



IR-4 Environmental Horticulture Program Grower & Extension Survey Summary 2019 – US Respondents

<https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-grower-needs/#SurveyResults>

The intent of the Environmental Horticulture Survey was to poll growers, landscape care operators, researchers, extension personnel and others affiliated with this industry on needs and issues related to disease, insect, and weed management. The responses from the survey feed directly into how IR-4 allocates its research budget for environmental horticulture projects.

Demographics of Survey Participants

The purpose for several questions in this survey was to describe the demographics of participating growers, landscape care personnel and others in the green industry. The survey participants came from across the United States with responses unequally distributed among the four geographic regions (Table 1), with 45% from the western region. Sixty percent were growers with the next largest segment being extension personnel at 14% (Table 2). The operation types most represented were producers (greenhouse, nursery container, nursery field grown) (Table 3). Landscape care represented about 11% of the respondents. Very few survey participants selected more than one operation type (data not shown).

Relatively equal numbers of respondents identified themselves as using chemical control and/or IPM (Table 4). Nineteen percent used biological controls while 11% of survey participants used organic tools. Many participants did not choose a philosophy for when to apply, but those that did make applications when needed rather than based on a calendar.

Herbaceous perennials, shrubs and trees were grown by 13 – 14% of the respondents followed closely by bedding plants and ornamental grasses (Table 5). Fewer survey respondents grew seasonal potted plants, foliage plants, cut flowers, palms, and Christmas trees.

Table 1. IR-4 Region for survey participants

Region	Count	Percent
NorthCentral	16	11%
Northeast	28	18%
Southern	39	26%
Western	69	45%
Total	152	100%

Table 2. Employment sector for survey participants (single selection option)

Segment	Count	Percent
Extension	22	14%
Government	3	1%
Grower	92	60%
Industry	9	5%
Interiorscaper	0	0%
LCP	9	5%
Researcher	17	11%
Unspecified	0	0%

Table 3. Operation types (multiple selections)

Production Site	Count	Percent
Greenhouse	36	24%
Nursery Container	31	21%
Nursery Field	32	21%
Landscape	17	11%
Interiorscape	8	5%
Christmas Tree Farm	22	15%
Sod Farm	4	3%

Table 4. Disease, insect and weed management styles (multiple selections)

Management Styles	Count	Percent
Biological Control	37	19%
Chemical Control	47	24%
IPM	44	23%
Organic	22	11%
Weekly/Monthly Sprays	3	2%
Spray at Thresholds	39	20%

Table 5. Spectrum of crops grown (multiple selections)

Crop Type	Count	Percent
Bedding Plants	25	11%
Cut Flowers	21	9%
Christmas Trees	22	9%
Foliage Plants	16	7%
Perennials	34	14%
Ornamental Grasses	22	9%
Palms	4	2%
Seasonal Potted Plants	17	7%
Shrubs	32	13%
Trees	34	14%
Turf	11	5%

Type of Data Needed

Two questions solicited information on the general direction of research and the type of data needed in the program. The first question asked whether crop safety data was needed more than efficacy, efficacy more than crop safety, or both equally. The option for needing both crop safety and efficacy equally was highly selected (Figure 1) with more participants favoring efficacy data over crop safety.

Activities to Protect Beneficial Organisms including Pollinators

This was the third time a question was added to the survey to assess current practices used to protect beneficial organisms including pollinators during production and maintenance of plants.

There were 141 respondents to this question, and they were able to select multiple answers. The activity most employed was scouting for pest and disease hot spots and apply crop protection tools to only those areas (Figure 2). The next selection by frequency was applying crop protection tools when no beneficial organisms are present, followed by applying an optimal rate to manage pests or diseases without harming beneficial organisms. The next highest was applying the best tool possible for

crop situation knowing that some beneficial organisms may be harmed followed by applying systemic tools when they offer greater safety than foliar tools. Of note, the option to apply only biopesticides was the least selected followed by only applying biorationals.

Among the write-ins (Table 6, p3), most were geared towards cultural methods, timing or spot treatment.

Figure 1. Counts for type of data to be generated

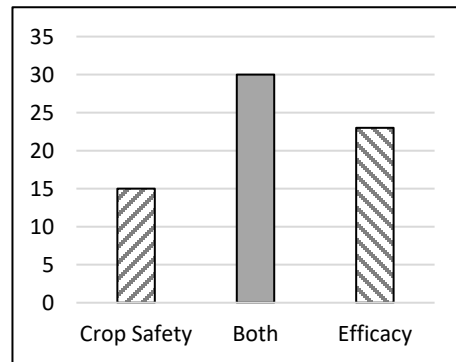


Figure 2. Activities to protect beneficial organisms including pollinators (multiple selections)

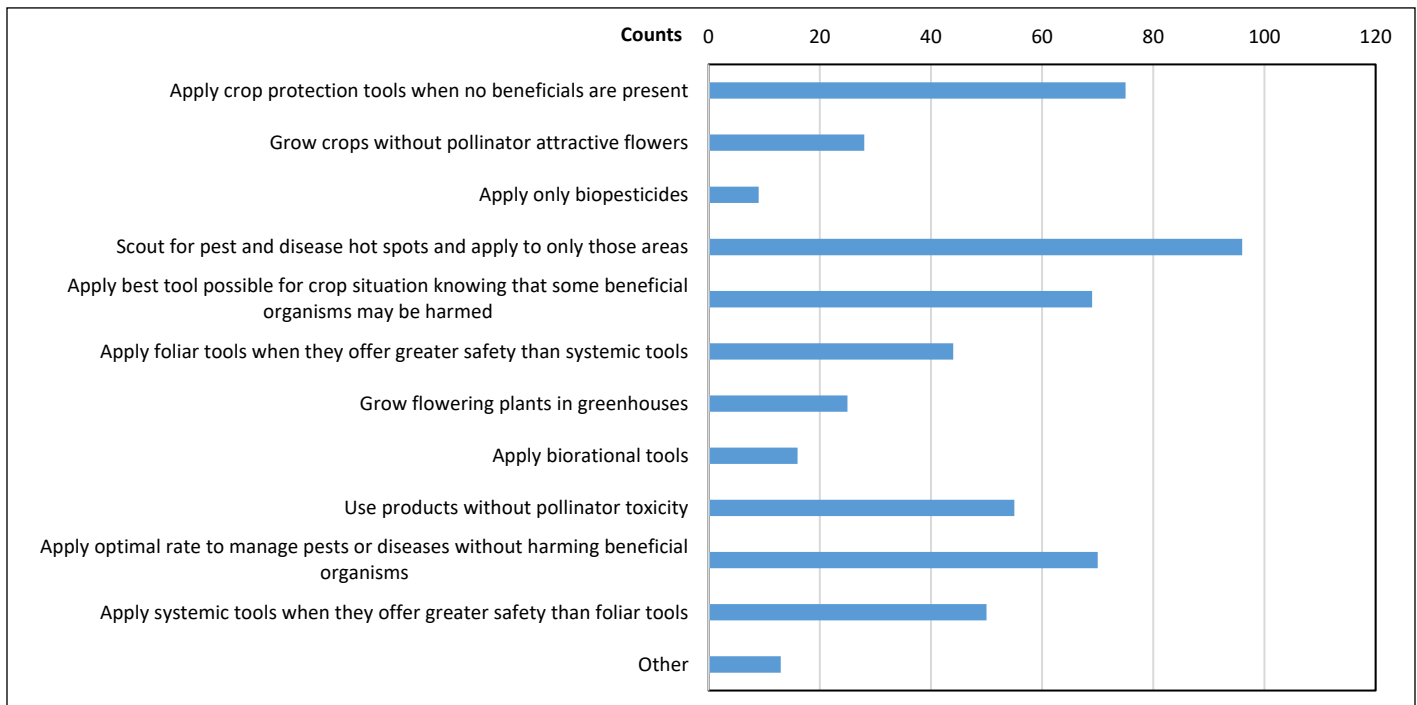


Table 6. Comments included related to protecting beneficial organisms including pollinators

Additional Activities Use to Protect Beneficial Organisms
Encourage pollinators & birds with habitats. We have 3 hives on our farm. We don't use pesticides or herbicides.
Use non-chemical strategies like crop isolation, physical removal where possible; early detection and treatment before flowering, some mating disruption (oriental beetle)
Apply tool using herbal plant base for safer beneficial organism
don't produce plants
Emerald Ash Borer is the only insect we treat and rarely do we treat for plant disease
Use mechanical or biological tools or procedures first
Try to attract beneficial insects, remove and destroy infected trees, use insecticidal soaps and hand spray, basal prune and have my trees more open to air circulation
compost tea
I have a tolerance threshold. If the pest exceeds our tolerance then we spray, we really don't like to spray if it will harm pollinators.
apply by hand to target each tree rather than spraying entire area
Avoid pesticide use, use non-chemical controls whenever possible
I simply don't use any of the three chemicals I describe above during the brief period in early May / early seasonal maturation, (not far enough seasonally progressed to inject) when ash trees are flowering (OSU Bee Lab has confirmed that a minimal though
Reduce insect pests by increasing the diversity of flowering plants in landscapes to attract insects that are both pollinators and enemies (predators or parasitoids) of plant pests
Growing flowering plants in greenhouses increases western flower thrips populations

Ranking of Issues by Discipline

Each of the issues within the disciplines listed by participants was given a weighted ranking based on the order written. Each was also assigned to a group based on similar diseases, pests, or weeds. This section also examines the survey responses grouped by production site.

Entomology

When all responses were grouped together the top five pests of concern were thrips, mites & spider mites, borers & beetles, scale & mealybugs, and aphids (Table 7, p3). Note that the calculation for weighted ranking here removes any duplication for crop or production site.

When weighted rankings were calculated for categories of crops, the top 5 pests changed for each crop type (Table 10, p5). One pest group was in all five crop types: mites & spider mites. Two were in four of the five: snails & slugs, and thrips. There was little consistency among the rest of the top five pests.

When the weighted rankings were calculated based on the production sites, there were some differences among the order, but 4 of the top 5 were similar (Table 11, p5). Four pest types were in the top five for each primary production site: mites & spider mites, scale & mealybugs, snails & slugs, and thrips. For greenhouse and nursery container, borers & beetles was the fifth

Table 7. Ranking of pests with limited management choices.

Pest Group	Weighted Ranking
Thrips	69
Mites & Spider Mites	61
Borers & Beetles	58
Scale & Mealybugs	48
Aphids	45
Whiteflies	27
Lepidopterans	12
Snails & Slugs	11
Lygus	10
Fruit & Nut Pests	9
Leafminers	8
Adelgids	8
Gall Insects	6
Mammals	6
Other	6
Turf Pests	6
White Grubs & Root Weevils	5
Midges	5
Plant Bugs	4
Public health pests	3
Leaf Hoppers	2
Flies, Sawflies & Fungus Gnats	2
Wasp	2

pest group while for field in ground borers & beetles was tied with lepidopterans. For Landscape, lepidopterans was the fifth.

The specific pests mentioned most frequently included thrips (40) and aphids (27), but this does not take into consideration specific pests or those listed with host plants (Table 12, p5).

Plant Pathology

When all responses were grouped together, the top five diseases included bacterial diseases, Botrytis, Phytophthora & Pythium, leaf spots & anthracnose, and crown & root rots (Table 8, p4). The crown & root rot group contains diseases affecting roots, crowns, and lower trunks that are clearly not caused by Pythium or Phytophthora. Note that the calculation for weighted ranking here removes any duplication for crop or production site.

When the rankings were calculated based on the crop types there were some differences among the groups (Table 13, p8). Only bacterial diseases appeared in all crop types. Botrytis, crown & root rots (non-oomycte), leaf spots & anthracnose, Phytophthora & Pythium and powdery mildew all appeared in three crop types.

For the rankings grouped by production site, bacterial diseases, Botrytis, and Phytophthora & Pythium appeared in all four production sites. (Table 14, p8). Both crown & root rots and leaf spots & anthracnose categories appeared in three of the four production sites.

The specific diseases mentioned most frequently include botrytis (40) and powdery mildew (22) , but this does not take into consideration specific pests or those listed with host plants (Table 15 p8). Plus, the largest emphasis for botrytis was related to peony growers from Alaska (data not shown).

Table 8. Ranking of diseases with limited management choices.

Disease Group	Weighted Ranking
Bacterial Diseases	51
Botrytis	50
Phytophthora & Pythium	45
Leaf Spots & Anthracnose	44
Crown & Root Rot	41
Powdery Mildew	24
Other	22
Downy Mildew	22
Rusts	18
Nematodes	16
Foliar Blights	14
Canker	9
Turf Diseases	7
Virus	3
Vascular Wilts	3

Table 9. Ranking of weeds with limited management choices.

Weed Group	Weighted Ranking
Broadleaf - Perennial	57
Broadleaf - Summer Annual	33
Grasses	31
Horsetail & Similar Weeds	25
Liverworts & Moss & Algae	20
Sedge & Nutsedge	19
Other	19
Comment	15
Broadleaf - Biennial	15
Broadleaf - Winter Annual/Biennial	8
Vine - Perennial	4
Broadleaf - Winter Annual	4
Broadleaf - Annual/Perennial	3
Broadleaf	2
Vine - Winter/Summer Annual	2
Broadleaf - Annual	2

Weed Science

When all responses were grouped together, the top five weeds included Broadleaf Perennials, Broadleaf Summer Annuals, Grasses, Horsetail & Similar Weeds, and Liverworts & Moss & Algae (Table 9, p4). Note that the calculation for weighted ranking here removes any duplication for crop or production site.

Although there were some variations between rankings whether the responses are grouped together or separated by crop or production site, there was a general trend with broadleaf perennials, broadleaf summer annuals, and

liverworts & moss and algae in the top five weed types across crops and production sites (Table 16, Table 17, p11). Horsetails (Equisetum), liverwort, and wild carrot were identified most frequently as problematic weeds (Table 18, p11).

Table 10. Top 5 issues by crop category for Entomology.

	Bedding Plants & Seasonal Potted Plants	Cut Flowers	Ornamental Grasses	Foliage & Perennial Plants	Shrubs, Trees, Palms & Christmas Trees
1	Thrips (35)	Thrips (21)	Snails & Slugs (11)	Thrips (30)	Borers & Beetles (51)
2	Whiteflies (22)	Aphids (8)	Scale & Mealybugs (7)	Mites & Spider Mites (21)	Mites & Spider Mites (43)
3	Mites & Spider Mites (22)	Lygus (7)	Lepidopterans (5)	Scale & Mealybugs (18)	Scale & Mealybugs (33)
4	Aphids (12)	Snails & Slugs (7)	Mites & Spider Mites (4)	Borers & Beetles (16)	Aphids (20)
5	Lepidopterans (10)	Mites & Spider Mites (6)	Thrips (3)	Snails & Slugs (11) Whiteflies (11)	Snails & Slugs (11) Thrips (11)

Table 11. Top 5 issues by production site for Entomology.

	Greenhouse	Nursery Container	Nursery Field	Landscape
1	Thrips (81)	Mites & Spider Mites (74)	Thrips (62)	Mites & Spider Mites (42)
2	Mites & Spider Mites (69)	Borers & Beetles (58)	Mites & Spider Mites (48)	Scale & Mealybugs (35)
3	Scale & Mealybugs (53)	Thrips (58)	Snails & Slugs (40)	Snails & Slugs (28)
4	Borers & Beetles (41)	Scale & Mealybugs (48)	Scale & Mealybugs (39)	Thrips (21) Lepidopterans (21)
5	Snails & Slugs (40)	Snails & Slugs (40)	Borers & Beetles (34) Lepidopterans (34)	

Table 12. Specific issues for each pest group.

Pest Group	Pest	Weighted Ranking
Adelgids	Adelgid, fir	2
	Adelgid, silver fir	3
	Balsam woolly adelgid	3
Aphids	Aphid, fir	3
	Aphid, lily	2
	Aphids	30
	Aphids, bedding plants	1
	Aphids, true fir	3
	Oleander aphid, milkweek	3
	Root aphid, noble fir	3
Borers & Beetles	Ambrosia beetle, woodies	1
	Borers	7
	Cucumber beetle, EHC field crops	1
	Flea beetle	11
	Ips	2
	Japanese beetle, rose	3
	Red headed flea beetle	3
	Red-headed flea beetle	18
	South american palm weevil	3
	Twig borer, fir	2
	Twig weevil	1
	Twig weevil, Christmas trees	3
Weevil, fir	3	
Flies, Sawflies & Fungus Gnats	Fungus gnats, poinsettia	1
	Fungus gnats, shorefly	1
Fruit & Nut Pests	Ambrosia beetle, avocado	3

Pest Group	Pest	Weighted Ranking
	Cherry fruit worm	3
	Light brown apple moth	1
	Spotted wing drosophila	2
Gall Insects	Gall wasps, midges	3
	Leaf/stem gall, oak	3
Leaf Hoppers	Leafhopper, rosemary	2
Leafminers	Leafminer	8
Lepidopterans	Bagworms, arborvitae	2
	Caterpillars	3
	Duponchelia fovealis	7
Lygus	Lygus	4
	Lygus, gerbera	3
	Lygus, peony	3
Mammals	Deer	6
Midges	Douglas fir needle midge	3
	Needle midge	2
Mites & Spider Mites	Broad mite	3
	Bulb mite, tulip	1
	Eriophyid mite	6
	Eriophyid mite, conifers	2
	Mites	18
	Mites, choisya	3
	Olive mite	3
	Spider mite	15
	Spider mite, true fir	1
	Two spotted spider mites	6
	Two spotted spider mites, hydrangea	3
Other	Millipedes	3
	Spotted lantern fly	3
Plant Bugs	Four-lined plant bug	1
	Plant bugs	3
Public health pests	Ticks	1
	yellow jackets , hornets, bumble bees	2
Scale & Mealybugs	Armored cale	1
	Armored scale, magnolia white scale	1
	Armored scale, woodies	2
	Citrus mealybug	2
	Crapemyrtle bark scale	8
	Honeydew mealybug, phormium & cordyline	1
	Japanese maple scale	2
	Lobate scales	2
	Long tailed mealybug	3
	Mealybug	7
	Mealybug, ruscus	2
	Oystershell scale	2
	Scale	10
	Scale, holly	2
Scale, woodies	3	
Snails & Slugs	Amber snail	1
	Slugs	3
	Snail & slug	3
	Snails	2

Pest Group	Pest	Weighted Ranking
	White garden snail	2
Thrips	Chili thrips, distylium	2
	Chili thrips, nuttall oak	3
	Onion thrips	2
	Thrips	40
	Thrips, dahlia & gerbera	2
	Thrips, lily	3
	Thrips, peony	3
	Western flower thrips	11
	Western flower thrips, impatiens	3
	Turf Pests	Rhodesgrass mealybug, bermudagrass
Wasp	Megastigmus	2
White grubs & Root Weevils	June bug - larvae	1
	Root weevil	3
	Strawberry root worm	1
Whiteflies	Bemisia tabaci Q	1
	Whiteflies	18
	Whitefly, hibiscus	2
	Whitefly, poinsettia	6

Table 13. Top 5 issues by crop category for Plant Pathology.

	Bedding Plants & Seasonal Potted Plants	Cut Flowers	Ornamental Grasses	Foliage & Perennial Plants	Shrubs, Trees, Palms & Christmas Trees
1	Crown & Root Rot (21)	Botrytis (38)	Bacterial Diseases (6) *	Botrytis (21)	Leaf Spots & Anthracnose (33)
2	Bacterial Diseases (19)	Crown & Root Rot (9)	Turf Diseases (5)	Bacterial Diseases (19)	Bacterial Diseases (28)
3	Phytophthora & Pythium (18)	Bacterial Diseases (6)	Rusts (4)	Phytophthora & Pythium (14)	Phytophthora & Pythium (24)
4	Downy Mildew (18)	Leaf Spots & Anthracnose (4)	Powdery Mildew (3)	Crown & Root Rot (14)	Foliar Blights (14)
5	Botrytis (16)	Powdery Mildew (4) Rusts (4)	Nematodes (3)	Leaf Spots & Anthracnose (11) Nematodes (11)	Powdery Mildew (12)

* Note: Ornamental grasses are not known to be susceptible to bacterial disease infections.

Table 14. Top 5 issues by production site for Plant Pathology.

	Greenhouse	Nursery Container	Nursery Field	Landscape
1	Bacterial Diseases (66)	Bacterial Diseases (62)	Bacterial Diseases (52)	Bacterial Diseases (26)
2	Crown & Root Rot (48)	Phytophthora & Pythium (36)	Botrytis (50)	Phytophthora & Pythium (19)
3	Phytophthora & Pythium (46)	Crown & Root Rot (32)	Phytophthora & Pythium (28)	Leaf Spots & Anthracnose (12)
4	Botrytis (40)	Botrytis (25)	Leaf Spots & Anthracnose (27)	Botrytis (12)
5	Downy Mildew (33)	Leaf Spots & Anthracnose (22)	Crown & Root Rot (25)	Powdery Mildew (10)

Table 15. Specific issues for each disease group

Disease Group	Disease/Pathogen *	Weighted Ranking
Bacterial Diseases	Bacteria	20
	Bacterial leaf spot	6
	Erwinia	3
	Erwinia in propagation	3
	Fire blight	3
	Pseudomonas	6
	Pseudomonas, woodies	3
	Xanthomonas	4
	Xanthomonas, prunus	3
Botrytis	Botrytis	42
	Botrytis - biocontrols	3
	Botrytis, peony	5
Canker	Botryosphaeria	3
	Canker (Grovesiella sp)	1
	Phoma	2
	Phomopsis	3
Crown & Root Rot	Armillaria	3
	Fusarium	9
	Fusarium, chrysanthemum	3
	Rhizoctonia	2
	Rhizoctonia, woodies	2

Disease Group	Disease/Pathogen *	Weighted Ranking
	Root rot	7
	Sclerotium rolfsii	2
	Soil borne diseases	1
	Thielaviopsis	9
	Tulip bulb diseases	3
Downy Mildew	Downy mildew	14
	Downy mildew, coleus	3
	Downy mildew, hellebore	2
	Downy mildew, phlox	3
Foliar Blights	Interior Needle Blight	9
	Needle necrosis	5
Leaf Spots & Anthracnose	Anthracnose	5
	Apple scab	3
	Black spot	2
	Cladosporium	3
	Colletotricum	3
	Entomosporium	1
	Foliar Diseases, peony	1
	Fungal disease	5
	Leaf Spot	1
	Myrothecium	2
	Needle blight	3
	Needle cast	7
	Needle cast, noble fir	2
	Needle cast, Scot Pine	2
	Shot Hole	2
	Sooty mold	2
Nematodes	Nematode	2
	Nematode, boxwood	2
	Nematode, foliar	6
	Nematode, root knot	6
Other	Algae	3
	Brown rot	2
	Frasier fir death	2
	Fungal disease	3
	Geotrichum	3
	Unknown	9
Phytophthora & Pythium	Aerial web blight	3
	Foliar Phytophthora	2
	Phytophthora	17
	Phytophthora & Pythium	3
	Phytophthora, boxwood	3
	Phytophthora, noble fir	2
	Phytophthora, poinsettia	2
	Phytophthora, rosemary	3
	Phytophthora, woodies	3
	Pythium	4
Pythium, geranium cuttings	3	
Powdery Mildew	Powdery Mildew	22
	Powdery mildew on elm	2
Rusts	Rust	7
	Rust, fuschia	2

Disease Group	Disease/Pathogen *	Weighted Ranking
	Rust, grand fir	3
	Rust, Guava	1
	Rust, heuchera	3
	Rust, ornamental grass	2
Turf Diseases	Bermuda grass decline	2
	Brown patch	2
	Dollar spot	3
Vascular Wilts	Wilt, laurel	3
Virus	Rose Rosette Virus	3

**The authors standardized the format for presenting diseases and pathogens. In parentheses are Latin names, where either mentioned by survey participants or when specific diseases were mentioned to foster clarity (ie rusts). Where crops were mentioned, the disease or pathogen is listed first followed by a comma and one or more crops.*

Table 16. Top 5 issues by crop category for Weed Science.

	Bedding Plants & Seasonal Potted Plants	Cut Flowers	Ornamental Grasses	Foliage & Perennial Plants	Shrubs, Trees, Palms & Christmas Trees
1	Liverworts & Moss & Algae (12)	Grass (12)	Liverworts & Moss & Algae (17)	Broadleaf - Perennial (26)	Broadleaf - Perennial (35)
2	Broadleaf - Perennial (10)	Broadleaf - Perennial (12)	Broadleaf - Perennial (14)	Liverworts & Moss & Algae (18)	Broadleaf - Summer Annual (21)
3	Broadleaf - Winter Annual/Biennial (5)	Broadleaf - Summer Annual (9)	Broadleaf - Summer Annual (8)	Broadleaf - Summer Annual (11)	Horsetail & Similar Weeds (19)
4	Grass (3)	Horsetail & Similar Weeds (6)	Grass (6)	Broadleaf - Winter Annual/Biennial (5)	Broadleaf - Biennial (15)
5	Broadleaf - Annual/Perennial (3)	Broadleaf - Winter Annual (3)	Broadleaf - Winter Annual/Biennial (5)	Grass (5) Sedge & Nutsedge (5) Horsetail & Similar Weeds (5)	Liverworts & Moss & Algae (11)

Table 17. Top 5 issues by production site for Weed Science

	Greenhouse	Nursery Container	Nursery Field	Landscape
1	Broadleaf - Perennial (79)	Broadleaf - Perennial (75)	Broadleaf - Perennial (72)	Broadleaf - Perennial (54)
2	Liverworts & Moss & Algae (61)	Liverworts & Moss & Algae (47)	Liverworts & Moss & Algae (47)	Broadleaf - Summer Annual (19)
3	Broadleaf - Summer Annual (37)	Broadleaf - Summer Annual (30)	Broadleaf - Summer Annual (40)	Vine - Perennial (8)
4	Broadleaf - Winter Annual/Biennial (20)	Sedge & Nutsedge (15)	Horsetail & Similar Weeds (16)	Liverworts & Moss & Algae (6)
5	Grass (13)	Vine - Perennial (10) Horsetail & Similar Weeds (10)	Grass (16)	Grass (6) Broadleaf – Winter Annual (6)

Table 18. Specific issues for each weed group.

Weed Group	Weed	Weighted Ranking
Broadleaf	Bindweed	2
Broadleaf - Annual	Parthenium	2
Broadleaf - Annual/Perennial	Oxalis	3
Broadleaf - Biennial	Queen Anne's Lace	3
	Wild Carrot	12
Broadleaf - Perennial	Canada Thistle	5
	Chickweed	7
	Clover	2
	Dandelion	3
	False Dandelion	4
	Fig buttercup	3
	Fireweed	5
	Horse nettle	3
	Meadow fleabane	3
	Multiflora rose	3
	Northern Willowherb	3
	Oxalis	1
	Perennial Weeds	3
	Rorippa sylvestris	3
	Violet	3
Willowherb	3	

Weed Group	Weed	Weighted Ranking
	Yarrow	3
Broadleaf - Summer Annual	Asian mustard	1
	Bidens	3
	Eclipta	1
	Euphorbia	2
	Fumewort	3
	Globe camomile	3
	Hairy Fleabane	3
	Mallow	2
	Pigweed	3
	Prostrate Spurge	2
	Ragweed	2
	Small flower stock (invasive)	2
	Smartweed	2
Spurge	4	
Broadleaf - Winter Annual	Groundsel	1
	Horseweed	3
Broadleaf - Winter Annual/Biennial	Bittercress	8
Comment	Need pre-emergents	3
	Peony - Virtually no effective products registered	1
	Pre emergent weed control	6
	Pre-emergent herbicide w/ 90+ day control	2
	Round up resistant weeds and grasses	3
Grass	Crabgrass	3
	Dallisgrass	5
	Eragrostis	1
	Goosegrass	3
	Grass	6
	Johnsongrass	3
	Roughstalk Bluegrass	2
	Ryegrass	2
	Smutgrass	2
	Wild grass	3
	Witch grass (Panicum capillare)	1
Horsetail & Similar Weeds	Equisetum	25
Liverworts & Moss & Algae	Liverwort	16
	Moss	1
	Nostoc Algae	3
Other	All weeds	7
	All weeds, greenhouse	3
	Broadleaf weeds, grasses	3
	Glyphosate	3
	Native weeds	3
Sedge & Nutsedge	Kyllinga	1
	Nutgrass	3
	Nutsedge	6
	Yellow Nutsedge	9
Vine - Perennial	Convolvulus	2
	Porcelain vine	2
Vine - Winter/Summer Annual	Morning glory	2

Region Specific Results

Table 19. Top issues in each discipline by region

Discipline		North Central	Northeast	Southern	Western
Entomology	1	Borers & Beetles (6)	Thrips (11)	Scale & Mealybugs (28)	Thrips (42)
	2	Mites & Spider Mites (6)	Mites & Spider Mites (10)	Borers & Beetles (27)	Aphids (35)
	3	Lepidopterans (5)	Borers & Beetles (10) Scale & Mealybugs (10)	Mites & Spider Mites (16)	Mites & Spider Mites (29)
	4	Whiteflies (3)	Whiteflies (7)	Thrips (14)	Borers & Beetles (15)
	5	Aphids (3)		Lepidopterans (7)	Whiteflies (14)
Pathology	1	Phytophthora & Pythium (12)	Crown & Root Rot (16)	Bacterial Diseases (25)	Botrytis (45)
	2	Other (6)	Leaf Spots & Anthracnose (15)	Leaf Spots & Anthracnose (14)	Crown & Root Rot (20)
	3	Botrytis (5)	Bacterial Diseases (12)	Phytophthora & Pythium (13)	Phytophthora & Pythium (18)
	4	Leaf Spots & Anthracnose (4) Bacterial Diseases (4)	Downy Mildew (6)	Downy Mildew (6)	Rusts (16)
	5		Nematodes (5)	Other (6)	Foliar Blights (14)
Weed Science	1	Broadleaf - Perennial (21)	Grass (10)	Broadleaf - Summer Annual (10)	Broadleaf - Perennial (29)
	2	Broadleaf - Summer Annual (5)	Broadleaf - Perennial (6)	Sedge & Nutsedge (6)	Horsetail & Similar Weeds (22)
	3	Horsetail & Similar Weeds (3)	Other (6)	Liverworts & Moss & Algae (4)	Broadleaf - Summer Annual (18)
	4	Other (3)	Liverworts & Moss & Algae (6)	Grass (3)	Grass (18)
	5	Comment (2)	Comment (6)	Other (3) Broadleaf – Winter Annual/Biennial (3)	Broadleaf - Biennial (15)

Table 20. Specific issues for the North Central region by discipline

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
Entomology	Aphids	Oleander aphid, milkweek	3
	Borers & Beetles	Flea beetle	3
		Japanese beetle, rose	3
	Gall Insects	Gall wasps, midges	2
	Lepidopterans	Bagworms, arborvitae	2
		Caterpillars	3
	Mites & Spider Mites	Eriophyid mite	3
		Mites	3
	Plant Bugs	Four-lined plant bug	1
Thrips	Thrips	2	
Whiteflies	Whiteflies	3	
Pathology	Bacterial Diseases	Bacteria	3
		Xanthomonas	1
	Botrytis	Botrytis	5
	Canker	Botryosphaeria	2
	Leaf Spots & Anthracnose	Apple scab	3
		Needle cast	1
	Nematodes	Nematode, root knot	3
	Other	Algae	3
		Fungal disease	3
	Phytophthora & Pythium	Phytophthora	6
		Phytophthora & Pythium	3
		Pythium	3
Powdery Mildew	Powdery Mildew	2	
Rusts	Rust	2	
Weed Science	Broadleaf - Perennial	Canada Thistle	2
		Chickweed	2
		Dandelion	3
		Fig buttercup	3
		Meadow fleabane	3
		Multiflora rose	3
		Perennial Weeds	3
		Rorippa sylvestris	2
	Broadleaf - Summer Annual	Mallow	2
		Pigweed	3
	Broadleaf - Winter Annual	Groundsel	1
	Comment	Pre-emergent herbicide w/ 90+ day control	2
	Horsetail & Similar Weeds	Equisetum	3
	Other	Broadleaf weeds, grasses	3
Vine - Perennial	Porcelain vine	2	

Table 21. Specific issues for the Northeast region by discipline

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
Entomology	Aphids	Aphids	5
	Borers & Beetles	Borers	4
		Red-headed flea beetle	6
	Fruit & Nut Pests	Cherry fruit worm	3
		Spotted wing drosophila	2
	Gall Insects	Gall wasps, midges	1
	Mammals	Deer	6
	Mites & Spider Mites	Mites	3
		Spider mite	7
	Other	Spotted lantern fly	3
	Plant Bugs	Plant bugs	3
	Public health pests	Ticks	1
		Yellow jackets , hornets, bumble bees	2
	Scale & Mealybugs	Citrus mealybug	2
		Japanese maple scale	2
		Long tailed mealybug	3
		Mealybug	3
	Thrips	Onion thrips	2
		Thrips	3
		Western flower thrips	6
	Whiteflies	Bemisia tabaci Q	1
Whiteflies		6	
Pathology	Bacterial Diseases	Bacteria	3
		Bacterial leaf spot	3
		Fire blight	3
		Pseudomonas	3
	Crown & Root Rot	Fusarium	3
		Root rot	5
		Sclerotium rolfsii	2
		Thielaviopsis	6
	Downy Mildew	Downy mildew	3
		Downy mildew, coleus	3
	Leaf Spots & Anthracnose	Fungal disease	5
		Needle cast	6
		Needle cast, Scot Pine	2
		Sooty mold	2
	Nematodes	Nematode, foliar	5
Other	Brown rot	2	
Phytophthora & Pythium	Phytophthora	2	
Powdery Mildew	Powdery Mildew	4	
Turf Diseases	Brown patch	2	
Weed Science	Broadleaf - Annual/Perennial	Oxalis	3
	Broadleaf - Perennial	Horse nettle	3
		Violet	3
	Broadleaf - Winter Annual/Biennial	Bittercress	2
	Comment	Need pre-emergents	3

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
		Round up resistant weeds and grasses	3
	Grass	Crabgrass	3
		Dallisgrass	5
		Roughstalk Bluegrass	2
	Liverworts & Moss & Algae	Liverwort	6
	Other	All weeds	3
		All weeds, greenhouse	3
	Sedge & Nutsedge	Kyllinga	1
	Vine - Perennial	Convulvulus	2

Table 22. Specific issues for the Southern region by discipline

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
Entomology	Aphids	Aphids	2
	Borers & Beetles	Ambrosia beetle, woodies	1
		Borers	3
		Flea beetle	8
		Red headed flea beetle	15
	Fruit & Nut Pests	Ambrosia beetle, avocado	3
	Gall Insects	Leaf/stem gall, oak	3
	Leafminers	Leafminer	5
	Lepidopterans	Duponchelia fovealis	7
	Mites & Spider Mites	Broad mite	3
		Mites	7
		Spider mite	3
		Two spotted spider mites	3
	Scale & Mealybugs	Armored scale	1
		Armored scale, woodies	2
		Crapemyrtle bark scale	8
		Mealybug	3
		Oystershell scale	2
		Scale	10
	Thrips	Scale, holly	2
		Chili thrips, distylium	2
		Chili thrips, nuttall oak	3
		Thrips	6
	Turf Pests	Western flower thrips	3
		Rhodesgrass mealybug, bermudagrass	6
	White Grubs & Root Weevils	Strawberry root worm	1
	Whiteflies	Whiteflies	3
Pathology	Bacterial Diseases	Bacteria	11
		Bacterial leaf spot	3
		Erwinia	2
		Erwinia in propagation	3
		Xanthomonas	3
		Xanthomonas, prunus	3
	Canker	Botryosphaeria	1
		Phomopsis	3
	Crown & Root Rot	Fusarium, chrysanthemum	3
		Rhizoctonia, woodies	2
	Downy Mildew	Downy mildew	4
		Downy mildew, hellebore	2
	Leaf Spots & Anthracnose	Anthracnose	5
		Entomosporium	1
		Leaf Spot	1
		Myrothecium	2
		Needle blight	3
		Shot Hole	2
	Nematodes	Nematode, boxwood	2
		Nematode, root knot	3
Other	Unknown	3	

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
	Phytophthora & Pythium	Aerial web blight	3
		Phytophthora	3
		Phytophthora, boxwood	3
		Phytophthora, woodies	3
		Pythium	1
	Powdery Mildew	Powdery Mildew	3
		Powdery mildew on elm	2
	Vascular Wilts	Wilt, laurel	3
Virus	Rose Rosette Virus	3	
Weed Science	Broadleaf - Annual	Parthonium	2
	Broadleaf - Perennial	Oxalis	1
	Broadleaf - Summer Annual	Bidens	3
		Prostrate Spurge	2
		Ragweed	2
		Spurge	3
	Broadleaf - Winter Annual/Biennial	Bittercress	3
	Grass	Johnsongrass	3
	Liverworts & Moss & Algae	Moss	1
		Nostoc Algae	3
	Other	Glypohsate	3
Sedge & Nutsedge	Yellow Nutsedge	6	

Table 23. Specific issues for the Western region by discipline

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
Entomology	Adelgids	Adelgid, fir	2
		Adelgid, silver fir	3
		Balsam woolly adelgid	3
	Aphids	Aphid, fir	3
		Aphid, lily	2
		Aphids	23
		Aphids, bedding plants	1
		Aphids, true fir	3
		Root aphid, noble fir	3
	Borers & Beetles	Cucumber beetle, EHC field crops	1
		Ips	2
		South american palm weevil	3
		Twig borer, fir	2
		Twig weevil	1
		Twig weevil, Christmas trees	3
		Weevil, fir	3
	Flies, Sawflies & Fungus Gnats	Fungus gnats, poinsettia	1
		Fungus gnats, shorefly	1
	Fruit & Nut Pests	Light brown apple moth	1
	Leaf Hoppers	Leafhopper, rosemary	2
	Leafminers	Leafminer	3
	Lygus	Lygus	4
		Lygus, gerbera	3
		Lygus, peony	3
	Midges	Douglas fir needle midge	3
		needle midge	2
	Mites & Spider Mites	Bulb mite, tulip	1
		Eriophyid mite	3
		Eriophyid mite, conifers	2
		Mites	5
		Mites, choisya	3
		Olive mite	3
		Spider mite	5
		Spider mite, true fir	1
		Two spotted spider mites	3
		Two spotted spider mites, hydrangea	3
	Other	Millipedes	3
	Scale & Mealybugs	Armored scale, magnolia white scale	1
		Honeydew mealybug, phormium & cordyline	1
		Lobate scales	2
		Mealybug	1
		Mealybug, ruscus	2
		Scale, woodies	3
	Snails & Slugs	Amber snail	1
		Slugs	3
		Snail & slug	3

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
		Snails	2
		White garden snail	2
	Thrips	Thrips	29
		Thrips, dahlia & gerbera	2
		Thrips, lily	3
		Thrips, peony	3
		Western flower thrips	2
		Western flower thrips, impatiens	3
	Wasp	Megastigmus	2
	White Grubs & Root Weevils	June bug - larvae	1
		Root weevil	3
	Whiteflies	Whiteflies	6
		Whitefly, hibiscus	2
Whitefly, poinsettia		6	
Pathology	Bacterial Diseases	Bacteria	3
		Erwinia	1
		Pseudomonas	3
		Pseudomonas, woodies	3
	Botrytis	Botrytis	37
		Botrytis - biocontrols	3
		Botrytis, peony	5
	Canker	Canker (Grovesiella sp)	1
		Phoma	2
	Crown & Root Rot	Armillaria	3
		Fusarium	6
		Rhizoctonia	2
		Root rot	2
		Soil borne diseases	1
		Thielaviopsis	3
		Tulip bulb diseases	3
	Downy Mildew	Downy mildew	7
		Downy mildew, phlox	3
	Foliar Blights	Interior Needle Blight	9
		Needle necrosis	5
	Leaf Spots & Anthracnose	Black spot	2
		Cladosporium	3
		Colletotricum	3
		Foliar Diseases, peony	1
		Needle cast, noble fir	2
	Nematodes	Nematode	2
		Nematode, foliar	1
	Other	Frasier fir death	2
		Geotrichum	3
		Unknown	3
	Phytophthora & Pythium	Foliar Phytophthora	2
		Phytophthora, rosemary	3
		Phytophthora	6
		Phytophthora, noble fir	2
		Phytophthora, poinsettia	2
		Pythium, geranium cuttings	3
	Powdery Mildew	Powdery Mildew	13

Discipline	Pest/Disease/Weed Group	Pest	Weighted Ranking
	Rusts	Rust	5
		Rust, fuschia	2
		Rust, grand fir	3
		Rust, Guava	1
		Rust, hechera	3
		Rust, ornamental grass	2
	Turf Diseases	Bermuda grass decline	2
		Dollar spot	3
Weed Science	Broadleaf	Bindweed	2
	Broadleaf - Biennial	Queen Anne's Lace	3
		Wild Carrot	12
	Broadleaf - Perennial	Canada Thistle	3
		Chickweed	5
		Clover	2
		False Dandelion	4
		Fireweed	5
		Northern Willowherb	3
		Rorippa sylvestris	1
		Willowherb	3
		Yarrow	3
		Broadleaf - Summer Annual	Asian mustard
	Eclipta		1
	Euphorbia		2
	Fumewort		3
	Globe camomile		3
	Hairy Fleabane		3
	Small flower stock (invasive)		2
	Smartweed		2
	Spurge		1
	Broadleaf - Winter Annual	Horseweed	3
	Broadleaf - Winter Annual/Biennial	Bittercress	3
	Comment	Peony - Virtually no effective products registered	1
		Pre emergent weed control	6
	Grass	Eragrostis	1
		Goosegrass	3
		Grass	6
		Ryegrass	2
		Smutgrass	2
		Wild grass	3
		Witch grass (Panicum capillare)	1
	Horsetail & Similar Weeds	Equisetum	22
Liverworts & Moss & Algae	Liverwort	10	
Other	All weeds	4	
	Native weeds	3	
Sedge & Nutsedge	Nutgrass	3	
	Nutsedge	6	
	Yellow Nutsedge	3	
Vine - Winter/Summer Annual	Morning glory	2	