Pests of Onion Grown for Seed

Cody Copp

Latest revision—March 2025

In all cases, **follow the instructions on the pesticide label**. The *PNW Insect Management Handbook* has no legal status, whereas the pesticide label is a legal document. Read the product label before making *any* pesticide applications.

Pesticides registered for pest control on a given vegetable crop can also be used for that vegetable's seed crop, unless prohibited. For pesticide recommendations in addition to those listed below, see the appropriate vegetable section in this handbook.

Note: Products are listed in alphabetical order and *not* in order of preference or superiority of pest control.

Onion seed—Armyworm and cutworm

Beet armyworm (*Spodoptera exigua*)
Bertha armyworm (*Mamestra configurata*)
Western yellowstriped armyworm (*Spodoptera praefica*)
Black cutworm (*Agrotis ipsilon*)
Variegated cutworm (*Peridroma saucia*)

Pest description and crop damage These are from the noctuidae group. Adult moths come out at dusk and have a dark grey or brown and grey forewing with a lighter gold or cream-colored underwing. Dark grey or brown or various-color moth larvae damage roots and bulbs by feeding.

Management—chemical control

- azadirachtin (Neemix 4.5) at 4 to 16 fl oz/A (0.012 to 0.049 lb ai/A). PHI 0 days. REI 4 hr. In most cases, apply at high rate. Effective on larval or immature stages only. This botanical pesticide acts slowly. Repeat in 7 to 10 days or as needed. Spray early and check for effect. Some formulations are OMRI-listed for organic production.

Onion seed—Lygus bug

Includes
Pale legume bug (*Lygus elisus*)
Western tarnished plant bug (*Lygus hesperus*)

Pest description and crop damage Lygus bugs are Hemipteran insects with characteristic piercing-sucking mouthparts. Adults are about 0.25 inch long, half as wide, somewhat hunchbacked, flat on the abdomen, and oval in shape. Immature lygus are smaller than adults and do not have wings. Newly hatched lygus resemble aphids. Lygus bugs can feed on developing onion seed, rendering it non-viable.

Management—chemical control

- azadirachtin (Neemix 4.5) at 7 to 16 fl oz/A (0.021 to 0.049 lb ai/A). PHI 0 days. REI 4 hr. In most cases, apply at high rate. This botanical pesticide acts slowly. Spray early and check for effect. Repeat in 7 to 10 days as needed. Some formulations are OMRI-listed for organic production.

Onion seed—Maggot

Includes
Bean seed maggot (*Delia florilega*)
Onion maggot (*Delia antiqua*)
Seedcorn maggot (*Delia platura*)

Pest description and crop damage Adult is a fly with a gray body and black legs, less than 0.25 inch long. Larvae are legless, blunt, white maggots that feed on seeds and reduce onion stands. They sometimes damage bulbs of mature plants.

Management—chemical control

- azadirachtin (Neemix 4.5) at 7 to 16 fl oz/A (0.021 to 0.049 lb ai/A). PHI 0 days. REI 4 hr. In most cases, apply at high rate. Effective on larval or immature stages only. This botanical pesticide acts slowly. Spray early and check for effect. Repeat in 7 to 10 days as needed. Some formulations are OMRI-listed for organic production.

Onion seed—Thrips

Includes
Onion thrips (*Thrips tabaci*)
Western flower thrips (*Frankliniella occidentalis*)

Pest description and crop damage Adults are small, slender, feather-wing insects. They are yellow to light brown and about 0.06 inch long. The young are wingless. They feed on foliage, reduce plant vigor, and may kill tops. Thrips can be vectors of disease in onion crops. Onion thrips are not damaging once seed heads have formed. Western flower thrips, which feed on pollen without damaging seed, often are most prevalent in the flower heads. It rarely is justified to treat for thrips beyond the initial early application.

Management—chemical control

- azadirachtin (Neemix 4.5) at 7 to 16 fl oz/A (0.021 to 0.049 lb ai/A). PHI 0 days. REI 4 hr. In most cases, apply at high rate. This botanical pesticide acts slowly. Repeat in 7 to 10 days as needed. Spray early and check for effects. Some formulations are OMRI-listed for organic production.
- spirotetramat (Movento) at 5 fl oz/A (0.08 lb ai/A). Apply no more than 10 fl oz/A (0.15 lb ai/A) per crop season with a minimum treatment interval of 7 days. PHI 3 days (members of Subgroup 3-07A); 7 days (members of Subgroup 3-07B). For onions, leeks, and chives grown for seed production, do not apply 4 months prior to bloom, during bloom or until after petal fall.
- spirotetramat (Movento HL) at 2.5 fl oz/A (0.07 lb ai/A). Apply no more than 5 fl oz/A (0.16 lb ai/A) per crop season with a minimum treatment interval of 7 days. PHI 3 days (members of Subgroup 3-07A); 7 days (members of Subgroup 3-07B). For onions, leeks, and chives grown for seed production, do not apply 4 months prior to bloom, during bloom or until after petal fall.

Pests of Radish Grown for Seed

Carrie H. Wohleb

Latest revision—March 2025

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Important notice Several pesticides with 24c SLN (Special Local Need) registrations for use on seed crops lack legal tolerances established for pesticide residues that may be on the seed, screenings, or hay at harvest. Therefore, certain seed grower associations in Washington, Oregon, and Idaho have declared, through their respective state departments of agriculture, that the crop produced for seed in those states is a nonfood crop. This declaration means that none of the seed, screenings, hay, or sprouts produced from harvested seed will be available for human or animal consumption when these pesticides have been applied. The grower must notify the seed processing plant in writing of any seed treated with these pesticides. Processed seed must be labeled: "This seed was produced using one or more products for which the United States Environmental Protection Agency has not established pesticide residue tolerances. This seed, in whole, as sprouts, or in any form, may violate requirements of the Federal Food and Drug Administration, the Oregon Department of Agriculture and other regulatory agencies."

Note: Products are listed in alphabetical order and *not* in order of preference or superiority of pest control.

Radish seed—Aphid

Includes:
Cabbage aphid (*Brevicoryne brassicae*)
Green peach aphid (*Myzus persicae*)
Turnip aphid (*Lipaphis pseudobrassicae*)

Pest description and crop damage Cabbage and turnip aphids species are gray and adults are covered with a bluish-white waxy powder. They form colonies on foliage, on or in buds, or in flowers. High populations reduce seed set, cause seed pods to abort, cause premature plant death, and interfere with harvest operations.

Management—chemical control

See:

Radish—Aphid

Radish seed—Cabbage looper

Trichoplusia ni

Pest description and crop damage Pale green larvae with white stripes on back and sides. They move in a looping manner.

Management—chemical control

See:

Radish—Looper

Radish seed—Cabbage maggot

Delia radicum

Pest description and crop damage White maggots that feed on roots and underground stems and weaken, lodge, and kill plants. Evidence of larval damage will present as withering leaves developing a bluish hue and delayed plant growth. Larvae do not tolerate extended period of high temperature. Adult is a small gray fly that lays white eggs at plant bases.

Management—chemical control

See:

Radish—Cabbage maggot

Radish seed—Cabbage seedpod weevil

Ceutorhynchus assimilis

Pest description and crop damage Small, dark gray snout beetles that congregate on blooms. Larvae feed on seeds inside pods.

Management—chemical control

- azadirachtin (Aza-Direct, Neemix 4.5)—See label for rates. PHI 0 days. This is a botanical insecticide with ingestion and contact action that kills larvae by interfering with molting; also reduces damage by repelling and deterring feeding. Repeat in 7- to 10- day intervals beginning at the first sign of infestation when pests are immature. Repeated applications break the life cycle of the pest. Some formulations are OMRI-listed for organic use.

Radish seed—Cutworm

Various species

Pest description and crop damage Dull gray, brown, or black caterpillars. They are active at night and can be found in the soil by day. They cut off young plants at ground level, or feed on foliage, buds, and bloom of older plants.

Management—chemical control

See:

Radish—Armyworm and cutworm

Radish seed—Diamondback moth

Plutella xylostella

Pest description and crop damage Diamondback larvae are about 0.31 inch when fully grown. The larval body is wider in the middle and tapers at both ends, with two legs

(prolegs) on the last segment forming a distinctive V-shape at the rear end. They feed mostly on outer or more mature leaves of older plants, chewing out small holes, or at growing points of young plants. They also feed on floral stalks and flower buds. Adult moths are small, (0.47 to 0.59 inch wingspan), slender, and grayish brown. Male moths display three diamond-shaped markings on their back.

Management—chemical control

See:
Radish—Diamondback moth

Radish seed—Imported cabbageworm

Pieris rapae

Pest description and crop damage Larvae are green and very hairy, with an almost velvet-like appearance. Older larvae may be up to 1 inch long. They often have one faint yellow-orange stripe down their backs and broken stripes along the sides.

Management—chemical control

- azadirachtin (Aza-Direct, Neemix 4.5)—See label for rates. PHI 0 days. This is a botanical insecticide with ingestion and contact action that kills larvae by interfering with molting; also reduces damage by repelling and deterring feeding. Repeat in 7- to 10- day intervals beginning at the first sign of infestation when pests are immature. Repeated applications break the life cycle of the pest. Some formulations are OMRI-listed for organic use.
- zeta-cypermethrin (Mustang) at 3.4 to 4.3 fl oz/A (0.04 to 0.05 lb ai/A). PHI 1 day. REI 12 hr. Do not exceed 25.8 fl oz/A (0.3 lb ai/A) per season. Do not make applications less than 4 days apart. This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Toxic to fish and aquatic organisms. Do not apply by ground within 25 feet of bodies of water. Do not apply by ULV aerial application within 450 feet or by non-ULV aerial application within 150 feet of bodies of water. Maintain a minimum 10-ft wide vegetative filter strip between the field and down gradient aquatic habitat.

Radish seed—Leafhopper

Beet leafhopper (*Circulifer tenellus*)

Pest description and crop damage Beet leafhoppers transmit a phytoplasma, the beet leafhopper transmitted virescence agent (BLTVA), to radish crops in the arid regions of the Pacific Northwest. BLTVA-infected radish seed plants tend to bolt prematurely, and the flower parts can be malformed.

Management—chemical control

- azadirachtin (Aza-Direct, Neemix 4.5)—This is a botanical insecticide with ingestion and contact action that kills immature pests by interfering with molting; also reduces damage by repelling and deterring feeding. Repeat in 7- to 10-day intervals beginning at the first sign of infestation when pests are immature. Repeated applications break the life cycle of the pest. Some formulations are OMRI-listed for organic use.
- thiamethoxam (Actara) at 1.5 to 3.0 oz/A (0.023 to 0.047 lb ai/A) foliar application. PHI 7 days. REI 12 hr. Retreatment interval 7 days. Do not exceed a total of 4.0 oz/A (0.063 lb ai/A) per season. This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds.
- thiamethoxam (Platinum) at 5.0 to 6.5 fl oz/A (0.078 to 0.1 lb ai/A) soil application. REI 12 hr. Apply at seeding or within 24 hours of seeding. Do not exceed 6.5 fl oz/A (0.1 lb ai/A) per season of Platinum or 0.063 lb ai/A per season of thiamethoxam-containing products. This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds.
- zeta-cypermethrin (Mustang) at 1.9 to 4.3 fl oz/A (0.016 to 0.05 lb ai/A). PHI 1 day. REI 12 hr. Do not exceed 25.8 fl oz/A (0.3 lb ai/A) per season. Do not make applications less than 4 days apart. This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Toxic to fish and aquatic organisms. Do not apply by ground within 25 ft of bodies of water. Do not apply by ULV aerial application within 450 ft or by non-ULV aerial application within 150 feet of bodies of water. Maintain a minimum 10-ft wide vegetative filter strip between the field and down gradient aquatic habitat.

Radish seed—Lygus bug

Lygus spp.

Pest description and crop damage Adults are 0.18 inch long and have a light yellow V on the back. Lygus bugs pierce buds and suck sap, injuring both vegetative and reproductive buds. Damage includes blasted buds, blossom drop, and shriveled seed.

Management—chemical control

- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/A. REI 24 hr. Do not exceed 0.06 lb ai/A per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. The low rate may be applied from late evening to midnight during bloom. Do not apply at the 0.015 rate to blooming seed crops. Do not apply to daikon radish. Toxic to fish and aquatic invertebrates. Do not apply within 25 ft of an aquatic habitat, 150 ft if applied by air. Apply with ground or air equipment. Section 18 label allows application to radish seed in Oregon only.

Radish seed—Slug

Several species

Pest description and crop damage Mollusks that feed on foliage and leave slime trails.

Management—chemical control

See:

Slug Control

Radish seed—Wireworm

Limonius spp. and *Ctenicera* spp.

Pest description and crop damage Brown, shiny, jointed larvae of click beetles. Larvae are from 0.33 to 0.5 inch long. They inhabit soil for 2 to 5 years during maturation, feeding on plant roots and lower stems.

Management—chemical control

See:

Radish—Wireworm

Pests of Rutabaga and Turnip Grown for Seed

Carrie H. Wohleb

Latest revision—March 2025

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Rutabaga and turnip seed—Aphid

Cabbage aphid (*Brevicoryne brassicae*)
Turnip aphid (*Lipaphis pseudobrassicae*)

Pest description and crop damage Both species are gray mealy plant lice that form colonies on foliage.

Management—chemical control

- pymetrozine (Fulfill) at 2.75 oz/A (0.086 lb ai/A). PHI 7 days. REI 12 hr. This insecticide works primarily by ingestion, but also has some contact activity. Aphids stop feeding shortly after exposure but may remain on the plant foliage until they die, which is usually within 2 to 7 days. This product has residual activity in the plant. Do not exceed 5.5 oz/A (0.17 lb ai/A) per season. The addition of a penetrating type spray adjuvant is recommended. Do not apply through any type of irrigation system. Allow at least 7 days between applications. Fulfill is toxic to bees exposed to direct

application. Application to blooming crops must be between late evening and early morning to coincide with minimal bee activity. No portion of treated plants can be used for food or feed. 24c SLN: OR-180013 (expires 12/31/28). Oregon only.

See also:

Turnip (roots and tops) and rutabaga—Aphid

Rutabaga and turnip seed—Cabbage maggot

Delia brassicae

Pest description and crop damage Larvae are legless white maggots that feed on roots.

Management—chemical control

See also:

Turnip (roots and tops) and rutabaga—Cabbage maggot

Spinach Grown for Seed

Louis Nottingham

Latest revision—March 2025

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Spinach seed—Aphid

Bean aphid (*Aphis fabae*)
Green peach aphid (*Myzus persicae*)
Melon aphid (*Aphid gossypii*)

Pest description and crop damage Bean aphids are black and colonize foliage. Green peach aphids are yellowish pink to pale green with a large, distinct blotch on top of the abdomen. Melon aphids are small and yellowish to dull green; pale forms have dark mottlings. Aphids can make several generations in a single year and may transmit viral diseases. They will typically feed on newer growth, turning leaves yellow and causing spinach to appear water stressed.

Management—chemical control

- azadirachtin (AzaGuard) at 10 to 16 fl oz/A (0.021 to 0.035 lb ai/A). For use on crops grown in a greenhouse for transplants, apply at 10 to 16 fl oz/A (0.031 to 0.049 lb ai/A). PHI 0 days. REI 4 hr. Begin applications at first sign of infestation. Multiple applications and thorough coverage are necessary for effective control. Apply every 7 to 10 days as needed. This botanical pesticide acts slowly. Spray early, well before harvest, and check for effect. Some formulations of azadirachtin are OMRI-listed for organic use.
- pymetrozine (Fulfill) at 2.75 oz/A (0.086 lb ai/A) when aphids first appear. Do not apply more than 5.5 oz/A (0.172 lb ai/A) per crop per year. Allow a minimum of 7 days between applications. PHI 14 days. REI 12 hr. Use a minimum of 5 gal water/A when applied by air and a minimum of 10 gal water/A when applied by ground. Pollinator protection: when crops or weeds are in bloom, apply only when bees are not foraging (between 6 pm and 7 am). Washington only. SLN WA-190003 for Adama Fulfill products (expires 12/31/2024)

See also:

Spinach—Aphid

Spinach seed—Collembola (Springtail)

Primarily *Onychiurus pseudarmatus*

Pest description and crop damage Small, white, slow-moving, soil-dwelling insects that feed on germinating seeds or roots of small plants, causing reduced stands and loss of vigor in surviving plants. They usually are in localized or irregular spots in the field.

Management—chemical control

See also:

Spinach—Collembola (Springtail)

Spinach seed—European cranefly

Tipula paludosa

Pest description and crop damage Small, gray-brown, worm-like larvae that develop a tough skin and are commonly called leatherjackets. They feed on clover and a number of vegetables.

Management—chemical control

- azadirachtin (AzaGuard) at 10 to 16 fl oz/A (0.021 to 0.035 lb ai/A). For use on crops grown in a greenhouse for transplants, apply at 4 to 16 fl oz/A (0.012 to 0.047 lb ai/A). PHI 0 days. REI 4 hr. Begin applications at first sign of infestation. Multiple applications and thorough coverage are necessary for effective control. Apply every 7 to 10 days as needed. This botanical pesticide acts slowly. Spray early, well before harvest, and check for effect. Some formulations are OMRI-listed for organic use.

See also:

Spinach—European cranefly

Spinach seed—Looper

Includes alfalfa looper (*Autographa californica*)

Pest description and crop damage Mottled gray moth, 1.5 inches in length, with silver markings on forewings. Worms are slender (1 inch) and dark olive-green with a paler head marked with three light stripes.

Management—chemical control

- azadirachtin (Neemix) at 7 to 16 fl oz/A (0.021 to 0.047 lb ai/A). For use on crops grown in a greenhouse for transplants, apply at 4 to 16 fl oz/A (0.012 to 0.049 lb ai/A). PHI 0 days. REI 4 hr. Begin applications at first sign of infestation. Multiple applications and thorough coverage are necessary for effective control. Apply every 7 to 10 days as needed. This botanical pesticide acts slowly. Spray early, well before harvest, and check for effect. Some formulations are OMRI-listed for organic use.

See also:

Spinach—Looper

Spinach seed—Seed corn Maggot

Delia platura

Pest description and crop damage Adult flies are difficult to distinguish from other *Delia* species. *D. platura* adults are 0.2 inch in length, gray or brown, and look like a small house fly. Eggs are not often seen, but larvae (maggots) and pupae are found in the soil near or within developing seedlings. Maggot will grow to 0.25 inch in length with a creamy white colored tapered body and black hook-like mouthparts. Pupae are bronze colored, oval, and the size of oldest larvae. Larvae feed on spinach seeds or seedlings, resulting in stunted or missing plants. Minor feeding may cause notched or disformed cotyledons, and/or stunted plants.

Biology and life history In the PNW, there are generally three generation of *D. platura* per season. Pupae overwinter in the soil, and adults emerge around early to mid-April. The phenology of *D. platura* has been described with a Biofix of Jan 1, lower threshold of 39°F and upper threshold of 84.2°F (horizontal cutoff). First adult peaks occur at 360 degree-days. A real time model can be found at USpest.org.

Management—chemical control

- azadirachtin (Neemix 4.5) at 4 to 16 fl oz/A (0.012 to 0.049 lb ai/A). Apply in furrow or as soil drench. PHI 0 days. REI 4 hr. Washington only.
- cyantraniliprole (Verimark) 5 to 13.5 fl. oz/A (0.065 to 0.176 lb ai/A). REI 4 hr. Do not apply a total of more than 0.4 lb ai/A per year for any cyantraniliprole product.
- thiamethoxam (Cruiser 70 WS) seed treatment. 0.12 mg ai/seed, up to 1,000,000 seeds per acre. Washington only.

Spinach seed—Two-spotted spider mite

Tetranychus urticae

Pest description and crop damage Adult mites are about 0.06 inch in length, have four pairs of legs, are greenish to pink or cream color, and have various-sized black spots on the body. Under warm conditions, spider mites move rapidly within the colony area. Damaged leaves become somewhat stippled on the upper surface and may turn brown or bronze with heavy damage. The undersurface of leaves may have a grayish cast due to webbing. Wilting, leaf deformity, tissue death, and abscission all may take place.

Biology and life history Spider mites have four stages of development: the round, somewhat translucent egg with a red dot; a six-leg translucent larval stage; an eight-leg nymph stage; and the eight-leg adult stage. A resting or quiescent stage occurs at the end of the larval and nymph stages. A generation may pass in as few as 5 to 7 days in midsummer, or in a month during cool periods. There are numerous overlapping generations each year.

Management—cultural control

Spider mites generally prefer hot, dry, and dusty conditions. Avoid activities that increase dirt or dust on plants such as excessive driving during dry conditions; or, dampen driving areas to prevent dust drift into crops.

Management—biological control

Spider mites can be controlled by many natural enemy arthropods, such as predatory mites, thrips, and ladybird beetles. Conservative use of broad-spectrum insecticides and

miticides that kill these natural enemies can prevent spider mite outbreaks. Preserve refugia for predators of mites with living plant ground covers or conservation tillage.

Management—chemical control

- bifenazate (Acramite-4SC) at 16 to 24 fl oz/A (0.45 to 0.675 lb ai/A). Maximum of two applications per season. REI 12 hr. Retreatment interval 14 days. Toxic to birds, estuarine/ marine invertebrates and fish. SLN 24c WA-150003 (expires 12/31/2022). Washington only.
- propargite (Comite) at 32 to 48 fl oz/A (1.64 to 2.46 lb ai/A). Maximum of two applications per season. REI 9 days. Retreatment interval 14 days. Toxic to fish. Resistance Group 12c. Restricted Use Pesticide. SLN 24c WA-040019 (expires 12/31/2025). Washington only.

Pests of Table Beet Grown for Seed

Erik J. Wenninger and Anastasia Stanzak

Latest revision—March 2025

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Table beet seed—Aphid

Includes green peach aphid (*Myzus persicae*)

Pest description and crop damage The green peach aphid is yellowish green and teardrop-shaped. Its most important damage is as a vector of virus diseases rather than by feeding injury through sucking sap.

Management—chemical control
See Table 1.

Table beet seed—Garden symphylan

Scutigerella immaculata

Pest description and crop damage Active, white, fragile, centipede-like soilborne relatives of insects, 0.25 inch in length, with 12 or more pairs of legs. They damage table beet primarily early in the season by feeding on germinating seed or on small roots of seedling plants. Symphylans are in unpredictably spotty infestations and generally are considered minor pests.

Management—chemical control

No effective "rescue" treatments for symphylans can be applied postemergence in table beet seed fields.

Table beet seed—Slug

Various species

Management—chemical control
See Table 1.

Table beet seed—Twospotted spider mite

Tetranychus urticae

Management—chemical control
See Table 1.

Table 1. Pesticides registered for arthropods and slugs in table beet grown for seed.

Active Ingredient	Trade Name	Aphids	Slug	Spider mite	Signal Word	REI	PHI (days)	24c SLN	SLN Expiration
bifenazate	Vigilant 4SC			X	C	12 h	14	WA-230009	12/31/2027
metaldehyde	Slugger 4.0		X		C	12 h	30	OR-140004A	12/31/2028
propargite	Comite			X	D	9 days		WA-040019	12/31/2025
pymetrozine	Fulfill	X			C	12 h		WA-190003	12/31/2024

All trade names may not be listed. The products that are listed are not in order of efficacy or preference. Always refer to the specific product label before making recommendations and/or applications.

X = labelled for control

Abbreviations: C = Caution; W = Warning; D = Danger. PHI = Pre-harvest interval. REI = Restricted entry interval.