Market Opportunities for Culturally Meaningful Seed and Food

2023-24 Stakeholder Summary Report

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EXECUTIVE SUMMARY

Food security requires consistent access to safe, affordable, culturally appropriate, and healthy foods that meet caloric and nutritional needs to support an active life. As one of the most important inputs for crop-based production systems, seeds are essential to food security. In addition to fulfilling sustenance needs, seeds and plants are also interconnected with cultural knowledge, practices, and traditions. However, in the United States, the dominant commercial seed industry has excluded cultural and regional aspects of agricultural production in favor of (bio)technological approaches such as genetically modified seeds and hybrid varieties (often referred to as "improved seed") with traits that may protect against pests and disease and produce higher yields but are also genetically uniform and often bred to be used with agrichemicals that cause harm to the environment and contribute minimally to diverse landscapes and diets. To enhance food security holistically, improved seeds cannot be the only ones available to growers. As we stress in this report, there is a need to enhance the availability of heirloom, organic, open-pollinated, and *culturally meaningful seeds:* seeds with deep histories and stories, reflecting deliberate selection and adaptation that has occurred over long periods of time and that hold significant cultural meaning. Yet, while culturally meaningful seeds have long been (and are currently) produced by farmers and seed growers at small scales around the world, these growers are often disconnected from one another and lack profitable market opportunities that would enable them to spread their seeds to more growers.

This technical report emerges from data collected during a three-year collaboration between the Ujamaa Cooperative Farming Alliance (UCFA) and the University of Vermont (UVM) on a research project funded by Northeast Sustainable Agriculture Research and Education entitled "Culturally Meaningful, Regionally Adapted Seed: Making the Ujamaa Cooperative Farmers Alliance Market Ready." The research used surveys and focus groups with seed-to-food value chain stakeholders, including farmers, gardeners, seed companies, restaurants, food distributors and processors, and grocers. The purpose was to ascertain interest in growing and selling culturally meaningful seeds and food. The data provide important insight for the development of marketing opportunities for culturally and regionally relevant seeds and serve as a knowledge base for organizations interested in expanding pertinent seed research and programs alternative to the conventional seed industry that highlight the cultural, economic, and social aspects of seed and food systems.

This report draws on data collected from 1,789 survey respondents comprised of seed-to-food value chain stakeholders across the United States as well as focus group participants (n = 31) from the Northeast U.S. Survey respondents were emailed an online survey to answer questions related to the opportunities and bottlenecks for culturally meaningful seed and food supply, demand, and marketing. Data collection occurred between October 2023-January 2024. We also conducted a series of focus groups with six seed-to-food value chain stakeholder groups and used those data to complement survey findings for this report.

Key findings include the following:

- Cultural meaning as a seed/food trait was found to be important among respondents, though not as important as other qualities.
- Supply uncertainties exist for culturally meaningful seed/food.
- Culturally appropriate marketing was found to be difficult for seed companies but less so for downstream seed-to-food value chain stakeholders like grocers.
- Consumers lack familiarity with culturally meaningful seed/food.

- Culturally meaningful seed and food are viewed as more than market goods, as they also provide community, cultural, and culinary ties.
- Seed-to-food value chain stakeholders desire to strengthen their connections with others along the chain.
- To amplify culturally meaningful seed/food in the market, increased policy support and multi-stakeholder partnerships are necessary.

Our aim through this report is to inform decision-making regarding the cultivation of genetically diverse, culturally meaningful seeds and the development of improved marketing opportunities for growers, seed sellers, and end users of culturally meaningful seeds and food.

TABLE OF CONTENTS

INTRODUCTION

The Problem

In the last half-decade, the global seed industry has increasingly consolidated, resulting in just four companies controlling 51% of global seed sales.[1] As profit-seeking entities, these companies embrace (bio)technological approaches (i.e., hybrid and genetically modified (GM) varieties) for just a handful of crops. As a result, the vast majority of cropland in the U.S. (approximately 64.7%) is planted with just three crops: corn, wheat, and soy, 90% of which are GM varieties.[2] The homogeneous landscape of crops in the U.S. is just the latest manifestation of a dominant narrative within international development that global food security can be best addressed through scientific approaches to develop high-yielding varieties, which has come at the cost of losing many locally-adapted and traditional crop varieties. While the availability of calories has dramatically increased since the mid-20th century through this approach, global crop diversity has eroded.[3] With this loss of diversity, the ability to breed new varieties that are resilient to environmental challenges has also suffered. Major initiatives including the Sustainable Development Goals and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services highlight the loss of germplasm (the material needed for plant breeding (e.g., seeds)) as a significant threat to global food security and biodiversity conservation.

However, the negative effects of crop diversity loss are not only environmental. In its emphasis on homogeneity, the dominant seed industry fails to foster the preservation and development of seeds embedded with culture. In the Global South, farmers who maintain high levels of crop diversity often preserve biocultural heritage, which acknowledges that seeds and plants are biological organisms tightly connected to cultural knowledge, traditions, and agricultural and culinary practices.[4] In the U.S., among the most industrialized agricultural systems in the world, the cultural aspects of agricultural production have deteriorated significantly. Communities, and especially communities of color, lack access to crop varieties that provide a link to their ethnic identities and cultural backgrounds.[5]

Food security requires access to food that is not only calorically and nutritionally sufficient but also culturally acceptable. Given the limited availability of culturally meaningful (CM) crop varieties in the U.S. seed system, there is a critical need for targeted research, programming, and policy initiatives for CM seed. CM seed and food can be thought of as seeds that turn into crops that are associated with deep histories and stories, reflecting deliberate selection and adaptation that has occurred over long periods of time. Interacting with these seeds and foods is a way to connect with one's culture. Although different crops are culturally meaningful to different cultures and groups of people, many seeds and crops can nonetheless still be considered culturally meaningful.

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[1] Howard, P. H. (2023). Recent changes in the global seed industry and Digital Agriculture Industries. https://philhoward.net/2023/01/04/seed-digital/

[2] USDA NASS (2019a). *2017 Census of Agriculture Report: United States Summary and State Data. AC-17-A-51. Geography Area Series, Part 51*. Washington, DC: United States Department of Agriculture.

[3] Khoury, C. K., Brush, S., Costich, D. E., Curry, H. A., De Haan, S., Engels, J. M., ... & Thormann, I. (2022). Crop genetic erosion: understanding and responding to loss of crop diversity. *New Phytologist*, *233*(1), 84-118.

[4] Swiderska, K., Argumedo, A., Wekesa, C., Ndalilo, L., Song, Y., Rastogi, A., & Ryan, P. (2022). Indigenous peoples' food systems and biocultural heritage: Addressing indigenous priorities using decolonial and interdisciplinary research approaches. *Sustainability*, *14*(18), 11311.

[5] Grigsby-Toussaint, D. S., Zenk, S. N., Odoms-Young, A., Ruggiero, L., & Moise, I. (2010). Availability of commonly consumed and culturally specific fruits and vegetables in African American and Latino neighborhoods. *Journal of the American Dietetic Association*, *110*(5), 746-752.

The dominant seed industry, driven by profit, standardization, and uniformity, does not adequately support access to these varieties. Addressing this gap is crucial for maintaining global cultural heritage, fostering community identity especially among Black, Indigenous, and people of color (BIPOC), and ensuring truly comprehensive and just food security.

Our Approach

The Ujamaa Cooperative Farming Alliance (UCFA), incubated by the non-profit Steam Onward in 2021, is a collective of predominantly BIPOC growers dedicated to cultivating seeds and crops important for regional and ethnic cultural traditions. Its objectives include enhancing diversity in seed farming, creating opportunities to empower historically oppressed and marginalized communities, and expanding access to CM seed. Building upon the land-grant university mission which orients research around inquiries for the public good, the project team from the University of Vermont (UVM), which includes researchers, faculty, and students, works through partnerships (in this case with UCFA) to address contemporary food system challenges.

The region of focus for this project was the Northeastern United States, given that the project was funded by Northeast Sustainable Agriculture Research and Education (SARE). The focus group participants were from the Northeast[6] and the initial recruitment for the survey was within the same regional area before being expanded nationally. Two major avenues were used to reach study participants 1) email addresses were compiled through strategic searches of online databases and 2) using the research team's personal and professional networks, the survey was shared through online listservs, university master gardener lists, and additional online lists of contacts. Once adequate survey responses were obtained from the Northeast, the geographic scope of the survey was expanded nationwide, reflecting UCFA's national-level reach.

This technical report is derived from the data collected during the three-year long collaboration between UCFA and UVM for the project entitled "Culturally Meaningful, Regionally Adapted Seed: Making the Ujamaa Cooperative Farmers Alliance Market Ready." With the broader goal of contributing to the amplification of CM seed in the U.S. food system, the perspectives of individuals across the seed-to-food value chain (see Figure 1) including seed growers, seed companies and retailer representatives, crop growers, wholesalers and distributors, grocers, and restaurants owners were solicited to acquire knowledge for the specific objectives of: a) ascertaining the opportunities and barriers to producing and marketing CM seeds, b) assessing end users' demand for CM seeds, and c) determining opportunities for programmatic support that organizations can provide to the seed-to-food value chain to enhance the availability and accessibility of CM seed.

[6] For this project, the USDA SARE definition of the Northeast was used, which includes Connecticut, Delaware, Maryland, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, West Virginia, and Washington, D.C.

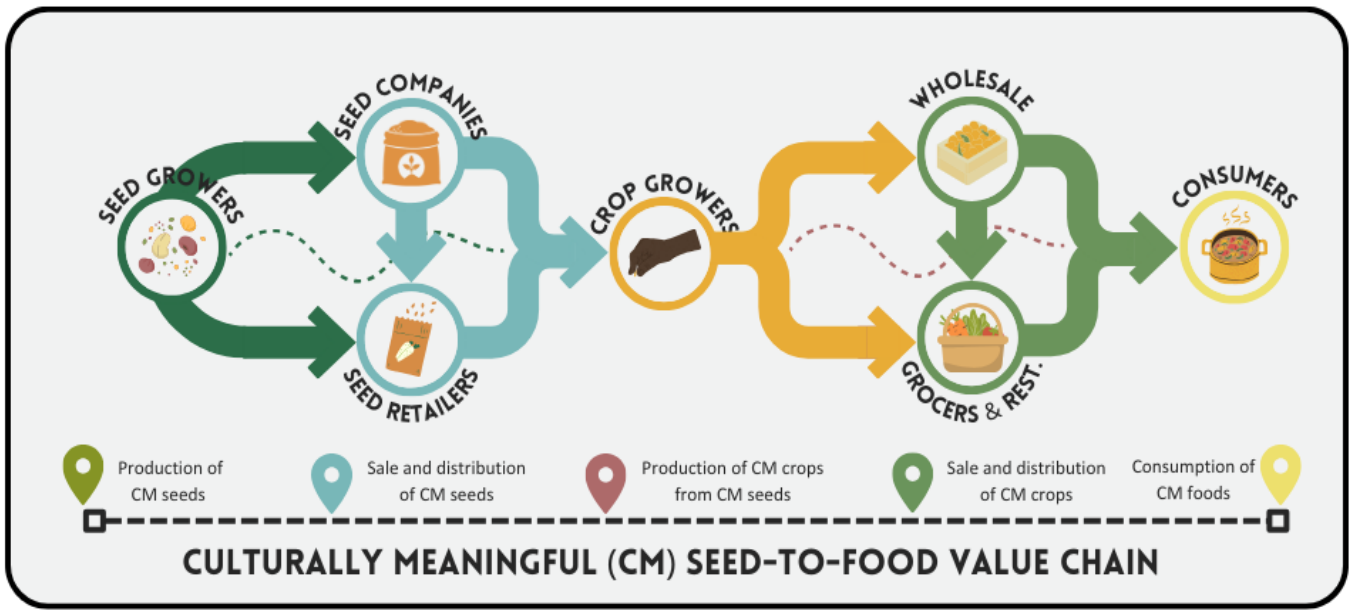

Figure 1. Culturally Meaningful Seed-to-Food Value Chain

Methodology

The findings of this summary report come from two main sources: focus groups with seed-to-food value chain stakeholders (n=31) and an online survey that sought to capture the opinions of a wider audience of the same populations of interest (n=1789).[7] Using a mixed-methods approach, findings in this report are presented together such that qualitative data are used to complement quantitative findings when possible.

Focus group meetings and discussions were conducted in Fall 2022, each comprising a different stakeholder group: UCFA growers (n=4), farmers and gardeners (n=3), seed companies (n=7), chefs and restaurants (n=9), specialty grocers (n=4), and produce wholesalers and distributors (n=4). Focus group participants were identified through existing networks and collaborations, with a focus on racial and ethnic representation and location within the Northeastern U.S. For each stakeholder group, we recruited from a list of potential participants that UCFA developed in collaboration with UVM and conducted recruitment until we had at least six participants for each focus group. However, some focus groups were conducted with fewer than six participants due to attrition. Each focus group was conducted on an online meeting platform and lasted between 60 to 90 minutes. The focus groups were facilitated by a UCFA project researcher who followed a standardized series of questions. Participants received a $50 gift card as compensation. Each focus group session was recorded and subsequently transcribed with participants' personal information de-identified prior to analysis.

Survey participants were purposively selected based on their seed-to-food value chain position (e.g., farmer, gardener, seed company representative, etc.), race/ethnicity, geographic location, etc. To reach farmers, gardeners, and seed companies, we made use of online listservs and e-newsletters managed by organizations such as the Northeast Organic Farming Associations, university Master Gardener program listservs, the Organic

[7] Lower case 'n' stands for sample size

Seed Alliance, Southern Exposure Seed Exchange, as well as other organizations supporting growers. To recruit BIPOC chefs and restaurants, we used websites such as Eat Okra and Yelp. We took particular care to reach out to organizations with an explicit mission to support under-represented populations (e.g., National Black Food and Justice Alliance and the Pocasset Pokanoket Land Trust), and we also relied on UCFA's personal and professional networks to increase representation of BIPOC individuals. Grocers, wholesalers, and other value-added food businesses (i.e., processors) were mainly identified through internet searches. Recruitment of all value chain groups occurred either through organizations' listservs and e-newsletters or direct emails to individuals, both of which contained a link to our online Qualtrics survey. The survey remained open between October 2023-January 2024 and took approximately 20 minutes to complete. Survey questions focused on how the market viability of CM seed can be enhanced to strengthen the availability of CM seed. All responses were confidential, and participation was entirely voluntary. Respondents could opt into a raffle to receive one of fifty $100 gift cards; any personal information that was collected for the raffle was de-identified from survey responses.

The summary findings of the focus groups and survey are presented below. We first detail the sample in the next section before describing the findings related to perceptions of respondents regarding important farm, seed, and food characteristics. The subsequent three sections are the responses from tailored questions relevant to each specific sector of the seed-to-food value chain: seed companies, farmers and gardeners, and downstream actors (produce wholesalers and distributors, restaurant chefs and managers, and specialty grocers). In these sections, we integrate findings from focus groups to gain a more complete and nuanced understanding of survey findings. The subsequent section assesses the connectivity that each stakeholder group has across the value chain before we discuss the findings and provide recommendations for future directions for research and programming.

DEMOGRAPHICS

The survey received responses from individuals across the United States (Figure 2), with representation from all states except three (WV, WI, and WY). The greatest number of respondents came from the Eastern U.S. and more specifically the Mid-Atlantic and Northeastern regions, explained by our initial emphasis on the Northeastern region due to the project scope.

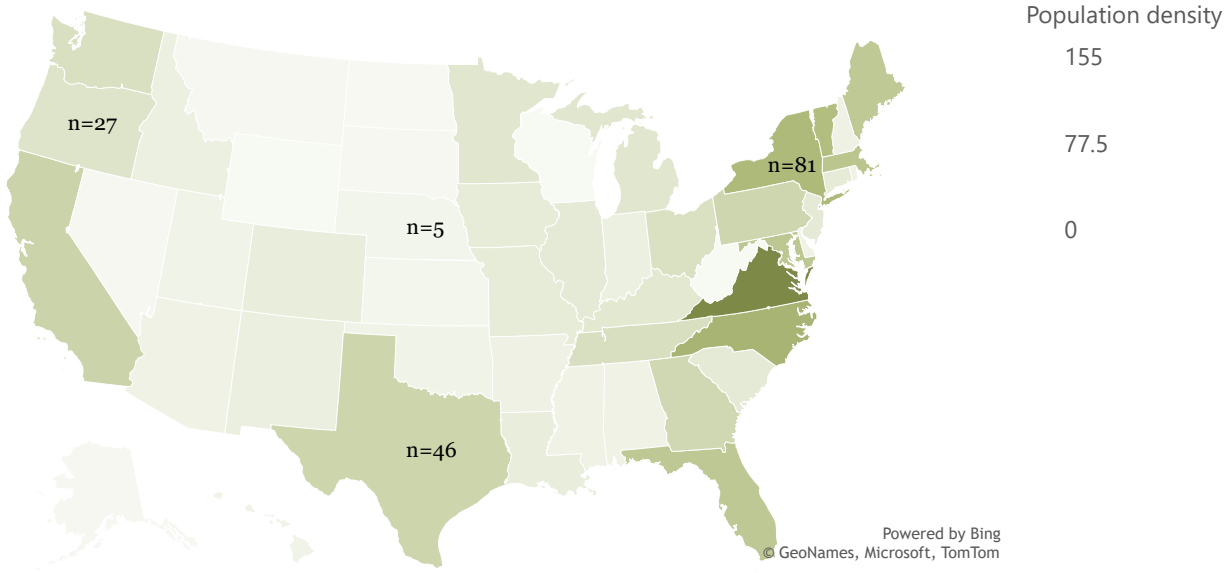

Figure 2. In which U.S. state do you current reside? (n=1313)

Approximately 20% of individuals who responded to the survey identified as BIPOC, when combining those who indicated that they were Black/African American, American Indian or Alaska Native, Hispanic/Latine, Asian, and Native Hawaiian or Pacific Islander, or mixed race (Figure 3). Despite our considerable efforts to recruit BIPOC individuals to participate in the survey, the under-representation of BIPOC respondents suggests broader challenges, including a lack of trust that continues to exist within communities of color towards research institutions and government agencies. Thus, in the effort to pursue community-engaged research with communities of color, more attention to building greater collaboration and trust is necessary.

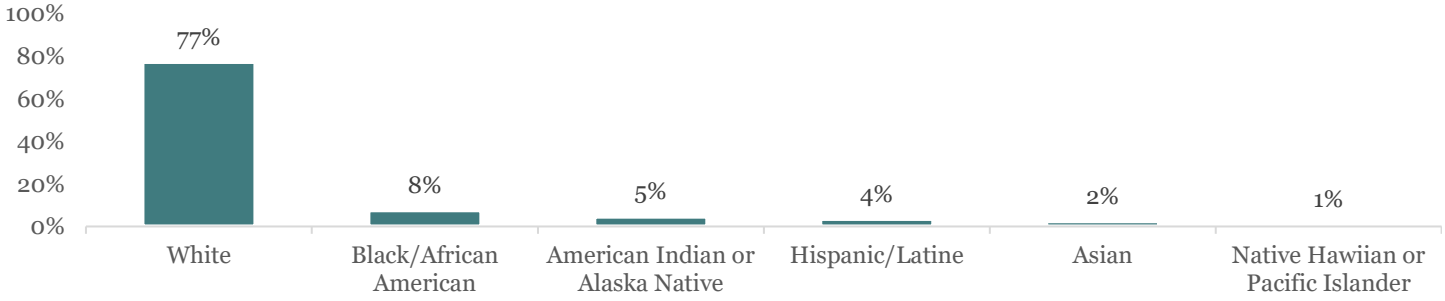

Figure 3. What race(s) or ethnicity do you identify as? (n= 1497)

***Note:** Percentages do not add up to 100% because "Prefer not to answer" (8%) and "Other" (6%) were removed and a respondent could choose more than one response.*

To complement data on race and ethnicity – and to acknowledge that a person's identity is nuanced and complex - we also asked respondents to report their family's region of origin (Table 1). Considering that 77% of the survey respondents indicated they were white, it is perhaps unsurprising that the most common global region of origin was Western Europe (42%). Among respondents, 35% of individuals reported that their family came from North America, an interesting finding considering only 5% of the sample indicated being American Indian or Alaska Native. This may be explained by differences in the length of time since a family has immigrated and how people interpreted the question itself. In other words, it is possible that respondents whose families arrived (voluntarily or coercively) several generations ago may view their family as North American. In comparison, relatively few respondents indicated that their families came from continents outside of Europe, with West Africa (4%), the Caribbean (3%), and East Asia (3%) being the most common non-European regions of the world to which people reported having ties.

Table 1

Please select from all the places from which your family comes.

West Europe	42%	East Asia	3%	West Asia	1%
North Europe	35%	North Africa	3%	Australia	1%
North America	35%	South Asia	3%	Central Asia	1%
East Europe	22%	Central America	2%	Pacific Islands	1%
Central Europe	22%	South America	2%	New Zealand	0%
South Europe	13%	South Africa	2%	Prefer not to answer	7%
West Africa	4%	Central Africa	1%	Other	4%
Caribbean	3%	East Africa	1%		

Note: *Percentages do not add up to 100% because a respondent could choose more than one response. Colors correspond to geographic region.*

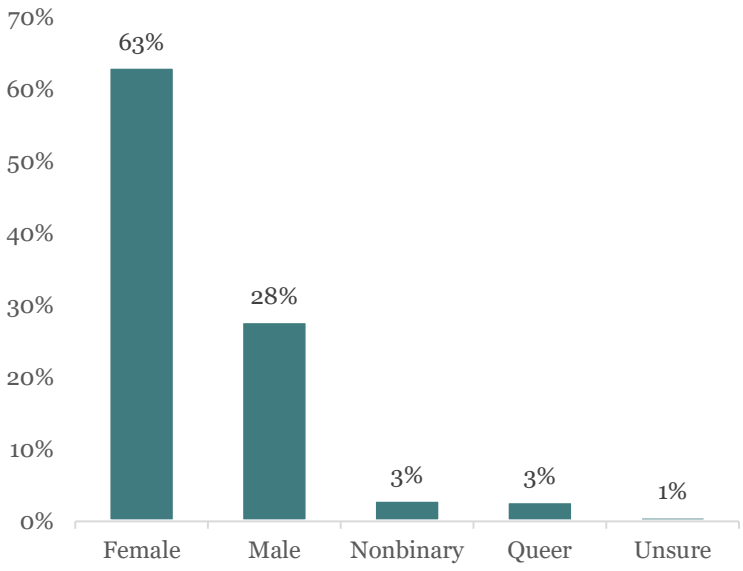

Figure 4. What is your gender identity? (n=1499)
Note: *Percentages do not add up to 100% because "Prefer not to answer" (5%) and "Other" (2%) were removed from the figure and a respondent could choose more than one response.*

Female respondents accounted for 63% of survey respondents, 28% identified as male, 3% identified as non-binary, 3% as queer, and 1% as unsure (Figure 4). Most respondents were 50 years of age and older, which adheres to demographic trends of farmers in the U.S. overall, demonstrating an aging population within the U.S. seed-to-food value chain. The relatively older age of respondents is in line with employment information we gathered, with 30% of respondents reporting being retired. That said, 48% were employed full-time (by an organization = 34%; self-employed = 14%), 23% were employed part-time (by an organization = 9%; self-employed = 14%), and 4% reported being either unemployed or not able to work.

Concerning educational achievement, Figure 5 shows that most respondents reported receiving some form of higher education or certification beyond a high school degree (91%), with a majority having above a 4-year degree (75%). The majority of respondents reported that their households made less than $99,999 per year (54%) (Figure 6). When respondents were asked whether they felt their household income was sufficient to meet basic living needs, 54% reported that it "fully" met their needs and 26% reported that their income "mostly" met their needs, while 14% and 3% reported that their income "barely" or did not at all meet their needs, respectively.

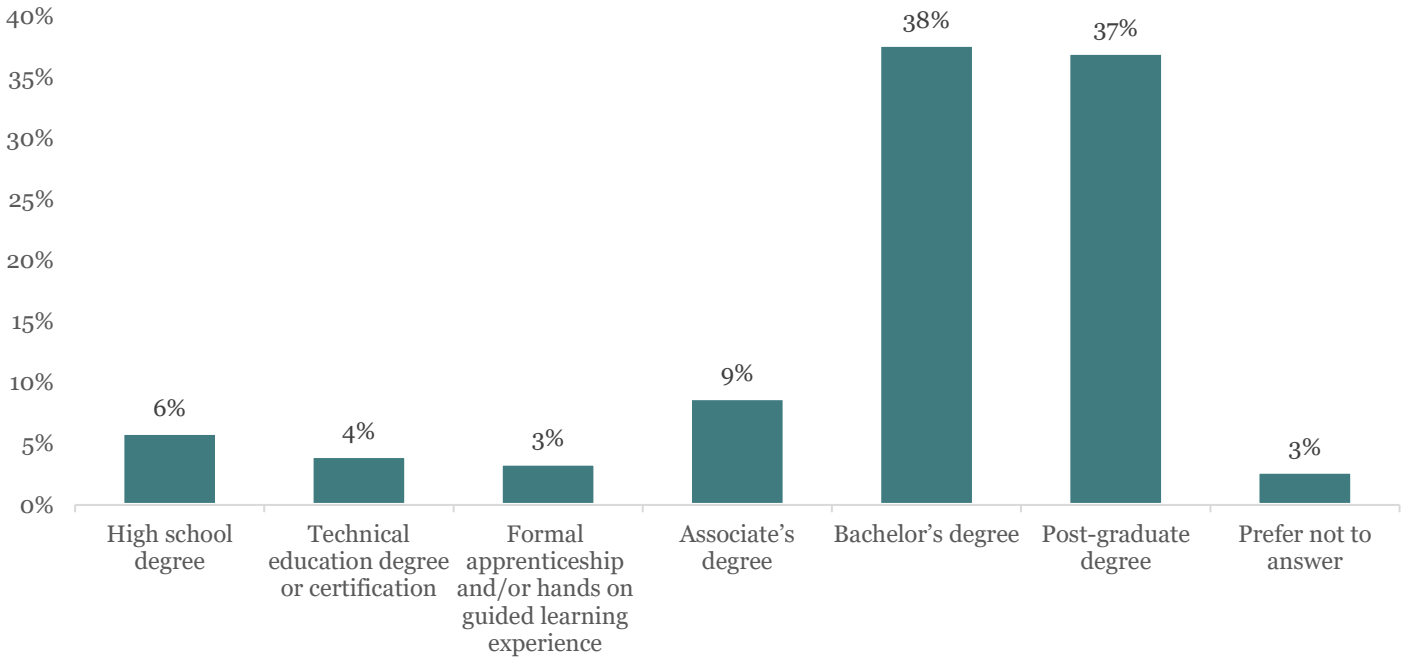

Figure 5. What is the highest level of education you have completed? (n= 1511)

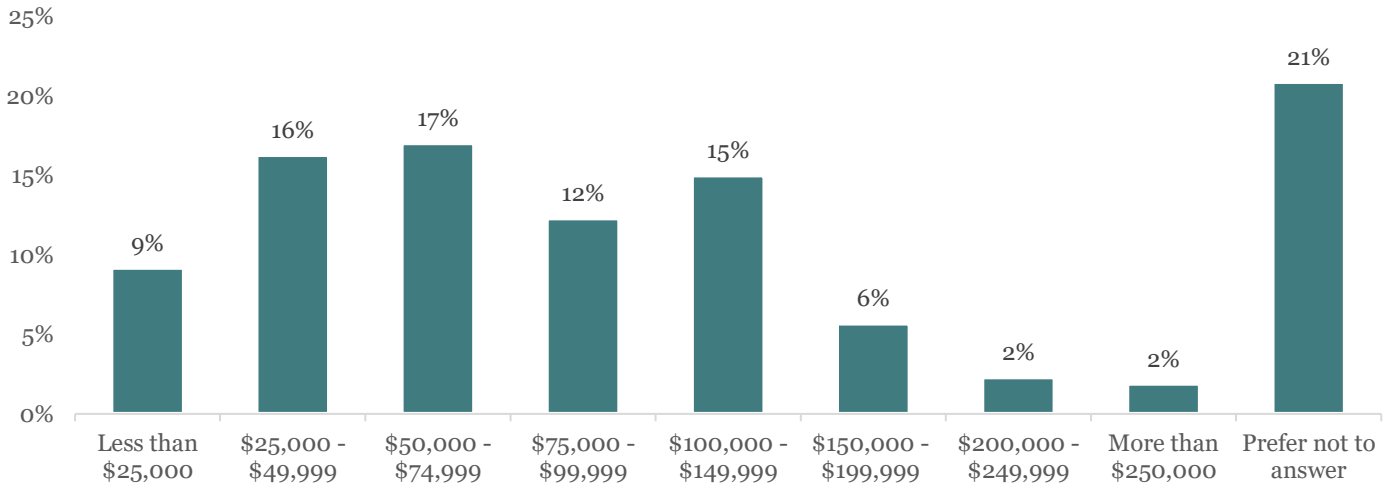

Figure 6. What is your current total annual household income? (n= 963)

Given that the primary aim of this research was to provide a comprehensive seed-to-food value chain analysis for CM seed, we sampled both upstream stakeholders (those who are actively involved in either the production, planting, or marketing of seeds (UCFA seed growers, farmers, gardeners, and seed companies)) and downstream stakeholders (those who use the products of seeds (i.e., food crops) but not the seeds directly (produce wholesalers and distributors, chefs and restaurant managers, and grocers)).

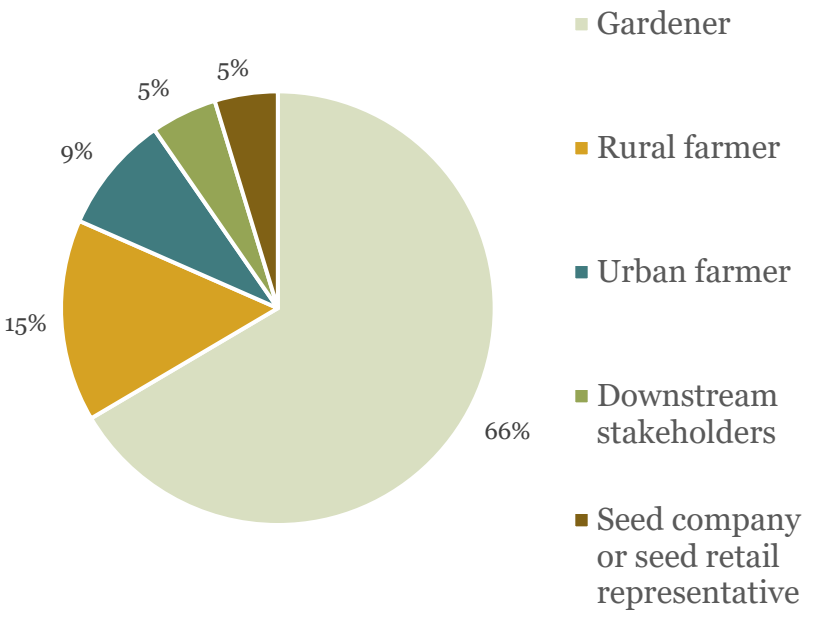

Figure 7. Which of the following best describes your position in the seed value chain? (n=1756)

Note: *"Downstream stakeholders" includes restaurant representatives (n=13), food distributor representative (n=16), value-added food business representative (n=17) and grocer representative (n=27).*

Within focus groups, our sample was relatively evenly distributed between upstream (seed companies, farmers/gardeners, and UCFA growers, n= 14) and downstream (chefs/restaurants, specialty grocers, and produce wholesalers/distributors, n= 17) stakeholders. In comparison, most of our survey sample was composed of upstream stakeholders (Figure 7), with gardeners alone accounting for 66% of respondents, and farmers accounting for another 24% of respondents. While farmers and gardeners were relatively less challenging to recruit due to the number of organizations and affiliations of which they are a part (such as university, non-profit, and other online networks), the other stakeholder groups presented more difficulty, as indicated by their low levels of representation among the entire survey sample. Fewer organizations and associations exist supporting downstream industry stakeholders, and those that do exist were typically not accessible or willing to support recruitment efforts. Future research that seeks a comprehensive value chain analysis in the food system will likely need personal and professional connections to downstream stakeholders and time to build those relationships to assure adequate sample sizes.

PREFERENCES FOR FOOD AND SEED

Given that the goal of this research is to ultimately contribute to enhancing market opportunities for CM crop growers and access to CM food for consumers, we collected data on food preferences to better understand if and how cultural meaning is an important characteristic that informs decision-making. Through a series of questions, we assessed the degree to which respondents valued various farm, seed, and food characteristics. When asked about the types of farms from which they preferred to source seeds, respondents most highly valued seeds that were produced on a farm using ethical labor standards, farms using environmentally friendly practices, and local and regional farms (Figure 8). Although sourcing seeds from a farm maintaining CM crops was the least important characteristic among respondents, 66% of respondents still indicated that it was either somewhat or very important, suggesting that while it may not be the highest priority among respondents relative to other farm characteristics, it nonetheless may contribute to their decision-making about what to source and from where. Common write-in answers included farms that grow heirloom crops (n=12), farms that use non-GMO seeds (n=12), and BIPOC-owned farms (n=9).

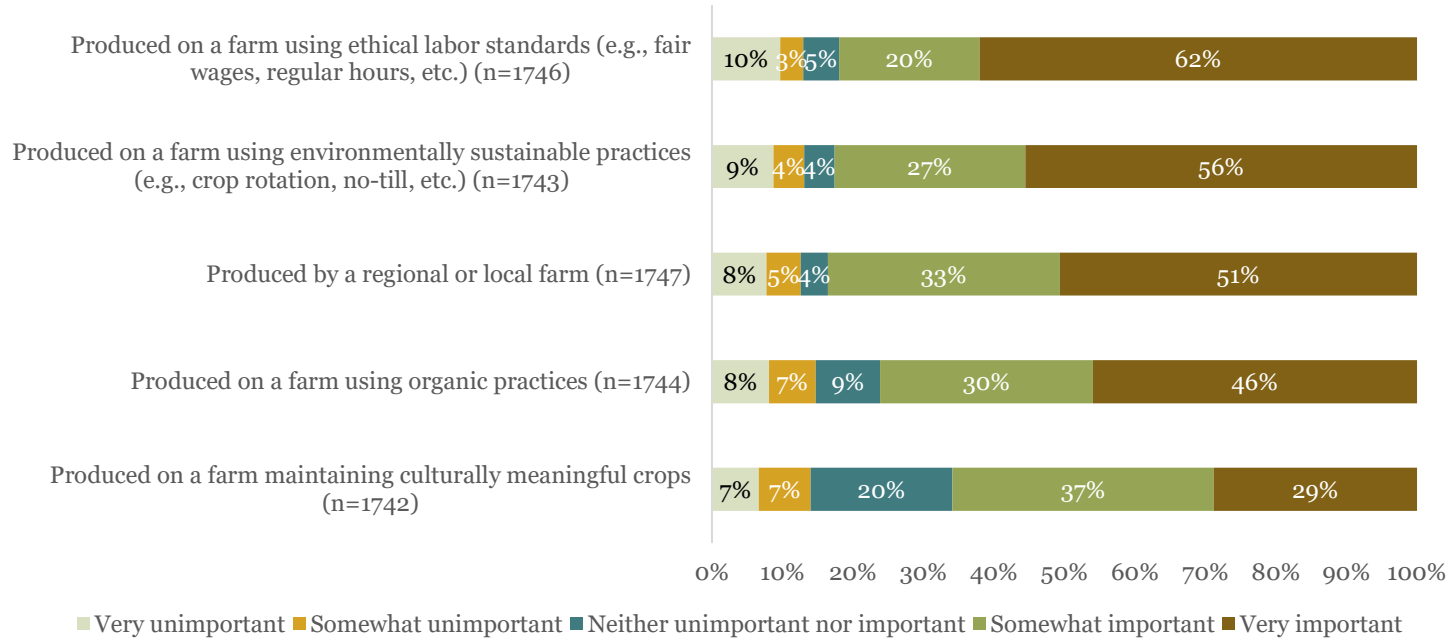

Figure 8. How important are the following farm characteristics to the foods you prefer to consume?

When asked about how various seed characteristics influenced preferences for food (Figure 9), respondents overwhelmingly indicated that seeds were most important to food quality, with all other response options lagging far behind in terms of respondent preferences. Still, over 50% of respondents indicated that the connections between seeds and place as well as family traditions were either very important or important, suggesting that elements of cultural meaning are relevant. Common write-in responses included regional adaptation (n=4), non-GMO (n=12), and respondents' connection with their local ecosystem and community (n=19).

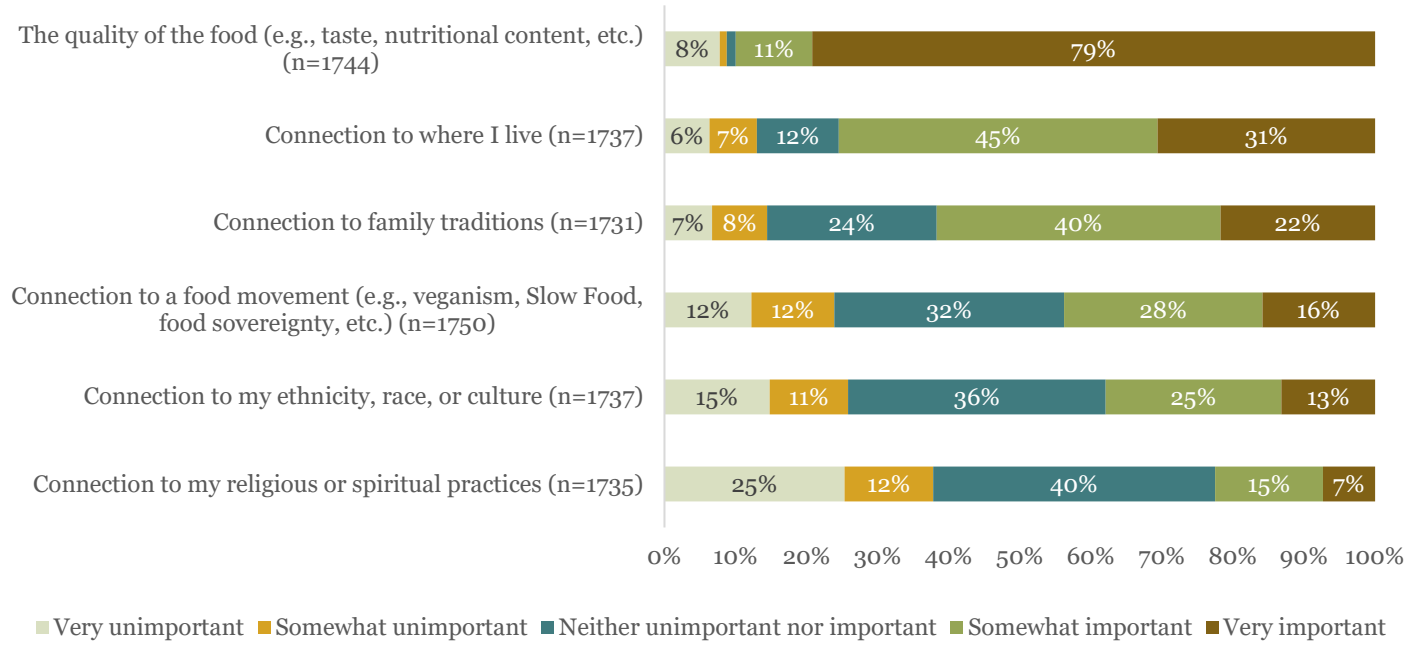

Figure 9. In considering the foods you prefer to consume, to what degree do you feel that the seeds from which those foods are grown are important to the following?

Accessibility to CM seeds appears to present a challenge, as respondents reported experiencing a high degree of difficulty accessing CM seed in locations close to them, with 72% reporting that finding CM seed in their neighborhood is somewhat or very difficult, 65% reporting difficulty finding CM seed in their towns or city, and 56% finding it difficult to access CM seeds in their counties (Figure 10). However, Figure 10 also shows that sources such as mail order catalogues and online websites are important outlets for CM seeds. For both sources, more than 60% of respondents reported that accessing seeds was very or somewhat easy.

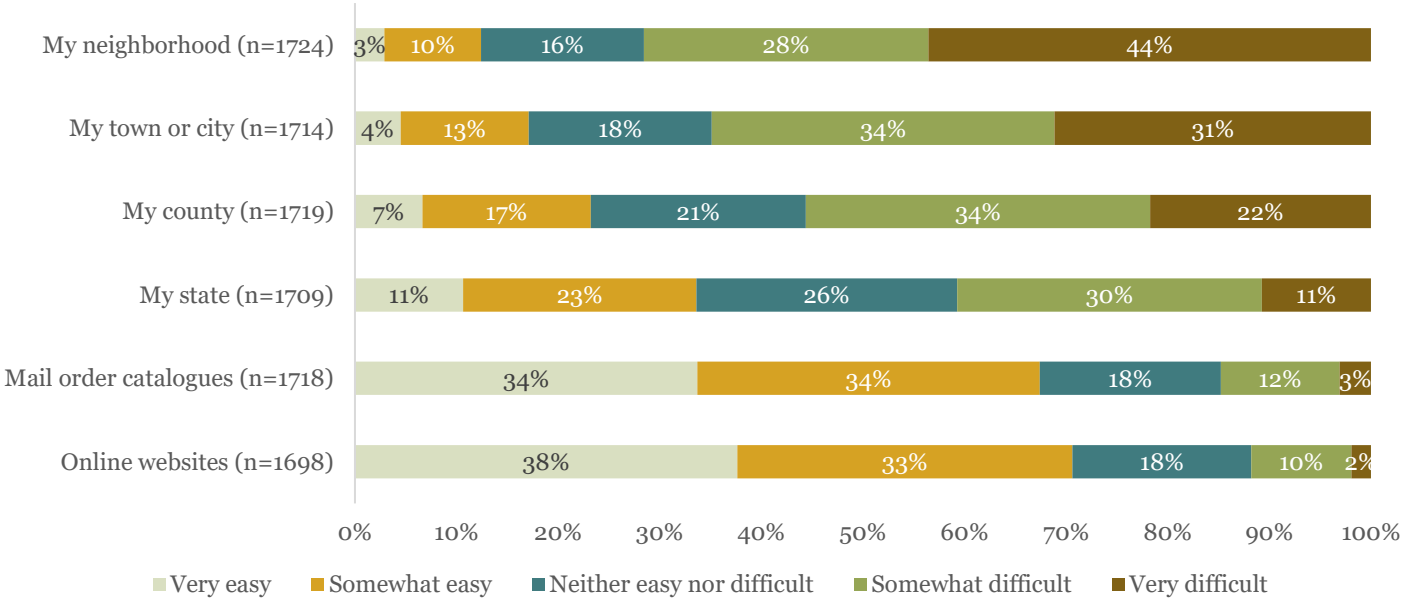

Figure 10. How difficult is it for you to find CM seed within….

SEED COMPANIES

In this section, summary findings of the questions to which only representatives of seed companies or retailers responded are presented. To contextualize the findings, it is important to note that the racial demographic of this group is 82% white. The survey responses were from 82 representatives (5% of the total sample, as shown in Figure 7) from seed companies or seed retailers (i.e., businesses such as garden or hardware stores that sell seeds from other seed companies).[8] We asked representatives to answer on behalf of their company, using questions about seed catalogue size (Figure 11) and annual revenue (Figure 12) to assess company scale. Overall, most of the seed companies in our survey were small-scale companies that focus on a diverse seed supply: 62% of the companies had fewer than $5 million in revenue in 2022 but 70% offered more than 100 crop varieties in their seed catalogue.

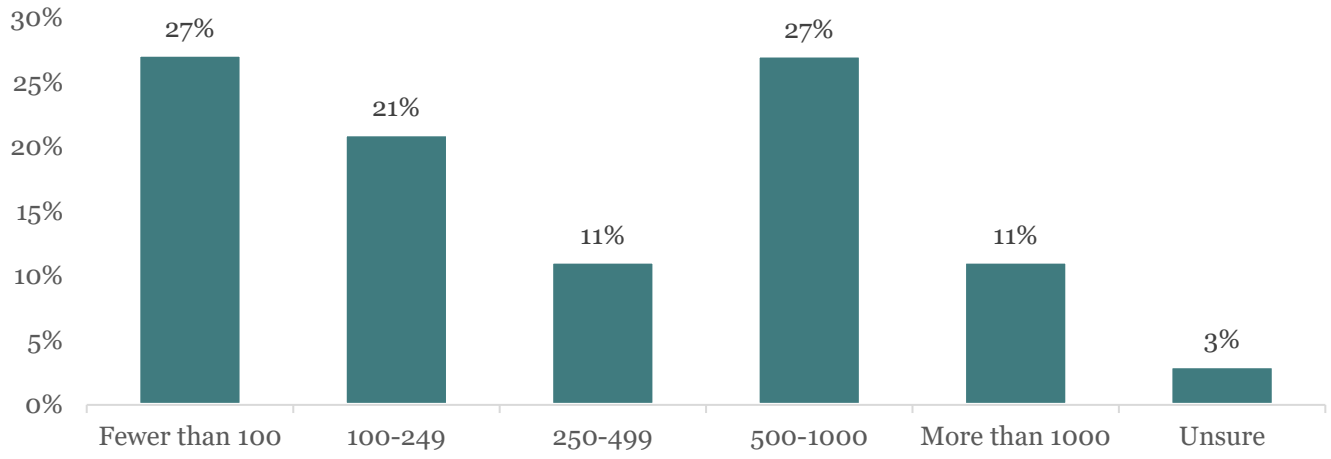

Figure 11. Considering the seed company/retailer you work for or represent; how many total varieties of seeds are offered in the company's catalogue? (n=81)

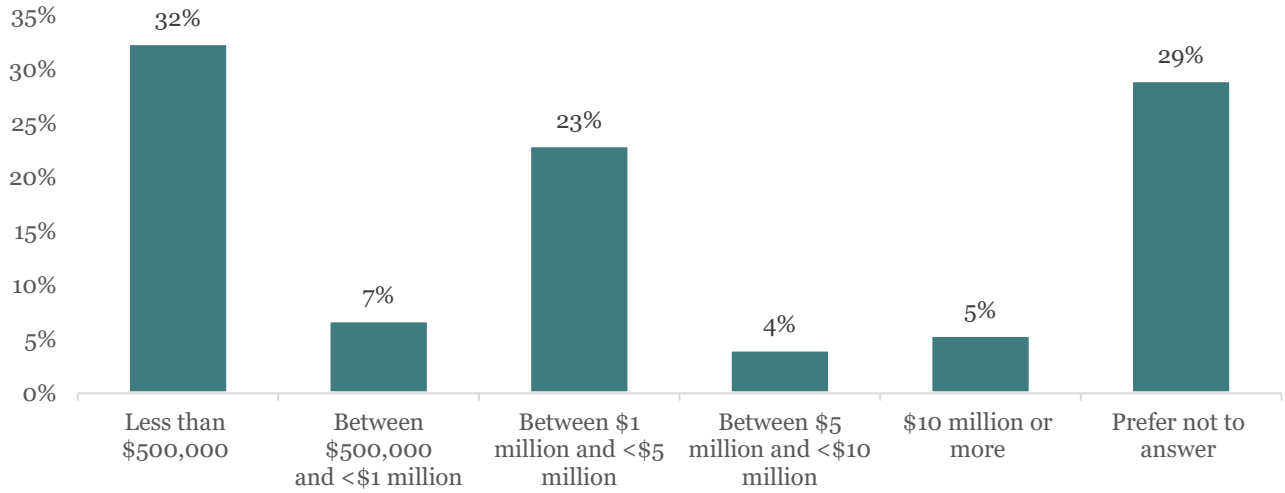

Figure 12. What was the 2022 annual revenue for the seed company/retailer you work for or represent? (n=74)

[8] Although responses in this section are from both seed company and seed retailer representatives, we refer to both as seed companies throughout for ease of reporting.

In terms of the types of seeds that companies sell, most sell heirloom (81%), hybrid (67%), and open-pollinated seeds (65%) (Figure 13). We note that the emphasis on heirlooms and open-pollinated varieties – and the relative lack of GM seeds – among the companies in our sample signals that these companies represent alternatives to the multinational seed and agrichemical corporations at the core of seed industry consolidation.

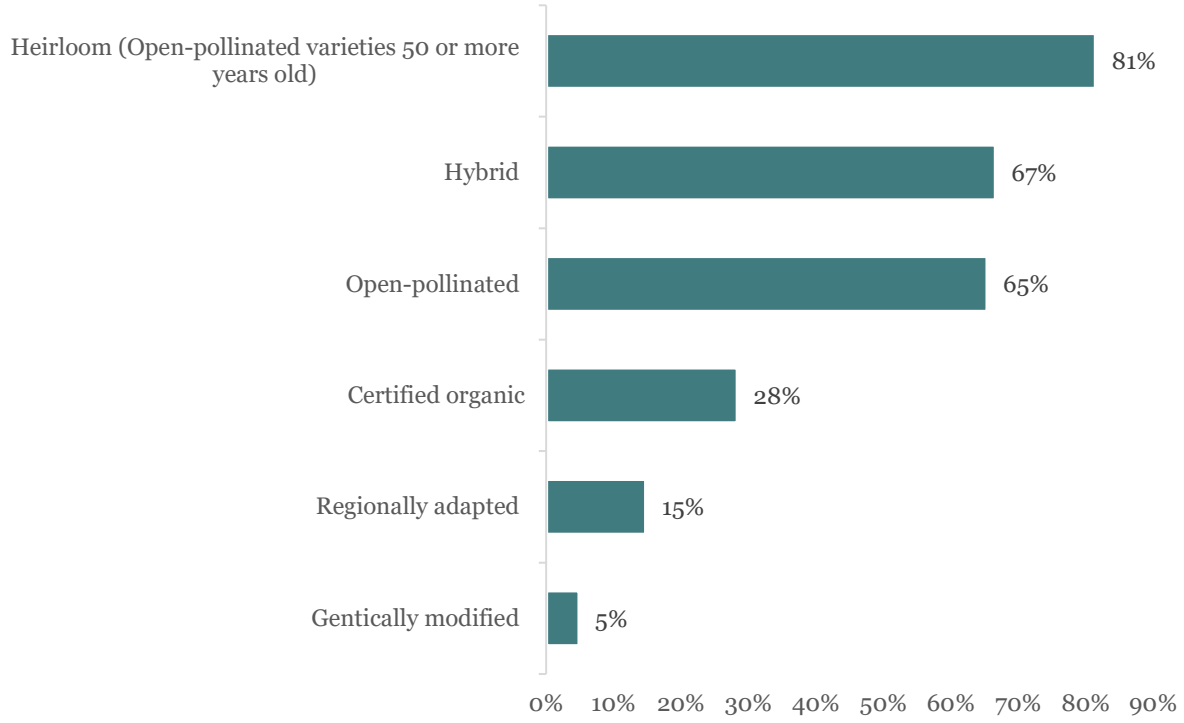

Figure 13. Among the seed types listed below, please select up to four categories that contribute the most to the seed sales of the company/retailer you work for or represent. (n=81)

We also asked about the typical customers who purchased seeds from the respondents' company (Figure 14). The responses also point to small-scale companies catering to small-scale growers: 66% of seed companies noted

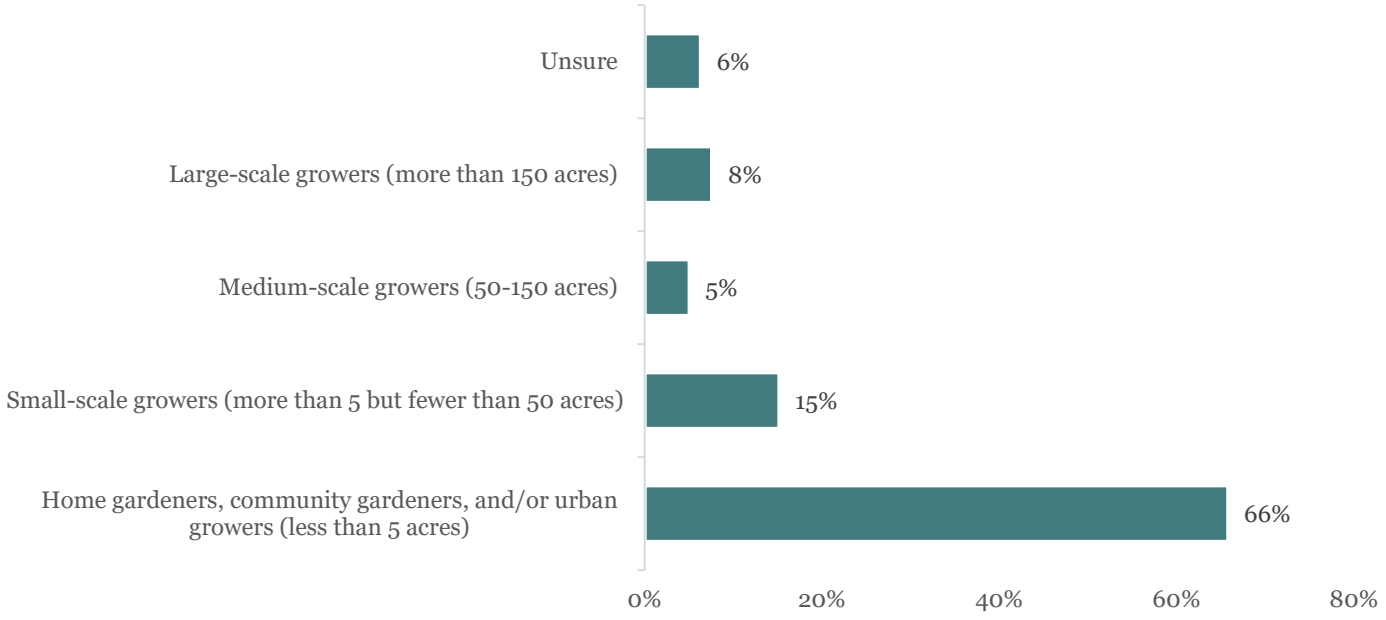

Figure 14. Considering the seed company/retailer you work for or represent, which of the following best describes the largest contingent of the company's customer base? (n=79)

their largest customer base as home gardeners, community gardeners, and/or urban growers who are cultivating less than 5 acres.

The influence that a customer base of small-scale farmers and home gardeners has on the offerings of a seed company were revealed by one focus group participant representing a seed company: *"...most of our customers are home gardeners. And I think that many when they decide in their limited space, what they're going to grow, they're choosing things that are, especially good, fresh, and eaten straight off the plant."* Based on these findings from seed company representatives, we can infer that CM seed fills a niche market not likely to be embraced by the industrialized agrifood industry. These types of smaller seed companies are presumably best suited to serve as partners for growers of CM seed interested in market opportunities.

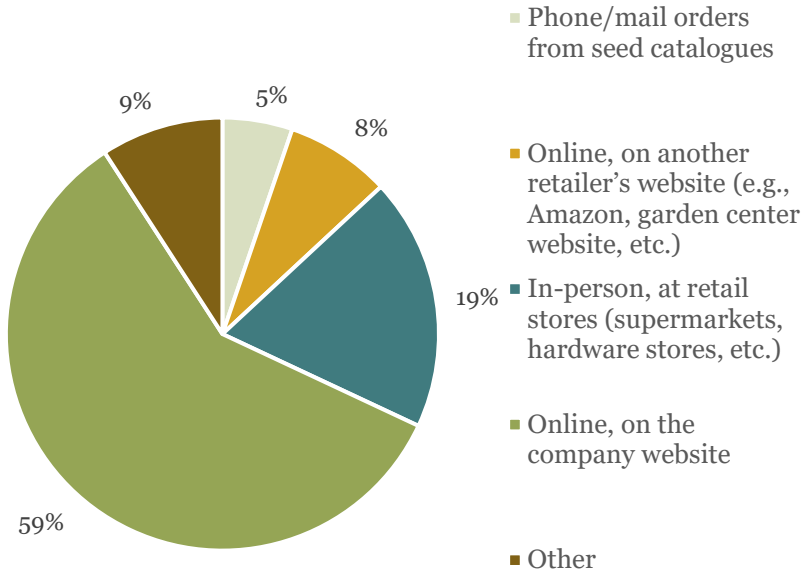

Figure 15. Considering the seed company/retailer you work for or represent, which of the following retail outlets contributes the most to the company's total seed sales? (n=81)

To consider how seed company customers typically purchase seeds, we asked through which outlet seed companies sold most of their seeds (Figure 15). Respondents reported that their companies mostly sell their seeds online via their company's website (59%), providing strategic insight into how CM seeds could be best distributed. Since seed companies are mostly selling via their company's website, online materials will be important to inform potential customers about CM seeds.

For growers of CM seed to successfully sell their seeds to seed companies, quality requirements and other preferences seed companies have for their seeds are important to consider. Seed companies overwhelmingly indicated that non-GMO seeds were most important to their company, with 70% noting it is very important (and an additional 10% indicating that it is important) (Figure 16).

In addition, flavor emerged as an important characteristic from the perspective of seed companies, with 83% of respondents marking it as somewhat important or very important. A seed company focus group participant remarked, *"I think quality and flavor is really important...you know, it has to taste good, and it doesn't really matter what all the other characteristics are of a variety if it doesn't taste good."* The challenges of environmental change were represented through the 76% of respondents who answered that both regional adaptation and climate resilience were either important or very important characteristics.

While non-GMO, flavor, quality standards, and resilience to environmental change emerged as the most important seed characteristics, we note that at least 50% of respondents indicated that each of the items they were asked about were somewhat or very important to their company. Reflecting the diverse range of seed characteristics in which the seed companies in our survey sample valued, a seed company focus group participant

explained the strategy of their company in experimenting with new varieties: *"...we always like to find things that are regionally significant...as well as just things that are a little bit unusual...different than most of what's on the market or happen to be, especially delicious, or especially easy to grow."*

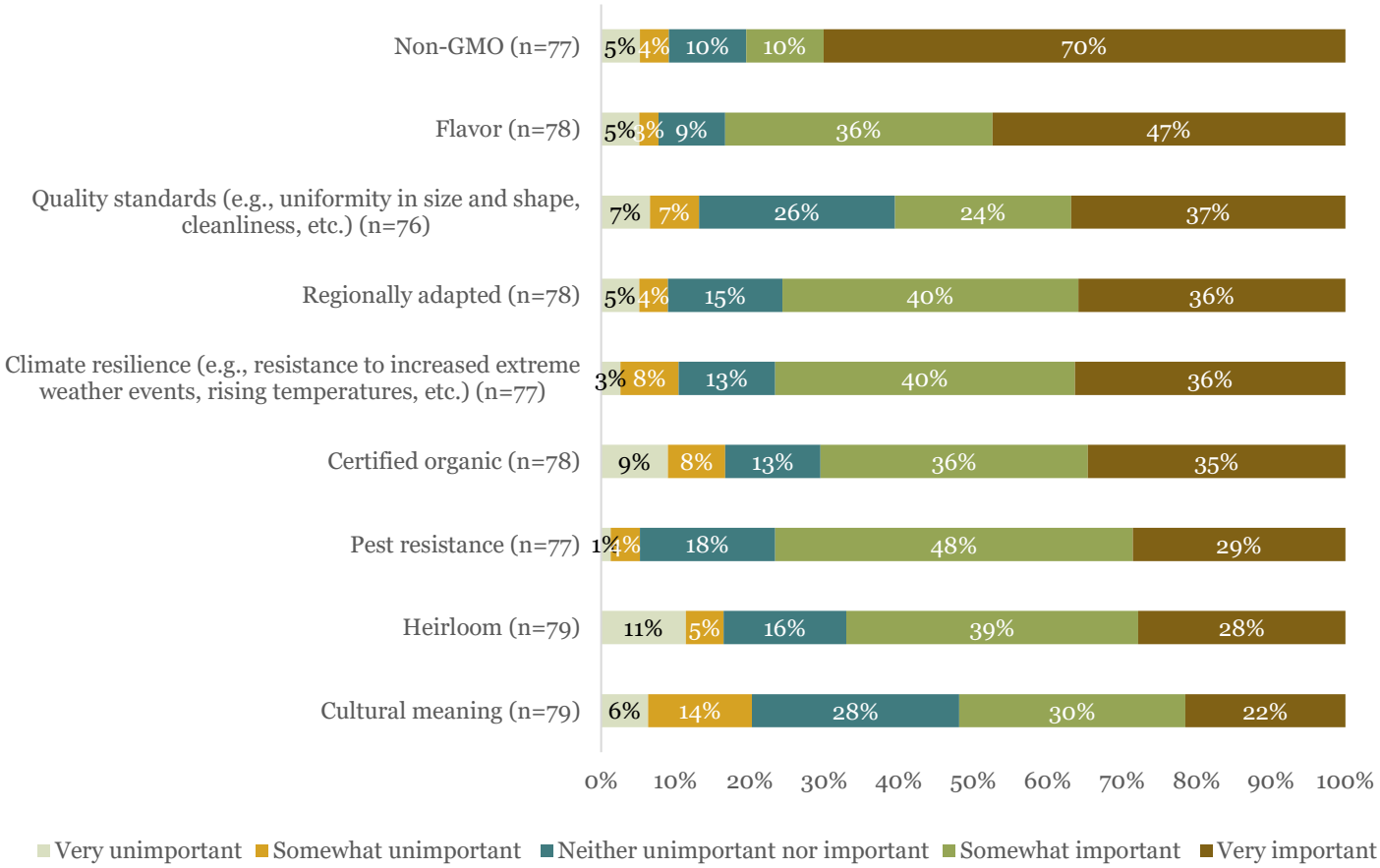

Figure 16. How important are the following seed characteristics to the company/retailer you work for or represent when making business purchasing decisions (e.g., buying seeds for your store/catalog, sourcing seeds from growers, etc.)?

Although cultural meaning was perceived as either important or very important among 52% of seed company respondents, it was nonetheless the characteristic that received the least priority. This likely reflects the under-emphasis of cultural meaning as a seed characteristic in the U.S. seed system and points to the need for awareness campaigns for seed companies and their consumers about the biocultural heritage of seeds. Despite the relative lower importance placed on cultural meaning by respondents, responses indicate that the majority of seed companies in our sample are already selling CM seeds (67%), and of the 23% that are not currently selling CM seeds, 71% of these companies are interested in beginning to sell them. The existing offerings of CM seed, coupled with the growing interest, suggests that cultural meaning can emerge as an important characteristic in the niche seed market.

For CM seed to become established in the marketplace, the challenges and opportunities seed companies confront in distributing CM seeds must be identified and addressed. As shown in Figure 17, seed company representatives reported various challenges to marketing CM seeds, with at least 40% of respondents indicating each category as moderately or very challenging. Seed company representatives noted selling and advertising CM seeds in a culturally appropriate way as particularly challenging for their company (79% and 69%,

respectively). This concern for engaging with CM seeds in an appropriate manner was also reflected in the seed company focus group, with one participant noting, *"...there's some varieties that I don't think have ever been sold in a big seed company way, at least. And I definitely don't want [my seed company] to be the ones always bringing new varieties like that to a market. [It] feels exploitative and, yeah, not our place...it's just tricky constantly."* This suggests a need for educating seed companies on appropriate practices for engaging with CM seeds prior to integrating them into the seed market. When seed company representatives were asked to consider their company's interest in amplifying its stock of CM seed during the focus group, they highlighted the difficultly of paying their growers a fair price for CM seed as a major barrier to offering more CM seeds and being able to scale up their CM seed options. One seed company representative remarked, *"... thinking about who the opportunities exist for in terms of, like, who gets to sell these unique culturally relevant seeds to seed companies...it's pretty hard to have a small-scale seed crop that's legitimately profitable in a meaningful way...it's our goal at [our seed company] to pay our growers as well as we can... But it is really hard."* Survey respondents shared this sentiment, with 36% indicating that increasing pay for the seed growers that supply their company was a high priority (Figure 19). However, offering affordable prices to customers was a higher priority for seed companies (high priority = 46%), shedding insight on a key focal area – potential profit squeeze should seed companies both pay CM seed growers fairly and maintain affordable prices for CM seed customers – that will need to be addressed for CM seed to become market viable.

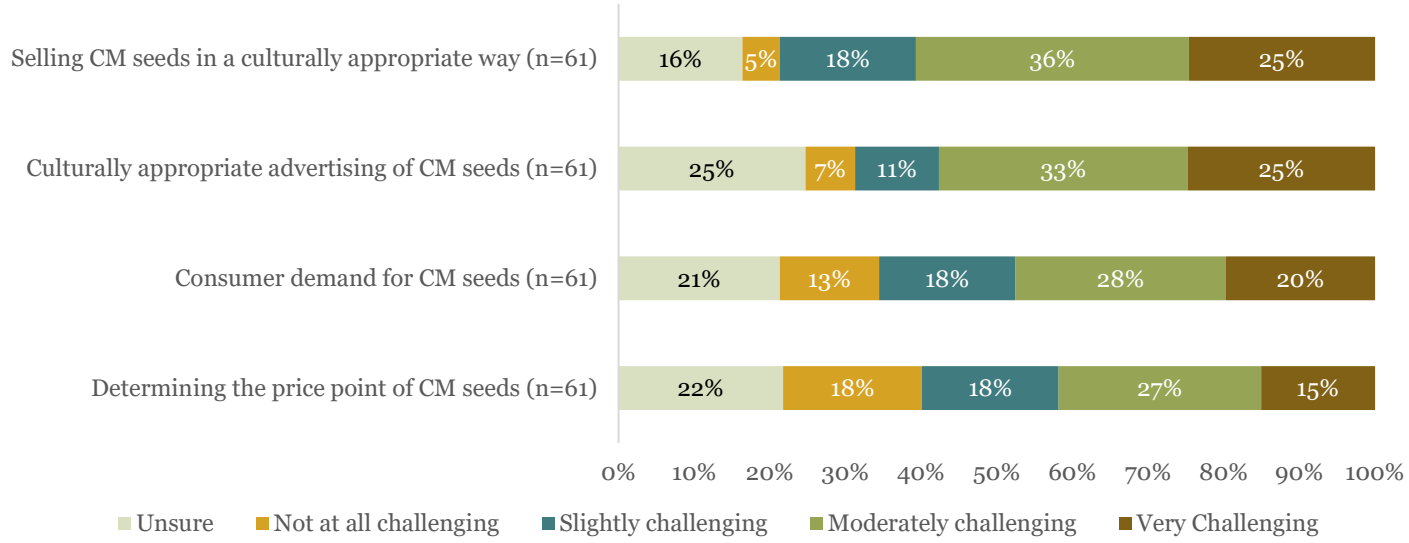

Figure 17. When thinking about marketing CM seeds, how challenging would you rate each of the following for the company/retailer you work for or represent?

In terms of potential opportunities to expanding CM seed offerings, seed company representatives indicated that a wide range of resources would be helpful, with over 70% of respondents indicating that each item would be somewhat or very helpful to their company (Figure 18). Opportunities to directly interact with growers of CM seed was highlighted as the resource that would be most helpful (somewhat or very helpful = 82%). In the seed company focus group, one participant expressed the desire to strengthen relationships with CM seed growers: *"...we could help to make things available and well known if...the people who have that cultural importance with the seed were on board and partners...not just agreeing but partners. But then, is that ever appropriate? Could that have the risk of being, you know, exploiting people? I think so."*

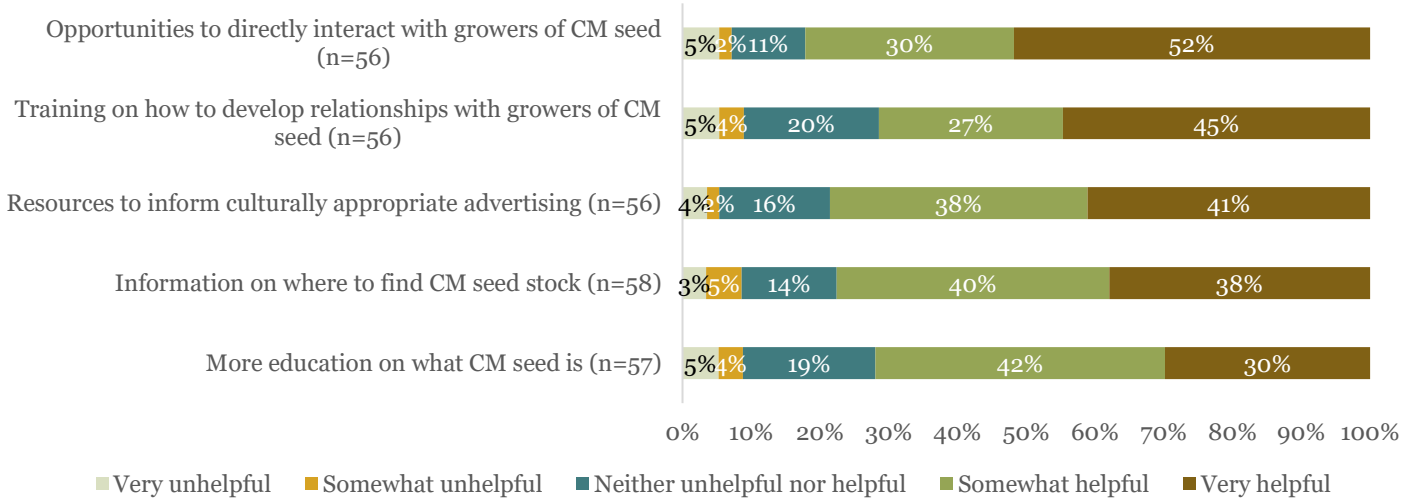

Figure 18. To what extent would each of the following be helpful to the company/retailer you work for or represent in expanding its offerings of CM seed?

Based on the findings, it appears seed companies have a complicated relationship with CM seeds: they understand their importance but worry about marketing and selling them in a culturally sensitive way. Partnerships between CM seed growers and seed companies will be vital to enhance the market opportunity for CM seeds. However, when asked about future priorities for seed companies, respondents indicated that increasing the number of CM varieties offered and strengthening connections with BIPOC consumers and growers were the lowest priorities (Figure 19), further suggesting some wariness around investing in cultural meaning as a valuable market characteristic. Considering that increasing the number of regionally adapted varieties was perceived as the highest priority for seed companies across respondents (86% indicated this was a medium or high priority), plant breeding that attempts to integrate cultural meaning and regional adaptation may hold promise to increase interest in CM seeds among seed companies.

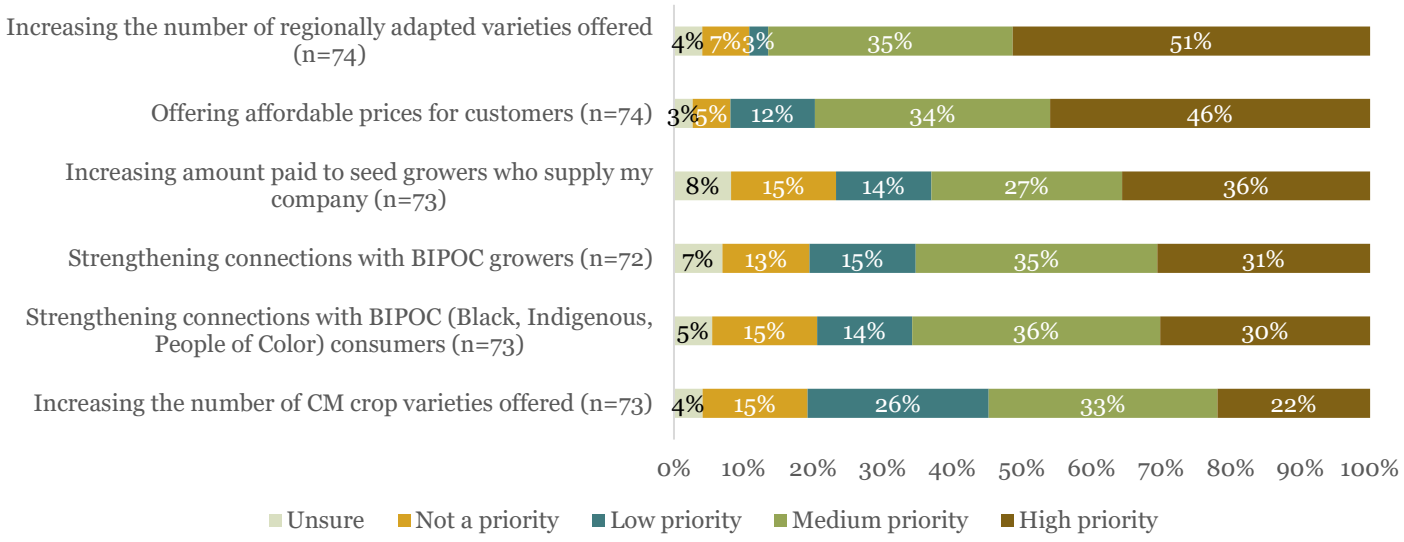

Figure 19. To what extent is each of the following items a priority for the company/retailer you work for or represent?

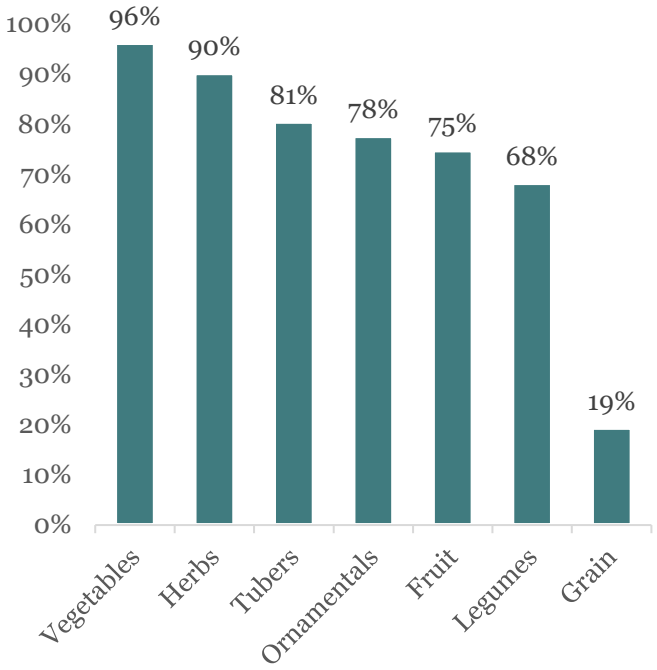

Figure 20. Which of the follow crops do you grow in your farm/garden? (n=1576)
***Note:** Percentages do not add up to 100% because "Other" (14%) was removed and a respondent could choose more than one response.*

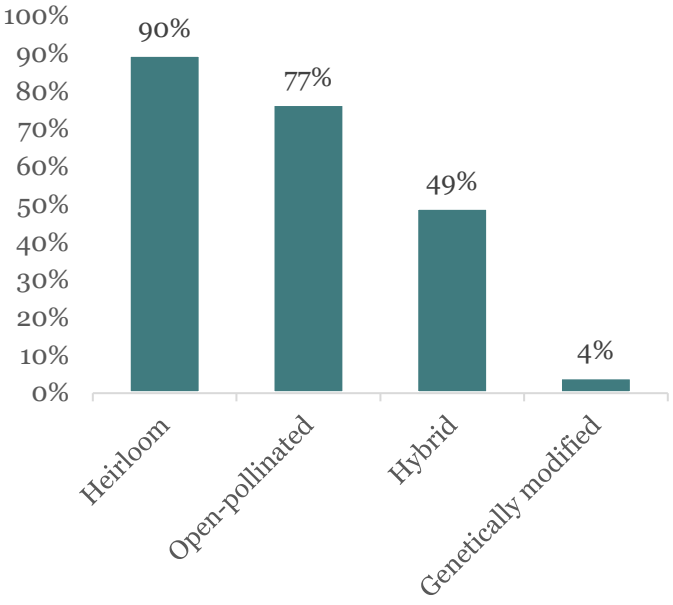

Figure 21. In terms of the seeds you source for your farm/garden, please select the categories of seeds that you most commonly use in a typical season. (n= 1573)
***Note:** Percentages do not add up to 100% because "Other" (12%) was removed and a respondent could choose more than one response.*

Approximately 82% of survey respondents were farmers and gardeners (n=1585), making it the largest seed-to-food value chain stakeholder group providing survey responses. Of these respondents, 40% reported coming from a multi-generational farming family, while 60% reported being first-generation growers.

Most respondents grow vegetables (96%), herbs (90%), tubers (81%), ornamentals (78%), fruit (75%) and legumes (68%) (Figure 20). Common write-in responses regarding crops grown included medicinal plants (n=23), nuts (n=22), mushrooms (n=16), and hay (n=6). When asked about growing practices, most farmer and gardener respondents indicated that their production is non-certified organic (82%) while fewer growers indicated conventional (14%) and certified organic (8%) agriculture as best describing their production. Common other responses for this question included regenerative (n=9), permaculture (n=6) and no-till (n=5) agriculture. What this illustrates is a sample of farmers and gardeners who are likely diversified in their production (in that they grow many categories of crops) and engaged in some form of sustainable agricultural production (though mostly uncertified).

In terms of the types of seeds most commonly used within our sample in a typical growing season, results indicate that a majority use heirloom (90%) and open-pollinated (77%) seeds, with others responding they use hybrid (49%) and genetically modified (4%) seeds (Figure 21). Responses to this question are well-aligned with those we received from seed companies when asked which types of seeds comprise the majority of their sales, with heirloom, hybrid, and open-pollinated seeds making up most of their seed sales (see Figure 13). Among those farmers and gardeners who responded "other" to this question (n=189), 53 individuals indicated they saved seed, 15 used organic seed, and 6 reported using landraces (locally-adapted varieties).

When asked about land access, Table 2 shows that more than 70% of respondents have fewer than 5 acres of land

available for farming. This makes sense, given that among our total sample, 66% are gardeners who typically grow on small plots of land. As one farmer focus group participant noted, *"the scale of a lot of growers who are interested in these [CM] crops is anywhere from like a quarter acre to up to two acres."* Gardeners and small-scale farmers thus may provide opportunities for expansion of CM seed marketing, especially considering the focus of the dominant seed industry on large-scale producers. In other words, small-scale growers who are often overlooked by large seed conglomerates likely constitute the critical group of potential CM seed purchasers.

Table 2

Land access

	Less than 5 acres	5 - 50 acres	>50-150 acres	More than 150 acres
Access to land for farming (total acres) (n=1033)	71%	23%	3%	3%
Total acres owned (n=911)	61%	30%	7%	2%
Total acres in production (2023) (n=836)	86%	11%	2%	1%

To ascertain obstacles to crop production that growers confront, we asked farmer and gardener respondents to assess a series of 13 potential barriers (Figure 22). Unpredictable weather (88% indicated as either a minor, moderate, or major barrier), long-term climate change (81%), lack of time (79%), and cost of inputs (63%) were most commonly identified as barriers to their farming and gardening. While reflecting on time constraints specifically as a barrier to the production of CM crops, one participant in the grower focus group explained, *"the characteristics of varieties that have cultural significance have been very difficult for growers to manage themselves, because most of these folks are working full-time jobs, they have families, and they do the farming the rest of the time. So, it's very hard to also save seed and be a plant breeder and a seed producer on top of that. So, I think a lot of hybrids can displace traditional varieties, just sometimes because folks are stretched thin…"* On the flip side, lack of social networks (40% indicated as not at all a barrier), access to tools/equipment (41%), and access to technical information (49%) were the items growers struggled with the least. Common write-in responses for this question included access to reliable labor (n=8) and age (n=7).

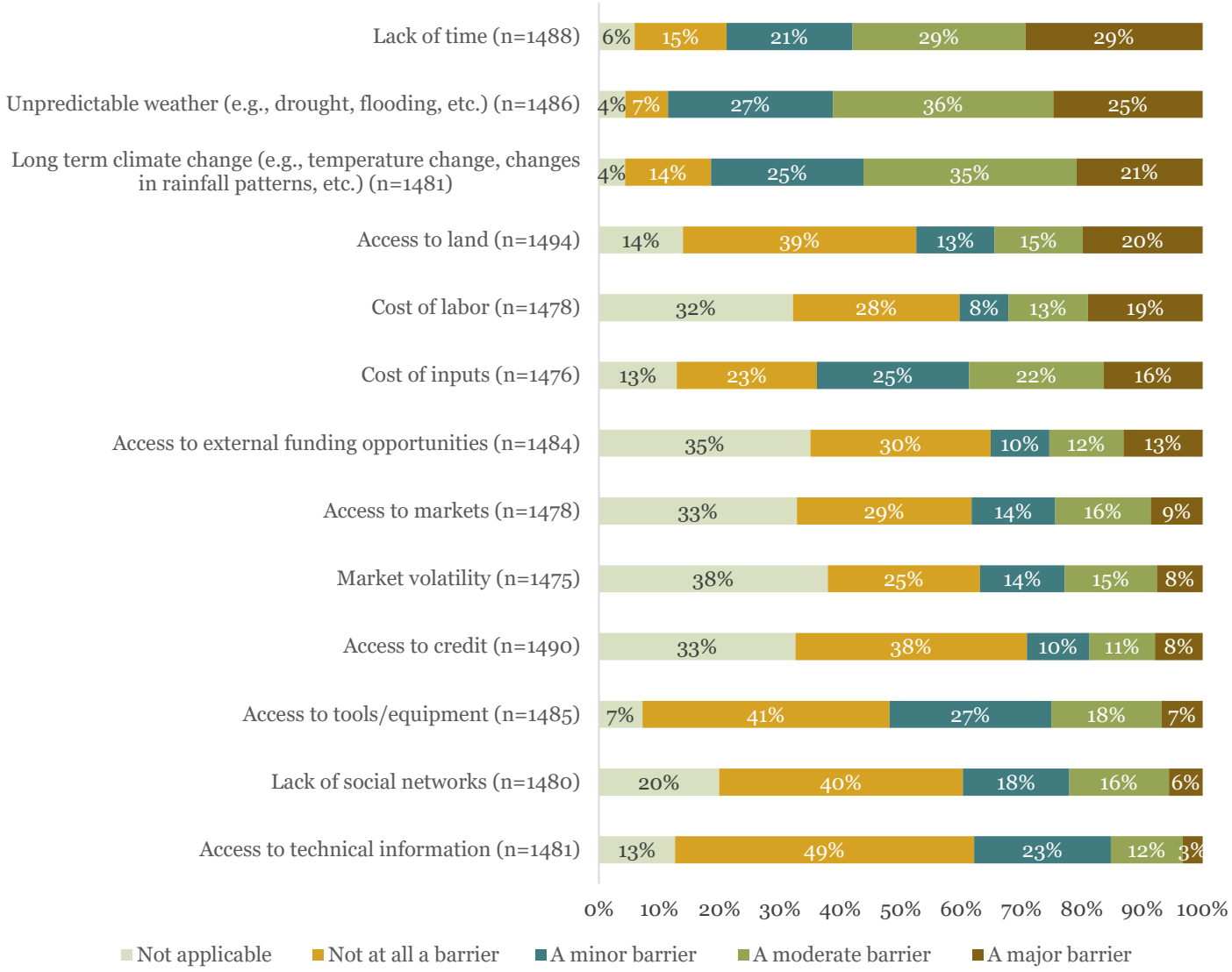

Figure 22. To what extent does each of the following present a barrier to your ability to farm or garden in the ways you would ideally like to?

After inquiring about respondents' crop production generally, we asked growers a series of questions to better understand if and how CM crops are integrated into their production. First, we sought to contextualize the importance of growing CM crops among other common motivations for agricultural production (Figure 23). The responses indicated that the growers in our sample were most highly motivated by home consumption (81% identified this as very important), enhancing wellbeing (73%), practicing sustainable agriculture (71%), and connecting to nature (69%). In terms of cultural aspects of agriculture serving as motivations to production, 59% and 55% of respondents identified connecting to family traditions and enhancing access to CM foods as either somewhat or very important, respectively, suggesting that culture contributes to decision-making for many growers but is just one among many other important motivations.

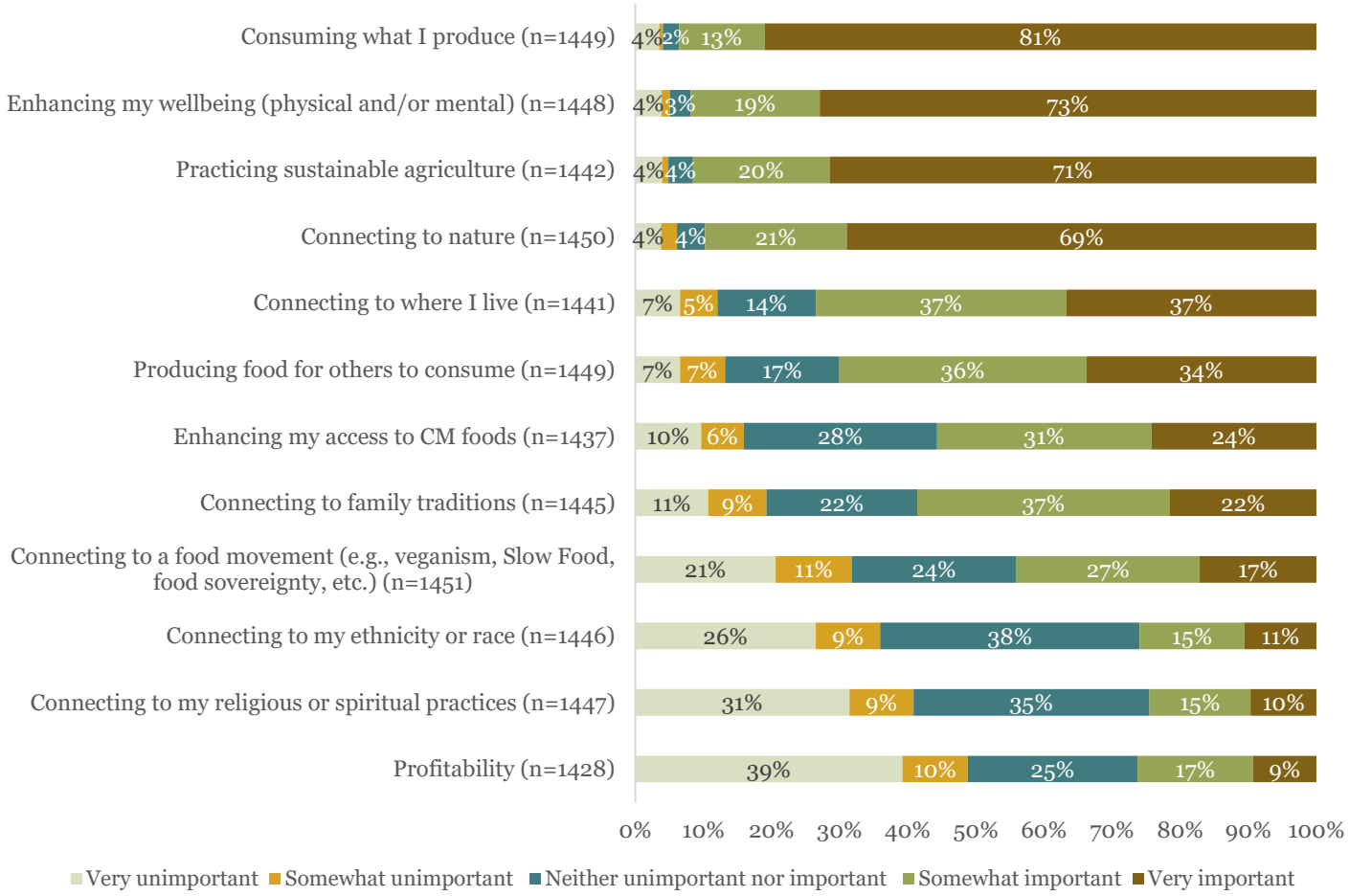

Figure 23. How important are the following farm characteristics to the foods you prefer to consume?

To further elucidate if and how CM crops are used by growers, we asked farmers and gardeners to describe their current cultivation of CM crops (Figure 24). Approximately 52% of respondents said they currently grow CM crops and another 17% said they would like to begin growing CM crops. With almost 70% of growers reporting that they currently grow or are interested in growing CM crops, and over 80% of seed companies saying the same, potential appears to exist for growers and seed companies to make connections to amplify the supply of CM seed.

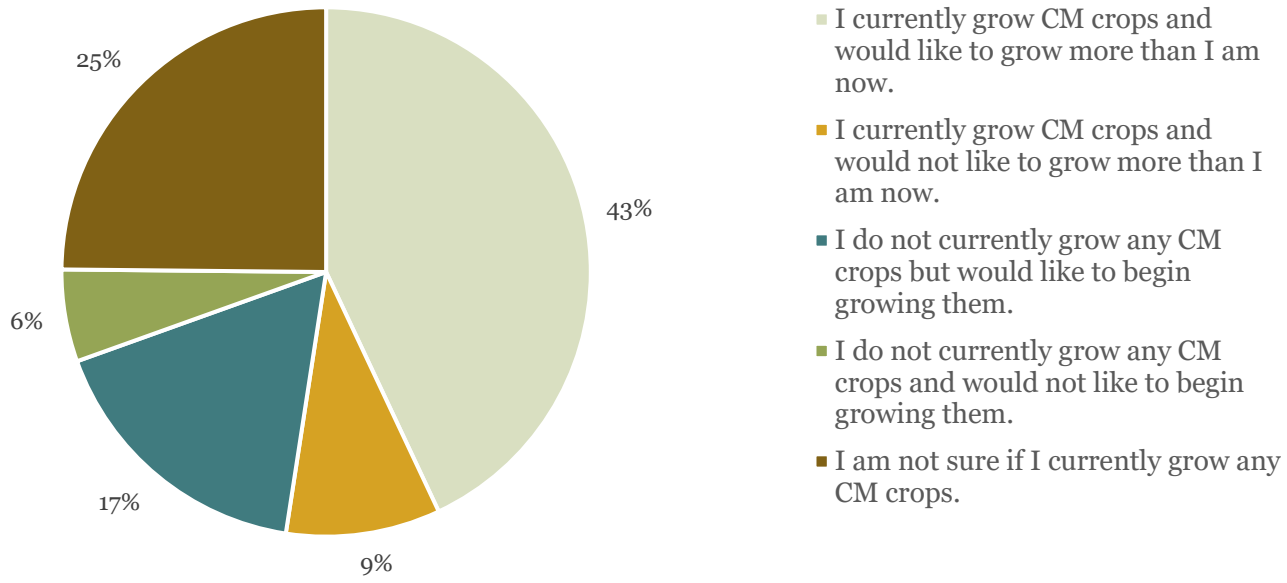

Figure 24. Which of the following statements best describes your current cultivation of CM crops? (n=1428)

To realize the market potential that exists for CM seed, it is critical to identify the perceived opportunities and bottlenecks among farmers and gardeners. Growers were asked about the barriers they face when sourcing CM seed (Figure 25). Among respondents, 81% face barriers (minor, moderate, or major) with accessing information to identify varieties of interest; 80% experience some level of barrier to accessing CM seed stock; 79% experience barriers with availability of CM crop varieties adapted to their region; 71% identified the cost of seed as a barrier; and accessing sufficient quantities of CM seed poses a barrier to 69% of respondents. A grower who participated in the farmer/gardener focus group provided further insight: *"The question is, how do we make those varieties that there's a market for accessible seed-wise?... And from our experience here, seed access is key, that a lot of times, it takes being able to access seeds in a larger amount or consistently to get someone off the ground to help them to either meet a growing contract or meet a need for a local market. ... there's lots of potential for folks to work towards a livable wage growing culturally significant varieties, but I think the seed access is definitely central..."*

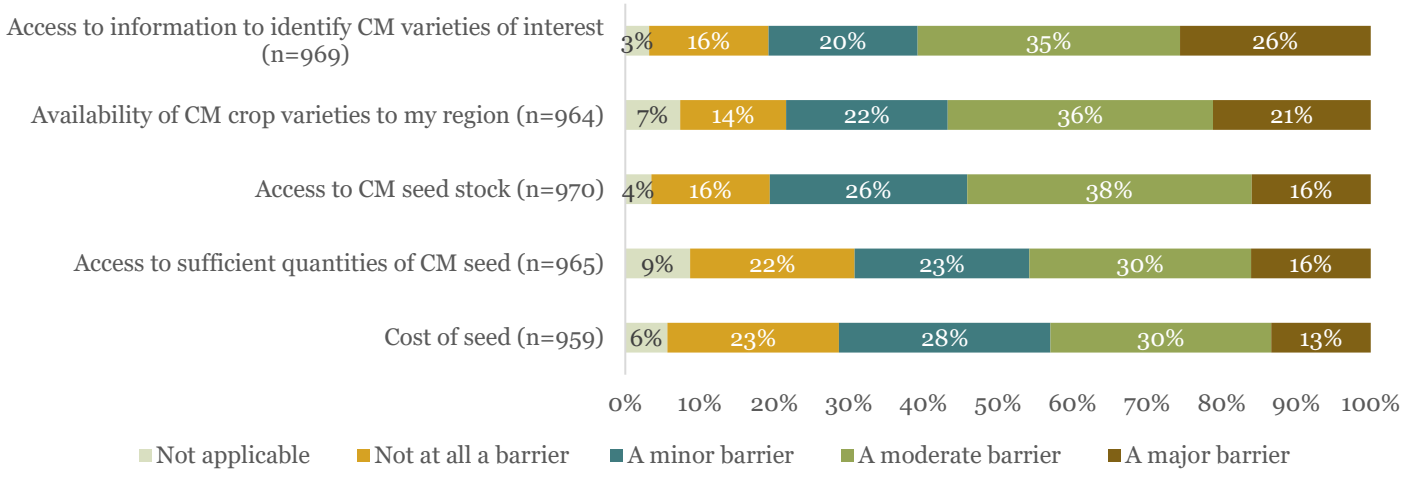

Figure 25. Please rate the degree to which each of the following is a barrier to your sourcing CM seeds.

DOWNSTREAM SEED-TO-FOOD VALUE CHAIN STAKEHOLDERS

Given that seed transforms into (food) crops, we extend our analysis to include downstream stakeholders (restaurant chefs and managers, food distributors and processors, and grocers) in the CM seed-to-food value chain (Figure 26). Although representation in this sub-sample is limited, the 86 individuals who responded to our survey and 13 individuals who participated in focus groups nonetheless provide insight into downstream demand for CM food.

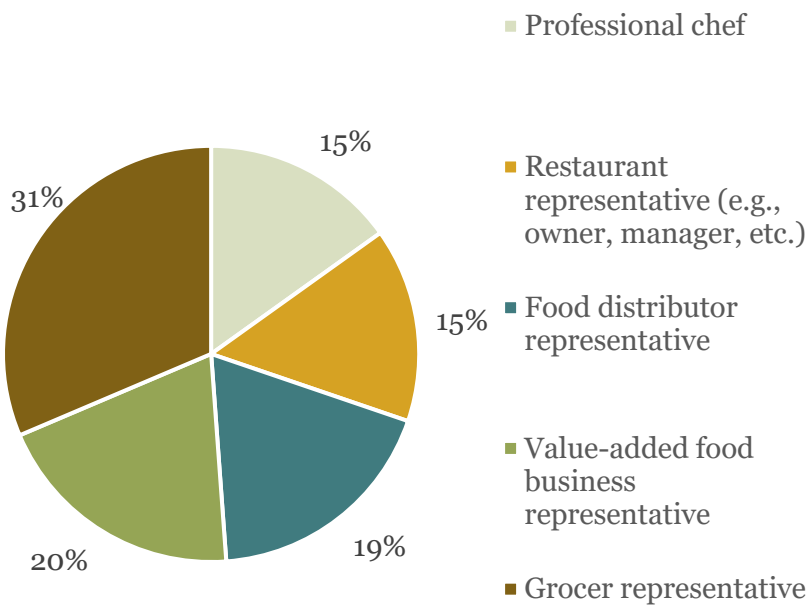

Figure 26. Which of the following best describes your position in the seed value chain? (n=86)

As with other stakeholder groups, we asked these stakeholders to assess specific food characteristics as well as market requirements that their businesses valued. Flavor (73% rated as very important), consistency of supply (56%), locally or regionally produced (54%), non-GMO (54%), and sustainably produced (53%) were prioritized most by downstream survey respondents. Like seed

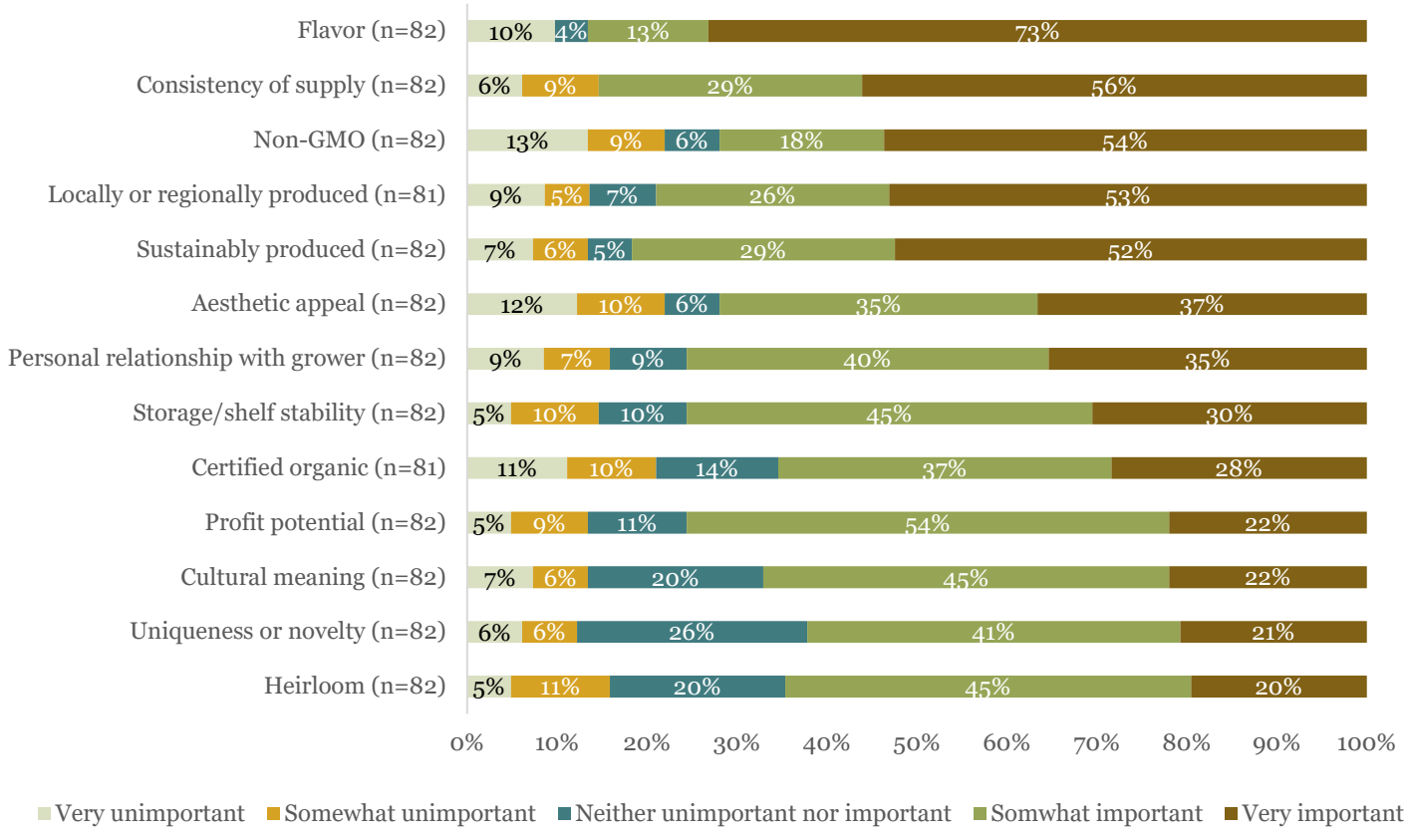

Figure 27. When considering what foods to purchase for your business, how important are the following considerations?

companies, downstream businesses value a myriad of characteristics in their products. As explained by one grocer focus group participant, *"you know, trying to find that sweet spot between organic, local, you know, the eating experience of that item and the price point."* As with seed companies, downstream businesses valued cultural meaning relatively less than other characteristics but still 67% of respondents indicated that cultural meaning is either somewhat or very important in deciding which products to carry. The implications of these results for developing the CM food market are similar to those for developing the CM seed market: foods embedded with multiple desirable characteristics that are important to diverse consumers will likely be important for market success.

When downstream value chain stakeholders were asked about CM foods specifically, 55% of businesses indicated that they offered CM products. Of the 25% that do not currently offer CM foods, 80% of these businesses indicated they would like to begin offering these foods. Thus, as with seed companies, there appears to be emerging interest and potential for value chain development for CM foods in this sector.

In terms of challenges for downstream businesses to sell CM food (Figure 28), supply uncertainties and profit margins were indicated as the greatest challenges, with over 60% of respondents indicating that each was moderately or very challenging for their businesses. This suggests that there may be bottlenecks within the supply chain for CM foods, an issue that must be traced back to the production of CM crops. While some participants in the focus group with downstream stakeholders were well-connected with growers and able to source many of their foods locally, several expressed a desire for increased connection, with one individual noting, *"...I'm not buying typically from smaller farmers or community-based farms. It always feels like something I love to do but can't find access to in the volumes I need..."* Whether they were able to achieve it or not, all participants in the focus group agreed on the desire to source their products locally, which is consistent with the above finding that 84% of survey respondents indicated locally or regionally produced to be moderately or highly important when sourcing foods for their businesses (see Figure 8). This suggests the importance of establishing strong local or regional supply chains for CM foods. In contrast to seed companies, downstream businesses reported less challenge with selling CM food in a culturally respectful way, with 47% indicating it was very or moderately challenging compared to 61% of seed companies (see Figure 17).

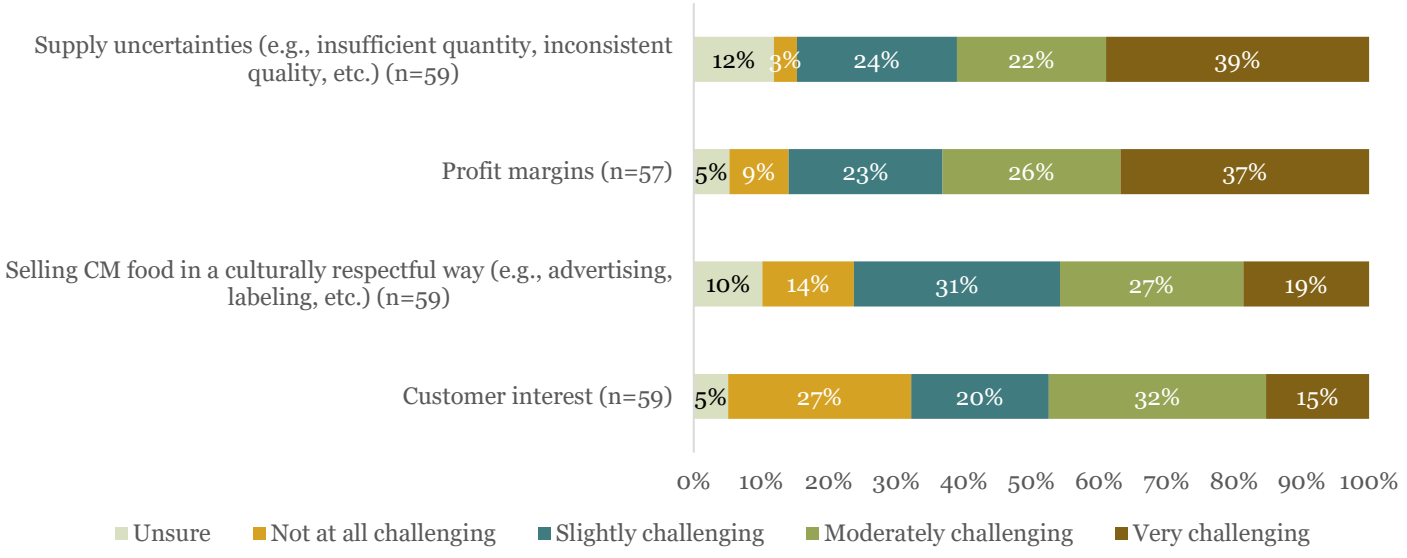

Figure 28. To what extent does your business find each of the following a challenge to selling CM food?

Like seed companies, downstream business respondents indicated that a wide range of resources to enhance their supply of CM food would be helpful for their businesses (Figure 29). As with seed companies, opportunities to directly interact with growers of CM food was highlighted, with 71% indicating that it would be very helpful for them to expand their offerings. This interest in closer connections to producers constitutes a worthy future pursuit, given that successful value chain initiatives require close collaboration across the value chain. The importance of market relationships was recognized by one chef focus group participant, who remarked, *"I've always thought the food system chefs are on the demand side, farmers are on the supply side, and both need to shift simultaneously. And so, my opinion would be chefs have to be willing to step into that demand role for crops that are potentially marginal, and certainly within traditionally underserved minorities that aren't classically producing these crops in these regions."* Both survey and focus group findings suggest there needs to be collaboration from both the supply and demand side of the CM seed-to-food value chain to enhance marketability.

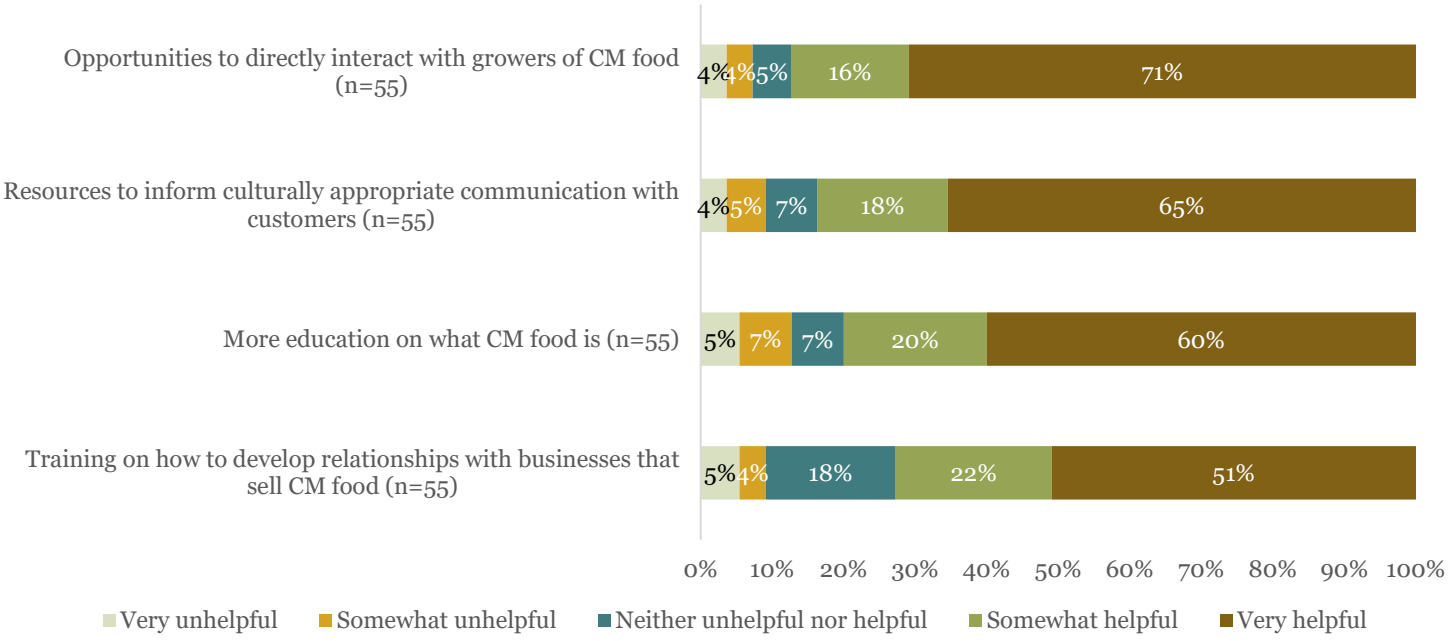

Figure 29. To what extent would each of the following be helpful to your business in expanding its offerings of CM food?

SEED-TO-FOOD VALUE CHAIN CONNECTIVITY

Because of the importance of collaboration among value chain stakeholders to establish and grow a niche product like CM seed, we asked all survey respondents how connected they felt to other stakeholders in the seed-to-food value chain.

Seed company representatives reported to be well-connected to other stakeholders, with over 50% of respondents indicating their company was somewhat or very connected to 7 of the 11 groups (Figure 30), suggesting the seed companies in our survey were generally more connected than disconnected to other seed-to-food value chain stakeholder groups. Seed companies reported being most connected with growers (64%), consumers (47%), and other seed companies (32%). That said, seed companies noted they were least connected to food processors, food distributors, and policymakers/government officials, with less than 25% indicating they were somewhat or very connected to each of those groups. This suggests seed companies are generally better connected to stakeholders who are involved with seeds, rather than downstream stakeholders who are involved with the crops and foods resulting from those seeds.

Farmers and gardeners felt notably less well-connected than seed companies, with 50% or more respondents indicating they were somewhat or very connected to only 3 of the 11 groups (Figure 31). Seventeen percent of farmers and gardeners were very connected to community-based organizations/non-profits, 16% were very connected to other growers, and 12% were very connected to seed companies (quite different from seed companies, as 64% of seed company representatives felt very connected with growers). Respondents were least connected to food processers, food distributors, and policymakers/government officials, with less than 3% saying they were very connected to these groups. As with seed companies, farmers and gardeners are better connected to upstream stakeholders than to downstream stakeholders. The disconnect felt between growers and downstream market actors is reflected in a quote that came from a grower in the farmer/gardener focus group: *"I think we need more producers. And we need more producers closer to their customers. And we need to make that connection between the producer, the small producers, and in the market..."*

Downstream stakeholders also seemed to be well-connected in the value chain, with over 50% of respondents indicating they were moderately or very connected to 8 of 11 stakeholder groups (Figure 32). Respondents indicated that they were most connected to consumers (very connected = 62%), growers (very connected = 48%), and food distributors (very connected = 45%). On the other hand, they were least connected to policymakers/government officials (very connected = 6%), seed companies (very connected = 9%), and researchers/academics (very connected = 10%). Unsurprisingly, respondents in this group were generally better connected to downstream stakeholders than upstream ones, indicating an opportunity to strengthen connections across the value chain to expand the CM seed market. Downstream stakeholders in our focus groups saw themselves as serving the important role of linking growers and consumers. One participant expressed how this impacted willingness to provide specialty products: *"...as a produce retailer, it doesn't scare us to pay more for something, especially when it has the attributes and kind of that story behind it that make it a unique product...we're more than happy to pay a little bit more, you know, to our grower, right, to our local farm partner, especially if we know it has an importance that we're able to transfer to a customer and we're able to be kind of that bridge between the grower and [consumers].*

In all focus groups, stakeholders articulated the need to increase connectivity within the seed-to-food value chain to increase accessibility of CM seeds and foods. As one wholesaler/distributor focus group participant commented, *"...we all have this shared goal of educating and getting people to eat within this local food system, whatever state that you're in, and sometimes it just seems like we're there, but we're not on the same page...It's transportation. It's availability. It's staffing. It's just, like, a more collaborative movement to more collaborative mindsets within these systems.*" Based on findings stemming from previous value chain initiatives[9], these insights on the importance of connectivity across the value chain are critical to market viability; enabling these connections will be key to establishing the CM seed-to-food value chain.

Taken together, the results suggest that while some stakeholders (seed companies and downstream actors) in the seed-to-food value chain are relatively well-connected, potential exists to enhance relationships. Neither farmers and gardeners nor seed companies are very well-connected to downstream actors, indicating a divide between the seed portion and the food portion of the seed-to-food value chain. Considering how to better bridge these ends of the chain and provide opportunities for stakeholders along the entirety of the value chain presents opportunity for future research and programming efforts.

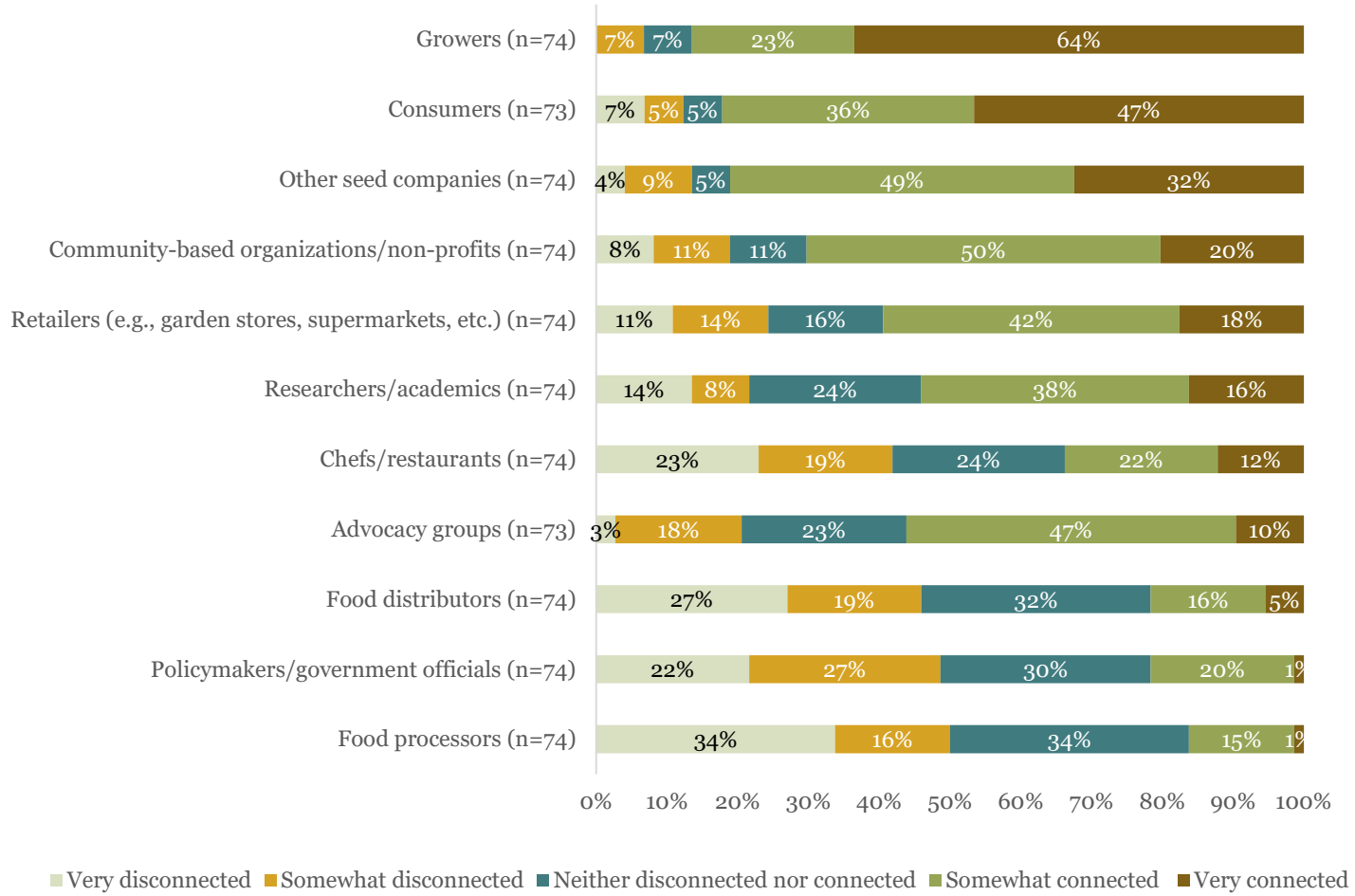

Figure 30. Considering your place as a seed company in the seed value chain: Please indicate how connected you are to the following groups.

[9] Thiele, G. Devaux, A., Reinoso, I., Pico, H., Montesdeoca, F., Pumisacho, M., Andrade-Piedra, J., Velasco, C., Flores, P., Esprella, R., Thomann, A., Manrique, K., & Horton, D. (2011). Multi-stakeholder platforms for linking small farmers to value chains: Evidence from the Andes. *International Journal of Agricultural Sustainability, 9*(3), 423-433.

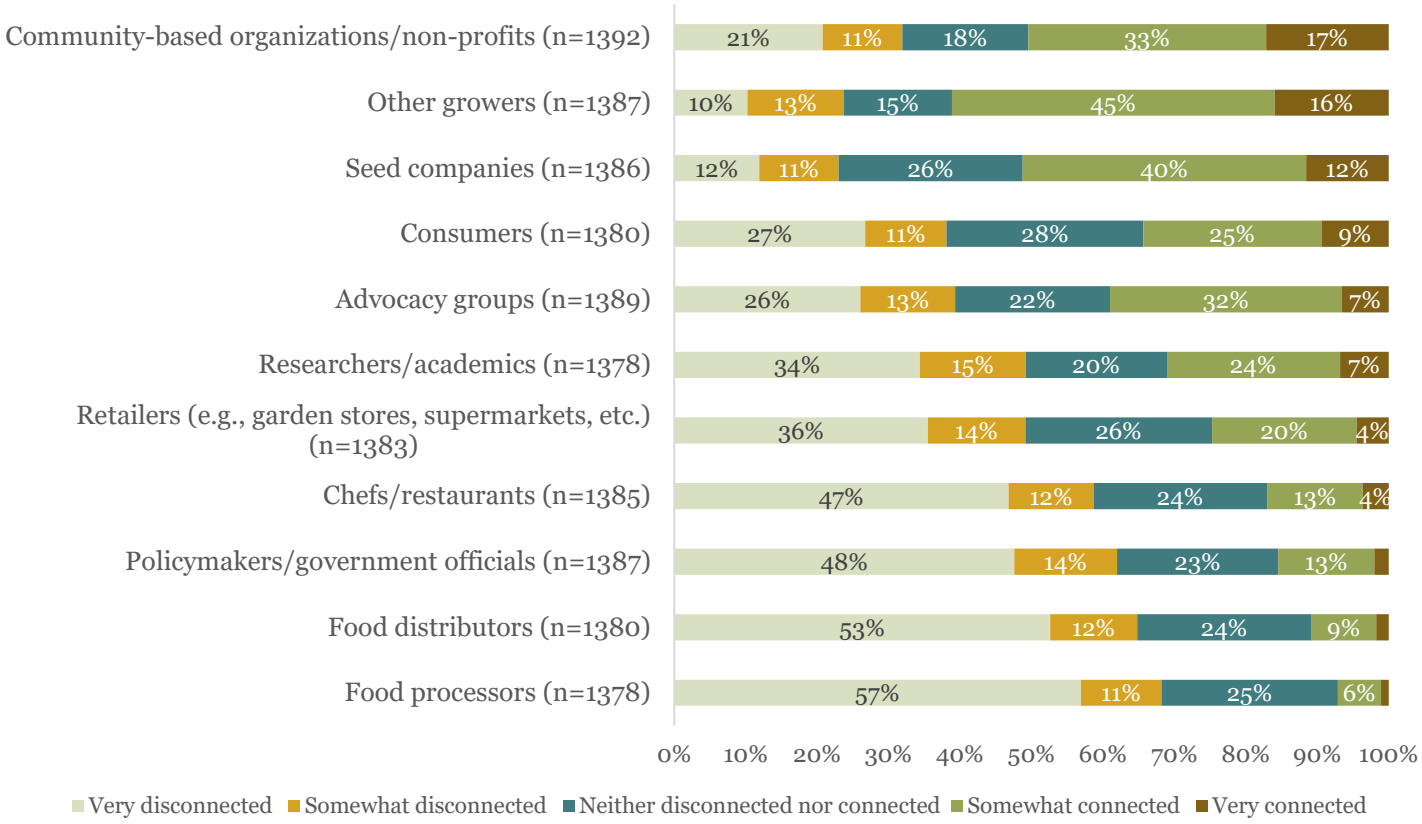

Figure 31. Considering your place as a grower in the seed value chain: Please indicate how connected you are to the following groups.

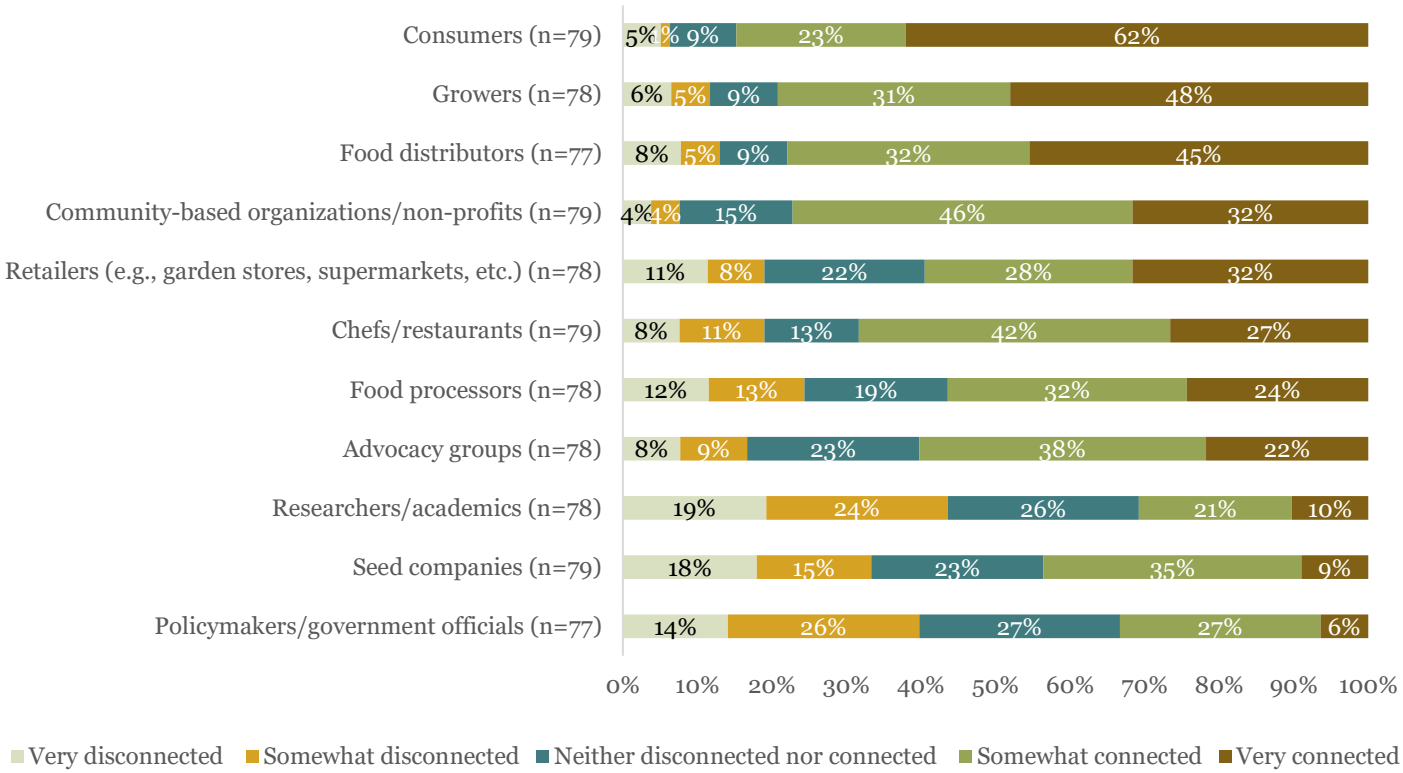

Figure 32. Considering your place as a food-related business in the seed value chain: Please indicate how connected you are to the following groups.

INTERPRETING THE RESULTS

In this section, we interpret the findings presented in the report to catalyze discourse on CM seeds, suggest potential opportunities to expand their availability in the market, and describe bottlenecks and challenges that exist. While the data presented in this report cannot be generalized to the entire population of seed-to-food value chain participants in the U.S., they are still useful in communicating important knowledge to help inform future research, programming, and advocacy. We do note, however, that these conclusions and recommendations must be interpreted with care. Most importantly, we acknowledge that our sample skewed heavily towards white respondents with European heritage. Considering the importance of CM seed to BIPOC communities, further research and outreach are necessary to ensure their perspectives are heard as the CM seed market continues to grow. Nonetheless, important insights emerge from the findings, which we detail below.

Cultural meaning as a seed/food trait was found to be important among respondents, though not as important as other qualities. Although cultural meaning was rated as one of the least important traits across all respondent groups relative to other traits that were measured, it was still rated as an important consideration. Nonetheless, seed/food traits that were consistently ranked the highest were local, sustainable, non-GMO, flavor, and quality. Thus, focusing on flavor, quality profiles, local/regional origin, and non-GMO as important complements to cultural meaning must be incorporated into production to encourage marketing opportunities and consumption of CM seeds and foods.

Supply uncertainties exist for culturally meaningful seed/food. Our findings indicate that CM seed producers are often operating on small plots of land and producing limited amounts of CM seeds. These results may help explain why farmers, gardeners, seed companies/retailers, and downstream stakeholders reported that they lack a consistent and adequate supply of CM seeds and crops. Furthermore, considering that 66% of respondents self-identified as gardeners, it is likely that CM seed is being produced by many growers on limited scales and who are not currently connected to markets. Attention to how to link these growers to outlets to sell or share their seeds may be especially important.

Culturally appropriate marketing was found to be difficult for seed companies but less so for downstream seed-to-food value chain stakeholders like grocers. Although seed companies/retailers expressed concerns related to their ability to sell CM seeds in a culturally appropriate manner, fewer downstream stakeholders indicated that they struggled with marketing and selling CM foods in culturally appropriate ways. Fostering connections between these groups (and other seed-to-food value chain stakeholders such as farmers and gardeners) could help businesses develop culturally sensitive strategies, while also encouraging connections across the value chain in such a way that would help close the gap that exists between the upstream and downstream segments. While seed companies articulated wariness about making assumptions about CM seeds and food culture out of concern for exploitation, we also note that those with families from European cultures could also benefit from CM seeds specific to the foodways of various European regions. Providing more opportunities for different growers, consumers, and other stakeholders with diverse identities to interact along the value chain to connect and share strategies to market CM seed and food appropriately presents an important future initiative to address the concern expressed by seed companies.

Consumers lack familiarity with culturally meaningful seed/food. Across the seed-to-food value chain, all stakeholder groups indicated that consumers' lack of familiarity with CM products is a barrier to their market potential. Seed companies perceived that many of their consumers may not know how to grow CM seed. Both growers of CM crops and downstream stakeholder groups noted that they often dedicate their growing/purchasing food products to those familiar to their customers. Educating consumers and launching public awareness campaigns highlighting that CM means a particular seed or food is important to a cultural group and each consumer has a food culture or unique preference are necessary focal points to address apprehension about CM seeds.

Culturally meaningful seed and food are viewed as more than market goods, as they also provide community, cultural, and culinary ties. In addition to the economic viability of CM seed and food, it will be important to simultaneously consider the values associated with CM seeds, crops, and foods within the value chain. For example, seed companies indicated that CM seed markets must encompass more than just supply and demand considerations and also include culturally appropriate advertising and marketing. Strategizing how to ensure economic viability of CM seeds without tainting their other important attributes is a critical concern for seed-to-food value chain stakeholders to address.

Seed-to-food value chain stakeholders desire to strengthen their connections with others along the chain. All seed-to-food value chain stakeholder groups expressed a desire to strengthen their connections to others along the chain. In particular, seed companies and downstream businesses indicated high interest in more interaction with seed and crop producers. In developing these kinds of opportunities for connection, discussing and identifying strategies to both compensate CM seed and crop producers competitively, while also ensuring that the cost for consumers remains reasonable, must be a priority. In addition, fostering collaboration across the value chain to harmonize goals and objectives, share resources, and troubleshoot challenges will be critical to grow the CM seed market.

To amplify culturally meaningful seed/food in the market, increased policy support and multi-stakeholder partnerships are necessary. We identified several barriers to the amplification of CM seed and food in the market, such as limited land access among producers and funding to support the cultivation and marketing of CM seeds and crops, that could be addressed with policy. Although stakeholders along the value chain may be able to identify some creative solutions to address these challenges, policymakers can support these efforts and open up new opportunities for enhancing CM seed and food. For CM seed and food to gain prominence in the market, public-private partnerships will likely be necessary, such that public entities like the government and universities support private and community-based efforts. When transparent and inclusive public-private partnerships are established, value chain development is more likely to achieve success.

Building a more culturally appropriate food system in the U.S. requires attention to all the aforementioned bottlenecks as well as increasing the support given to the growers and stewards of these CM seeds. This initial research serves to elevate the potential that exists to create a more culturally appropriate food system by devoting attention and resources to key stakeholders along the seed-to-food value chain who are critical to this mission.

CONCLUSIONS

Both global and U.S. seed systems are marked by market concentration and an erosion of genetic diversity, resulting in negative environmental, social, and cultural effects. Our findings contribute to the conversation about how to counteract these problems in the seed-to-food value chain, increase genetic diversity, and ensure culturally appropriate food access through the proliferation of CM seeds. To achieve the goal of a seed – and eventually food – system that better serves the needs of all stakeholders, we recommend increased connection and coordination of stakeholders in the seed-to-food value chain. What is clear is that the dominant seed industry does not fulfill the needs of many consumers and especially not BIPOC producers and consumers looking for seeds and foods that contribute to culturally preferred diets. Biocultural heritage is being eroded by the current seed system, which does not adequately provide culturally important seeds (and thus culturally important foods). Therefore, changes must be made to not only provide more choices to consumers but to pay particular attention to ensuring access to CM seeds. Value chain development initiatives intending to expand the supply and demand of CM seed and food must be pursued in such a way that they incorporate ongoing monitoring and evaluation to ensure that communities to which the seeds are important are benefitting from their place in the market, rather than reproducing the extractive relationships that have been historically present in the seed system.

While the findings from this report provide preliminary insight into what will be necessary, it is important to continue to gather more information regarding the perspectives of value chain stakeholders, particularly given the sample limitations in this study. Nonetheless, it is our intention that this report can help further the goals of those working to create a seed and food system that better serves the needs of all stakeholders through the implementation of policy, outreach, and research. Despite the difficult work ahead of developing seed-to-food value chains that embed cultural meaning, we see that potential exists to establish alternative market opportunities with value chain stakeholders to operate independently from the dominant seed system to amplify choice and (re)connect consumers to their cultural backgrounds through seed and food.