SCBGP PROJECT PROFILE TEMPLATE

AWARD YEARS 2022 FORWARD

The State Plan should include a series of project profiles that detail the necessary information to fulfill the goals and objectives of each project. The acceptable font size for the narrative is 11 or 12 pitch with all margins at 1 inch. The following information must be included in each project profile.

PROJECT TITLE

Provide a descriptive project title in 15 words or less in the space below.

Enabling a Sustainable Controlled Environment Agriculture (CEA) Industry in Indiana

DURATION OF PROJECT

Start Date: 9/30/2022 **End Date**: 9/29/2024

PROJECT PARTNER AND SUMMARY

Include a project summary of 250 words or less suitable for dissemination to the public. A Project Summary provides a very brief (one sentence, if possible) description of your project. A Project Summary includes:

1. *The name of the applicant organization that if awarded a grant will establish an agreement or contractual relationship with the State Department of Agriculture to lead and execute the project,*
2. *The project's purpose, deliverables, and expected outcomes and*
3. *A description of the general tasks/activities to be completed during the project period to fulfill this goal.*

FOR EXAMPLE:
The ABC University will mitigate the spread of citrus greening (Huanglongbing) by developing scientifically-based practical measures to implement in a quarantine area and disseminating results to stakeholders through grower meetings and field days.

Because of its importance to the food production system, there has been a rapid growth of the controlled environment agriculture (CEA) industry in Indiana. As with any nascent industry, the CEA industry is facing major challenges including high risk from increased capital and operational costs, lack of research-based and region-specific information, weak industry-academia collaborations, less involvement of beginner, socially disadvantaged, and veteran farmers, and limited knowledge level and training among the workforce. Dr. Krishna Nemali at Purdue University will study the feasibility of growing food in both greenhouse and indoor-based CEA systems in Indiana by identifying major hurdles to crop production technology, 'Farm to Table' costs, and overall industry profits. Further, monthly educational programs will be conducted by collaborating with established CEA companies in the field, especially to the beginner, socially disadvantaged, and veteran farmers, and increase the knowledge level of the CEA workforce in Indiana. The project plans to conduct Indiana region-specific research to identify solutions, at a minimum, to two major issues to food production in both CEA systems including greenhouses and indoor farms.

PROJECT PURPOSE

PROVIDE THE SPECIFIC ISSUE, PROBLEM OR NEED THAT THE PROJECT WILL ADDRESS

Nearly 81% of the US population and 86% of the Indiana population live in urban areas (US Census, 2010). Rapid urbanization demands the availability of fresh, nutritious, and safe food for the overall health of the urban population. The demand will likely not be met solely by conventional outdoor agriculture systems due to issues associated with climate change, water scarcity, and food safety from intensive pesticide usage. It is necessary to develop innovative and alternative food production systems that provide fresh, nutritious, and safe food to the increasing urban population. One concept that has been developed is to produce food in or near urban communities utilizing controlled environment agriculture (CEA) systems. This involves food production inside climate-controlled structures including greenhouse and indoor/vertical farms. Benefits of CEA include year-round production, increased availability of fresh, nutritious, and safe food, efficient water and fertilizer use, reduced environmental pollution, and increased employment opportunities in urban communities. Leafy greens (lettuce, basil, kale), vegetables (e.g. tomato, pepper), and fruits (strawberry, cherry tomato) are among the major crops produced in CEA systems.

Because of its important contribution to food production, there has been a rapid growth of the CEA industry in the US including Indiana. For example, many greenhouse-based companies (e.g. Nature Fresh, OH; AppHarvest, KY; Gotham Greens, NY; BrightFarms, PA, OH, IL) and indoor/ vertical farms, (e.g., Aerofarms, NJ; Plenty, CA and WY; Freight Farms, MA; Eden Green Technology, TX) are already established in the US. In addition, there are many associated companies that supply technology to the CEA industry in the US (e.g. LED lighting, production systems, software and automation, fertilizers). The wholesale value of crops grown in CEA is projected to reach $3.6 billion in the US by 2025 (Kong and Nemali, 2019). The CEA industry is starting to grow in Indiana due to its proximity to urban markets in the Midwest and favorable government policies towards entrepreneurs. Examples of established companies in Indiana include Pure Green Farms (South Bend), Healthy Roots LLC, Uplift Farms, Super Micro Greens (Indianapolis), Green Sense (Portage), and many more small-scale facilities. Given this, there is a huge potential to attract the CEA industry, and significantly enhance new markets and economic development in Indiana.

As with any nascent industry, the CEA industry is facing some major challenges. These include high risk due to increased capital and operational costs, lack of research-based and region-specific information, limited efforts on developing readily applicable research due to poor industry-academia collaborations, and a limited trained workforce. These issues can result in reduced profits, startup closures, and decreased industry growth , and challenge the overall sustainability of the CEA industry. It is extremely important to quickly address these issues to enable continuous investment, growth, and a sustainable CEA industry in Indiana. The project addresses these challenges by developing unbiased information about profitability of CEA systems,, providing continuous educational programs to beginner, socially disadvantaged, and veteran farmers, training workforce, and developing region-specific research related to CEA industry.

The proposal tackles the above issues by first collecting data from small to large-scale CEA enterprises on major issues with crop production, 'farm to table' costs, and overall profits. A research technician will be hired to collect data from collaborating CEA industries in Indiana and other states. We will make efforts to recruit companies operating at different scales and platforms (i.e. greenhouse and indoor-based companies). The technician will visit the grower sites twice each month to collect data on operational costs from the point of sowing seeds to the point of sale to the customer ('Farm to Table' costs). In addition, the technician with the help of PI will identify production-related issues or bottlenecks at different stages. The data will be utilized to develop enterprise budgets, major research questions, and determine the economics of growing food crops in greenhouses and indoor farms, especially in Indiana. Support letters from different CEA companies are included with this application.

Second, we plan to organize monthly educational programs by collaborating with experienced industry partners and experts from Purdue and other universities to train beginner, socially disadvantaged, and veteran farmers. The industry partners include Eden Green Technology (TX), Intelligent Growth Solutions (Scotland, UK), Venntis Lighting (MI), Pure Green Farms (South Bend), New Age Provisions (Indianapolis), and Purdue Extension Hydroponics Display at the AMP in 16-Tech Innovation District in Indianapolis. Eden Green Tech. and Pure Green Farms are greenhouse

based hydroponic facilities while New Age Provisions is an indoor container farm. The IGS-Scotland is a supplier of completely automated vertical farm equipment and Venntis is a manufacture of LED lighting. All these companies have established non-disclosure agreements with PI and Purdue University. The collaborators will partner with PI to provide educational programs and share videos of their facility and growing experiences with participants at the workshops. We will plan to organize some workshops at collaborators' facilities to further enhance educational experiences. We learned from our past experience that focused and continuous training will result in larger impacts than fewer and day-long workshops. Regular workshops provide more opportunities for the participants to register. These educational programs are aimed at increasing the knowledge level among participants, and further enabling them to make informed decisions about their business. In addition, the educational programs are aimed at increasing the confidence level among beginner, socially disadvantaged, and veteran farmers to invest in small to large-scale startups in Indiana. We also plan to train junior growers, supervisors, and fresh undergraduates involved in CEA crop production during the workshops to increase the knowledge level of the Indiana workforce, which is critically required for the sustainable growth of the CEA industry in Indiana.

Third, we will conduct applied research at Purdue University and collaborating industries to develop Indiana region-specific solutions that will address, at a minimum, the top two issues or bottlenecks to crop production in CEA systems. The issues will be identified based on the data collected from visiting CEA industries by the technician and PI. Some of the anticipated issues to crop production may include factors that significantly increase operational costs (e.g. labor costs, energy costs), decrease crop yields (e.g. varietal performance, nutritional disorders, growth environment), or decreased plant quality (e.g. nutritional quality or food safety). We will develop appropriate research questions and experimental protocols to develop research-based solutions, at a minimum, to two major issues. The developed information will be validated in select CEA industries and shared with larger groups, utilizing the monthly workshops.

PROVIDE A LISTING OF THE OBJECTIVES THAT THIS PROJECT HOPES TO ACHIEVE

Add more objectives by copying and pasting the existing listing or delete objectives that aren't necessary.

Objective 1	1. Market Enhancement: Study the feasibility of growing food in both greenhouse and indoor-based CEA systems in Indiana by identifying major hurdles to crop production, 'Farm to Table' costs, and overall profits
Objective 2	2. Education and Training: Conduct monthly educational programs by collaborating with established CEA companies in the field, especially to beginner, socially disadvantaged, and veteran farmers, and increase the knowledge level among the workforce in Indiana
Objective 3	3. Research: Conduct Indiana region-specific research to identify solutions, at a minimum, to two major hurdles to food production in both CEA systems

PROJECT BENEFICIARIES

Estimate the number of project beneficiaries: 600

Does this project directly benefit socially disadvantaged farmers and/or underserved communities as defined in the RFA? **Yes** ☑ **No** ☐

If you selected yes, please describe how the project directly benefits socially disadvantaged farmers and/or underserved communities.

The proposed project will aid in training socially disadvantaged farmers to enable them own and manage operations associated with local food systems that will provide year-round income. In addition, the project will provide both instructional and hands-on training utilizing Purdue University research platforms and the collaboration support of successful CEA companies to minorities.

Does this project directly benefit beginning farmers as defined in the RFA? **Yes** ☑ **No** ☐

If you selected yes, please describe how the project directly benefits beginning farmers.

The project will develop fundamental information about existing hurdles to efficient crop production , costs associated with food production, and overall profits in CEA systems. This information is critical for beginner farmers with interests in medium to large startup companies. The workshops will aid beginner farmers to make informed decisions about their business. The project will also train the workforce critically needed for beginner farming operations.

Does this project directly benefit veteran farmers as defined in the RFA? **Yes** ☑ **No** ☐

If you selected yes, please describe how the project directly benefits veteran farmers.

The project will develop region-specific information on new market opportunities to enable veteran farmers invest in small to medium scale operations. This coupled with educational programs, which provide hands-on training and educational experiences, by Purdue experts and experienced industry partners will increase the confidence level among veterans who do not possess first-hand training in agriculture/ horticulture to invest in CEA systems. The project aims to provide year-round income to Indiana's beginner veteran farmers.

STATEMENT OF ENHANCING SPECIALTY CROPS

By checking the box to the right, I confirm that this project enhances the competitiveness of specialty crops in accordance with and defined by the Farm Bill. Further information regarding the definition of a specialty crop can be found at www.ams.usda.gov/services/grants/scbgp. ☑

List of Specialty Crops: Leafy greens, herbs, strawberries, and tomatoes

CONTINUATION PROJECT INFORMATION

Does this project continue the efforts of a previously funded SCBGP project? **Yes** ☐ **No** ☑

If you have selected "yes", please address the following:

DESCRIBE HOW THIS PROJECT WILL DIFFER FROM AND BUILD ON THE PREVIOUS EFFORTS

PROVIDE A SUMMARY (3 TO 5 SENTENCES) OF THE OUTCOMES OF THE PREVIOUS EFFORTS

PROVIDE LESSONS LEARNED ON POTENTIAL PROJECT IMPROVEMENTS

What was previously learned from implementing this project, including potential improvements?

How are the lessons learned and improvements being incorporated into the project to make the ongoing project more effective and successful at meeting goals and outcomes?

DESCRIBE THE LIKELIHOOD OF THE PROJECT BECOMING SELF-SUSTAINING AND NOT INDEFINITELY DEPENDENT ON GRANT FUNDS

The project aims at medium and long-term impacts. Given this, the project will be continued beyond the duration of the current proposal. We plan to apply for federal grants from USDA - AMS to obtain additional support for future programs. In addition, we will actively seek in-kind support to organize training programs at established facilities by continuing collaborations and partnerships with CEA industry.

OTHER SUPPORT FROM FEDERAL OR STATE GRANT PROGRAMS

The SCBGP will not fund duplicative projects. Did you submit this project to a Federal or State grant program other than the SCBGP for funding and/or is a Federal or State grant program other than the SCBGP funding the project currently?

Yes ☐ **No** ☑

IF YOUR PROJECT IS RECEIVING OR WILL POTENTIALLY RECEIVE FUNDS FROM ANOTHER FEDERAL OR STATE GRANT PROGRAM

Identify the Federal or State grant program(s).

NA

Describe how the SCBGP project differs from or supplements the other grant program(s) efforts.

Dr. Nemali is currently involved in another SCBG project aimed at increasing productivity and accessibility of hydroponically grown organic lettuce in Indiana. The current proposal is different in that the scope of the project is more wider and aimed at understanding the feasibility and challenges that threaten sustainability of rapidly growing CEA industry in Indiana. While the funded project focuses on accessibility of healthy organic food to consumers in general, the current proposal specifically aims to train socially disadvantaged, beginner and veteran farmers. The current proposal heavily involves collaborative support from experienced industry professionals to provide valuable and real world educational experiences to project beneficiaries.

EXTERNAL PROJECT SUPPORT

Describe the specialty crop stakeholders who support this project and why (other than the applicant and organizations involved in the project).

Beginner farmers, socially disadvantaged farmers, veterans, experienced CEA growers, extension educators, industry collaborators, content experts at Purdue University, and consumers in urban communities are stakeholders of this project.
Beginner farmers, socially disadvantaged farmers, and veterans are interested to learn about the hurdles to crop production, the economics of production, and hands-on educational programs that will increase their knowledge levels and enable them to make informed decisions about their investments.

Experienced industry professionals will support the project due to established productive partnerships with Purdue University. Extension educators will be working as a liaison between beginner farmers, socially disadvantaged farmers, veterans, and Purdue experts.

EXPECTED MEASURABLE OUTCOMES

SELECT THE APPROPRIATE OUTCOME(S) AND INDICATOR(S)/SUB-INDICATOR(S)

You must choose at least one of the eight outcomes listed in the SCBGP Performance Measures, which were approved by the Office of Management and Budget (OMB) to evaluate the performance of the SCBGP on a national level.

OUTCOME MEASURE(S)

Select the outcome measure(s) that are applicable for this project from the listing below.

- ☐ **Outcome 1:** Increasing Consumption and Consumer Purchasing of Specialty Crops
- ☑ **Outcome 2**: Increasing Access to Specialty Crops and Expanding Specialty Crop Production and Distribution
- ☐ **Outcome 3**: Increase Food Safety Knowledge and Processes
- ☐ **Outcome 4**: Improve Pest and Disease Control Processes
- ☐ **Outcome 5**: Develop New Seed Varieties and Specialty Crops
- ☑ **Outcome 6**: Expand Specialty Crop Research and Development
- ☐ **Outcome 7**: Improve Environmental Sustainability of Specialty Crops

OUTCOME INDICATOR(S)

Provide at least one indicator listed in the SCBGP Performance Measures and the related quantifiable result. If you have multiple outcomes and/or indicators, repeat this for each outcome/indicator.

FOR EXAMPLE:
Outcome 1, Indicator 1.1a
Total number of consumers who gained knowledge about specialty crops, Adults 132.

Outcome 2, Indicator 1
Number of stakeholders that gained technical knowledge about producing, preparing, procuring, and/or accessing specialty crops [600].

Outcome 2, Indicator 5
Number of stakeholders that adopted best practices or new technologies to improve distribution systems [200].

Outcome 6, Indicator 1
Number of research goals accomplished [2].

Outcome 6, Indicator 4
Total number of research outputs published to industry publications and/or academic journals [3]. For each published research output, the: a. Number of views/reads of published research/data [3]. b. Number of citations counted [0].

MISCELLANEOUS OUTCOME MEASURE

In the unlikely event that the outcomes and indicators above the selected outcomes are not relevant to your project, you must develop a project-specific outcome(s) and indicator(s) which will be subject to approval by AMS.

DATA COLLECTION TO REPORT ON OUTCOMES AND INDICATORS

Explain how you will collect the required data to report on the outcome and indicator in the space below.

We will conduct surveys after each educational session. The survey will collect answers to questions about the number of participant who learned new information, who believe that training has improved their ability to make informed decisions, who are willing to make a change of practice, and who believe that training will enable them invest in startups.
Principal investigator and research technician will collaborate with industry partners to develop innovative and hands-on educational programs, and collect data from participants using both paper and electronic methods after training. The data will be reported to funding agency on a quarterly and yearly basis.

We will identify, at a minimum, two major hurdles for crop production in greenhouses and indoor farms utilizing the data collected by collaborating with industries. For these hurdles, we will develop appropriate research questions, experimental methods, and data collection methods. The type of data collected will depend on the question being addressed. Data may include crop environmental variables, plant growth, consumer preferred quality measures, nutritional quality, and pathogen contamination levels. The data will be collected from replicated trials utilizing sensors, laboratory analytical procedures, qualitative assessments, and manual methods.
The collected data will be interpreted to address the research questions. The findings will be confirmed in greenhouse/ indoor commercial facilities to validate the impact. The findings will be published in both extension and refereed publications. We will develop timelines and periodically evaluate the progress against the pre-determined timeline.

BUDGET NARRATIVE

All expenses described in this Budget Narrative must be associated with expenses that will be covered by the SCBGP. If any matching funds will be used and a description of their use is required by the State department of agriculture, the expenses to be covered with matching funds must be described separately. Applicants should review the Request for Applications section 4.7 Funding Restrictions prior to developing their budget narrative.

BUDGET SUMMARY

Expense Category	Funds Requested
Personnel	$104,776.00
Fringe Benefits	$46,572.00
Travel	$2,057.00
Equipment	$0.00
Supplies	$4,000.00
Contractual	$0.00
Other	$4,400.00
Direct Costs Sub-Total	$161,805.00
Indirect Costs	$4,854.15
Total Budget	$166,659.15

PERSONNEL

List the organization's employees whose time and effort can be specifically identified and easily and accurately traced to project activities that enhance the competitiveness of specialty crops. See the Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Salaries and Wages, and Presenting Direct and Indirect Costs Consistently under section 4.7.1 for further guidance.

#	Name/Title	Level of Effort (# of hours OR % FTE)	Funds Requested
1	**Krishna Nemali, Assistant Professor**	290	$20,301.00

#	Name/Title	Level of Effort (# of hours OR % FTE)	Funds Requested
2	**TBA, Technician**	1.00 %	$72,475.00
3	**Undergraduate Student TBA, UG researcher**	1,200	$12,000.00

Personnel Subtotal: $104,776.00

PERSONNEL JUSTIFICATION

For each individual listed in the above table, describe the activities to be completed by name/title including approximately when activities will occur. Add more personnel by copying and pasting the existing listing or deleting personnel that aren't necessary.

Personnel 1:	Dr. Nemali will coordinate the collaborations with CEA industries to enable data collection on production-related issues and farm to table costs,, develop enterprise budgets based on farm to table costs and revenue, organize workshops and educational sess
Personnel 2:	Technician will be responsible for data to day activities in general. The person will regularly travel to grower sites to collect data on production-related issues, farm to table costs, help in organizing workshops, reach to the community for enrolling
Personnel 3:	Students will be responsible for aiding in research including experimental setup, treatment imposition, plant maintenance, recording data, harvesting, maintaining a clean growth environment. je;[omg set i[workshops and educational programs.

FRINGE BENEFITS

Provide the fringe benefit rates for each of the project's salaried employees described in the Personnel section that will be paid with SCBGP funds.

#	Name/Title	Fringe Benefit Rate	Funds Requested
1	Krishna Nemali, Assistant Professor	0.27 %	$5,532.00
2	TBA, Technician	0.55 %	$40,078.00
3	Undergraduate Student TBA, UG researcher	0.08 %	$962.00

Fringe Subtotal: $46,572.00

TRAVEL

Explain the purpose for each Trip Request. Please note that travel costs are limited to those allowed by formal organizational policy; in the case of air travel, project participants must use the lowest reasonable commercial airfares. For recipient organizations that have no formal travel policy and for-profit recipients, allowable travel costs may not exceed those established by the Federal Travel Regulation, issued by GSA, including the maximum per diem and subsistence rates prescribed in those regulations. This information is available at http://www.gsa.gov. See the Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Travel, and Foreign Travel for further guidance.

#	Trip Destination	Type of Expense (airfare, car rental, hotel, meals, mileage, etc.)	Unit of Measure (days, nights, miles)	# of Units	Cost per Unit	# of Travelers Claiming the Expense	Funds Requested
1	Grower Sites	mileage	miles	145.0	$0.41	1	$713.00
2	Around the state	per diem	days	24.0	$56.00	1	$1,344.00

Travel Subtotal: $2,057.00

TRAVEL JUSTIFICATION

For each trip listed in the above table describe the purpose of this trip and how it will achieve the objectives and outcomes of the project. Be sure to include approximately when the trip will occur. Add more trips by copying and pasting the existing listing or delete trips that aren't necessary.

Trip 1 (Approximate Date of Travel):	Travel is planned for the technician to visit grower sites twice a month and for 12 months. Mileage costs of $0.41 per mile and for 145 miles per month for 12 months .
Trip 2 (Approximate Date of Travel):	per diem costs of $56 per day (per trip) for 24 trips.

CONFORMING WITH YOUR TRAVEL POLICY

By checking the box to the right, I confirm that my organization's established travel policies will be adhered to when completing the above-mentioned trips in accordance with 2 CFR 200.474 or 48 CFR subpart 31.2 as applicable. ☐

EQUIPMENT

Describe any special purpose equipment to be purchased or rented under the grant. "Special purpose equipment" is tangible, nonexpendable, personal property having a useful life of more than one year and an acquisition cost that equals or exceeds $5,000 per unit and is used only for research, medical, scientific, or other technical activities. See the Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Equipment - Special Purpose for further guidance

Rental of "general purpose equipment" must also be described in this section. Purchase of general purpose equipment is not allowable under this grant. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Equipment - General Purpose for definition, and Rental or Lease Costs of Buildings, Vehicles, Land and Equipment.

#	Item Description	Rental or Purchase	Acquire When?	Funds Requested
1	N/A			$0.00

Equipment Subtotal: $0.00

EQUIPMENT JUSTIFICATION

For each Equipment item listed in the above table describe how this equipment will be used to achieve the objectives and outcomes of the project. Add more equipment by copying and pasting the existing listing or delete equipment that isn't necessary.

Equipment 1:	N/A

SUPPLIES

List the materials, supplies, and fabricated parts costing less than $5,000 per unit and describe how they will support the purpose and goal of the proposal and enhance the competitiveness of specialty crops. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Supplies and Materials, Including Costs of Computing Devices for further information.

Item Description	Per-Unit Cost	# of Units/Pieces Purchased	Acquire When?	Funds Requested
Experimental Costs	$2,000.00	2.0	October 1, 2022	$4,000.00

Supplies Subtotal: $4,000.00

SUPPLIES JUSTIFICATION

Describe the purpose of each supply listed in the table above purchased and how it is necessary for the completion of the project's objective(s) and outcome(s).

Experimental Costs: Experimental costs of $2000 per year and for two years. These costs per unit include seed ($200), fertilizer ($100), containers ($100), laboratory analyses ($750), tissue analyses ($750), and substrates ($100). A total of 2 units is included ($4000).

CONTRACTUAL/CONSULTANT

Contractual/consultant costs are the expenses associated with purchasing goods and/or procuring services performed by an individual or organization other than the applicant in the form of a procurement relationship. If there is more than one contractor or consultant, each must be described separately. (Repeat this section for each contract/consultant.)

ITEMIZED CONTRACTOR(S)/CONSULTANT(S)

Provide a list of contractors/consultants, detailing out the name, hourly/flat rate, and overall cost of the services performed. Please note that any statutory limitations on indirect costs also apply to contractors and consultants.

#	Name/Organization	Hourly Rate/Flat Rate	Funds Requested
1	N/A		$0.00

Contractual/Consultant Subtotal: $0.00

CONTRACTUAL JUSTIFICATION

Provide for each of your real or anticipated contractors listed above a description of the project activities each will accomplish to meet the objectives and outcomes of the project. Each section should also include a justification for why contractual/consultant services are to be used to meet the anticipated outcomes and objectives. Include timelines for each activity. If contractor employee and consultant hourly rates of pay exceed the salary of a GS-15 step 10 Federal employee in your area, provide a justification for the expenses. This limit does not include fringe benefits, travel, indirect costs, or other expenses. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Contractual and Consultant Costs for acceptable justifications.

Contractor/Consultant 1:	N/A

CONFORMING WITH YOUR PROCUREMENT STANDARDS

By checking the box to the right, I confirm that my organization followed the same policies and procedures used for procurements from non-federal sources, which reflect applicable State and local laws and regulations and conform to the Federal laws and standards identified in 2 CFR Part 200.317 through.326, as applicable. If the contractor(s)/consultant(s) are not already selected, my organization will follow the same requirements. ☐

OTHER

Include any expenses not covered in any of the previous budget categories. Be sure to break down costs into cost/unit. Expenses in this section include, but are not limited to, meetings and conferences, communications, rental expenses, advertisements, publication costs, and data collection.

If you budget meal costs for reasons other than meals associated with travel per diem, provide an adequate justification to support that these costs are not entertainment costs. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Meals for further guidance.

Item Description	Per-Unit Cost	Number of Units	Acquire When?	Funds Requested
Costs to organize workshops	$100.00	24.0	October 1, 2022	$2,400.00
Publishing Fees	$2,000.00	1.0	October 1, 2022	$2,000.00

Other Subtotal: $4,400.00

OTHER JUSTIFICATION

Describe the purpose of each item listed in the table above purchased and how it is necessary for the completion of the project's objective(s) and outcome(s).

Costs to organize workshops: Costs to organize workshops at $100 per workshop and for 12 workshops for a period of two years is included ($2400)
Publishing Fees: Online and free access publishing cost for one refereed article in one of the journals published by the American Society for the Horticultural Science is included ($2000)

INDIRECT COSTS

The indirect cost rate must not exceed 8 percent of any project's budget. Indirect costs are any costs that are incurred for common or joint objectives that therefore, cannot be readily identified with an individual project, program, or organizational activity. They generally include facilities operation and maintenance costs, depreciation, and administrative expenses. See Request for Applications section 4.7.1 Limit on Administrative Costs and Presenting Direct and Indirect Costs Consistently for further guidance.

Indirect Cost Rate	Funds Requested
3.00 %	$4,854.15

Indirect Subtotal: $4,854.15

PROGRAM INCOME

Program income is gross income—earned by a recipient or subrecipient under a grant—directly generated by the grant-supported activity or earned only because of the grant agreement during the grant period of performance. Program income includes, but is not limited to, income from fees for services performed; the sale of commodities or items fabricated under an award (this includes items sold at cost if the cost of producing the item was funded in whole or partially with grant funds); registration fees for conferences, etc.

Source/Nature of Program Income	Description of how you will reinvest the program income into the project to enhance the competitiveness of specialty crops	Estimated Income
N/A		$0.00

Program Income Total: $0.00

Intelligent Growth Solutions Limited
Landmark
Exchange Place 2
5 Semple Street
Edinburgh
EH3 8BL
Scotland

Date: 8th March 2022

To whom it may concern at the Indiana State Department of Agriculture (ISDA)

I understand that Purdue University is applying for grant funding to ISDA with the following objectives in a Controlled Agriculture Environment (CEA) programme with the following objectives:

1. Market Enhancement: Study the feasibility of growing food in CEA systems in Indiana by identifying major hurdles to crop production technology, 'Farm to Table' costs, and overall profits

2. Education and Training: Conduct regular and monthly educational programs by collaborating with established CEA companies in the field, especially to beginner, socially disadvantaged, and veteran farmers, and increase the level of trained workforce in Indiana

3. Research: Conduct region-specific research to identify solutions, at a minimum, to two major hurdles to food production in CEA systems

IGS wishes to register its wholehearted support for this programme and the grant application to ISDA.

IGS is currently working with Purdue towards a collaboration as part of the global 'IGS Research Network'. CEA has the potential to help humankind meet its challenge of feeding the world in a sustainable manner. We believe that for CEA to be optimized, three things need to work together:

- The growing system (hardware & software)
- The plant science (pure science)
- The horticulture/agronomy (applied science).

All three are important individually and all three affect each other. We need scientific advances across all three to develop this young sector further.

IGS wants to push the game forward (and is putting resources into doing so) by partnering with up to six select universities or institutes in different regions of the world. The idea is to set up an IGS farm system at each site so that the academics can utilize this world leading platform to carry out both experiments and teaching.

In the USA this means establishing a state-of-the-art IGS system at Purdue for producing and monitoring crops. We think that this collaboration has great potential for supporting each of the above three objectives.

We very much look forward to working with Purdue University under our Research Network collaboration. We firmly believe it will assist the development of CEA in Indiana but also nationally and internationally.

Your sincerely,

Andrew Lloyd
Chief Operating Officer

NOTES:

Intelligent Growth Solutions delivers platforms that create optimized indoor Controlled Environments for global horticulture, based upon a culture of continuous innovation, brilliant, simple design and a refusal to accept conventional technical thinking.

BUDGET JUSTIFICATION

In accordance with 2 CFR 200, Uniform Administrative Requirements, Cost Principles, And Audit Requirements for Federal Awards, Purdue University tracks and reports its professional personnel on a percent of effort and not on an hourly basis. Salaries are adjusted by standard University inflation rates each fiscal year (July 1): 3% for faculty, 2.5% for professional/technical assistants, and 2% for postdocs, graduate/undergraduate students, and service staff.

Personnel

PI- Krishna Nemali-Person months or percent effort required (0.79 SUM)) Dr. Nemali will coordinate the collaborations with CEA industries to enable data collection on production-related issues and farm to table costs,, develop enterprise budgets based on farm to table costs and revenue, organize workshops and educational sessions at Purdue University for beginner farmers, socially disadvantaged farmers, and veteran beginner farmers, train junior growers, and workforce, identify major hurdles to production and determine the objectives for research, develop research methodology, enable high-quality research, interpret results, draft reports to ISDA, and publish extension and refereed articles.

Undergrad Student(s)- Person months or percent effort required (600 hours) Several students will be hired during the two-year project period. Students will be responsible for aiding in research including experimental setup, treatment imposition, plant maintenance, recording data, harvesting, maintaining a clean growth environment, and helping to set up workshops and educational programs. Students may also help the technician in data collection at grower sites.

Technician- TBA-Person months or percent effort required (12 CY) Technician will be responsible for data to day activities in general. In addition, the person will regularly travel to grower sites to collect data on production-related issues, farm to table costs, help in organizing workshops, reach to the community for enrolling beginner, socially disadvantaged, and veteran farmers into programs, organize study materials, point-of-contact for research operations, manage undergraduate researchers, enable successful completion of experiments, coordinate and collect research data, aid in interpreting results, and contributing to publishing extension and refereed articles.

Fringe Benefits

Fringe benefits are budgeted in accordance with university policy as follows:

Faculty	27.25%
Undergrad	8.02%
Technician	55.3%

Travel

Travel is planned for the technician to visit grower sites twice a month and for 12 months. Mileage costs of $0.44 per mile and for 145 miles per month, and for 12 months during the project were included. In addition, per diem costs of $56 per day (one trip) and for 24 trips during the project were included ($2110).

Other Direct Costs

(i) Costs to organize workshops at $100 per workshop and for 12 workshops for a period of two years is included ($2400)

(ii) Experimental costs of $2000 per year and for two years for seed, fertilizer, containers, laboratory analyses, tissue analyses, production systems, and substrates is included ($4000)

(iii) Online and free access publishing cost for one refereed article in one of the journals published by the American Society for the Horticultural Science is included ($2000)

Indirect Costs
Indirect costs are budgeted at the rate of 3% of total direct costs per sponsor guidelines.

Krishna Nemali

Assistant Professor, Department of Horticulture and Landscape Architecture
(765) 494 8170, knemali@purdue.edu

General Information

Academic Degrees

- Ph.D. Horticulture, University of Georgia, Athens, GA. December 2005
- M.S. Horticulture, University of Georgia, Athens, GA. December 2002
- B.S. Agriculture, Acharya N.G. Ranga Agriculture University, India, December 1992

Professional Experience

- July 2016 - Current: Assistant Professor and Extension Specialist, Purdue University
- October 2007- June 2016: Controlled Environment Crop Physiologist, Monsanto Company, U.S.A.
- January 2006 - June 2007: Postdoctoral Scholar, University of California, Davis, CA
- January 2001- December 2005: Graduate Research Assistant, Horticulture Department, University of Georgia, Athens, GA
- October 1996 - October 2000: Horticulturalist, Ramoji Film City, AP, India

Awards and Honors

Purdue University:

- Societal Impact Fellow (2021)
- Faculty Entrepreneurial Leadership Academy Member (2021)
- Scholarship of Engagement Fellow, Purdue University (2020)
- Purdue University Cooperative Extension Specialists Association (PUCESA) Early Career Award (2019)
- Seed for Success Award (2019)

Monsanto Company:

- Technology Award (2015, 2014)
- Above and Beyond Award (2014)
- Regulatory Leadership Team Award (2014)
- Excellence Award for Identification of Area of Improvement in Safety (2010)
- Yield and Traits Program Awards (2008, 2009 and 2011)

Membership in Academic, Professional, and Scholarly Societies

- American Society for Horticultural Science, 2001-present
- American Society of Plant Biologists, 2006-07
- Member of Indiana Horticultural Conference and Expo, 2017-present
- Member of Purdue Cooperative Extension Specialists Association, 2019-present
- Chair of Indiana Flower Growers Association, 2016-present
- Chair of Association of Horticulturalists from Indian Subcontinent, ASHS, 2018-2019

Refereed Publications

1. Adhikari, R. and K. Nemali. (2022). Whole-Plant Tissue Nitrogen Content Measurement Using Image Analyses in Floriculture Crops. Journal of Environmental Horticulture (Feb, 2022). https://doi.org/10.24266/0738-2898-40.1.22
2. Zea, M, S, A, Yang, Y, Lee, L, Nemali, K. and L. Hoagland. 2022. Leveraging high-throughput hyperspectral imaging technology to detect cadmium stress in two leafy green crops and accelerate soil remediation efforts. Environmental Pollution. https://doi.org/10.1016/j.envpol.2021.118405.
3. K. Nemali (2022). History of Controlled Environment Agriculture: Modern Greenhouses. Hortscience https://doi.org/10.21273/HORTSCI16160-21.
4. Kong, Y. and K. Nemali. (2021). Blue and Far-red Light Affect Area and Number of Individual Leaves to Influence Vegetative Growth and Pigment Synthesis in Lettuce. Frontiers in Plant Science. https://doi.org/10.3389/fpls.2021.667407.
5. Burgner, S., Nemali, K., Massa, G., Wheeler, R., Morrow, R., & Mitchell, C. A. (2020). Growth and photosynthetic responses of Chinese cabbage (*Brassica rap*a L. cv. Tokyo Bekana) to continuously elevated carbon dioxide in a simulated Space Station "Veggie" crop-production environment. Life Sciences in Space Research. https://doi.org/https://doi.org/10.1016/j.lssr.2020.07.007
6. Miller, A., Adhikari, R., & Nemali, K. (2020). Recycling nutrient solution can reduce growth due to nutrient deficiencies in hydroponic production. Frontiers in Plant Science. https://doi.org/https://doi.org/10.3389/fpls.2020.607643
7. Adhikari, R., & Nemali, K. (2020). A Novel Method for Estimating Nitrogen Stress in Plants Using Smartphones. Horticulturae (MDPI Journal), 6(4), 76. https://doi.org/https://doi.org/10.3390/horticulturae6040074
8. Miller, A., Langenhoven, P., & Nemali, K. (2020). Maximizing Productivity of Greenhouse-grown Hydroponic Lettuce during Winter. HortScience, 55(12). https://doi.org/https://doi.org/10.21273/HORTSCI15351-20
9. Adhikari, R., Li, C., Kalbaugh, K., & Nemali, K. (2020). A low-cost smartphone controlled sensor based on image analysis for estimating whole-plant tissue nitrogen (N) content in floriculture crops. Computers and Electronics in Agriculture. https://doi.org/https://doi.org/10.1016/j.compag.2019.105173
10. Fischer, J., Nemali, K., & Rogan, G. (2020). Yield component responses of biotechnology-derived drought tolerant maize under controlled environment conditions. Agricultural and Environmental Letters, 5(1). https://doi.org/https://doi.org/10.1002/ael2.20007
11. Craver, J., Nemali, K., & Lopez, R. (2020). Acclimation of growth and photosynthesis in petunia seedlings exposed to high intensity blue radiation. Journal of the American Society for Horticultural Science, 145(3). https://doi.org/https://doi.org/10.21273/JASHS04799-19
12. Li, C., Adhikari, R., Miller, A., Kalbaugh, K., & Nemali, K. (2020). Measuring Plant Growth Characteristics Using Smartphone Based Image Analysis Technique in Controlled Environment Agriculture. 2020. Computers and Electronics in Agriculture. https://doi.org/https://doi.org/10.1016/j.compag.2019.105123.
13. Nemali, K., & van Iersel, M. (2019). Relating Whole-plant Photosynthesis to Physiological Acclimations at Leaf and Cellular Scales under Drought Stress in Bedding Plants. Journal of the American Society for Horticultural Science. https://doi.org/https://doi.org/10.21273/JASHS04665-19.

14. Kong, Y., Nemali, A., Mitchell, C. A., & Nemali, K. (2019). Spectral Quality of Light Can Affect Energy Consumption and Energy-Use Efficiency of Electrical Lighting in Indoor Lettuce Farming. HortScience. https://doi.org/https://doi.org/10.21273/HORTSCI13834-18.

15. K.S. Nemali, C. Bonin, F.G. Dohleman, M. Stephens, W.R. Reeves, D.E. Nelson, P. Castiglioni, J. E. Whitsel, B. Sammons, R.A. Silady, D. Anstrom, R. E. Sharp, O. R. Patharkar, D. Clay, M. Coffin, M. A. Nemeth, M. E. Leibman, M. Luethy & M. Lawson. 2015. Physiological Responses Related to Increased Grain Yield under Drought in the First Biotechnology-Derived Drought Tolerant Maize. Plant Cell & Environment 38 (9): 1866-80.
16. H.M. Easlon, K.S. Nemali, J.H. Richards et al. 2013. The physiological basis for genetic variation in water-use efficiency and carbon isotope composition in Arabidopsis thaliana. Photosynthesis Research 119 (1-2):119-29.
17. J.K. McKay, J.H. Richards, K.S. Nemali, S. Sen, T. Mitchell-olds, S. Boles, E.A. Stahl, T. Wayene, T.E. Juenger. 2008. Genetics of drought adaptation in Arabidopsis thaliana II: QTL analysis of new mapping population, Kas-1 x Tsu-1. Evolution 62 (12): 3014-3026.
18. K.S. Nemali and M.W. van Iersel. 2008. Physiological responses to different substrate water contents: screening for high water-use efficiency in bedding plants. J. Amer. Soc. Hort. Sci. 133: 1-8.
19. K.S. Nemali and M.W. van Iersel. 2007. A new controller for irrigation and simulating drought stress in potted plants. Scientia Horticulturae 110: 292-297.
20. K.S. Nemali, F. Montesano, S.K. Dove, and M.W. van Iersel. 2007. Calibration and Performance of moisture sensors in soilless substrates: ECH2O and Theta probes. Scientia Horticulturae. 112: 227-234.
21. van Iersel, M.W. and K.S. Nemali. 2004. Drought stress can produce small but not compact marigolds. HortScience 39: 1298-1301.
22. Kang, J-G., M.W. van Iersel, and K.S. Nemali. 2004. Fertilizer concentration and irrigation method affect growth and fruiting of ornamental pepper. J. Plant Nutr. 27: 867-884.
23. Nemali, K.S. and M.W. van Iersel. 2004. Acclimation of wax begonia to light intensity: changes in photosynthesis, respiration, and chlorophyll concentration. J. Amer. Soc. Hort. Sci. 129: 745-751.
24. Nemali, K.S. and M.W. van Iersel. 2004. Light effects on wax begonia: photosynthesis, growth respiration, maintenance respiration, and carbon use efficiency. J. Amer. Soc. Hort. Sci. 129: 416-424.
25. Nemali, K.S. and M.W. van Iersel. 2004. Light Intensity and fertilizer concentration: II. Optimal fertilizer solution concentration for species differing in light requirement and growth rate. HortScience 39:1293-1297.
26. Nemali, K.S. and M.W. van Iersel. 2004. Light Intensity and fertilizer concentration: I. estimating optimal fertilizer concentration from water-use efficiency of wax begonia. HortScience 39:1287-1292.
27. Nemali K.S. (Sainath-Krishna, M.N) and M.W. van Iersel. 2003. Light effects on wax begonia: photosynthesis, growth respiration, and maintenance respiration. Acta Hort. 624:541-547.

Book Chapters

1. K.S. Nemali and M. Stephens. 2014. Plant Abiotic Stress: Water. Encyclopedia of Agriculture and Food Systems, Elsiever Publishing Company 4: 335-43.

2. Nemali, K. and M. van Iersel.2004. Acclimation and growth of photosynthesis of wax begonias grown at different light levels. In: E. Runkle and P. Fischer (eds.) Lighting up profits. Understanding greenhouse lighting. p. 22-23. Meister publishing, Willoughby, Ohio. (ISBN 1-892829-10-X).

External Grants

Year	Agency	Title	Role	Total Grant ($)	Personal Grant ($)
2017-19	Fred Gloeckner Foundation	Smartphone-Based Rapid, Inexpensive, and Accurate Estimation of Plant Nitrogen Status in Floriculture Production	PI	25000	25000
2018-20	USDA SCBG	Research Based Extension Education Program for Increased Year-Round Profitability in Greenhouse Based Hydroponic Lettuce Production	PI	50000	30000
2018-20	USDA SCBG	Research Based Education for Indiana Beginner Farmers on Profitable Indoor (Vertical) Farming	PI	35000	30000
2018-20	USDAFAS	Integrated Pest Management for hydroponic crops	PI	46,600	27960
2018-21	American Floral Endowment	Smartphone-Based Rapid, Inexpensive, and Accurate Estimation of Plant Nitrogen Status in Floriculture Production	PI	33000	33000
2019-23	Horticultural Research Institute	Measurement of Plant Nitrogen Status using smartphones	PI	48000	28800
2019-22	USDA SCBG	Development of E. coli-free lettuce in hydroponic production	PI	90,115	54069
2019-22	USDA FAS	Development of low-cost hydroponic/ aeroponic production system for Egypt	PI	49,830	49830
2019-22	Purdue Ag Seed	Automated monitoring and management of plant nitrogen status in organic hydroponics using iOT sensors	PI	26,984	20000
2021-24	USDA SCBG	Increasing crop productivity and consumer acceptance of hydroponically grown organic lettuce	PI	143,000	95000
2019-24	USAID	US-Egypt center of excellence in agriculture	Co-I	2990157	224262
				3537686	617921

Invited Presentations

1. Smart Sensors for Floriculture Production. Ontario's Ministry of Food and Agriculture, Canada (Sep, 2021).
2. Smart Sensors for Vertical Farming Industry. Indoor Ag Science Café. Department of Horticulture and Crop Science. The Ohio State University, Columbus, OH (May 2021).
3. Smart Sensors in Controlled Environment Agriculture. Horticulture and Landscape Architecture Department. Oklahoma State University, Stillwater, OK (March 2021).
4. Increasing Crop Value and Productivity in Vertical Farming. Department of Horticulture. University of Arkansas, Fayetteville, AK (2021)
5. Smart Sensors for Greenhouse Production. Horticulture Department. G.B. Pant University of Agriculture and Technology, Pant Nagar, India (2020).
6. Smart Sensors. Department of Horticulture and Landscape Architecture. Colorado State University, Fort Collins. CO (2020)
7. Optimizing energy use in vertical farming. Department of Horticulture Science, Texas Agriculture & Mechanical University. College Station, TX (2019)
8. Modern Climate-Controlled Greenhouses. Workshop on 'History of Controlled Environment Agriculture'. American Society for Horticultural Science Annual Conference, Las Vegas, NV. (2019)
9. Next Generation Sensors. Cultivate, Columbus OH (2019).
10. Smartphone based Estimation of Plant Growth and Nitrogen Status. American Society for Horticultural Science Annual Conference, Washington DC. (2018)
11. Controlled Environment Agriculture. Utsunomiya University, Tochigi, Japan (2017)
12. Application of Remote Sensing to Monitor Plant Input Needs in Controlled Environment Agriculture. (Workshop Presentation). American Society for Horticultural Science Annual Conference, HI (2017).

Mentoring

Name	Degree	Focus Area	Completion Date	Current Position
Major Advisor:				
Alexander Miller	MS	Hydroponics	2019	Grower Operator, 80 Acres Farms, OH
Ranjeeta Adhikari	PhD	Floriculture	April, 2021	Bayer Crop Science
Yuyao Kong	PhD	Indoor Agriculture	Dec, 2022	n.a.
Committee Member:				
Joshua Craver	PhD	Floriculture	2018	Assistant Professor, Colorado State University
Samuel Burgner	MS	Controlled Environments	2018	PhD student, McGill University
David Flores	MS	Lawn and Garden	2019	n.a
Maria Roja Zea	MS	Phenotyping	2020	n.a.
Fatemeh Sheibani	PhD	Indoor Agriculture	n.a.	n.a.

New Age Provisions LLC

03/06/2022

The purpose of this letter is to support the efforts of Dr. Krishna Nemali and Purdue's efforts towards applying for the USDA Specialty Crop Block Grant. We are an Urban Commercial farming company located in Indianapolis, Indiana. We are the first company in Indiana to use hydroponic farming concepts inside of a Shipping container. Our goal is to provide our community with fresh produce without the use of herbicides, pesticides, or contamination from the soil.

The use of hydroponic methods inside of a Shipping container farm is only possible with the support Dr. Krishna Nemali and the Purdue extension faculty staff. We have worked with the team to design a nutrient mix that enable us to save costs and increase the nutritional make up of our crops. We have been able to participate in the workshops and presentations and learn various methods and concepts of hydroponic farming.

We look forward to participating in future research and collaborations with Purdue to learn more about hydroponics methods and maintain the future of food sustainability and security within our community.

Respectfully,

DeMario Vitalis

Owner and CEO

(317) 370-3670

newageprovision@gmail.com

DeMario Vitalis

PURE
GREEN FARMS

March 7, 2022

To ISDA,

Recently I was approached by Dr. Krishna Nemali of Purdue University regarding the work he is doing to help advance the technology and investment being made in Controlled Environment Agriculture for the state of Indiana. Dr. Nemali is renowned professor in this field of study and has been helpful to us at Pure Green Farms in South Bend, IN. He is interested in gaining the support of the ISDA to help the cause of advancing more operations withing our state in the field of controlled environment farming.

At Pure Green Farms we currently operate a large-scale greenhouse that produces fresh leafy salad greens all year round. We started production in the Spring of 2021 and our business continues to advance as we provide the freshest leafy greens to our local markets within a three-hundred-mile radius. We are employing some of the latest technology to not only be able to grow these products throughout the year but also in a most efficient manner that preserves our natural resources relative to legacy supply chain models that depend on field grown production from California and Arizona.

The most recent trends in this field of study and operation has received a lot of attention recently as more and more states have projects starting up or even expanding. Our project in South Bend is now quickly planning for the second phase of expansion which we hope to bring into production in early 2023. In order for this to be successful we realize that we must have the most cutting-edge technology that allows us to maintain maximum efficiencies which will lead to superior production that consumers can enjoy at an acceptable cost. We are working on new ways to build our greenhouse and manage our crops so that we can achieve the goals needed to compete in this market. Just to give you an example, when our plants are growing in the wintertime, we need to battle the cold or low levels of sunlight to maintain yield and likewise when the summer rolls around we must battle against the climate that brings heat and high humidity. There is a lot of room to innovate and develop so that we can produce more while using less of our valuable resources.

Therefore, we think the project that Dr. Nemali is planning to do will be a tremendous benefit to the industry and the state of Indiana for fresh produce farming in controlled environments. We plan to work with him so that we can stay ahead of the changes in technology and be at the forefront of these developments.

Please feel free to reach out to me if you have any questions.

Sincerely,

Joe McGuire
CEO Pure Green Farms
(863) 370-3154
jmcguire@gopgf.com

SCBGP PROJECT PROFILE TEMPLATE

AWARD YEARS 2022 FORWARD

The State Plan should include a series of project profiles that detail the necessary information to fulfill the goals and objectives of each project. The acceptable font size for the narrative is 11 or 12 pitch with all margins at 1 inch. The following information must be included in each project profile.

PROJECT TITLE

Provide a descriptive project title in 15 words or less in the space below.

Enabling a Sustainable Controlled Environment Agriculture (CEA) Industry in Indiana

DURATION OF PROJECT

Start Date: 9/30/2022 **End Date**: 9/29/2024

PROJECT PARTNER AND SUMMARY

Include a project summary of 250 words or less suitable for dissemination to the public. A Project Summary provides a very brief (one sentence, if possible) description of your project. A Project Summary includes:

1. *The name of the applicant organization that if awarded a grant will establish an agreement or contractual relationship with the State Department of Agriculture to lead and execute the project,*
2. *The project's purpose, deliverables, and expected outcomes and*
3. *A description of the general tasks/activities to be completed during the project period to fulfill this goal.*

FOR EXAMPLE:
The ABC University will mitigate the spread of citrus greening (Huanglongbing) by developing scientifically-based practical measures to implement in a quarantine area and disseminating results to stakeholders through grower meetings and field days.

Because of its importance to the food production system, there has been a rapid growth of the controlled environment agriculture (CEA) industry in Indiana. As with any nascent industry, the CEA industry is facing major challenges including high risk from increased capital and operational costs, lack of research-based and region-specific information, weak industry-academia collaborations, less involvement of beginner, socially disadvantaged, and veteran farmers, and limited knowledge level and training among the workforce. Dr. Krishna Nemali at Purdue University will study the feasibility of growing food in both greenhouse and indoor-based CEA systems in Indiana by identifying major hurdles to crop production technology, 'Farm to Table' costs, and overall industry profits. Further, monthly educational programs will be conducted by collaborating with established CEA companies in the field, especially to the beginner, socially disadvantaged, and veteran farmers, and increase the knowledge level of the CEA workforce in Indiana. The project plans to conduct Indiana region-specific research to identify solutions, at a minimum, to two major issues to food production in both CEA systems including greenhouses and indoor farms.

PROJECT PURPOSE

PROVIDE THE SPECIFIC ISSUE, PROBLEM OR NEED THAT THE PROJECT WILL ADDRESS

Nearly 81% of the US population and 86% of the Indiana population live in urban areas (US Census, 2010). Rapid urbanization demands the availability of fresh, nutritious, and safe food for the overall health of the urban population. The demand will likely not be met solely by conventional outdoor agriculture systems due to issues associated with climate change, water scarcity, and food safety from intensive pesticide usage. It is necessary to develop innovative and alternative food production systems that provide fresh, nutritious, and safe food to the increasing urban population. One concept that has been developed is to produce food in or near urban communities utilizing controlled environment agriculture (CEA) systems. This involves food production inside climate-controlled structures including greenhouse and indoor/vertical farms. Benefits of CEA include year-round production, increased availability of fresh, nutritious, and safe food, efficient water and fertilizer use, reduced environmental pollution, and increased employment opportunities in urban communities. Leafy greens (lettuce, basil, kale), vegetables (e.g. tomato, pepper), and fruits (strawberry, cherry tomato) are among the major crops produced in CEA systems.

Because of its important contribution to food production, there has been a rapid growth of the CEA industry in the US including Indiana. For example, many greenhouse-based companies (e.g. Nature Fresh, OH; AppHarvest, KY; Gotham Greens, NY; BrightFarms, PA, OH, IL) and indoor/ vertical farms, (e.g., Aerofarms, NJ; Plenty, CA and WY; Freight Farms, MA; Eden Green Technology, TX) are already established in the US. In addition, there are many associated companies that supply technology to the CEA industry in the US (e.g. LED lighting, production systems, software and automation, fertilizers). The wholesale value of crops grown in CEA is projected to reach $3.6 billion in the US by 2025 (Kong and Nemali, 2019). The CEA industry is starting to grow in Indiana due to its proximity to urban markets in the Midwest and favorable government policies towards entrepreneurs. Examples of established companies in Indiana include Pure Green Farms (South Bend), Healthy Roots LLC, Uplift Farms, Super Micro Greens (Indianapolis), Green Sense (Portage), and many more small-scale facilities. Given this, there is a huge potential to attract the CEA industry, and significantly enhance new markets and economic development in Indiana.

As with any nascent industry, the CEA industry is facing some major challenges. These include high risk due to increased capital and operational costs, lack of research-based and region-specific information, limited efforts on developing readily applicable research due to poor industry-academia collaborations, and a limited trained workforce. These issues can result in reduced profits, startup closures, and decreased industry growth , and challenge the overall sustainability of the CEA industry. It is extremely important to quickly address these issues to enable continuous investment, growth, and a sustainable CEA industry in Indiana. The project addresses these challenges by developing unbiased information about profitability of CEA systems,, providing continuous educational programs to beginner, socially disadvantaged, and veteran farmers, training workforce, and developing region-specific research related to CEA industry.

The proposal tackles the above issues by first collecting data from small to large-scale CEA enterprises on major issues with crop production, 'farm to table' costs, and overall profits. A research technician will be hired to collect data from collaborating CEA industries in Indiana and other states. We will make efforts to recruit companies operating at different scales and platforms (i.e. greenhouse and indoor-based companies). The technician will visit the grower sites twice each month to collect data on operational costs from the point of sowing seeds to the point of sale to the customer ('Farm to Table' costs). In addition, the technician with the help of PI will identify production-related issues or bottlenecks at different stages. The data will be utilized to develop enterprise budgets, major research questions, and determine the economics of growing food crops in greenhouses and indoor farms, especially in Indiana. Support letters from different CEA companies are included with this application.

Second, we plan to organize monthly educational programs by collaborating with experienced industry partners and experts from Purdue and other universities to train beginner, socially disadvantaged, and veteran farmers. The industry partners include Eden Green Technology (TX), Intelligent Growth Solutions (Scotland, UK), Venntis Lighting (MI), Pure Green Farms (South Bend), New Age Provisions (Indianapolis), and Purdue Extension Hydroponics Display at the AMP in 16-Tech Innovation District in Indianapolis. Eden Green Tech. and Pure Green Farms are greenhouse

based hydroponic facilities while New Age Provisions is an indoor container farm. The IGS-Scotland is a supplier of completely automated vertical farm equipment and Venntis is a manufacture of LED lighting. All these companies have established non-disclosure agreements with PI and Purdue University. The collaborators will partner with PI to provide educational programs and share videos of their facility and growing experiences with participants at the workshops. We will plan to organize some workshops at collaborators' facilities to further enhance educational experiences. We learned from our past experience that focused and continuous training will result in larger impacts than fewer and day-long workshops. Regular workshops provide more opportunities for the participants to register. These educational programs are aimed at increasing the knowledge level among participants, and further enabling them to make informed decisions about their business. In addition, the educational programs are aimed at increasing the confidence level among beginner, socially disadvantaged, and veteran farmers to invest in small to large-scale startups in Indiana. We also plan to train junior growers, supervisors, and fresh undergraduates involved in CEA crop production during the workshops to increase the knowledge level of the Indiana workforce, which is critically required for the sustainable growth of the CEA industry in Indiana.

Third, we will conduct applied research at Purdue University and collaborating industries to develop Indiana region-specific solutions that will address, at a minimum, the top two issues or bottlenecks to crop production in CEA systems. The issues will be identified based on the data collected from visiting CEA industries by the technician and PI. Some of the anticipated issues to crop production may include factors that significantly increase operational costs (e.g. labor costs, energy costs), decrease crop yields (e.g. varietal performance, nutritional disorders, growth environment), or decreased plant quality (e.g. nutritional quality or food safety). We will develop appropriate research questions and experimental protocols to develop research-based solutions, at a minimum, to two major issues. The developed information will be validated in select CEA industries and shared with larger groups, utilizing the monthly workshops.

PROVIDE A LISTING OF THE OBJECTIVES THAT THIS PROJECT HOPES TO ACHIEVE

Add more objectives by copying and pasting the existing listing or delete objectives that aren't necessary.

Objective 1	1. Market Enhancement: Study the feasibility of growing food in both greenhouse and indoor-based CEA systems in Indiana by identifying major hurdles to crop production, 'Farm to Table' costs, and overall profits
Objective 2	2. Education and Training: Conduct monthly educational programs by collaborating with established CEA companies in the field, especially to beginner, socially disadvantaged, and veteran farmers, and increase the knowledge level among the workforce in Indiana
Objective 3	3. Research: Conduct Indiana region-specific research to identify solutions, at a minimum, to two major hurdles to food production in both CEA systems

PROJECT BENEFICIARIES

Estimate the number of project beneficiaries: 600

Does this project directly benefit socially disadvantaged farmers and/or underserved communities as defined in the RFA? **Yes** ☑ **No** ☐

If you selected yes, please describe how the project directly benefits socially disadvantaged farmers and/or underserved communities.

The proposed project will aid in training socially disadvantaged farmers to enable them own and manage operations associated with local food systems that will provide year-round income. In addition, the project will provide both instructional and hands-on training utilizing Purdue University research platforms and the collaboration support of successful CEA companies to minorities.

Does this project directly benefit beginning farmers as defined in the RFA? **Yes** ☑ **No** ☐

If you selected yes, please describe how the project directly benefits beginning farmers.

The project will develop fundamental information about existing hurdles to efficient crop production , costs associated with food production, and overall profits in CEA systems. This information is critical for beginner farmers with interests in medium to large startup companies. The workshops will aid beginner farmers to make informed decisions about their business. The project will also train the workforce critically needed for beginner farming operations.

Does this project directly benefit veteran farmers as defined in the RFA? **Yes** ☑ **No** ☐

If you selected yes, please describe how the project directly benefits veteran farmers.

The project will develop region-specific information on new market opportunities to enable veteran farmers invest in small to medium scale operations. This coupled with educational programs, which provide hands-on training and educational experiences, by Purdue experts and experienced industry partners will increase the confidence level among veterans who do not possess first-hand training in agriculture/ horticulture to invest in CEA systems. The project aims to provide year-round income to Indiana's beginner veteran farmers.

STATEMENT OF ENHANCING SPECIALTY CROPS

By checking the box to the right, I confirm that this project enhances the competitiveness of specialty crops in accordance with and defined by the Farm Bill. Further information regarding the definition of a specialty crop can be found at www.ams.usda.gov/services/grants/scbgp. ☑

List of Specialty Crops: Leafy greens, herbs, strawberries, and tomatoes

CONTINUATION PROJECT INFORMATION

Does this project continue the efforts of a previously funded SCBGP project? **Yes** ☐ **No** ☑

If you have selected "yes", please address the following:

DESCRIBE HOW THIS PROJECT WILL DIFFER FROM AND BUILD ON THE PREVIOUS EFFORTS

PROVIDE A SUMMARY (3 TO 5 SENTENCES) OF THE OUTCOMES OF THE PREVIOUS EFFORTS

PROVIDE LESSONS LEARNED ON POTENTIAL PROJECT IMPROVEMENTS

What was previously learned from implementing this project, including potential improvements?

How are the lessons learned and improvements being incorporated into the project to make the ongoing project more effective and successful at meeting goals and outcomes?

DESCRIBE THE LIKELIHOOD OF THE PROJECT BECOMING SELF-SUSTAINING AND NOT INDEFINITELY DEPENDENT ON GRANT FUNDS

The project aims at medium and long-term impacts. Given this, the project will be continued beyond the duration of the current proposal. We plan to apply for federal grants from USDA - AMS to obtain additional support for future programs. In addition, we will actively seek in-kind support to organize training programs at established facilities by continuing collaborations and partnerships with CEA industry.

OTHER SUPPORT FROM FEDERAL OR STATE GRANT PROGRAMS

The SCBGP will not fund duplicative projects. Did you submit this project to a Federal or State grant program other than the SCBGP for funding and/or is a Federal or State grant program other than the SCBGP funding the project currently?

Yes ☐ **No** ☑

IF YOUR PROJECT IS RECEIVING OR WILL POTENTIALLY RECEIVE FUNDS FROM ANOTHER FEDERAL OR STATE GRANT PROGRAM

Identify the Federal or State grant program(s).

NA

Describe how the SCBGP project differs from or supplements the other grant program(s) efforts.

Dr. Nemali is currently involved in another SCBG project aimed at increasing productivity and accessibility of hydroponically grown organic lettuce in Indiana. The current proposal is different in that the scope of the project is more wider and aimed at understanding the feasibility and challenges that threaten sustainability of rapidly growing CEA industry in Indiana. While the funded project focuses on accessibility of healthy organic food to consumers in general, the current proposal specifically aims to train socially disadvantaged, beginner and veteran farmers. The current proposal heavily involves collaborative support from experienced industry professionals to provide valuable and real world educational experiences to project beneficiaries.

EXTERNAL PROJECT SUPPORT

Describe the specialty crop stakeholders who support this project and why (other than the applicant and organizations involved in the project).

Beginner farmers, socially disadvantaged farmers, veterans, experienced CEA growers, extension educators, industry collaborators, content experts at Purdue University, and consumers in urban communities are stakeholders of this project.
Beginner farmers, socially disadvantaged farmers, and veterans are interested to learn about the hurdles to crop production, the economics of production, and hands-on educational programs that will increase their knowledge levels and enable them to make informed decisions about their investments.

Experienced industry professionals will support the project due to established productive partnerships with Purdue University. Extension educators will be working as a liaison between beginner farmers, socially disadvantaged farmers, veterans, and Purdue experts.

EXPECTED MEASURABLE OUTCOMES

SELECT THE APPROPRIATE OUTCOME(S) AND INDICATOR(S)/SUB-INDICATOR(S)

You must choose at least one of the eight outcomes listed in the SCBGP Performance Measures, which were approved by the Office of Management and Budget (OMB) to evaluate the performance of the SCBGP on a national level.

OUTCOME MEASURE(S)

Select the outcome measure(s) that are applicable for this project from the listing below.

- ☐ **Outcome 1:** Increasing Consumption and Consumer Purchasing of Specialty Crops
- ☑ **Outcome 2**: Increasing Access to Specialty Crops and Expanding Specialty Crop Production and Distribution
- ☐ **Outcome 3**: Increase Food Safety Knowledge and Processes
- ☐ **Outcome 4**: Improve Pest and Disease Control Processes
- ☐ **Outcome 5**: Develop New Seed Varieties and Specialty Crops
- ☑ **Outcome 6**: Expand Specialty Crop Research and Development
- ☐ **Outcome 7**: Improve Environmental Sustainability of Specialty Crops

OUTCOME INDICATOR(S)

Provide at least one indicator listed in the SCBGP Performance Measures and the related quantifiable result. If you have multiple outcomes and/or indicators, repeat this for each outcome/indicator.

FOR EXAMPLE:
Outcome 1, Indicator 1.1a
Total number of consumers who gained knowledge about specialty crops, Adults 132.

Outcome 2, Indicator 1
Number of stakeholders that gained technical knowledge about producing, preparing, procuring, and/or accessing specialty crops [600].

Outcome 2, Indicator 5
Number of stakeholders that adopted best practices or new technologies to improve distribution systems [200].

Outcome 6, Indicator 1
Number of research goals accomplished [2].

Outcome 6, Indicator 4
Total number of research outputs published to industry publications and/or academic journals [3]. For each published research output, the: a. Number of views/reads of published research/data [3]. b. Number of citations counted [0].

MISCELLANEOUS OUTCOME MEASURE

In the unlikely event that the outcomes and indicators above the selected outcomes are not relevant to your project, you must develop a project-specific outcome(s) and indicator(s) which will be subject to approval by AMS.

DATA COLLECTION TO REPORT ON OUTCOMES AND INDICATORS

Explain how you will collect the required data to report on the outcome and indicator in the space below.

We will conduct surveys after each educational session. The survey will collect answers to questions about the number of participant who learned new information, who believe that training has improved their ability to make informed decisions, who are willing to make a change of practice, and who believe that training will enable them invest in startups.
Principal investigator and research technician will collaborate with industry partners to develop innovative and hands-on educational programs, and collect data from participants using both paper and electronic methods after training. The data will be reported to funding agency on a quarterly and yearly basis.

We will identify, at a minimum, two major hurdles for crop production in greenhouses and indoor farms utilizing the data collected by collaborating with industries. For these hurdles, we will develop appropriate research questions, experimental methods, and data collection methods. The type of data collected will depend on the question being addressed. Data may include crop environmental variables, plant growth, consumer preferred quality measures, nutritional quality, and pathogen contamination levels. The data will be collected from replicated trials utilizing sensors, laboratory analytical procedures, qualitative assessments, and manual methods.
The collected data will be interpreted to address the research questions. The findings will be confirmed in greenhouse/ indoor commercial facilities to validate the impact. The findings will be published in both extension and refereed publications. We will develop timelines and periodically evaluate the progress against the pre-determined timeline.

BUDGET NARRATIVE

All expenses described in this Budget Narrative must be associated with expenses that will be covered by the SCBGP. If any matching funds will be used and a description of their use is required by the State department of agriculture, the expenses to be covered with matching funds must be described separately. Applicants should review the Request for Applications section 4.7 Funding Restrictions prior to developing their budget narrative.

BUDGET SUMMARY

Expense Category	Funds Requested
Personnel	$104,776.00
Fringe Benefits	$46,572.00
Travel	$2,057.00
Equipment	$0.00
Supplies	$4,000.00
Contractual	$0.00
Other	$4,400.00
Direct Costs Sub-Total	$161,805.00
Indirect Costs	$4,854.15
Total Budget	$166,659.15

PERSONNEL

List the organization's employees whose time and effort can be specifically identified and easily and accurately traced to project activities that enhance the competitiveness of specialty crops. See the Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Salaries and Wages, and Presenting Direct and Indirect Costs Consistently under section 4.7.1 for further guidance.

#	Name/Title	Level of Effort (# of hours OR % FTE)	Funds Requested
1	**Krishna Nemali, Assistant Professor**	290	$20,301.00

#	Name/Title	Level of Effort (# of hours OR % FTE)	Funds Requested
2	**TBA, Technician**	1.00 %	$72,475.00
3	**Undergraduate Student TBA, UG researcher**	1,200	$12,000.00

Personnel Subtotal: $104,776.00

PERSONNEL JUSTIFICATION

For each individual listed in the above table, describe the activities to be completed by name/title including approximately when activities will occur. Add more personnel by copying and pasting the existing listing or deleting personnel that aren't necessary.

Personnel 1:	Dr. Nemali will coordinate the collaborations with CEA industries to enable data collection on production-related issues and farm to table costs,, develop enterprise budgets based on farm to table costs and revenue, organize workshops and educational sess
Personnel 2:	Technician will be responsible for data to day activities in general. The person will regularly travel to grower sites to collect data on production-related issues, farm to table costs, help in organizing workshops, reach to the community for enrolling
Personnel 3:	Students will be responsible for aiding in research including experimental setup, treatment imposition, plant maintenance, recording data, harvesting, maintaining a clean growth environment. je;[omg set i[workshops and educational programs.

FRINGE BENEFITS

Provide the fringe benefit rates for each of the project's salaried employees described in the Personnel section that will be paid with SCBGP funds.

#	Name/Title	Fringe Benefit Rate	Funds Requested
1	Krishna Nemali, Assistant Professor	0.27 %	$5,532.00
2	TBA, Technician	0.55 %	$40,078.00
3	Undergraduate Student TBA, UG researcher	0.08 %	$962.00

Fringe Subtotal: $46,572.00

TRAVEL

Explain the purpose for each Trip Request. Please note that travel costs are limited to those allowed by formal organizational policy; in the case of air travel, project participants must use the lowest reasonable commercial airfares. For recipient organizations that have no formal travel policy and for-profit recipients, allowable travel costs may not exceed those established by the Federal Travel Regulation, issued by GSA, including the maximum per diem and subsistence rates prescribed in those regulations. This information is available at http://www.gsa.gov. See the Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Travel, and Foreign Travel for further guidance.

#	Trip Destination	Type of Expense (airfare, car rental, hotel, meals, mileage, etc.)	Unit of Measure (days, nights, miles)	# of Units	Cost per Unit	# of Travelers Claiming the Expense	Funds Requested
1	Grower Sites	mileage	miles	145.0	$0.41	1	$713.00
2	Around the state	per diem	days	24.0	$56.00	1	$1,344.00

Travel Subtotal: $2,057.00

TRAVEL JUSTIFICATION

For each trip listed in the above table describe the purpose of this trip and how it will achieve the objectives and outcomes of the project. Be sure to include approximately when the trip will occur. Add more trips by copying and pasting the existing listing or delete trips that aren't necessary.

Trip 1 (Approximate Date of Travel):	Travel is planned for the technician to visit grower sites twice a month and for 12 months. Mileage costs of $0.41 per mile and for 145 miles per month for 12 months .
Trip 2 (Approximate Date of Travel):	per diem costs of $56 per day (per trip) for 24 trips.

CONFORMING WITH YOUR TRAVEL POLICY

By checking the box to the right, I confirm that my organization's established travel policies will be adhered to when completing the above-mentioned trips in accordance with 2 CFR 200.474 or 48 CFR subpart 31.2 as applicable. ☐

EQUIPMENT

Describe any special purpose equipment to be purchased or rented under the grant. "Special purpose equipment" is tangible, nonexpendable, personal property having a useful life of more than one year and an acquisition cost that equals or exceeds $5,000 per unit and is used only for research, medical, scientific, or other technical activities. See the Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Equipment - Special Purpose for further guidance

Rental of "general purpose equipment" must also be described in this section. Purchase of general purpose equipment is not allowable under this grant. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Equipment - General Purpose for definition, and Rental or Lease Costs of Buildings, Vehicles, Land and Equipment.

#	Item Description	Rental or Purchase	Acquire When?	Funds Requested
1	N/A			$0.00

Equipment Subtotal: $0.00

EQUIPMENT JUSTIFICATION

For each Equipment item listed in the above table describe how this equipment will be used to achieve the objectives and outcomes of the project. Add more equipment by copying and pasting the existing listing or delete equipment that isn't necessary.

Equipment 1:	N/A

SUPPLIES

List the materials, supplies, and fabricated parts costing less than $5,000 per unit and describe how they will support the purpose and goal of the proposal and enhance the competitiveness of specialty crops. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Supplies and Materials, Including Costs of Computing Devices for further information.

Item Description	Per-Unit Cost	# of Units/Pieces Purchased	Acquire When?	Funds Requested
Experimental Costs	$2,000.00	2.0	October 1, 2022	$4,000.00

Supplies Subtotal: $4,000.00

SUPPLIES JUSTIFICATION

Describe the purpose of each supply listed in the table above purchased and how it is necessary for the completion of the project's objective(s) and outcome(s).

Experimental Costs: Experimental costs of $2000 per year and for two years. These costs per unit include seed ($200), fertilizer ($100), containers ($100), laboratory analyses ($750), tissue analyses ($750), and substrates ($100). A total of 2 units is included ($4000).

CONTRACTUAL/CONSULTANT

Contractual/consultant costs are the expenses associated with purchasing goods and/or procuring services performed by an individual or organization other than the applicant in the form of a procurement relationship. If there is more than one contractor or consultant, each must be described separately. (Repeat this section for each contract/consultant.)

ITEMIZED CONTRACTOR(S)/CONSULTANT(S)

Provide a list of contractors/consultants, detailing out the name, hourly/flat rate, and overall cost of the services performed. Please note that any statutory limitations on indirect costs also apply to contractors and consultants.

#	Name/Organization	Hourly Rate/Flat Rate	Funds Requested
1	N/A		$0.00

Contractual/Consultant Subtotal: $0.00

CONTRACTUAL JUSTIFICATION

Provide for each of your real or anticipated contractors listed above a description of the project activities each will accomplish to meet the objectives and outcomes of the project. Each section should also include a justification for why contractual/consultant services are to be used to meet the anticipated outcomes and objectives. Include timelines for each activity. If contractor employee and consultant hourly rates of pay exceed the salary of a GS-15 step 10 Federal employee in your area, provide a justification for the expenses. This limit does not include fringe benefits, travel, indirect costs, or other expenses. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Contractual and Consultant Costs for acceptable justifications.

Contractor/Consultant 1:	N/A

CONFORMING WITH YOUR PROCUREMENT STANDARDS

By checking the box to the right, I confirm that my organization followed the same policies and procedures used for procurements from non-federal sources, which reflect applicable State and local laws and regulations and conform to the Federal laws and standards identified in 2 CFR Part 200.317 through.326, as applicable. If the contractor(s)/consultant(s) are not already selected, my organization will follow the same requirements. ☐

OTHER

Include any expenses not covered in any of the previous budget categories. Be sure to break down costs into cost/unit. Expenses in this section include, but are not limited to, meetings and conferences, communications, rental expenses, advertisements, publication costs, and data collection.

If you budget meal costs for reasons other than meals associated with travel per diem, provide an adequate justification to support that these costs are not entertainment costs. See Request for Applications section 4.7.2 Allowable and Unallowable Costs and Activities, Meals for further guidance.

Item Description	Per-Unit Cost	Number of Units	Acquire When?	Funds Requested
Costs to organize workshops	$100.00	24.0	October 1, 2022	$2,400.00
Publishing Fees	$2,000.00	1.0	October 1, 2022	$2,000.00

Other Subtotal: $4,400.00

OTHER JUSTIFICATION

Describe the purpose of each item listed in the table above purchased and how it is necessary for the completion of the project's objective(s) and outcome(s).

Costs to organize workshops: Costs to organize workshops at $100 per workshop and for 12 workshops for a period of two years is included ($2400)
Publishing Fees: Online and free access publishing cost for one refereed article in one of the journals published by the American Society for the Horticultural Science is included ($2000)

INDIRECT COSTS

The indirect cost rate must not exceed 8 percent of any project's budget. Indirect costs are any costs that are incurred for common or joint objectives that therefore, cannot be readily identified with an individual project, program, or organizational activity. They generally include facilities operation and maintenance costs, depreciation, and administrative expenses. See Request for Applications section 4.7.1 Limit on Administrative Costs and Presenting Direct and Indirect Costs Consistently for further guidance.

Indirect Cost Rate	Funds Requested
3.00 %	$4,854.15

Indirect Subtotal: $4,854.15

PROGRAM INCOME

Program income is gross income—earned by a recipient or subrecipient under a grant—directly generated by the grant-supported activity or earned only because of the grant agreement during the grant period of performance. Program income includes, but is not limited to, income from fees for services performed; the sale of commodities or items fabricated under an award (this includes items sold at cost if the cost of producing the item was funded in whole or partially with grant funds); registration fees for conferences, etc.

Source/Nature of Program Income	Description of how you will reinvest the program income into the project to enhance the competitiveness of specialty crops	Estimated Income
N/A		$0.00

Program Income Total: $0.00