

2020/2021
Mid-Atlantic Commercial Vegetable
Production Recommendations

Delaware

University of Delaware Cooperative Extension (EB137)

Maryland

University of Maryland Extension (EB-236)

New Jersey

Rutgers Cooperative Extension (E001)

Pennsylvania

Penn State Extension (AGRS-028)

Virginia

Virginia Cooperative Extension (456-420)

West Virginia

West Virginia University Extension Service

**For Immediate Medical Attention
Call 911**

**For a Pesticide Exposure Poisoning
Emergency Call**



For All States

This number will automatically connect you to the poison center nearest to you.

Anyone with a poisoning emergency can call the toll-free telephone number for help.

Personnel at the Center will give you first-aid information and direct you to local treatment centers if necessary.

For Pesticide Spills

Small Spills: See the product label for cleanup advice.

Large spills: Call the National Response Center at 1-800-424-8802 or CHEMTREC at 800-424-9300 (24 hours) - Industry assistance with emergency response cleanup procedures for large, dangerous spills.

Be aware of your responsibility to report spills to the proper state agency.

Preface

NOT TO BE USED BY HOME GARDENERS

This copy of the 2020/2021 Mid-Atlantic Commercial Vegetable Production Recommendations replaces all previous editions of the Commercial Vegetable Production Recommendations published individually for Delaware, Maryland, New Jersey, Pennsylvania, Virginia, and West Virginia. Information presented in this publication is based on research results from the University of Delaware, the University of Maryland, Rutgers - The State University of New Jersey, The Pennsylvania State University, Virginia Polytechnic Institute and State University, West Virginia University, and the U.S. Department of Agriculture, combined with industry and grower knowledge and experience.

This publication will be revised biennially. In January 2021, a critical update with important updates for this publication will be communicated through local Extension Agents and Vegetable Specialists. The editors welcome constructive criticism and suggestions from growers and industry personnel who may wish to help improve future editions of this publication.

These recommendations are intended for the commercial vegetable grower who has to make numerous managerial decisions. Although the proper choices of variety, pesticides, equipment, irrigation, fertilizer, and cultural practices are the individual vegetable grower's responsibility, it is intended that these recommendations will facilitate decision-making. Recommended planting dates will vary across the six-state region. Local weather conditions, grower experience, and variety may facilitate successful harvest on crops planted outside the planting dates listed in this guide. This can be evaluated in consultation with the local agents and state specialists. Government agencies and other organizations administering crop insurance programs or other support programs should contact local Extension agents and/or vegetable specialists for guidance.

DISCLAIMER

- The label is a legally-binding contract between the user and the manufacturer.
- The user MUST follow all rates and restrictions as per label directions.
- The use of any pesticide inconsistent with the label directions is a violation of Federal law.

Pesticide User Responsibility

Always follow the label and use pesticides safely. For Special Local Needs Label 24(c) registrations or Section 18 exemptions, do not use the material without a copy of the special label or written instructions from your Extension Agent or another recognized authority. **The user is always responsible for the proper use of pesticides, residues on crops, storage and disposal, as well as for damage caused by drift.**

State and federal pesticide regulations are constantly under revision. Be sure to determine if such changes apply to your situation. Using pesticides inconsistent with label directions is illegal.

Days Between Last Application and Harvest

The minimum number of days between the last application and harvest (**PHI**, Pre-Harvest Interval, in days) and reentry information (**REI**, Restricted Entry Interval, in hours) are listed in the herbicide, insecticide and fungicide recommendation tables in chapter F Commodity Recommendations. Always follow the label to avoid the occurrence of deleterious chemical residues on harvested crops.

Trade or Brand Names

The trade or brand names given herein are supplied with the understanding that no discrimination is intended and no endorsement is implied. Furthermore, in some instances the same compound may be sold under different trade names, which may vary as to label clearances. For the convenience of our users, both product names and active ingredients are provided and any product name omissions are unintended.

Coordinators and Editors

2020/2021 Mid-Atlantic Commercial Vegetable Production Recommendations

Coordinators

C.A. Wyenandt, Ph.D.

Extension Specialist in Vegetable Pathology (Rutgers University)

M.M.I. van Vuuren Ph.D. (Rutgers University)

Discipline Editors

Entomology

Thomas P. Kuhar, Ph.D. (Virginia Tech)

Pesticides

George C. Hamilton, Ph.D. (Rutgers University)

Patricia D. Hastings (Rutgers University)

Weed Science

Mark J. VanGessel, Ph.D. (University of Delaware)

Horticulture

Gordon C. Johnson, Ph.D. (University of Delaware)

Plant Pathology

C.A. Wyenandt, Ph.D. (Rutgers University)

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contributors by State

These recommendations were prepared and reviewed by the following individuals from respective institutions with the purpose of providing up to date information for commercial vegetable growers in the mid-Atlantic states of Delaware, Maryland, New Jersey, Pennsylvania, Virginia, and West Virginia.



University of Delaware

Horticulture

E. Ernest

G.C. Johnson

Plant Pathology

A.M. Koehler

Weed Science

M.J. VanGessel

K. Vollmer

Entomology

D. Owens

Irrigation

J. Adkins



Rutgers University

Horticulture

M. Infante-Casella

W. Kline

P. Nitzsche

T.J. Orton

R.W. VanVranken

Weed Science

T. Besançon

Entomology

K. Holmstrom

J. Ingerson-Mahar

Plant Pathology

C.A. Wyenandt

Pesticide Safety

G.C. Hamilton

P.D. Hastings



Virginia Tech

Horticulture

M.S. Reiter

Entomology

H.B. Doughty

T.P. Kuhar

J.M. Wilson

Plant Pathology

D.B. Langston

S.L. Rideout

Wildlife

J.A. Parkhurst

Food Science

L.K. Strawn



University of Maryland

Entomology

G.E. Brust

Plant Pathology

K.L. Everts

M.J. Hu



PennState

Horticulture

K. Demchak

T.E. Elkner

E. Sánchez

Weed Science

D. Lingenfelter

J.M. Wallace

Entomology

S.J. Fleischer

B.J. Lingbeek

Pathology

B.K. Gugino



West Virginia University

Horticulture

L.W. Jett

Weed Science

R.S. Chandran

Plant Pathology

M.M. Rahman

State Extension Information

DELAWARE

University of Delaware

University of Delaware Agricultural Extension: <https://www.udel.edu/canr/cooperative-extension/>
Vegetable Program Trial Reports, Publications, and Budgets:

<https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/commercial-crops/vegetable-crops/>

Weekly Crop Update Newsletter: <https://sites.udel.edu/weekllycropupdate/>

Insect Trap Program:

<https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/pest-management/insect-trapping/>

UD Plant Diagnostic Clinic: <https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/plant-diagnostic-clinic/>

University of Delaware Weed Science:

<https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/weed-science/>

Statewide

Gordon Johnson, Fruit and Vegetable Crops Specialist, 302-856-7303, gcjohn@udel.edu

Emmalea Ernest, Associate Scientist, Vegetables, 302-856-7303, emmalea@udel.edu

Mark VanGessel, Extension Specialist, Weed Science, 302-856-7303, mjv@udel.edu

Alyssa Koehler, Extension Specialist, Plant Pathology, 302-856-7303, akoehler@udel.edu

Kathryne Everts, Vegetable Plant Pathology Specialist, 410-742-8780, everts@udel.edu

David Owens, Entomology/IPM Specialist, 302-856-7303, owensd@udel.edu

County Offices

New Castle County: Carrie Murphy, 302-831-2506, cjmurphy@udel.edu

New Castle County: Dan Severson, 302-831-2506, severson@udel.edu

Kent County: Jake Jones, 302-730-4000, jgjones@udel.edu

Sussex County: Tracy Wootten, 302-856-7303, wootten@udel.edu

Sussex County: Cory Whaley, 302-856-7303, whaley@udel.edu

MARYLAND

University of Maryland

University of Maryland Extension: <https://extension.umd.edu/topics/agriculture>

Maryland Vegetables: <https://extension.umd.edu/mdvegetables>

Vegetable & Fruit Headline News:

<https://extension.umd.edu/anne-arundel-county/agriculture/vegetable-fruit-headline-news>

University of Maryland Extension Specialists

Kathryne L. Everts, Plant Pathologist, keverts@umd.edu, Lower Eastern Shore REC-Salisbury

Gerald E. Brust, IPM Vegetable Specialist, jbrust@umd.edu, Central Maryland REC-Upper Marlboro

Kurt Vollmer, Weed Management Specialist, kvollmer@umd.edu, Wye Research and Education Center

Cerruti R. R. Hooks, IPM and Insect Ecology crrhooks@umd.edu, Dept of Entomology

Robert J. Rouse (Emeritus), Horticulture

Galen Dively (Emeritus), Entomology and IPM

University of Maryland Plant Diagnostic Lab

<https://extension.umd.edu/plantdiagnosticlab>

Karen Rane, Department of Entomology, 4112 Plant Sciences Building, College Park, MD 20742
301-405-1611, rane@umd.edu

State Extension Information

NEW JERSEY

Rutgers, The State University of New Jersey

New Jersey Agricultural Experiment Station: <http://njaes.rutgers.edu/ag/>

Fact Sheets and Bulletins: <https://njaes.rutgers.edu/pubs/>

Plant & Pest Advisory: <http://plant-pest-advisory.rutgers.edu>

Rutgers Vegetable Crops Online Resources: <https://nj-vegetable-crops-online-resources.rutgers.edu/>

Mid-Atlantic Commercial Vegetable Production Recommendations:

<http://njaes.rutgers.edu/pubs/publication.asp?pid=E001>

Rutgers Pest Management Office: <https://pestmanagement.rutgers.edu/>

Rutgers NJAES Extension Specialists and IPM Program Personnel

For a complete listing see: <https://njaes.rutgers.edu/extension-specialists/service.php>

Albert Ayeni (Vegetables), A.J. Both (Controlled Environmental Engineering), George Hamilton (Pest Management), Joseph Heckman (Soil Fertility), Kris Holmstrom (Vegetable IPM Research Project Coordinator), Joseph Ingerson-Mahar (Vegetable IPM Sr. Program Coordinator), Thomas Orton (Vegetables), Jim Simon (Plant Biology), C.A. Wyenandt (Vegetable Pathology)

Rutgers Cooperative Extension County Agricultural Agents with Vegetable Responsibilities

For a complete listing of county offices and agents see: <https://njaes.rutgers.edu/county/>

Atlantic County, Richard VanVranken, 609-625-0056, vanvranken@njaes.rutgers.edu

Cape May County, Jennifer Sawyer (interim), 609-465-5115, sawyer@njaes.rutgers.edu

Cumberland County, Wesley Kline, 856-451-2800, wkline@njaes.rutgers.edu

Gloucester County, Michelle Infante-Casella, 856-224-8040, minfante@njaes.rutgers.edu

Mercer County, Meredith Melendez, 609-989-6830, melendez@njaes.rutgers.edu

Middlesex County, Bill Hlubik, 732-398-5262, hlubik@njaes.rutgers.edu

Morris County, Peter Nitzsche, 973-285-8304, nitzsche@njaes.rutgers.edu

Rutgers Vegetable Working Group Directory

For complete listing and contact information see:

<https://nj-vegetable-crops-online-resources.rutgers.edu/> and go to “members” section.

Rutgers NJAES Plant Diagnostic Lab and Nematode Detection Service

<http://njaes.rutgers.edu/plantdiagnosticlab/>; clinic@njaes.rutgers.edu

20 Indyk-Engel Way, North Brunswick, NJ 08902, phone: 732-932-9140, fax: 732-932-1270,

Rutgers Soil Testing Lab <http://njaes.rutgers.edu/soiltestinglab/>

57 US Highway 1, New Brunswick, NJ 08901, 848-932-9295, soiltest@njaes.rutgers.edu

PENNSYLVANIA

The Pennsylvania State University

Penn State Extension, including publications, fact sheets, and more: <http://extension.psu.edu>

Penn State Vegetable Production: <https://extension.psu.edu/forage-and-food-crops/vegetables> (click on the “News” button to see recent articles related to vegetable and small fruit production)

Penn State Vegetable Team Directory

For complete listing and contact information see:

<https://extension.psu.edu/forage-and-food-crops/vegetables/vegetables-experts>

Plant Disease Clinic: <http://plantpath.psu.edu/facilities/plant-disease-clinic>

220 Buckhout Laboratory, University Park, PA 16802, 814-865-2204

Insect Advice from Extension/Insect Identification Laboratory: <https://ento.psu.edu/extension>

501 Agricultural Sciences and Industries Building, University Park, PA 16802, 814-865-3256

Agricultural Analytical Services Laboratory: <https://agsci.psu.edu/aasl>

111 Ag Analytical Services Lab, University Park, PA 1682, 814-863-4540, aaslab@psu.edu

State Extension Information

VIRGINIA

Virginia Tech & Virginia State University

Virginia Cooperative Extension (VCE): <https://ext.vt.edu/>

VCE Publications and Educational Resources:

<http://pubs.ext.vt.edu/> and

<https://ext.vt.edu/agriculture.html>

Virginia Tech Pesticide Programs (VTPP): <http://vtpp.ext.vt.edu>

Virginia Extension Specialists

Thomas P. Kuhar, Professor, Entomology, 540-231-6129, tkuhar@vt.edu

David B. Langston, Jr., Professor, Plant Pathology, 757-657-6450, dblankston@vt.edu

James A. Parkhurst, Associate Professor, Wildlife, 540-231-9283, jbparkhur@vt.edu

Mark S. Reiter, Associate Professor, Nutrient Management, 757-414-0724, mreiter@vt.edu

Steve L. Rideout, Associate Professor, Plant Pathology, 757-414-0724, srideout@vt.edu

Jayesh Samtani, Area Specialist, Small Fruit, 757-363-3901, jsamtani@vt.edu

Vijay Singh, Assistant Professor and Extension Specialist, Weed Science and Precision Agriculture, 757-414-0724, vijaysingh@vt.edu

Laura K. Strawn, Assistant Professor of Food Science, 757-414-0724, lstrawn@vt.edu

James Wilson, Apiculturist, 540-231-2168, keepbees@vt.edu

Plant Disease Clinic

106 Price Hall, 170 Drillfeld Drive, Virginia Tech Blacksburg, VA 24061-0331

Phone: 540-231-6758, Fax: 540-231-7477, clinic@vt.edu

Or contact the local VCE office

Insect Identification Lab

205A Price Hall, 170 Drillfeld Drive, Virginia Tech Blacksburg, VA 24061-0319

Phone: 540-231-4899, ericday@vt.edu

Or contact the local VCE office

WEST VIRGINIA

West Virginia University Extension Service:

<https://extension.wvu.edu/agriculture/horticulture>

West Virginia University Extension Specialists

Lewis W. Jett, Ph.D., Extension Horticulture Specialist, 304-293-2634, Lewis.Jett@mail.wvu.edu

Rakesh S. Chandran, Ph.D., Extension Weed Specialist and IPM Coordinator, 304-293-2603,

RSChandran@mail.wvu.edu

Mahfuz M. Rahman, Ph.D., Extension Plant Pathology Specialist, 304-293-8838, MM.Rahman@mail.wvu.edu

Plant Diagnostic Clinic

<https://extension.wvu.edu/lawn-gardening-pests/plant-disease/plant-diagnostic-clinic>

G102 South Ag. Sciences Building, PO Box 6108, Morgantown, WV 26506-6108

Phone: 304-293-8838/288-9541, mm.rahman@mail.wvu.edu

Soil Testing Lab

<https://soiltesting.wvu.edu>

1309-B Agricultural Sciences Bldg., P.O. Box 6108, Morgantown, WV 26506-6108,

Phone: 304-293-6023, infoplantsoil@mail.wvu.edu

Table of Contents

Preface	i
Coordinators and Editors	ii
Contributors by State	iii
State Extension Information	iv
Table of Contents	vii
Listing of Tables and Figures	x
Abbreviations and Acronyms	xi

Chapter	Section	Title	Page
A General Production Recommendations	1	Varieties	1
	2	Seed Storage and Handling	2
	3	Specialty Vegetables	2
	4	Organic Production	3
	5	Transplant Production	3
	6	Conservation Tillage Crop Production (No-Till, Strip-Till)	8
	7	Mulches and Row Covers	9
	8	Staking and Trellising	11
	9	High Tunnels	12
	10	Greenhouse Production	14
	11	Wildlife Damage Prevention	14
	12	Pollination	22
	13	Food Safety Concerns	28
B Soil and Nutrient Management	1	Soils	31
	2	Liming Soils	31
	3	Plant Nutrients	35
	4	Nutrient Management	37
	5	Soil Improvement and Organic Nutrient Sources	44
C Irrigation Management	1	Basic Principles	49
	2	Drip (Trickle) Irrigation	51
	3	Fertigation	56
	4	Subsurface Drip Irrigation Systems	57
	5	Chemigation	57
D Pesticide Safety	1	General Information	59
	1.1.	Pesticide Registration	59
	1.2.	Pesticides and Food Safety	59
	2	Certification of Pesticide Applicators	60
	3	The Pesticide Label	61
	3.1	Labels and Labeling	61
	3.2	Label Statements	61
	3.2.1	Restricted Use Classification Statement	62
	3.2.2	Signal Words	62
	3.2.3	First Aid Statements	64
	3.2.4	Other Label Statements	65
	3.3	Significant Labeling Changes	66
	3.3.1	Soil Fumigants	66
3.3.2	Paraquat dichloride (Paraquat)	66	

Table of Contents - continued on next page

Table of Contents - continued

Chapter	Section	Title	Page
D Pesticide Safety <i>(continued)</i>	4	Handling Pesticides	67
	4.1	Prior to Pesticide Application	67
	4.2	Pesticide Application	68
	4.3	Pesticide Transport	69
	4.4	Pesticide Storage	69
	4.5	Disposal of Pesticides	70
	4.6	Disposal of Pesticide Containers	71
	5	Reducing Risks to Handlers and Workers	72
	5.1	EPA's Worker Protection Standard	72
	5.2	Personal Protective Equipment (PPE) for Pesticides	76
	5.3	Respiratory Protection for Pesticide Handlers	77
	6	Protect the Environment	78
	6.1	Protection of Pollinators	79
	6.2	Protection of Groundwater	81
	6.3	Pesticide Spills	82
E Pest Management	1	How to Improve Pest Management	84
	1.1	Recommendations for More Effective Pest Control	84
	1.2	Calibrating Field Sprayers	88
	1.3	Calibrating Granular Applicators	89
	1.4	Pesticide Drift and Misapplication	90
	1.5	Soil Fumigation	91
	1.6	Nematode Control	91
	2	Weed Control	95
	2.1	Postharvest Perennial Weed Control	95
	2.2	Herbicide Effectiveness on Common Weeds in Vegetables	95
	2.3	Crop Rotation Planting Restrictions	95
	2.4	Prepackaged Herbicide Mixtures	108
	2.5	Herbicide Site of Action: Reducing the Risk of Herbicide Resistance	109
	3	Insect Control	111
	3.1	Soil Pests - Detection and Control	111
	3.2	Insecticide Mode of Action: Reducing the Risk of Insecticide Resistance	113
	3.3	Insect Pest and Mite Control for Greenhouse Production	113
	3.4	Insect Pest and Mite Control for Chemigation	117
	4	Disease Control	118
	4.1	Fungicide Mode of Action: Reducing the Risk of Fungicide Resistance	118
	4.2.	Fungicides Registered for Vegetables	118
	4.3	Disease Control in Seeds, Plant Growing Mix and Plant Beds	124
	4.4	Disease Control for Greenhouse Production	125
	F Commodity Recommendations <i>(commodities listed in alphabetical order)</i>		Pesticide Use Disclaimer
		Asparagus	129
		Beans (Snap and Lima)	138
		Beets (Garden)	152
		Carrots	156
		Celery	162

Table of Contents - continued on next page

Table of Contents - continued

Chapter	Section	Title	Page
F Commodity Recommendations <i>(commodities listed in alphabetical order)</i> <i>- continued</i>		Cole Crops: Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Collards, Kale and Kohlrabi	168
		Cucumbers	184
		Eggplant	197
		Garlic	206
		Greens (Asian, Mustard, Turnip)	212
		Horseradish	218
		Leeks	223
		Lettuce, Endive and Escarole	228
		Muskmelons and Mixed Melons	236
		Okra	249
		Onions	254
		Parsley	263
		Parsnips	268
		Peas (Succulent)	271
		Peppers	277
		Potatoes	292
		Pumpkins and Winter Squash	304
		Radishes, Rutabagas and Turnips	318
		Specialty Vegetables	324
		Spinach	329
	Strawberries	335	
	Summer Squash	350	
	Sweet Corn	361	
	Sweet Potatoes	376	
	Tomatoes	381	
	Watermelons	401	
G Resources and Records	1	Resources	418
	1.1	Vegetable Seed Sizes	418
	1.2	Plant Spacing and Populations	418
	1.3	Frequently Used Weights and Measures	419
	1.4	Making a Plant-Growing Mix	419
	2	Records	421
	2.1	Pesticide Application Record	422
	2.2.	Pesticide Registration Numbers Record	423

Listing of Tables and Figures

Table	Title	Page
A-1	Temperature, and Planting Recommendations for Transplant Production	4
A-2	Planting and Harvesting Schedule for Freestanding High Tunnel Vegetable Crop Production	13
A-3	State Pollinator Protection Plans	23
B-1	Target Soil pH Values for Vegetable Crops	32
B-2	Pounds of Calcium Carbonate Equivalent (CCE) Recommended per Acre	34
B-3	Conversion of Recommended Calcium Carbonate Equivalent to Recommended Limestone	35
B-4	Soil Test Categories for Nutrients Extracted by Mehlich 3 and 1	36
B-5	Composition of Principal Macronutrient Fertilizer Materials	39
B-6	Chemical Sources of Secondary and Micronutrients	40
B-7	Boron Recommendations Based on Soil Tests for Vegetable Crops	41
B-8	Recommendations for Correction of Vegetable Crop Nutrient Deficiencies	43
B-9	Sufficiency Ranges for Fresh Petiole Sap Concentrations in Vegetable Crops	43
B-10	Plant Nutrient Value Credits to Be Allowed for Manure Applications and Crop Residues	47
B-11	Status for Organic Production, Mineral Nutrient Value, and Relative Availability of Various Materials	48
C-1	Most Critical Periods of Water Needs by Crops	49
C-2	Available Water Holding Capacity Based on Soil Texture	50
C-3	Soil Infiltration Rates Based on Soil Texture	50
C-4	Irrigation Applied per Hour per Cropped Acre (inches)	52
C-5	Maximum Number of Hours per Application for Drip Irrigated Vegetables	52
C-6	Irrigation Guidelines for Tensiometers	53
C-7	Equivalent Injection Proportions	56
D-1	EPA Signal Words According to Toxicity Categories (I, II, III, IV) of Pesticide Products	63
D-2	K_d , K_{oc} , Water Solubility and Persistence Values for Selected Pesticides	82
E-1	Ground Speed Conversion	88
E-2	Herbicide Effectiveness on Common Weeds in Vegetables	96
E-3	Crop Rotation Planting Restrictions	98
E-4	Prepackaged Herbicide Mixtures Available for Various Vegetable Crops and the Components of the Mixtures	108
E-5	Important Herbicide Groups for Commercial Vegetables	109
E-6	Insecticides and Miticides Labeled for Use on Greenhouse Vegetables	114
E-7	Insecticides with Labels for Chemigation	117
E-8	FRAC Codes and Corresponding Chemical Groups for Commonly-Used Fungicides	118
E-9	Commonly Used Fungicides Registered for Vegetables	119
E-10	Effective Seed Treatment Temperature Protocols (2 nd Bath) for Pathogen Eradication	124
E-11	Selected Fungicides and Bactericides Labeled for Greenhouse Use	125
G-1	Vegetable Seed Sizes	418
G-2	Plant Spacing and Populations	418
G-3	Frequently Used Weights and Measures	419
G-4	Simple Plant-Growing Mix	420
G-5	Preferred Plant-Growing Mix	420
Figure	Title	Page
A-1	The Environmental Protection Agency Bee Advisory Box	27
B-1	Nutrient Application Rates Vary in Relation to Soil Test Category	36
B-2	Petiole Delineation for Several Plant Species	42

Abbreviations and Acronyms

Units of Measurement

/A	per acre
bu	bushel(s)
°C	degrees Celsius
cc	cubic centimeter(s)
cu ft	cubic foot (feet)
cu yd	cubic yard(s)
cwt	hundredweight
d	day(s)
°F	degrees Fahrenheit
ft	foot (feet)
fl oz	fluid ounce(s)
g	gram(s)
gal	gallon(s)
gpm	gallons per minute
h	hour(s)
in	inch
lb	pound(s)
min	minute(s)
mph	miles per hour
oz	ounce(s)
ppm	parts per million
psi	pounds per square inch
pt	pint(s)
qt	quart(s)
sq ft	square foot (feet)
tbs	tablespoon(s)
tsp	teaspoon(s)
wk	week(s)
yr	year(s)

Product Formulations

COC	crop oil concentrate
D	dust
DF	dry flowable
DP	dry prill
DS	dry salt
E	emulsion
EC	emulsifiable concentrate
ES	emulsifiable suspension
EW	emulsion in water
F	flowable
FC	flowable concentrate
FL	fluid
FM	flowable micro-encapsulated
G	granule
L	liquid
LC	liquid concentrate
LF	liquid flowable
ME	micro-encapsulated

OF	oil formulation
OLF	other labeled formulations
<i>Product Formulations - continued</i>	
SC	spray concentrate, soluble concentrate
SG	soluble granules
SP	soluble powder
W	wettable
WBE	water-based emulsion
WDG	water-dispersible granules
WDL	water-dispersible liquid
WP	wettable powder
WSB	water-soluble bag
WSP	water-soluble packet

Diseases

AMV	alfalfa mosaic virus
EBDC	early blight disease control
FR	Fusarium wilt resistance
LR	leaf roll resistant
MT	mosaic tested
PMR	powdery mildew resistant
PMT	powdery mildew tolerant
PR	Phytophthora resistance
PT	Phytophthora tolerant
PVX	potato virus X
PVY	potato virus Y
WMV	watermelon mosaic virus
WMV2	watermelon mosaic virus race2
WRR	white rust resistance
ZYMV	zucchini yellow mosaic virus

Other

ai	active ingredient
AP	at planting
ALS	acetolactate synthase
AMS	ammonium sulfate
FRAC	Fungicide Resistance Action Committee
IRAC	Insecticide Resistance Action Committee
K	potassium
K ₂ O	available potash
N	nitrogen
OMRI	Organic Materials Research Institute
P	phosphorus
P ₂ O ₅	available phosphoric acid
PHI	Pre Harvest Interval (in days)
REI	Restricted Entry Interval (in hours)
WSSA	Weed Science Society of America

