

Hemiberlesia pitysophila

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Homoptera	Diaspidae

Common name pine armoured scale (English), pine needle hemiberlesian scale (English), pine-needle scale insect (English), pine greedy scale (English)

Synonym

Similar species

Summary *Hemiberlesia pitysophila* (pine-needle scale insect) is a damaging pest of pine tree plantations, especially when introduced in the absence of natural enemies.



[view this species on IUCN Red List](#)

Species Description

The scale cover of adult female the pine-needle scale insect (*Hemiberlesia pitysophila*) in life is oval, convex, dirty white to mid-brown, with buff to red-brown submarginal exuviae that may be paler or darker than the secreted scale. The scale cover of male has not been documented (Watson Undated).

Habitat Description

The pine-needle scale insect (*Hemiberlesia pitysophila*) has been recorded from the needles of trees belonging to the plant family Pinaceae, genus *Pinus* (Takagi 1969, Tao 1999, in Watson Undated). Hosts include: *Pinus elliotii*, *P. massoniana* and *P. thunbergii* (Watson Undated). Pan and colleagues (1989) found that *H. pitysophila* had 5 overlapping generations/year in China. Temperature was the main factor influencing the population growth and forest decline, and pest mortality increased when the temperature was above 23°C or lower than 18°C. Dense stands favoured the incidence and development of the pest (Watson Undated). In China, Tong and colleagues (1988) found that air temperature was the main influence on population size, with 19.5°C averaged over 10 days being the optimum for the growth and development of the insect, but monthly precipitation over 100mm was detrimental to reproduction (Watson Undated).

General Impacts

The pine-needle scale insect (*Hemiberlesia pitysophila*) is a damaging pest of pine tree plantations, especially when introduced in the absence of natural enemies (Watson Undated). Plants are affected in the following stages: vegetative growing, flowering and fruiting stages and plant parts affected are the needles (Watson Undated). Heavy infestations of *H. pitysophila* can kill pine trees (Watson Undated).

Management Info

Preventative measures: Detection and inspection methods: Examine needles of the hosts listed above, for oval, convex, dirty white to mid-brown scale covers, each with buff to red-brown submarginal exuviae that may be paler or darker than the secreted part of the scale. Microscopic examination of slide-mounted adult females is required for authoritative identification to species (Watson Undated). International Quarantine: Planting material of *Pinus* species should not be transported from China or Japan (where this species is a known pest) to other countries without thorough phytosanitary precautions.

Chemical: Studies on chemical control of the pine armoured scale seriously infests pine trees were conducted during 1988 and 1989 in Guangdong Province, China. Oil emulsion, formulated by mixing rubber tree seed oil (or chinaberry seed oil) with the diesel oil at a ratio of 3:7 (with an emulsifier) was highly effective. Ground spray application showed that at concentration of 5% the product gave a control of up to 90-100%. In aerial spray application it was shown that this mixture when diluted with water at 1:4 equivalent to 75kg/ha gave a control efficiency above 70%, more potent than the conventional pine resin-diesel oil mixture commonly used in Hui-Ding County, Guangdong Province and other places. The product was safe for *Encarsia* sp. and *Aphytis* sp., hymenopterous parasites as the most important natural enemies of the pine armoured scale and proved to have no harmful effect on the environment. Furthermore, the formulation can be easily prepared as an emulsion. It is suggested that the product could be widely used for the effective control of the pine armoured scale and other insects infesting the pine trees (Chiu *et al.* 1993).

Results of field experiments conducted in Luoyang, China, to study the control effects of 6 compound pesticides on *H. pitysofila* in a forest environment, showed that all the tested pesticides were effective in controlling the scale. Applied singularly, chlorpyrifos mixed with methidathion at a ratio of 11:25 had a satisfactory control effect and a continuous effect at the concentration of 400-800 in a forest environment. Chlorpyrifos mixed with buprofezin at the ratio of 11:20, at the concentration of 400-800, and acetamiprid mixed with imidacloprid at the ratio of 1:1 at the concentration 1:3000 had relatively high control effect (English summary Hu *et al.* 2006).

Biological: Natural enemies of *Hemiberlesia pitysofila* are as follows: parasitoids - *Coccobius azumai* (attacks adult females in Japan (Okinawa) and introduced in China (Guangdong)), *Encarsia amacula* (China), *E. citrina* (China), *Marietta carnesi* (China); predators - *Anystis baccarum* (China); pathogens - *Cladosporium cladosporioides* (China) (Watson Undated). *Cladosporium cladosporioides*, isolated from a species of *Kermes*, was used to control *H. pitysofila*. The results showed that the mortality rate of the insects induced by the fungus was up to 38.9% on an average in laboratory tests, and 20-57% in field tests (Pan *et al.* 1989). In a survey in 15 counties of Guangdong Province, China, 12 species of parasitoid wasps of the diaspidid *H. pitysofila* were found. Of these, *Encarsia citrina*, *E. amacula* and *Marietta carnesi* were the most widely distributed and *Encarsia* spp. were the most numerous. The parasitoid complex has been unable to control the diaspidid effectively, as the rates of parasitism are low (Liang and Chen 1990).

Pathway

Dispersal of sessile adults and eggs occurs through human transport of infested plant material (Watson Undated).

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG) with support from the Forestry Division (Council Of Agriculture) Taiwan

Review: Expert review underway

Publication date: 2007-10-01

ALIEN RANGE

[4] CHINA

[3] JAPAN

[1] HONG KONG

[1] MACAO

[1] TAIWAN

BIBLIOGRAPHY

14 references found for *Hemiberlesia pitysofila*

Management information

BGCI. 2006. The Botanic Gardens of Macau, *Serviços de Zonas Verdes e Jardins* 3(2).

Summary: A reference to the ecological damage caused by *H. pitysofila* in Macau.

Chiu, Shin-Foon, Liu, Xiu-Qiong, Huang, Zhang-Xin, Chen, Wen-Kui, Wei, Xi-Kui and Wen, Fu-Yi. 1993. The chemical control of the pine armoured scale *Hemiberlesia pitysofila* Takagi, *Acta Entomologica Sinica*. 36(2): 177-184.

Summary: A study on the use of oil emulsions to control *H. pitysofila* in Chinese forests.

Ding Jianqing and Xie Yan. 1996. The mechanism of biological invasion and the management strategy, in: *Conserving China's Biodiversity II* (PETER Johan Schei, WANG Sung and XIE Yan eds.). China Environmental Science Press. Beijing. 125-156p.

Summary: Review of invasive species in China and their management.

Gu, M., Wang, B., Li, Y., Yang, Z., Qiu, J., Chen, P., Chen, Z., Lian, J., Weng, J. 1990. Relationship between the ecological factors and the damage level of *Pinus-Massoniana* forest attacked by *Hemiberlesia pitysofila*, *Forest Research* 3(6): 562-567.

Summary: Ecological study of *H. pitysofila* assessing its impact in Chinese forest ecosystems.

Hu, Y.H., Huang, Z.Y., Cui, L.K., Chen, S.L. & Liu, X. 2006. [A study on control effect of field test on *Hemiberlesia pitysofila* Takagi.]. (In Chinese with summary in English.) *Acta Agriculturae Zhejiangensis* 28(3): 364-367.

Liang, G.Q. and Chen, Z.Y. 1990. A preliminary survey of parasitoid wasps of *Hemiberlesia pitysofila*, *Natural Enemies of Insects* 12(1): 1-6, 20.

Summary: A study on the biological control of *H. pitysofila*.

Liebholt, A.M., Macdonald, W.L., Bergdahl, D. and Mastro, V.C. 1995. Invasion by Exotic Forest Pests: A Threat to Forest Ecosystems, *Forest Science Monographs* 30. p 14.

Summary: A brief reference to forestry management with respect to *H. pitysofila*.

Pan, W.Y., Chen, S.L, Lian, J.H., Qiu, H.Z. and Lan, G. 1989. A preliminary report on control of *Hemiberlesia pitysofila* using *Cladosporium cladosporioides*, *Forest Pest and Disease* 3: 22-23.

Summary: A study on the biological control of *H. pitysofila*.

[State Environmental Protection Administration of China. Undated. CBD National Report.](#)

Summary: A report of alien pest management in China.

Available from: <http://www.cbd.int/doc/world/cn/cn-nr-fe-en.doc> [Accessed 20th October 2007]

Wang, Z.H., Wang Zhu Hong, Huang, J., Huang Jian, Liang, Z.S., Liang Zhi Sheng, Lian Bing Xian, Lin Qing Yuan, Zhong Jing Hui. 2004. Introduction and application of *Coccobius azumai* Tachikawa (Hymenoptera: Aphelinidae), *Journal of Fujian Agriculture and Forestry University* (Natural Science Edition) 33(3): 313-317.

Summary: A study on the biological control of *H. pitysofila* in Japanese forests.

General information

Gu, D., Murakami, Y. 1990. Ecological studies on the pine needle Hemiberlesian scale *Hemiberlesia pitysofila* Takagi Homoptera:Diaspididae and its parasitoid *Coccobius azumai* Tachikawa Hymenoptera:Aphelinida, *Science Bulletin of the Faculty of Agriculture Kyushu University* 45 (1-2): 31-36.

Summary: Ecological study of *H. pitysofila* in Japan.

[Mingyang, L. and Haigen, X. 2005. Indirect Economic Losses Associated with Alien Invasive Species to Forest Ecological System in China. *Electronic Journal of Biology* 1\(1\): 14-16.](#)

Summary: The economic impact of various forestry pests in China.

Available from: <http://www.ejbio.com/pps/14.pdf> [Accessed 20th October 2007]

[State Environmental Protection Administration of China. 2001. China's Second National Report on Implementation of the Convention on Biological Diversity. China Environmental Science Press: Beijing.](#)

Summary: A report of the pest status of *H. cunea*.

Available from: <http://www.cbd.int/doc/world/cn/cn-nr-02-en.pdf> [Accessed 20th October 2007]

[Watson, G.W. Undated. *Arthropods of Economic Importance: Hemiberlesia pitysofila*. Natural History Museum: London.](#)

Summary: An overview of information pertaining to the invasive *H. pitysofila*.

Available from: <http://ip30.eti.uva.nl/BIS/diaspididae.php?selected=beschrijving&menuentry=soorten&id=126> [Accessed 20th October 2007]