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The Center for Sustaining Agriculture and Natural Resources (CSANR) exists to catalyze research, extension and educational activities that improve the sustainability of agriculture, natural resources, and food systems in Washington State and around the world.

The Washington State Legislature provides funding to the Washington Department of Agriculture, Washington State Conservation Commission, and Washington State University to undertake a Washington Soil Health Initiative (SHI). Within WSU this initiative is being administered by the CSANR. In 2018, the Legislature provided proviso funds to undertake many actions including the installation of a long-term agroecological research and extension (LTARE) site at WSU Mount Vernon Northwestern Research and Extension Center focused on soil health. With the diversity of cropping systems across the state, the need to add additional LTARE sites is one of the main priorities of the WSU SHI.

The WSU SHI was created to generate leading edge information related to soil health and disseminate this information to relevant stakeholders. At the core of this effort, is the production of meaningful and relevant long-term data that can help producers, consultants, policy makers, agricultural professionals, and the public make better informed decisions to protect and improve soil health across the state. Long term research needs to be planned well in advance as decisions made in one year might will influence decisions in subsequent years. In addition to financial support, WSU's SHI will also provide support in the form of data management, website and social media outreach, agroecosystem modelling for a LTARE, and broader connections for research collaborations.

As part of the SHI, this internal request for proposals is intended to fully or partially fund additional LTARE sites or experiments across the state. It is expected that demand will be greater than there are available resources so applicants must accurately prepare their documents and prepare to not receive full funding for the LTARE. Leverage of funds in the form of external support from entities such as commodity commissions, donors, or host sites is suggested.

More information on the SHI can be found: <http://csanr.wsu.edu/program-areas/soil-health-initiative/>

If the project does not fit the requirements of this call, another opportunity may be of interest:

- *Funding from CSANR's BIOAg program is also available to support research, extension activities, or planning grants that advance the development, understanding, and use of biologically-intensive, organic and sustainable agriculture in Washington State. More information on that program can be found: <http://csanr.wsu.edu/csanr-grants/bioag-grant-program/> and the FY21 RFP is anticipated to be released by September 15th.*



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WSU Soil Health Initiative (SHI) Request for Qualifications (RFQ)

Goal:

The goal of this SHI LTARE RFQ is to advance the knowledge of and adoption of agricultural practices that promote soil health. These practices must be relevant to the related agroecosystem and evaluate innovative practices that are beyond “business as usual”.

Proposal Guidelines:

- Proposals *must* prioritize needs relevant to the state of Washington agricultural systems.
- The site must be established on a WSU managed farm or facility.
- The Lead PI must be a WSU faculty member (contact us if clarification is needed). Faculty members must limit their submissions as Lead PI to a single proposal.
- Proposal narratives are limited to 7 pages maximum with 11-point Times New Roman font and 1 in margins. Proposals shorter than 5 pages are acceptable.
- Each proposal narrative must address the following sections (7-page limit):
 - Title and primary investigator
 - Co-investigators and roles
 - Cooperators and roles/stakeholder input (If existing input does not exist a plan must be described where feedback is sought during the experiment design process)
 - Target audience and production systems
 - Brief introduction and justification
 - Concise statement of the goal and objectives of the proposal
 - Experimental plan, including detailed description of the cropping system
 - Project management plan
 - Expected outputs and outcomes
 - Anticipated impact of outputs
 - Project timeline by state fiscal year
 - Budget and budget justification
 - Advisory group description
 - Data management plan
 - Letters of support (if available)
- Budget: Reviewed by CAHNRS Grant Administrator please consider site / experiment start-up costs as well as ongoing capacity costs – including considerations for fiscal year cash flow. Budgets should be outlined from 1/1/22 through 6/30/26.

Submission and Budget Guidelines:



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- Qualification proposals must be submitted electronically as PDF (proposal narrative) and Excel file (budget) submitted **by October 29, 2021**.
- SHI funding may not be used for faculty salary augmentation (e.g., summer salary), and salary accruals are not allowable.
- Requested funds must be spent by the end of each state fiscal year, **there will be no exceptions for this.**
- Questions regarding annual or total amount requested can be sent to Chris Benedict at the below information.

Any questions regarding the appropriateness of proposed topics or allowable expenses should be directed to Chris Benedict, chrisbenedict@wsu.edu, 360-389-3853.

Submission and Project Timeline:

- All proposal submissions must be received by 5 PM on **October 29, 2021**.

Proposal Review and Funding Decisions:

Each SHI proposal will be reviewed by the SHI Management Team, then ranked using the below criteria:

- Does the proposal follow guidelines stated in the RFQ?
- Has the proposal addressed all criteria as outlined in the RFQ?
- Is there a documented need for the LTARE?
- How well does the proposed project address the goals of SHI as stated in this RFQ?
- Are target audiences clearly identified and the objectives realistic and impactful?
- Is the work plan and budget realistic and clearly articulated?



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Criteria for Long-Term Agroecological Research and Extension (LTARE) Site Support from the WSU Soil Health Initiative

Introduction

Washington State University's (WSU) Soil Health Initiative (SHI) was created to generate leading edge information related to soil health and disseminate this information to relevant stakeholders. At the core of this effort is the production of meaningful and relevant long-term data that can help producers, consultants, policy makers, agricultural professionals, and the public make informed decisions to protect and improve soil health. The SHI as proposed requires WSU to establish three Long-Term Agroecological Research and Extension sites (LTAREs) in addition to the existing LTAR at the Cook Agronomy Farm. The "three" include a Legislatively required site at WSU Mount Vernon NWREC (already in start-up), along with commitments to a site focused on potato cropping systems in the Columbia Basin (e.g., Othello) and a tree fruit / perennial focused system (e.g., Sunrise Research Orchard), but we have the opportunity and desire to augment these with additional sites / experiments from other locations / systems around the state.

Each SHI-affiliated LTARE should have its own local flavor and design that is relevant to the research and management questions of the priority production system in the area – but will be required to meet a minimum set of metrics and criteria relevant to the state-wide SHI soil health baseline assessment (described below) to receive funding from the SHI.

Outlined Need for LTARE

Request for resources to support an LTARE must be rooted in a clear, outlined need for the LTARE. This should include a literature review, documented need by a specific agriculture production system, and feedback from stakeholders.

Documented Industry Support

Industry support for a LTARE is required to receive SHI support. This can be documented in many different forms that must include at least two of the following:

- Perform a needs assessment with representatives of an agricultural sector (e.g., tree fruit, dryland).
- Letter of support from agricultural industry interest group/commission or group of producers.
- Financial support from an agricultural industry interest group/commission or group of producers.

Formation of a Team of Investigators

As the demand for support outstrips available resources, collaboration with other scientists is required. The formation of a transdisciplinary team of investigators across disciplines and covering both research and extension dimensions is required. This team could include WSU, but



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also non-WSU collaborating scientists. A clear, documented role for each investigator is required, and proposals will be scrutinized heavily for this.

Formation of an Advisory Group

All LTAREs will need an advisory group that consists of producers/consultants from a defined agricultural sector. This advisory group should meet prior to the development of the design and plan to meet at least twice a year. If funds are needed to host this, PIs must include this in their budgets. There should be some articulation of how the advisory group will initially influence the LTARE design and management and what the commitment of an advisor is. Individuals who have agreed to serve on an LTARE advisory group must be listed with affiliations. Advisors from individual LTAREs may be asked to participate in the overall SHI Advisory Group.

Treatment Structure

Imposed agricultural and management treatments need to be relevant to the agricultural sector that the LTARE represents, while also being designed to measure indicators that are relevant to the statewide soil health baseline assessment (below). **Prior to submitting for support, the primary investigator needs to solicit feedback from a representative group of producers/consultants on treatment priorities.** It is suggested to seek consultation with WSU's Center for Interdisciplinary Statistical Education and Research ([CISER](#)) for assistance with experimental design.

Soil Measurement Dataset

All LTARE sites must collect data from their experiment for the following list of indicators:



Minimum Set¹

What	Depth	Frequency/Timing	Method
Total organic carbon	0-15 cm, 15-30 cm, 30-60 cm, 60-90 cm (Depths beyond that should be relevant to the region)	Baseline (Pre-Treatment),	Dry combustion (accounting for carbonates on soils >pH 7.2 or with a history of lime application)
Mineralizable Carbon	0-15 cm, 15-30 cm	Baseline (Pre-Treatment)	CO ₂ produced after wetting in a 24-hr incubation
POX Carbon	0-15 cm, 15-30 cm	Baseline (Pre-Treatment)	Permanganate-oxidation (NRCS Technical Note Appendix 5)
ACE Protein	0-15 cm, 15-30 cm	Baseline (Pre-Treatment)	NRCS Technical Note Appendix 6
pH	0-15 cm, 15-30 cm, 30-60 cm, 60-90 cm (Depths beyond that should be relevant to the region)	Baseline (Pre-Treatment)	1:10 soil slurry with 0.01 M CaCl ₂
EC	0-15 cm, 15-30 cm	Baseline (Pre-Treatment)	1:1 soil slurry with DI H ₂ O
CEC	0-15 cm, 15-30 cm	Baseline (Pre-Treatment)	Ammonium acetate method
Texture	0-15 cm, 15-30 cm, 30-60 cm, 60-90 cm (Depths beyond that should be relevant to the region)	Baseline (Pre-Treatment)	Hydrometer method or pipette method with sand sieving
Bulk Density	0-15 cm, 15-30 cm, 30-60 cm, 60-90 cm (Depths beyond that should be	Baseline (Pre-Treatment)	Intact cores collected at relevant depths, oven-dried at 105 °C



	relevant to the region)		
Fertility (macro- and micro-nutrients)	0-15 cm, 15-30 cm	Baseline (Pre-Treatment)	
Aggregate Stability	0-15 cm (collected with a wide core to preserve structure)	Baseline (Pre-Treatment)	Wet sieving
Microbial Biomass/Community Characterization	0-15 cm, 15-30 cm	Baseline (Pre-Treatment)	PLFA

¹Samples should be processed and stored as appropriate for each method, which will include freezing a subsample at < -20° C (-80° C preferred) for biological analyses and air-drying. Air-dried sample should be archived.

Resources

[NRCS Technical Notes](#)

[Soil Health Institute Guidelines](#)

[OSU Soil Health Lab](#)

Optional

What	Method
Earthworms	Application of skin irritant allyl isothiocyanate (AITC) to soil to expel earthworms (Pelosi, C, M. Bertrand, Y. Capowiez, H. Boizard, J. Roger-Strade. 2009. Earthworm collection from agricultural fields: Comparisons of selected expellants in presence/absence of hand sorting. European Journal of Soil Biology. 45: 176-183)
Nematodes	Isolation from soil with a Baerman funnel modified with a wet-sieving step (Ingham, 1994) or elutriation. Identify to genus or family level at 400 or 1000×. Community indices (e.g., structure index, maturity index) computed (Bongers and Ferris, 1999; Forge et al., 2003). Ingham, R.E. 1994. Nematodes. p. 491–516. In R.W. Weaver et al. (ed.) Methods



	<p>of soil analysis. Part 2. SSSA, Madison, WI.</p> <p>Bongers, T., and H. Ferris. 1999. Nematode community structure as a bioindicator in environmental monitoring. <i>Trends Ecol. Evol.</i> 14:224–228.</p> <p>Forge, T.A., E. Hogue, G. Neilsen, and D. Neilsen. 2003. Effects of organic mulches on soil microfauna in the root zone of apple: Implications for nutrient fluxes and functional diversity of the soil food web. <i>Appl. Soil Ecol.</i> 22:39–54.</p>
Macro Invertebrates	Berlese-Tullgren funnel (Moldenke, A.R. 1994. <i>Arthropods</i> . p. 517–542. In R.W. Weaver et al. (ed.) <i>Methods of soil analysis. Part 2. SSSA, Madison, WI.</i>)
Particulate Organic Matter	>50-63 μm (Lavalley, J.M., Soong, J.L., Cotrufo, M.F., 2020. Conceptualizing soil organic matter into particulate and mineral-associated forms to address global change in the 21st century. <i>Glob. Chang. Biol.</i> 26, 261–273. https://doi.org/10.1111/gcb.14859
Mineral Associated Organic Matter	< 50-63 μm and denser than 1.6-1.85 g/cm^3
Microbiome	Amplicon sequencing from whole soil DNA extractions... amplicon should represent at least the Bacterial and Fungal community composition. Metagenomics with sufficient coverage of the whole soil community is also acceptable.
Penetration Resistance	Hand-held or truck-mounted penetrometer
Infiltration Rate/Hydraulic Conductivity	
Available Water Holding Capacity	Pressure plate on repacked cores or HYPROP2 on intact cores
Protozoa	
Mineralizable Nitrogen	28-day aerobic incubation
AMF	Percent root colonization; spore counts and taxonomy are also acceptable.

Create a Data Management Plan

WSU’s SHI will design and manage a data management structure for all SHI LTARE sites and researchers. In your specific LTARE plan, please describe the data that will be generated, how the PIs plan to process the data, and eventually how to present it. This management plan should contain the following components: data types, formats, standard, storage/preservation, sharing, and public access.



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Reviewed Budget and Budget Narrative

Regarding the SHI site investment, applicants should plan a five-year (through 6/30/26) budget that includes funds requested for both establishment and maintenance of the experiment. Due to the nature of the funding, funds must be budgeted according to state fiscal years and all funds must be used in the year that they are requested – so requests should be fiscally conservative. Leveraged funding from PI's, host units, stakeholder partners, and extramural grants will be considered in site selection. The funding requests should be very carefully developed and will be scrutinized closely. The primary investigator is required to have their grant support personnel review the budget prior to submitting for the support request. Benefits are not covered centrally and should be included in the budget.

Outreach, Outputs, and Outcomes Plan

The investigators need to develop a plan for outreach activities and create a clear outline of what outputs are planned and subsequent outcomes in the agricultural sector that the LTARE represents. Proposals will be heavily scrutinized for these elements and the composition/capacity of the investigators to complete and deliver on these plans. It is highly suggested to collaborate with local Extension specialist to help generate this plan.