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Speaker

Roadside Habitat for Monarchs: A Great Opportunity or Salty Death Traps?







Roadside habitat for monarchs: a great opportunity or salty death traps?



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4 million miles of public roads... 76% are 2-lane rural highways





A. Cariveau... Snell-Rood 2019 Frontiers Ecology & Evolution



Not Bombus affinis* just has a truck in the background!

D Cariveau Report # MnDOT 2019-25











A focus on sodium...













The interconnected ways that salt affects your body

Too much salt



Raised blood pressure	X
Damaged blood vessels	
Hormonal changes	Ì
Inflammation	Ì
Effects on the immune system	
Changes to gut bacteria	
Damaged stomach lining) (
Calcium lost from bones	k
Changes to fat metabolism) (
Drinking more sugary drinks	



Heart disease Heart failure

Dementia Stroke

Chronic kidney disease Kidney stones

Stomach cancer

Osteoporosis

Weight gain

Eat less than 6g of salt a day to stay healthy. Always check the label.

Salty roadsides: toxic or trap?

- How is sodium moving into plants used by pollinators?
- When do things start to get toxic?
- Is it a trap?

Roadside surveys





1111111

Field manipulations





Greenhouse manipulations

Sodium moves from road to soil to milkweeds...





Mitchell et al. 2020 Sci Tot Env

Sodium moves from milkweeds to caterpillars...







Similar patterns for metals like Zinc

Mitchell et al. 2020 Sci Tot Env



Some roadside elements are getting into pollen and nectar



Daily Traffic Volume (log)



Mitchell, Borer and Snell-Rood in prep

Salty roadsides: toxic or trap?

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Bumblebee rearing: lab

Butterfly rearing: lab and field









Lab studies





Kobiela et al in prep

n = 629, p = 0.005

How does this translate into performance in the wild?

















Salt has minimal effects on survival



Salt has minimal effects on body size



What about performance in the field?



2464 tagged monarchs



Who makes it to Mexico?







recovered 12/26/19

Monarchs are concentrating sodium at low diet levels



Low toxicity in bees as well



Lauren Agnew





Salty roadsides: toxic or trap?

- How is sodium moving into plants used by pollinators?
- When do things start to get toxic?
- Is it a trap?











Mitchell et al. 2019 Animal Behaviour

What does this all mean for roadside habitat for pollinators?

Remarkably promising with respect to nutrition!



Salty roadsides: toxic or trap?

- How is sodium moving into plants used by pollinators?
- When do things start to get toxic?
- Is it a trap?

Recommendations for Roadside Habitat for Pollinators

- Prioritize low-moderate traffic roads
- Mowing adjacent to the roadside may be eliminating the most toxic plants
- Plant a diversity of plants as they accumulate toxins to different degrees
- Reduce pollutant inputs! (salt less!)

Despite the risks, roadside habitat shows a lot of promise, especially on lower traffic roads.



Final note: just because effects on pollinators are minimal, this does not condone or encourage application of more salt!



