- This partnership with North Carolina State University seeks to evaluate Biochar use in peach fields planted in sandy soils. The outcome and goal of this research is to determine if biochar use can increase the soil nutrient holding capacity and the moisture holding capacity, and minimize the incidence of peach tree short life.
- This partnership with North Carolina State University seeks to breed new hop (Hunulus lupulus) varieties for North Carolina growers.
- This partnership with North Carolina State University (NCSU) seeks to conduct applied and basic research to mitigate the development of single-site fungicide resistance and promote sustainable chemical management in Colletotrichum pathogens responsible for Glomerella leaf spot and bitter rot of apple.
- This partnership with North Carolina State University (NCSU) seeks to increase plant growth, reduce production times, and increase profits for ornamental plant producers by designing systems to improve the source water quality that ornamental producers use for irrigation. Impacts from this simple systems approach will be disseminated at on-nursery workshops, at grower meetings, through existing websites, and by new extension documents.
- This partnership with North Carolina State University (NCSU) seeks to develop a genetic linkage map for Fraser fir showing the location and putative functions of genes. These comparisons will allow identification of Fraser fir genes similar to genes in other plant species for traits that are important for Christmas trees such as control of branching, pest resistance, and abscission (postharvest needle retention).
- This partnership with the Forest Restoration Alliance (FRA) at NC State University seeks to restore hemlocks to the North Carolina nursery and landscape industry that, previous to HWA, was valued at $10 to $15 million annual farm income. In addition, this project will place the North Caroline nursery industry in a position to provide seedlings for reforestation of the thousands of acres of hemlock stands killed by HWA.
- Ensure that the State Agency and sub-awardees abide by Federal and State requirements and regulations by performing pre-award and post-award activities to administer Specialty Crop Block Grant Program funding.

North Dakota

Recipient: North Dakota Department of Agriculture **Award Amount:** 2,560,312.23

Number of Projects: 28

- Anthrcanose in dry beans, caused by the fungal disease Colletotrichum lindemuthianum (Sacc. & Magnus) Lams.-Scrib., can cause yield losses up to 80 Percent. The North Dakota State University will determine the level of disease tolerance to anthracnose infection in 16 partial resistant dry bean (Phaseolus vulgaris L.) lines for the purpose of germplasm enhancement. North Dakota State University will also evaluate seed health after anthracnose infection, as well as a reduced fungicide spray regime for the partial resistant dry bean lines.
- North Dakota State University will evaluate several different rootstocks for commercial tree production to increase the diversity, survivability, and profitability of ornamental woody plantings across North Dakota. Several different species (oak, magnolia, dogwood, and maple) will be evaluated and the results will be disseminated to specialty crop beneficiaries through website publications and field days.
- North Dakota State University will evaluate the potential of cider apple cultivars for commercial cider production in North Dakota. Cultivar (variety), rootstock, and best management practices will be evaluated and the results will be disseminated to specialty crop beneficiaries through website publications and field days.
- The North Dakota Trade Office (NDTO) will increase market visibility of the upper Midwest's specialty crop sector in the Philippines by working with the Foreign Agricultural Service to introduce companies to pre-qualified buyers, distributors, and importers of specialty crops, resulting to an increase in export sales of specialty crops to this target market. NDTO has developed a reimbursement program for approved participating companies in the 2016 Specialty Crop project to offset the high cost of identifying and developing international markets.

- The pulse lab in the Plant Pathology Department at North Dakota State University will determine the genetic diversity within and among populations of Aphanomyces euteiches, the causal agent of Aphanomyces root rot, collected from North Dakota and other field pea growing regions in the United States. Aphanomyces root rot is an extremely devastating disease that nearly eliminated fresh pea production from Wisconsin, Iowa, Southern Minnesota, and some regions in France. Aphanomyces root rot was first identified in North Dakota in 2014. Survey results indicate that the pathogen was present in pea roots from over 50 percent of the fields in 16 field pea growing counties in North Dakota. Recent studies have reported that pathotypes I and III of A. euteiches, the dominant pathotypes found in the United States, display a high level of genetic diversity across regions in the western United States. Several research studies have indicated that isolate origin and genotype tend to be related to aggressiveness, while pathotype generally does not. Given this previous research, we aim to characterize A. euteiches genotypes using next generation sequencing technology and evaluate unique pathogen genotypes for aggressiveness on a set of host genotypes with varying genetic backgrounds and levels of resistance under greenhouse conditions. The outcome of this research will be to enhance the competitiveness of pulse crops using the innovative technology of next generation sequencing to drastically improve our understanding of the genotypic and phenotypic diversity in A. euteiches. This research is a very important first step in deploying resistance to this devastating pathogen.
- Funding is requested for application technology research needed to develop foliar fungicides as a tool for managing Sclerotinia head rot, a disease that causes significant yield and quality losses for confection sunflowers in North Dakota and Minnesota. No management tools are currently available for the disease; resistant hybrids are not available, crop rotation is ineffective, and traditional fungicide application methods confer insufficient fungicide deposition to the front of sunflower heads for disease control. Producers have inquired about applying fungicides through drop nozzles mounted on a high-clearance sprayer. Preliminary research conducted in 2015 demonstrated that the use of drop nozzles can result in very good fungicide deposition to the front of sunflower heads. However, improvements in fungicide deposition did not confer control of Sclerotinia head rot. Possible reasons for the lack of disease control include lack of fungicide movement between disk flower buds that received droplets of fungicide and adjacent buds that did not, poor efficacy of the selected fungicide against this disease on sunflowers, and inappropriate fungicide application timing. The North Dakota State University Carrington Research Extension Center seeks to conduct field trials to: 1) identify strategies to further improve fungicide deposition to the front of sunflower heads and increase the proportion of disk flower buds receiving spray droplets; 2) evaluate the use of spreader adjuvants to facilitate the movement of fungicides between disk flower buds that receive fungicide product and adjacent buds that do not; 3) assess the comparative fungicide efficacy; and 4) identify optimal fungicide application timing.
- North Dakota State University agronomists will identify optimal agronomic practices for faba bean production in the northern plains. Faba bean (Vicia faba minor) is a legume crop historically grown in the Mediterranean region, Europe, Australia, and more recently in Canada. There is strong interest in growing faba bean in the northern plains and potential markets have been identified. Faba bean has about 7 percent higher protein than peas and a pleasant flavor. New uses for the protein, starch, or whole seed have been identified, thus creating greater demand for faba bean. Faba bean agronomic benefits are said to include flooding tolerance, deeper rooting, excellent N fixation, leaves more N in soil than peas, grows well in no-till stubble, can cut higher than peas, not shatter-prone, good lodging resistance, can be straight cut or swathed, and has higher protein than other pulses. Faba bean has been grown by a limited number of North Dakota growers and research is needed to help optimize production practices in the northern plains. This research project will focus on best management practices for planting date, planting rate, and weed and disease management. This research will also provide data for potential new herbicide or fungicide labels. This project will provide growers with knowledge and tools to grow faba beans more efficiently and profitably.

- The North Dakota State University (NDSU) land grant mission includes improving crop production within the State and region. Lentil production in North Dakota is challenged by the crop's inherent lack of competitiveness with weeds. Compounding this fact is that lentil is tolerant of few post emergent applied herbicides. In fact, no post emergent herbicides are labeled for use in lentil that adequately control most broadleaf weeds. Sulfentrazone can provide good residual control of kochia and wild buckwheat. CDC Sedley has been observed to be tolerant to sulfentrazone in field conditions when applied pre-emergence. It is assumed that this tolerance is genetic and therefore can be exploited in a breeding program; but to do this, reliable, rapid screening methods must be optimized. Laboratory and greenhouse sulfentrazone screening techniques have been developed at the North Central Research Extension Center. These techniques will be used to accomplish the primary objective of this project which is the breeding of sulfentrazone tolerant germplasm. Crosses will be performed between CDC Sedley and five NDSU breeding lines in order to bring CDC Sedley's tolerance, or newly discovered tolerance into more adapted breeding lines. The availability of a sulfentrazone-tolerant lentil would be a welcome tool for weed control for lentil producers who currently have few. The objective of this project is to develop sulfentrazone-tolerant breeding lines and confirm this tolerance using optimized greenhouse and laboratory screening methods.
- The North Dakota State University potato breeding program will aid in management of Potato Virus Y (PVY) in certified seed and commercial potato fields utilizing the new technology of remote sensing by demonstrating the reflectance curves for genotypes infected with PVY versus those suffering from a nutrient deficiency. Results will be disseminated to stakeholders via research reporting conferences, field day events, and article(s) in the Valley Potato Grower magazine and the American Journal of Potato Research.
- North Dakota State University will investigate the impact of biofertilizers on plant growth and floral traits relevant for beneficial insects, such as pollinators and natural enemies, using three types of specialty crops (confection sunflower, edamame, field peas). We will partner with local organizations that support specialty crops to share educational information and research results at conferences/meetings or via printed/online media.
- North Dakota State University (NDSU) will determine methods to improve tuber set, uniformity, and quality of potato cultivars to reduce production costs and improve returns. The information will be disseminated to stakeholders in North Dakota through grower meetings, field days, the Valley Potato Grower magazine, and the NDSU Potato Extension website and social media outlets.
- Pulse pathology researchers at North Dakota State University will conduct research to identify and characterize a previously uncharacterized pathogen, likely a variant of Pea Seedborne Mosaic Virus (PSbMV). This research will be conducted in collaboration with virologists at the University of Idaho with extensive experience characterizing viruses in the same family as PSbMV (Potyviridae). PSbMV was recently detected in North Dakota, however, during evaluations over the past 3 years, plants with symptoms indistinguishable from PSbMV tested negative for the virus. Using resources from the 2014 SCBGP, we identified and developed a diagnostic tool for one new variant of PSbMV. This new variant was found in 16 percent of 117 seed samples tested from 2013 and 2014. The outcome indicator of the current research will be development of two diagnostic assays for detection of the pathogen / PSbMV variant. The tasks to complete this outcome include identifying and characterizing the pathogen / PSbMV variant as the cause of the PSbMV-like symptoms and determining of the frequency of the pathogen in North Dakota field samples. This will be accomplished via viral amplification, sequencing, and greenhouse bioassays. Seed-testing and the use of resistant cultivars are the best known ways to manage PSbMV. The lack of detection of all variants of PSbMV make seed testing ineffective and the development of varieties resistant to all variants virtually impossible. The inability to detect all variants of PSbMV could be devastating to the field pea industry in North Dakota.
- The North Dakota Department of Agriculture (NDDA) will help increase the access of specialty crops to schools and communities by offering competitive grants to these groups for building and maintaining orchards and gardens in their community. The NDDA will create resources that will help connect current and new specialty crop growers to those schools and communities. The NDDA will help increase access of specialty crops to people with food insecurities by providing them with educational tools to grow and preserve specialty crops. The NDDA will also educate specialty crop producers on food safety in two ways: by creating a North Dakota Specialty Crop Good Agricultural Practices Manual along with online resources and by organizing speakers to talk about food safety at different events across the State.
- Burnt Creek Nursery will increase the availability and public awareness of North Dakota hardy woody plant material by growing North Dakota State University (NDSU) - released tree and shrub species in a controlled environment and disseminate results to stakeholders and beneficiaries through grower meetings, State and local professional publications, and Arbor Day plant material donations.

- North Dakota State University Weed Scientists and agronomists will determine the effect of simulated glyphosate and dicamba drift on crop yield and seed quality of several crops (potato, dry pea, lentil, dry bean, and edamame). Adoption of this technology is expected to be high to combat the increasing glyphosate-resistant weed problems. Dicamba inherently poses a high risk for off-target crop injury due to volatility after spraying and potential spray tank contamination, even with very low quantities of left-over product. The study will consist of three glyphosate rates, three dicamba rates, and a combination of glyphosate + dicamba applied just prior to flowering or after flowering. Data will be collected on crop injury, yield, test weight, seed germination, and seed vigor. The study will help determine the effect of spray drift on the current crop as well as any residual effects on saved seed.
- Dakota Prairies RC&D Council, the applicant organization, will partner with Sioux County Extension Service to conduct a Cultural Plant, Harvest and Preserve (PHP) project on the Standing Rock Reservation in North Dakota and South Dakota. This multi-State project will provide specialty crop access and education for about 1,000 underserved and socially-disadvantaged children and adults of the Standing Rock Reservation. To increase specialty crop production, access, and consumption on this reservation, this project will: sustain a program that includes school and community gardens and farmers markets in Fort Yates and Cannon Ball in North Dakota; create a multi-State project by creating new school gardens at McLaughlin, Bullhead, and Little Eagle, SD; assist with the farmers market at McLaughlin; continue the in-classroom education at Cannon Ball; and provide educational materials at three South Dakota schools (McLaughlin, Bullhead and Little Eagle) and the Fort Yates Elementary School in North Dakota.
- Sunflower downy mildew (DM) is the most economically important disease of sunflower worldwide. The disease threatens the sustainability of the U.S. sunflower industry by severely damaging the crop, rendering it unharvestable. The use of resistant hybrids, where available, is the most efficient method of controlling downy mildew in sunflower, and marker-assisted selection (MAS) is the best strategy to deliver resistant sunflowers in the shortest time. The proposed project aims to apply genomic tools for efficient identification of DM resistance (R) genes to increase the efficiency of sunflower breeding, enhance yield and quality, and reduce chemical use. The National Sunflower Association will integrate genetic and genomic approaches to determine the genetic basis of the DM resistance, and identify candidate genes that can be used for sunflower improvement. We will analyze the allelic relationship of the DM R gene Pl17 with a new gene Plann, conduct high-resolution genetic and physical mapping of the three DM R-genes, Pl17, Pl18, and Plann, identify candidate genes for DM resistance, and develop user-friendly ‘perfect’ markers suitable for marker-assisted selection. Molecular tags for the DM resistance genes will be valuable tools for more accurate selection and pyramiding of multiple resistances and increasing selection efficiency in sunflower breeding programs. The DM resistant confection hybrids combined with superior agronomic characteristics will enhance the sustainability of sunflower production and profitability for the U.S. confection sunflower industry.
- North Dakota State University will evaluate woody plant cold hardiness by differential thermal analysis, (DTA) a scientifically based procedure to determine ice formation in plant tissues with electronic devices that measure the heat generated when water within the plant tissues freeze. Assessing cold hardiness is key to the development of woody plant material for North Dakota, especially during periods of unpredictable climatic conditions. Grapes and other woody plant material suffer winter injury during acclimation in the late fall as well as deacclimation during periodic warm conditions in the late winter. This procedure will enable researchers to determine the acclimation and deacclimation patterns of stem and bud tissue without conducive field conditions. Acclimation and deacclimation patterns will be determined for potential parent material as well as accessions considered for advanced selection. Results will assist breeders in the selection process and will provide growers with much needed information on cold hardiness of cultivars potentially planted or recently released. Information obtained from this grant will be disseminated to stakeholders through grower meetings and field days.

- Dickeya dianthicola (previously Erwinia chrysanthemi), is an aggressive emerging bacterial pathogen pest in the US. Like other soft rotting species, including Pectobacterium carotovora, it can be found in potato fields, greenhouse settings, and storages. As a bacterial pathogen, it is difficult to detect prior to planting and prediction of disease occurrence in the field is hampered by dependence on environmental conditions. The Departments of Plant Sciences and Plant Pathology at North Dakota State University will develop procedures to screen potato varieties for resistance to the soft rot bacteria Dickeya and Pectobacterium and a protocol based on molecular techniques to screen potato seed lots for the presence of these bacteria. Identifying infected seed lots to prevent the entry of bacteria and identification of resistant varieties will mitigate the impact of these pathogens on the productivity and competitiveness of potatoes grown in North Dakota and Minnesota. In collaboration with the North Dakota State Seed Department Potato Program, we will develop a management strategy for certified seed producers to mitigate potential exposure. Results will be disseminated to stakeholders via research reporting conferences, field day events, and article(s) in the Valley Potato Grower magazine and American Journal of Potato Research.
- North Dakota State University and North Dakota State University Williston Research Extension Center will partner to utilize a previously funded Specialty Crop Block Grant “Hop Selections for North Dakota”. This project is completely new, but will utilize previously planted hop cultivars to conduct an in-depth study on how training dates and techniques affect crop yield using cultivars that survive or even thrive under North Dakota environmental conditions in order to recommend practices that optimize production. This project will examine training date and number of bines trained to a string at two locations (east and west North Dakota) to help growers understand the importance of training date and the number of bines trained. Field days will enable stakeholders to see how cultivars respond to training date and bine number for growing conditions similar to their own. This research is fundamental for grower success and to demonstrate to growers how different production practices will be compared to the Pacific Northwest with a specialty crop that has very high startup costs.
- The Department of Plant Sciences at North Dakota State University will be studying the production of leafy green vegetables under controlled environment conditions. Research emphasis will be placed on identifying superior cultivars of leafy green crops for hydroponic culture, preventing such physiological disorders as leaf margin burns on lettuce, reducing tissue concentration of nitrate, use of artificial lights for winter production, and modification of nutrient solution and cultural systems. Outcome of this research will enhance year- round supply of fresh leafy green vegetables for local and regional consumption as well as the understanding of plant growth and development under an intensive production system.
- Ensure that the State Agency and sub-awardees abide by Federal and State requirements and regulations by performing pre-award and post-award activities to administer Specialty Crop Block Grant Program funding.
- North Dakota State University will determine if the current levels of Verticillium wilt resistance in French fry potato cultivars are a practical and sustainable means to manage this disease, negating the need for soil fumigation, an environmentally hazardous and economically expensive disease control practice.
- North Dakota State University will breed and develop new cultivars of tomato, peppers, and selected cucurbit crops including squash, pumpkin, and melons. Research focus will be on genetic improvement in these crops for earliness, disease resistance, and higher nutritional quality. The ultimate goal is to develop and release new cultivars of selected vegetable crops that are suited for northern climate. Success of this research will enhance local production and consumption of vegetables in the northern plains region.
- Sclerotinia (white mold) is a critical production constraint for dry beans in North Dakota. Fungicides are widely employed to manage the disease, but optimal fungicide application timing is poorly understood. While some producers apply fungicides at early bloom initiation, others target full bloom and initial pod development, and it is unclear which approach may be superior. Results from field trials testing fungicide application timing in pinto beans in Carrington, ND, in 2015 suggest that considerable latitude may exist relative to the timing of the first fungicide application when two sequential applications are made; in pinto beans seeded to both narrow and wide rows, applications at bloom initiation performed equivalently to applications at full bloom and early pod. In this project, the North Dakota State University Carrington Research Extension Center, with collaborators at other locations in North Dakota, will rigorously assess how much latitude exists relative to the timing of fungicide applications for Sclerotinia control when a single fungicide application targeting white mold is made and when two sequential applications are made. Testing will be conducted on pinto, navy, and black beans seeded to narrow rows and to pinto beans seeded to wide rows. Supplemental irrigation will be utilized to simulate the economics and optimal fungicide application timing and frequency (zero, one, or two applications) of fungicide applications under different rainfall patterns.

- The Northern Pulse Growers Association (NPGA) is a producer organization representing producers and processors in North Dakota and Montana. The mission of the NPGA is to provide leadership for a sustainable and profitable pulse industry through research, market development, and education. The objective of the proposed project is to increase the usage of regional peas and lentils by providing strong evidence of pulse as a low glycemic index ingredient. This is a continuous project of the specialty block grant in Fiscal Year 2014-2015. The proposed project is expected to provide in depth perspective of pulse ingredients on the glycemic index lowering effect. This study will cover the ingredients and applications in depth to further provide stronger evidence on the glycemic lowering effect of pulse ingredients. As a result, the expected outcome is to increase awareness of pulse as a healthy ingredient to health professionals, as well as food companies. The study will be conducted in an acceptable manner through clinical journals and promotional activities such as seminars for health and clinical professionals.

- North Dakota State University will develop an application for iOS and android interfaces for potato farmers to receive severity updates and alerts for potato late blight and early blight to improve sustainable potato production in North Dakota. Training on the use of this application will be given to stakeholders during winter meetings, field days, and one-on-one consultations.

- North Dakota State University (NDSU) will evaluate and demonstrate organic production of raspberry and blackberry by developing soil nutrient and weed management strategies. Field trials will examine two organic nutrient sources at two levels with three organic weed control methods under the environmental conditions in North Dakota, while monitoring for insect and disease differences. The results will be disseminated to growers and stakeholders interested in small fruit production through NDSU Extension Service field days and spring garden meetings, professional meetings, and direct visits with growers.

Northern Mariana Islands

Recipient: Commonwealth of the Northern Mariana Islands Department of Lands a **Award Amount:** 210,664.16

Number of Projects: 1

- Growing specific varieties of specialty crops year round in the Northern Mariana Islands has been a tremendous challenge for many local farmers and other vegetable growers. Our 2016 Specialty Crop Block Grant proposals cover three areas – agricultural outlets, community outreach, and brand marketing. The “Tinanom AgriCenter” project will erect high-tunnels on the islands of Saipan, Tinian, and Rota to be used for the cultivation of specialty crop seedlings, as well as, a community agri-resource center for beginning agricultural enthusiasts. The “Gualu Community Outreach” project urges communities to practice subsistence farming within the confines of the private dwellings. The program will host community outreach sessions wherein experts on various home gardening / farming themes will be sharing their approach to community gardening. Project “Buy Local” is a marketing campaign that aims to create product awareness and help launch local produce brands. The intended goal of the campaign is to build trust between the consumers and producers. “Buy Local” believes that the more trust people have on the local agriculture providers the more they will likely avail of their products and services.

Ohio

Recipient: Ohio Department of Agriculture **Award Amount:** 527,624.47

Number of Projects: 10

- Ohio State University scientists will identify value of juice of new and existing Ohio-grown apple varieties for artisanal hard cider, collaborate with the Midwest Apple Improvement Association to select unique Midwest cider varieties, and facilitate networking opportunities among Ohio apple growers and cider makers enabling local connections in the burgeoning craft cider industry.

- The Ohio Department of Agriculture will plan, coordinate and execute specialty crop farm tours for food service and retail buyers to educate them about Ohio's specialty crop industry. These farm tours will create awareness and develop new and existing relationships between buyers and growers. Media will also be invited to participate on the farm tours so news articles/stories can help educate consumers about Ohio's specialty crops.