



Stand Up for Earthworms

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Editorial

Earthworms have existed on earth for more than 600 million years. They are commonly known as farmers' friends and scientifically, as the soil engineers. Earthworms have an effect on soil properties and influence the availability of resources for other organisms, including microorganisms and plants [1]. Many scientists have attributed the terms soil engineers and ploughmen to Darwin. What Darwin actually said was, "The plough is one of the most ancient and most valuable of man's inventions; but long before he existed the land was in fact regularly ploughed, and still continues to be thus ploughed by earth-worms" [2]. Nevertheless, earthworms are a significant component of the soil fauna and their beneficial effects on the agricultural properties of soils, such as increased aeration, water infiltration and percolation, nutrient turnover, aggregate formation and soil neutralization [3].

I used to think that all earthworms were beneficial and that there were no negative aspects to their activities in the soil. In recent decades, knowledge of their spread as invasive species as an effect of climate change and human transportation have caused me to rethink my original position. I have often thought of myself as itinerant worm-picker and the antithesis of Johnny Appleseed, whose popular image is of a man crossing the continent spreading apple seeds randomly everywhere he went [4]. I have travelled the ten Canadian provinces and the Yukon, plus 45 of the 49 continental United States, and various foreign countries, collecting specimens at every opportunity [5]. In over 50 years of research throughout the world, I have noticed many changes.

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Climate change is on the minds and tongues of most people today, but the effects are not heeded by many citizens. Once you change something in the ecosystem, there are ripple effects. The introduction of invasive species can have a significant impact on habitats, particularly when coupled with climate change. The native earthworms in the holarctic were displaced by the ice ages and, subsequently, replaced by man's dispersal through migration, mainly with European species. In areas where native species remained, agricultural and forestry practices eradicated the native species in favour of the introduced species. The warming effect of climate change has allowed other species from temperate climes to invade. Many of these species are parthenogenetic, aggressive in nature and do not improve soil characteristics [6].

Earthworms play an essential part in determining the greenhouse gas balance of soils worldwide, and their influence is expected to grow over the next decades. They are thought not only to stimulate carbon sequestration in soil aggregates, but also to increase emissions of the main greenhouse gases, carbon dioxide and nitrous oxide. Hence, it remains highly controversial whether earthworms predominantly affect soils by acting as a mechanism for the change to the net source or sink of greenhouse gases [7].

The Arctic hasn't been this warm for 3 million years; geoscientists have great concern about what is happening in the Arctic and the effect it will have on the rest of the world. It has taken humans only 200 years to completely reverse the trajectory begun 50 million years ago, and return the planet to CO₂ levels not experienced for millions of years. Scientists project that the Arctic will be completely icefree in summer within the next two decades, e.g., by 2040 [8]. It is my belief that by 2050, the frequency and diversity of earthworms in Arctic soils will be considerably greater than it is today [5].

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