



*Regulating Services – Biological
Population Control
Part 2*

Domestic animal diseases

Soil-borne pathogens may also affect domestic animals, such as livestock, with both economic and health implications. The most direct economic impacts of livestock diseases are loss of production and/or productivity, and the cost of treatments. Estimates of the economic costs to agriculture of the outbreak of foot-and-mouth disease in the United Kingdom suggest a loss of approximately 20 % of the total income from farming in 2001. The causative agents of BSE, (commonly known as mad cow disease), the severe acute respiratory syndrome (SARS) and avian influenza (H5N1 and H1N1) can survive for extended periods of time in the soil. These diseases are estimated to have caused over US\$20 thousand million of direct economic losses over the past decade and much more than US\$200 thousand million (approx. €186 bn) in indirect losses.

From a human health perspective, zoonotic diseases (passed from animals to humans) represent the majority of infectious diseases that have the potential to become pandemic. However, it should be noted that the majority of zoonotic diseases are not soil-borne. Of the 1 415 known human pathogens, 62 % are of animal origin. On average, a new disease has emerged or re-emerged each year since the Second World War, and 75 % of these were zoonotic. The influenza pandemic that killed 50 - 100 million people between 1918 and 1919 had largely faded from public memory by the late 1990s and early 2000s, when outbreaks of SARS and avian influenza occurred. Other examples of soil-borne zoonotic diseases include: anthrax, giardiasis, leptospirosis, Q fever and tuberculosis.

Plant diseases

Plants are the key primary producers in most terrestrial ecosystems and generally exploit soils for resources, using complex root systems. The root exudates allow for the maintenance of a dynamic and nutrient-rich niche around the root-soil interface called the rhizosphere. The diversity of nutrients and plant secondary metabolites present in the exudates allows for the enrichment of specific taxonomic or functional groups of microbes in the rhizosphere. Soil microbes interact with plant tissues and cells with different degrees of dependence, and have developed several strategies for adapting to the plant environment. Plant-microbe interactions include competition, commensalism, mutualism, and parasitism. However, because of its enormous economic importance, one aspect of plant-microbe interactions that has been extensively studied is the plant-pathogen interaction. Losses caused by soil-borne plant pathogens remain important constraints on efforts to increase plant production and productivity worldwide.

Plant diseases are mainly caused by fungi, viruses, bacteria, nematodes and protists. Of this bacterial disease is less severe and inflicts less economic damage. Most of plant pathogenic bacteria belong to the Actinobacteria and Proteobacteria phyla. Some nematodes (e.g Globodera spp. and Meloidogyne spp.) parasitise crop roots and cause significant crop loss in the tropics and subtropics.

The severity of damages and economic costs can be minimised by selecting cultivars that are resistant to particular diseases or using agronomic practices (e.g. crop rotations, seed treatments).

Soil Lovers say: Healthy Soils Grow Healthy Plants Grow Healthy Animals

Ref: A Global Atlas of Soil Biodiversity p108

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