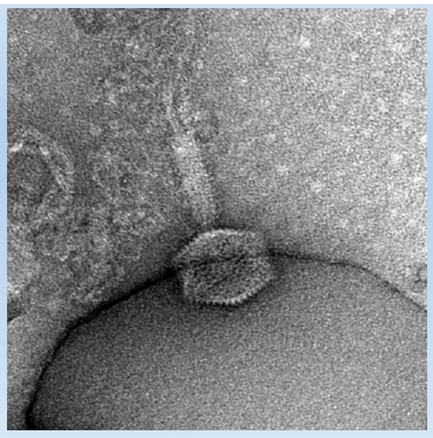

Viral Ecology of Onion Bulbs with Bacterial Rot

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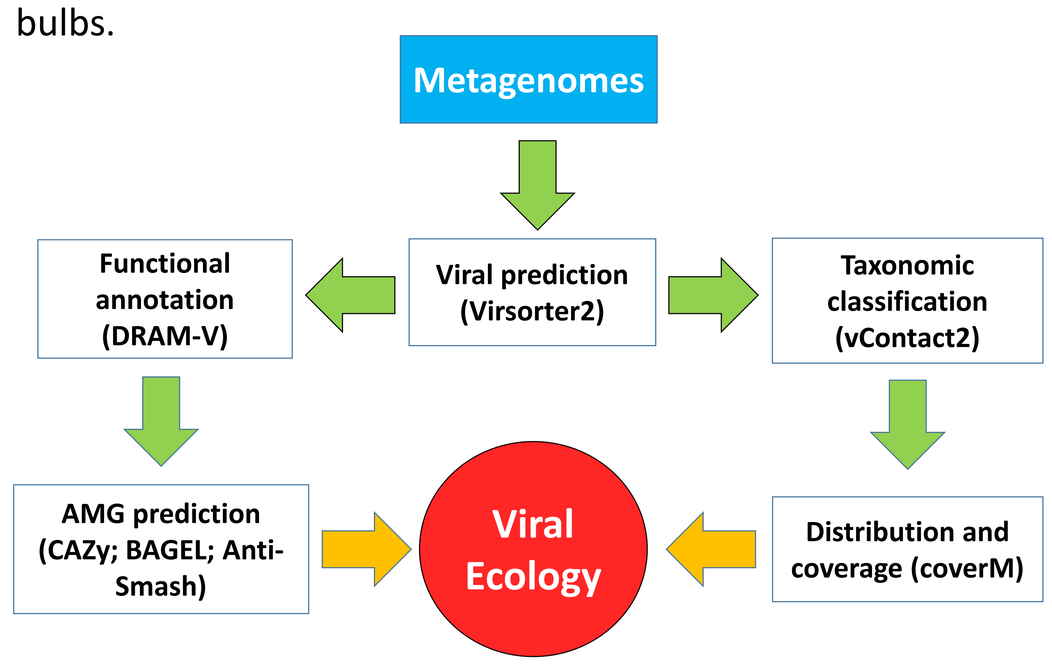
1. Introduction

- Microbes are key players in both plant health and plant disease (Ortíz-Castro et al, 2009).
- Examples include *Rhizobium*, which is essential for nitrogen fixing in leguminous plants (Gourion et al. 2014); and *Pantoea ananatis*, one of the pathogens responsible for bulb rot in onions (Asselin et al, 2018).
- Viruses have been shown to also play important roles in shaping the ecosystem around them (Rohwer et al, 2009).
- However, there is little information regarding viral ecology during crop disease development.

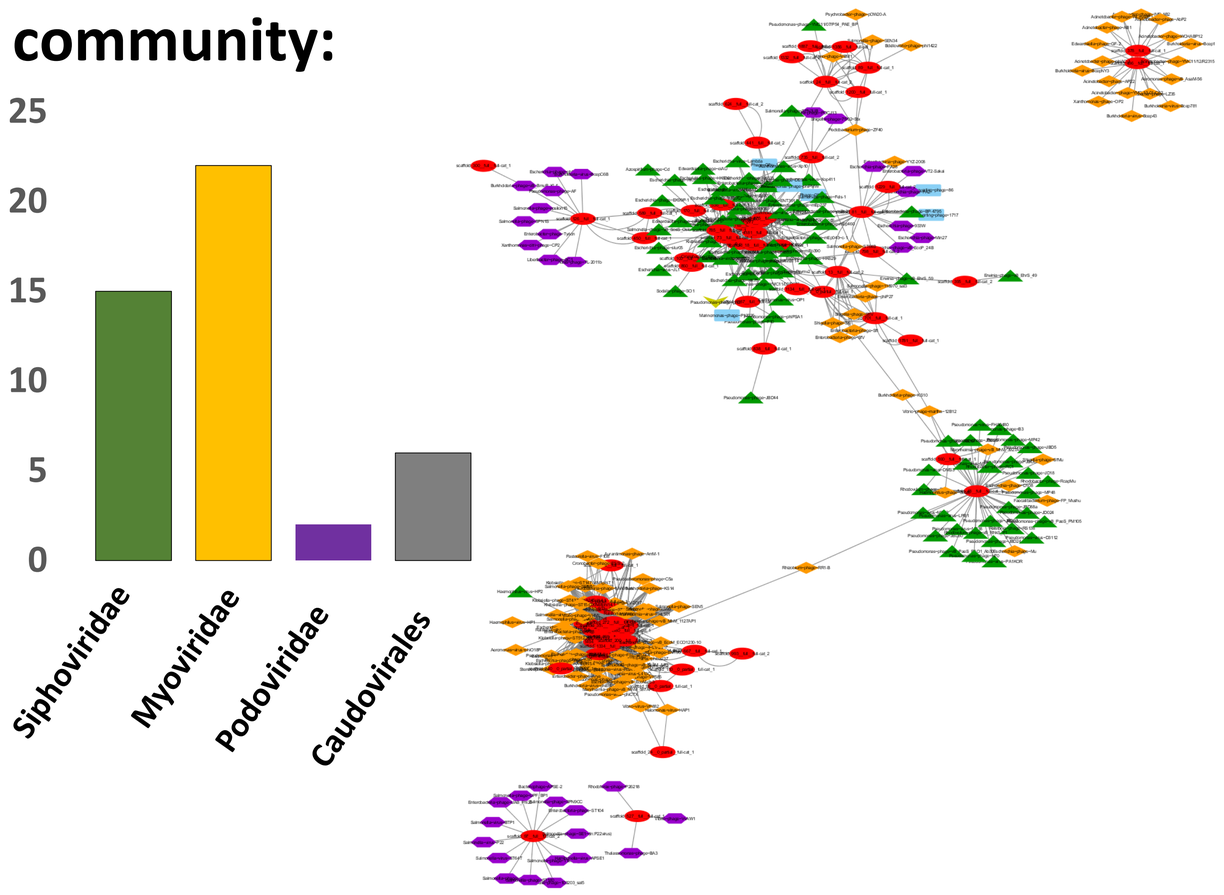
Aim: ***To characterize the endophytic viral populations of diseased onion bulbs using a metagenomics approach.***

2. Methodology:

- Metagenomes from the endophyte community onion bulb cultivars stored in Washington State and Georgia facilities.
- Metagenomes were extracted from both healthy and diseased bulbs.



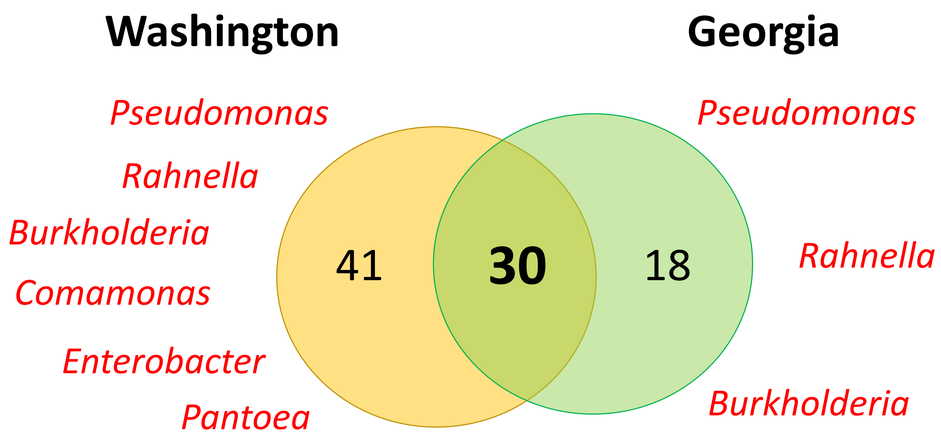
3. Results – Taxonomy of viral community:



- A total of 89 bacterial viral contigs were extracted from the diseased bulbs (no signal from healthy) .
- 67 viral contigs (in red) were linked to known viruses

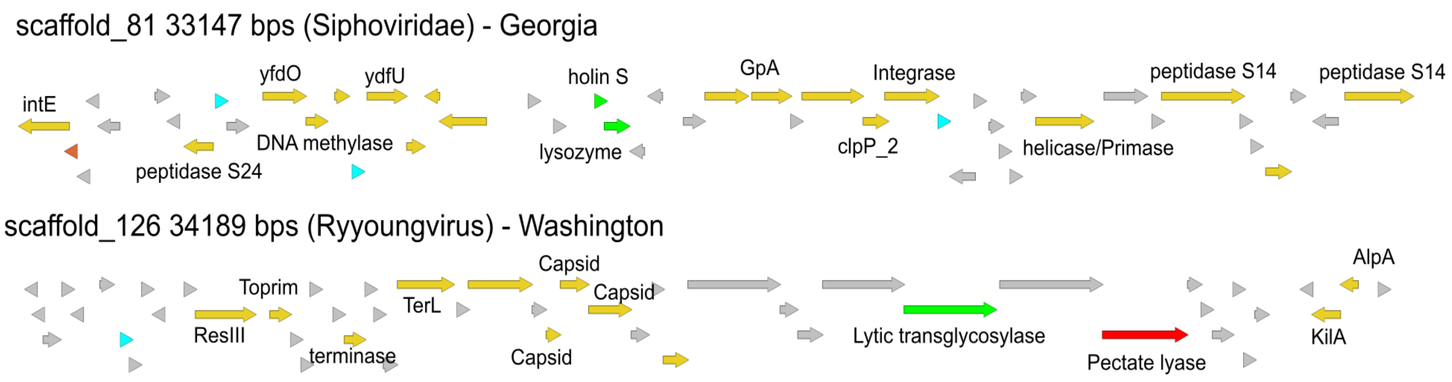
4. Results – Distribution of viral populations:

- Distinct populations in bulb cultivars from Georgia and Washington State (only 30 viruses are shared between cultivars).
- The viral population in bulbs from Washington cultivars are more diverse (41 unique viruses) and includes a broader range of hosts (indicated in red).



5. Results – Functional Annotations

- Several of the viral contigs contained gene markers for replication and evasion.
- These also include genes for lysis of the bacterial host (green) and that might help bacterial host pathogenicity (red).



6. Conclusions

- High diversity of endophytic bacterial viruses in onion bulbs with bacterial rot.
- Results suggest that endophytic viral populations might be regionally distinct, reflecting the different bacterial hosts observed in cultivars from these regions.
- Endophytic viruses show marker genes that might help in bacterial host fitness and population control (biocontrol agents).

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Nature's Ninja graphic courtesy of National Onion Association.

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