How IR-4 Can Be a Tool for Nursery Growers

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Abstract

Pesticide use is a central part of modern nursery production. Newer pesticides may be safer for the applicator, address resistance management, and better target pest species, which reduces nontarget activity and pest resurgence. However, the relatively small horticultural sector growing native plants for reforestation does not attract the level of research investment as commodity crops, and pesticide manufacturers may be unaware of what nursery managers need. IR-4 is an organization funded by the U.S. Department of Agriculture, National Institute of Food and Agriculture that supports research into pesticide use on specialty crops, with the aim of expanding legal access to useful pesticides. Research direction comes from a public workshop and growers through a needs survey and communication with regional coordinators. IR-4 also serves as a repository of information on pesticide efficacy and crop safety. These research summaries represent comprehensive and current collections of information on pesticide use and are available through IR-4's website.

History of IR-4

Founded in 1963, the purpose of IR-4 (https://www.ir4project.org/) is extending pesticide registrations from major commodity crops to minor crops that may not be included in initial labeling. The program is divided into four regions, each having a regional contact (figure 1 and table 1). The program has regional laboratories housed with academic or Federal partners.

Longstanding Environmental Protection Agency (EPA) rules require pesticide manufacturers to provide data demonstrating efficacy in controlling labeled pests and to set limits, which must be determined experimentally, for preharvest application on food crops. Some States, such as California, may also require efficacy data for ornamental crops. Additionally, manufacturers may be exposed to liability if the compound causes crop damage.

Pesticide manufacturers are often unwilling to bear the cost of generating data required by the EPA if they believe the market for the compound will not justify that cost. IR-4 funds research to support claims of pest suppression, establish timelines of compound degradation, and evaluate potential phytotoxicity. Since its inception, IR-4 has facilitated more than 75,000 registrations of pest management technologies on specialty crops.

Beginning in the 1970s, IR-4 expanded its research to nursery crops. Early work into environmental horticulture includes experiments supporting new uses of Banrot (etridiazole and thiophanate-methyl), glyphosate, Ronstar (oxadiazon), and a project to find better control for black vine weevil.

Table 1—IR-4 Regional field coordinators and contact information

IR-4 regional office	Name	Phone	Email
Western Region	Kari Arnold	(530) 574-9181	klarnold@ucdavis.edu
	Mika Tolson (Env Hort)	(530) 752-7635	mptolson@ucdavis.edu
North Central Region	Nicole Soldan	(517) 712-8441	schroe65@msu.edu
Southern Region	Kristen Searer-Jones	(352) 294-3979	k.searerjones@ufl.edu
Northeast Region	Marylee Ross	(410) 742-8788 ext. 310	mross@umd.edu

Figure 1—IR-4's headquarters is in Raleigh, NC, with regional offices located in each of its four regions.

IR-4 Resources

Resources relevant to native plant growers are found under "Environmental Horticulture" in the top menu bar of the IR-4 website (direct link: https://www.ir4project.org/ehc/). What follows is a brief overview of resources relevant to nursery growers and planters.

Crop Vignettes

For a number of commonly grown native plants, IR-4 produces crop vignettes, which include plant information, economic value, main pests, and IR-4 research.

Environmental Horticulture Research Summaries

IR-4 summarizes relevant research on pesticide use and pest control, drawing from research they fund and other work (table 2). The site organizes research summaries by an active ingredient, a group of pests, or a class of compounds. Summaries focus on crop safety (evaluating nontarget phytotoxic effects of pesticide use), control of specific pests or groups of pests, or sometimes efficacy of a class of pesticides. Many of the compounds tested are not labeled for a specificized use or may be unregistered entirely at the time of experimentation. Browse research summaries on crop safety and compound or biological efficacy at https://www.ir4project.org/ehc/environmental-horticulture-research-summaries/.

Table 2—Recent efficacy summaries

Topic	Year	Trials summarized
Nematode	2024	34 active ingredients tested against foliar and soil dwelling nematodes
Bacterial disease	2024	83 products tested against 10 bacterial species
Mollusk	2024	11 products tested against the brown garden snail
Fatty acid herbicides	2024	5 herbicides tested against 7 weeds, some of which are resistant to glyphosate
Phytophthora	2024	74 products tested against 11 *Phytophthora* species
Nutsedge and sedge	2023	28 products tested against several *Cyperus* species
Rhizoctonia solani	2023	42 products tested against *R. solani* in 15 hosts
Liverwort	2023	37 products tested for both pre and post emergent activity against liverwort
Powdery mildew	2023	28 products tested against 12 pathogenic species
Scale	2023	32 active ingredients tested against 24 scale species
Mealy bug	2023	31 active ingredients tested against 7 mealy bug species
Botrytis	2023	56 active ingredients tested against 3 species of *Botrytis*
Beetle, borer, weevil, & white grub	2022	91 products tested against adult and grub beetles and 10 products tested against clearwing borers
Pythium	2022	47 active ingredients were tested against 5 *Pythium* species
Thrips	2022	78 products tested against 5 thrips species
Fusarium	2021	40 active ingredients tested against 4 species of *Fusarium*

Trials Database and Biopesticide and Organic Database

The trials database is a finding aid to individual trials and research reports on thousands of studies. Users can filter the database by crop, plant group (e.g. narrowleaf evergreen tree/shrub or deciduous tree/shrub/vine), active ingredient, chemical group (herbicides or insecticides), or target pest, among other factors. The search results will describe general results of the trial and provide a link to more detailed results or the associated research summary. View and search the trials database at https://www.ir4project.org/ehc/ehc-registration-support-research/environmental-horticulture-database-a-2/.

IR-4 also hosts a database on biopesticides and organic compounds. Users can filter this database by crop, crop group, pest, and other variables to find alternative treatments to common pests (figure 2). This database is available at https://ir4app.cals.ncsu.edu/biopestPub/labelDb.

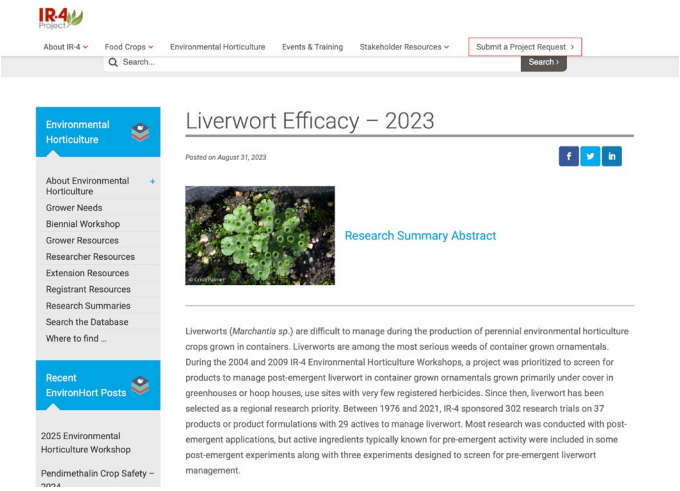

Figure 2—For specific pathologies or insects, an efficacy summary will be displayed with a link to the efficacy results.

The Environmental Horticulture Program within the IR-4 Project has conducted over 2,500 trials, testing more than 275 products on 90 native plant species. For Douglas-fir alone, IR-4 has helped get 240 new registrations or label amendments for more than 75 products.

National Needs Survey and Research Direction

IR-4 staff relies on local growers and the agriculture community to identify pest management needs for specialty crops. IR-4 sends an annual needs survey to growers requesting input on their research direction. Priorities are set at a biennial meeting using data from the needs survey and supported through direct communication with IR-4 and meeting attendance. Common recurring priorities in environmental horticulture include *Phythophora* and *Pythium,* scales, thrips, mealybugs, *Botrytis,* borers, beetles, and preemergent and postemergent herbicide crop safety.

The research request form is available at https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-grower-needs-2/#Request. A link to the ongoing grower and extension survey, which helps set research priorities, is on that same web page (https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-grower-needs-2/).

Resources Available

Staff are available to discuss pest management needs. IR-4 distributes a quarterly newsletter and shares updates on Facebook. Sign up for the newsletter at https://www.ir4project.org/about-ir4/news/registration-form/.

Address correspondence to:

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