

# Dry Bulb and Green Bunching Onion, Garlic, and Leek

ONION Varieties		
Bulbs	Early	Candy, Cavalier, Comanche, Norstar
	Main	Burgos, Copra, Lakota, Nitro, Spirit
	Late	Crusader, Daytona, Celtic, Sweet Sandwich, Spartan Banner 80, Walla Walla Sweet
Green		Beltsville Bunching

GARLIC Varieties	
Hardneck, Porcelain group	Georgian Crystal, Music
Hardneck, Rocamboles group	Capathian, Spanish Roja
Hardneck, Purple Stripe group	Metechi, Persian Star
Softneck, Artichoke group	Inchelium Red
Softneck, Silverskin group	Idaho Silverskin

LEEK Varieties	
Arkansas, Lancelot	

## Spacing

**Onion:** Raised beds with two double rows or wide rows spaced 14 inches apart on top of the bed with 12 seeds per foot within the wide (2 inches) row. Seed: 4 pounds per acre. Or transplant 4 inches apart in rows.

**Garlic:** Rows 12 to 36 inches apart with cloves 3 to 6 inches apart in the row. Plant bulbs 3 to 4 inches deep, with top of clove twice the depth of the clove height. For mechanical cultivation, plant flat side of clove perpendicular to the length of the row; for hand cultivation in dense plantings, plant angled side of clove parallel to the length of the row. Plant in fall 6 to 8 weeks before ground freezes.

**Leek:** Rows 14 to 18 inches apart with transplants 3 to 4 inches apart in the row.

## Fertilizing

### Onion, Garlic and Leek

**Lime:** Mineral soils: to maintain a soil pH of 6.0 to 6.8. Organic soils: lime if pH is less than 5.2.

## Harvesting

**Green onion:** Harvest by pulling from soil after bulb base is thicker than a pencil but before bulbing. Optional undercutting can be used to make pulling easier. Remove dirty outer layer from bulb area. Trip roots. Trim tops as needed if allowed by state regulations. Green onions are usually sold in bunches. Harvest knob onions by pulling from soil when bulb has reached desired stage of development. Follow practices for green onions.

**Dry bulb onion:** Harvest dry bulb onions after tops have naturally fallen over. If a sprout inhibitor is used on storage onions, time application according to label

instructions. Undercutting several days before harvest can improve keeping quality of storage onions. Dig from soil and dry in field or indoors at 75°F to 80°F and 70 percent to 80 percent relative humidity. Cut tops about 1 inch from bulb at harvest or after drying, or braid tops and hang onions to dry. Clean dry onions by gently brushing.

**Leek:** Harvest when stalk is 1 inch or more in diameter. Undercut plants, pull from soil, trim, and bunch.

**Garlic:** Harvest when tops have fallen over and partially dried. Lift from soil and dry protected from sun and rain. After drying, trim roots and remove tops, or leave tops on for braiding.

## Onion and Leek

**Preplant N:** for mineral soils, 70 pounds N per acre broadcast or applied to bed before planting for transplanted crops, or half broadcast preplant and half applied as a band 2 inches below the seed for direct seeded crops; for organic soils, 100 pounds N per acre broadcast and disked in. P<sub>2</sub>O<sub>5</sub>: 25 to 250 pounds per acre. K<sub>2</sub>O: 0 to 250 pounds per acre. Adjust according to soil type, previous management, and soil test results for your state. At seeding, spray directly on the seed a solution of 2-6-0 at 1 pint per 100 feet of linear row. A 2-6-0 solution is equivalent to a 1:5 dilution of 10-34-0 liquid fertilizer with water. On muck soils with a pH greater than 6.0, add 1 pound of MnSO<sub>4</sub> per 1,000 feet of row at seeding, or use foliar Mn at the rate of 0.3 pound/100 gallons. Apply 2 to 3 times during the season starting 3 weeks after emergence.

**Sidedress N:** Mineral soils: 60 pounds N per acre to either side of the row at the 4- to 5-week stage of growth or by June 1. Muck soils: No sidedress N needed unless heavy rain occurs.

## Garlic

N: 70 to 125 pounds N per acre total. Adjust according to soil organic matter content and cropping history. Broadcast and incorporate 0 to 20 pounds N per acre before planting in the fall. Apply half the remainder when

garlic begins to grow in the spring, and the rest in 1 to 2 sidedressings at 3-week intervals, ending 4 to 6 weeks before harvest. P<sub>2</sub>O<sub>5</sub>, 25 to 250 pounds per acre. K<sub>2</sub>O: 0 to 250 pounds per acre. Adjust according to soil type, previous management and soil test results for your state. Broadcast and incorporate before planting in the fall.

## Disease Control

Diseases Controlled	Treatment	Comments
Alternaria Purple Blotch and Botrytis Leaf Blight (all onion types)	3-4 year crop rotation.	Rotation out of onions or related vegetables reduces the threat of these diseases in future onion crops.
	Amistar 80WP® at the following rates: <b>Purple blotch:</b> 2-4 oz. per acre. <b>Botrytis:</b> 3-5 oz. per acre.	Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0-day PHI.
	Cabrio EG20® at the following rates: <b>Purple blotch:</b> 8-12 oz. per acre. <b>Botrytis:</b> 12 fl. oz. per acre (suppression only).	Do not apply Cabrio® more than once before alternating to a fungicide with a different mode of action. 7-day PHI.
	Endura 70WG® at 6.8 oz. per acre.	Do not make more than two applications of Endura® before alternating to a fungicide with a different mode of action. 7-day PHI.
	Maneb 75 DF® or 80 WP® at 2-3 lbs. per acre, or Manex® at 1.6-2.4 qts. per acre.	7-day PHI.
	Pristine 38WG® at the following rates: <b>Botrytis leaf blight:</b> 14.5-18.5 oz. per acre. <b>Purple blotch:</b> 10.5-18.5 oz. per acre.	Do not make more than 2 applications of Pristine® before alternating to a fungicide with a different mode of action. If application intervals are shorter than every 14 days, rotate to another fungicide with a different mode of action. 7-day PHI.
	Quadris 2.08SC® at the following rates: <b>Purple blotch:</b> 6.0-12.0 fl. oz. per acre. <b>Botrytis leaf blotch:</b> 9.0-15.5 fl. oz. per acre.	Do not make more than 1 application of Quadris® before alternating to a fungicide with a different mode of action. 0-day PHI.
	Quadris Opti® at 1.6-3.2 pts. per acre.	Do not apply Quadris Opti® more than once before alternating to a fungicide with a different mode of action. 14-day PHI for green onion. 7-day PHI for dry bulb.
	Reason® at 5.5 fl. oz. per acre. <b>Not for Botrytis leaf blight.</b>	Do not apply more than once before alternating to a fungicide with a different mode of action. 7-day PHI.
	Scala® at 18 fl. oz. per acre (9 oz. per acre in tank mixes).	Use the lower rate only in tank mix. 7-day PHI.
Switch 62.5WG® at 11-14 oz. per acre.	Use 7-10 day interval. May be effective when used in rotation with other pesticides labeled for purple blotch or botrytis leaf blight. 7-day PHI.	
Alternaria Purple Blotch and Botrytis Leaf Blight (dry bulb, garlic only)	Aliette® at 2-3 lbs. per acre. <b>Purple blotch only.</b>	If disease is present, use the 3-lb. rate. 7-day PHI.
	Several chlorothalonil formulations (e.g., Bravo®, Echo®, Equus®) are labeled for use at various rates.	Minimum re-treatment interval is 7 days. 7-day PHI.
	Folicur 3.6F® at 4-6 fl. oz. per acre.	7-day PHI.
	Several formulations of mancozeb (e.g., Dithane®, Manzate®, Manex II® Penncozeb®) or maneb (e.g., Manex®, Maneb®) are labeled at various formulations.	7-day PHI.
	Rovral 4F® at 1.0-1.5 pts. per acre.	Use low rate when tank mixed with another product registered for use on onion. 7-day PHI.

**Dry Bulb and Green Bunching Onion, Garlic, and Leek (continued)**

Disease Control (continued)

Diseases Controlled	Treatment	Comments
Downy Mildew (all types)	Acrobat 50WP® at 6.4 oz. per acre.	Do not apply Acrobat 50WP® more than twice before alternating to a fungicide with a different mode of action. Apply Acrobat 50WP® as a tank mix with another fungicide with another mode of action. 0-day PHI.
	Agri-Fos® at 1.25 qts. per acre.	7-day PHI.
	Aliette® at 2-3 lbs. per acre. <b>Dry bulb only.</b>	7-day PHI.
	Amistar 80WP® at 3-5 oz. per acre.	Do not make more than one application before alternating to a fungicide with a different mode of action. 0-day PHI.
	Cabrio EG20® at 12 oz. per acre.	Do not apply Cabrio® more than once before alternating to a fungicide with a different mode of action. 7-day PHI.
	Several formulations of chlorothalonil (e.g., Bravo®, Echo®, Equus®) are labeled for use at various rates. <b>Suppression only.</b>	14-day PHI for green onion. 7-day PHI for dry bulb.
	Several formulations of mancozeb (e.g., Dithane®, Manzate®, Manex II® Penncozeb®) are labeled for dry bulb.	7-day PHI.
	Maneb 75DF® or Maneb 80WP® at 2-3 lbs. per acre, or Manex® at 1.6-2.4 qts. per acre.	7-day PHI.
	Phostrol® at 2.5-3.75 pts. per acre.	0-day PHI
	Quadris 2.08SC® flowable at 9.0-15.5 fl. oz. per acre. Note rate differences between diseases.	Do not make more than 1 application of Quadris® before alternating to fungicides with a different mode of action. 0-day PHI.
	Quadris Opti® at 2.4-3.6 pts. per acre.	Do not apply Quadris Opti® more than once before alternating to a fungicide in group 11. 14-day PHI for green onion. 7-day PHI for dry bulb.
	Reason® at 5.5 fl. oz. per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. 7-day PHI.
	Revus 2.09SC® at 8 fl. oz. per acre.	Make no more than 2 consecutive applications before switching to another non-group 40 fungicide.
	Ridomil Gold Bravo® at 2 lbs. per acre.	7-day PHI for dry bulb. 21-day PHI for green onion.
Fusarium Basal Rot	Use Fusarium-resistant varieties such as Elba Globe, Spartan Banner, and Harvestmore.	Consult seed catalogues for varietal characteristics.
Botrytis Neck Rot (all types)	Windrow plants until neck tissues are dry before topping and storage. Cure rapidly and properly.	Artificial drying may be necessary (forced heated air at 93-95°F for 5 days).
	Several chlorothalonil formulations (e.g., Bravo®, Echo®, Equus®) are labeled for use at various rates. <b>Suppression only.</b>	7-day PHI.
	Maneb 75 DF® or Maneb 80WP® at 2-3 lbs. per acre, or Manex® at 1.6-2.4 qts. per acre.	7-day PHI.

## Weed Control

Weeds Controlled <sup>1</sup>	Treatment <sup>2</sup>	Comments
Annuals (emerged) — treatment applied before planting or crop emergence	Gramoxone Inteon 2L <sup>®</sup> at 2.5-4 pts. per acre, or Gramoxone Max 3L <sup>®</sup> at 1.3-2.7 pts. per acre. <b>Garlic and direct-seeded onions only.</b> <b>Not for leeks or transplanted onions.</b>	Use 1 qt. of COC or 4-8 fl. oz. of nonionic surfactant per 25 gallons of spray solution. Apply before planting or after planting but before crop emergence. Do not exceed 4 pts. of Gramoxone Inteon 2L <sup>®</sup> or 2 pts. of Gramoxone Max 3L <sup>®</sup> per acre. <b>RUP.</b>
Annuals (emerged) and Perennials — crop not present or protected from spray	Glyphosate products at 0.75-3.75 lbs. acid equivalent (ae) per acre. Use formulations containing 3 lbs. ae/gal. (4 lbs. isopropylamine salt/gal.) at 1-5 qts. per acre, or formulations containing 4.5 lbs. ae/gal. (5 lbs. potassium salt/gal) at 0.66-3.3 qts. per acre.	Broadcast before planting, after planting but before crop emergence, or apply between crop rows with hooded or shielded sprayers. Use low rate for annuals and higher rates for perennials. See label for suggested application volume and adjuvants. 14-day PHI.
Broadleaves and Grasses (not emerged)	Nortron SC <sup>®</sup> at the following rates: <b>Preemergence:</b> 16-32 fl. oz. per acre. <b>Postemergence:</b> 16 fl. oz. per acre. <b>Garlic and dry bulb onions only.</b> <b>Not for leeks or green onions.</b>	Apply preemergence or soon after seeding before weeds germinate. Apply postemergence up to 4 times, ending 30 days before harvest. May cause temporary leaf fusion. May injure stressed plants. Use on mineral soils only. Do not exceed 48 fl. oz. per acre per season on coarse soils and 96 fl. oz. per acre per season on medium and fine soils.
	Outlook <sup>®</sup> at 12-21 fl. oz. per acre.	Apply after crop plants have 2 true leaves. For transplants, apply after transplanting when soil has settled around plants. May be tank-mixed with other herbicides, see label. 30-day PHI.
	Pendimethalin products. Use 3.3EC formulations at 1.2-3.6 pts. per acre, or Prowl H <sub>2</sub> O <sup>®</sup> at 1.5-3 pts. per acre. <b>Garlic and dry bulb onions only.</b> <b>Not for leeks or green onions.</b>	<b>Garlic:</b> apply after planting before crop and weeds emerge, and/or apply when garlic has 1-5 true leaves. <b>Dry bulb onions:</b> apply when onions have 2-9 true leaves. <b>Onions on muck soils only:</b> apply up to 4.8 pts. 3.3EC formulations, or 4 pts. Prowl H <sub>2</sub> O <sup>®</sup> after seeding and before crop emerges, after onions have 2 leaves, and if needed at 6-9 leaves. Do not exceed 14.4 pts. per acre of 3.3EC formulations or 12.5 pts. per acre of Prowl H <sub>2</sub> O <sup>®</sup> on muck soils. Use low rates on coarse soils. 45-day PHI.
	Trifluralin products at 0.375-0.625 lb. a.i. per acre. Use 4EC formulations at 0.75-1.25 pts. per acre. <b>Dry bulb onions only.</b> <b>Not for use on garlic, leeks, or green onions.</b>	Use the lowest rate on coarse soils. Apply at layby as directed spray between onion rows and incorporate. Mineral soils only. 60-day PHI.
Broadleaves (not emerged)	Chateau WDG <sup>®</sup> at the following rates: <b>Dry bulb onions:</b> 2 oz. per acre. <b>Garlic:</b> 6 oz. per acre.	<b>Dry bulb onions:</b> Apply to transplanted onions between the 2- and 6- leaf stage or to direct-seeded onions between the 3- and 6-leaf stage. Will not control emerged weeds. Wait at least 14 days between applications. Do not exceed 2 oz. per acre per application, or 3 oz. per acre per growing season. 45-day PHI for dry bulb onions. <b>Garlic:</b> Apply within 3 days after planting and before garlic emerges. Do not exceed 6 oz. per acre per growing season.
Grasses (not emerged)	Dacthal W-75 <sup>®</sup> at 6-14 lbs. per acre, or Dacthal Flowable <sup>®</sup> at 6-14 pts. per acre. <b>Garlic and onions only.</b>	Apply at seeding, transplanting, and/or layby. Preplant incorporation not recommended. May be sprayed over transplants.

**Dry Bulb and Green Bunching Onion, Garlic, and Leek (continued)**

Weed Control (continued)

Weeds Controlled <sup>1</sup>	Treatment <sup>2</sup>	Comments
Grasses (not emerged) <b>(continued)</b>	Prefar 4E® at 5-6 qts. per acre. <b>Garlic and dry bulb onions only.</b> <b>Not for leeks or green onions.</b>	Use low rate on soils with less than 1% organic matter. Apply and incorporate before planting. Or apply after seeding, before crop emerges and irrigate within 24 hours. Mineral soils only.
Broadleaves (emerged)	Aim EC® at 0.5-2 fl. oz. per acre.	Apply with hooded sprayers as a directed application between crop rows. Use COC or nonionic surfactant. Weeds must be actively growing and less than 4 inches tall. Do not allow spray to contact crop. Do not exceed 6.1 fl. oz. per acre per season.
	Buctril® products at the following rates: <b>Garlic:</b> Buctril 2EC® at 1.5-2 pts. per acre, or Buctril 4EC® at 0.75-1 pt. per acre <b>Onions:</b> Buctril 2EC® at 1-1.5 pts. per acre, or Buctril 4EC® 0.5-0.75 pt. per acre for onions. <b>Not for leeks.</b>	Apply after garlic emerges and before it is 12 in. tall. Apply when onions have 2-5 true leaves, using 50-70 gallons of water per acre, or on muck soils east of the Mississippi River only, apply 3-4 days before onions emerge. To minimize onion injury apply after 2 days of sunny weather when onion leaves are dry and temperatures are 70-80°F. 112-day PHI for garlic.
	Goal 2XL® at the following rates: <b>Seeded crops:</b> 0.5 pt. per acre. <b>Transplanted crops:</b> 1-2 pts. per acre. <b>Garlic and dry bulb onions only.</b> <b>Not for use on leeks, green garlic, or green onions.</b>	Use lower rate on coarse soils. Apply after direct-seeded crop has 2 true leaves, or prior to transplanting onions, or within 2 days after transplanting. Do not exceed 2 pts. per acre. 45-day PHI for onions. 60-day PHI for garlic.
Broadleaves and Grasses (emerged)	Nortron SC® at 16 fl. oz. per acre postemergence. <b>Garlic and dry bulb onions only.</b> <b>Not for leeks or green onions.</b>	Apply postmergence up to 4 times, ending 30 days before harvest. May cause temporary leaf fusion. May injure stressed plants. Use on mineral soils only. Do not exceed 48 fl. oz. per acre per season on coarse soils and 96 fl. oz. per acre per season on medium and fine soils.
Grasses (emerged)	Fusilade DX 2E® at 10-12 fl. oz. <b>Garlic and dry bulb onions only.</b> <b>Not for leeks or green onions.</b>	Use 1-2 pts. of COC or 0.5-1 pt. of nonionic surfactant per 25 gallons of spray solution. Apply to small actively growing grass. Do not exceed 48 fl. oz. per acre. 45-day PHI.
	Poast 1.5E® at 1-1.5 pts. per acre.	Use 1 qt. of COC per acre. Spray on actively growing grass. Use high rate on quackgrass. Do not exceed 4.5 pts. per acre per season. 30-day PHI.
	Select® products at the following rates: <b>Garlic:</b> Select Max® at 12-16 fl. oz per acre, or Select 2EC® at 6-8 fl. oz. per acre. <b>Dry bulb onions:</b> Select Max® at 12-32 fl. oz. per acre, or Select 2EC® at 6-16 fl. oz. per acre. <b>Not for use on leeks or green onions.</b>	Use 1 qt. of COC per 25 gallons of spray solution (1% v/v). Spray on actively growing grass. Wait at least 14 days between applications. Do not exceed 2 applications per season for garlic or shallots. 45-day PHI.

<sup>1</sup>For specific weeds controlled by each herbicide, check Table 19 on page 37.

<sup>2</sup>Rates given are for overall coverage. For band treatment, reduce amounts according to the portion of acre treated.

**Insect Control**

Insects Controlled	Treatment	Comments
Onion Maggots (dry bulb)	Lorsban 4E® at 1.1 fl. oz. per 1,000 linear ft. of row, or Lorsban 75WG® at 0.73 oz. per 1,000 linear ft. of row as an in-furrow drench. <b>For furrow treatment at planting.</b>	Use a minimum of 40 gals. of total drench per acre. One application per year.
Onion maggots (dry bulb and green bunching)	Ambush 25W® at 6.4-19.2 fl. oz. per acre. <b>Adult control.</b>	Do not exceed 2.0 lbs. a.i. per acre per season. 1-day PHI. <b>RUP.</b>
	Diazinon AG500® at 2-4 qts. per acre, or Diazinon 50W® at 4-8 lbs. per acre.	Broadcast just before planting and mix into the top 3-4 inches of soil. Apply in sufficient water to drench seed furrow planting. Do not exceed 3 foliar applications per season. 14-day PHI. <b>RUP.</b>

<b>Insects Controlled</b>	<b>Treatment</b>	<b>Comments</b>
Onion maggots (dry bulb and green bunching) <b>(continued)</b>	Mustang MAX® at 2.24-4.0 fl. oz. per acre. <b>Adult control.</b>	Do not exceed 0.125 lb. a.i. per acre per season. Add COC at 16 fl. oz. per acre. 7-day PHI. <b>RUP.</b>
	Pounce 25WP® at 6.4-19.2 fl. oz. per acre. <b>Adult control.</b>	Do not exceed 2.0 lbs. a.i. per acre per season. 1-day PHI. <b>RUP.</b>
	Warrior® at 1.92-3.2 fl. oz. per acre. <b>Adult control.</b>	Do not exceed 1.92 pts. per acre per season. 14-day PHI. <b>RUP.</b>
Onion Thrips (dry bulb, green bunching, garlic, and leeks)	Field site selection.	Onion thrips build to high levels in small grains and move to onions when small grains dry down or are harvested. Avoid planting next to small grains.
	Plant resistant/tolerant varieties.	Tolerant varieties include White Keeper, El Charro, Snow White, Vega, X201, and Zapotec.
	Assail 70WP® at 2.1-3.4 oz. per acre.	Do not exceed 4 applications per season. 7-day PHI.
	Mustang MAX® at 2.88-4.0 fl. oz. per acre.	Do not exceed 0.125 lb. a.i. per acre per season. Add COC at 16 fl. oz. per acre. 7-day PHI. <b>RUP.</b>
	PennCap-M® at 2 pts. per acre.	Do not exceed 8 pts. per acre per season. 15-day PHI. <b>RUP.</b>
Onion Thrips (dry bulb and garlic)	Ambush 25W® at 9.6-19.2 oz. per acre.	Use when thrips first appear. Not for rescue treatments. Do not exceed 2.0 lbs. a.i. per acre per season. 1-day PHI. <b>RUP.</b>
	Pounce 25WP® at 9.6-19.2 oz. per acre.	
	Warrior® at 2.56-3.84 fl. oz. per acre.	Do not exceed 1.92 pts. per acre per season. 14-day PHI. <b>RUP.</b>
Onion Thrips (dry bulb and green bunching)	Diazinon AG500® at 1 pt. per acre, or Diazinon 50W® at 1 lb. per acre.	Use 100-200 gals. of water per acre for improved control. Do not exceed 3 foliar applications per season. 14-day PHI. <b>RUP.</b>
	Lannate SP® at 1 lb. per acre.	<b>Green onion:</b> Do not exceed 5.4 lbs. a.i. per acre. <b>Dry bulb:</b> Do not exceed 3.6 lbs. a.i. per acre. 7-day PHI. <b>RUP.</b>



*These onions are members of the green onion group. Pesticide label directions differ significantly for applications to green or dry onions. Always read product labels.*