IR-4 Provides Economic Viability

The specialty food crop value in Minnesota is $673.8 million. Special crops include most vegetables, fruits, nuts, herbs, nursery and flower crops. IR-4’s research helped to register Section 18 Emergency Exemptions for Minnesota that helped prevent a loss of $288.4 million from occurring (see back). A registration is granted by the Environmental Protection Agency (EPA) for a particular pest control product on a specific crop. In 2003, ninety-five of the 120 Section 18 Emergency Exemptions that were converted to final registrations were credited to IR-4 by the EPA.

IR-4 Provides Research in Support of a Safe and Secure Food Supply

The Reduced Risk chemicals that IR-4 researches receive clearances from the Environmental Protection Agency (EPA), and are able to control pests that destroy crops without harming the individuals that use them, the food that is harvested, or the environment in which the crops are grown.

IR-4 Helps US Farmers Compete in a Global Economy

With farm production costs rising every day, IR-4 research helps growers stay ahead of global competition, by producing safe and effective pest management solutions for their high value specialty crops.

Major funding for IR-4 is provided by Special Research Grants and Hatch Act Funds from USDA-CSREES, in cooperation with the State Agricultural Experiment Stations, and USDA-ARS. To learn more about IR-4 programs, visit the IR-4 web site at www.ir4.rutgers.edu
### Barley
- Azoxystrobin
- Glyphosate
- Spinosad
- Tebuconazole (Sec. 18)

### Basil
- Napropamide
- Spinosad

### Bean (Dry)
- Bacillus thuringiensis
- Chlorothalonil
- Cyromazine
- Halosulfuron
- Imazamox (Sec. 18)
- Sodium Chlorate

### Beet (Garden)
- Bacillus thuringiensis
- Endothall
- Sethoxydim

### Blueberry
- 2,4-D
- Captan
- Chlorothalonil
- Chlorpyrifos
- Esfenvalerate
- Ethephon
- Fenhexamid
- Fluazifop
- Fosetyl-Al
- Pyriproxyfen
- Fosetyl-Al
- Glyphosate
- Hexazinone
- Methyl Anthranilate
- Norflurazon
- Tebufenozide
- Terbacil
- Ziram

### Brussels Sprouts
- Baciulus thuringiensis
- Chlorpyrifos
- Dimethoate
- Endothall
- Sodium Hypochlorite

### Cabbage
- Bacillus thuringiensis
- Clopyralid
- Chlorpyrifos
- Clomazone
- DCPA
- Endothall
- Glyphosate
- Malathion
- Methomyl
- S-metolachlor
- Oxyniluron
- Paraziquat
- Sodium Hypochlorite

### Canola
- Clopyralid (Sec. 18)
- Clopyralid
- Thiophanate-methyl
- Sethoxydim
- Trifluralin

### Celery
- Bacillus thuringiensis
- Carbaryl
- Glyphosate
- Malathion
- Methamidophos
- S-metolachlor
- Pendimethalin

### Crayfish Apple
- 2,4-D
- Acrepate
- Azoxystrobin
- Clopyralid
- Chlorothalonil
- Chlorpyrifos
- Cryolite
- Ferbam
- Fosetyl-Ak
- Glyphosate
- Maleic Hydrazide
- Metalaxyl
- Pyridaben
- Sethoxydim
- Tebufenozide

### Cucumber
- Bacillus thuringiensis
- Clomazone
- Dimethomorph
- Glyphosate
- Metalaxyl + Copper
- Methyl Anthranilate
- Spinosad
- Zinc Phosphate

### Dill
- Bacillus thuringiensis
- Carbrally
- Prometryn

### Eggplant
- Bacillus thuringiensis
- Bifenthrin
- Glyphosate
- Hexakis
- Paraziquat
- Permethrin

### Elderberry
- Bacillus thuringiensis
- Esfenvalerate
- Glyphosate

### Endive (Escarole)
- Bacillus thuringiensis
- Fluazifop
- Imazethapyr
- Sethoxydim

### Garlic
- Bacillus thuringiensis
- Chlorpyrifos
- Methomyl

### Gooseberry
- Acrepate
- Azinphos-methyl
- Chlorpyrifos
- Fosetyl-Al
- Glyphosate
- Metalaxyl

### Grape
- Bacillus thuringiensis
- Bifenthrin
- Chlorpyrifos
- Fosetyl-Al
- Glyphosate
- Melanaphos-methyl
- Myclobutanil

### Honey and Beeswax
- Bacillus thuringiensis
- Formic Acid
- Menthol

### Horseradish
- Bacillus thuringiensis
- DCPA
- Methomyl
- Oxyfluorfen
- Permethrin
- Sethoxydim

### Kale
- Bacillus thuringiensis
- Chlorpyrifos
- Methomyl
- PCNB
- Sodium Hypochlorite

### Kohlrabi
- Bacillus thuringiensis
- Chlorpyrifos
- DCPA
- Endothall
- Esfenvalerate
- Methomyl
- Sodium Hypochlorite

### Leek
- Bacillus thuringiensis
- Chlorpyrifos
- Methomyl

### Lima Bean
- Bacillus thuringiensis
- Sodium Chlorate
- MAPLE SAP
- Carbrally

### Marigold
- Hexakis
- MARJORAM
- Napropamide

### Mint
- 2,4-DB
- Acrepate
- Bacillus thuringiensis
- Bentazon
- Bromoxynil
- Chlorothalonil
- Chlorpyrifos
- Clopyralid
- Glyphosate
- Metalaxyl
- Methyl Anthranilate
- Spinosad
- Zinc Phosphate

### Rosemary
- Hexakis
- Sodium Chlorate
- Sodium Hypochlorite
Clearances On Some Important Minnesota Crops

**MINT cont.**
Malathion
Paraquat
Propiconazole
Quizalofop
Sethoxydim
Tebufenozide
Trifluralin

**PEAR**
2,4-D
Codling Moth
Granulosis Virus
Diphenylamine
Diflubenzuron
Lignin Sulfonate
Malathion
Metomído
Oxycarboxafen
Permethrin

**PEPPER (BELL)**
Bacillus thuringiensis
Bifenthrin
Clomazone
Glyphosate
Imidacloprid
S-metolachlor
Paraquat
Permethrin

**PLUM**
2,4-D
Codling Moth
Granulosis Virus
Clomazone
Fludioxonil
Iprikidone
Pronamide

**PEONY**
Bacillus thuringiensis
Bifenthrin
Imidacloprid
S-metolachlor
Paraquat
Sethoxydim

**POTATO**
2,4-D
Bacillus thuringiensis
Calcium Hypochlorite
Copper Complex
Sethoxydim
Sodium Chlorate
Spinadox
Sulfuric Acid
Thiobencarb

**PUMPKIN**
Bacillus thuringiensis
Clomazone
Glyphosate
Metalaxyl + Mancozeb
Paraquat

**RADISH**
Bacillus thuringiensis
DCPA
Metomido
Sodium Hypochlorite

**RAPSEED**
Bifenthrin
Glyphosate
Trifluralin

**RASPBERRY**
2,4-D
Bifenthrin
Captan
Chlorpyrifos
Glyphosate
Hexacis
Malathion
Mycolebutanil
Mycothiol
Permethrin
Sulfur

**RHUBARB**
Bacillus thuringiensis
Fluazifop
Gibberellic Acid
Napropamide
Paraquat
Pronamide
Sethoxydim

**RHUBARB (SEED TREATMENT)**
Bacillus thuringiensis
Imidacloprid
Paraquat
Sethoxydim

**SILK BEAN**
Bacillus thuringiensis
Clomazone
Glycophosate
Hexacis
Malathion
Sethoxydim

**SQUASH (WINTER/ SUMMER)**
Bacillus thuringiensis
Clomazone
Glyphosate
Metalaxyl + Mancozeb
Paraquat
Permethrin

**TOMATO**
Bacillus thuringiensis
Fluazifop
Gibberellic Acid
Napropamide
Permethrin
Pyrethrum + Piperonyl
Sethoxydim
Sulfur

**TURNIP (ROOT / GREENS)**
Bacillus thuringiensis
Clopyralid
Metalaxyl + Mancozeb
Paraquat
Permethrin
Sethoxydim
Spinosad

**WATERCRESS**
Bacillus thuringiensis
Gibberellic Acid
Glyphosate
Malathion
Sethoxydim

**WATERMELON**
Bacillus thuringiensis
Imidacloprid
Malathion
Paraquat
Permethrin

**WHEAT**
Bacillus thuringiensis
Clomazone
Glyphosate
Malathion
Paraquat
Permethrin

**WHITE BEANS**
Bacillus thuringiensis
Clomazone
Glyphosate
Hexacis
Malathion
Pronamide
Sethoxydim

**WILD RICE**
2,4-D (Sec. 18)
Aluminum Phosphate
Lagenidium giganteum
Malathion

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Since 1963, the IR-4 Project has cooperated with researchers, producers, the agri-chemical industry and federal agencies to secure regulatory clearances for pest management products on specialty crops.

Since 2000, over 80% of IR-4's research effort has involved new pest management technology with biopesticides and Reduced Risk chemistries. This huge shift was a direct result of the focus IR-4 placed on advocating this new technology. It was accomplished through a three pronged approach consisting of partnering with the agricultural chemical companies, educating specialty crop stakeholders, and partnering with the EPA to facilitate specialty crop registrations.

IR-4 recognized that without access to the new technology it could not assist specialty crop growers. So they solicited industry’s willingness to work together on new product development strategies which, for the first time, included specialty crops in their development plans. The foundation for this close working relationship was crop grouping, where studies on a few key crops would allow for registration on many more crops; many of those were specialty crops.

The other aspect of IR-4’s emphasis on new technology was the educational facet. It became clear that with reduced staffs in many of the companies due to mergers, federal and state research/extension scientists were not always given the ability to test the new materials. IR-4 instituted a mechanism through publication of New Pest Control Products/Transition Solutions List to inform the public about the virtues of the new technology to assist in the transition away from Food Quality Protection Act (FQPA) vulnerable crop protection tools.

Today, IR-4 continues to work as a model government funded program due to unique partnerships formed between the USDA (CSREES and ARS), the IR-4 Headquarters and Regional staff, the land grant university system, the crop protection industry, commodity and grower groups and the EPA.

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Estimated Potential Loss Without Use of IR-4 Based Section 18s for Minnesota

<table>
<thead>
<tr>
<th>Crop</th>
<th>Economic Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley</td>
<td>$234,800,000</td>
</tr>
<tr>
<td>Sugar Beet</td>
<td>$50,800,000</td>
</tr>
<tr>
<td>Sunflower</td>
<td>$800,000</td>
</tr>
<tr>
<td>Wild Rice</td>
<td>$2,000,000</td>
</tr>
</tbody>
</table>

Total: $288,400,000

1 1997 Census of Agriculture
2 From 1998 to 2002