NEBRASKA

University of Nebraska Lincoln

PHREC 06-05b

# POTATO EYES

Vol. 18, Issue 2, Summer 2006 • Alexander D. Pavlista, Ph.D., Extension Potato Specialist

University of Nebraska Panhandle Research and Extension Center - 4502 Avenue I, Scottsbluff, NE 69361

## Insect Reference Guides for Growing Season

The 2006 growing season is has begun. Now would be an excellent time to review common defoliating, vectoring and tuber eating insects affecting plantgrowth and harvest. The following tables are brief guides as to what may be anticipated and how to deal with the possibilities during the season. At the end, the three major predatory insects are referenced as well.

• **Page 1** is a Reference Guide for Common Insects Associated with Eating Tubers.

• **Page 2** is a Reference Guide for Common Insects Associated with Defoliation.

• **Page 3** is a Reference Guide for Common Insects Associated with Vectoring Viruses and Toxins.

• **Page 4** is Identifying the Potato Tuber Moth or Tuberworm.

**Reference Guide for Common Insect Associated with Tuber Eaters**

| Insect | Appearance | Damage | Action |
|---|---|---|---|
| **Wire Worm (Click Beetle)** | Larva: very small and white when young becoming hard-shelled with dark transverse bands along the length of their body, shiny yellow to rust body with six (three pairs) slender legs toward the head region, pair of pincer-like protrusions at the head, half to an inch long at maturity and easily visible in traps and may be found in or hanging from a potato tuber. | During emergence, larvae may drill into seed-pieces, weakening them and soft rot infection may result. Sprouts also may be eaten. During the season, although uncommon, roots and stems may be fed upon. Harvested tubers are often perforated with tunnels appearing on surface as straight, round holes with smooth walls making them unmarketable. | Because wireworm larvae often live for six years and longer, avoid fields with a history of wireworm. Avoid planting after grasses. Planting after several years of alfalfa is excellent. Control is difficult as they live underground. Materials applied in-furrow or seed are labeled for protecting seed-pieces and sprouts. Ethoprop may be applied around emergence and is usually the standard. |
| **White Grub (Sand Chafer)** | Adult sand chafer: ⅜ inch long, similar size and shape to Japanese beetles, shiny black with rusty-red wing covers, bronze or copper from reflecting light when seen from above, Larva (white grub): small, fat and worm-like, inch long, dirty white and partially transparent, brown head with six prominent legs. They live underground. | Tubers appears with large, shallow, irregular and ridged gouges, ¼ to ½ inch deep running along the surface. As grubs enlarge, feeding increases. The worst damage may occur after vine desiccation due to a reduction of shade allowing warming. Feeding stops when the ground cools. | Avoid using manure and planting in high organic matter. Vine desiccate later. Little is known about chemical control. Carbofuran has worked the best but needs to be incorporated by sprinkler irrigation within a week after vine desiccation. Carbofuran may be used against adults in mid-season with some effect. |
| **Flea Beetles** | Adult: very small, oval, shiny green to brown to black, enlarged hind legs for jumping. Larva (grub): elongated soft-bodied, white with yellow or tan head, ¼ - ⅓ inch long, six short legs. | Economic damage is due to feeding on tubers by late season larvae. Tubers appear with narrow, straight, very small tunnels along the perimeter of the tuber. Tunnels are shallow, may extend ½ inch deep, and act as a disease entry. | Infestations are sporadic and unpredictable; economic thresholds are not known. Crop rotation and weed control help. Soil-applied systemic insecticides control adults. Most foliar material work well against adults. Treatment for larvae are not available. |

# Insect Reference Guides, continued

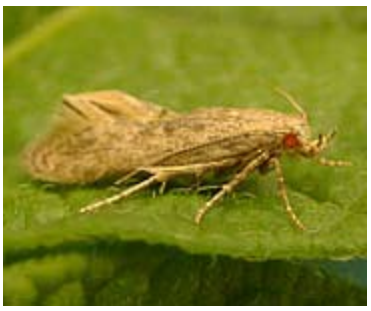
| Reference Guide for Common Insect Associated with Defoliation | | | |
|---|---|---|---|
| **Insect** | **Appearance** | **Damage** | **Action** |
| **Colorado Potato Beetle (CPB)** | Adult: round, hard-shelled, yellow with black stripes, half inch long.<br>Eggs: oval, yellow to bright orange, clustered.<br>Larva: soft-shell, slug-like, red-orange-tan with black dots in a row on each side. | The adults eat foliage, making increasingly larger holes until foliage is gone, leaving behind the stem tissue. When completely defoliated, plant appears as a collection of naked branches. | It easily develops resistance to insecticides ('super bug').<br>Non-resistant populations are susceptible to most insecticides that may be applied on seed-pieces, in furrow or to foliage.<br>Mechanical means of control such as flaming are available.<br>Several predatory insects feed on eggs and larvae.<br>In the 1990s, genetically altered potato were resistant to it but are no longer available in USA. |
| **European Corn Borer (ECB)** | Adult: triangular at rest, (female) creamy to light yellow to tan wings the outside of which are marked by two dark serrated lines running across, and stout bodies about ¾ inch long.<br>Egg: smaller than the head of a pin, white or creamy changing to yellow and darken, clustered and covered with waxy film.<br>Larva: one-inch long, capsule-shaped with segmented legs, light gray to faint pink with a brown to black head, small brown to black spots along the sides on each segment, and a faint stripe along its back.<br>Pupa: smooth, cylindrical, reddish-brown, half inch long, found in a chamber burrowed into the stem. | The larvae burrow into the stem, eating out the pith and, in the process, also eat the vascular tissue, thereby disrupting nutrient flow and resulting in reduced vigor. Depending on where the larva burrows, leaves appear rolled.<br>Tunnels have been associated with infection by bacteria (especially the pathogen causing black leg) and fungi. | Broad-spectrum foliar insecticides are effective on adults. Treatment should begin about a week after peak moth flight in corn and a second application made a week to 10 days later. Due to tunneling, effectiveness on larvae is poor. After adults are first detected, examin stems for small entry holes and start applications if 15% of the plants have stems with entry holes.<br>Biological control is spotty. Ladybird beetles will eat eggs. |
| **False Chinch Bug** | Adult: cylindrical-shaped, ⅛ inch long, brownish-gray with silvery-gray wings.<br>Nymph: brownish-gray head and thorax with a light-tan longitudinal stripe and light tan abdomen with some tiny reddish spots, smaller than adults and wingless. | Plants look wind burned. Young top leaves appear wilting and slightly curled. These leaves then turn brown along the edges and curl tightly, and finally dry out completely.<br>Adults congregate on young leaves at the top of the plant and suck the sap. A 100 may be on a single leaflet which appears tightly curled. The adults crawl or fly to other plants after killing the plant top. | Little is known insecticide efficacy. Endosulfan is the only ingredient specifically labeled. Dimethoate also works well.<br>The time to apply is during the week after nearby grains or alfalfa are harvested since the insect prefers these crops and go looking for a temporary home.<br>Damage to affected young leaves will remain after their departure. |

# Insect Reference Guides, continued

| Reference Guide for Common Insect Associated with Vectors of Viruses and Toxins. | | | |
|---|---|---|---|
| **Insect** | **Appearance** | **Damage** | **Action** |
| **Green Peach Aphid** | Winged adult: tear-drop body shape, bright green with a dark head and thorax, and green abdomen with dark patches. [For true identification, observe head under 10X magnification and look at the shape and length of the converging tubercules or projections at the base of the antennae as viewed from above. Nymph (wingless female adults): tear-drop shape, tenth inch long, (early season) light yellow-green to pink, (later) pink to pale orange, move around and colonize. | Sap is ingested from leaf veins causing a wilt. They are vectors for viruses most notably potato leaf roll virus (PLRV) which is carried persistently from plant to plant. PLRV causes a sever rolling of leaves. Leaves become hard and brittle, and give a rattle sound when shaken. The virus moves to the tuber and causes net necrosis which appears brown during frying. | The aphid usually is not a major problem unless plants with viruses are around. Plant certified seed tubers. Eliminate cull piles. Control volunteer potato. Practice good weed control, especially of nightshades. Rogue infected plants. Avoid fields near Prunus trees. Beneficial insects can predate nymphs. Systemic, broad-spectrum, soil-applied insecticides are effective. Methamidophos is commonly used for late season aphid control. Other foliar material also may be used. |
| **Potato Psyllid** | Adult ("jumping plant lice"): not damaging, tiny cicada-like, tenth inch long with wings held roof-like over the body, light green turning black with white markings, usually stripes, bulging eyes, developed legs. Nymph: tiny (pin-head), flat, overlapping scales ringed with tiny hairs, tan turning pale green, excrete a waxy white granule. Nymphs are found in the upper canopy on the underside of leaves; they are quiescent and do not move around. | Nymphs attach to the underside of leaves, sucking sap, injecting a toxin. The toxin drastically reduces or even stops all plant growth from that point. The degree depends on the amount of toxin and the plant's growth stage. Typical foliar symptoms (psyllid yellow) are stunting, leaf yellowing and leaf roll.Tubers may be smaller, fewer and deformed. Dormancy may not be imposed and hair sprouting occur. | There are many natural predators but their effect on populations is modest. Weather plays the key roll on occurrence of psyllids. Many insecticides will affect potato psyllids. A systemic is best since the nymphs do not move around and reside on the leaf underside. Foliar insecticides may control adults but application timing is critical. Monitor population in more southern states, northerly wind currents, and night coolness. |
| **Leaf Hoppers (Aster & Potato)** | Adult: wedge or spindle-shaped bodies, ⅛ inch long, bright lime-green to yellow green with white markings, transparent green wings, variable number of white spots on top of head and along thorax. Nymph: similar to adults but smaller and wingless. | Feeding is on the underside of leaflets. Injury starts with a yellowing along leaflet margins with a slight rolling followed by a gradual browning starting at the leaflet's tip and margin (hopperburn), and extending basipetally until the leaflet is all dead and desiccated. Defoliation will occur. Leafhoppers transmit a phytoplasma causing aster yellow. Symptoms vary and include rosette, leaf roll, and leaf discolor. Aerial tubers may form. Tubers may be affected. | Monitoring and correctly identifying leafhoppers are essential as many do not damage potato. The economic threshold for potato leafhopper is one nymph per 10 leaves. Many insecticides are effective against leafhoppers. They may be applied to seed-pieces, in-furrow, or to foliage. |

# Identifying the Potato Tuber Moth or Tubeworm

Potato tuber moth (PTM) has appeared and spread in the US in the past century. It was reported in Nebraska in 2005. PTM consists of several species. Phthorinaea operculella is widely distributed in the world, found in North Africa, and parts of Asia, Europe, the Americas, and Oceania, in warm and dry regions. It is the most widely distributed potato insect in the world.



www.oisat.org

Potato Tuber Moth.

www.plantdepommedeterre.org

Damage to the tuber from Potato Tuber Moth -- tunnels lined with silk thread.

**Description:**

PTM has four stages: adult, egg, larva (damaging), pupa.

Adults have a narrow, silver-gray body with grayish-brown wings patterned with small dark spots. The body length is around 1/3 of an inch and a wing span of an inch. It is mostly nocturnal and attracted to light. They are poor fliers.

Eggs are oval, smooth and yellow; laid alone or in clusters on leaves or near eyes on infested tubers.

Larva, caterpillar-like, is gray, cream or pale green with a dark brown head about ½ to ¾ inch long in the final instar.

Pupa is yellow or rust colored; pupation occurs among dead leaves or debris, in soil, or on stored tubers.

**Damage:**

PTM attacks solanaceous crops with potato being favored.

Foliage -- Larva (tuberworm) mines into leaflets causing them to form transparent blisters, then move into stem tissue causing death.

Tubers -- Larva move through cracks in the soil after vine desiccation to tubers and often enter through eyes making slender tunnel along the surface or deep into tubers. A tunnel can be detected by mounds of worm excrement (frass) appearing black at the entrance. Tunnels do not heal and are entryways for diseases most notably soft rot and dry rot.

Life Cycle: Generation time is 17 to 125 days depending on temperature, commonly one month. Adult = up to 10 days; egg = 2 to 6 days; larva = 13 to 33 days; pupa = 6 to 29 days. Several generation may form per year. Life cycle can continue in storage on tubers.

**The Nebraska Potato Eyes**

**is on the World Wide Web at:**

**www.panhandle.unl.edu/peyes.htm**