Technical Bulletin for:
Agriotes Wireworm (caspicus)

Agriotes caspicus (Heyden) • Coleoptera, *Elateridae* • AGRCAS

DISTRIBUTION	Afghanistan, Iran, Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Turkmenistan, and Uzbekistan, Russia
HOSTS	Many types of seedlings, potato tubers and sweet potatoes are also potential hosts.
DESCRIPTION	
Adult	About 9 mm long, brownish to black in color.
Larvae	Cylindrical, smooth, waxy with few hairs. Larvae are straw yellow in color.
Eggs	
LIFE HISTORY	

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl hexanoate, Geraniol and Myrcene in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding  
MONITORING STRATEGY	Hang trap near potential host plants. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding is another effective preventative measure.

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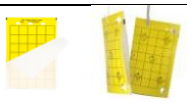
Technical Bulletin for:
Agriotes Wireworm (gallicus)

Agriotes gallicus (Lacordaire) • Coleoptera, *Elateridae* • AGRGAL

DISTRIBUTION	Central, Western and Southern Europe
HOSTS	Many types of seedlings, potato tubers and sweet potatoes are also potential hosts.
DESCRIPTION	
Adult	About 6-7 mm (males) or 7-9 mm (females) long, brownish to black in color, with a slight greenish tint.
Larvae	Cylindrical, smooth, waxy with few hairs. Larvae are straw yellow in color.
Eggs	
LIFE HISTORY	

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl hexanoate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding is another effective preventative measure.

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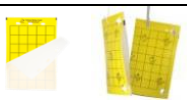
Technical Bulletin for:
Agriotes Wireworm (lineatus)

Agriotes lineatus (Linnaeus) • Coleoptera, *Elateridae* • AGRLIN

DISTRIBUTION	Europe, North America, Iran, Israel, and Turkey
HOSTS	Many species, including winter cereals, beet, carrot, onion, alfalfa, clover, tomato, and fruit saplings. Potato tubers and sweet potatoes are also potential hosts.
DESCRIPTION	
Adult	About 7-10 mm long, dark-brownish in color, with rounded, reddish-brown elytra and a near-black head.
Larvae	Initially whitish, turning light brown with maturity, and able to grow up to 15 mm.
Eggs	
LIFE HISTORY	This species prefers humid soil conditions along with relatively high temperatures. The adults appear in early spring, fly at night when temperatures are above 20ºC and are attracted to light. They place their eggs (100-300/female) in vegetation-covered humid soil. The emerging larvae, which are sensitive to dryness, initially feed on humus and then on under- and above-ground plant material. They may go through several (up to 12) instars. At maturity they pupate in the soil, to appear in the spring, sometimes dispersing by flying. Total development requires several years.

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl butyrate and Geranyl octanoate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants just before spring. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding and crop rotation are other effective preventative measure.

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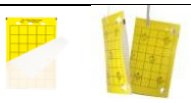
Technical Bulletin for:
Agriotes Wireworm (litigiosus)

Agriotes litigiosus (Rossi) • Coleoptera, *Elateridae* • AGRLIT

DISTRIBUTION	Iran, Austria, Bulgaria, France, Greece, Italy, Macedonia, Slovenia, Spain and Switzerland.
HOSTS	Many species, including maize, cereals, sunflower, sugar beet, potato, and tomato
DESCRIPTION	
Adult	About 7-11 mm long. Species can come in either dark beige or reddish brown in color, depending on geographical location.
Larvae	
Eggs	
LIFE HISTORY	Eggs are laid in the soil, where larvae feed on the roots of the host plant.

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl isovalerate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding is another effective preventative measure.

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Technical Bulletin for:
Agriotes Wireworm (obscurus)

Agriotes obscurus (Linnaeus) • Coleoptera, *Elateridae* • AGROBS

DISTRIBUTION	Widely distributed across Europe, Northern Caucasus, Kazakhstan, and Mongolia. Introduced to North America
HOSTS	Many species, including maize, cereals, sunflower, sugar beet, potato, and tomato
DESCRIPTION	
Adult	About 7-10 mm long, dark brown with convex elytra covered in yellow-gray hairs.
Larvae	Dark metallic yellow, can grow up to 25 mm long
Eggs	White, nearly globular, up to 0.5 mm in diameter.
LIFE HISTORY	Adults are on the wing from April to June or May to August, depending on geography. Females lay eggs in groups of 3-18, totally 75-230, on leaves or in the soil to a depth of 5 cm. Larvae develop for 3-5 years, feeding on the roots of the host plant. Pupation begins generally around July-August, with young Adults emerging around the same time, overwintering in the soil up to 25 cm below the surface.

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl hexanoate and Geranyl octanoate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding  
MONITORING STRATEGY	Hang trap near potential host plants. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding is another effective preventative measure.

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Technical Bulletin for:

Pale Western Cutworm

Agrotis orthogonia (Morrison) • Coleoptera: *Noctuidae* • AGRORT

DISTRIBUTION	North America, from Southern Canada to California, ranging to the eastern edge of the Great Plains.
HOSTS	Various forbs and grasses, including winter wheat, corn, sugar beets, and other small grains.
DESCRIPTION	
Adult Moth	Gray to brownish-white, about 19 mm in length with a wingspan of about 35 mm.
Larvae	25 mm in length when mature, grayish-white in color, with 2 brown bars on the front of the head capsule.
Eggs	Laid in the upper 12 mm of soil, about 250-300 eggs laid in total.
LIFE HISTORY	Adult moths emerge from the soil in late summer and fall. Eggs are deposited in loose soil and usually hatch within two weeks. Hatch may be delayed for up to several months if moisture and temperature conditions are unfavorable. Larvae prefer loose, sandy or dusty soil and are found most easily in the driest parts of the field, such as hilltops. After feeding is completed, pale western cutworm larvae move to pupal chambers constructed several inches below the soil surface. Adult emergence can begin in late July.

MONITORING INFORMATION

LURE ACTIVE INGREDIENTS, SUBSTRATE & FIELD LIFE	Z5-12Ac, and Z7-12Ac in a Red Rubber Septum. Lure longevity: Thirty (30) days. 
TRAP TO USE	Paper or Plastic Delta Trap, or Uni Trap 
MONITORING STRATEGY	Hang traps in mid to late August and monitor weekly through October. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Since they appear during dry springs, detection is difficult. Check for wilting or dead tillers in wheat, or leaf damage, and dispose of such crops to help prevent further infestation.

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Technical Bulletin for:
Agriotes Wireworm (ponticus)

Agriotes ponticus (Stepanov) • Coleoptera, *Elateridae* • AGRPON

DISTRIBUTION	Southern Europe, including Italy, France, Spain, Bulgaria, Austria, Corsica, Czech Republic, Greece, Hungary, and Crete.
HOSTS	Many species, including Potato and Sweet Potato species.
DESCRIPTION	
Adult	
Larvae	
Eggs	
LIFE HISTORY	

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl butyrate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding  
MONITORING STRATEGY	Hang trap near potential host plants. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding, as well as crop rotation, are other effective preventative measure.

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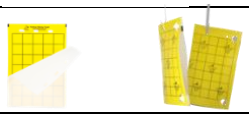
Technical Bulletin for:
Agriotes Wireworm (proximus)

Agriotes proximus (Schwarz) • Coleoptera, *Elateridae* • AGRPRO

DISTRIBUTION	Widely distributed, including Austria, Bulgaria, Greece, Hungary, Italy, Moldova, Near East, North Africa, Slovakia, and South Russia.
HOSTS	Many species, including Maize, cereal grains, sunflower, sugar beet, potato, and tomato
DESCRIPTION	
Adult	7-11 mm long, very similar to *A. lineatus* morphologically.
Larvae	
Eggs	
LIFE HISTORY	

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl butyrate and Geranyl octanoate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding, as well as crop rotation, are other effective preventative measure.

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Technical Bulletin for:
Agriotes Wireworm (rufipalpis)

Agriotes rufipalpis (Brullé) • Coleoptera, *Elateridae* • AGRRUF

DISTRIBUTION	Widely distributed, including Bulgaria, Croatia, Greece, Hungary, Slovakia, and the former Yugoslavia.
HOSTS	Many species, including Maize, cereal grains, sunflower, sugar beet, potato, and tomato
DESCRIPTION	
Adult	7-11 mm long, body and elytra are greenish-brown to shiny black. Looks very similar, albeit smaller, to *A. sordidus*
Larvae	
Eggs	
LIFE HISTORY	

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl hexanoate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding, as well as crop rotation, are other effective preventative measure.

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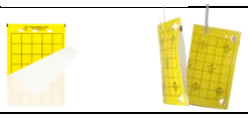
Technical Bulletin for:
Agriotes Wireworm (sordidus)

Agriotes sordidus (Brullé) • Coleoptera, *Elateridae* • AGRSOR

DISTRIBUTION	Widely distributed, including Britain, France, Spain, Sicily
HOSTS	Many species, including Maize, cereal grains, sunflower, sugar beet, potato, and tomato
DESCRIPTION	
Adult	9-12 mm long, body and elytra are shiny black
Larvae	
Eggs	
LIFE HISTORY	Adults are on the wing around the end of April. Larvae feed on the roots and seeds of ths host plant within the soil.

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl hexanoate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants, changing out after 3-4 weeks as necessary. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding, as well as crop rotation, are other effective preventative measure.

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Technical Bulletin for:
Agriotes Wireworm (sputator)

Agriotes sputator (Linnaeus) • Coleoptera, *Elateridae* • AGRSPU

DISTRIBUTION	Widely distributed, including Central Europe, Asia Minor, Northern Mongolia and Northern Africa
HOSTS	Many species, including Maize, cereal grains, sunflower, sugar beet, potato, and tomato
DESCRIPTION	
Adult	Measures between 6 and 9 mm long, bluntly pointed head and pronotum, of which the latter is brownish-ginger in color. The abdomen is brownish-black, with the elytra tinted reddish-brown with yellow tinge.
Larvae	Yellow, slender, stiff and leathery, growing to ~20 mm in length.
Eggs	
LIFE HISTORY	The adults are active for one or two months from late spring onwards. About one hundred eggs are laid in batches, 2 to 5 cm (0.8 to 2.0 in) beneath the soil and hatch after about two weeks. The larvae develop in the soil for two to four years. They feed on seeds and seedlings and the new tillers of cereal crops, and gnaw their way into roots, finding their food by smell. When fully-grown, the larvae pupate in late summer in the soil. The adults emerge two to three weeks later. The insects overwinter as adults and as larvae, the whole life cycle taking up to five years to complete.

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	Geranyl butyrate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants, changing out after 3-4 weeks as necessary. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding, as well as crop rotation, are other effective preventative measure.

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Technical Bulletin for:
Agriotes Wireworm (ustulatus)

Agriotes ustulatus (Schaller) • Coleoptera, *Elateridae* • AGRUST

DISTRIBUTION	Widely distributed, including Central Europe, Asia Minor, Northern Mongolia and Northern Africa
HOSTS	Many species, including Maize, cereal grains, sunflower, sugar beet, potato, and tomato
DESCRIPTION	
Adult	Measures between 7 to 11 mm long, brownish or reddish-brown abdomen and elytra with a black head and prothorax.
Larvae	Can go through up to 13 instars under lab conditions. Initially 1 mm in length.
Eggs	
LIFE HISTORY	Eggs are laid in moist soil and can be laid singly or in clusters, where clusters can be made up by 2 to 39 eggs, between May and June. Larvae hatch within 3-4 weeks and begin feeding on the roots of the host plants. Larvae reach maturity in the summer months and pupate within the soil. Fully-developed adults occur in two weeks, who overwinter and take wing in late March and early April.

MONITORING INFORMATION

ACTIVE INGREDIENTS, LURE, FIELD LIFE	E,E-famesyl acetate in a plastic vial. Lure longevity: 30 Days 
TRAP TO USE	Yellow Card, Double-sided or back-folding 
MONITORING STRATEGY	Hang trap near potential host plants, changing out after 3-4 weeks as necessary. Check with Cooperative Extension or Master Gardener for local information and recommendations.
CULTURAL & PHYSICAL CONTROL	Check soil near roots for wireworm presence or roots themselves for damage. Flooding fields for a few days prior to seeding, as well as crop rotation, are other effective preventative measure.

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