



Western US Leafy Greens Industry Research Priorities Survey



THE UNIVERSITY OF ARIZONA

Yuma Center of Excellence
for Desert Agriculture

INTRODUCTION

Leafy greens production in California and Arizona is a multi-billion-dollar industry that is critical to supplying the health and nutritional needs of the United States. To assure maximal productivity over the long term, this industry needs more research and outreach addressing pressing production challenges such as pest and disease pressure, water efficiency, degradation of soil quality, and human pathogen outbreaks. A consensus from the agriculture industry on high-priority research objectives, and direct action from university and government researchers and funding programs leading to the development and implementation of research projects, is fundamental to the goal of sustained leafy greens production. To this end, the Yuma Center of Excellence for Desert Agriculture (YCEDA) developed a survey to identify and prioritize focus areas for research based on industry feedback and reviewed the survey results with researchers to identify barriers that have prevented the objectives from being accomplished. This survey was distributed electronically to leafy greens industry

members in Arizona and California in February 2021 through YCEDA, industry organizations and Cooperative Extension.

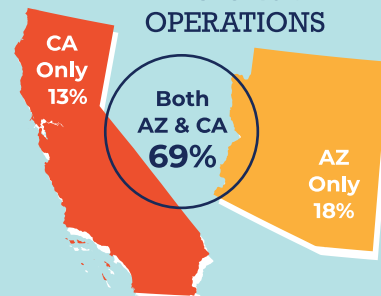
RESPONDENT DEMOGRAPHICS

A total of seventy-eight industry members responded to this survey. Of these respondents, 69% operate in both California and Arizona. Only a small percentage operate solely in Arizona (18%) or California (13%), and 45% of the respondents' operations are located solely in the desert growing regions. More than half of the respondents were growers (53%) and 27% of respondents represented shippers; multiple areas of the industry could be represented by a single respondent.

The grower respondents all grow lettuce, mainly conventional head and romaine (92%), 63% grow spinach, and 68% other leafy greens. Of these growers, 66% grow organic lettuce, 47% organic spinach, and 40% organic leafy greens. Growers reported a range of acreages farmed, for example conventional lettuce growers reported farming as few as 10 acres and as many as 10,000 acres. All data can be found online using the link at the end of this document.

78 PARTICIPANTS

REGIONS OF OPERATIONS



CROPS GROWN



KEY FINDINGS

When asked to rate the top three priority areas for research funding, plant disease management was the most selected topic (65%) followed by food safety (49%), and soil health management and mechanization (both at 37%).

65%



Plant
Disease
Management

49%



Food Safety

37%



Mechanization

37%



Soil
Health
Management

35%



Pest
Management

Q: What topics should be prioritized for research funding?

SUMMARY OF RESULTS



PLANT DISEASE AND PEST MANAGEMENT:

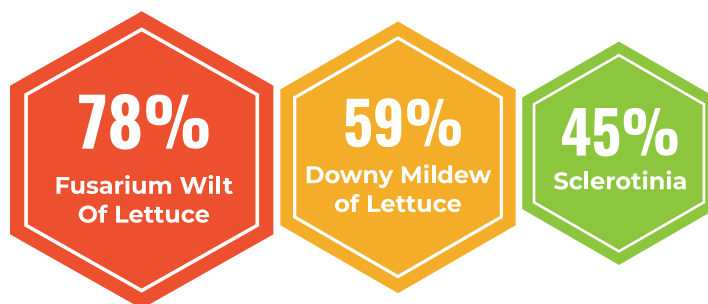
The most important diseases identified for more focus were Fusarium wilt of lettuce (78%), downy mildew of lettuce (59%) and sclerotinia (45%). After this survey closed, Impatiens Necrotic Spot Virus (INSV) and Pythium wilt of lettuce have had a serious impact on the industry in California, and INSV has shown up in the desert growing region of Arizona and California. The impact in the desert growing region was not economically significant in 2021, but it is unknown how the disease will impact the industry in the future. The industry is very concerned with INSV and Pythium wilt of lettuce, research on these diseases should be prioritized along with the other identified diseases.

Within plant disease management, the areas of research that the industry would like to see more focus on are breeding of resistant cultivars (73%), improving soil health for disease suppression (59%) and fumigation alternatives such as soil disinfestation (45%). These are all important areas of research that can help manage plant disease.

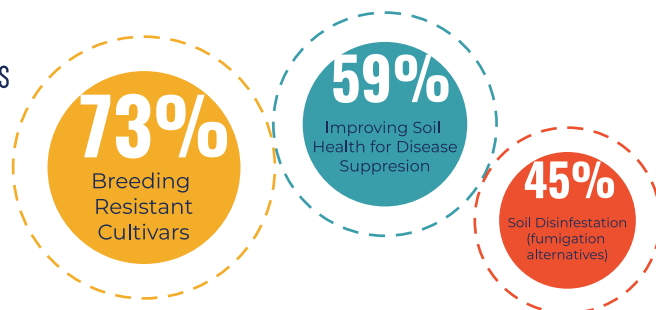
Pest management was also a high-priority area of research to the respondents. Thrips (70%) and aphids (68%) were the most important pests of concern. Thrips have become an even more significant pest of concern as thrips are the vector of INSV and the disease cannot be controlled without good strategies for controlling the vector.

For pest management, the development of resistant cultivars (61%) is again a top area in which the industry would like to see more focus followed by pesticide resistance management (49%).

Q: What top three plant diseases are you most concerned about?



Q: What top three areas of plant disease management need more focus?



Q: What top three areas of pest management need more focus?



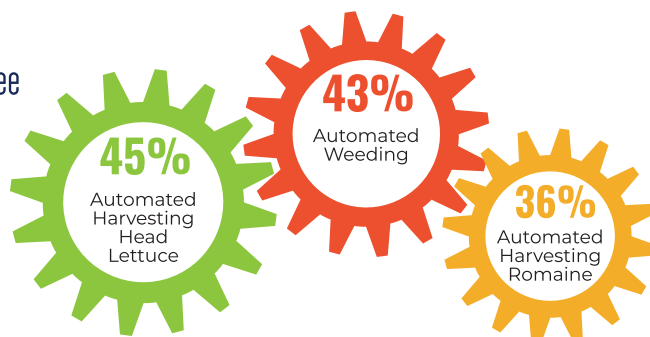
MECHANIZATION

Mechanization was prioritized for research funding to the same degree as soil health management (37%) and second only to plant disease management (65%). Mechanized harvesting of head (45%) and romaine (36%) lettuce and mechanized weeding of conventional leafy greens (43%) were most frequently selected. Mechanized weeding of conventional leafy greens was the most selected topic from desert respondents (52%).

SIDE NOTE

For many of the questions in this survey there was not a clear preference for one response. This is a logical result as the survey was developed to include questions about the known areas of importance to the industry. This also helps to show that the leafy greens industry is diverse, and concerns may differ by location, operation type, crop type, size of operation, etc. This survey was not able to parse the differences by operation type due to sample size.

Q: What are the top three areas of agricultural mechanization that need more focus?





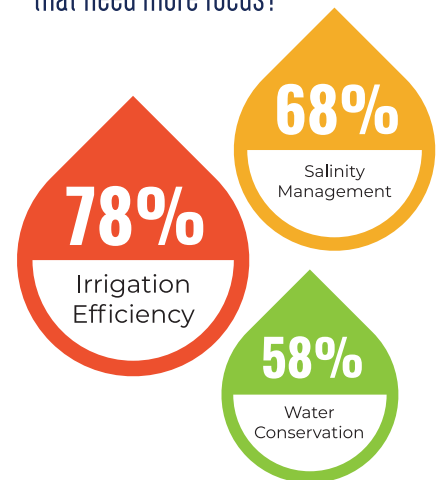
SOIL AND WATER MANAGEMENT

The industry is concerned with many areas related to soil health and this is reflected in the responses to the questions on soil health topics. Salinity management was selected most frequently (42%) as the top aspect of soil health that needs more focus, but several topics were selected nearly as frequently including integrated strategies for improving soil health (38%), the effects of water sanitizers on soil health (36%), the importance of soil microbial communities (35%), and soil health for nitrogen and other nutrient management (both at 30%).

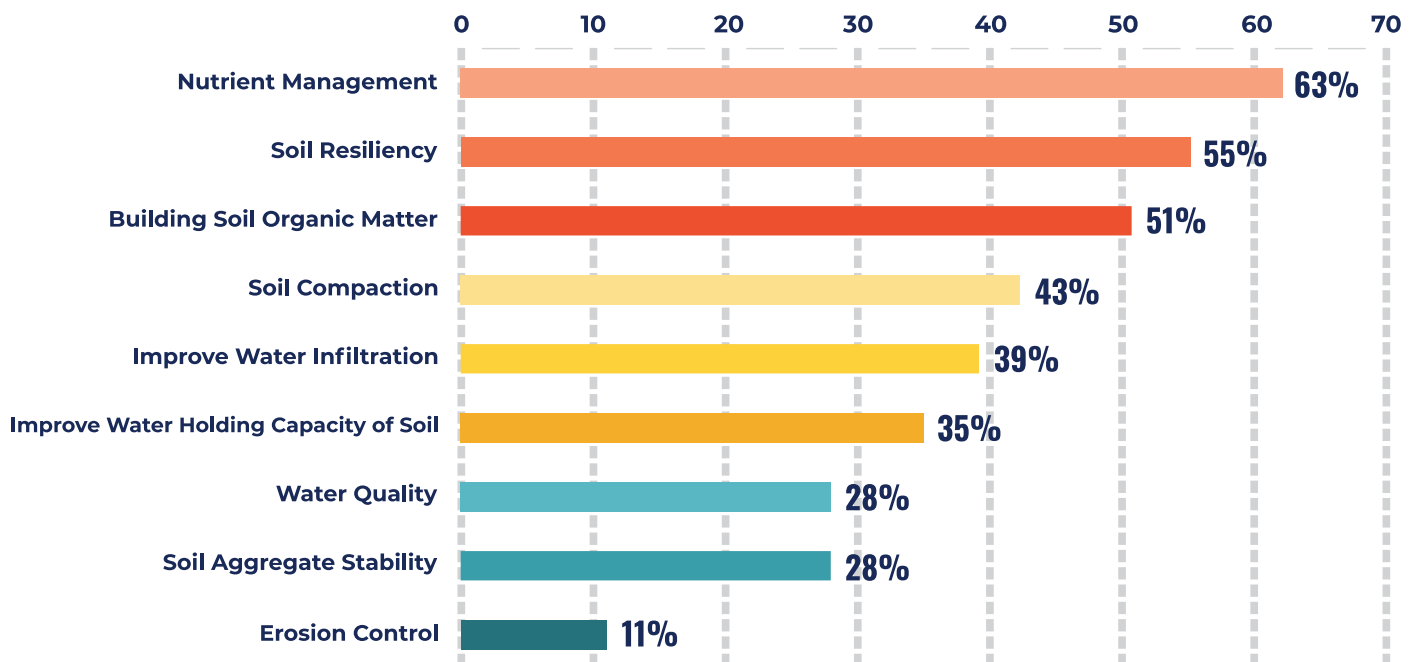
Under water management needs, salinity management was again an important topic. Respondents from desert growing regions selected it more often than the general response (79% versus 68%). Irrigation efficiency was most frequently selected as the area of research need by the general respondents (78%).

In our survey, a question was posed that is similar to a question from a recent Soil Health Nexus survey asking what the most important benefits of soil health are to the respondent. Overall the respondents indicated that a number of benefits were important, but nutrient management, soil resiliency and building soil organic matter were the benefits most often selected.

Q: What are the top three areas of water management that need more focus?



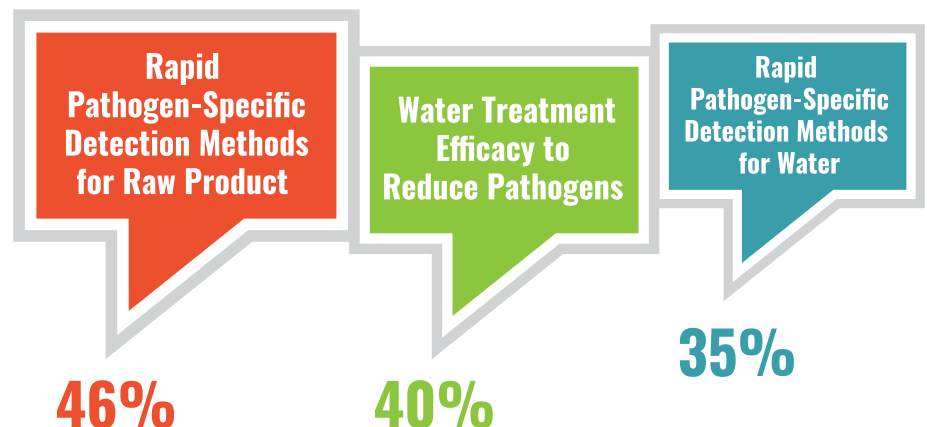
Q: In your opinion, what are the most important benefits of soil health?



FOOD SAFETY

Rapid pathogen-specific detection methods for raw product was selected most often by respondents (46%), but respondents considered most of the focus areas important. Water treatment efficacy to reduce pathogens (40%) and rapid pathogen-specific detection methods for water (35%) were among the top three responses. Desert respondents considered wildlife deterrents of higher importance (it was the third most important topic) than the general respondents, who rated it the seventh most important topic.

Q: What are the top three areas of food safety that need more focus?



DISCUSSION

Subject matter experts with experience conducting research for the leafy greens industry in California and Arizona were recruited to review the survey results and provide feedback on how to address the identified research needs. Reviewers were asked to answer the following questions: Are the identified focus areas currently being adequately addressed? Is there funding available to address research needs, and who should provide funding? Are there researchers in place to address research needs? If the knowledge exists, what is needed to provide the necessary outreach to the industry?

Several key barriers were identified:

- 1. A need for more highly skilled professionals**
- 2. Limited investments in research**
- 3. Support for outreach**

NEED MORE HIGHLY TRAINED PROFESSIONALS

Recall that under the plant disease and pest management topic, the need for resistant cultivars was the highest priority area identified for more focus. Reviewers mentioned that more plant breeders trained in cultivar development were needed as well as more cultivars developed by public breeding programs. Reviewers also indicated that molecular breeding techniques are the best method for developing resistant cultivars and some methods may be more acceptable to consumers.

Vacant positions are a contributor to the need for highly trained professionals. This was especially emphasized by reviewers responding to the plant disease and pest management sections. These positions include Cooperative Extension and other university positions that are important for supporting the industry. Collaboration between researchers from the various growing regions can help to fill knowledge gaps. More interactions through working groups was suggested.

INCREASE RESEARCH INVESTMENTS & PARTNERSHIPS

Funding was mentioned by almost all reviewers. Funding limitations affect researchers' ability to address research priorities. Support from both federal and state programs and from commodity groups has been reduced over the years. Building programs to address the most pressing challenges requires long-term support from

funding agencies.

Areas such as soil health require multi-year projects with multi-disciplinary teams. Building a strong team to address soil health is essential because this is a multi-disciplinary field where an individual researcher cannot adequately address soil health holistically. Adequate funding and funding opportunities are needed for cohesive, multi-disciplinary teams to be established and maintained over the long term.

Funding is also needed to build projects by gathering preliminary data that can be used as proof-of-concept. These data can be used for applications to larger funding programs. Commodity groups could make an impact in this area by investing in projects that support the project development stages.

Another way the industry can support research is by offering field sites for long-term studies. Field sites managed by the industry can lead to management methods that are well developed and easily adopted by growers. Field sites and funding opportunities are also important for demonstration plot trials used for outreach to increase grower adoption of management strategies.

Partnerships with industry are essential for research to address the pressing challenges of industry. Industry input should be solicited by funding agencies to develop research priorities, review project proposals and allocate funding. Many funding programs solicit industry input, for example, the USDA-NIFA Specialty Crop Research Initiative program solicits industry relevance reviewers to review proposals. Industry members should be encouraged to participate in these review processes. Partnerships between researchers and industry members are important as well. These partnerships can ensure that the research developed will adequately address industry needs and the results can

be utilized by the industry. Interactions between industry and researchers may need to be facilitated if opportunities do not often occur.

Funding for technology development may not be feasible for commodity groups, but these groups can provide partnership opportunities. Partnerships between the agriculture industry, technology companies and researchers are beneficial in bringing new technology into the industry. These partnerships will facilitate technology development or adaptation that addresses the most pressing needs and easily integrates into operations.

INCREASED FUNDING FOR OUTREACH

Respondents identified field days (62%) and workshops (56%) as the most useful outreach methods. Social media was the resource selected least frequently (4%). Outreach efforts vary by region and by area of research. Much of the deficiency in outreach is due to unfilled positions or nonexistence of positions. In some areas, such as food safety, more funding for outreach and tailoring outreach to specific operations will be beneficial to help integrate knowledge into industry operations.

CONCLUSION

This survey and report were developed to provide a focus on pressing challenges of the leafy greens industry. We hope this report helps to inform the development of research priorities and that researchers will use it to develop research projects relevant to the leafy greens industry. We appreciate the time and effort reviewers and survey respondents put into this process, the support from commodity groups for distributing this survey, and funding from a USDA-NIFA Specialty Crop Research Innovation Planning Grant.

FOR MORE INFORMATION

VIEW FULL SURVEY DATA AT:

<https://desertagsolutions.org/projects>

(click on Western US Leafy Greens Industry Research Priorities Survey)

AUTHOR CONTACT:

Stephanie Slinski -- sslinski@arizona.edu

☎ 928.782.5873

📍 6425 W. 8th St. Yuma, AZ 85364

💻 DesertAgSolutions.org

