

Key Drivers of Variation in Food Crop Composition: A Scoping Review

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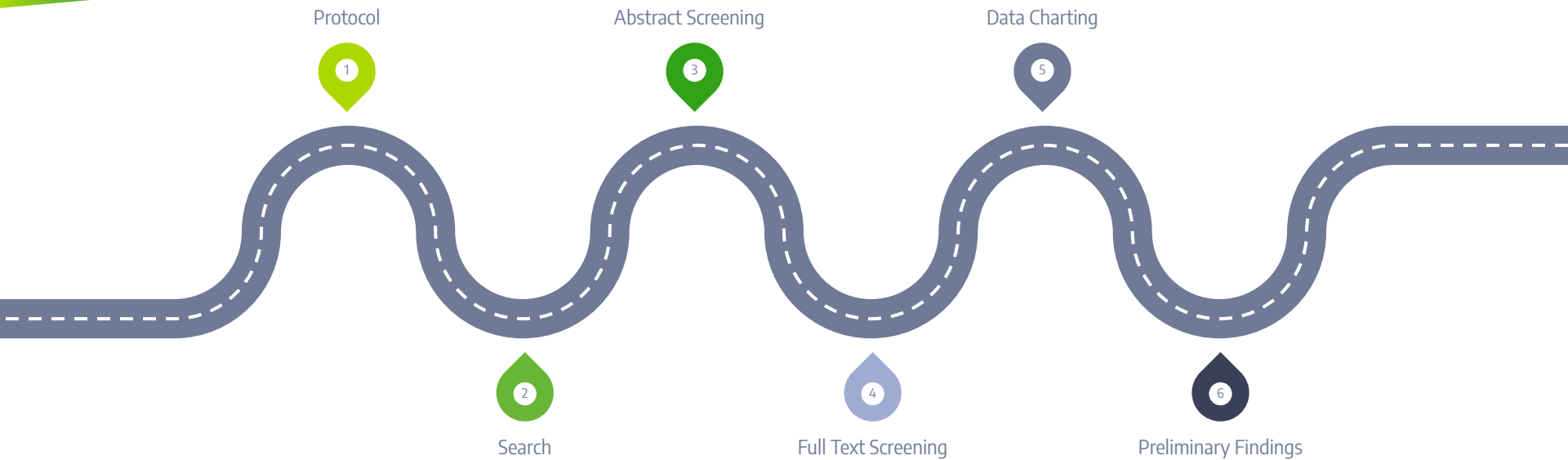


**PERIODIC
TABLE OF FOOD
INITIATIVE**



**The
Rockefeller
Foundation**
FOOD

High level overview





Aim:

To synthesize the key upstream factors in the food system that determine downstream variation in biomolecular components of food crops to generate evidence to produce foods that are good for both people and the planet.

Introduction

- ▶ Scoping reviews are "preliminary assessment of potential size and scope of available research literature. Aims to identify nature and extent of research evidence (usually including ongoing research)." Grant and Booth (2009).
- ▶ **Objectives:**
 - ▶ (i) Identify and map out how upstream environment-ecological and agricultural management factors drive variation of crop composition
 - ▶ (ii) Identify gaps in the literature for informing future research
 - ▶ (iii) Identify groups of food biomolecules that are most vulnerable to shifts due upstream factors.
- ▶ **Closed-frame research question:** *What are the agricultural and environmental drivers of variation in food crop composition?*

Methods

Protocol

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Articles must address the closed-frame research question. Quantitative, qualitative, and mixed-method studies were included.



Screening and Charting

Covidence is an online platform that facilitates collaborative article screening, reviewing, and data extraction for systematic and scoping reviews.

Covidence software allows reviewers to complete two data charting processes screening and data extraction.



Methods - Search

Search

150 Search Terms were selected after multiple test searches to optimize search term sensitivity and specificity.

- ▶ ProQuest Agricultural and Environmental Science Collection: 6,441
- ▶ ProQuest GeoRef: 5,280
- ▶ EBSCO Greenfile: 6,025

A “not” column as a valuable tool for refining the search strategy.

Search Terms Table: *What key upstream factors drive downstream variation of food crop composition?*

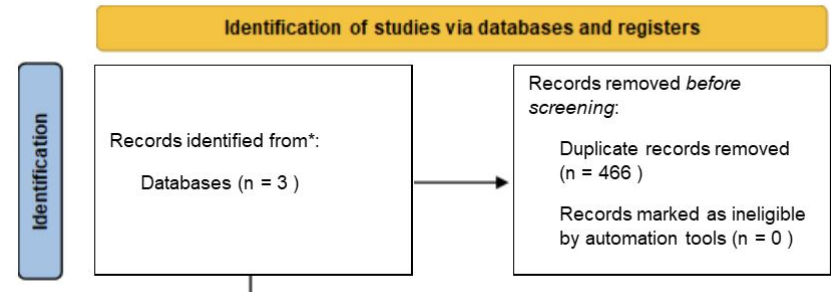
“UPSTREAM DRIVERS OF VARIATION IN FOOD CROP COMPOSITION”	<i>A N D</i>	“FOOD CROP”	<i>A N D</i>	“FOOD CROP COMPOSITION”	<i>N O T</i>	“NON-FOOD CROP TERMS AND ACTIVITIES”
Or abiotic factor or “agricultural management” or “agroecological” or “biofertilizer” or		or “cereal” or “cultivar” or “landrace”		Or anti-nutrient or “antioxidant” or “aromatic” or <u>bioactiv*</u> or <u>bioavailab*</u> or		Or animal nutrition or <u>laborator*</u> or <u>thermally process*</u> or allergy or <u>“alzheimer’s”</u> or

The Boolean phrasing utilized to identify relevant articles in the databases consisted of iterations of the following search terms: [iterations of food] AND [iterations of environmental OR iterations of agricultural management] AND [iterations of biomolecules OR iterations of food composition].

Methods - Abstract Screening

Abstract screening in a scoping review helps researchers identify relevant studies that provide insights into the research topic while ensuring transparency and rigor in the review process.

- ▶ 17,280 articles were imported to the Covidence software program.
- ▶ A subset of 2,998 diverse abstracts were reviewed by a team of nine screeners.
- ▶ 1,850 abstracts were deemed relevant for full text review.



Methods - Screening and Charting

Abstracts

- ▶ Three team members pilot-tested six abstracts, including clear positive and negative cases.
- ▶ A single reviewer screened each abstract due to the comprehensive nature of the review.
- ▶ The "maybe" decision allowed team members to flag articles for review by a second team member, improving the screening methodology.

Full Text

- ▶ Full-text screening involves reviewing the complete articles of the studies that passed the abstract screening phase.
- ▶ The extracted data will be expanded upon and further analyzed and synthesized to identify patterns, trends, and gaps in the literature.

Data extraction form snapshot:

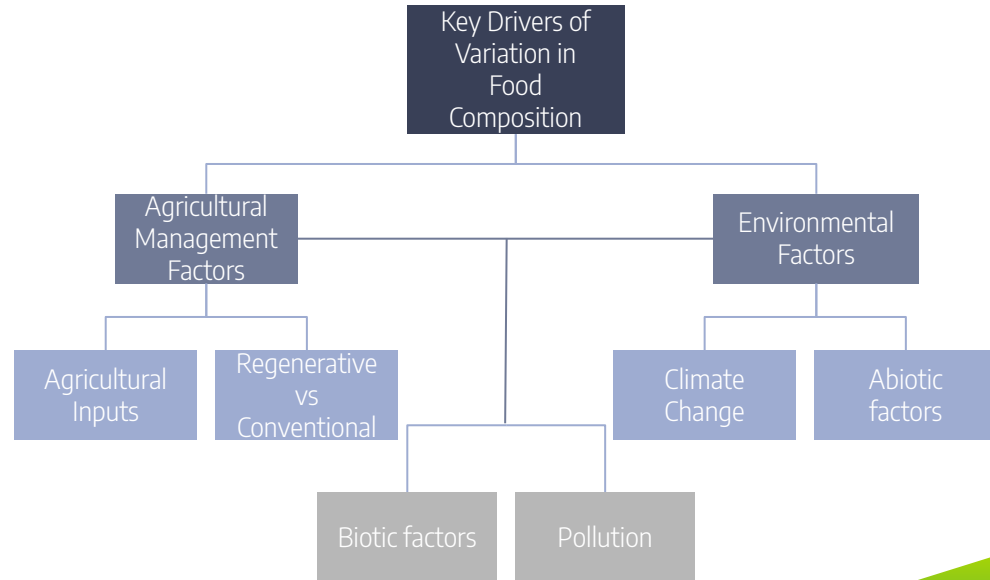
First Author, Year	Study Title	Location / Country (where study was conducted)	Upstream driver (agricultural or environmental variable)	Key Search terms - Upstream (proposed column)	Food crop
<i>Example: Smith et. al, 2023</i>	<i>An example of real title</i>	<i>United States</i>	<i>intercropping</i>		<i>lentils; wheat</i>
Piscitelli et. al, 2020	Tomato plants (Solanum	Agro Nocerino-Sarnese, Italy	Climate change and Environmental	pollution, soil	tomato
Feng et. al, 2020	Improving yield and qua	Guangdong Academy of Agricultural Sciences, China	Sustainable Agricultural management	fertilizer	brassica parac
Hozzein et. al, 2018	Exploring the potential c	Jouf region, Saudi Arabia	Sustainable Agricultural management	soil, soil microbiota	oat; wheat; b
Varga et. al, 2003	Influence of sodium hun	Nitra, Slovak Republic	Sustainable Agricultural management	greenhouse, fertilizer	pepper; Andre

Preliminary Charting Results

Preliminary Findings on Upstream Drivers of variation in food composition:

- ▶ Environmental Factors
- ▶ Agricultural Management Factors

Preliminary Food Crops Assessed: tomato, chinese cabbage, oats, wheat, barley, maize, sorghum, pepper, fig trees, date palm, maize, cucumber, rice

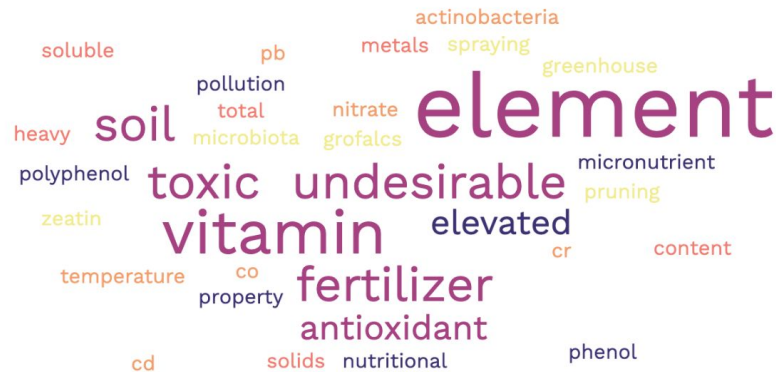


Preliminary Findings - Research Gaps

Mechanistic understanding

Long-term effects

Interactions between drivers

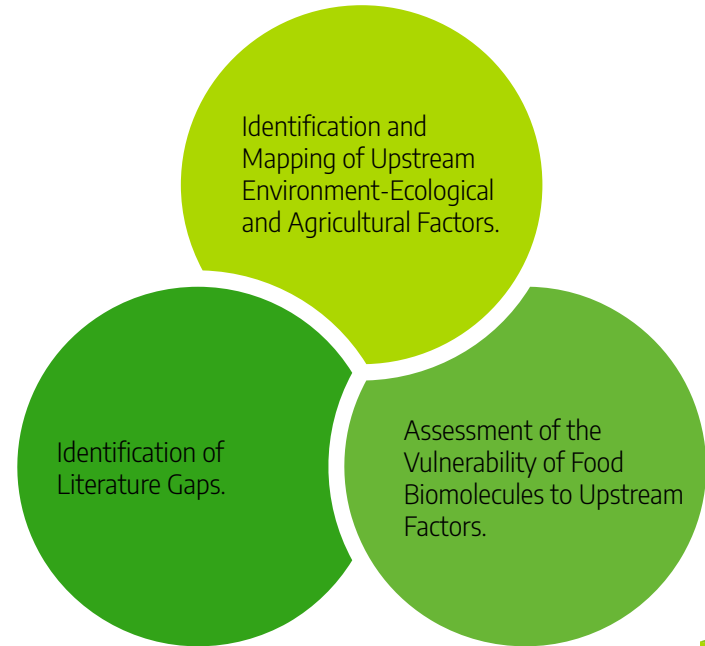


Word cloud of outcome summary data.

Application

Findings will be applied by the PTFI to identify important meta-data to be captured when analyzing food composition.

Next steps



Complete full screen

Full synthesis of
results

Summary of
evidence

Submit for
Publication



Thank you



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Food Initiative

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