

# Pest Management Practices in Washington State

## Mint: A 2002 Survey Summary

Holly Ferguson and Douglas Walsh

Washington State University • IAREC • 24106 North Bunn Road • Prosser, WA 99350

A survey was conducted in 2002 to determine which arthropod, weed, and disease pests impacted Washington mint and what strategies were employed by growers against these pests. Data collected in this survey were compared with results from a similar survey conducted in 1995 to document changes in pests and pest control practices. This document serves as an Executive Summary of those data. A more complete presentation and discussion of the data are available as WSU publication EB1989E.

### Industry Overview

Historically, Washington State's mint acreage (mostly peppermint and Scotch spearmint) increased rapidly in the early 1990s, then declined in the mid- to late 1990s. While the state's harvested mint acreage decreased approximately 23% from 1995 to 2002, Washington remained the number-one ranked state in the nation for spearmint oil production and moved from the number-two rank (second to Oregon) in 1995 to the number-one producer of peppermint oil in 2002.

In 2002, 33,900 acres of mint were harvested in Washington State: 24,000 acres of peppermint, 6,900 acres of native spearmint, and 3,000 acres of Scotch spearmint. Peppermint acreage decreased by 25% from 32,000 acres in 1995 to 24,000 acres in 2002. Native spearmint decreased by only 1,000 acres (approximately 13%) during that time period, from 7,900 to 6,900 acres in 2002. Scotch spearmint acreage declined by 23%, from 3,900 acres in 1995 to 3,000 acres in 2002.

Table 1 summarizes the mint type and region represented by the respondents, who accounted for 20% of the peppermint acreage, 61% of the Scotch spearmint acreage, and 24% of the native spearmint acreage in the state.

Though the harvested acreage dropped from 1995 to 2002, yield of mint oil was considerably higher in 2002. Survey respondents reported an overall average yield of 130

pounds of mint oil per acre. The average yield among 2002 survey respondents was 118 pounds per acre from peppermint, 129 pounds per acre from Scotch spearmint, and 166 pounds per acre from native spearmint. Peppermint is typically cut only once per year, therefore yields fewer pounds per acre than either type of spearmint. The highest yields reported 1993-1995 were 87 pounds per acre from peppermint, 130 pounds per acre from Scotch spearmint, and 140 pounds per acre from native spearmint.

Growers surveyed used several different types of irrigation systems. Fifty-seven percent of the total mint acreage was irrigated with center-pivot drop systems. Furrow irrigation was used in 27% of the total mint acreage reported, followed by 11% with impact sprinklers, 5% with center-pivot overhead systems, and less than 1% with wheel lines.



### Pests of Washington Mint (Table 2)

The growers were asked to estimate the severity of their arthropod, weed, and disease pest problems using the same index developed for the 1995 survey, as follows:

- 1 = severe problem, limits where mint can be grown
- 2 = severe problem, decreases yield significantly
- 3 = moderate problem, decreases yield somewhat
- 4 = minor problem, slight yield reduction
- 5 = present but not a problem
- 6 = not present or unsure if present

In order to standardize the severity ratings, weighted averages, based on the number of acres each rating score represented, were calculated for each pest and each mint type. Average ratings were compared to those reported in the 1995 survey to determine if there had been a change in the importance of these pests over time.

**TABLE 1: SUMMARY OF GEOGRAPHIC DISTRIBUTION OF SURVEY RESPONDENTS AND ACREAGE OF MINT TYPES IN WASHINGTON**

Region	% of Total	Number of Acres		
		Peppermint	Scotch Spearmint	Native Spearmint
Paterson	5	3,100	900	0
Columbia Basin	19	1,556	790	103
Lower Yakima Valley	76	206	152	1,536
<b>Total</b>	<b>100</b>	<b>4,862</b>	<b>1,842</b>	<b>1,639</b>

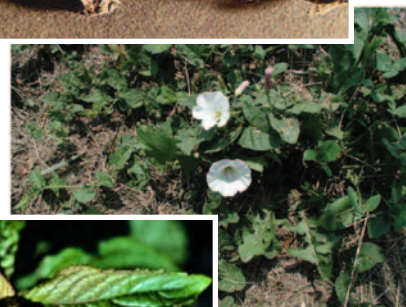
Table 2 shows the pests that were rated as the most severe problems to the industry. Only those pests with overall severity ratings of less than 4.0 are shown. For a complete list of ratings for insect/mite, weed, and disease/nematode pests, see WSU publication EB1989E.

**TABLE 2: TOP-RANKED INSECT, WEED, DISEASE, AND NEMATODE PESTS OF WASHINGTON STATE MINT FOR 2002**

Major Pest	Average Severity Rating			Overall Severity Rating of Pest	Problem Level Compared to 1995
	Peppermint	Scotch Spearmint	Native Spearmint		
Mint root borer	2.8	2.6	4.8	3.4	Greater
Field bindweed	2.5	2.1	3.8	2.8	Greater
Common groundsel	2.9	2.9	4.3	3.4	Lesser
Canada thistle	3	2.9	4.8	3.6	Same
Bermudagrass	2.7	2.6	5.7	3.7	Greater
Salsify	3.2	3.1	5.2	3.8	Greater
Verticillium wilt	2.1	2.2	5.3	3.2	Greater
Nematodes	2.9	2.7	5	3.5	Greater



*Top: Mint root borer*



*Center: Field bindweed*



*Bottom: Verticillium wilt*

### Pesticides (Table 3)

An estimated total of 202,437 pounds of pesticide active ingredients (a.i.) were applied to mint during 2002. This compares to 205,713 pounds in 1995. As before, most of the poundage was applied to peppermint, primarily because of the larger number of peppermint acres. Both insecticide/miticide and fungicide/nematicide applications decreased (from 53,444 to 47,512 and from 77,704 to 70,739 total pounds, respectively), while total pounds of herbicides applied increased from 74,565 to 84,186.

The percentage of Washington mint acreage treated with insecticides/miticides decreased significantly from 1995 to 2002. Ninety-six percent of all mint was treated with insecticide or miticide in 1995, while only 56% was reported as treated by 2002 survey respondents. Peppermint acreage treated decreased from 94% to 73%, Scotch spearmint from 100% to 55%, and native spearmint from 82% to just 5%. The majority of growers (92%) still reported treating with herbicides in 2002, down slightly from the 100% reported in 1995. The overall application increase is likely due to greater use of Gramoxone and Goal in 2002 as well as the special registrations and use of Prowl (Section 18, expired 12/31/2003) and Tough (Section 24c). Treatment with fungicides/nematicides shifted from a 1995 emphasis on powdery mildew (particularly in Scotch spearmint, with 84% of acreage treated) to greater focus on verticillium wilt and nematodes in 2002. Only 41% of all mint was treated with fungicide or nematicide in 2002.




### Non-Chemical Pest Management Practices

Survey results indicate that pesticide use in 2002 had either stayed the same (57%) or decreased (43%) since 1995. Most growers indicated that they practiced certain non-chemical control methods, including field monitoring (scouting), economic thresholds, crop rotation, and mechanical weed control (85.5%, 84%, 70%, and 65%, respectively). Eighty percent indicated that they “sometimes” or “often” used reduced pesticide rates. Up to 35% of the growers reported using integrated mite management or biological control (35 and 25%, respectively).

Scouting practices were explored in detail in the 2002 survey. Approximately 76% of respondents reported monitoring for mint root borer, and 67% monitored spider mites and aphids. Forty-eight percent of the mint growers scouted for mint cutworm, while 38% of the growers looked for alfalfa loopers. Twenty percent of the growers scouted for cabbage loopers, redbacked cutworms, and spotted cutworms. Monitoring for other, minor arthropod pests including garden symphylans and wireworms took place occasionally.

By mint type, approximately 97% of the reported peppermint acreage, 92% of the reported Scotch spearmint acreage, and 81% of the reported native spearmint acreage were monitored for arthropod pests. Peppermint and Scotch spearmint were scouted more frequently than native spearmint; at least 98% of both peppermint and Scotch spearmint were scouted at least 4 times per month. About 71% of native spearmint was monitored one to three times per month.

**TABLE 3: PESTICIDE USE IN WASHINGTON STATE MINT BY TYPE:  
INSECTICIDE/MITICIDE, FUNGICIDE/NEMATICIDE, AND HERBICIDE**

Insecticide/ Miticide	Mint Type*	% Acres Treated	Mean Rate (lb ai/A)	Mean No. Apps/Year	Total lb ai/year	Herbicide	Mint Type*	% Acres Treated	Mean Rate (lb ai/A)	Mean No. Apps/Year	Total lb ai/year	
Orthene (acephate)	P	69	0.93	1.27	19,698	Tough (pyridate)	P	67	0.94	1.96	29,354	
	SS	49	0.997	1.76	2,567		SS	55	0.96	1.88	2,993	
	NS	---	---	---	---		NS	---	---	---	---	
Lorsban (chlorpyrifos)	P	21	1.95	1.04	10,271	Sinbar (terbacil)	P	71	0.79	1.05	14,232	
	SS	39	2	1	2,345		SS	56	0.78	1.25	1,622	
	NS	5	2	1	707		NS	89	0.58	1.95	6,892	
Comite (propargite)	P	27	1.64	1.05	11,709	Gramoxone (paraquat)	P	81	0.54	1	10,566	
	SS	7	1.08	1.02	215		SS	72	0.52	1	1,115	
	NS	---	---	---	---		NS	73	0.49	1	2,269	
All Insecticides and Miticides	P	73			41,678	Prowl (pendimethalin)	P	19	0.78	1	3,468	
	SS	55			5,127		SS	23	0.68	1	464	
	NS	5			707		NS	33	1.23	1	2,839	
	ALL	56			47,512	Goal (oxyfluorfen)	P	19	0.44	1	1,975	
					SS		16	0.13	1	61		
Fungicide/ Nematicide	Mint Type*	% Acres Treated	Mean Rate (lb ai/A)	Mean No. Apps/Year	Total lb ai/year	NS	46	0.41	1	1,318		
	Vydate (oxamyl)	P	55	3	1	39,391	Basagran (bentazone)	P	13	0.52	1	1,673
		SS	8	3	1	684		SS	24	0.5	1	362
NS		2	1	1	156	NS		---	---	---	---	
Vapam (metam- sodium)	P	---	---	---	---	Buctril (bromoxynil)	P	7	0.3	1	515	
	SS	---	---	---	---		SS	---	---	---	---	
	NS	2	319.5	1	23,392		NS	43	0.19	1.17	674	
Microthiol (sulfur)	P	4	3.47	1.4	3,957	Treflan (trifluralin)	P	<1	0.75	1	148	
	SS	7	3.25	4	2,528		SS	---	---	---	---	
	NS	5	1.6	1	539	NS	14	0.75	1	726		
Rally (myclobutanil)	P	---	---	---	---	Assure (quizalofop)	P	32	0.05	1.1	455	
	SS	7	0.13	1	25		SS	73	0.06	1.48	192	
	NS	8	0.13	1	67		NS	5	0.04	1	14	
All Fungicides and Nematicides	P	58			43,348	Poast (sethoxydim)	P	---	---	---	---	
	SS	17			3,237		SS	---	---	---	---	
	NS	15			24,154		NS	14	0.21	1	201	
	ALL	41			70,739	Stinger (clopyralid)	P	<1	0.03	1	<1	
							SS	---	---	---	---	
							NS	3	0.15	1	35	
* P = peppermint, SS = Scotch spearmint, NS = native spearmint, ALL = All 3 mints						Select (clethodim)	P	<1	0.16	1	19	
							SS	---	---	---	---	
							NS	---	---	---	---	
						All Herbicides	P	89			62,407	
							SS	98			6,809	
NS	92			14,970								
	ALL	92			84,186							

## Information Sources

Growers were asked about the importance of certain information sources to them as they made decisions regarding the use of pest management practices. They were asked to rate certain information sources as very important, somewhat important, or not important.

By far the most important information source for mint growers in Washington State was their own experience: 90% called personal experience very important. The second highest ranked source of pest management information was chemical firm representatives; 85% of



respondents rated this source either very important (55%) or somewhat important (30%). Private consultants were deemed a very important source by 41% of respondents. Other growers, university Extension personnel, university crop protection guides, and corporate scientists were each rated somewhat important by half or more of the respondents

(65%, 50%, 70%, and 55%, respectively), but were ranked as very important by 35% or fewer of the growers. The lowest ranked of the seven sources listed was corporate scientists; 39% of respondents rated this source not important.

## Fertilizer Use (Table 4)

Fertilizer applications play a role in overall chemical inputs. Nutrient applications also affect the vigor of plants, which can in turn determine the extent of pest problems encountered by growers.

The survey asked growers to list fertilizer applications to mint acreage in 2002. From these data, the number of acres treated, percent acreage treated, average pounds per acre, and total pounds applied per year statewide were calculated. Table 4 summarizes the fertilizer use information gleaned from the respondents.

Nearly all of the reported mint acreage received at least one nutrient application. Nitrogen was applied to most of the mint acreage, with 99% of the peppermint, 100% of the Scotch spearmint, and 91% of the native spearmint treated. An estimated 9.3 million pounds of nitrogen were applied to Washington mint in 2002, similar to that applied during 1993 to 1995, according to the earlier survey. Large amounts of potassium (2.4 million pounds) and phosphorus (2 million pounds) were applied to mint statewide. Applications of minor nutrients such as sulfur (448,124 pounds), zinc (19,372 pounds), boron (14,172 pounds), and magnesium (2,231 pounds) were reported by mint growers as well. Sulfur as a nutrient application was separated from sulfur as a fungicide in the analysis. Growers reported that their nutrient applications varied according to field and soil test results.

### ACKNOWLEDGEMENTS

The authors are very grateful to the growers who participated in this survey. The authors would also like to thank Dr. Rick Boydston and Rocky Lundy for their valuable editorial assistance on this project, Ron Wight for some of the photographs used in the report, and Sally O'Neal Coates for the final editing. This project was supported by grants from the Mint Industry Research Council and the Washington Mint Commission.

TABLE 4: FERTILIZER USE IN WASHINGTON MINT, 2002

Nutrient	Mint Type*	% Acres Treated	Estimated Acres Treated	Average lbs/acre	Total lbs Applied/Year
Nitrogen	P	99	23,778	303.3	7,210,899
	SS	100	3,000	276.2	828,601
	NS	91	6,247	201.6	1,259,218
Potassium	P	74	17,854	115	2,053,525
	SS	51	1,539	118.6	182,492
	NS	56	3,894	52.2	203,380
Phosphorus	P	86	20,668	76	1,570,341
	SS	76	2,275	68.7	156,375
	NS	80	5,536	47.6	263,328
Sulfur	P	22	5,366	34.2	183,727
	SS	27	809	28.3	22,876
	NS	79	5,481	44.1	241,521
Zinc	P	10	2,345	4	9,379
	SS	9	269	4.7	1,270
	NS	28	1,907	4.6	8,723
Boron	P	74	17,854	0.6	10,203
	SS	58	1,735	0.5	904
	NS	37	2,560	1.2	3,065
Magnesium	P	---	---	---	---
	SS	---	---	---	---
	NS	8	577	3.9	2,231

\* P = peppermint, SS = Scotch spearmint, NS = native spearmint

Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.



## College of Agricultural, Human, & Natural Resource Sciences

WSU Extension bulletins contain material written and produced for public distribution. You may reprint written material, provided you do not use it to endorse a commercial product. Alternate formats of our educational materials are available upon request for persons with disabilities. Please contact the Information Department, College of Agricultural, Human, & Natural Resource Sciences, Washington State University for more information. You may order copies of this and other publications from the WSU Bulletin office, 1-800-723-1763, or online at <http://pubs.wsu.edu>.

Issued by Washington State University Extension and the U.S. Department of Agriculture in furtherance of the Acts of May 8 and June 30, 1914. WSU Extension programs and policies are consistent with federal and state laws and regulations on nondiscrimination regarding race, sex, religion, age, color, creed, national or ethnic origin, physical, mental or sensory disability, marital status, sexual orientation, and status as a Vietnam-era or disabled veteran. Evidence of noncompliance may be reported through your local WSU Extension office. Trade names have been used to simplify information; no endorsement is intended. Published December 2004. Subject Code 350. EB1988E.