

# West Virginia Problem Weeds

## Research Summary



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# ACKNOWLEDGMENTS

Special appreciation is expressed to the following:

- Extension agents who participated in the project survey from Barbour, Hancock, Hardy, Jackson, Jefferson, Lewis, Logan, Mason, Preston, Putnam, Randolph, Roane, Tyler, Wayne, and Wood Counties
- Dr. Rakesh Chandran, Extension Specialist, Integrated Pest Management Coordinator, for valuable review comments
- Wayne Bennett, Extension Agent, Putnam County, for assistance in reviewing survey questionnaires and making necessary changes
- Rodney Wallbrown, Extension Agent, Mason County, for assistance in reviewing survey questionnaires and making necessary changes
- Joyce Bower, Extension Specialist, and Eric Hrin, Staff Writer, of the Office of Communications, West Virginia University Extension Service, for editing

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# INTRODUCTION

Weeds pose a pest problem, especially on poorly managed soils. Different agronomic management decisions (time and type of tillage, rate and effectiveness of herbicides used, etc.) made by the farm operator at various times during the crop year may alter the weed dynamic of the field. Chemical control is not the only solution to weed problems. Other effective and environmentally safe agricultural practices (i.e., cultural, mechanical, and biological options) must be integrated into the system whenever possible.

A research was conducted to identify current problem weeds of various crops in West Virginia by surveying West Virginia Extension agents. By identifying the top three to five problem weeds and their management practices, better weed management assessments can be made.

Questionnaires were sent to Extension agents in all 55 counties in West Virginia in April 1999. Information collected from the survey includes: problem weed species, hard-to-control weed species, and herbicide-resistant weeds in corn, pasture, hay, lawns and home gardens, soybean, tobacco, small grains, sweet corn and vegetables. In addition, information regarding chemical and nonchemical means used for weed control were collected for the aforementioned crops in the state. Fifteen responses were received from Extension agents representing major cropping areas of the state. Survey results were summarized and tabulated. Also provided is a list of herbicides that were labeled but not reported. Related review comments are provided for each crop.

This report presents the results of the research conducted to identify problem weeds and management practices on agronomic crops in West Virginia during the 1999 growing season. Support for this project was provided by the Northeast Pest Management Center.

Results of this research indicate the extent of troublesome weed populations and weed management methods practiced in West Virginia. This information will benefit the Pesticide Information Network Program, Integrated Pest Management Program, United State Department of Agriculture, Environmental Protection Agency, and other agricultural agencies, which need information on current pest problems, pest management methods used, and key references and contacts. Such a precise source of accurate and up-to-date information is needed by the EPA for making regulatory decisions. Data collected in this research also serve as a source of information on pest management practices for a given crop in West Virginia. Such information could be used by state personnel, growers, and the general public. In addition, a listing of critical needs in weed management will help to identify research priorities for future research funding.

# Corn Weeds

A total of 16 problem weed species, 10 hard-to-control weeds, and four herbicide-resistant weeds were reported in corn fields. Of these, Johnsongrass was the most reported problem weed in corn followed by velvetleaf and pigweed spp. (Table 1).

**Table 1.** Corn Weed Species and Their Ranking in West Virginia (1999)

<u>Weed species</u>	<u>Ranking*</u>
Johnsongrass	1
Velvetleaf	2
Pigweed spp.	3
Burcucumber <sup>+</sup>	3
Common Lambsquarters	3
Foxtail spp.	3
Fall panicum	4
Bindweed spp.	4
Ragweed spp.	4
Yellow nutsedge <sup>+</sup>	5
Common purslane	5
Thistles spp.	5
Common Cocklebur	5
Morningglory spp. <sup>+</sup>	5
Runningbriers <sup>+</sup>	5
Goosegrass	5
<b><u>Herbicide-Resistant Weeds</u></b>	
Pigweed spp. (triazine)	1
Lambsquarters (triazine)	2
Velvetleaf (triazine)	3
Johnsongrass (triazine)	3

\* Ranking #1: the most frequently reported problem weed in West Virginia.

<sup>+</sup> Hard-to-control weed species. Also, sumac, mulberry, ryegrass, kudzu, Japanese bamboo, and wild chrysanthemum were reported as hard-to-control weed species.

## Chemical control:

The following herbicides were reported to be used for weed control in corn: Aatrex, Accent, Axiom, Banvel, Basis, Bicep, Broadstrike, Bullet, Dual, Exceed, Grammaxone, Lightning, Princep, and 2,4-D (Please see Appendix for common names).

## Nonchemical control:

Two nonchemical methods were reported for weed control in corn: cultivation (i.e., chisel plow and heavy disk) and crop rotation.

Other reported methods of weed management include integrated pest management and planting Roundup-ready corn.

**Review comments:** The following is a partial list of herbicides available for weed control in corn, which were not reported in this survey.

<u>Trade name</u>	<u>Application / Weeds controlled</u>
Aim	POST/small broadleaves
Basagran	POST/contact, broadleaves
Beacon	POST/ grasses and some broadleaves
Buctril	POST/ contact, broadleaves
Celebrity plus	POST/ grasses and broadleaves
Distinct	POST/ broadleaves
Forntier	PPI, PRE, or early POST/annual grasses, some broadleaf, and nutsedge
Evik	POST/ broadleaves
Harness	POST/ broadleaves
Hornet	PRE/ annual grasses
Liberty	POST/contact, for Liberty Link corn
MicroTech/Partner	PRE/ grasses and some broadleaves
North Star	POST/ broadleaves and some grasses
Permit	POST/ broadleaves
Pinnacle	POST/ broadleaves
Poast	POST/ grasses
Prowl	PPI, PRE, early POST/annual grasses and some broadleaves
Python	PPI, PRE/ broadleaves
Roundup	POST/ broadleaves
Shotgun	POST/ broadleaves
Spirit	POST/ broadleaves
Stinger	POST/ some boradleaves
Surpass 100	PPI, PRE, early POST/grasses and broadleaves
Top notch	Micro-encapsulated formulation of Surpass 100, for no-till corn
Touchdown	A non-selective, translocating herbicide for emerged vegetation.
Tough	POST/ broadleaves

PP: PRE-plant; PPI: Preplant-Incorporated; PRE: Preemergence; POST: Postemergence

**Please refer to label for restrictions and precautions.**

# Pasture Weeds

A total of 16 problem weed species, five hard-to-control weeds, and one herbicide-resistant weed were reported in pasture. Woody brush, Multiflora rose, and Autumn olive were reported to be the most problematic pasture weeds (Table 2).

**Table 2.** Pasture Weed Species and Their Ranking in West Virginia (1999)

<u>Weed Species</u>	<u>Ranking*</u>
Multiflora rose <sup>+</sup>	1
Autumn olive <sup>+</sup>	2
Ironweed	3
Johnsongrass	4
Canada thistle	4
Burcucumber	5
Hemp dogbane	5
Honeysuckle	5
Horsenettle	5
Hairy gallensoga	5
Ground ivy	5
Curly dock	5
Dandelion	5
Fall panicum	5
Kudzu <sup>+</sup>	5
Japanese knotweed <sup>+</sup>	5
 <u>Herbicide -Resistant Weeds</u>	
Pigweed spp. (triazine)	1

\* Ranking #1: the most frequently reported problem weed in West Virginia.

<sup>+</sup> Hard-to-control weed species. Also, Mugwort was reported as a hard-to-control weed.

## Chemical control:

The following herbicides were reported to be used for weed control in pasture: Aatrex, Ally, Banvel, Crossbow, Roundup, Spike, and 2,4-D.

## Nonchemical control:

Mechanical control methods reported were: multiple cuts per year, use of brush hog or chain saw, mowing, mulching, and rotation. Biological brush control included the use of sheep and goats for controlling weed species such as multiflora rose and others.

## Review comments:

Unreported herbicides, Stinger, Clarity, and Gramoxone Extra also are labeled in pasture for control of weeds.

## Hay (Alfalfa) Weeds

Twenty-one plant species were reported as problem weeds, eight species as hard-to-control weeds, and two species as herbicide-resistant weeds in the state. Foxtail, curly duck, horse nettle, and hemp dogbane all ranked as number-one problem weeds in hay (Table 3).

**Table 3.** Hay (Alfalfa) Weed Species and Their Ranking in West Virginia (1999)

<u>Weed species</u>	<u>Ranking*</u>
Foxtail <sup>+</sup>	1
Curly dock <sup>+</sup>	1
Horsenettle <sup>+</sup>	1
Hemp dogbane <sup>+</sup>	1
Chickweed	2
Bindweed spp.	2
Thistles spp.	2
Quackgrass	2
Fall panicum	2
Goosegrass	3
Pigweed spp.	3
Ragweed spp.	3
Shepherdspurse	3
Henbit	3
Johnsongrass	3
Sandbur <sup>+</sup>	3
Multiflora rose <sup>+</sup>	3
Milkweed	3
Cocklebur	3
Barnyardgrass	3
Lambsquarters	3
 <u>Herbicide-Resistant Weeds</u>	
Lambsquarters (triazine)	1
Pigweed spp. (triazine)	2

\* Ranking #1: the most frequently reported problem weed in West Virginia.

<sup>+</sup> Hard-to-control weed species. Also, Japanese bamboo and Japanese knotweed were reported as hard-to-control weeds.

### Chemical control:

The following herbicides were reported to be used for weed control in hay fields: Aatrex, Ally, Banvel, Crossbow, Poast, and 2,4-D.

**Nonchemical control:**

Several nonchemical weed control methods were reported, including harvesting to prevent weed seed formation (three or more harvests per year), practicing a sound cutting and fertility management (i.e., more frequent mowing), and grazing with animals as needed.

**Review comments:**

The following is a partial list of other herbicides that are also labeled for weed control in hay.

<u>Trade name</u>	<u>Application/ Weeds controlled</u>
Balan	PPI/grasses and some broadleaves
Buctril	Contact/broadleaves
Eptam	PP/grasses and some broadleaves
Gramoxone Extra	PP and POST/ grasses and broadleaves
Karmex	POST/ broadleaves and grasses
Kerb	PRE and early POST/weed control in forage legumes
Lexone/Sencor	Early POST/grasses and broadleaves
MCPA	PRE/broadleaves
Pursuit	Early PP, PPI, PRE, and POST/broadleaves, grasses, and sedges
Roundup Ultra	PP/ grasses and broadleaves
Select	POST/grasses
Sinbar	For dormant season control of annual grasses and broadleaves
Velpar	POST/broadleaves and some grasses
2,4-DB(Butyrac200)	POST/broadleaves

PP: PRE-plant; PPI: Preplant-Incorporated; PRE: Preemergence; POST: Postemergence

**Please refer to label for restrictions and precautions.**

## Lawns and Home Garden Weeds

Eighteen species were reported as problem weeds, five species as hard-to-control weeds, and one species as a herbicide-resistant weed in lawns and home gardens (Table 4). Chickweed and dandelion ranked as the most common problem weeds in West Virginia's lawn and home gardens.

**Table 4.** Lawns and Home Garden Weed Species and Their Ranking in West Virginia (1999)

<u>Weed species</u>	<u>Ranking*</u>
Chickweed <sup>+</sup>	1
Dandelion	1
Ground ivy	2
Multiflora rose <sup>+</sup>	2
Kudzu <sup>+</sup>	2
Plantain spp.	3
Pigweed spp.	3
Hemp dogbane	3
Bindweed spp.	3
Burcucumber	3
Clover	3
Violet	3
Buttercup	3
Gallensoga	3
Curly dock	3
Fall panicum	3
Johnsongrass	3
Japanese knotweed <sup>+</sup>	3
 <b><u>Herbicide -Resistant Weeds</u></b>	
Pigweed spp. (triazine)	1

\* Ranking #1: the most frequently reported problem weed in West Virginia.

<sup>+</sup> Hard-to-control weed species. Also, Mugwort was reported as a hard-to-control weed.

### **Chemical control:**

The following herbicides were reported to be used for weed control in lawn and home garden: Aatrex, Crossbow, Roundup, and 2,4-D.

### **Nonchemical control:**

Nonchemical weed control methods reported include: plowing, hand pulling, hoeing, cultivating the soil, clipping, mowing, and mulching.

**Review comments:**

The following is a partial list of other herbicides that are labeled for weed control in lawns and home gardens.

<u>Trade name</u>	<u>Application/ Weeds controlled</u>
Acclaim	POST/ summer annual grasses
Balan	PRE/grasses and some broadleaves
Banvel	PRE and POST/control emerged broadleaves
Barricade	PRE/ grasses
Betasan	PRE/ grasses
Confront	POST/ broadleaves
Dacthal	PRE/annual grasses and some broadleaves
Dimension	PRE and POST/ grasses
MCPP	POST/ broadleaves
Ronstar	PRE/ grasses
Team	PRE/ grasses
Trimec Classic	POST/ broadleaves
Tupersan	PRE/ grasses
Turflon Ester, and D.	POST/ broadleaves
Turf Weedgrass,PreM	PRE/ grasses
Weedestroy	POST/ broadleaves

PP: PRE-plant; PPI: Preplant-Incorporated; PRE: Preemergence; POST: Postemergence

**Please refer to label for restrictions and precautions.**

# Soybean Weeds

Nine species were reported as problem weeds and two hard to control plant species in soybean (Table 5). Johnsongrass was the biggest problem weed in soybean in West Virginia.

**Table 5.** Soybean Weed Species and Their Ranking in West Virginia (1999)

<u>Weed Species</u>	<u>Ranking*</u>
Johnsongrass	1
Hemp dogbane	2
Ragweed spp.	2
Cocklebur	2
Pigweed spp.	2
Black nightshade	2
Velvetleaf	2
Burcucumber <sup>+</sup>	2
Sumac	2

\* Ranking #1: the most frequently reported problem weed in West Virginia.

<sup>+</sup> Hard-to-control weed species. Also, briers was reported as a hard-to-control weed.

## **Chemical control:**

The following herbicides were reported to be used for weed control in soybean: Canopy, Classic, Cobra, Fusilade, and Roundup.

## **Nonchemical control:**

Cultivation (i.e., disking and chisel plow) and crop rotation with corn are the main nonchemical weed control methods used in soybean production.

**Review comments:**

The following is a partial list of other herbicides labeled for weed control in soybeans.

## Soybean- Conventional Tillage

<u>Trade name</u>	<u>Application/ Weeds controlled</u>
Axiom	PRE/grasses and small-seeded broadleaves
Command	PPI and PRE/ grasses and some broadleaves
Dual II Magnum	PPI and PRE/ grasses, nutsedge, and some broadleaves
Frontier	PPI and PRE/ grasses and nutsedge
Lexone/Sencor	PRE/ broadleaves and some grasses
Lorox	PRE/ annual weeds
MicroTech/Partner	PRE/ annual weeds
Prowl	PPI and PRE/ grasses and some broadleaves
Python	PRE/ annual weeds
Scepter	PPI and PRE/ broadleaves
Treflan HFP	PPI/ broadleaves and some grasses
Vernam	PPI/ annual weeds and nutsedge

PP: PRE-plant; PPI: Preplant-Incorporated; PRE: Preemergence; POST: Postemergence

**Please refer to label for restrictions and precautions.**

## Soybean-no-Till or Conventional

<u>Trade name</u>	<u>Application/ Weeds controlled</u>
Basagran	POST/broadleaves
Blazer or storm	POST/broadleaves
FirstRate	POST/broadleaves
Flexstar	POST/broadleaves
Pinnacle or Harmony GT	POST/broadleaves
Pursuit	POST/broadleaves
Raptor	POST/broadleaves
Reflex	POST/broadleaves
Pursuit	POST/broadleaves
Raptor	POST/broadleaves
Reflex	POST/broadleaves
Resource	POST/broadleaves
Scepter	POST/broadleaves
Stellar	POST/broadleaves
Synchrony STS	POST/broadleaves
Touchdown	POST/broadleaves
Assure II	POST/broadleaves
Fusion	POST/broadleaves
Poast plus	POST/broadleaves
Select	POST/broadleaves
Butyrac	POST/broadleaves
Gramoxone Extra	POST/broadleaves

PP: PRE-plant; PPI: Preplant-Incorporated; PRE: Preemergence; POST: Postemergence

**Please refer to label for restrictions and precautions.**

## Tobacco, Small Grain, Sweet Corn, and Vegetable Weeds

Several plant species were reported as problem weeds and hard-to-control weeds in tobacco, small grains, sweet corn, and vegetables in the state, but ranking was not available (Table 6).

**Table 6.** Problem Weeds in Tobacco, Small Grains, Sweet Corn, and Vegetables in West Virginia (1999)

Tobacco	Small Grains	Sweet Corn	Vegetables
Johnsongrass Chickweed <sup>+</sup> Ragweed spp. Field bindweed <sup>+</sup> Jimsonweed <sup>+</sup>	Garlic Winter annuals	Curly dock Purslane Bindweeds	Chickweed <sup>+</sup> Pigweed spp. Dogbane Field Bindweed <sup>+</sup> Burcucumber

<sup>+</sup> Hard-to-control weed species.

## Chemical and Nonchemical Means of Weed Control Used in Tobacco, Small Grains, Sweet Corn, and Vegetables (1999)

### Chemical control:

Tobacco	Small Grains	Sweet Corn	Vegetables
Prowl Spartan Command Devrinol Tillam	Harmony extra	Atrazine Dual	Treflan Devrinol Command 2, 4-D

### Nonchemical control:

Cultivation, hoeing, and crop rotation were used for weed control in tobacco.

Higher crop density and proper nitrogen fertilization were used in small grains to control weeds.

Cultivation was used for weed control in sweet corn.

Plastic cover, hoeing, cultivation, and crop rotation were used for weed control in vegetables.

**Review comments:**

The following is a partial list of other herbicides that are labeled for weed control in tobacco, small grains, sweet corn, and vegetables.

**Tobacco**

<u>Trade name</u>	<u>Application/ Weeds controlled</u>
Poast	POST/annual and perennial grasses

**Small Grains (barley, rye, and wheat)**

<u>Trade name</u>	<u>Application/ Weeds controlled</u>
Buctril	POST/broadleaves
Gramaxone Extra	Nonselective contact herbicide for emerged annual weeds in no-till
Peak	POST/broadleaves
Rhomene	POST/annual broadleaves, especially mustards
Roundup Ultra	PP, POST, nonselective/most annual weeds in no-till plantings
Touchdown	For use in wheat only, annual weeds and some perennial in no-till
2,4-D amine	POST/broadleaves

(There are other herbicides that are labeled for fall-seeded small grains)

**Sweet Corn**

<u>Trade name</u>	<u>Application/ Weeds controlled</u>
<b>In no-till:</b>	
Gramoxone Extra + Dual Magnum + Atrazine 80WP	Control small annual grasses and/or broadleaves.
Roundup Ultra + Dual Magnum + Atrazine 80WP	Control well-established annual weeds and/or perennials
<b>Conventional tillage:</b>	
Basgran 4SC	POST/susceptible broadleaves
Bladex 90DF	PPI and PRE/most broadleaves
MicroTech	PPI and PRE/annual grasses and certain broadleaves
Sutan+	PPI/annual grasses, nutsedge, and certain broadleaves
2,4-D Amine	POST/broadleaves

**Vegetables (Each herbicide is labeled for specific crop; please read the label)**

<b><u>Trade name</u></b>	<b><u>Application/ Weeds controlled</u></b>
Assure II	POST/annual and perennial grasses
Goal	PP or PPI/annual broadleaves
Kerb	PRE and early POST/grasses and some broadleaves
Micro-Tech	PP or PPI/grasses and some broadleaves
Poast	POST/grasses
Prefar	PP/grasses
Prism	POST, selective/grasses
Pursuit	POST/broadleaves and grassy weeds

(There are other herbicides that are labeled for specific crop)

PP: PRE-plant; PPI: Preplant-Incorporated; PRE: Preemergence; POST: Postemergence

**Please refer to label for restrictions and precautions.**

## Appendix A: Common weed species in crops reported in the states of Maryland, Delaware, Pennsylvania, New Jersey, Virginia, and West Virginia.

<u>Common Name</u>	<u>Common Name</u>
Annual bluegrass	Foxtail (giant, green, yellow)
Annual ryegrass	Goosegrass
Barnyardgrass	Hemp dogbane
Bermudagrass	Horsenettle
Bindweed	Johnsongrass
Burcucumber	Orchardgrass
Canada thistle	Pigweed spp.
Canarygrass	Prickly lettuce
Carpetweed	Purslane
Cattail	Pusley (Florida)
Chickweed	Quackgrass
Common lambsquarters	Ragweed
Curly dock	Sandbur
Dandelion	Shattercane
Dogbane	Velvetleaf
Fall panicum	Wirestem muhly

\*Source: Pest management recommendations for filed crops 1998. Cooperative Extension Services, University of Maryland, Delaware, Penn State, Rutgers, VPI, and West Virginia, Bulletin 237.

Common herbicide-resistant weeds in crops.

<u>Herbicide-Resistant Weeds</u>	<u>Resistant to</u>
Common lambsquarters	Triazine herbicides
Pigweed spp.	Triazine herbicides

## Appendix B: Herbicide trade and common names

TRADE NAME	COMMON NAME
Aatrex	atrazine
Accent	nicosulfuron
Acclaim	fenoxaprop-P-ethyl
Aim	carfentrazone-ethyl
Ally	metsulfuron methyl
Assure II	Quizalofop -P- ethyl
Authority	sulfentrazone
Axiom	flufenacet + metribuzin
Balan	benefin
Banvel	dicamba dimethylamine salt
Basagran	bentazone
Basamid	dazomet
Basis	rimsulfuron + thifensulfuron methyl
Beacon	primisulfuron
Betasan	beninlide
Bicep	metolachlor + atrazine
Blazer	acifluorfen
Broadstrike	metolachlor + flumetsulam
Buctril	bromoxynil
Bullet	alachlor + atrazine
Butyrac	2,4-D B
Celebrity Plus	nicosulfuron + dicamba + diflufenzopyr
Clarity	dicamba
Command	clomazone
Crossbow	2,4-D + trichlopyr
Devrinol	napropamide
Dual	metolachlor
Eptam	EPTC
Eradicane	EPTC
Exceed	prosulfuron + primisulfuron methyl
FirstRate	cloransulam-methyl
Flexstar	fomesafen
Frontier	dimethenamid
Fusion	fluazifop-P butyl + fenoxaprop-P-ethyl
Gallery	isoxaben
Grammaxone	paraquat
Harmony Extra	thifensulfuron + tribenuron
Kerb	pronamide
Lariat	alachlor + atrazine
Lasso	alachlor

## Append. B (Cont.): Herbicide trade and common names

TRADE NAME	COMMON NAME
Leadoff	dimethamid + atrazine
Liberty	glufosinate -ammonium
Lightning	imazethapyr + imazapyr
Lorox	linuron
MCPA	MCPA
Microtech	alachlor
Peak	prosulfuron
Pendulum	pendimethalin
Pinnacle	thifensulfuron methyl
Poast	sethoxydim
Princep	simazine
Prowl	pendimethalin
Pursuit	imazethapyr
Python	flumetsulam
Raptor	imazamox
Reflex	fomesafen
Resource	fumiclorac pentyl ester
Roundup	glyphosate
Rounar	oxadiazon
Scepter	imazaquin
Select	clethodim
Sencor/Lexone	metribuzin
Sinbar	terbacil
Spartan	sulfentrazone
Spike	tebuthiuron
Stinger	clopyralid
Stellar	flumiclorac pentyl ester + lactofen
Storm	acifluorfen + bentazon
Surflan	oryzalin
Surpass 100	acetochlor + atrazine + safener
Synchrony	chlorimuron ethyl + thifensulfuron
Tillam	pebulate
Top Notch	acetochlor + safener
Touchdown	sulfosate
Treflan	trifluralin
Velpar	hexazinone
Warthal	DEPA

# References

- Commercial Vegetable Production Recommendations. Publication EB-236. Maryland Cooperation Extension, Maryland.
- Pest Management Guide: Home Grounds & Animals. Publication 456-018. Virginia Cooperative Extension, Virginia Tech, Virginia.
- Pest Management Recommendations for Field Crops. Bulletin 237. Cooperative Extension Services, Maryland, Delaware, Pennsylvania, Rutgers- New Jersey, Virginia Polytechnic Institute, and West Virginia University.

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November 2001.

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