

# *Diprion pini*

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## Scientific Name

*Diprion pini* (Linnaeus)

## Synonyms:

*Diprion butovitshci* (Hedqvist)

*Diprion pini* var. *klugi* (Enslin)

*Diprion pini* var. *nigristernis* (Enslin)

*Diprion pini* var. *nigroscutellatum*  
(Enslin)

*Lophyrus pini* var. *nigripectus*  
(Matsumura)

*Tenthredo dorsata* (Fabricius)

*Tenthredo eques* (Scrank)

*Tenthredo pectinata major* (Retzius)

*Tenthredo pini* (Linné)

*Tenthredo pineti* (Bechstein & Scharfenberg)



**Figure 46.** Adult female of *Diprion pini* (Image courtesy of Daniel Adam, Office National des Forêts, Bugwood.org)

## Common Names

**Pine sawfly**, Common pine sawfly

## Type of Pest

Sawfly

## Taxonomic Position

**Kingdom:** Animalia, **Phylum:** Arthropoda, **Order:** Hymenoptera, **Family:** Diprionidae

## Reason for Inclusion in Manual

CAPS Target: AHP Prioritized Pest  
List for FY 2012

## Pest Description

Egg: The eggs are elongated, “somewhat kidney-shaped and are about 1.4 mm [0.06 in] long” (Novak, 1976).

Larva: “The light yellow to yellow-green larvae have three pairs of dark thoracic legs, seven pairs of short prolegs, which have a transitional line along the abdominal segments, and one pair of anal prolegs. The



**Figure 47.** Larva of *D. pini* on *Pinus sylvestris* (Scots pine) (image courtesy of Louis-Michel Nageleisen, Département de la Santé des Forêts, Bugwood.org).

head is small and brown. The fully grown larva is 26 mm [1.02 in] long" (Novak, 1976).

Pupa: "The pupae look similar to the adults; pupae are surrounded by a yellow-brown cocoon 8 to 12 mm [0.31 to 0.47 in] in length" (Novak, 1976).

Adult: Have a strongly arched body and range from 7 to 10 mm long (0.28 to 0.39 in) (Novak, 1976). "The antennae have 26 segments. Sexual dimorphism is marked. The smaller male is mostly black-brown to black. It has strong comb-like (pectinate) antennae. The negligibly larger female is more robust and has saw-like antennae. The pale yellow colour prevails, with some darker patches on the thorax and on the central abdominal segments, which is ended with a saw-like ovipositor" (Novak, 1976).

### Biology and Ecology

Females attract males through the use of sex pheromones. After adults mate, females cut grooves into pine needles in dense rows, laying 3 to 20 eggs per site (Novak, 1976). Eggs are usually laid in a cluster occupying about 10 adjacent needles (Sharov, 1993). Females then place a protective coating over the eggs (Novak, 1976). If a female fails to find a mate, she will still produce progeny, but they will all be male (Besemer, 1942). During the spring, only old needles are used, while both new and old needles are used during the summer (Novak, 1976). This could be because juvenile foliage may be toxic to early instars and can lead to high mortality, decreased rate of development, and reduction in weight and fecundity (Géri et al., 1993). Females can lay a total of 100 to 150 eggs (Novak, 1976). Eggs hatch after 14 to 21 days after being laid (Novak, 1976).

Larvae are gregarious feeders and attack the shoots as well as mine the needles from the side. Larvae may also eat the bark of the shoots and may sometimes consume the shoots completely. Older larvae are less gregarious (Novak, 1976). As the growing season continues, larvae will begin to consume needles of all age classes, not just older foliage (Långström et al., 2001). Larvae take at least 4 to 5 days to develop (Novak, 1976). Craig and Mopper (1993) state that males have 5 instars while females have 6 instars.

Larvae spin cocoons and pupation occurs on twigs, bark crevices, and undergrowth (Novak, 1976). Pupation can last two to three weeks or throughout winter depending on the time of year (Novak, 1976). Diapause occurs in the pupal stage (Novak, 1976). Some parts of the population can have a prolonged diapause which lasts more than one year (Sharov, 1993).

This species has one generation per year in northern regions of its range as well as high elevations; two generations per year can occur in its range throughout central and southern Europe (Novak, 1976). In Russia, there is a maximum of two generations a year (Sharov, 1993).

*D. pini* has a complex life history. Parts of the population can have prolonged diapause, which can differ in total length. There can also be differences in the number of generations per year (Knerer, 1993). Because of this, both larvae and adults may be

present at the same time (Anderbrant, 1993). In areas with two generations, the first generation swarms around the end of April until the start of May (Novak, 1976). In Russia, the second generation occurs from the end of July to the beginning of August (Sharov, 1993). In the northern region of its range, adults usually emerge during June and July (Novak, 1976). Adults only live a few days and do not feed (Sharov, 1993).

### Pest Importance

According to Sharov (1993), *D. pini* is considered one of the most serious pests of pine in Russia, Ukraine, and Belarus. In Russia, outbreaks usually occur in 3-6 year intervals after hot and dry summers (Sharov, 1993).

In Germany, mature pine forests are usually attacked (Herz et al., 2000). In the early 1990s, Lithuania had its largest outbreak of *D. pini* on *Pinus sylvestris*. These trees were located on well drained and infertile soils in the southern portion of the country (Augustaitis, 2007).

Lyytikäinen-Saarenmaa and Tomppo (2002) found that *P. sylvestris* increment and timber yield decreased due to defoliation by diprionid sawflies, including *D. pini*. During moderate defoliation by *D. pini*, volume growth was reduced by 86% while heavy defoliation led to 94% reduced volume growth (Lyytikäinen-Saarenmaa and Tomppo, 2002). Mortality of host plants can occur during outbreaks as well. Lyytikäinen-Saarenmaa and Tomppo (2002) estimated 30% tree mortality in defoliated stands during a *D. pini* outbreak in Finland.

Géri et al. (1993) states that fecundity of *P. sylvestris* was significantly reduced when defoliated by *D. pini* the previous year.

### Symptoms

*D. pini* populations can build up suddenly causing defoliation of large forested areas (Knerer, 1993). Outbreaks often occur after very hot and dry summers (Géri et al., 1993). *D. pini* usually attacks older pines (Géri et al., 1993) and typically causes greater damage in pure stands (Géri, 1988). Outbreaks caused by *D. pini* can lead to heavy defoliation of hosts (*Pinus* spp.) (Herz et al., 2000).



**Figure 48.** Damage on *Pinus sylvestris* (Scots pine) caused by *D. pini* (Image courtesy of G. Reboux, Bugwood.org).

### Known Hosts

Host	Reference
<i>Pinus cembra</i> (Swiss stone pine)	(Barre, 2002; Liston, 1995)
<i>Pinus contorta</i> (lodgepole pine)	(Barre, 2002; Liston, 1995)
<i>Pinus montana</i> (dwarf mountain pine)	(Barre, 2002; Liston, 1995)
<i>Pinus nigra</i> (black pine) (including ssp. <i>nigricans</i> var. <i>austriaca</i> , ssp. <i>laricio</i> var. <i>corsicana</i> , ssp. <i>clusiana</i> var. <i>cebennensis</i> )	(Barre, 2002; Liston, 1995)
<i>Pinus radiata</i> (radiata pine)	(Barre, 2002; Liston, 1995)
<i>Pinus strobus</i> (eastern white pine)*	(Barre, 2002; Liston, 1995)
<i>Pinus sylvestris</i> (Scots pine)	(Barre, 2002; Liston, 1995)
<i>Pinus uncinata</i> (mountain pine)	(Barre, 2002; Liston, 1995)

\*Seems to be a poor host according to Barre (2002).

The major host of this species is *Pinus sylvestris* (Scots pine). Novak (1976) states that *D. pini* is most likely to occur on 20 to 40 year old *P. sylvestris* pine forests and stands or on hosts found on poor sites in warmer areas.

### Known Vectors

This pest is not currently known to vector any pathogens or other associated organisms, but damage by this pest can lead to trees becoming more susceptible to secondary attack. Secondary attack may be caused by stem-boring insects like the common pine shoot beetle, *Tomicus piniperda* (Långström et al., 2001).

### Known Distribution

Location	Reference
<b>Africa</b>	
Algeria	(CABI, 2008; EPPO, 2007)
<b>Asia</b>	
Russia	(CABI, 2008; EPPO, 2007)
Turkey	(CABI, 2008; EPPO, 2007)
<b>Europe</b>	
Albania*	(Géri, 1988)
Austria	(CABI, 2008; EPPO, 2007)
Belgium	(CABI, 2008; EPPO, 2007)
Bosnia and Herzegovina*	(Géri, 1988)
Bulgaria	(CABI, 2008; EPPO, 2007)
Croatia	(CABI, 2008; EPPO, 2007)
Czech Republic	(CABI, 2008; EPPO, 2007)



Location	Reference
Denmark	(CABI, 2008; EPPO, 2007)
Estonia*	(Géri, 1988)
Finland	(CABI, 2008; EPPO, 2007)
France	(CABI, 2008; EPPO, 2007)
Germany	(CABI, 2008; EPPO, 2007)
Greece*	(Géri, 1988)
Hungary	(CABI, 2008; EPPO, 2007)
Italy	(CABI, 2008; EPPO, 2007)
Latvia	(CABI, 2008; EPPO, 2007)
Liechtenstein*	(Géri, 1988)
Lithuania*	(Géri, 1988)
Luxembourg	(CABI, 2008; EPPO, 2007)
Macedonia*	(Géri, 1988)
Moldova*	(Géri, 1988)
Monaco*	(Géri, 1988)
Montenegro*	(Géri, 1988)
Netherlands	(CABI, 2008; EPPO, 2007)
Norway	(CABI, 2008; EPPO, 2007)
Poland	(CABI, 2008; EPPO, 2007)
Portugal	(CABI, 2008; EPPO, 2007)
Romania	(CABI, 2008; EPPO, 2007)
Serbia*	(Géri, 1988)
Slovakia	(CABI, 2008; EPPO, 2007)
Slovenia	(CABI, 2008; EPPO, 2007)
Spain	(CABI, 2008; EPPO, 2007)
Sweden	(CABI, 2008; EPPO, 2007)
Switzerland	(CABI, 2008; EPPO, 2007)
Ukraine	(CABI, 2008; EPPO, 2007)
United Kingdom	(CABI, 2008; EPPO, 2007)

\*Géri (1988) states that *D. pini* is found throughout Europe and includes these countries in his distribution map.

(CABI, 2008; EPPO, 2007; Tozlu, 2001; Liston, 1995; Géri, 1988; Novak, 1976).

### Potential Distribution within the United States

Sawflies, including *D. pini*, highly prefer pine stands on infertile and well-drained soils as well as stands that are affected by unfavorable climatic or anthropogenic factors (Augustaitis, 2007).

If introduced into the United States, this species may be able to utilize other pine species not present in its native range. A commodity acreage map by USDA-CPHST (2010) illustrates a low to moderate amount of pine material throughout most of the

eastern part of the United States and a moderate to high amount of pine material throughout most of the western part of the United States.

Its main host, *P. sylvestris* is found throughout much of the northeastern and Midwestern portion of the United States (USDA-NRCS, 2011).

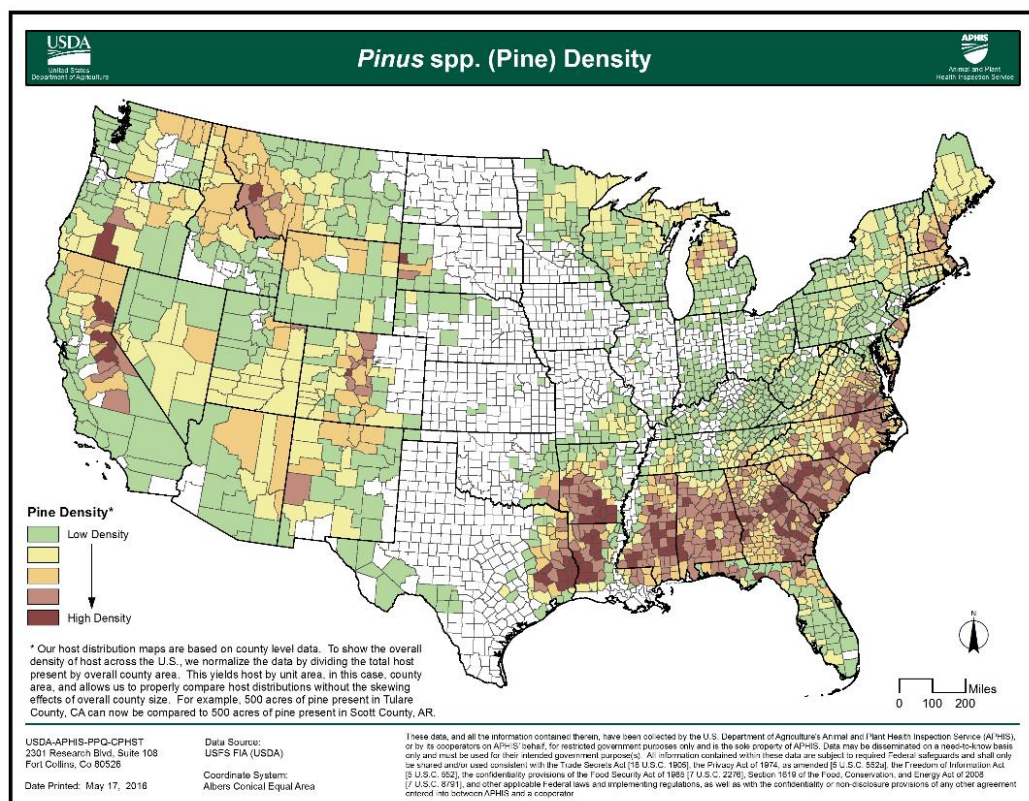


Fig. 49. Commodity acreage map of pine species (*Pinus* spp.) within the continental United States. Values from low to high indicate increased commodity density. Map courtesy of USDA-APHIS-PPQ-CPHST.

**Figure 50.** Distribution of *Pinus sylvestris* throughout North America (USDA-NRCS, 2011; Accessed 24 March, 2011).

## Pathway

No interceptions have been recorded in the last ten years for either this species or the genus *Diprion* (AQAS, 2011; queried 3-11-2011). Neither the genus nor species is listed in the AQAS system. However, the family Diprionidae is listed as reportable. This pest may be able to travel on host plant material in international trade. Pupae of *D. pini*

can be found in the bark of host plants as well as surrounding leaf litter and soil while larvae and eggs can be found on the leaves of host plants. As there are certain regulations in place when importing plant material (i.e. no soil attached to plant material) the risk associated with this is most likely low. This species may be moved short distances by man through silvicultural practices (CABI, 2008). Dispersal by adults may also occur.

## Survey

### **CAPS-Approved Method\*:**

The CAPS-approved method is a trap and lure combination. The trap is the large plastic delta trap. The lure is effective for 28 days.

Any of the following Trap Product Names in the IPHIS Survey Supply Ordering System may be used for this target:

Large Plastic Delta Trap Kits, Orange,  
Large Plastic Delta Trap Kits, Red, or  
Large Plastic Delta Trap Kits, White

Trap color is up to the State and does not affect trap efficacy.

The Lure Product Name is *Diprion pini* Lure.

### **Literature-Based Methods:**

#### Survey site and selection

*Pinus sylvestris* may be used in forest stands as wind breaks, timber, and Christmas tree plantations (USDA-NRCS, 2011). Traps should be placed near areas where host trees are abundant.

#### Time of year to survey

This species has one generation per year in northern regions of its range as well as high elevations; two generations per year can occur in its range throughout central and southern Europe (Novak, 1976). In areas with two generations, the first generation swarms around the end of April until the start of May (Novak, 1976). In the northern region of its range, adults usually emerge during June and July (Novak, 1976).

In parts of Russia where two generations occur, adults emerge from the end of April to early May and then again from the end of July to early August (Sharov, 1993).

#### Trap Placement

In Herz et al. (2000), traps for *D. pini* were hung on twigs of pine trees at heights of 1.8 m (6 feet). A minimum distance of 50 m (164 feet) was used between traps in the same pine stand (Herz et al., 2000).

#### Trapping

A sex pheromone for *D. pini* has previously been identified as the acetate or

propionate ester of (2*S*,3*R*,7*R*)-3,7-dimethyl-2-tridecanol (Anderbrant et al., 2005; Bergström et al., 1995).

When surveying for *D. pini* in Germany, Herz et al. (2000) used Lund-I traps. These consisted of two horizontal cardboard sheets that were 22 x 22 cm (8.66 in); sheets were separated about 6 cm (2.36 in) from one another by wires. The upper surface of the bottom sheet is covered with insect glue and is exchangeable. Traps were hung on host plants at a height of approximately 1.8 m (5.91 ft) (Herz et al., 2000).

### Visual inspection

Many countries in Europe survey for Diprionidae by either visually inspecting forest stands for damage or by sampling the egg clusters or cocoons in the soil (Herz et al., 2000).

### Identification

#### **CAPS-Approved Method\*:**

Morphological. There are 13 world species in the *Diprion* genus. All *Diprion* are very similar in general appearance and examination of the female ovipositor and male genitalia are the most reliable means for separation of the species.

\*For the most up-to-date methods for survey and identification, see Approved Methods on the CAPS Resource and Collaboration Site, at <http://caps.ceris.purdue.edu/>.

### Easily Confused Pests

The genus *Diprion* is most similar to species of *Neodiprion* and *Gilpinia*. Species of *Gilpinia* are the most similar-looking; species of the two genera are often confused. For a key separating North American genera of Diprionidae, see: Smith (1974).

### Commonly Encountered Non-targets

Similar species that may show up in traps in the United States are species of *Neodiprion*, *Diprion similis*, *Gilpinia hercyniae*, and *Gilpinia frutetorum*.

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