Mass Infestation of a Rural Residential Area with Millipede Larvae: A Case Report

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Abstract

The class Diplopoda (the millipedes) is the most abundant and diverse group within the Myriapoda, comprising 15 orders and numerous families. They range in length from very tiny (~5 mm in Polyxenida) to the longest terrestrial invertebrates (some Spirostreptida being up to 35 cm long) in tropical and subtropical regions.

On the 29th September 2018, the residents of Dare Mal (a village of Marvdasht city) were faced with a massive infestation of an unknown larva. Arthropods were transferred to the Entomology Laboratory of Shiraz Health School. The unknown arthropods were identified as millipede larvae belonging to the Polyxenidae family (*Polyxenus spp.*) Millipede larvae are not of medical importance, but they cause panic among the residents and make them evacuate their homes. The source of their infestation was a leftover farmyard watering near the village.

The number of larvae declined sharply and their activity decreased after conducting the control program. This program included physical control as well as spraying of the infested areas with permethrin and diazinon. Activity of larvae abruptly decreased and eventually they were removed from all infested homes.

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Introduction

Centipedes and millipedes belong to the classes Chilopoda and Diplopoda, respectively. They are classified under the subphylum of Myriapoda ("plenty feet"). Myriapods are 0.5–300 mm long and are primarily terrestrial. Most species of Chilopoda (centipedes) are carnivorous and have a body made up of flattened segments (15–173 segments) covered with chitin coupled with a pair of legs on each segment. The first segment has 2 large poisonous forcipules (fangs), which act as the defense organs and also as a tool to capture prey. These arthropods are able to inject their poison from the glands located in the trunk. Centipedes use these fangs to kill and consume insects, other centipedes, annelids, molluscs, and sometimes small vertebrates. The venom contains several different enzymes, especially metalloproteases that have myotonic, cardio toxic, and neurotoxic activities. The poison is rarely lethal to people.[1, 2]

The class Diplopoda (the millipedes) is the most abundant and diverse group within the Myriapoda, comprising 16 orders and 140 families. Almost all the ~15,000 described species of millipedes are strictly terrestrial, and the rare presence of diplopods in freshwater is generally occasional or accidental.

They range in length from very tiny (~5 mm in Polyxenida) to the longest terrestrial invertebrates (some Spirostreptida being up to 35 cm long) in tropical and subtropical regions. Most millipedes are saprophagous detritivores and mull formers in the soil, converting vegetable debris into humus and playing a vital role in the cycling of matter, energy, and nutrients. They are well represented in any kind of terrestrial ecosystem, as well as in subterranean habitats. They feed on decayed vegetable material and are generally regarded as harmless; however, when acting defensively, some tropical species may cause harm to humans.[3] Millipedes do not have fangs, but

their toxic fluids may be ejected and cause erythema and brown or black pigmentation in the affected skin. The pigmented lesions may persist for months.[4, 5]

Diplopods are also sources of various compounds useful for medicine and possibly industry since they produce a large array of toxic substances that they use not only for self-defense, but probably also for intraspecific communication among populations (Geoffroy and Mauriès, 2014).

Polyxenida (Common names: pin cushion millipedes, dwarf millipedes) is the only millipede order in the subclass Penicillata and they are the most primitive diplopods. They are easily distinguished from other millipedes by the presence of tufts of stiff setae over the body and a soft, non-calcified exoskeleton. The setae are used primarily as a defense mechanism to prevent predation by predators such as ants. Polyxenids can resemble some beetle larvae in general appearance. They possess 13 pairs of legs, and the eyes are normally composed of several ocelli; however, blind species are also known. Four families with 160 species are described worldwide in this order.

Polyxenidae is a family of millipedes in the order Polyxenida containing approximately 47 species in 19 genera. These millipedes have soft bodies and antenna without any calcified skeletal organs. Their legs are usually less than 17 pairs and their long hairs are less than 7 mm. This species of millipede lacks chemical, skeletal and defense systems such as bites and usually do not cause prey damage.[6, 7]

Case Report

Dare Mal is a village of Marvdasht city (40 km to Shiraz, the capital of Fars province) which is located in a mountainous area and has 13 households including 25 males and 23 females (Figure 1). The inhabitants of this village are engaged in livestock farming and agriculture. The village has been affected by droughts in recent years due to climate changes and limited rainfall in recent years. Residents of this area use springs which are located on the adjacent mountains as a source of drinking water because there is no central water supply system. They use containers to store their drinking water. In the 29th September 2018, the residents were faced with massive infestations of an unknown larva.

After sending a healthcare expert to the site, some samples of the invading arthropods were collected and transferred to the Entomology Laboratory of Shiraz School of Health for further studies. In the laboratory, after morphological exams, it was found that the unknown arthropods were millipede larvae belonging to the Polyxenidae family (*Polyxenus spp.*) (Figure 2).

Although these millipede larvae were not of medical importance and were almost harmless to humans, they caused panic among the residents and it had led to evacuation of their houses. After inspection, the source of invading larvae was identified. The source of the infestation was an old place for livestock watering with a depth of 0.5m, length of 5 m, and width f 2m near the village.

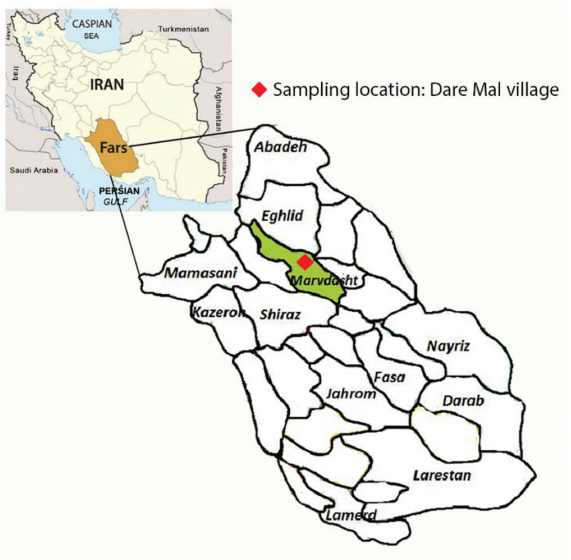

Figure 1: Location of the area infested with millipedes, Dare Mal village, Marvdasht city, Fars province

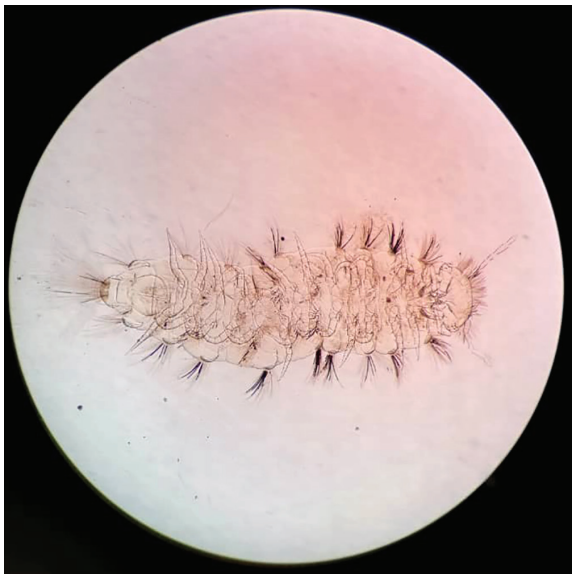

Figure 2: Dorsal habitus of *Polyxenus spp.* Larva (family: Polyxenidae) collected from Dare Mal village, Fars province, 2018

Millipede larvae were nocturnally active in soil environments. They invaded residential homes, and their numbers decreased significantly after sunrise and during the day. Eventually, the number of larvae declined sharply and their activity decreased after running the control program on the source of infestation and residential area. The control program included physical control as well as spraying of the infected area with permethrin and diazinon. Activity of larvae decreased and eventually

they were removed from all infested homes. In order to prevent damage to the environment and other animals, carcasses of dead larvae were collected and buried in an area far from the village.

Discussion

Arthropods are the most abundant creatures on earth. They are hugely diverse and incredibly numerous – more than 850000 species have been described. Myriapods (millipedes and centipedes) are one of the major components of the soil ecosystems and are divided into herbivorous, carnivorous, and detritivorous species. Millipedes have nocturnal activity and are sensitive to light and drought. They are usually considered as harmless species to humans. They usually live under rocks, foliage beds, root of decayed trees, forests and grasslands and need moisture and nutritional elements to survive in an area.[8] Drought is a phenomenon that has affected especially the southern part of the country of Iran like Fars province in recent years. It has had adverse effects on human, animal and plant life.[9]

In the present study, it was observed that the number of a species of milliped suddenly increased in a rural residential area. It is evident that there is a relationship among millipedes' abundance, humidity, and litter nutritional elements composition in the terrestrial environment.[8] Given that the source of infestation was a water storage place for cattle, it indicates that due to the limited water resources in this village, millipedes moved to this area. Because of the abundance of organic matter in this area, as well as the abandoned area, the number of millipedes has increased dramatically. Eventually, due to the lack of sufficient food sources in that habitat, it caused Millipedes to invade the residential area for finding more nutrients at night because they have nocturnal activity.

Conclusion

Overall, the results of the present study suggest that ecosystem changes, such as drought, do not only affect human life, but also disrupt the lives of other organisms, even those that are scarce and of lesser concern to humans. This ultimately disrupts the balance of the ecosystem. As a result, the authorities should pay more attention to drought phenomena and its consequences.

Acknowledgment

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Conflict of Interest: None declared.

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