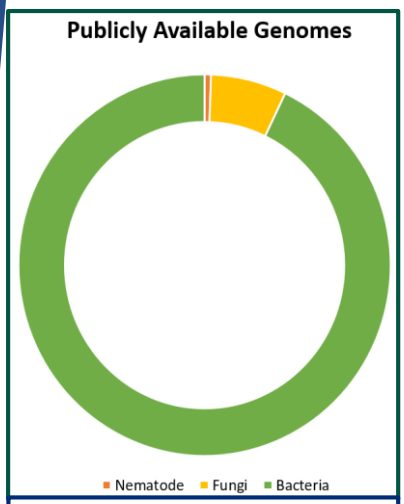
United States Department of Agriculture

Why are nematodes and their DNA important?

Catie Wram, Amy Peetz, Michelle Soule, and Inga Zasada



Number of genomes available to scientists by organism type.

The PNW is ripe with a diversity of crops from small fruit crops like blueberries and raspberries to wheat and hazelnuts. In Oregon alone, there were 15.8 million acres farmed in 2019. This variety in crops also comes with an array of pests including 51 different species of plant-parasitic nematodes, or microscopic roundworms, which live in soil and invade plant roots, divert important nutrients, inhibit water uptake, and lead to yield loss. Plant-parasitic nematodes are a problem for growers in the PNW, with >6,000 samples sent to diagnostic labs for nematode identification in 2016. Despite the impact that nematodes have on plant health, they remain understudied especially in understanding their genetic code, or genome.

All organisms possess a genome, which functions like a "cookbook", giving cells instructions on how to make "recipes" or proteins in the cell. These proteins allow the cell to function and in turn allow the organism to survive. Cells can use different "recipes" in their genome "cookbook" to adapt to their environment or stage in life. In the case of plant-parasitic nematodes, they have special "recipes" they use only when trying to invade a plant. Understanding the different recipes in the genome "cookbook" allows scientists to find ways stop harmful nematodes. Scientists can use genomes to breed resistance in plants, develop diagnostic tools, monitor how nematodes respond to management practices, and understand the introduction of nematodes to new fields and countries.

OSU Graduate Student, Catie Wram, holding a nematode infected potato tuber.

Compared to other soil dwellers, nematodes have very few genomic resources. Currently there are 36,464 bacterial genomes and 2,586 fungal genomes, but only 217 nematode genomes publicly available. This lack of information for nematologists limits the potential benefits of understanding nematode genomes. To help address this gap, we are currently working on global project to sequence 12 nematode genomes of the Burrowing nematode, an important nematode pest. We hope to use these genomes to better understand the host range of this nematode, how it invades it's hosts, and how different the genome of a single species may vary across geographic areas. These are important steps in understanding nematode biology, with the potential to lead to the development of new ways to manage plant-parasitic nematodes.

Burrowing nematode root damage (darkened portions of the root). Image source: Inga Zasada

If you have any questions or would like to know more, feel free to reach out to Catie Wram at wramc@oregonstate.edu.

Pacific West Area – Horticultural Crops Research Laboratory
3420 NW Orchard Ave. Corvallis, OR 97330-5098
Voice: 541-738-4021 Fax: 541-738-4025

Agricultural Research - Investing in Your Future