GRANTS PROGRAM: CENTER FOR PRODUCE SAFETY

2020 RFP Research Priorities Summary – September 11, 2019

The Center for Produce Safety prioritizes research programs that support the development of solutions for critical industry produce safety needs across the entire supply chain. For the 2020 Request for Proposals (RFP), CPS has focused research questions on specific, anticipated data outcomes with high potential for industry adoption at key points across the supply chain.

To successfully fulfill the expectations for funding by CPS partners, CPS encourages principal investigators to secure committed industry collaborators to help identify research objectives and assess anticipated outcomes.

Produce safety research priorities were identified after solicitation of input from the produce industry, government agencies and academic stakeholders. In addition, reviews of previously funded CPS grants and research outcomes were utilized to identify existing knowledge gaps. Lastly, research priorities have been reviewed by the CPS Technical Committee to assemble this 2020 RFP. Applicants should note the following:

- Core produce safety research priorities cut across all fresh produce commodities, in production, packing, processing, cooling, storage, transportation, receiving and point-of-sale environments.
- Research projects that identify *solutions* as opposed to further defining a problem are strongly preferred.
- CPS prioritizes funding for short-term, applied, practical, and knowledge gap–filling projects with direct application to industry practices. A smaller portion of CPS research funds are generally allocated to longer-term fundamental research and proof-of-concept projects exploring novel solutions of broad interest to the industry and to better inform public health agencies. The opportunity to find practical, commercial applications should be considered (e.g., take regulatory approval, cost, etc. into account).
- Preference is given to research teams that have, or can establish, collaborations with industry members.
- For 2020, the research priorities are provided as the focal point for program needs but are not intended to preclude submissions on topics within the broadest context of produce safety. CPS is open to suggestions outside the scope of this RFP, if the researcher can make a compelling case that there is an urgent industry need *and proposed solution* that the Technical Working Group overlooked.

The CPS 2020 RFP research priorities are listed below and guidance is provided on the following pages.

1. Growing
    a. *Cyclospora* control
    b. Co-existence with animal agriculture
2. Harvest
    a. Cleaning and sanitation of harvest equipment
    b. Cleaning and sanitation of harvest bins/containers
3. Postharvest Receiving, Staging and Cooling
    a. Staging practices
    b. Water quality in cooling
4. Packing and Processing
    a. Water quality in packing and processing
    b. Wash water validation
    c. Wash water antimicrobial monitoring
    d. *Listeria* management
5. Shipping and Distribution
    a. Temperature control
6. Retail and Food Service Handling and Use
    a. Produce environment

1. Growing
    a. ***Cyclospora* control**: Previous CPS research has assessed the prevalence, persistence and transference of *Cyclospora* to produce during production. Two types of projects are desired. First, we seek research aimed at **controlling** this parasite. What are the most effective chemical and physical methods (e.g., UV, antimicrobials) to reduce or eliminate *Cyclospora* in agricultural water inputs (i.e., not wastewater) and/or the produce growing environment? Under what real-life conditions does the organism become infective or "die off"? What interventions – biological, chemical, physical or social – might be employed to reduce or eliminate infectivity on the produce or during harvest (spray applications, treatments, etc.)? Second, we seek research that evaluates the effectiveness of methods (chemical, physical, and biological) that are commonly used in the treatment of wastewater. Determining the prevalence of *Cyclospora* in treated wastewater and/or municipal water sources is of interest, if combined with one or both of the research areas identified above.

    b. **Co-existence with animal agriculture**: Recognizing that a variety of factors will influence the risk of contamination of fresh produce grown in proximity to animals, we seek research (field based or modeling) that evaluates the conditions under which various sized particles that could carry pathogens (dust, manure, etc.) may travel. In 2019, CPS presented three awards for biomarker tools. The use of these or similar tools in field studies is encouraged. Field-based research should be at multiple locations, surveying a radius around various animal operations (beef, dairy, swine, poultry) for the prevalence of pathogens at varying distances from the animal source, and using whole genome sequencing (WGS) on positives, to track movement of target microorganisms. These data, along with relevant metadata (e.g., relevant weather data preceding each sampling; wind directions and speed; conditions where the animals are kept, and concentrations of animals; presence of natural or man-made wind blocks; presence of insects, birds or other animals that can vector pathogens), can help produce growers make informed decisions about co-existence with animal agriculture.

    c. **Agricultural water** – On May 23, 2019 CPS Announced Request for Proposals for a Regionally Coordinated Agricultural Production - Water Treatment Baseline Program. Proposals are currently under review.

2. Harvest
    a. **Cleaning and sanitation of harvest equipment**: What are science-based strategies for cleaning and sanitation of harvest machines and equipment *during the harvest day*, which would be practical yet effective in preventing cross contamination? A protocol to assess harvest equipment risk points based on design or design in-use operations is desired, as well as how these risk points can help drive the frequency of periodic deep cleaning and/or equipment maintenance.

    b. **Cleaning and sanitation of harvest bins/containers**: How do a specific commodity and its harvest conditions influence the cleaning of harvest bins/containers? How do the commodity being harvested and the harvest conditions influence the potential for cross contamination of the produce? Are there pre- or post-use dry treatments that can be used to clean and sanitize bins or harvest containers? How would a dry cleaning and sanitation method compare to methods employing water-based treatments? What role does manual agitation play in impacting cleaning and sanitation?

3. Postharvest Receiving, Staging and Cooling
    a. **Staging practices**: Produce goes through a few transition points before entering a cooling and/or packinghouse facility. During this time, produce in bins, totes, or gondolas may be staged outside in open or covered sheds at ambient temperatures. Some operations use tarps to cover harvested product; others do not. There is little or no published information on how these various staging practices could increase food safety risk to the produce. Recognizing that microbial growth and transfer is possible in any of these scenarios, research is sought that evaluates the *relative* risk of

these approaches in multiple commodities so as to inform best practices related to staging specific produce commodities prior to cooling and/or packing.

b. **Water quality in cooling**: A number of different water-reliant mechanisms are employed to cool harvested produce. Recirculating hydrocoolers, ice slurries and hydrovacuum cooling are commonly found in different types of operations. With each of these mechanisms, the water (or the ice derived from water) has contact with the produce. What are the key water quality parameters that need to be monitored recirculating water in hydrocoolers, hydrovacuum cooling or icing applications? Are there commodity-specific or method-specific considerations for optimizing water quality and managing cross-contamination risks?

4. Packing and Processing
   a. **Water quality in packing and processing**: Water is used in the postharvest environment for transport of fresh produce (e.g., in flumes), washing, processing, cleaning and sanitation, and hand washing. When is water fit for use under the varying circumstances? We seek the development of a guide, based on a review of existing research, supplemented by new research, which will advise on the factors that must be considered (temperature, pH, dissolved solids, etc.) for different use cases.

   b. **Wash water validation**: Despite efforts to consolidate current science into a guiding matrix and framework for validation, verification, and critical monitoring standards for microbiological quality of aqueous produce cooling, transport, wash, or postharvest treatment, there remains an immediate need to address practical data-supported issues of process control. [Industry collaborator: Washington Tree Fruit Industry]

   c. **Wash water antimicrobial monitoring**: Meeting desired set-points and outcomes is harder to achieve for many commercial operations than bench-top testing would predict. Research is solicited that yields best practices for monitoring commercially available antimicrobials in fresh produce wash water (both fresh-cut and raw agricultural commodities [RACs]). The development of novel monitoring methods is not desired. The location of probes or samples that will be assessed in test kits should be evaluated, including (but not limited to) monitoring for hypochlorites, chlorine dioxide, ozone, and peracetic acid. The factors that impact location of sampling/monitoring, frequency, and the accuracy and precision of measurements should be described. The evaluation of new and /or novel antimicrobials is not desired. [Industry collaborator: Washington Tree Fruit Industry]

   d. ***Listeria* management**: Recognizing that *Listeria* can grow in many fresh produce environments, we seek research to understand the relative contribution of the factors that may turn an incidental, low-level, probably undetectable contamination into something much worse. Research that can inform which risk mitigation practices (zone separation, dedicated forklifts or pallet jacks, de-nesting, foaming, fogging, etc.) are most effective is desired.

5. Shipping and Distribution
   a. **Temperature control**: Temperature control *for safety* is a non-issue if produce is free of pathogens. However, recognizing that low levels of pathogens may be present, a combination of modeling and laboratory-based research is desired that will evaluate pathogen growth (starting with a low inoculum) under ideal and abuse temperatures, using 41°F (5°C) as a baseline for comparison. The impact of competitive microflora, seasonality, surface topography (including for fresh-cut items and RACs) and moisture should be considered in selecting a diversity of representative produce items to begin to elucidate when temperature control may or not influence risk.

6. Retail and Food Service Handling and Use
   a. **Produce environment**: What factors affect the microbiological environment of produce shelves that

are “misted” to prevent product dehydration? How often should these surfaces be cleaned and sanitized to prevent cross contamination, considering the variety of organisms (pathogens and competitive microflora) that may be introduced via produce or human handling?

Please check the Center for Produce website, www.centerforproducesafety.org for research priority updates