Onions and Related Crops - Horticulture

Major update by Ben Phillips, Liz Maynard – Oct 2020
Reviewed by Ben Phillips – Mar 2022

Crop Description

Garlic (*Allium sativum*): There are two main types of garlic: softneck and hardneck. Hardneck types overwinter better in the Midwest, have a stronger flavor, and are easier to peel. Softneck types have a longer shelf-life, milder flavor, and smaller cloves. Elephant or great headed garlic (*A. ampeloprasum*) is grown like other garlic, but has a milder flavor.

Leek (*A. porrum*): Leeks do not bulb, but form a straight shank of layered leaves that stay white when buried with soil. They can be planted deeply and hilled to increase the length of the shank. There are nonhardy summer-harvested varieties and frost-tolerant fall-harvest varieties.

Onion (*A. cepa* var. *cepa*): Bulb onions include yellow, red, and white-skinned types, and within each of the colors, there are sweet varieties and pungent storage varieties. Bulb onions are categorized as long-day, intermediate-day, or short-day based on the day-length that stimulates bulbing. Long-day varieties grow best in the Midwest. Some intermediate-day onions can also do well in the Midwest. Sweet onions contain more sugar, and do not keep as well as pungent storage onions. Any onion variety can also be used as a green onion, but *A. fistulosum* is a species that is commonly used for bunching that does not make a large bulb.

Shallot (*A. cepa* var. *aggregatum* or *A. ascalonicum*): Shallots form clusters of bulbs and are very winter hardy, like garlic. The torpedo-shaped bulbs are smaller than onions and have a milder flavor.

Planting and Spacing

Garlic: Plant in fall 6 to 8 weeks before ground freezes in 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. Garlic benefits from 2 to 4 inches of straw mulch applied over winter, which can be left on the rows until harvest. 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. Remove flower stalks for maximum yield.

Leek: Seed or transplant outdoors about a month before the frost-free date in rows 14 to 18 inches apart with plants 3 to 4 inches apart in the row. Transplants can be started 10 to 15 weeks before planting. Place transplants 4 to 8 inches deep and backfill soil, or hill throughout the season to maintain a long white shank.

Onion: Seed or transplant outdoors about a month before the frost-free date, or as early as soil can be worked on raised beds with two double rows or wide rows spaced 14 inches apart on top of the bed with 12 seeds per foot, or 3 to 4 transplants per foot. A popular transplanting method on farms that are hand-weeded is to plant onions in groups of four that grow up and out as a clover shape. Transplants may also be planted into plastic-mulch covered beds. When seeding, use 4 pounds per acre of onion seed and consider broadcasting 1 bushel of oats or barley per acre overtop as a nurse crop that can protect young onions from sandblasting and hard frosts. Kill the barley or oats when they are 5 to 6 inches tall with a graminicide. Young onions can withstand several overnight lows in the 23 F to 32 F range, but survivability is less if it is also windy.

Shallots: Seed in the spring like onions with similar row spacing, or transplant bulbs in the fall like garlic with similar row spacings. However, if fall planted, remove mulch in the spring before emergence. Shallot leaves are hollow and are easy to bend and crimp by the movement of straw mulch once they emerge. Transplanting young plants from a greenhouse in the early spring will yield bulbs along the same timeline as garlic.

Fertilizing

pH: Maintain a soil pH of 6.0 to 6.8 on mineral soils, and above 5.2 on muck soils.

Garlic, Shallot–fall-planted: Before planting, apply 25 pounds N per acre, up to 150 pounds P_2O_5 per acre, and up to 100 pounds K_2O per acre based on soil test results and recommendations from your state.

Sidedress in 20- to 40-pound increments of N per acre in 3-week intervals, ending 4 to 6 weeks before harvest. The total amount of N from fertilizer (including starter) and other credits should be 70 to 125 pounds N per acre.

Onion, Leek, Shallot–spring-planted: Before planting, apply 70 pounds N per acre, 0 to 250 pounds P_2O_5 per acre, and 0 to 250 pounds K_2O per acre based on soil test results

and recommendations from your state. Or, broadcast half the N and most of the K_2O before planting, and at planting time band the remaining N, all of the P_2O_5, and up to 20 pounds of K_2O at least 2 inches below and 2 inches to the side of the row. If indicated by soil test, include manganese, copper and zinc in band, or broadcast.

If planting on organic (muck) soils with a pH over 6.0, include 1 pound manganese sulfate per 1,000 feet of row in the starter band (2 pounds actual manganese per acre), and/or apply 1 to 2 pounds manganese sulfate per acre as a foliar spray 2 to 3 times starting 3 weeks after emergence.

Sidedress bulb onions with 90 to 100 pounds N per acre in mid-June or split that amount between early and late June. Sidedress green onions and leeks with 40 to 50 pounds of N per acre when the plants have four true leaves. Reduce the amount of fertilizer N applied by the value of N credits from green manures, legume crops grown in the previous year, compost and animal manures, and soils with more than 3% organic matter. The total amount of N from fertilizer (including starter) and other credits should be 190, 150, or 130 pounds N per acre for bulb onions, leeks, or green onions, respectively, on mineral soils, and 50 pounds less on muck soils.

Harvesting

Garlic and Shallot: 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 softneck garlic tops on for braiding.

Onion, bulb: Harvest pungent storage-type bulb onions after tops have naturally fallen over, and tops are dried. To prevent sprouting of bulb onions in storage, use maleic hydrazide (Royal MH-30) according to label directions, when bulbs are fully mature and 50% of tops have fallen over but all tops are still green. Rolling leaves and undercutting several days before harvest can hasten dormancy and improve keeping quality of storage onions. Dig from soil and dry in field or indoors at 75 F to 80 F and 70% to 80% 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. Time from seeding to harvest ranges from 100 to 125 days for pungent storage types.

Harvest sweet onions at the desired size any time. However, they become more pungent as they go into dormancy, and do not store as well as true storage-types. Time from transplanting to harvest of sweet onions ranges from 60 to 80 days for cipollini or pearl-sized onions, or 90 to 115 days for larger sizes.

Onion, green: 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. Trim roots. Trim tops as needed if allowed by state regulations. Green onions are usually sold in bunches. Harvest small “knob” onions by pulling from soil when bulb has reached desired stage of development, following the same practices as for green onions. Time from seeding to harvest ranges from 60 to 70 days.

Leek: Harvest when stalk is 1 inch or more in diameter. Undercut plants, pull from soil, trim, and bunch. The wide range of maturity times is variety-dependent. Some can withstand heavy freezes and mature late into the fall, while others are not as frost-hardy and mature earlier for summer harvests. Time from seeding to harvest ranges from 70 to 120 days.

Onions and Related Crops - Diseases

Reviewed by Dan Egel, Mary Hausbeck – Aug 2023

Basal Rot of Alliums - Fusarium Fungus

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Avoid fields with a history of the disease and excess water. Rotate to non-host crops for 4 years. Resistant varieties are available. Managing soil insect pests, like Onion Maggot, may reduce disease incidence.

Black Mold of Onions - Aspergillus Fungus

Development is favored by high temperatures. Most losses occur in storage. Pathogen may be seed-borne, however, the pathogen is widespread in many soils.

Non-Pesticide

Garlic, Onion (Dry), Shallot | Store and transport bulbs at temperatures below 59 F and at low humidity to slow growth of the fungus. Avoid injury to bulbs during harvest, handling, and transport. Harvest onions promptly at maturity. Wide temperature fluctuations can cause condensation on the bulbs which promotes the development of black mold.

Bulb Rot of Alliums - Pseudomonas Bacteria

Pesticide

ManKocide (copper hydroxide, mancozeb) *Garlic, Onion (Dry), Shallot* | 2.5 lbs. per acre for Botrytis leaf blight, Downy mildew and Purple blotch. 1.5-2.25 lbs. per acre for bacterial diseases. REI: 48-hour. PHI: 7-day. FRAC M01, FRAC M03.

Damping-Off Seed and Seedling Rots of Multiple Crops - Multiple Pathogens

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Use disease-free seeds and sets. Practice good greenhouse sanitation of equipment, tools propagation trays/pots, and surfaces. Avoid excess moisture to the transplants in the greenhouse by monitoring irrigation frequency. Plant in warm field soils. The fungi responsible for damping-off in field soils cause more loss when the seedling is slow to emerge.

Pesticide

azoxystrobin products (azoxystrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Dynasty, Heritage, Quadris). Use 3.3 lb. a.i. per gallon formulations at 0.24-0.48 fl. oz. per 1,000 row feet. Use 2 lb. a.i. per gallon formulations at 0.4-0.8 fl. oz. per 1,000 row feet. Use 1.65 lb. a.i. per gallon formulations at 0.5-1.0 fl. oz. per 1000 row feet. Use 0.83 lb. a.i. per gallon formulations (Dynasty) for seed treatment at 0.10-0.38 fl. oz. per 100 lbs. of seed. Use 0.5 lb. a.i. per gallon formulations (Heritage) on greenhouse transplants only at 0.11-0.18 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

mefenoxam/metalaxyl products (mefenoxam) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations (Apron, MetaStar, Ridomil Gold, Ultra Flourish, Subdue Maxx, and Xyler) are labeled. Always check the label. Several formulations are labeled as pre-plant incorporated or surface broadcast and banded applications at various rates between 0.5 pt. and 4 pt. per acre. A 33.3% seed treatment formulation can be used at 0.32-0.64 fl. oz. per 100 lb. of seed. A 22% formulation can be used at 10.9-21.7ml. per 1000 sq. ft. *for transplants grown for retail sale to consumers*. REI: 48-hour. PHI: 0-day. FRAC 04.

Uniform (mefenoxam, azoxystrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 0.34 fl. oz. per 1,000 ft. Make one application per crop season. REI: 0-hour. PHI: 0-day. FRAC 04, FRAC 11.

Downy Mildew of Multiple Crops - Peronospora Oomycete

Cool, wet conditions favor the development of this disease. Can be seedborne or setborne.

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Use disease-free seed and sets. Plant in areas with adequate drainage and air movement to reduce leaf wetness and humidity. Rotate to non-host crop for 3 years. Some resistant varieties of onion are available. Avoid late-season fertilizer applications or overhead irrigation. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. Destroy onion cull piles and debris.

Pesticide

Catamaran (potassium phosphite, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 4-7 pts. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallot and garlic; 14-day for green bunching onion and leek. FRAC 33, FRAC M05.

Cymbol Advance (chlorothalonil, cymoxanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 1.6-2.4 pts. per acre. Use lower rates for dry bulb onions and garlic. Other formulations are available such as Ariston. REI: 12-hour. PHI: 7-day for dry bulb onions, and garlic; 14-day for green bunching onions, shallots, leeks. FRAC M05, FRAC 27.

Dexter Max (mancozeb, azoxystrobin) *Garlic, Onion (Dry), Shallot* | 3.2 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03, FRAC 11.

Dexter Xcel (mancozeb, azoxystrobin, tebuconazole) *Onion (Dry)* | 56-72 fl. oz. per acre. REI: See label. PHI: 7-day. FRAC M03, FRAC 11, FRAC 03.

Forum (dimethomorph) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 6 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 40.

Gavel 75DF (zoxamide, mancozeb) *Garlic, Onion (Dry), Shallot* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 7-day. FRAC 22, FRAC M03.

mancozeb products (mancozeb) *Garlic, Onion (Dry), Shallot* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Always check the label. Use 37% formulations at 1.6-2.4 qt. per acre. Use 75% and 80% formulations at 2-3 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03.

Omega 500F (fluazinam) *Garlic, Onion (Dry), Shallot* | 16 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 29.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Garlic, Onion (Dry)* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 7-day. FRAC 49, FRAC M05.

Orondis Ultra (oxathiapiprolin, mandipropamid) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 5.8-8.0 pts. per acre. REI: 4-hour. PHI: 7-day. FRAC 49, FRAC 40.

Reason 500SC (fenamidone) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 5.5 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 11.

Revus (mandipropamid) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8 fl. oz. per acre. REI: 4-hour. PHI: 7-day. FRAC 40.

Ridomil Gold Bravo SC (mefenoxam, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2.5 pts. per acre. REI: 48-hour. PHI: 7-day for dry bulb onions, shallots, and garlic; 14-day for green bunching onions and leek. FRAC 04, FRAC M05.

Ridomil Gold Copper (mefenoxam, copper hydroxide) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2 lbs. per acre. REI: 48-hour. PHI: 7-day for green bunching onions, shallots, and leeks; 10-day for dry bulb onions and garlic. FRAC 04, FRAC M01.

Ridomil Gold MZ WG (mefenoxam, mancozeb) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2.5 lbs. per acre. REI: 48-hour. PHI: 7-day. FRAC 04, FRAC M03.

Viathon (potassium phosphite, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2-3 pts. per acre. REI: 12-hour. PHI: 7-day. FRAC 33, FRAC 03.

Zampro (ametoctradin, dimethomorph) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 14 fl. oz. per acre. REI: 12-hour. PHI: 0-day. FRAC 45, FRAC 40.

Gray Mold of Multiple Crops - Botrytis Fungus

Pesticide

ManKocide (copper hydroxide, mancozeb) *Garlic, Onion (Dry), Shallot* | 2.5 lbs. per acre for Botrytis leaf blight, Downy mildew and Purple blotch. 1.5-2.25 lbs. per acre for bacterial diseases. REI: 48-hour. PHI: 7-day. FRAC M01, FRAC M03.

Leaf Blight and Center Rot of Alliums - Pantoea Bacteria

Applying fixed copper products may reduce the spread of these bacterial diseases. For emerged annuals, apply before planting or crop emergence.

Pesticide

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use and may slow the spread of bacterial blights. See label for directions. REI: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

ManKocide (copper hydroxide, mancozeb) *Garlic, Onion (Dry), Shallot* | 2.5 lbs. per acre for Botrytis leaf blight, Downy mildew and Purple blotch. 1.5-2.25 lbs. per acre for bacterial diseases. REI: 48-hour. PHI: 7-day. FRAC M01, FRAC M03.

Leaf Blight and Stalk Rot of Onions - Stemphylium Fungus

Stemphylium causes leaf blight and stalk rot but rarely affects the bulb. Long warm periods with leaf wetness favor disease development. Many growers have local populations of the pathogen that are resistant to strobilurin fungicides (FRAC 11).

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) *Onion (Dry), Onion (Green)* | 10.5 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 03, FRAC 07.

Cabrio EG (pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8-12 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 11.

Fontelis (penthiopyrad) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-24 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 07.

Inspire Super (difenoconazole, cyprodinil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-20 fl. oz. per acre. REI: 12-hour. PHI: 7-day for dry bulb onions, shallots, and garlic; 14-day for green bunching onion and leek. FRAC 03, FRAC 09.

Luna Experience (fluopyram, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 12.8 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 03.

Luna Tranquility (fluopyram, pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-27 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 09.

Merivon (fluxapyroxad, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 5.5-11 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

Pristine 38WG (boscalid, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 10.5-18.5 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

Switch 62.5WG (cyprodinil, fludioxonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 11-14 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09, FRAC 12.

Leaf Blight of Alliums - Botrytis Fungus

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Use disease-free seeds and sets. Rotate to non-host crops for 3-4 years. Monitor thrips populations. Prompt destruction of the finished crop and cull piles with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

azoxystrobin products (azoxystrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Heritage, Quadris). Use 3.3 lb. a.i. per gallon formulations at 5.8-9.7 fl. oz. per acre. Use 2 lb. a.i. per gallon formulations at 9.0-15.5 fl. oz. per acre. Use 1.65 lb. a.i. per gallon formulations at 11.3-19.5 fl. oz. per acre. Use 0.5 lb. a.i. per gallon formulations (Heritage) on greenhouse transplants only at 0.11-0.18 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

Cabrio EG (pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 12 oz. per acre. Suppression only. REI: 12-hour. PHI: 7-day. FRAC 11.

chlorothalonil products (chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 1.5-4.25 pt. per acre. Use 54% (720) formulations at 1-3 pt. per acre. Use 82.5% (WDG) formulations at 0.9-2.7 lb. per acre. Use 90% (DF) formulations at 1.25-2.5 lb. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallot, and garlic; 14-day for green bunching onion and leek. FRAC M05.

Custodia (azoxystrobin, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 12.9 fl. oz. per acre. Suppression only. REI: 12-hour. PHI: 7-day. FRAC 11, FRAC 03.

Dexter Max (mancozeb, azoxystrobin) *Garlic, Onion (Dry), Shallot* | 3.2 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03, FRAC 11.

Dexter Xcel (mancozeb, azoxystrobin, tebuconazole) *Onion (Dry)* | 56-72 fl. oz. per acre. REI: See label. PHI: 7-day. FRAC M03, FRAC 11, FRAC 03.

Endura (boscalid) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 6.8 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07.

Fontelis (penthiopyrad) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-24 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 07.

Gavel 75DF (zoxamide, mancozeb) *Garlic, Onion (Dry), Shallot* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 7-day. FRAC 22, FRAC M03.

Inspire Super (difenoconazole, cyprodinil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-20 fl. oz. per acre. REI: 12-hour. PHI: 7-day for dry bulb onions, shallots, and garlic; 14-day for green bunching onion and leek. FRAC 03, FRAC 09.

iprodione products (iprodione) *Onion (Dry)* | 1.5 pts. per are. Formulations of iprodione include Nevado and Rovral. See label for tank mix rates. REI: 24-hour. PHI: 14-day. FRAC 02.

Luna Experience (fluopyram, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8-12.8 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 03.

Luna Tranquility (fluopyram, pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-27 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 09.

mancozeb products (mancozeb) *Garlic, Onion (Dry), Shallot* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Always check the label. Use 37% formulations at 1.6-2.4 qt. per acre. Use 75% and 80% formulations at 2-3 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03.

Merivon (fluxapyroxad, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8-11 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

Omega 500F (fluazinam) *Garlic, Onion (Dry), Shallot* | 16 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 29.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Garlic, Onion (Dry)* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 7-day. FRAC 49, FRAC M05.

Pristine 38WG (boscalid, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 14.5-18.5 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

propiconazole products (propiconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2-8 fl. oz. per acre. PropiMax EC and Tilt are labeled. Use 2-4 fl. oz. per acre rate when tank mixing with another effective fungicide. REI: 12-hour. PHI: 14-day for dry bulb onions, shallots, and garlic; 0-day for green bunching onion and leek. FRAC 03.

Quadris Opti (azoxystrobin, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 1.6-3.2 pts. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallots, and garlic; 14-day for green bunching onions and leeks. FRAC 11, FRAC M05.

Quilt (azoxystrobin, propiconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 14-27.5 fl. oz. per acre. REI: 12-hour. PHI: 14-day for dry bulb onions, shallots, and garlic; 0-day for green bunching onions and leeks FRAC 11, FRAC 03.

Ridomil Gold Bravo SC (mefenoxam, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2.5 pts. per acre. REI: 48-hour. PHI: 7-day for dry bulb onions, shallots, and garlic; 14-day for green bunching onions and leek. FRAC 04, FRAC M05.

Scala (pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 18 fl. oz. per acre. Use 9-18 fl. oz. per acre rate when tank mixing with another effective fungicide. REI: 12-hour. PHI: 7-day. FRAC 09.

Switch 62.5WG (cyprodinil, fludioxonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 11-14 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09, FRAC 12.

Vangard WG (cyprodinil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 10 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09.

Zing! (zoxamide, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 30 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 22, FRAC M05.

Leaf Blight of Alliums - Xanthomonas Bacteria

Applying fixed copper products may reduce the spread of these bacterial diseases. For emerged annuals, apply before planting or crop emergence.

Pesticide

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use and may slow the spread of bacterial blights. See label for directions. REI: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

ManKocide (copper hydroxide, mancozeb) *Garlic, Onion (Dry), Shallot* | 2.5 lbs. per acre for Botrytis leaf blight, Downy mildew and Purple blotch. 1.5-2.25 lbs. per acre for bacterial diseases. REI: 48-hour. PHI: 7-day. FRAC M01, FRAC M03.

Leaf Streak of Alliums - Pseudomonas Bacteria

Applying fixed copper products may reduce the spread of these bacterial diseases. For emerged annuals, apply before planting or crop emergence.

Pesticide

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use and may

slow the spread of bacterial blights. See label for directions. REI: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

ManKocide (copper hydroxide, mancozeb) *Garlic, Onion (Dry), Shallot* | 2.5 lbs. per acre for Botrytis leaf blight, Downy mildew and Purple blotch. 1.5-2.25 lbs. per acre for bacterial diseases. REI: 48-hour. PHI: 7-day. FRAC M01, FRAC M03.

Neck Rot of Alliums - Botrytis Fungus

Treatments for Botrytis leaf blight may retard or prevent symptomless spread of Botrytis neck rot in the field prior to harvest.

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Rotate to non-host crop for 3 years. Avoid late-season fertilizer applications or overhead irrigation. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up. For dry-bulb crops: 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 to 95 F for 5 days).

Pesticide

chlorothalonil products (chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 1.5-4.25 pt. per acre. Use 54% (720) formulations at 1-3 pt. per acre. Use 82.5% (WDG) formulations at 0.9-2.7 lb. per acre. Use 90% (DF) formulations at 1.25-2.5 lb. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallot, and garlic; 14-day for green bunching onion and leek. FRAC M05.

Dexter Max (mancozeb, azoxystrobin) *Garlic, Onion (Dry), Shallot* | 3.2 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03, FRAC 11.

Dexter Xcel (mancozeb, azoxystrobin, tebuconazole) *Onion (Dry)* | 48-72 fl. oz. per acre. REI: See label. PHI: 7-day. FRAC M03, FRAC 11, FRAC 03.

Fontelis (penthiopyrad) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-24 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 07.

Gavel 75DF (zoxamide, mancozeb) *Garlic, Onion (Dry), Shallot* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 7-day. FRAC 22, FRAC M03.

iprodione products (iprodione) *Onion (Dry)* | 1.5 pts. per are. Formulations of iprodione include Nevado and Rovral. See label for tank mix rates. REI: 24-hour. PHI: 14-day. FRAC 02.

Luna Experience (fluopyram, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8-12.8 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 03.

Luna Tranquility (fluopyram, pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-27 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 09.

mancozeb products (mancozeb) *Garlic, Onion (Dry), Shallot* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Always check the label. Use 37% formulations at 1.6-2.4 qt. per acre. Use 75% and 80% formulations at 2-3 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03.

Merivon (fluxapyroxad, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8-11 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

Omega 500F (fluazinam) *Garlic, Onion (Dry), Shallot* | 16 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 29.

Pristine 38WG (boscalid, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 14.5-18.5 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

Quadris Opti (azoxystrobin, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 1.6-3.2 pts. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallots, and garlic; 14-day for green bunching onions and leeks. FRAC 11, FRAC M05.

Scala (pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 18 fl. oz. per acre. Use 9-18 fl. oz. per acre rate when tank mixing with another effective fungicide. REI: 12-hour. PHI: 7-day. FRAC 09.

Switch 62.5WG (cyprodinil, fludioxonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 11-14 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09, FRAC 12.

Vangard WG (cyprodinil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 10 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09.

Zing! (zoxamide, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 30 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 22, FRAC M05.

Purple Blotch of Alliums - Alternaria Fungus

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Use disease-free seeds and sets. Rotate to non-host crops for 3-4 years. Monitor thrips populations. Prompt destruction of the finished crop and cull piles with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Pesticide

Aprovia Top (difenoconazole, benzovindiflupyr) *Onion (Dry), Onion (Green)* | 10.5 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 03, FRAC 07.

azoxystrobin products (azoxystrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations are labeled at various rates (Acadia LFC, AZteroid FC 3.3, Heritage, Quadris). Use 3.3 lb. a.i. per gallon formulations at 3.9-7.8 fl. oz. per acre. Use 2 lb. a.i. per gallon formulations at 6.0-12.0 fl. oz. per acre. Use 1.65 lb. a.i. per gallon formulations at 7.6-15.1 fl. oz. per acre. Use 0.5 lb. a.i. per gallon formulations (Heritage) on greenhouse transplants only at 0.08-0.15 oz. per 1,000 sq. ft. REI: 4-hour. PHI: 0-day. FRAC 11.

Cabrio EG (pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8-12 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 11.

Catamaran (potassium phosphite, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 4-7 pts. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallot and garlic; 14-day for green bunching onion and leek. FRAC 33, FRAC M05.

chlorothalonil products (chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations are labeled at various rates (Bravo, Echo, Equus, Initiate). Use 38.5% (Zn) formulations at 1.5-4.25 pt. per acre. Use 54% (720) formulations at 1-3 pt. per acre. Use 82.5% (WDG) formulations at 0.9-2.7 lb. per acre. Use 90% (DF) formulations at 1.25-2.5 lb. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallot, and garlic; 14-day for green bunching onion and leek. FRAC M05.

Custodia (azoxystrobin, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8.6-12.9 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 11, FRAC 03.

Cymbol Advance (chlorothalonil, cymoxanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 1.6-2.4 pts. per acre. Use lower rates for dry bulb onions and garlic. Other formulations are available such as Ariston. REI: 12-hour. PHI: 7-day for dry bulb onions, and garlic; 14-day for green bunching onions, shallots, leeks. FRAC M05, FRAC 27.

Dexter Max (mancozeb, azoxystrobin) *Garlic, Onion (Dry), Shallot* | 3.2 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03, FRAC 11.

Dexter Xcel (mancozeb, azoxystrobin, tebuconazole) *Onion (Dry)* | 48-72 fl. oz. per acre. REI: See label. PHI: 7-day. FRAC M03, FRAC 11, FRAC 03.

Fontelis (penthiopyrad) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-24 fl. oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 07.

Gavel 75DF (zoxamide, mancozeb) *Garlic, Onion (Dry), Shallot* | 1.5-2 lbs. per acre. REI: 48-hour. PHI: 7-day. FRAC 22, FRAC M03.

Inspire Super (difenoconazole, cyprodinil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-20 fl. oz. per acre. REI: 12-hour. PHI: 7-day for dry bulb onions, shallots, and garlic; 14-day for green bunching onion and leek. FRAC 03, FRAC 09.

iprodione products (iprodione) *Onion (Dry)* | 1.5 pts. per are. Formulations of iprodione include Nevado and Rovral. See label for tank mix rates. REI: 24-hour. PHI: 14-day. FRAC 02.

Luna Experience (fluopyram, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8-12.8 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 03.

Luna Tranquility (fluopyram, pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 16-27 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 09.

mancozeb products (mancozeb) *Garlic, Onion (Dry), Shallot* | Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Always check the label. Use 37% formulations at 1.6-2.4 qt. per acre. Use 75% and 80% formulations at 2-3 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03.

ManKocide (copper hydroxide, mancozeb) *Garlic, Onion (Dry), Shallot* | 2.5 lbs. per acre for Botrytis leaf blight, Downy mildew and Purple blotch. 1.5-2.25 lbs. per acre for bacterial diseases. REI: 48-hour. PHI: 7-day. FRAC M01, FRAC M03.

Merivon (fluxapyroxad, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 5.5-11 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

Muscle ADV (chlorothalonil, tebuconazole) *Garlic, Onion (Dry), Shallot* | 1.1-1.6 pts. per acre. REI: 12-hour. PHI: 7-day. FRAC M05, FRAC 03.

Omega 500F (fluazinam) *Garlic, Onion (Dry), Shallot* | 16 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 29.

Orondis Opti (oxathiapiprolin, chlorothalonil) *Garlic, Onion (Dry)* | 1.75-2.5 pt. per acre. REI: 12-hour. PHI: 7-day. FRAC 49, FRAC M05.

Pristine 38WG (boscalid, pyraclostrobin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 10.5-18.5 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 11.

propiconazole products (propiconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2-8 fl. oz. per acre. PropiMax EC and Tilt are labeled. Use 2-4 fl. oz. per acre rate when tank mixing with another effective fungicide. REI: 12-hour. PHI: 14-day for dry bulb onions, shallots, and garlic; 0-day for green bunching onion and leek. FRAC 03.

Quadris Opti (azoxystrobin, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 1.6-3.2 pts. per acre. REI: 12-hour. PHI: 7-day for dry bulb onion, shallots, and garlic; 14-day for green bunching onions and leeks. FRAC 11, FRAC M05.

Quilt (azoxystrobin, propiconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 14-27.5 fl. oz. per acre. REI: 12-hour. PHI: 14-day for dry bulb onions, shallots, and garlic; 0-day for green bunching onions and leeks FRAC 11, FRAC 03.

Reason 500SC (fenamidone) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 5.5 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 11.

Ridomil Gold Bravo SC (mefenoxam, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2.5 pts. per acre. REI: 48-hour. PHI: 7-day for dry bulb onions, shallots, and garlic; 14-day for green bunching onions and leek. FRAC 04, FRAC M05.

Scala (pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 18 fl. oz. per acre. Use 9-18 fl. oz. per acre rate when tank mixing with another effective fungicide. REI: 12-hour. PHI: 7-day. FRAC 09.

Switch 62.5WG (cyprodinil, fludioxonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 11-14 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09, FRAC 12.

Tanos (famoxadone, cymoxanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 8 oz. per acre. REI: 12-hour. PHI: 3-day. FRAC 11, FRAC 27.

tebuconazole products (tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 4-6 fl. oz. per acre. There are many brand names (Monsoon, Onset, Vibe) with 3.6 lbs. a.i. per gallon that use the same rate. REI: 12-hour to 18-day. PHI: 7-day FRAC 03.

Vangard WG (cyprodinil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 10 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09.

Viathon (potassium phosphite, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2-3 pts. per acre. REI: 12-hour. PHI: 7-day. FRAC 33, FRAC 03.

Zing! (zoxamide, chlorothalonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 30 fl. oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 22, FRAC M05.

Slippery Skin and Sour Rot of Alliums - Burkholderia Bacteria

Applying fixed copper products may reduce the spread of these bacterial diseases. For emerged annuals, apply before planting or crop emergence.

Pesticide

copper products (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Several formulations of copper (Badge, Champ, Kocide) are labelled for use and may slow the spread of bacterial blights. See label for directions. REI: 4 to 48-hour. PHI: 0-day. FRAC M01. *OMRI-listed.*

ManKocide (copper hydroxide, mancozeb) *Garlic, Onion (Dry), Shallot* | 2.5 lbs. per acre for Botrytis leaf blight, Downy mildew and Purple blotch. 1.5-2.25 lbs. per acre for bacterial diseases. REI: 48-hour. PHI: 7-day. FRAC M01, FRAC M03.

Smut of Onion - Urocystis Fungus

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Use disease-free seed and sets. Plant in areas with adequate drainage and air movement to reduce leaf wetness and humidity. Rotate to non-host crop for 3 years. Avoid late-season fertilizer applications or overhead irrigation.

Pesticide

Elixir (mancozeb, chlorothalonil) *Garlic, Onion (Dry), Shallot* | 3-3.6 lbs. per acre. REI: 24-hour. PHI: 7-day. FRAC M03, FRAC M05.

mancozeb products (mancozeb) *Garlic, Onion (Dry), Shallot* | Apply as an in-furrow drench at time of seedling. Several formulations are labeled at various rates (Dithane, Koverall, Manzate, Penncozeb). Always check the label. Use 37% formulations at 2.4 qt. per acre. Use 75% and 80% formulations at 3 lb. per acre. REI: 24-hour. PHI: 7-day. FRAC M03.

White Rot of Alliums - Stromatinia Fungus

This highly destructive soil pathogen is related to White Mold (*Sclerotinia*), but only infects onions and related species. There are quarantines in effect to slow its spread from region to region.

The fungus infects roots, and then moves to the surface of the bulbs. Inspection of the bulbs will reveal small black pellets that are the overwintering body of the pathogen.

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Wash equipment and footwear between fields to avoid transferring fungal propagules from infested fields.

Pesticide

Custodia (azoxystrobin, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Apply foliar spray at 8.6-12.9 fl. oz. per acre. For dry bulb onion and garlic, one application is also allowed at planting with 32 fl. oz. per acre via in-furrow or chemigation. REI: 12-hour. PHI: 14-day for dry bulb onions, shallots, and garlic; 7-day for green bunching onions and leeks, FRAC 11, FRAC 03.

Fontelis (penthiopyrad) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Apply 1.2-1.6 fl. oz. per 1,000 ft. of row as pre-plant, at-plant in-furrow incorporated, transplant drench or drip irrigation application. Or, use 16-24 fl. oz. as foliar applications REI: 12-hour. PHI: 3-day. FRAC 07.

iprodione products (iprodione) *Garlic* | 4 pts. per acre. Formulations of iprodione include Nevado and Rovral. Use as in-furrow spray preplant. REI: 24-hour. PHI: 7-day. FRAC 02.

Luna Experience (fluopyram, tebuconazole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 12.8 fl. oz. per acre. Suppression only. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 03.

Luna Tranquility (fluopyram, pyrimethanil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 27 fl. oz. per acre. Suppression only. REI: 12-hour. PHI: 7-day. FRAC 07, FRAC 09.

Switch 62.5WG (cyprodinil, fludioxonil) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 11-14 oz. per acre. REI: 12-hour. PHI: 7-day. FRAC 09, FRAC 12.

Topsin 4.5FL (thiophanate-methyl) *Garlic, Onion (Dry)* | Use 4FL formulation or Cercobin at 40 fl. oz. per acre, or 70WSB formulation at 2 lb. per acre. REI: 24-hour to 3-day. PHI: 3-day. FRAC 01.

Onions and Related Crops - Insects

Major update by Laura Ingwell, Zsofia Szendrei – Sep 2021
Reviewed by Raymond Cloyd – Aug 2024

Seed and Root Maggots

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Plant after the peak flight and egg-laying window of the first generation of flies looking to lay eggs around 700 GDD base 40. Handle seeds carefully to prevent cracking. Plow winter vegetation under early in the spring and thoroughly cover to limit attractiveness of rotting vegetation to the first generation of flies to lay eggs on.

Pesticide

Diazinon AG500 (diazinon) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2-4 qts. per acre. Use 50W

formulations at 4-8 lbs. per acre as a pre-plant incorporation. Use AG500 formulations at 64-128 fl. oz. per acre as a pre-plant incorporation. Use AG600 formulations at 51-102 fl. oz. per acre as a pre-plant incorporation. Onion maggot exhibit resistance to diazinon. REI: 2 to 4-day. IRAC 01B. *RUP.*

Mustang Maxx (zeta-cypermethrin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 2.24-4.0 fl. oz. per acre. *For adult control only.* Add COC at 16 fl. oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 03A. *RUP.*

Perm-Up 25DF (permethrin) *Garlic, Onion (Dry)* | *For adult control only*. Use 25W, 25WP, and 25DF formulations at 9.6-19.2 oz. per acre for dry onion or 9.6-12.8 oz. per acre for garlic. Use 3.2EC formulations at 4-12 fl. oz. per acre for dry onion and 4-8 fl. oz. per acre for garlic. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP.*

Seed treatments for insects (various ingredients) *Leek, Onion (Dry), Onion (Green), Shallot* | Rates vary by product, and are often multiple premixed ingredients, such as FarMore FI500. Select seed treatments with ingredients such as clothianidin (Sepresto), thiamethoxam (Cruiser 5FS), imidacloprid (Sepresto), or spinosad (Regard).

Warrior II (lambda-cyhalothrin) *Garlic, Onion (Dry)* | 0.96-1.6 fl. oz. per acre. *For adult control only*. REI: 24-hour. PHI: 14-day. IRAC 03A. *RUP.*

Thrips

Threshold for making an insecticide application is 1 thrips per leaf for Agri-Mek, Exirel, Minecto Pro, Movento, Lannate LV and 3 thrips per leaf for Radiant.

A suggested treatment schedule starts with two applications of Movento for the first two weekly applications when the thrips population reaches the treatment threshold of 1 thrips per leaf for the first time of the season. Then, rotate products with two sequential weekly applications for each, reserving Radiant for high 3 thrips per leaf thresholds in peak season.

Pesticide

Agri-Mek SC (abamectin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 1.75-3.5 fl. oz. per acre. Use 0.7SC formulations at 1.75-3.5 fl. oz. per acre. Use 0.15SC formulations at 8-16 fl. oz. per acre. Use at 1 thrips per leaf threshold. Make 2 consecutive applications 7-days apart, then rotate to an insecticide with a different mode of action. Do not use before or after Minecto Pro since it contains the same active ingredient. REI: 12-hour. PHI: 7-day for green onions and leeks, 30-day for dry onions, garlic and shallots. IRAC 06. *RUP.*

Assail 30SG (acetamiprid) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | Use 30SG formulations at 5.0-8.0 oz. per acre. Use 70WP formulations at 2.1-3.4 oz. per acre. Many onion thrips populations have developed resistance to this insecticide, so efficacy will vary. REI: 12-hour. PHI: 7-day. IRAC 04A.

Entrust SC (spinosad) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | For armyworms, fruitworms, and loopers. For armyworms, cutworms, and loopers. Use 2SC formulations at 4.0-8.0 fl. oz. per acre. Use 80WP formulations at 1.25-2.5 oz. per acre. Observe resistance management restrictions. REI: 4-hour. PHI: 1-day. IRAC 05. *OMRI-listed.*

Exirel (cyantraniliprole) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 13.5-20.5 oz. per acre. Use at 1 thrips per leaf threshold. For suppression only. For best results, use highest rate listed. If thrips populations are high, use Radiant before using Exirel. Tank mix with nonionic surfactant (0.25%-0.5% v/v) for best efficacy. Allow 5 days between applications. Do not make more than 2 consecutive applications before switching to another mode of action. Therefor, do not use in sequence before or after Minecto Pro since it contains the same active ingredient. REI: 12-hour. PHI: 1-day. IRAC 28.

Lannate LV (methomyl) *Onion (Dry), Onion (Green)* | 3 pts. per acre. REI: 48-hour. PHI: 7-day. IRAC 01A. *RUP.*

Minecto Pro (cyantraniliprole, abamectin) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 7.0-10 oz. per acre. Use at 1 thrips per leaf threshold. For suppression only. For best results, use highest rate listed. *Not for rescue treatments*. Tank mix with nonionic surfactant (0.25%-0.5% v/v) for best efficacy. Allow 5 days between applications. Do not make more than 2 consecutive applications before switching to another mode of action. Do not use before or after Exirel or Agri-Mek since these contain the same active ingredients. REI: 12-hour. PHI: 30-day for dry onion, shallots, and garlic.; 7-day for green bunching onion, shallots, and leek IRAC 28, IRAC 06. *RUP.*

Movento (spirotetramat) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 5 oz. per acre. Use in June or July when populations reach the 1 thrips per leaf threshold for the first time of the season. Tank mix with nonionic surfactant (0.25%-0.5% v/v) for best efficacy. Allow 7 days between applications. Do not make more than 2 consecutive applications before switching to another mode of action. REI: 24-hour. PHI: 3-day for dry onion, shallots, and garlic.; 7-day for green bunching onion, shallots, and leek IRAC 23.

Perm-Up 25DF (permethrin) *Garlic, Onion (Dry)* | Use 25W, 25WP, and 25DF formulations at 9.6-19.2 oz. per acre for dry onion or 9.6-12.8 oz. per acre for garlic. Use 3.2EC formulations at 6-12 fl. oz. per acre for dry onion and 6-8 fl. oz. per acre for garlic. Many onion thrips populations have developed resistance to this insecticide, so efficacy may vary. REI: 12-hour. PHI: 1-day. IRAC 03A. *RUP.*

Radiant 1SC (spinetoram) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 6-10 fl. oz. per acre. Use at 3 thrips per leaf threshold. Do not make more than 2 consecutive applications before switching to another mode of action. REI: 4-hour. PHI: 1-day. IRAC 05.

Torac (tolfenpyrad) *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 24 fl. oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 21A, FRAC 39.

Warrior II (lambda-cyhalothrin) *Garlic, Onion (Dry)* | 1.28-1.92 fl. oz. per acre. Many onion thrips populations have developed resistance to this insecticide so efficacy may vary. REI: 24-hour. PHI: 14-day. IRAC 03A. *RUP.*

Onions and Related Crops - Weeds

Reviewed by Stephen Meyers, Ben Phillips – Sep 2023

All Weeds

Onions and related crops pose challenges for weed control because the narrow leaves and short height of the crop provide little shade to suppress weed growth, and, except for green onions, the crops grow for several months.

Prepare a stale seedbed several weeks in advance of planting, allow weeds to emerge, and kill weeds without bringing new weed seeds to the surface with a burndown herbicide, flame weeder, or very shallow cultivation.

For specific weeds controlled by each herbicide, check the Relative Effectiveness of Herbicides for Vegetable Crops table.

Rates provided in the recommendations below are given for overall coverage. For a banded treatment, reduce amounts according to the portion of acre treated.

Non-Pesticide

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Weed control in onions often relies heavily on cultivation and hand weeding for full season weed control. These operations are most efficient when planting arrangement is designed with weed control in mind and is designed to work with available weed control equipment. Specialized weeding equipment for onions includes basket weeders, narrow-bladed hoes, finger weeders, and others. A stale seedbed can be prepared prior to transplanting with flame weeding or very shallow cultivation to control emerged weeds, instead of herbicides. Some growers also use flaming successfully over the top of young onions or garlic, or directed toward the bases of larger plants, even though some crop injury is likely with postemergence flaming. For transplanted sweet onions, plastic mulched beds are commonly used to manage weeds in the row with two or three rows of onions per bed. Black plastic can damage maturing onions in high-light conditions. For this reason, many growers prefer white-on-black plastic with the white side up.

Pesticide

Aim EC (carfentrazone) POST *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 0.5-2 fl. oz. per acre. Apply a minimum of 30 days prior to direct-seeding or with a hooded sprayer as a directed application between crop rows. Add 1 qt. COC (1% v/v) or 0.5 pt. NIS per 25 gal. of spray solution (0.25% v/v). Weeds must be actively growing and less than 4 inches tall. Do not exceed 6.1 fl. oz. per acre per season. Do not allow spray to contact crop. REI: 12-hour. HRAC 14.

Chateau SW (flumioxazin) PRE *Garlic, Onion (Dry)* | For **garlic:** apply 6 oz. per acre of Chateau SW or 6 fl. oz. per acre of Chateau EZ within 3 days after planting and before garlic emerges. Do not exceed 6 oz. per acre per growing season. For **onion** *in Michigan only*: apply 2 oz. per acre of Chateau SW or 2 fl. oz. per acre of Chateau EZ to transplanted onions between the 2- and 6-leaf stage or to direct-seeded onions between the 3- and 6-leaf stage and prior to weed emergence. Do not exceed 2 oz. per acre per application or 3 oz. per acre per growing season. Will not control emerged weeds. Wait at least 14 days between repeat applications. Do not tank mix with adjuvants or other herbicides. REI: 12-hour. PHI: 45-day for dry bulb onion. HRAC 14.

clethodim products (clethodim) POST *Garlic, Onion (Dry)* | Use 2EC formulations at 6-16 fl. oz. per acre with 1 qt. COC per 25 gals. of spray solution (1% v/v). Do not exceed 32 fl. oz. per acre per season. Use Select Max at 9-16 fl. oz. per acre to control annual grasses and 12-32 fl. oz. per acre to control perennial grasses. Add 0.5 pt. NIS per 25 gals. of spray solution (0.25% v/v). Do not exceed 64 fl. oz. per acre per season. Spray on actively growing grass. Wait at least 14

days between applications. REI: 24-hour. PHI: 45-day. HRAC 01.

Dual Magnum (s-metolachlor) PRE *Garlic, Leek, Onion (Dry), Onion (Green), Shallot | Illinois, Indiana, Kansas, Michigan, Minnesota, and Ohio 24c label only.* For **dry onion:** apply 0.67-1.33 pts. per acre prior to weed emergence and when the crop has at least 2 true leaves. A second application may be applied 21 or more days after the first. Do not exceed 1.3 pts. per acre per application and 2.6 pts. per acre per crop and two applications per crop. For **all else:** Apply 0.67-1.33 pts. per acre postemergence starting when the crop has 2 true leaves. Do not exceed 1.3 pts. per acre per season. REI: 24-hour. PHI: 60-day for dry bulb onion; 21-day for all else. HRAC 15.

Fusilade DX (fluazifop-P) POST *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 10-12 fl. oz. per acre. Add 1 qt. COC (1% v/v) or 0.5 pt. NIS per 25 gal. of spray solution (0.25% v/v). Apply to small actively growing grass. Do not exceed 48 fl. oz. per acre per year. REI: 12-hour. PHI: 45-day for garlic and dry bulb onion (dry), 14-day for green onion and leek. HRAC 01.

glyphosate products (glyphosate) POST *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 0.75-3.75 lbs. acid equivalent (ae) per acre. Use formulations containing 3 lbs. ae per gal. (4 lbs. isopropylamine salt per gal.) at 1-5 qts. per acre, or formulations containing 4.5 lbs. ae per gal. (5 lbs. potassium salt per 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. REI: 4-hour to 12-hour. PHI: 14-day. HRAC 9.

GoalTender (oxyfluorfen) POST | PRE *Garlic, Onion (Dry)* | *Seeded crops*: Broadcast 0.25 pt. per acre GoalTender or 0.5 pt. per acre Goal 2XL after crop has 2 true leaves. *Transplanted crops*: Broadcast 0.5-1 pt. per acre GoalTender or 1-2 pts. per acre Goal 2XL prior to transplanting (*onion only*), or within 2 days of transplanting. Greenhouse-grown transplants may be sensitive to GoalTender at transplanting. Also works preemergent weeds, and on actively growing postemergent weeds with 2-4 leaves. May cause foliar injury during cool weather. Use lower rate on coarse soils. Do not exceed 1 pt. per acre per season GoalTender or 2 pts. per acre per season Goal 2XL. REI: 24 to 48-hour. PHI: 45-day for onion, 60-day for garlic. HRAC 14.

Moxy 2E (bromoxynil) POST *Garlic, Onion (Dry)* | 1-1.5 pt. per acre for onion or 1.5-2 pt. per acre for garlic. Apply to weeds up to 2 in. tall and 1 in. wide with less than 4 leaves. For **onions:** apply 1.0-1.5 pts. per acre when onions have 2-5 true leaves, using 50-70 gal. 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. For **garlic:** apply 1.5-2.0 pts. per acre after garlic emerges and before it is 12 in. tall, using at least 20 gal. water per acre. REI: 24-hour. PHI: 45-day for onion, 112-day for garlic. HRAC 06.

Nortron SC (ethofumesate) POST | PRE *Onion (Dry), Shallot* | 16-32 fl. oz. per acre. Apply preemergence or soon after seeding before weeds germinate. May also be used postemergence. Do not exceed 4 applications or 48 fl. oz. per acre per season on coarse soils and 96 fl. oz. per acre per season on medium and fine soils. May cause temporary leaf fusion. May injure stressed plants. Use on mineral soils only. REI: 12-hour. HRAC 15.

Optogen (bicyclopyrone) POST | PRE *Garlic, Onion (Dry), Onion (Green)* | 2.6-3.5 fl. oz. per acre before transplanting or 3.5 fl. oz. per acre after transplanting as a row middle or post-directed application, avoiding contact with crop foliage. If weeds are present, add 0.5 pt. NIS (0.25% v/v) or 1 qt. COC (1% v/v) per 25 gal. of spray solution. Spray grade ammonium sulfate (AMS) may also be added to improve weed control consistency. Apply to weeds less than 2 inches. Do not exceed 1 application per year. Do not exceed 3.5 fl. oz. per acre per year. Do not apply preemergence on mineral soils. REI: 24-hour. PHI: 45-day for garlic and dry onions, 21-day for green onions HRAC 27.

Outlook (dimethenamid-p) PRE *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 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. See labelfor tank-mix recommendations. REI: 12-hour. PHI: 30-day. HRAC 15.

paraquat products (paraquat) POST *Garlic, Onion (Dry)* | 2-4 pt. per acre of 2 lb. per gal. formulation. Add 1 qt. COC (1% v/v) or 0.5 pt. NIS (0.25% v/v) per 25

gal. of solution and apply to emerged weeds less than 6" tall prior to transplanting or after direct-seeding but before crop emergence. Certified applicators must successfully complete an EPA-approved training program before mixing, loading, and/or applying paraquat. REI: 12 to 24-hour. PHI: 60-day HRAC 22. *RUP.*

pendimethalin products (pendimethalin) PRE  

Garlic, Leek, Onion (Dry), Onion (Green), Shallot | For **garlic:** use 3.8 formulations at 1.5-3.2 pts. per acre or 3.3 formulations at 1.8-3.6 pts. per acre after planting but before crop and weeds emerge, or when garlic has 1-5 true leaves. For **dry bulb onion, and dry shallot:** use 3.8 formulations at 1.5-3.2 pts. per acre (up to 4 pts. on muck) or 3.3 formulations at 1.8-3.6 pts. per acre (up to 4.8 pts. on muck) after planting but before crop and weeds emerge, or when onions have 2-9 true leaves. *In Michigan only: for* mineral soils with more than 10% organic matter, use similar rates as muck soil applications. For **green onion, leek, and green shallot:** use 3.8 formulations at 2 pts. per acre after seeding but before crop emerges, or when crop has 2-3 true leaves. Michigan growers can use up to 4 pts. in a single application with 24c label. The 3.3 formulations are not labeled for green onions or leeks. If both pre and post applications are used, wait 30 days after pre application before making a post application. Only apply pre to muck soils (organic matter greater than 20%) or mineral soils with greater than 3% organic matter. Do not exceed 4 pts. per acre per year. Use low rates on course soils. Heavy rain or excessive irrigation soon after application may cause crop injury. Will not control emerged weeds. REI: 24-hour. PHI: 45-day for dry bulb onion, garlic and dry shallot; 30-day for green onion, leek, and green shallot. HRAC 03.

Poast (sethoxydim) POST  *Garlic, Leek, Onion (Dry), Onion (Green), Shallot* | 1-1.5 pt. per acre. Add 1 qt. COC per 25 gal. of spray solution (1% v/v). Spray on actively growing grass. Use high rate on quackgrass. Do not exceed 4.5 pts. per acre per growing season. REI: 12-hour. PHI: 30-day. HRAC 01.

Prefar 4E (bensulide) PRE   *Garlic, Onion (Dry), Shallot* | 5-6 qts. per acre. 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 to incorporate. Mineral soils only. REI: 12-hour. HRAC NC.

Starane Ultra (fluroxypyr) POST  *Onion (Dry)* | 5.6 fl. oz. per acre. *Michigan only.* Apply to onions with 2-6 true leaves. Do not exceed 2 applications per season. Controls volunteer potato, chickweed, composites, nightshades, and mustards. REI: 24-hour. PHI: 42-day. HRAC 04.

trifluralin products (trifluralin) PRE   *Onion (Dry)* | Use 10G formulations at 3.75-6.26 lbs. per acre and do not exceed 20 lbs. per acre per season on fine soils. Use 4EC formulations at 0.75-1.25 pts. per acre and do not exceed 4 pts. per acre per season on fine soils. Apply at layby as a directed spray between onion rows and incorporate 1-2 inches. Mineral soils only (less than 3.5% organic matter). REI: 12-hour. PHI: 60-day. HRAC 03.