

**'Stop the Rot' Onion Bacterial Project
Stakeholder Advisory Panel Meeting
27 March 2024**



Stop the Rot

Objective A1: Bacterial Surveys

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<https://alliumnet.com/projects/stop-the-rot/>

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United States
Department of
Agriculture

National Institute
of Food and
Agriculture

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Objective A1: Survey onion crops nationally

Bacterial surveys in 11 states:

- 2020: 5 fields sampled 2-3x in each state
- 2021 & 2022: 5 fields sampled at least 1x in each state, each year
- Isolated from tissues, purified bacteria, identified to genus/species (16S rDNA sequencing), test pathogenicity on onion (scale, foliar, bulb tests)
- **Wide diversity of bacteria recovered, but most NOT onion pathogens**
- Pathogenic & non-pathogenic strains sent to National Onion Bacterial Strain Collection (NOBSC) at UGA



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Objective A1: Survey onion crops nationally

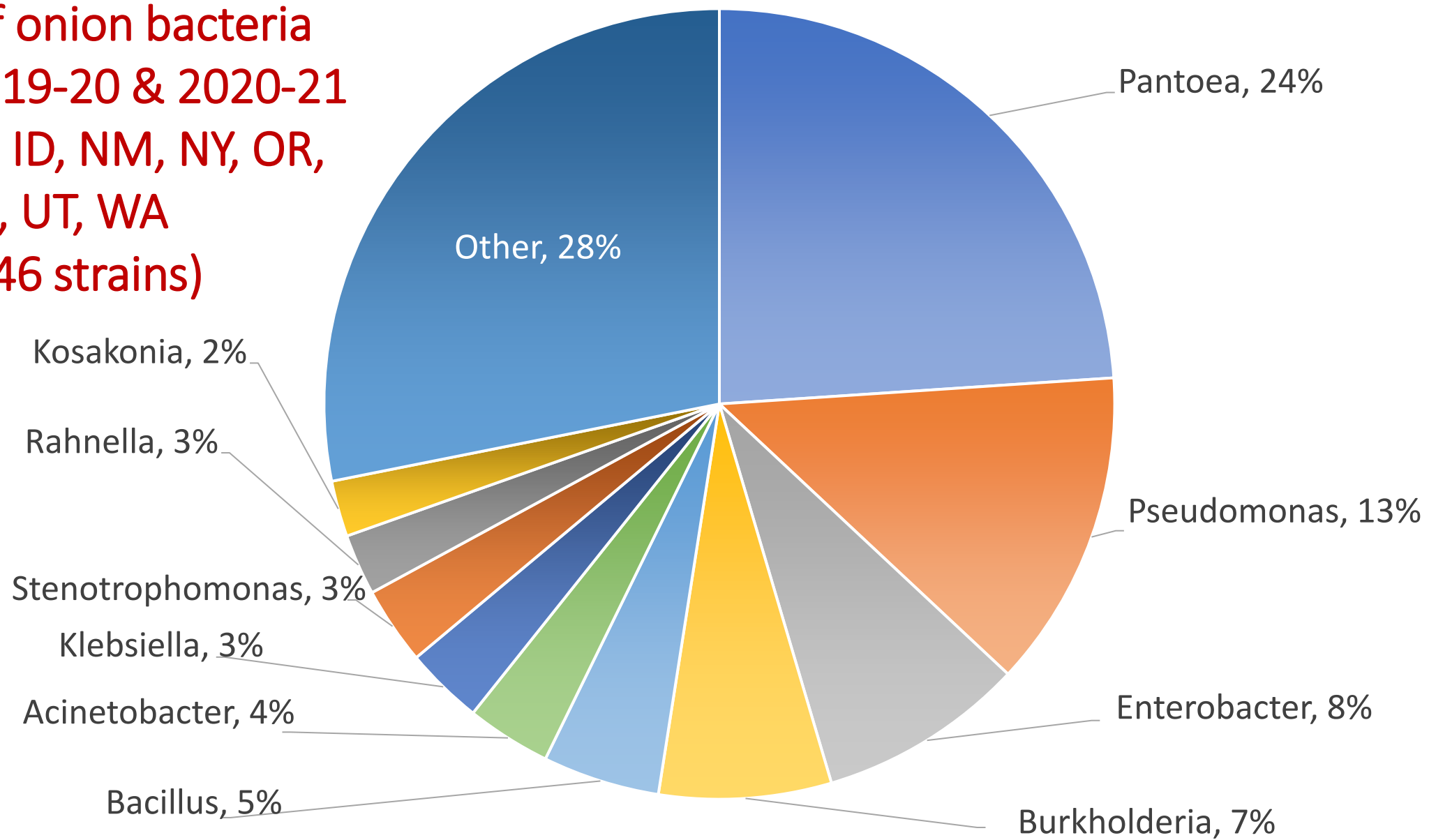
Season 1 + Season 2 + Season 3 to date:

- >200 field and storage locations in 11 states
- >3,500 onion samples
- 6,220 bacterial strains to date
- 124 bacterial genera identified to date
- Distribution & pathogenicity vary across onion production regions
- Most prevalent genera across states:
 - *Pantoea* (921 strains as of Jan. 2022)
 - *Pseudomonas* (501 strains as of Jan. 2022)
 - *Burkholderia* (271 strains as of Jan. 2022)
 - *Enterobacter* (325 strains as of Jan. 2022)
 - *Bacillus* (184 strains as of Jan. 2022)

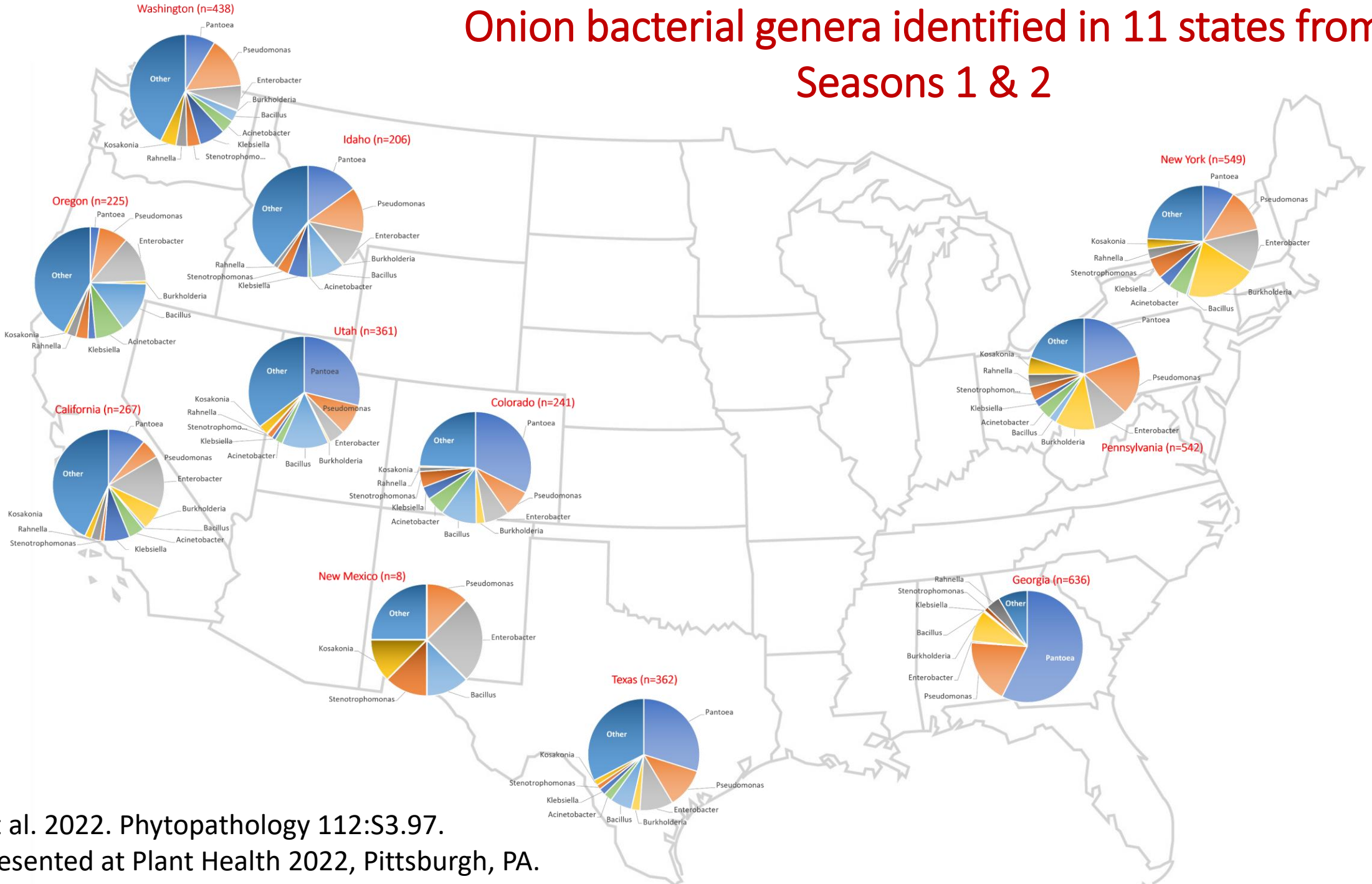
Onion bacterial strains from surveys in 11 states over 3 seasons (2020, 2021, 2022)

State	Three seasons (2020 + 2021 + 2022)								
	Total # of isolates for 3 seasons	16S rDNA sequence		RSN assay		Foliar assay		Bulb assay	
		# of isolates tested	# of isolates to be tested	# of isolates tested	# of isolates to be tested	# of isolates tested	# of isolates to be tested	# of isolates tested	# of isolates to be tested
CA	288	284	0	287	0	226	3	154	106
CO	280	275	0	252	20?	14	0	34	As many as possible
GA	794	794	0	794	0	183	0	54	0
ID	742	742	0	239	0	40	25	108	0
NM	159	157	0	157	0	0	0	53	As many as possible
NY	989	620	369	631	358	136	853	121	868
OR	713	713	0	211	0	34	0	92	0
PA	968	545	423	517	451	122	846	123	845
UT	388	385	0	368	0	18	0	65	As many as possible
TX	409	409	0	409	0	180	0	4	176
WA	476	467	1	475	0	288	1	168	233
OR Columbia Basin (2021)	14	14	0	14	0	14	0	0	9
Total	6,220	5,405	793	4,354	829	1,255	1,728	976	Many!

Prevalence of onion bacteria
identified in 2019-20 & 2020-21
in CA, CO, GA, ID, NM, NY, OR,
PA, TX, UT, WA
(n = 3,846 strains)



Onion bacterial genera identified in 11 states from Seasons 1 & 2

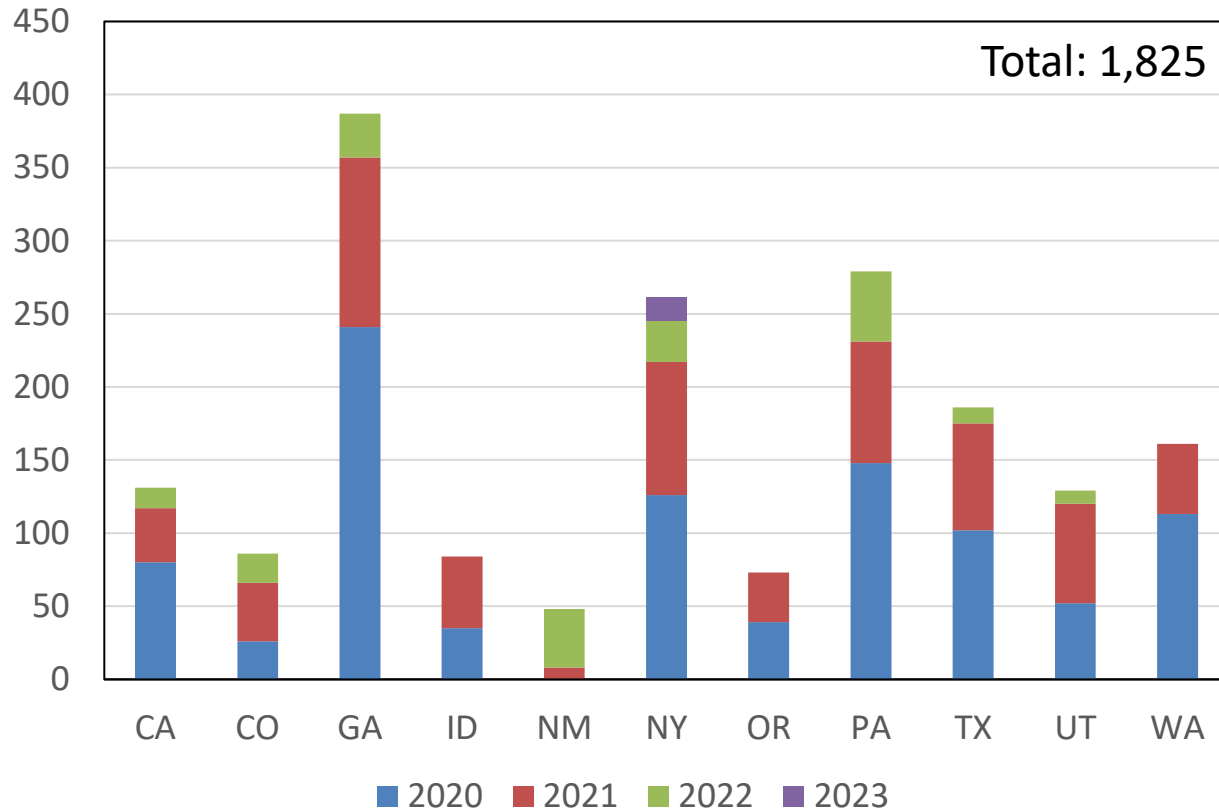


du Toit et al. 2022. *Phytopathology* 112:S3.97.
 Poster presented at Plant Health 2022, Pittsburgh, PA.

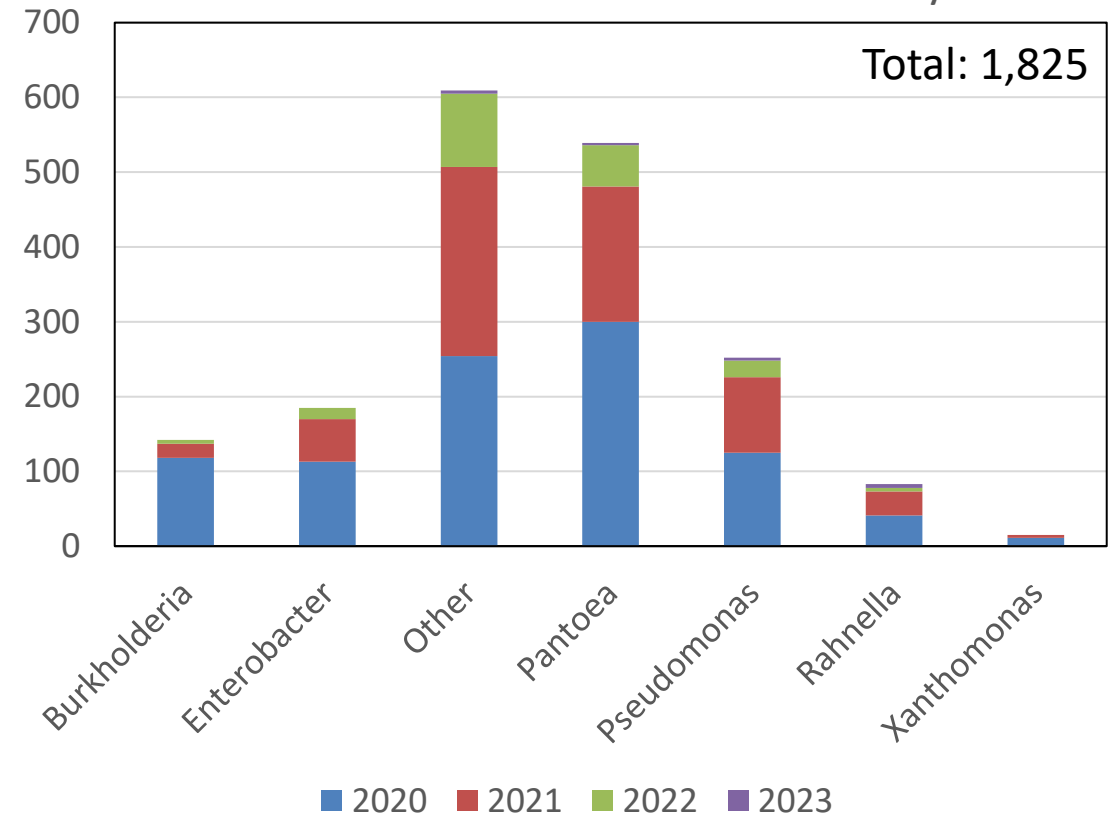
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Status of the National Onion Bacterial Strain Collection (NOBSC) at UGA

Number of bacterial strains submitted to the NOBSC from each state as of February 2024



Number of strains of primary genera submitted to the NOBSC as of February 2024



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Onion pathogenicity test results for the 4 most prevalent genera isolated from symptomatic onion crops in 2020 and 2021 in 4 of 11 states surveyed

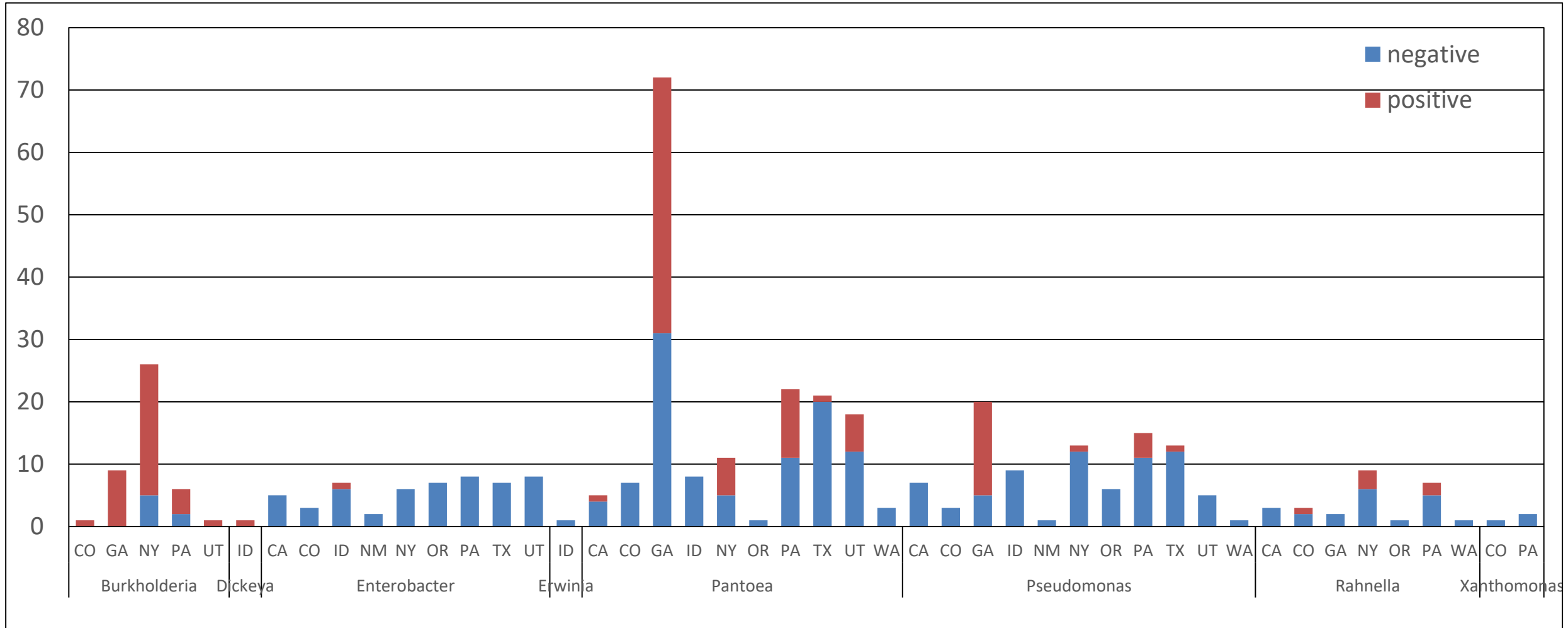
Genus	No. of isolates	RSN+ results	Georgia		New York		Texas		Washington	
			Strains identified	RSN+ results	Strains identified	RSN+ results	Strains identified	RSN+ results	Strains identified	RSN+ results
<i>Burkholderia</i>	271	83%	58	90%	111	83%	9	100%	7	100%
<i>Enterobacter</i>	325	2%	3	33%	69	6%	35	0%	32	0%
<i>Pantoea</i>	921	30%	365	47%	50	36%	108	6%	38	8%
<i>Pseudomonas</i>	501	17%	119	51%	68	10%	42	7%	65	0%

RSN+ = Red scale necrosis assay positive result

Following up with foliar and bulb pathogenicity tests
2022 survey isolates being processed

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Bacterial submitted to NOBSC by Jan. 2023 that were pathogenic with red scale necrosis assay



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Objective A1: National survey of onion crops for bacterial pathogens

Plans for 2024

- **Season 3 (2022) surveys:**
 - Receive/compile field and isolate data from 11 states for 'Stop the Rot' database
 - Complete 16S rRNA sequencing and scale, foliar, and bulb pathogenicity tests
 - Send select season 3 isolates to UGA to add to the NOBSC
- **Directed surveys:** Report/presentation by James Woodhall, Univ. of Idaho. Validate assays in 2024 season - protocols and fields to test?
- **Other potential inoculum sources:**
 - Soil, irrigation water, onion seed, weeds (James)
- Individual regional labs pursue species identification, survey publications, ...
- Plan combined, 3-season, 11-state survey publication

Recommendations/input from Stakeholder Advisory Panel



Stop the Rot: Combating onion bacterial diseases with pathogenomic tools and enhanced management strategies