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THE HEMP RUSSET MITE *ACULOPS CANNABICOLA* (FARKAS, 1960) (ACARI ERIOPHYOIDEA) FIRST DETECTED IN ITALY ON *CANNABIS SATIVA* L.

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Turillazzi F., de Lillo E., Mazza G., Marraccini D., Gagnarli E., Roversi P.F., Simoni S. - The hemp russet mite *Aculops cannabicola* (Farkas, 1960) (Acari Eriophyoidea) first detected in Italy on *Cannabis sativa* L.

Eriophyoid mites are represented worldwide by a multitude of extremely specialized species, with feeding habits largely restricted to a single host plant species. Hemp has been used for fiber, food, and medicine for thousands of years and it is still being used nowadays. One eriophyoid mite, *Aculops cannabicola* (FARKAS, 1960) (Acari: Eriophyoidea), appears to be very difficult to control and it constitutes a real menace to world hemp cultivation. In May 2021, severe damages were found in a greenhouse of therapeutic *Cannabis sativa* L. near Greve in Chianti (Florence); these damages were caused by *A. cannabicola*, the “hemp russet mite”: this is the first record of the agricultural pest in Italy.

KEY WORDS: central Italy; eriophyoid mites; first record; hemp pest; vagrant mite.

INTRODUCTION

Cannabis sativa L. (Cannabaceae), hereafter referred to as hemp, has been a domesticated crop for more than 8,000 years. Hemp has been used for fiber, food, and medicine for thousands of years and it is still being used nowadays (SCHLUTTENHOFER & YUAN, 2017). The *Cannabis* business implies global interests and a lot of economic potential: in the U.S., it represents the largest cash crop, with an estimated value of \$35.8 billion each year; imported hemp products, sold in the U.S., were estimated about \$688 million already in 2016 (STRICKLER, 2018; QUARLES, 2018).

All over the world, *Cannabis* spp. are cultivated for many purposes (e.g., therapeutic, industrial) and involved in transnational and transcontinental trading/markets. The use of *C. sativa* for medical purposes and as pain relief has been legalized in several countries (i.e. France, Romania, and the Czech Republic). Most pharmaceutical regulatory systems allow the use of herbal medicines that do not meet the same requirements as those for pharmaceutical medicines (EMCDDA, 2018). In Italy, the therapeutic use of *Cannabis* was authorized first in 2007 (BIFULCO & PISANTI, 2015). The medical *Cannabis* market in Italy grew by 30% in 2020: private wholesales accounted for 59% of the medical *Cannabis* sales during the year, with 21% coming from the Stabilimento Chimico Farmaceutico Militare (SCFM) and 19% coming from hospital pharmacies (PROHIBITION PARTNERS, 2021).

Critically and increasingly, both *Cannabis* production and trade are therefore subjected to pest monitoring-detection-management. Nearly 300 pests have been associated with *Cannabis* spp., even though few of them are reported to cause economic losses (MC PARTLAND, 1996): among them, sometimes, more serious damages are caused by aphids, whiteflies, mealybugs, chewing bugs, and mites mainly belonging to Tetranychidae and Eriophyidae (MC PARTLAND *et al.*, 2000).

Eriophyid mites are represented worldwide by a multitude of extremely specialized species, with feeding habits restricted largely to a single host plant genus (SKORACKA *et al.*, 2010). According to CRANSHAW (2019), *Aculops cannabicola* (FARKAS, 1960) (Acari: Eriophyoidea), the hemp russet mite (HRM), is among the most serious pests of *Cannabis* spp. The HRM, so named for the rusty damage it causes to the leaves, is capable of attacking all biotypes of *Cannabis* spp., including fiber-type plants and drug-type plants throughout all geographic regions (MC PARTLAND & HILLIG, 2006). It was reported in the Midwestern USA, Central Asia, Poland, Serbia and Hungary (FARKAS, 1960; SKORACKA *et al.*, 2005; RIPKA, 2007; PETANOVIĆ *et al.*, 2007).

In Italy, more than 300 species of Eriophyoidea are listed and, at now, no species results associated with *Cannabis* spp. In May 2021, HRM was found for the first time in Italy on *C. sativa* cv. Carmagnola cultivated in a greenhouse near Greve in Chianti (Florence) for therapeutic scopes. The species remained confined to the area

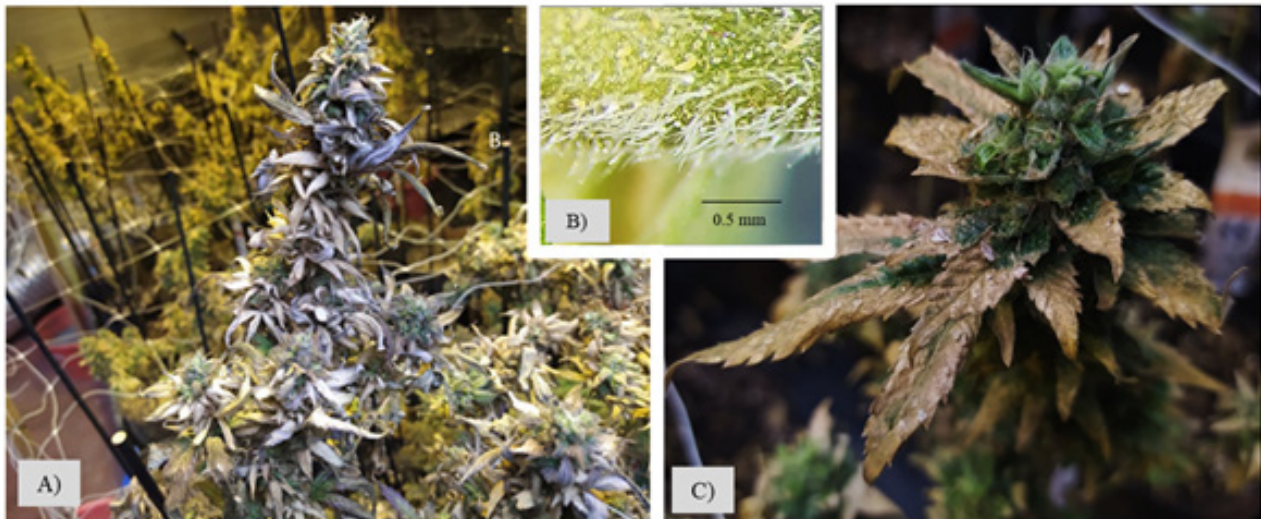


Fig. I – 1) Damage of *Aculops cannabicola* on *Cannabis sativa* in the greenhouse of Greve in Chianti (central Italy, Tuscany, Florence); 2) eriophyoid mites on/between *Cannabis* trichomes; 3) damaged apical part of *Cannabis* plant.

of the greenhouse. The damage derived from the high infestation of HRM led to the destruction/loss of the entire production of the agricultural company.

The mites were extracted from flowers and apical leaves in the CREA-DC laboratory and identified comparing the collected samples with the original description of the species (FARKAS, 1960).

Damage by HRM is subtle and has not been well characterized: curling of the leaf edges, followed by leaf russeting (see Fig. I, 1) and massing on petioles, which easily break off, can be indicative. In addition, mites feed on inflorescences of both sexes, and glandular trichomes (Fig. I, 2), drastically reducing resin production (MC PORTLAND & HILLIG, 2003). More clearly, damaging effects occur when HRM infests developing flower buds of plants grown for cannabidiol (CBD) extraction (Fig. I, 3) (CRANSHAW, 2019). Depending on the severity of the infestation, it has been observed a reduction in flowers and seeds production between 50% and 90% (DES BORDES, 2022).

The incidence of hemp pests may vary according to the production type (e.g., grain, fiber, flower), whether the plants are grown indoors or outdoors, and where the plants are grown geographically. Data on HRM are scanty concerning the biology, but its diffusion constitutes a real threat to world hemp cultivation. HRM, like a great part of the Eriophyidae, is 0.2 mm or less long, highly mobile, and does not produce webbing (LINDQUIST, 1996). These factors allow HRM presence and, sometimes, large populations to remain undetected. No dedicated data are currently available correlating the life cycle with the environmental conditions. In a controlled environment, HRM is presumed to live generally between 7 and 30 days, but it results persisting year-round and highly reproducing in dry and warm habitats (DES BORDES *et al.*, 2022).

Horticultural soaps, abamectin, and some miticides are reported as effective against this pest but do not result obviously in a complete eradication of the mites (MC PORTLAND & HILLIG, 2003; BRITT & KUCHAR, 2020). It is

known that biological control of eriophyoids by phyto-seiid mites is not so performing, particularly where dense covers of hairs (glandular mainly) allow protection of vital plant parts against herbivorous arthropods (CASTAGNOLI *et al.*, 2003; PEIFFER *et al.* 2009). Among phytoseiids tested against eriophyoids, *Neoseiulus californicus*, *Amblyseius andersoni*, and *A. swirskii*, may be promising agents; however, at this regard further research is needed to evaluate and implement the efficiency of these predators (DES BORDES *et al.*, 2022). Currently, for the reasons above, destroying all the plants cultivated indoor and sterilizing all the surfaces seem the only way to eradicate the infestation (MC PORTLAND & HILLIG, 2003).

The perspective of containment and control will be corroborated by combining further information on the biology of this alien mite for Italy, necessary studies on its distribution, and potential additional host plants.

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