First Record of Coccus hesperidum L. (Hemiptera: Coccidae) in Industrial Hemp in Kentucky

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First record of *Coccus hesperidum* L. (Hemiptera: Coccidae) in industrial hemp in Kentucky

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Industrial hemp, *Cannabis sativa* L. (Cannabaceae), increased its acreage in Kentucky, USA, during the last couple of yr, from 17.8 ha in 2014 to more than 10,500 ha (26,000 acres) grown outdoors, and 55 ha of greenhouse cultivation in 2019 (Quarles 2019). This spike is the result of legislation guidelines in the Agricultural Improvement Act of 2018 (US Government Publishing Office 2018) in the USA. In 2019, industrial hemp farming was legalized in 46 states, with 34 states growing hemp in approximately 207,000 ha, and 16,877 licensed growers (Anonymous 2019). Industrial hemp is a versatile crop that can be grown for fiber, seed production, oils (cannabidiols [CBD] and < 0.3% tetra-hydro cannabinols [THC] analogue), or for hybrid purposes (seed, fiber, or oil extracts). In 2019, more than 92% of hemp grown in Kentucky, was processed for CBD; most of these plants were grown from feminized seeds and clonally propagated in greenhouses, then transplanted to the fields (Kentucky Department of Agriculture 2020). Under these circumstances, it is most likely that some ornamental production facilities may have been used for hemp plant propagation, which might have exposed this new crop to existing insect pests from ornamentals.

The brown soft scale, *Coccus hesperidum* L. (Hemiptera: Coccidae), is one of the most common scale insects worldwide. This cosmopolitan insect has a wide range of hosts that includes many field crops, citrus, fruit trees, and ornamentals (Miller & Miller 2003). *Coccus hesperidum* may have the capacity to affect approximately 125 plant families (García et al. 2016). In the southern states of the US, *C. hesperidum* is found in outdoor plants the entire yr, whereas in the northern US, they may survive in greenhouses and indoor during winter mo (Hamon & Williams 1984). In greenhouse plants, *C. hesperidum* prefers perennials to annuals; however, ornamental ferns are 1 of the plants most affected by this insect under these conditions. Outbreaks of scale insects may cause economic losses due to direct feeding on cell nutrients and reduction of photosynthetic leaf area. Losses may affect yields on fruit (e.g., citrus) or reduce the cosmetic value of ornamental plants. Damages caused to plants include loss of sap, clogging of leaf or fruit surfaces with honeydew, on which sooty mold subsequently grows (Vranjic 1997). In the US, *C. hesperidum* is an important citrus pest in Texas, USA (Hoelscher 1967), and it may cause occasional damages to the citrus industry in Florida, USA. In California, USA, *C. hesperidum* has been controlled effectively by several species of parasitoids (Kapranas et al. 2007). Timberlake (1913), Kapranas et Al. (2007), and Rakimov et al. (2015) provided descriptions of several parasitoids and hyperparasitoids of *C. hesperidum*. Although predacious insects have been reported for soft scales; there is not much information available on predacious arthropods of *C. hesperidum*.

In industrial hemp intended for CBD production, many feminized seedlings or clones are produced in greenhouses in Kentucky. By mid-Oct 2019, soft scales in several stages of development were found affecting the stems and leaves of small hemp plants kept in a greenhouse that previously included herbaceous ornamentals. Thus, scale crawlers from the ornamental plants could have survived the 4-mo fallow period between crops, and been transported by wind through open windows, or been transferred by humans from outdoors. Hoelscher (1967) reported that *C. hesperidum* crawlers and scales may be carried by wind. Infested plants included seedlings approximately 20 cm tall in the vegetative stages. Cultivars were breeding stock from proprietary lines and were intended for CBD production. Females and nymphs of this insect were observed on the stems (Fig. 1) and abaxial leaf surfaces causing chlorosis and leaf drop.

Fig. 1. Different stages of the brown soft scale *Coccus hesperidum* in industrial hemp plants.

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Nymphal and female adult stages of *C. hesperidum* were collected and sent for identification to the Florida Department of Agriculture and Consumer Services, Division of Plant Industry in Gainesville, Florida. Female specimens from these scales were prepared and slide-mounted, and deposited in the Florida State Collection of Arthropods as vouchers (FDACS-DPI sample number E2019-5956). This scale species was identified as *C. hesperidum* by the last author and also was confirmed by Douglass Miller (retired scale insect systematist), which confirmed the first report of this pest in hemp.

This finding reports hemp as a new host record for *C. hesperidum*. Also, as industrial hemp grown for CBD is propagated in greenhouses, producers need to be conscious of this relationship. Besides *C. hesperidum*, other coccids reported feeding on hemp are *Parthenolecanium corni* (Bouche) and *Saisettia coffee* (Walker) (both Diptera: Coccidae) (McPartland & Clarke 2000). Similarly, compared to production of ornamentals or other crops, registered insecticides in hemp to control coccids might be scarce or unavailable in some states. The Kentucky Department of Agriculture reported that in 2014, 79% of hemp grown was for grain, seed, and fiber, and 21% for CBD production. In 2019, these percentages shifted to 8% and 92%, respectively (Kentucky Department of Agriculture 2020); this trend may extend to other states in the US in the next few yr. As mentioned above, the production of feminized seeds or clones will be produced in greenhouses where *C. hesperidum* is probably 1 of the most common scales; thus infested hemp plants may be transplanted to fields causing losses at transplanting. Hemp producers must be aware of the potential risk of acquiring plants infested with *C. hesperidum*. The purpose of this publication is to report and describe the damages caused by *C. hesperidum* in hemp and create awareness of potential problems it may create during the initial stages of plant establishment.

Summary

This article is the first report on the phytophagous activity of *C. hesperidum* on hemp plants grown in greenhouses in Kentucky, USA. Hemp plants were grown in a greenhouse where ornamental plant species were previously grown but were not present at the same time. *Coccus hesperidum* may have been carried by wind because greenhouse windows were kept open. *Coccus hesperidum* successfully fed and reproduced on the stems and leaves of hemp. After 2 wk a single plant, kept in laboratory for further studies, died as a consequence of the feeding damage caused by a large population of scales. As hemp is expanding to different production areas, *C. hesperidum* might be a potential pest for hemp grown in greenhouses. The surveillance and early detection of *C. hesperidum* will contribute to the production of healthy hemp plants to be planted in open fields, especially in southern states of the USA.

Key Words: *Cannabis sativa*; hemp; brown soft scale; new pests; feminized seeds

Sumario

Este artículo es el primer reporte sobre la actividad fitófaga de *C. hesperidum* en plantas cáñamo cultivadas en el invernadero en Kentucky, USA. Las plantas de cáñamo crecieron en un invernadero donde se mantuvieron ornamentales anteriormente pero no estuvieron presentes mientras se cultivaba cáñamo. *Coccus hesperidum* pudo haber ingresado al invernadero por las ventanas que se mantuvieron abiertas. *Coccus hesperidum* fue capaz de alimentarse y reproducirse en los tallos y hojas de cáñamo. Después de dos semanas una planta que se mantuvo en el laboratorio murió a consecuencia del daño causado por un gran número de *C. hesperidum*. La vigilancia y detección temprana de *C. hesperidum* va a contribuir con una producción de plantas sanas que serán trasplantada en campo abierto especialmente en los estados de sur de USA.

Palabras Clave: *Cannabis sativa*; cáñamo; queresa blanda; peste nueva; semillas feminizadas

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