Quantifying the Emissions Impact of Northern Arizona University's Campus-Grown Farm-to-Table Initiative

Kerry Spence
Student Funding Proposal
written for The Green Fund
April 2025

Quantifying the Emissions Impact of Northern Arizona University's Campus-Grown Farm-to-Table Initiative

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Abstract

"Quantifying the Emissions Impact of NAU's Campus-Grown Farm-to-Table Initiative" is a collaborative project involving the School of Hotel and Restaurant Management, Department of Biological Sciences, the Climate Science & Solutions graduate program, and the Greenhouse Gas Graduate Certificate Program. This project aims to implement and assess a campus-based farm-to-table produce initiative using produce grown on campus in the Shand Garden and Instructional Greenhouse into the menu at 1899, NAU's teaching restaurant. The aim of this research is to assess the feasibility of sustainable, local food sourcing and the impact this sourcing has on NAU's emissions. The research will involve quantifying the emissions from a business-as-usual method of food sourcing and comparing the emissions produced by using local produce through reduced transportation, refrigeration, and packaging waste.

Expected results include a measurable difference in greenhouse gas emissions between alternative and business-as-usual food sourcing, increased awareness of local food sourcing options, and information about building a scalable model for the university overall. The research will offer a quantification of the differing food sourcing methods, and the findings will be used to identify and understand successes and barriers in order to guide NAU's sustainability goals. This project expects to increase awareness of sustainable food sourcing options through increased engagement in the School of Hotel and Restaurant Management, 1899, and Biological Sciences.

This project fosters collaboration between multiple university departments to benefit each department individually as well as campus overall. This project provides HRM with local food sourcing and menu planning exposure. Biological Sciences will increase use of its instructional spaces for hands-on student research and engagement. The Climate Science & Solutions program will benefit from a real-world, scalable case study in emissions quantifications through sustainable food sourcing. Findings from this research aim to inform food sourcing initiatives at NAU in order to move toward best practices in reducing the university's emissions from food services.

Introduction

This research builds on HRM's farm-to-table initiative being used at the 1899 restaurant. Biological Sciences and HRM are partnering to revive the Shand Garden and Instructional Greenhouse to grow produce to be used on the 1899 menu. The research will focus on quantifying the emissions difference between using locally grown produce on 1899's menu in place of conventionally grown produce. This project is designed with sustainability in mind by reducing transportation and storage emissions as well as emissions from packaging waste used in the process of transporting and storing conventional produce. The project aims to reduce food waste by planning menu components based on actual yields from the garden and greenhouse.

Literature Review

Research on related topics, including locally sourced food and urban community farms, highlights the potential of this project to reduce greenhouse gas emissions. Supply chain emissions are considered an attainable category for greenhouse gas emissions reductions according to literature and industry best practices. Kulak et al. (2013) state, “the conventional food supply system also involves transportation of fruit and vegetables between distribution centres creating additional waste, such as polypropylene wrap or pallets, along the supply chain.” Other relevant research includes Life Cycle Analysis of emissions reductions from sourcing food locally on a campus setting (Striebig et al., 2019). This research literature serves as a jumping off point and provides useful references to set a foundation for this project’s research.

Research Goals & Objectives

The goal of this research is to quantify emissions from business-as-usual produce sourcing and alternative produce sourcing in the 1899 restaurant, determine whether this initiative meaningfully reduces emissions from produce sourcing, and understand what aspects (if any) of this initiative NAU could replicate across campus to further impact overall emissions. Additional goals of this research are to gauge the feasibility of scaling a project like this to apply to other dining sectors at NAU or other universities, discover potential barriers to using locally-grown produce in a university restaurant setting, and suggest solutions to any barriers.

Methods

This research requires quantifying two sets of data: emissions from produce grown in NAU’s Shand Garden and Instructional Greenhouse and emissions from previously used food procurement methods. Much of this work includes gathering necessary information about previous produce sourcing methods used by 1899 *and* growing strategies used by biological sciences in the Shand garden and instructional greenhouse. The Greenhouse Gas Protocol for quantifying agricultural emissions will be the primary guidance document for this research. The GHG Protocol is the global standard for industry best practices for quantifying and reporting emissions. The Protocol includes guidance regarding a hierarchy of quantification calculations based on how much and what types of input data are available. Ideally, the following data would be collected from respective partners including, but not limited to: land use area, crop type, yield, fertilizer type and application rate, tilling practices and rates, water use and related energy consumption, transportation distance and fuels, refrigeration area and duration, packaging types and mass, waste mass and disposal method, A comparison of these two data sets will be used to understand the difference in emissions by using campus-grown produce versus conventionally grown and transported produce. This data will drive an understanding of methods that support or inhibit emissions reductions from this farm-to-table initiative, and its potential to guide impacts across campus.

Data Dissemination & Impact

The data produced from this research will be twofold in the form of quantified emissions numbers and understood barriers and solutions of the project. Data is planned to be shared with a variety of stakeholders. Departments directly involved with the project will be presented with the findings from this research, which includes 1899, the School of Hotel and Restaurant Managements, and

the Department of Biological Sciences. As part of the expectations of receiving funding from the Green Fund, data and findings will be presented at the Graduate Symposium, or a mutually agreed upon alternative, within one year. This project hopes to share findings with NAU's Office of Sustainability and NAU's Dining Services to communicate the scalability of this project. Finally, data and findings can be used by other universities that wish to embrace similar projects.

Sustainability at NAU

This project aims to meet a number of NAU's sustainability goals including potentially reducing emissions, understanding barriers and solutions to barriers for implementation, and promoting a culture of sustainability by taking a multi-disciplinary approach. One step towards meeting NAU's carbon neutrality and sustainability goals include using in-house expertise from the greenhouse gas accounting graduate certificate, and a graduate of this program will conduct this research. This research also covers multiple of the Green Fund's cited student research needs including researching potential emissions reductions, waste minimization, and understanding and implementing sustainable systems. This research will analyze emissions from food sourcing and carbon sequestration through campus green space choices. Waste minimization will be researched through changes in food transportation packaging waste and food waste reduction though yield-appropriate menu planning. Additionally, this research will also explore water conservation strategies by utilizing the existing Shand Garden water catchment system and the implementation of a more sustainable system as a replacement for conventional produce sourcing.

Conclusion

This research poses the opportunity to enhance sustainability at NAU in a multitude of ways. By working across departments, this project provides learning experiences across a variety of disciplines. The findings of this research have the potential to be far reaching and scalable to other campus dining services and other universities hoping to engage in this work.

Bibliography

Michal Kulak, Anil Graves, Julia Chatterton, Reducing greenhouse gas emissions with urban agriculture: A Life Cycle Assessment perspective, Landscape and Urban Planning, Volume 111, 2013, Pages 68-78, ISSN 0169-2046, https://doi.org/10.1016/j.landurbplan.2012.11.007. (https://www.sciencedirect.com/science/article/pii/S0169204612003209).

Bradley Striebig, Eric Smitts, Samuel Morton, Impact of Transportation on Carbon Dioxide Emissions from Locally vs. Non-locally Sourced Food, Emerging Science Journal, Vol. 3, No. 4, August, 2019, Pages 222-234, DOI: 10.28991/esj-2019-01184, (https://ijournalse.org/index.php/ESJ/article/view/138).

Greenhouse Gas Protocol, GHG Protocol Agricultural Guidance: Interpreting the Corporate Accounting and Reporting Standard for the agricultural sector, 2014, (https://ghgprotocol.org/sites/default/files/2022-12/GHG%20Protocol%20Agricultural%20Guidance%20%28April%2026%29_0.pdf)

Questionnaire

Please select the focus of your research project, then address the following questions.

- ☐ Renewable energy/Energy efficiency
- ☐ Emissions reduction
- ☐ Environmental justice/Intersectionality
- ☐ Waste Minimization
- ☐ Understanding sustainability behavior/perspectives of NAU students
- ☐ Transportation
- ☐ Other: Water capture and reduction on campus, implementing sustainable systems

1. How will your research promote the purpose of the Green Fund and further sustainability on NAU's campus?

This research addresses multiple Green Fund research categories as well as multiple NAU sustainability goals. Sourcing produce locally, in this case on campus, is projected to reduce GHG emissions from transportation and refrigerated storage. Produce sourced on campus reduces packaging waste used during transportation and storage stages of produce sourcing. The existing water catchment system in Shand Garden will be used in produce growing. Finally, this research will be conducted in-house by a student of NAU's own greenhouse gas accounting graduate certificate program.

2. Will your research require the utilization of any spaces or infrastructure on campus? If so, identify the specific locations and/or infrastructure, how much of the space you require, and what each space will be used for. Please refer to the Space Committee Approval Process document to know if your research will require approval through the space committee.

This research will be conducted in the Shand Garden and Instructional Greenhouse. I do not require any specific space, but will be gathering information from these spaces. I will not be making any changes to these spaces.

3. Will other departments on campus be needed to assist in this project (i.e. Facility Services, Campus Transit)? If so, identify department partnerships.

For the purpose of my research, no other department assistance will be needed.

4. How will you monitor the impact of your research after completion? What do you plan to do with the results of your research?

This research will result in two data sets that quantify the greenhouse gas emissions from sourcing produce locally to be used in the 1899 restaurant, compared to the previously conventionally sourced produce. This will likely be measured in metric tons of CO2e (or similar unit of appropriate scale). The results will be presented to project stakeholders, relevant NAU groups (office of sustainability, dining services, etc.), and/or other universities who wish to replicate this project.

Project Budget

Please respond to the following funding question, and complete a thorough breakdown of all project costs in the provided Line Item Budget below. **Include a 5% line item for contingency of the overall costs**.

1. Does this project have any other sources of funding, and/or have you applied for other sources of funding? If so, list all additional sources of funding, both confirmed and potential, outside of the funds being requested from the Green Fund.

There are no other funding sources for this emissions reductions research. Stakeholders from Biological Sciences and HRM have applied for funding, but have been denied. Other sources of funding that have been applied for include the City of Flagstaff's Neighborhood Sustainability Grant, which was denied. The larger farm-to-table project has funding through the School of Restaurant and Hotel Management.

Line Item Budget:

Item	Item Justification	Quantity	Price per Unit
Student Wages	Graduate Student Wages	200 hours	$24
Contingency	5% Contingency Costs	1	$240

Total Funding Requested: $5,040.00

Project Timeline

Please provide an expected timeline for your research in the template below. The Green Fund recognizes that complex projects of this nature should have flexible, adaptable schedules, and the timeline provided will be treated as such. However, it is expected that you strive to adhere to this schedule as much as possible. **Please be as specific as possible.**

Expected Timeline:

Action	Parties Involved	Completion Month & Year
Greenhouse Planting	Kerry, Biological Sciences, HRM	April 2025
Shand Garden Planting	Kerry, Biological Sciences, HRM	May/June 2025
Collect previous produce sourcing data	Kerry & HRM	May 2025
Quantify emissions from previous sourcing methods	Kerry	June 2025
Quantify emissions from new produce sourcing method	Kerry	July 2025
Compile and present findings	Kerry	August 2025

Expected Project Completion Date: August 5, 2025

Green Fund Letter of Support

Part A: Project Advisors

Lorena Caballero – Lorena.Caballero@nau.edu
Richard Hodel – Richard.Hodel@nau.edu

Part B: Brief Description of Project

"Quantifying the Emissions Impact of NAU's Campus-Grown Farm-to-Table Initiative" is a collaborative project involving the School of Hotel and Restaurant Management, Department of Biological Sciences, and the Climate Science & Solutions graduate program. This project aims to implement and assess a campus-based farm-to-table produce initiative. The project centers on integrating produce grown on campus in the Shand Garden and Instructional Greenhouse into the menu at 1899, NAU's teaching restaurant. The aim is to promote sustainable, local food sourcing to reduce emissions on campus. The research will involve quantifying the emissions that are saved by using local produce through reduced transportation, refrigeration, and packaging waste.

Expected results include a measurable decrease in greenhouse gas emissions from alternative food sourcing, increased awareness of local food sourcing options, and building a scalable model for the university overall. By sourcing local, on-campus produce, the university can expect to reduce greenhouse gas emissions in its supply chain through reduced transportation, refrigerated storage, and packaging waste. This project expects to increase awareness of sustainable food sourcing options through increased engagement in the School of Hotel and Restaurant Management, 1899, and Biological Sciences.

This project fosters collaboration between multiple university departments to benefit each department individually as well as campus overall. This project provides HRM with local food sourcing and menu planning exposure. Biological Sciences will increase use of its instructional spaces for hands-on student research and engagement. The Climate Science & Solutions program will benefit from a real-world, scalable case study in emissions reductions through sustainable food sourcing. Findings from this research aim to inform food sourcing initiatives at NAU in order to move toward best practices in reducing the university's emissions from food services.

Part C: Brief Statement of Support

I am pleased to express my strong support for Kerry Spence's *Quantifying the Emissions Impact of NAU's Campus-Grown Farm-to-Table Initiative.* This project aligns with Northern Arizona University's commitment to sustainability and has the potential to provide valuable data-driven insights into the environmental benefits of local food systems. Kerry's initiative will contribute to a deeper understanding of how campus-based agriculture can reduce emissions by minimizing food transportation and promoting sustainable farming practices. By quantifying these reductions, her research will not only support NAU's sustainability goals but also serve as a model for other institutions seeking to measure and improve their own food systems.

With funding from the Green Fund, Kerry will have the resources necessary to conduct a thorough analysis, leveraging her expertise to collect and interpret meaningful data. Her dedication to sustainability and research makes her well-equipped to execute this project successfully. I am confident that her work will provide valuable recommendations for further

enhancing NAU's farm-to-table efforts and strengthening the university's role as a leader in environmental accountability. I strongly encourage the Green Fund to support this important project, which will contribute both to academic research and to tangible improvements in campus sustainability.

Sincerely,
Lorena Caballero

I am writing to express my strong support for **Kerry Spence**'s proposal entitled "*Quantifying the Emissions Impact of NAU's Campus-Grown Farm-to-Table Initiative*." This is a highly interdisciplinary project that represents both an innovative and practical approach to addressing food sustainability on campus, while providing valuable research opportunities for students and faculty across multiple departments/colleges/schools at NAU.

The expected outcomes of this project align strongly with NAU's sustainability goals. These expected outcomes include a measurable decrease in greenhouse gas emissions, increased awareness of sustainable food sourcing, and the development of a scalable farm-to-table model at NAU. Moreover, Kerry will gain valuable experience teaching and training undergraduate students in best practices in farm-to-table based food sustainability. Simultaneously, the undergraduates trained as a core component of this project will gain valuable career-readiness skills to make future impacts on sustainable food practices in Northern Arizona and beyond.

The findings from this research could directly inform food procurement policies at NAU**,** ensuring that sustainability is at the forefront of the university's dining and operations strategy. For the above reasons, I strongly endorse Kerry's proposal and believe it will contribute substantially to NAU's commitment to sustainability, student engagement, and trans-disciplinary research**.** I urge the Green Team to give this project your full consideration and am happy to provide any additional information to support this application.

Thank you for your consideration,
Richard Hodel
richard.hodel@nau.edu

Part D: Other Information

This project has been estimated at around 200 hours and shall begin on May 12th, 2025. Deliverables include Graduate Symposium presentation, emissions reductions dataset, and written research findings. Additionally, Kerry will oversee and manage greenhouse and garden technicians, ensuring efficient operations for this project while offering undergraduate students hands-on experience in sustainable food production, environmental research, high altitude horticultural practices, and greenhouse maintenance.

Commitment to Present Research

Please read and sign the statement below, acknowledging your commitment to present the findings of your research.

If selected as a recipient of the Green Fund Student Research Grant, regardless of the outcome of my research project, I Kerry Spence commit to presenting the status of the research as described in this application in the form of an oral presentation to the Green Fund Committee or a poster exhibit presentation at the Undergraduate or Graduate Research Symposium, no more than 1 year after receiving notification of funding.

The oral presentation to the Green Fund Committee will consist of an approximately 10 minute long PowerPoint that includes the following aspects of your project:

- Original goal and purpose of research
- Conflicts or changes to the original purpose
- Results/Conclusion
- All relevant graphical displays of data

Student Signature: Kerry Spence

Thank you for your submission. We deeply appreciate your commitment to sustainability at NAU, and we look forward to reviewing your application. Please direct any further questions to ***GreenFund@nau.edu***.

Contact Information

Project Leader Name: Kerry Spence E-mail: kes686@nau.edu Expected

Graduation Date: December 2025

Project Advisor Name: Lorena Caballero

Project Advisor Department: Biological Sciences

E-mail: Lorena.Caballero@nau.edu

Position: Instructional Laboratory Manager

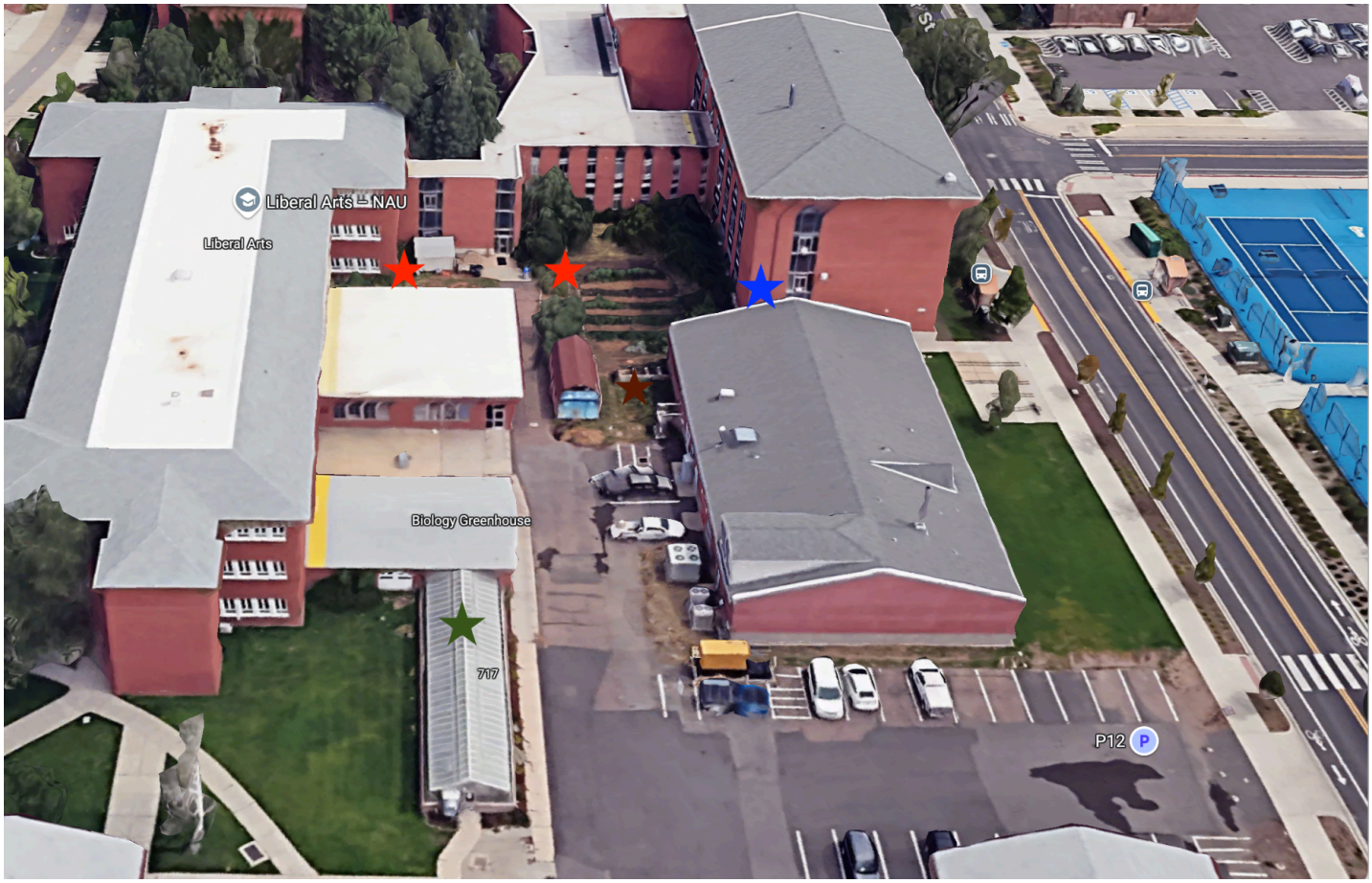
Project Name: Quantifying the Emissions Impact of Northern Arizona University's Campus-Grown Farm-to-Table Initiative

Date of Application Submission: April 4, 2025

Date of Revision Submission: April 17, 20245

Appendices

Map of Relevant Areas



Instructional Greenhouse
Shand Garden (2 sections)
Water Catchment System
Compost

Flagstaff last frost date - June 10
Flagstaff first frost date - Sep 23

Plant	Type	Planting instructions	Seed start date	Transplant date
Zucchini ("Black Beauty")	Annual - Vegetable	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Patty Pan Squash	Annual - Vegetable	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Arugula ("Astro")	Annual - Vegetable	Sow outside 4 weeks before average last frost date	Outside - May 13	n/a
Kale ("Dinosaur")	Annual - Vegetable	Start inside 6 weeks before average last frost date; transplant 2 weeks before last frost date	Inside - April 29	27-May
Kale ("Dwarf Blue Curled")	Annual - Vegetable	Start inside 6 weeks before average last frost date; transplant 2 weeks before last frost date	Inside - April 29	27-May
Swiss Chard ("Ruby Red")	Annual - Vegetable	Sow outside 40 days before first frost date for fall harvest	Outside - August 25	n/a
Scallions	Annual - Vegetable	Start inside 8 weeks before average last frost date; transplant 4 weeks before last frost date	Inside - April 15	13-May
Onion ("Walla Walla")	Annual - Vegetable	Start inside 10 weeks before average last frost date; transplant 4 weeks before last frost date	Inside - April 1	13-May
Shallot ("Zebrune")	Annual - Vegetable	Start inside 10 weeks before average last frost date; transplant 4 weeks before last frost date	Inside - April 1	13-May
Pepper ("Sweet Banana")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Pepper ("Shishito")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Pepper ("Early Jalepeno")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Pepper ("Ancho/Poblano")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Pepper ("Pasilla Bajio")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Pepper ("Tabasco")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Pepper ("Lemon Drop")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Pepper ("Anaheim")	Annual - Vegetable	Start inside 8 weeks before transplanting; Transplant outside 1 week after last frost date	Inside - April 15	10-Jun
Fennel ("Finocchio")	Annual - Vegetable	Start outside in mid-summer for fall harvest	Outside - July 19	n/a
Kohlrabi ("Purple Vienna")	Annual - Vegetable	Start outside in late summer for fall harvest	Outside - July 19	n/a
Cabbage ("Napa Slow Bolt")	Annual - Vegetable	Sow outside 10 weeks before first fall frost date for fall harvest	Outside - July 19	n/a
Broccoli ("Belstar")	Annual - Vegetable	Start inside 6 weeks before average last frost date; transplant 2 weeks before last frost date	Inside - April 29	27-May
Broccoli Raab ("Rapini")	Annual - Vegetable	Start outside in late summer for fall harvest	Outside - August 25	n/a
Bok Choy ("Toy Choy")	Annual - Vegetable	Start outside in late summer for fall harvest	Outside - August 25	n/a
Beet ("Detroit Dark Red")	Annual - Vegetable	Sow outside 8 weeks before average first frost date for fall harvest	Outside - July 29	n/a
Carrot ("Red Cored Chantenay")	Annual - Vegetable	Sow outside 8 weeks before average first frost date for fall harvest	Outside - July 29	n/a
Radish ("Cherry Belle")	Annual - Vegetable	Sow outside 8 weeks before average first frost date for fall harvest	Outside - July 29	n/a
Bean ("Tepary")	Annual - Vegetable	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Bean ("Scarlet Emperor Runner")	Annual - Vegetable	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Tomato ("Chocolate Cherry Pole")	Annual - Vegetable	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Tomato ("Glacier Bush")	Annual - Vegetable	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Tomato ("Sweetie Pole")	Annual - Vegetable	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Tomatillo ("Grande Rio Verde")	Annual - Vegetable	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Amaranth ("Burgundy")	Annual - Vegetable	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Corn, Peruvian Purple	Annual - Vegetable	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Basil ("Italian Genovese")	Annual - Herb	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Basil ("Purple Petra")	Annual - Herb	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Basil ("Tulsi")	Annual - Herb	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Thyme, English	Perennial - Herb	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Parsley ("Italian Flat Leaf")	Biennial - Herb	Start inside 8 weeks before average last frost date; transplant 4 weeks before last frost date	Inside - April 15	13-May
Dill ("Bouquet")	Annual - Herb	Sow outside 2 weeks before average last frost date	Outside - May 27	n/a
Catnip	Perennial - Herb	Start inside 6 weeks before transplanting; Transplant 1 week after last frost date	Inside - April 29	10-Jun
Cilantro ("Long Standing Santo")	Annual - Herb	Sow outside 2 weeks before average last frost date	Outside - May 27	n/a
Tarragon, Mexican	Annual - Herb	Start inside 6 weeks before average last frost date	Inside - April 29	10-Jun
Black-Eyed Susan	Perennial - Flower	Start inside 8 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 15	10-Jun
Coreopsis ("Plains Coreopsis")	Annual - Flower	Start inside 8 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 15	10-Jun
Echinacea ("Purple Coneflower")	Perennial - Flower	Start inside 8 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 15	10-Jun
Marigold, French	Annual - Flower (Edible)	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Marigold, African	Annual - Flower	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Nasturtium ("Butterscotch")	Annual - Flower (Edible)	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Wild Bergamot	Perennial - Flower (Edible)	Start inside 8 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 15	10-Jun
Calendula	Annual - Flower (Edible)	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Hyssop ("Anise Hyssop")	Perennial - Flower (Edible)	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Chamomile, German	Perennial - Flower (Edible)	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Cosmos ("Sensation Blend")	Annual - Flower	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Borage	Annual - Flower (Edible)	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Alyssum ("Oriental Nights")	Annual - Flower (Edible)	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Stock ("Column Blend")	Annual - Flower (Edible)	Start inside 8 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 15	10-Jun
Zinnia ("Persian Carpet")	Annual - Flower	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Zinnia ("California Giant")	Annual - Flower	Start inside 6 weeks before average last frost date; transplant 1 week after last frost date	Inside - April 29	10-Jun
Sunflower ("Lemon Queen")	Annual - Flower	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Sunflower ("Zohar")	Annual - Flower	Sow outside 1 week after average last frost date	Outside - June 10	n/a
Sunflower ("Hopi Black Dye")	Annual - Flower	Sow outside 1 week after average last frost date	Outside - June 10	n/a