

Isotope Ratio Measurements to Support Sustainable Wild Rice Production in Northern Saskatchewan Indigenous Communities

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Wild rice in Canada

- North American aquatic grass
 - *Zizania palustris*
- Grows primarily in shallow water and slow flowing streams
- Annual Canadian exports between \$5M to \$7M

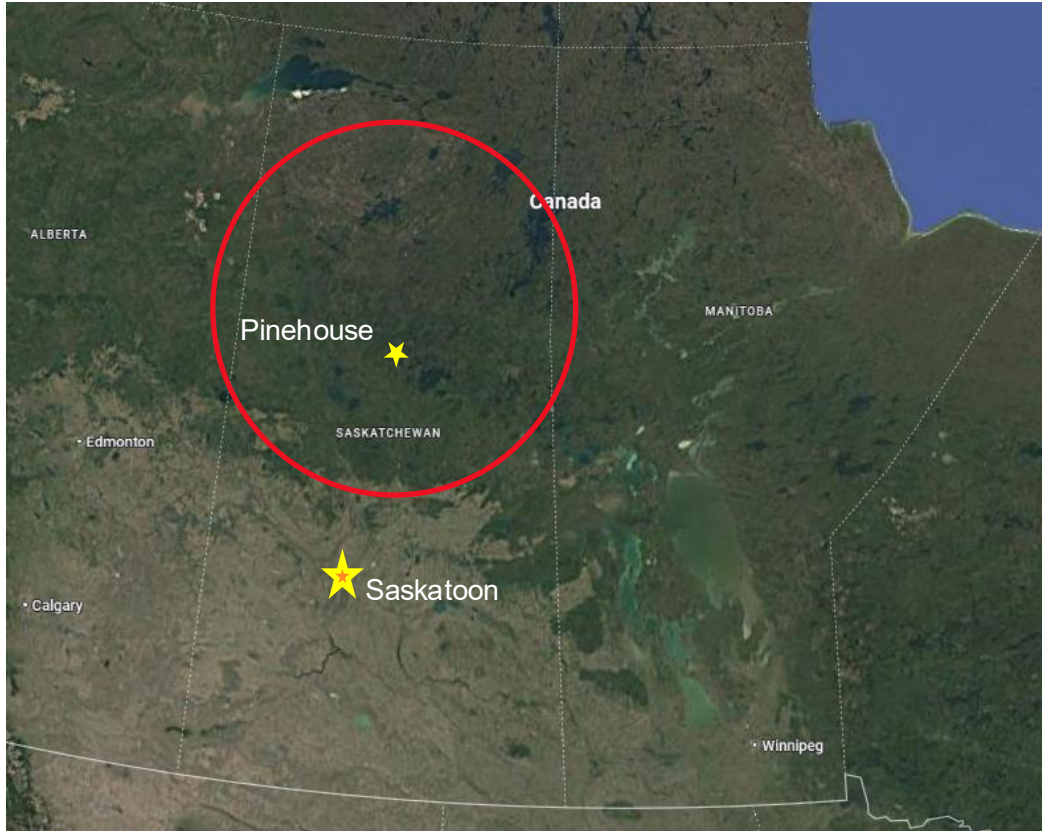


[https://en.wikipedia.org/wiki/Wild_rice#media/File:Zizania_palustris_\(20150198216\).jpg](https://en.wikipedia.org/wiki/Wild_rice#media/File:Zizania_palustris_(20150198216).jpg)



<https://northernlightsfoods.com/pages/what-is-wild-rice>

Northern Saskatchewan wild rice



Wild Rice Production in Northern Saskatchewan

Annual Production (kg)

2024	275 000
2023	1 400 000
2022	510 000
2021	600 000
2020	230 000
2019	670 000



<https://www.cbc.ca/news/canada/saskatchewan/unidentified-pest-wild-rice-harvest-damage-1.7322906>

Crop yield affected by temperatures,
changing water levels, pests (rice worm)

Integrating Traditional Knowledge and Science

NRC collaboration with Indigenous communities

- sensors to improve crop yield and growing conditions

Integration of traditional knowledge and science

- minimize environmental footprint
- sustainable environmental management



Role of stable isotope analysis

- Unique Canadian isotope signatures
 - CN – plant type and growing conditions
 - O – geolocation
- Protect Canadian sovereignty



Wild rice on the lake



Wild rice harvesting



<https://www.plentycanada.com/wild-rice.html>

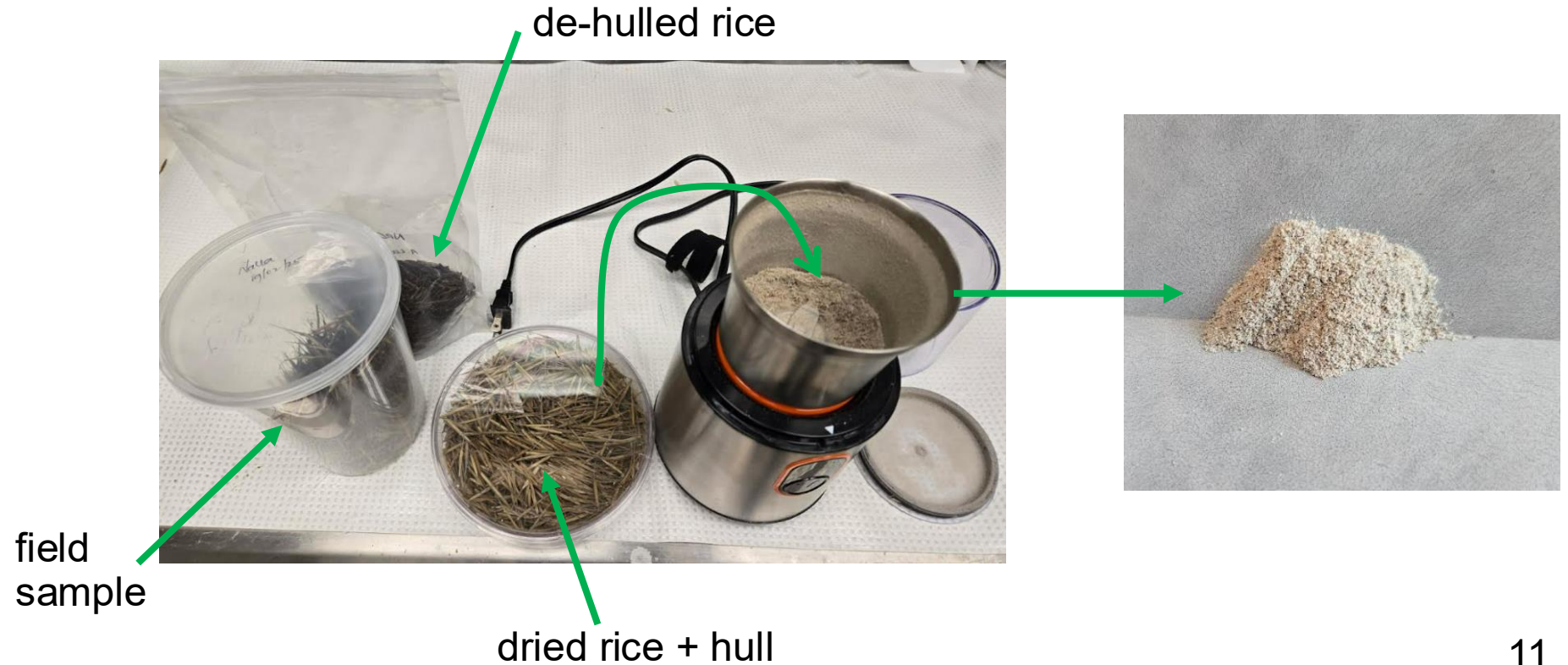


<https://www.cbc.ca/news/canada/saskatchewan/wild-rice-worm-moth-harvest-pest-1.7629594>

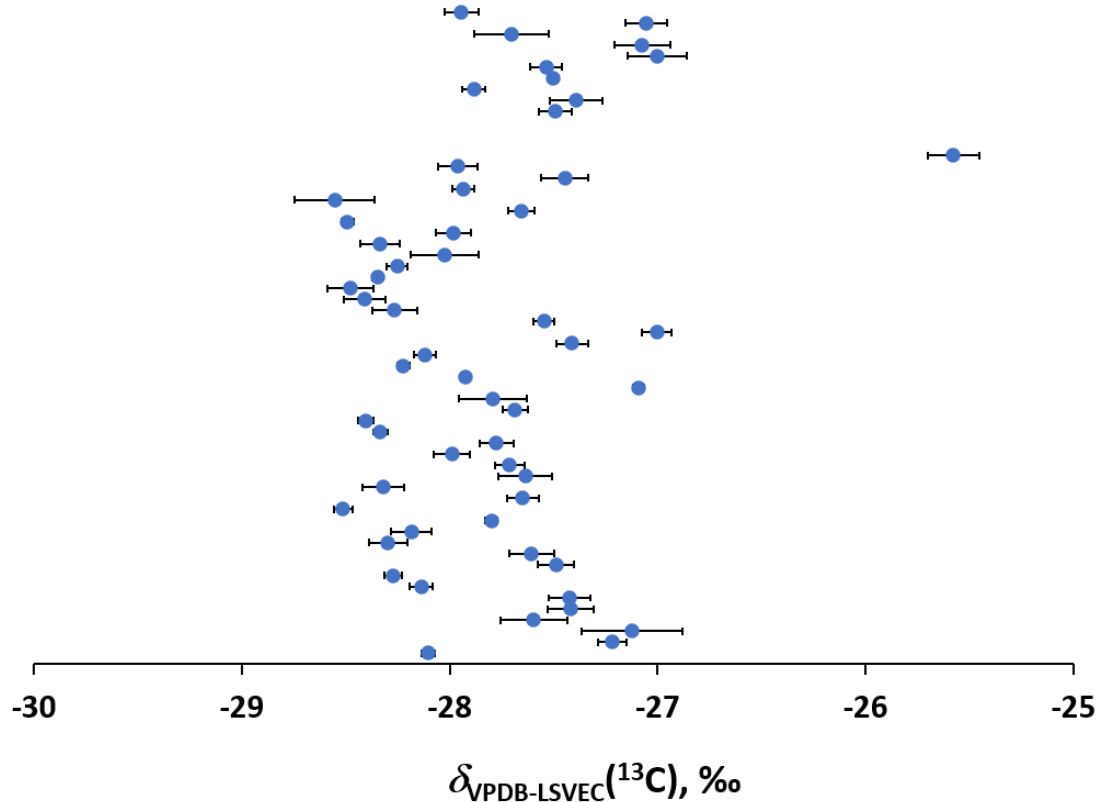
Sample collection



Sample processing

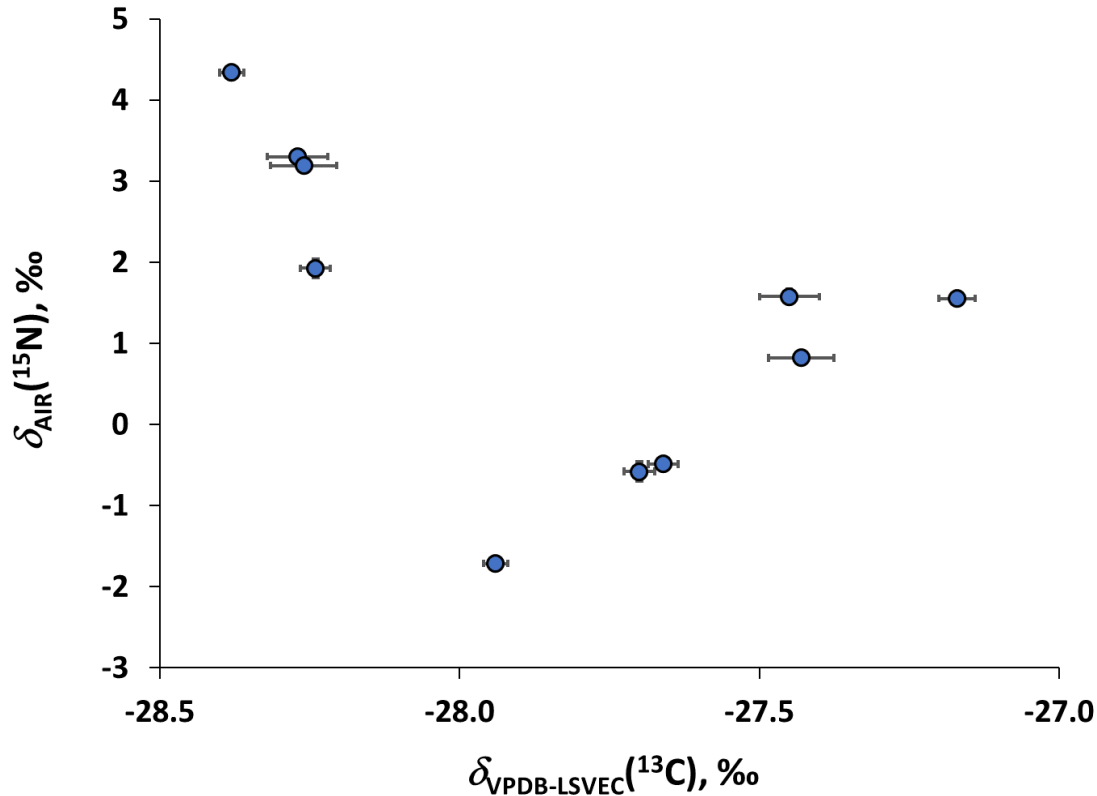


Carbon isotope delta measurements of wild rice



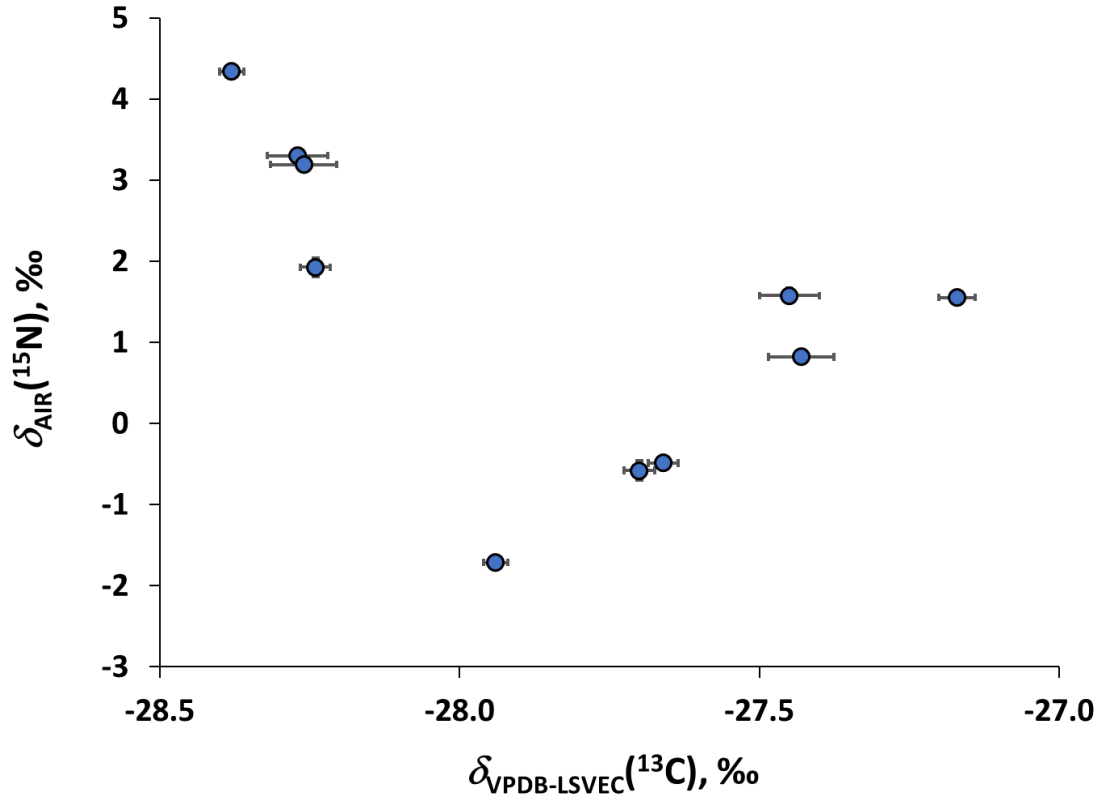
Literature values:
-25 to -30 ‰

Nitrogen isotope delta measurements



Literature values:
0 to +5 ‰

Preliminary Nitrogen isotope delta measurements



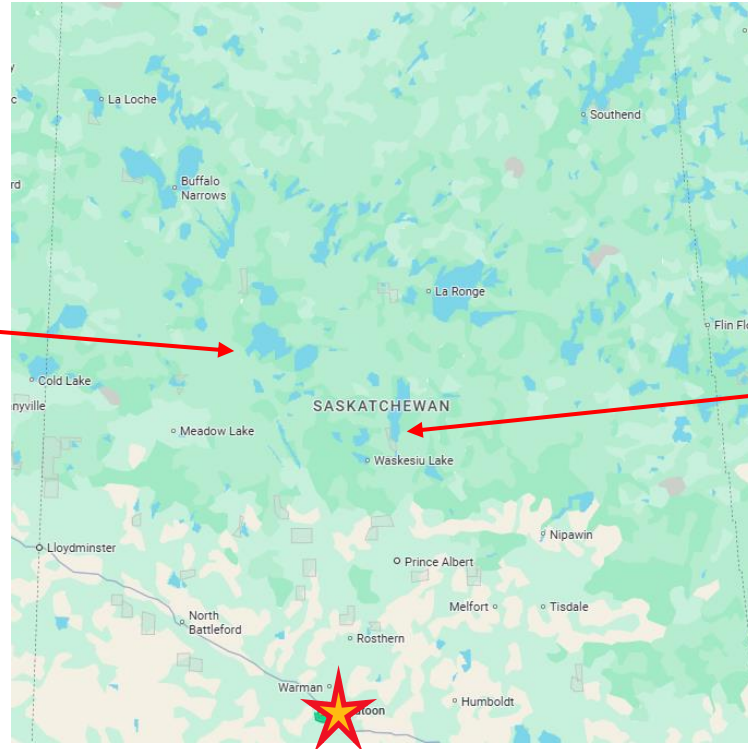
Literature values:
0 to +5 ‰

Oxygen isotope delta results

Location	Water	Rice
	$\delta_{\text{VSMOW-SLAP}}(^{18}\text{O}), \text{‰}$	$\delta_{\text{VSMOW-SLAP}}(^{18}\text{O}), \text{‰}$
MP Site 2	-8.25 ± 0.01	
Montreal Lake	-7.07 ± 0.04	
Lake 36	-7.06 ± 0.02	
Ratt Lake (main)	-6.89 ± 0.01	
Ratt Lake (south)	-6.21 ± 0.02	
Papoose	-4.24 ± 0.01	
Camp	-4.16 ± 0.01	



Oxygen isotope delta results in N Sask water



Papoose -4.24 ± 0.01 ‰

Montreal Lake -7.07 ± 0.01 ‰

Outlook

- Preliminary results are promising that Canadian wild rice does have a unique isotope fingerprint
- Continue to measure samples already collected

Future directions:

- 1) Temporal isotope profile
- 2) Rice with hull vs rice without hull



Thank you

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