritized current pest, disease, and weed management needs first and then discussed solutions to those needs. Status of EPA registration became the basis for setting priority levels of products included in protocols. The 2005 Ornamental Horticulture Workshop Priorities were: Efficacy for Phytophthora, Pythium, Thrips, Beetles, Borers, and White Grubs, and Crop Safety for Post-Emergent Herbicides.

1997

President: William J. Clinton
Vice President: Al Gore
Population: 267,743,595
Life expectancy: 76.4

Dow-Jones High: 8,250
Dow-Jones Low: 6,300

Federal spending: \$1.64 trillion
Federal debt: \$5.50 trillion
Inflation: 2.5%
Consumer Price Index: 160.5
Unemployment: 5.4%

Cost of a new home: \$176,200
Median Household Income: \$37,005
Cost of a first-class stamp: \$0.32
Cost of a gallon of regular gas: \$1.23
Cost of a dozen eggs: \$1.17
Cost of a gallon of milk: \$3.22



Active Ingredients Screened by IR-4 during the 1990's

Fungicides/Nematicides	Herbicides	Insecticides/Miticides	PGRs
<i>Ampelomyces quisqualis</i> isolate M-10 (FRAC NC)	2,4-D (AMINE) (WSSA 4)	Abamectin (IRAC 6)	Chlormequat chloride
Azoxystrobin (FRAC 11)	2,4-D (LV ESTER) (WSSA 4)	Abamectin + OIL (IRAC 6 +)	Ethephon
<i>Burkholderia</i> (FRAC NC)	Asulam (WSSA 18)	Acephate (IRAC 1B)	Flurprimidol
Captan (FRAC M4)	Azafenidin (WSSA 14)	Acetamiprid (IRAC 4A)	Paclbutrazol
Chlorothalonil (FRAC M5)	Benefin (WSSA 3)	Aldoxycarb (IRAC 1A)	Uniconazole
Copper (FRAC M1)	Bentazon (WSSA 6)	Azadirachtin (IRAC UN)	
Copper hydroxide (FRAC M1)	Chlorimuron (WSSA 2)	Bendiocarb (IRAC 1A)	
Copper sulphate pentahydrate (FRAC M1)	Clethodim (WSSA 1)	Bifenthrin (IRAC 3A)	
Dodemorph (FRAC 5)	Clofentezine (IRAC 10A)	Carbaryl (IRAC 1A)	
Etridiazole (FRAC 14)	Clopyralid (WSSA 4)	Carbofuran (IRAC 1A)	
Fenarimol (FRAC 3)	DCPA (WSSA 3)	Chlorfenapyr (IRAC 13)	
Fenhexamid (FRAC 17)	Dichlobenil (WSSA20)	Chlorpyrifos (IRAC 1B)	
Fenitrothion (IRAC 1B)	Dithiopyr (WSSA 3)	Cyromazine (IRAC 17)	
Ferbam (FRAC M3)	Diuron (WSSA 7)	Daminozide	
Fipronil (IRAC 2B)	EPTC (WSSA 8)	Deltamethrin (IRAC 3A)	
Fluazinam (FRAC 29)	Fluazifop-p-butyl (WSSA 1)	Diazinon (IRAC 1B)	
Fludioxonil (FRAC 12)	Fomesafen (WSSA 14)	Diflubenzuron (IRAC 15)	
Flutaloni (FRAC 7)	Halosulfuron (WSSA 2)	Dimethoate (IRAC 1B)	
Fosetyl Al (FRAC 33)	Imazethapyr (WSSA 2)	Esfenvalerate (IRAC 3A)	
<i>Gliocladium virens</i> (FRAC NC)	Isoxaben (WSSA 21)	Fenpropathrin (IRAC 3A)	
Imazalil (FRAC 3)	Isoxaben + Oryzalin (WSSA 21 + WSSA 3)	Formetanatehydrochloride (IRAC 1A)	
Iprodione (FRAC 2)	Lactofen (WSSA 14)	Horticultural Oil (FRAC NC)	
Mefenoxam (FRAC 4)	Metolachlor (WSSA 15)	Imidacloprid (IRAC 4A)	
Mancozeb (FRAC M3)	Metolachlor + Simazine (WSSA 15 + WSSA 5)	Isofenphos (IRAC 1B)	
Myclobutanil (FRAC 3)	Napropamide (WSSA 15)	Malathion (IRAC 1B)	
Oxytetracycline (FRAC 41)	Oryzalin (WSSA 3)	Methamidophos (IRAC 1B)	
PCNB (FRAC 14)	Oxadiazon (WSSA 14)	Methomyl (IRAC 1A)	
Piperalin (FRAC 5)	Oxyfluorfen (WSSA 14)	Naled (IRAC 1B)	
Quaternary ammonium	Oxyfluorfen + Oryzalin (WSSA 14 + WSSA 3)	Oxamyl (IRAC 1A)	
<i>Reynoutria sachalinensis</i> (FRAC NC)	Oxyfluorfen + Pendamethalin (WSSA 14 + WSSA 3)	Oxydemetonmethyl (IRAC 1B)	
Streptomycin (FRAC 25)	Pendimethalin (WSSA 17)	Oxythioquinox	
Tebuconazole (FRAC 3)	Pendimethalin (WSSA 3)	Permethrin (IRAC 3A)	
Thiophanate methyl (FRAC 1)	Prodiamine (WSSA 3)	Phosmet (IRAC 1B)	
Thiophanate-methyl (FRAC 1)	Prometryn (WSSA 5)	Pirimicarb (IRAC 1A)	
Thiram (FRAC M3)	Propiconazole (FRAC 3)	Pyridaben (IRAC 21)	
Triadimefon (FRAC 3)	Sethoxydim (WSSA 1)	Tefluthrin (IRAC 3A)	
<i>Trichoderma harzianum</i> (FRAC NC)	Simazine (WSSA 5)	Trichlorfon (IRAC 1B)	
Trifloxystrobin (FRAC 11)	S-Metolachlor (WSSA 15)	Bifenazate (IRAC UN)	
Triflumizole (FRAC 3)	Sulfentrazone (WSSA 14)	Hexythiazox (IRAC 10A)	
Triforine	Sulfometuron-methyl (WSSA 2)		
Cinnamaldehyde (FRAC NC)	Thiazopyr (WSSA 3)		
Fenamiphos (IRAC 1A)	Trifluralin (WSSA 3)		
Sodium tetrathiocarbonate (IRAC 1B)	Trifluralin + Isoxaben (WSSA 3 + WSSA 21)		

2006 The IR-4 website was updated to include not only program literature but also the newly developed project summaries, online versions of the project request form and annual survey, and the ability to search the live database and download posted researcher reports. The summary reports pulled together individual reports into a cohesive summary of research data for any given efficacy or crop safety project and included suggestions for label development.

As part of the Q-TAC, IR-4 collaborated with entomologists throughout the U.S. to develop Whitefly Management Plans for domestic production and for international shipment. These plans utilized knowledge about the different resistant profiles between B-Biotype and Q-Biotype and proposed rotations to minimize resistance development while managing whitefly populations.

The 2006 Ornamental Horticulture Workshop Priorities were: Efficacy for Phytophthora, Pythium, Thrips, Beetles, Borers, White Grubs, and Liverwort, and Crop Safety for Post-emergent Herbicides.

2007 The Ornamental Horticulture Program reached its 30th year facilitating safe and effective pest management solutions. Registrations for products related to Thrips and Phytophthora efficacy started to receive EPA approval.

Because research projects tended to span more than a single year, biennial workshops were started with less formal meetings held in conjunction with other scheduled events. The 2007 Ornamental Horticulture Workshop selected the following two year priorities: Efficacy for Phytophthora, Downy Mildew, Bacterial Disease, Thrips, Borers & Beetles, White Grubs, Armored Scale, and Herbicide Crop Safety.

2008 The Ornamental Horticulture Program was reviewed by representatives for growers, researchers and registrants. The Review Panel validated the positive impact of the program for the ornamental horticulture industry both in new uses and in the increased emphasis on “green” products and techniques which may offer growers management tools that pose a reduced environmental impact.

2007	
President:	George W. Bush
Vice President:	Dick Cheney
Population:	301,139,947
Life expectancy:	77.9
Dow-Jones High:	14,164
Dow-Jones Low:	12,050
Federal spending:	\$2.73 trillion
Federal debt:	\$9.23 trillion
Inflation:	2.85%
Consumer Price Index:	207.3
Unemployment:	4.6%
Cost of a new home:	\$308,775
Median Household Income:	\$52,673
Cost of a first-class stamp:	\$0.41
Cost of a gallon of regular gas:	\$2.80
Cost of a dozen eggs:	\$1.51
Cost of a gallon of milk:	\$3.47

IR-4 is an invaluable resource for greenhouse and nursery growers – not just in helping make sure they have access to the chemical and biocontrol tools they need to control pests and diseases, but also to support research that helps them use those tools wisely. Specialty crop growers are definitely getting double and triple benefits from the IR-4 Program, because the program listens to the industry ... you hear our voices!

– Lin Schmale, Society of American Florists

Research began on the new exotic, invasive species chili thrips.

EPA registrations were granted for Adorn, Kontos, Overture, and Pageant. Freehand and Tower labels were approved with approximately 85% of the crops supported by IR-4 research.

2009 The Center for Economic Analysis at Michigan State University concluded the IR-4 Ornamental Horticulture Program contributed \$1.176 billion to gross domestic product annually and supported 16,903 full and part-time jobs in the U.S. with annual income of \$719 million.

As part of the USDA-APHIS Technical Advisory Group for the Chili Thrips Task Force, IR-4 collaborated with entomologists throughout the U.S. to develop a Thrips Management Plan to manage chili thrips populations without instigating further resistance development in western flower thrips populations. 2009 marked the first year where IR-4 collaborated with international researchers to study a U.S. invasive disease: gladiolus rust.

The ‘Spotlight On Ornamentals’ was added to the IR-4 Newsletter as a routine column to highlight crops or pest management issues for ornamental horticulture growers.

At the 2009 Ornamental Horticulture Workshop, IR-4 honored Paul Schwartz, Chuck Powell, Dick Lindquist, and Ray Frank for their significant efforts to benefit growers by starting and remaining actively involved in the Ornamental Horticulture Program for more than 30 years.

In addition to supporting registrations in the U.S., IR-4 data was instrumental in registering Broadstar 2G and SureGuard in Canada.

The 2009 Workshop Biennial Priorities were: Thrips Efficacy and Crop Safety, Impact on Beneficials, Scale & Mealybug, Mite, Bacterial Disease Efficacy, Pythium Efficacy, Fusarium Efficacy, New Fungicide Crop Safety, Liverwort Efficacy, Early Post Emergence Efficacy, and Herbicide Crop Safety.

2010 John Ahrens received the first SOAR Award, an honor for those who have provided service, outreach, altruism, and research to IR-4 for the benefit of growers.

IR-4 research supported the registration of Biathlon, Hachi-Hachi, and Palladium and new uses for Pennant Magnum and Tower.



Over the years I know that IR-4 has been very important and instrumental in helping bring some of the minor use crop materials forward for our operations. Sometimes the work goes unrecognized because it happens behind the scenes without much fanfare. I view the IR-4 program as critically important especially to those of us in the “super specialty crop” area of agriculture because it is often times difficult or unprofitable for a manufacturer to register materials for our uses. IR-4 gives us the opportunity to broaden our arsenal against the ever increasing range of pests that challenge our farming operations. Without IR-4’s efforts our job would be much more difficult if not impossible.

– Mike A. Mellano, Mellano & Company

The IR-4 program is one of the best programs that directly help us, the specialty growers, to manage our pest problems and keep our plants and places clean from weeds. We support the program and greatly need their work.

— Sali Barolli of Imperial Nurseries, Inc.

Kathleen Hester joined the team and strengthened research in weed science and plant growth regulators.

Through USDA-ARS cooperative agreements, research began on two other invasive species projects with collaborators at USDA-ARS in Fort Detrick, University of California and University of Florida: chrysanthemum white rust and the mitigation of invasive arthropods during shipping.

Active Ingredients Screened by IR-4 during the 2000's (Herbicides & PGRs)

Herbicides	PGRs
Bentazon (WSSA 6)	1-MCP
Carfentrazone-ethyl (WSSA 14)	6-Benzyladenine
Chitin protein (FRAC NC)	6-Benzyladenine + Gibberellic Acid
Clethodim (WSSA 1)	Chlormequat chloride
Clofentezine (IRAC 10A)	Chlormequat chloride + Daminozide
Clomazone (WSSA 13)	Cyclanalide
Clopyralid (WSSA 4)	Dikegulac sodium
Copper Hydroxide (FRAC M1)	Ethephon
Dichlobenil (WSSA 20)	Flurprimidol
Dichlobenil (WSSA20)	GA4+7
Diclofop-methyl (WSSA 1)	GardEn
Dimethenamid-p (WSSA 15)	Gibberelic Acid + 6-Benzyladenine
Dimethenamid-p + pendimethalin (WSSA 15 + WSSA 3)	Pacllobutrazol
Diquat (WSSA 22)	Prohexadione calcium
Dithiopyr (WSSA 3)	Sodium Silver Thiosulfate
Diuron (WSSA 7)	STS + BA
EPTC (WSSA 8)	Thidiazuron
Ethalfuralin (WSSA 3)	Uniconazole
Ethofumesate (WSSA 8)	
Fenoxaprop (WSSA 1)	
Fluazifop-p-butyl (WSSA 1)	
Flumioxazin (WSSA 14)	
Fluroxypyr (WSSA 4)	
Foramsulfuron (WSSA 2)	
Glyphosate (WSSA 9)	
Halosulfuron (WSSA 2)	
Imazamox (WSSA 2)	
Imazapic (WSSA 2)	
Imzasulfuron (WSSA 2)	
Isoxaben (WSSA 21)	
Linuron (WSSA 7)	
Mesotrione (WSSA 27)	
Mesotrione + proflaminate & S-metolachlor (WSSA 27 + WSSA 3 + WSSA 15)	
Metribuzin (WSSA 5 + WSSA 1)	
MSMA (WSSA 17)	
Napropamide (WSSA 15)	
Oregano oil	
Oryzalin (WSSA 3)	
Oxadiazon (WSSA 14)	
Oxadiazon + Oxyfluorfen (WSSA 14 + WSSA 14)	
Oxadiazon + Pendamethalin (WSSA 14 + WSSA 3)	
Oxadiazon + Proflaminate (WSSA 14 + WSSA 3)	
Oxyfluorfen (WSSA 14)	
Oxyfluorfen + Oryzalin (WSSA 14 + WSSA 3)	
Oxyfluorfen + Pendamethalin (WSSA 14 + WSSA 3)	
Oxyfluorfen + Proflaminate (WSSA 14 + WSSA 3)	
Oxyflurfen (WSSA 14)	
Pendimethalin (WSSA 17)	
Pendimethalin (WSSA 3)	
Peroxyacetic acid	
Pirimicarb (IRAC 1A)	
Proflaminate (WSSA 3)	
Quinoclamine	
Rimsulfuron (WSSA 2)	
Sethoxydim (WSSA 1)	
Simazine (WSSA 5)	
S-Metolachlor (WSSA 15)	
Sulfentrazone (WSSA 14)	
Sulfentrazone + Proflaminate (WSSA 14 + WSSA 3)	
Sulfosulfuron (WSSA 2)	
Trifluralin (WSSA 3)	
Trifluralin + Isoxaben (WSSA 3 + WSSA 21)	
Trifluralin + Isoxaben + Oxyfluorfen (WSSA 3 + WSSA 21 + WSSA 14)	

The IR-4 program is instrumental in helping our growers and producers have the right supplemental labeling needed for the best insecticides, fungicides and growth regulators available. This enables us to do the best job possible growing our crops and helps us be competitive in Global markets.

— Bill Cook, VP, Southern Growers Wholesale Nurseries and Greenhouses

2011 During 2011, IR-4 research supported the registration of nine new products or updated registrations: Barricade 4FL, Basagran T/O 4L, Freehand G, Hachi-Hachi, Micora, Regalio 50, Safari 20SG, Sulfentrazone 4F, TickEx EC. The impact for growers could be far broader than implied with a list. For example, the research to add seven new pests on the Safari label began in 2004 with screening for efficacy on scale and mealybugs as a high priority project. Over time, this research expanded into efficacy for foliar beetle, borers, thrips, and whiteflies, translating into over 870 new crop-pest combinations for the updated Safari label.

New information gathered about efficacy and product rotations for thrips and whiteflies was incorporated into the respective Management Plans.

Attendees at the 2011 Ornamental Horticulture Workshop selected these research priorities: Thrips Efficacy & Crop Safety, Scale Efficacy, Borer Efficacy, Foliar Beetle Efficacy, Whitefly Efficacy, Bacterial Disease Efficacy, Pythium, Fusarium, Fungicide Crop Safety, Herbicide Crop Safety, and Liverwort Product Efficacy & Crop Safety.

2012 In spite of the continued challenging economic times for the ornamental horticulture industry, growers strove to deliver high quality plants for landscapes and interior houseplants. And new exotic species continued to provide significant challenges: boxwood blight and impatiens downy mildew threatened production of both crops. IR-4 collaborated with several U.S. researchers to study fungicide and sanitation mitigation strategies for boxwood blight.

After spearheading the development of the Liverwort Management Plan, IR-4 said a sad goodbye to Kathleen Hester as she headed to different pastures.

IR-4 data contributed to two new products registered through EPA: Orvego and RootShield Plus. By the end of 2002, the IR-4 Ornamental Horticulture program contributed more than 22,000 crop uses for over 100 products.

2013 and beyond: IR-4 turned 50! What began as a two-person operation at Rutgers University has grown to a multi-million dollar research organization with over 120 employees and a presence in nearly every state. Funding for the IR-4 comes from many sources including USDA-NIFA, state agriculture experiment stations, USDA-ARS, USDA-EPA, USDA-APHIS, US Department of Defense, US Foreign Agriculture

Service, trade associations, and the crop protection industry. Clear advances have resulted from this public and private sector investment in IR-4 of over \$38 million of annual direct and in-kind support. The Center for Economic Analysis at Michigan State University in 2011 studied IR-4's impact on U.S. Gross Domestic Product and concluded that IR-4 contributed more than \$7.2 billion to U.S. GDP and was anticipated to support research and industry sales sufficient to support 104,650 U.S. jobs. IR-4 Executive Director, Jerry Baron, stated, "Our economy and quality of life has been improved by the efforts of IR-4, but the story doesn't end at fifty years, as pests become resistant and new pests emerge from other countries, newer technologies will need research. IR-4 is looking forward to the next fifty years of helping specialty crop growers continue to fight pests to protect their valuable commodities."

Over the years, IR-4 has played an instrumental role facilitating the registration of over half of the crop protection tools available to nursery and greenhouse crop farmers. Having access to tools and technologies that would not otherwise be available for use in our industry helps our growers produce healthy crops while protecting both consumers and the environment from the threat of invasive plant pests and diseases.

– Craig J. Regelbrugge, American Nursery & Landscape Association



IR-4 Ornamental Horticulture Workshops & Priority Setting Meetings

1. St. Louis, MO April 1977
2. Dallas, TX Dec. 9, 1977
3. Location Unknown, 1978
4. Minneapolis, MN Dec. 1979
5. Orlando, FL Feb. 4-6, 1981
6. San Diego, CA Feb 23-25, 1982
7. New Brunswick, NJ Jan 1983
8. North Brook, IL Sept. 24-25, 1987
9. St. Louis, MO Nov. 12, 1990
10. Orlando, FL Sept. 11-13, 1996
11. Portland, OR Oct. 17-21, 1999
12. Eastlake, OH October 1-6, 2000
13. Houston, TX April 15-18, 2002
14. Windsor, CT October 20-23, 2003
15. Orlando, FL November 9-11, 2004
16. Charleston, SC October 10-13, 2005
17. Denver, CO October 10-12, 2006
18. Cherry Hill, NJ October 9-11, 2007
19. Cleveland, OH October 5-7, 2009
20. Sacramento, CA October 5-7, 2011
21. Coral Gables, FL October 8-10, 2013

The IR-4 Project continues to lead the charge for developing pest management solutions and alternatives for specialty crop growers or those associated with minor uses on major crops.

Being a specialty crop grower, I understand the high cost of registering products for our industry. Without IR-4, the products available to us would be drastically reduced and those that would be available would be more expensive and/or less effective.

— Jerry Lee, Monrovia