Evaluating Virginia Cooperative Extension Master Gardener Help Desks

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Education

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Abstract

Extension master gardeners are volunteers in the Cooperative Extension system that aim to educate the community about sustainable horticultural practices. Their required volunteer hours are fulfilled through educational workshops, presentations, home garden visits, help desks, and many other services. While help desk services are being overshadowed by the various search engines we use to find the answers to our questions, the data gathered from Extension master gardener help desks can help Extension professionals prioritize programs and allocate resources effectively. There is no current research that shows aggregated help desk data as an indicator of community needs, program prioritization, or program improvement. The objective of this study was to determine the most common topics that arise through the help desk and compare them with current master gardener initiatives to determine whether community needs are being met. Connections can be made between the hardiness zone of each master gardener unit, the season, and the types of topics that typically arise. A survey was developed and sent out to master gardener coordinators, agents, and volunteers across Virginia to gather this information. The survey had an overall response rate of 35%, with a response rate of 3.70% in zone 6a, 3.70% in zone 6b, 29.63% in zone 7a, 48.15% in zone 7b, and 14.81% in zone 8a. The survey results indicated that there were significant differences between the topics of interest in communities of different hardiness zones, as well as notable seasonal differences. Conclusions and recommendations were made specific to each zone, as they varied greatly in response rates and topic frequencies making it difficult to draw conclusions across zones.

Introduction

Background

The purpose of Cooperative Extension programs is to address the needs of communities and solve problems through the dissemination of research-based information. The Cooperative Extension Service (CES) frequently uses evaluation tools to determine the effectiveness of programs and to draw connections between resources and outcomes (Rennekamp & Arnold, 2009). Evaluation results can be used to determine the impact of a program, as well as to make recommendations to aid in decision-making, program improvement and program sunsetting. Because the CES operates on local, state and national levels, it is increasingly important to understand how educational programs function at each level and to improve them through evaluation practices (Franz & Townson, 2008). However, with scarcity of resources, complexity of issues, and staffing shortages; evaluations may be treated as a "check in the box" task or not utilized at all (Franz & Townson, 2008). The usefulness and reliability of a program evaluation is compromised when Extension staff do not have the training or time to conduct an appropriate evaluation. Evaluations are critical for collecting data and understanding short-term and long-term impacts of programs that are useful for state and local Extension employees, stakeholders, and clients.

The master gardener program has been active in Virginia for 44 years (*About the Extension Master Gardener Program,* 2022). The goal of master gardener programs is to educate communities on sustainable horticultural practices through volunteer-driven services and workshops. The focus, number, scale and format of these services and workshops are determined through needs assessments. The master gardener help desk is one of the services provided through the master gardener program. It is a free service that answers questions on a broad range

of horticultural topics including soil testing and results interpretation; insect, disease and weed ID and management, landscape design and plant maintenance, native plants and pollinator support, turf management, stormwater management and growing vegetables.

Statement of the Problem

The Cooperative Extension Service uses a variety of evaluation tools to ensure program success and facilitate program improvement. In the context of master gardener programs, evaluations focus primarily on master gardener training programs. The review of literature concluded that evaluations of master gardener help desks are not uniform and are not conducted regularly. Help desks are a widely utilized tool particularly in rural areas due to ease of accessibility and reliability. Unfortunately, due to the widespread use of the internet and an endless supply of information at no cost, help desks are becoming less relevant in modern society. There is still valuable data to be gleaned from help desk inquiries to improve master gardener programming. An evaluation of the master gardener help desk can give Extension professionals insight into the types of information their communities are seeking which will help them prioritize programs to increase engagement and interest in those communities. The help desk is still an extremely valuable tool and Extension professionals can use it to their advantage during program planning to benefit communities.

Purpose of the Project

The purpose of this project was to examine the content of the questions that come into Virginia Cooperative Extension Master Gardener (VCEMG) help desks and determine differences in content between hardiness zones and different seasons. Popular topics of interest among Virginia communities were gathered and categorized based on season and hardiness zones. This information was used to determine what information is requested most frequently

and when by zone. Recommendations were made as to what topics should be prioritized over others. Additionally, data was gathered on the workshops and services currently offered by master gardener programs across Virginia. The help desk information will be used to evaluate master gardener programming to see if programs align with needs.

Research Questions:

1. How does seasonality affect community needs in relation to master gardener help desk inquiries?

2. How do hardiness zones affect community needs in relation to master gardener help desk inquiries?

3. How does Master Gardener programming align with the needs identified across Virginia hardiness zones and seasons?

4. Which Virginia Cooperative Extension Master Gardener topics should be prioritized based on the needs identified across hardiness zones and seasons?

Definitions of Keywords/Terms

Cooperative Extension System- The Cooperative Extension System disseminates research-based information to the public to foster community engagement, protect the environment, improve food safety and nutrition, and encourage good agricultural practices (National Institute of Food and Agriculture, 2012).

Evaluation- "The systematic assessment of the worth or merit of some object" (Trochim, n.d.)

Master Gardener- A master gardener is a volunteer through the Cooperative Extension System whose primary responsibility is to give back to their community in the forms of "giving lectures, creating gardens, conducting research, and many other projects" (American Horticultural Society, n.d.).

<u>Master Gardener Help Desk-</u> A service provided by master gardener volunteers to answer questions about a variety of horticultural topics.

<u>Horticulture-</u> "A branch of agriculture dealing with garden crops; generally, fruits, vegetables, and ornamental plants" (Synge, 2023).

<u>Logic Models-</u> "A graphic depiction that presents the shared relationships among the resources, activities, outputs, outcomes, and impact for your program" (Centers for Disease Control and Prevention, 2018).

<u>Hardiness Zone-</u> USDA plant hardiness zones are based on average annual minimum winter temperatures across the United States. Growers use hardiness zones to determine planting and harvesting dates for their area (*U.S. Forest Service,* n.d.).

Theoretical Framework

Students and learners are motivated by personal interests and needs. One of the biggest determining factors for student success is whether or not they are motivated to engage in the learning process. Learners want to feel acknowledged, autonomous, and engaged in the content being presented to them. The self-determination theory of motivation proposes three human needs that influence a person's ability to achieve their goals: competence, autonomy, and relatedness (Ryan & Deci, 2000). When an activity has the potential to satisfy all three of those innate needs, a person is motivated to engage in the activity. Humans are motivated by both intrinsic and extrinsic factors. A person is intrinsically motivated by activities that bring them personal satisfaction, and these activities may differ based on the individual (Ryan & Deci, 2000). Gardening, for example, brings many people personal satisfaction and a sense of purpose. Extrinsic motivation is driven by punishment and reward, which explains why humans are motivated to perform well at work.

Motivation has historically been of great interest to psychologists because it explains why a person is more likely to engage in one activity over another and can therefore influence educators' ability to achieve their desired outcomes. Self-determination theory is frequently used to influence policies and decision-making in the workplace to create an environment where people work efficiently while also feeling motivated and fulfilled (Deci et al., 2017). In Extension, self-determination theory can be used to explain why volunteers choose certain organizations over others, and how to retain those volunteers for long periods of time. It can also explain why a person has chosen to participate in a particular Extension program. Catering educational programs to community interests and concerns will create motivating factors for community members to continue to support Extension education. An organization that provides both intrinsic and extrinsic motivation is much more likely to achieve their outcomes and make a greater impact (Deci et al., 2017).

Literature Review

Master Gardeners

Extension master gardener programs were developed as an educational outreach component of the Cooperative Extension Service. Master gardener efforts focus on encouraging and educating communities on sustainable horticultural practices and landscape management. According to the Extension Master Gardener National Summary (2020), 8.4 million clients were served through presentations, workshops, help desk lines, and other services offered. The impact of master gardener programs is seen across the country and is highly valued in many communities. Studies have shown that master gardener programs not only contribute to increased horticultural knowledge among participants, but they also improve participants quality of life (Waliczek et al., 2002). The benefits of master gardener programs include increased physical

activity, improved self-esteem, and increased social interaction (Waliczek et al., 2002). With these benefits considered, master gardener programs must continue to meet the needs of the communities they serve and adapt to changing circumstances.

The success of master gardener programs greatly depends on volunteers. There are many reasons why people are motivated to volunteer, including career advancement, helping others, socialization, and skill development (Schrock et al., 2000). Master gardener volunteers are members of the community that houses the Extension office, and therefore are extremely valuable as supporters and advocators of Extension. Ensuring that community issues are being addressed through Extension programming can increase volunteer involvement and improve retention. Volunteer recruitment and retention are obstacles that many organizations face. Word of mouth is one of the most effective strategies for recruiting volunteers, especially in small, tightly knit communities. When volunteer organizations have a positive reputation among their community, recruitment and retention should not pose a problem.

Non-Formal Education

Extension program outreach efforts are centered around non-formal education materials and methods. Non-formal education can be ambiguous in definition, but in layman's terms, it means any form of education that isn't in a typical classroom setting that uses exams and quizzes to assess knowledge retention. The CES uses experiential learning techniques to create an active learning environment in which participants are not only learning through lecturing, but also through hands-on exercises. Kolb's experiential learning theory outlines four distinct phases in the learning process: experience, observation, conceptualization, and reflection (Sharlanova, 2004). Educators should consider these phases when developing programs to ensure proper understanding of the course material and enable learners to apply their knowledge to real-world

settings. The phases of the learning process correspond to different learning styles, which include accommodator (problem-solving), diverger (analytical), converger (technical), and assimilator (observer). Figure 1 shows the four phases of learning and the learning styles they coincide with (Schröder et al., 2017). It is important for Extension educators to diversify their teaching methods and styles to complement the learner, enhance the overall learning experience, and disseminate information in multiple formats to end users.
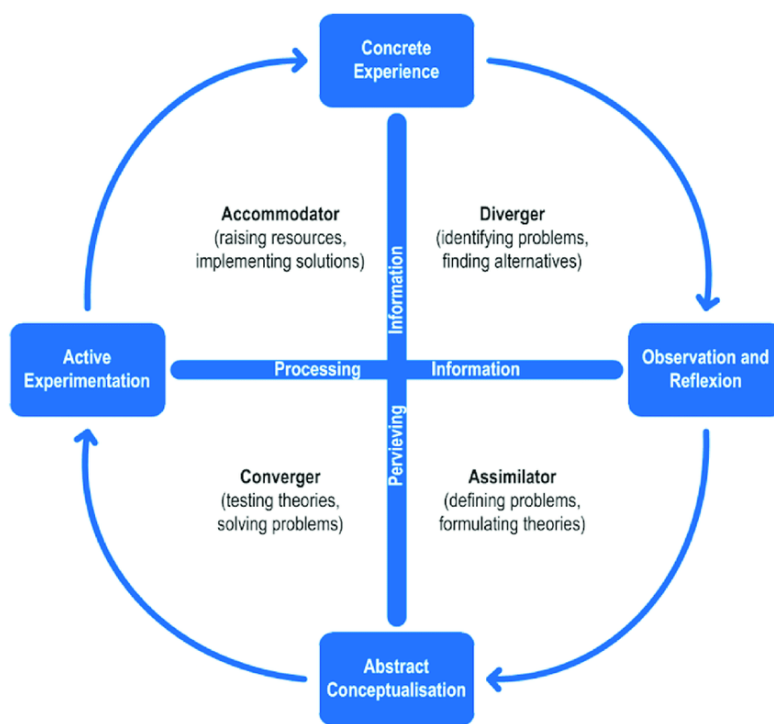

Figure 1: The Four Phases of Learning & Their Corresponding Learning Styles (Schröder et al., 2017).

Logic Models

Logic models are graphic depictions of how a program intends to accomplish its goals. According to Smith (1989), logic models have many benefits, including planning a program that can be evaluated, determining program goals and objectives, and showing the degree of

stakeholder interest in the program (p.63). Extension programs use logic models for various

reasons, namely evaluations and program planning (McLaughlin & Jordan, 1999). Inputs,

outputs, and outcomes of a program can be linked to pinpoint where a program can be improved

in order to accomplish certain goals. Inputs are the resources necessary for the program to be

successful. Activities are the actions a program is taking to produce outputs, which are the actual

services provided to those who the program intends to affect (McLaughlin & Jordan, 1999).

Lastly, outcomes can be divided into short, intermediate, and long-term outcomes which are the

changes that occur as a result of the program. Table 1 is a representation of VCEMG program

outcomes. Comparing the types of programs offered by VCEMG offices with the topics that are

of great interest to the community can create a better understanding of why certain outcomes are

not being achieved. While this study is not looking specifically at the achievement of one

outcome, many of the outcomes in the VCEMG logic model can be linked to the help desk caller

inquiries and the continual presence of a particular issue or concern among communities across

Virginia. The full VCEMG logic model is provided in Appendix A.

Virginia Master Gardener Logic Model Outcomes		
Short-term	**Medium-term**	**Long-term**
-Increased number of MG volunteers and trainees -increased knowledge of sustainable horticulture practices -individual adoption of sustainable horticulture practices -increased horticultural skills -increased awareness of community needs -increased self-confidence -improved technology skills	-MG's apply their training and skills through site-visits, workshops, and other services -disseminate research-based knowledge to community members -MG's recruit future trainees -increased adoption of sustainable horticulture practices -MG's use technology to disseminate information and connect with the community	-community-wide increase of sustainable horticulture practices -community members are more aware of the impact of MG programs -sense of belonging among MG's -decreased pesticide usage -increased ability to grow healthy food products among the community

Table 1: VCEMG Logic Model Outcomes (Rutherford et al., 2022)

Challenges of the Cooperative Extension System

Limited resources such as time, funding, and staffing have added to the challenges that Extension staff face every day (Franz & Townson, 2008). Stakeholders demand proof of outcome achievement and impacts of Extension programming through evaluation data. With complex social, environmental, and economic issues competing for funding, Extension must prove its worth to stakeholders for continual support (Franz & Townson, 2008). County and state governmental entities are supported by community members who also need to understand and value the work of Extension educators. The communities that Extension offices serve are valuable assets to the continuation of the CES, which places great stress on program coordinators to adapt to the changing values and needs of their communities. Gaining interest from the public is becoming a persistent issue as Extension strives to remain relevant in a technologically focused society (Workman & Scheer, 2012). Research on the concerns and values of community members can give insight as to what they would like to see in Extension programs, as well as what types of services and workshops they are interested in supporting. This study can provide valuable information regarding what requests for horticultural information are common across VA, what topics EMG educational programs are addressing in communities across Virginia, and how programs and resources can be prioritized, supported, evaluated, and reported for statewide impacts. Typically, programs evaluate their effectiveness through the distribution of surveys and questionnaires to participants. Rarely, however, do they gather data statewide on what types of information the community seeks out to provide the most desirable information (Franz & Townson, 2008). This information can be collected directly through EMG help desk records.

Evaluation

Evaluations are a crucial component of the Cooperative Extension program development model. Evaluations provide proof of program impact and outcome achievement, proper

allocation of resources, and client satisfaction (Franz et al., 2015). Without this proof, stakeholders might see little value in investing in certain programs. The main purpose of most evaluations is to provide feedback to influence decision-making and program improvement (Trochim, n.d.). While the definition of evaluation can be ambiguous, most definitions mention evaluations as a form of determining the worth or merit of some object or program (Schwandt, 2015). Many Extension evaluations involve the use of pre- and post-surveys to gauge knowledge retainment and understanding of program content. Unfortunately, the use of pre- and post-surveys is overdone, and many Extension professionals are looking for other evaluation methods that are unique and innovative. Logic models are a great tool for program evaluations because they give a visual representation of what the program is aiming to accomplish and allow evaluation professionals to focus on intended impacts and outcomes (McLaughlin & Jordan, 1999). While logic models are essentially hypotheses for what the program hopes to accomplish, evaluations are the tangible proof that particular goals and outcomes have been achieved. Unfortunately, non-profits and governmental agencies typically conduct evaluations for the purpose of satisfying performance benchmarks set by funding agencies rather than gathering data on program impacts and focusing on program improvement (Silliman et al., 2016). The goal of this research project is to provide tangible proof that master gardener programs are addressing community needs which can lead to outcome achievement and impact.

Extension Program Development Model

Extension professionals must prove their worth to various stakeholders within their community in order to receive funding and remain relevant in a rapidly evolving society. A huge determinant of program success is whether or not the community sees value in Extension initiatives. The Extension Program Development Model has been integrating public value

considerations in recent years to increase competition for funding, foster community

engagement, and to promote teaching and research (Franz, 2015). A service that benefits society

as a whole is said to have great public value, while a service catered to particular audiences or

individuals is said to have great private value (Kalambokidis, 2004). These concepts need to be

taken into consideration during program development to ensure public support, and therefore

increase funding. To give an example, one reason for developing a program for the public good

may be that there is inadequate information available about a particular topic, such as protection

of pollinators, and therefore Extension should work to address this issue through educational

programming. The program development model helps create a graphic depiction of the

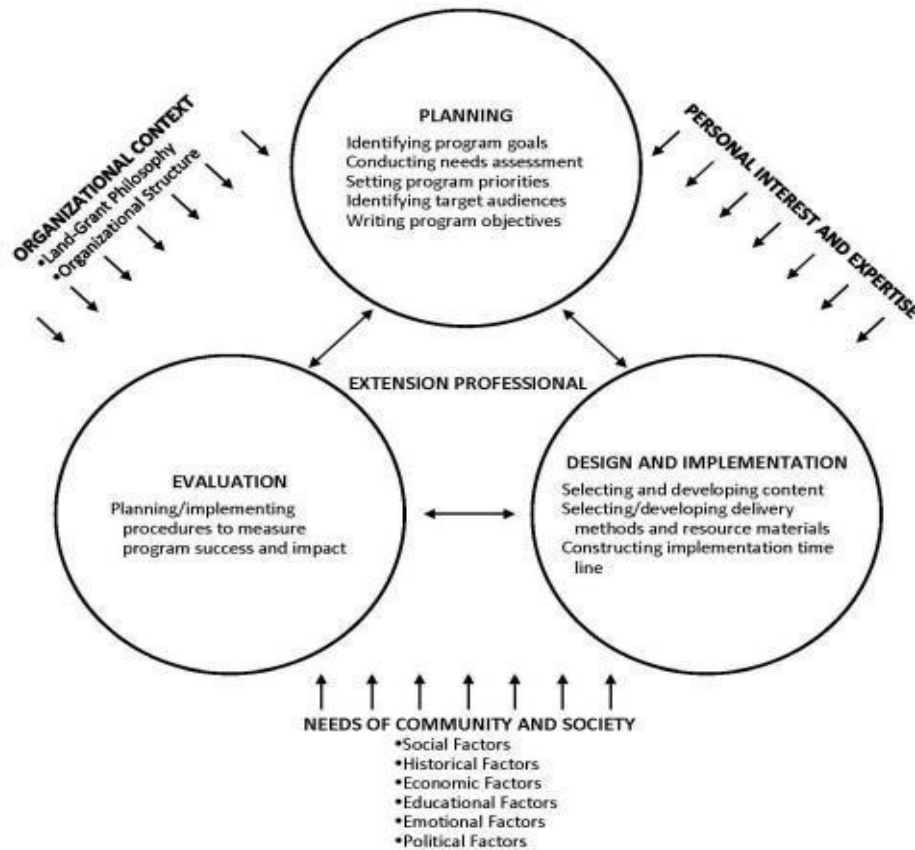professional skills and interests of Extension workers in relation to community needs in order to

Figure 2: Extension Program Development Model (Seevers, Graham, & Conklin, 2007)

address these needs properly through program planning, design, implementation, and evaluation. The Extension program development model is shown in Figure 2. While the program development model may appear very similar to a logic model in its objectives, they are not used interchangeably. The logic model pinpoints inputs, activities, impacts, and outcomes that are specific to a program, while the program development model outlines the considerations that must be made when developing a program. The program development model is of particular interest to us in this project due to its emphasis on the importance of considering the needs of the community and society when developing a program.

Procedure

Research Design

This project collected qualitative data through surveys distributed to VCE offices with master gardener programs. Purposive sampling methods were used to determine the types of respondents needed for the survey. The sample that matched best for the purpose of this project was master gardener administrators, which differs by office but includes volunteer coordinators, agents, and volunteers. The purpose of the survey was to gather information regarding help desk inquiries to prioritize certain topics to be implemented in VCEMG services such as workshops and presentations. The topics that arose most frequently through the help desk can be used to prioritize programming efforts and support resources and reporting processes. Additionally, data was collected regarding the types of topics that are already being implemented into current VCEMG programming to compare requests to current program offerings.

Instrumentation

Surveys were distributed to all VCE offices with master gardener units, with administrators, volunteers, and agents asked to complete the survey (n =77). Multiple job

positions serve as administrators for VCEMG programs, and therefore we requested survey respondents to only give one response per office to ensure reliability and validity of data. An initial email was sent to five master gardener coordinators in each region of Virginia to determine the nominal variables included in the survey. The initial email asked the question "what are the top 5 topics that occur most frequently through help desk inquiries?" The topics that had the highest frequencies in the email responses were included as topic options in the survey. The survey was distributed through QuestionPro. A copy of the survey is provided in Appendix B. Survey questions were developed to reflect common horticultural topics and VCEMG logic model outcomes. Surveys were sent out through the current Virginia master gardener state coordinator, Kathleen Reed, who had accessibility to all VCEMG offices and response rates would likely be higher if sent by her. The survey was pilot tested by two master gardener coordinators, a VCE Extension agent, and three research committee members. All personally identifiable information was removed.

Data Analysis

Survey questions were closed-ended with nominal variables. Most of the questions had options to choose multiple responses. Frequency analysis was performed to determine the most common topics that were selected in the survey. A comparative analysis was conducted to determine the differences in the most common horticultural requests from the help desk, and the topics that each master gardener program is addressing through programming. Responses were categorized and analyzed based on plant hardiness zone and season. An "other" option for the topic questions is included in the survey to provide an opportunity for an agent, coordinator, or volunteer to type in a topic not offered on the list, as we assume there are a wide range of topics arising through the help desk.

Findings

Results

Surveys were sent out to 77 administrators, agents, and master gardener volunteers

(n=77) across Virginia. 27 of the surveys were completed, resulting in a 35% response rate.

40.74% of the respondents indicated that their Extension office served a large city (>150,000

residents), 25.93% of respondents said their Extension office served a suburb near a large city

(100,000-150,000 residents), 22.22% respondents said their Extension office served a small city

or town (25,000-50,000 residents), and 11.11% of respondents indicated that their Extension

office served a rural area (<2,500 residents).

There are 62 Extension offices with master gardener units. Of those 62 units, 1.61% of

units are located in zone 6a, 19.4% in zone 6b, 41.9% in zone 7a, 25.8% in zone 7b, and 11.3%

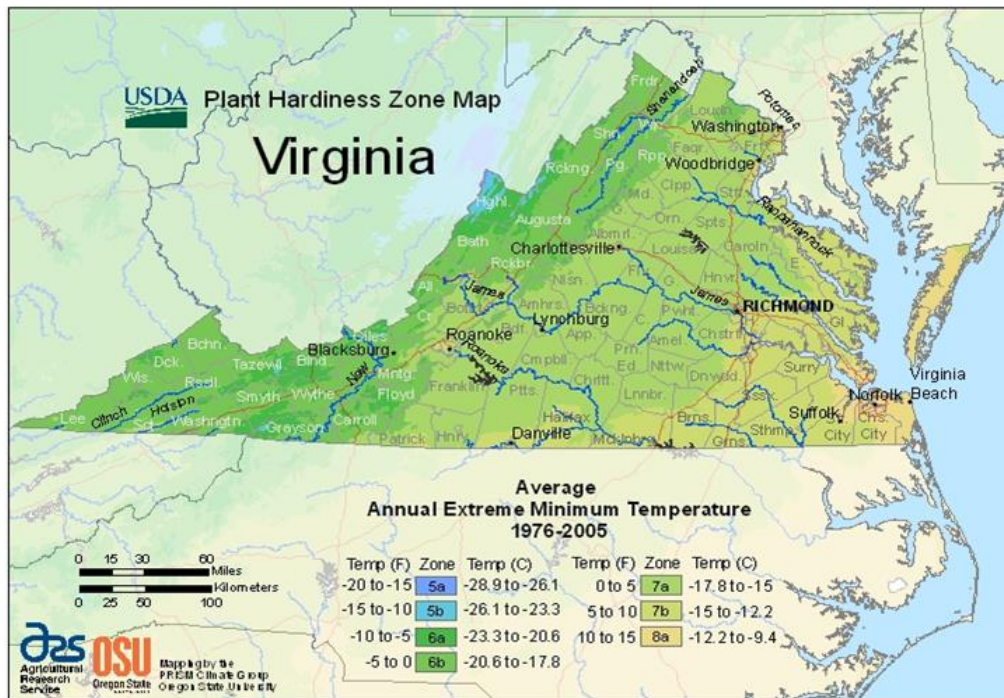in 8a. In terms of survey respondents, 3.70% of respondents were in hardiness zone 6a, 3.70% in

Figure 3: USDA Plant Hardiness Zones of Virginia (Map Downloads, n.d.)

zone 6b, 29.63% in zone 7a, 48.15% in zone 7b, and 14.81% in zone 8a. 0 respondents were in zones 5a or 5b. Figure 3 shows a map of Virginia hardiness zones.

In terms of respondent's role at their Extension office, 34.48% indicated that they were a volunteer, 27.59% indicated that they were a volunteer coordinator, 20.69% indicated that they were an Extension agent, and 17.24% indicated that they were paid staff. Surveys were sent out to those with different roles in their Extension office because some roles in certain offices may be more knowledgeable about their help desk data than others, and we wanted those who had the most information to be given an opportunity to respond to the survey.

Zone 7b

13 out of the 27 survey respondents were in zone 7b, giving it the highest respondent percentage (48.15%). Of the topics presented in the survey, plant problem diagnosis remained the most popular topic chosen by respondents in the spring (92%) and the summer (92%). Plant maintenance was the prevailing topic during the fall season (85%) and remained the highest along with plant problem diagnosis in the winter (38%). Pollinators and pesticide and fertilizer
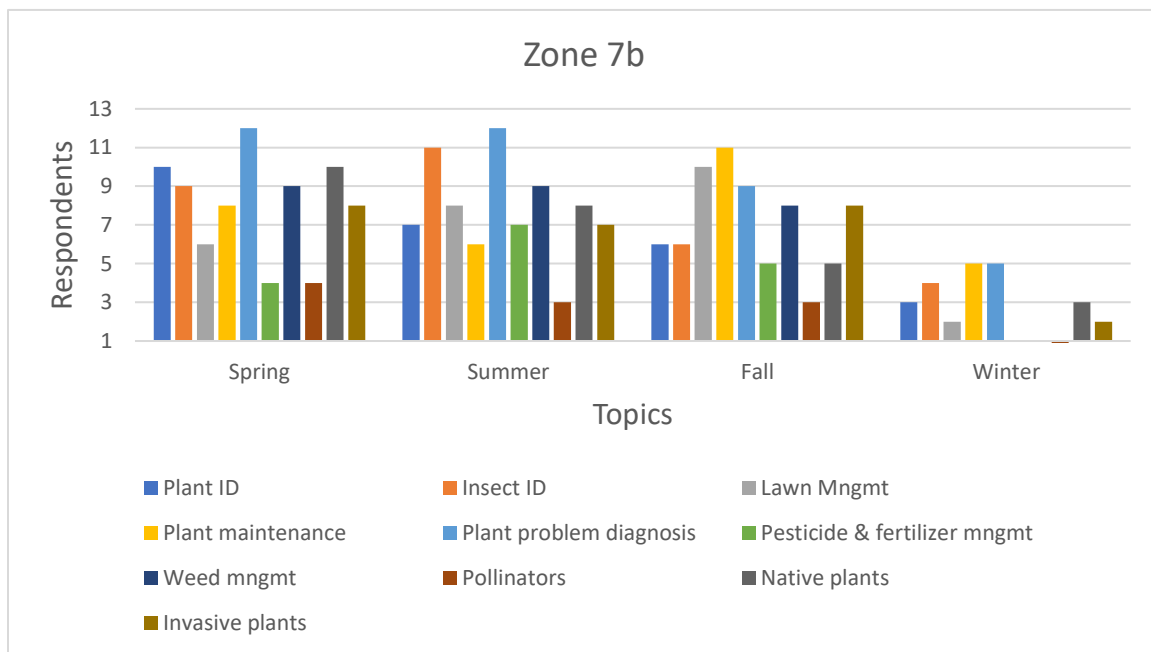

Figure 4: Zone 7b Topics by Season and Number of Respondents

management were the least chosen topics in the spring (31%), and pollinators remained the least

chosen topic in the summer (23%) and fall (23%). During the winter season, pesticide and

fertilizer management, weed management, and pollinators had a 0% response rate (see Figure 4).

Zone 7a

8 out of the 27 survey respondents (29.63%) indicated that they were located in zone 7a.

Of the topics presented in the survey, plant problem diagnosis prevailed as the most popular

topic throughout the spring (88%), summer (88%), and fall season (75%), with pesticide and

fertilizer management having an equal number of respondents in the summer (88%), and plant

maintenance having an equal number of respondents in the fall (75%). Plant maintenance was

the most frequently chosen topic in the winter season (63%). Pollinators was the least chosen

topic in the spring (13%) and summer (25%) and tied with plant identification (ID) as the least

popular topics in the fall (25%). Pollinators and native plants had a 0% response rate for the
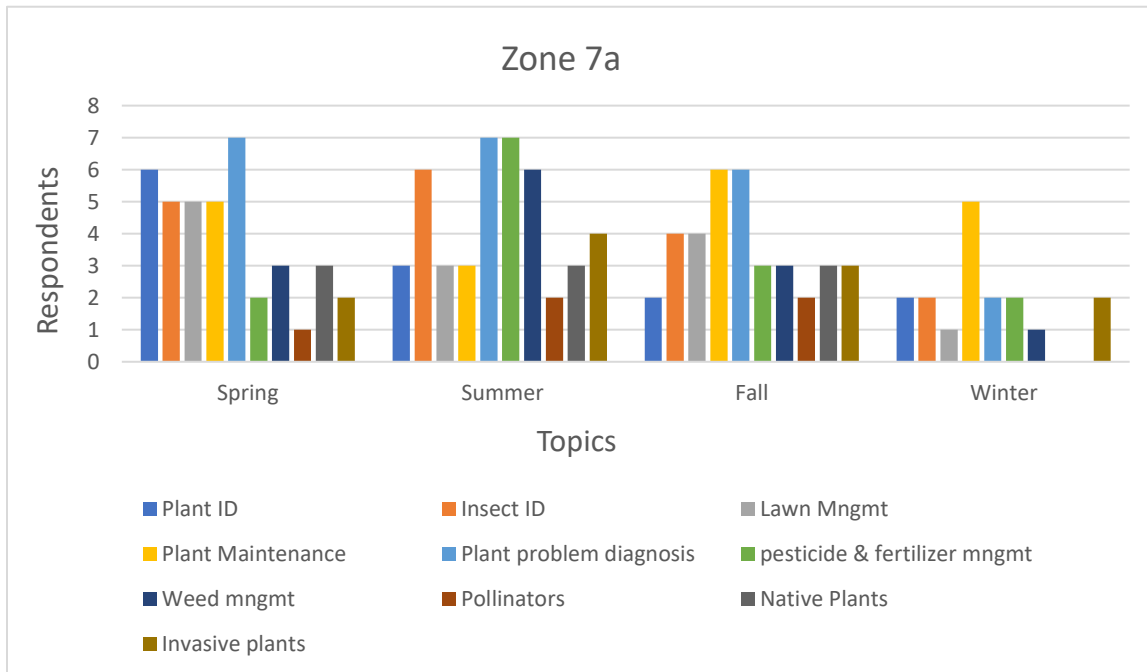
winter season (see Figure 5).

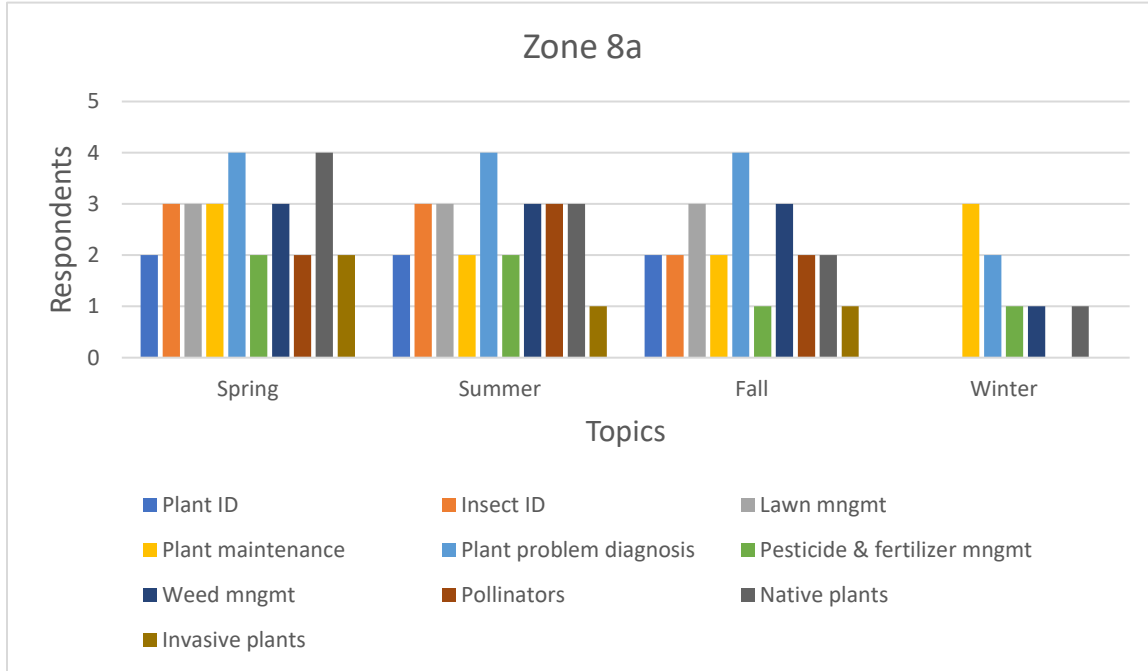*Figure 5: Zone 7a Topics by Season and Number of Respondents*

Zone 8a

Figure 6: Zone 8a Topics by Season and Number of Respondents

4 out of the 27 survey respondents (14.81%) indicated that they were in zone 8a. Of the topics presented in the survey, plant problem diagnosis had the highest response rate in the spring (100%), summer (100%), and fall (100%) tied with native plants in the spring (100%). Plant maintenance had the highest response rate in the winter (75%). Plant ID, pesticide and fertilizer management, pollinators, and invasive plants all tied with the lowest response rate in the spring (50%). Invasive plants had the lowest response rate in the summer (25%) and fall (25%). Plant ID, insect ID, lawn management, pollinators, and invasive plants had a 0% response rate in the winter season (see Figure 6).

Zone 6a

Zone 6a had one respondent. A graph was made similar to the previous zones for uniformity and ease of understanding. Of the topics presented in the survey, lawn management and native plants were not chosen as topics of interest for any of the four seasons. In addition to

the previous two topics not chosen for any season, pollinators and invasive plants were not

chosen during the spring season. For the summer season, plant maintenance, pollinators, and
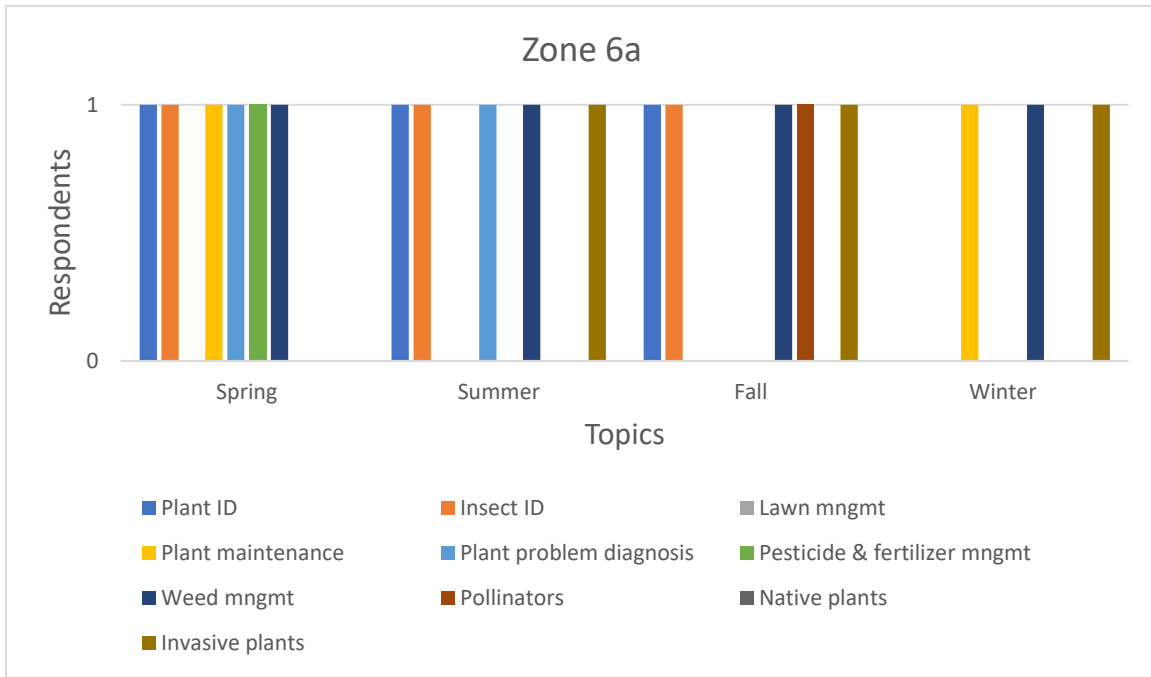

Figure 7: Zone 6a Topics by Season and Number of Respondents

pesticide and fertilizer management were not chosen as topics of interest. For the fall season,

only weed management, pollinators, and invasive plants were chosen as topics of interest. In the

winter season, only plant maintenance, weed management, and invasive plants were chosen as

topics of interest (see Figure 7).

Zone 6b

Zone 6b had one respondent. Of the topics presented in the survey, lawn management,

weed management, pollinators, native plants, and invasive plants were not chosen as topics of

interest for any of the four seasons (see Figure 8). In the spring, plant ID, insect ID, and plant

problem diagnosis were chosen as topics of interest. In the summer season, insect ID, plant
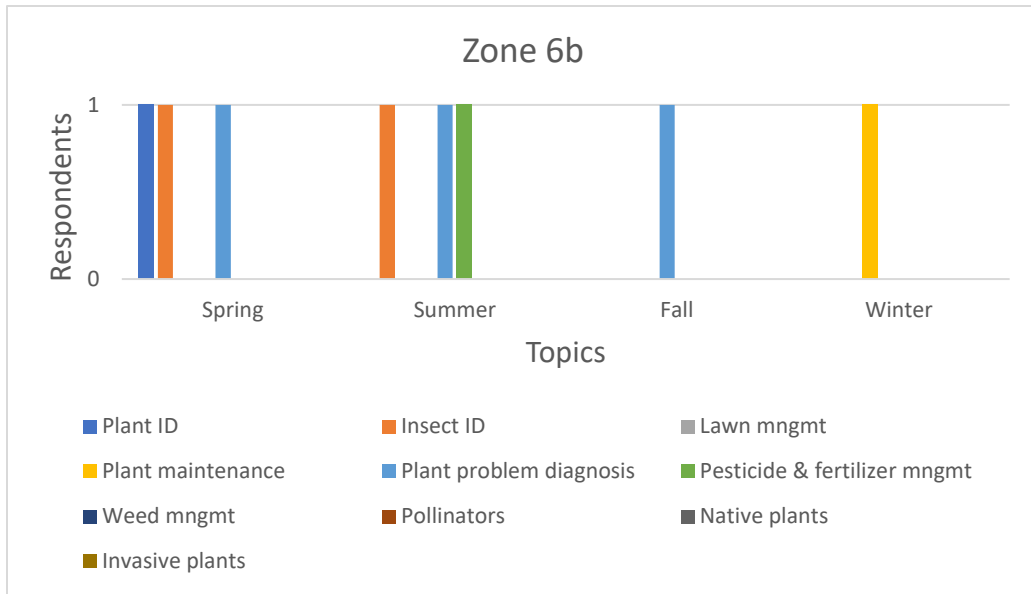
Figure 8: Zone 6b Topics by Season and Number of Respondents

problem diagnosis, and pesticide and fertilizer management were chosen as topics of interest. In the fall season, plant problem diagnosis was the only topic chosen. In the winter season, plant maintenance was the only topic chosen.

Current Program Topics

The last portion of the survey aimed to assess the topics that were already being implemented in current master gardener program initiatives (see Figure 9). Frequent topics of interest from each zone can be compared to current program topics to determine what types of programs to prioritize over others. Due to the number of respondents for each zone, topics will appear much less frequently in particular zones.

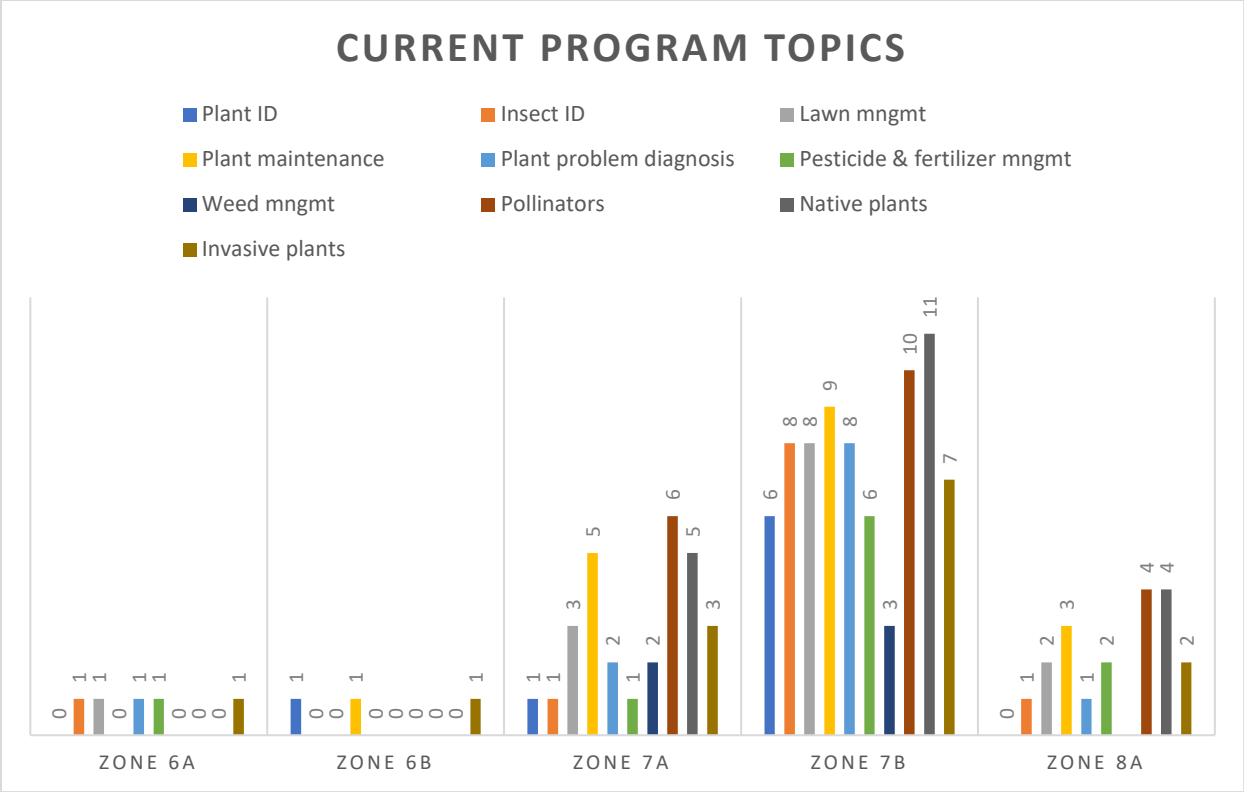*Figure 9: Current Master Gardener Program Topics*

Discussion

Plant hardiness zones can provide insight into how particular climatic conditions affect horticultural interests and issues. Categorizing based on season is very similar to why we categorize based on hardiness zone. A person is generally less likely to be concerned about pollinators during the winter, and average annual minimum temperatures can have an effect on what programs community members are interested in each season. The results showed that seasonality had a significant effect on the frequency of topics of interest, with winter having consistently lower response frequencies per topic in every zone. While the hardiness zones differed in response rates, they still showed significantly different topic interests across the board. Some differences in topic interest and frequency may be attributed to climatic differences,

and other differences may just occur at random. We will go into further detail in the following sections.

Zone 6 (2 responses out of 62 offices)

Hardiness zone 6 spans across 38 states, spanning from the Northeast to the Midwest and all the way to the Northwest (Logie, 2022). Zone 6 experiences more extreme winters than the other zones in this study, with temperatures reaching -10°F. With this being said, inhabitants of zone 6 must ensure that they choose perennial plants that are hardy and can withstand lower temperatures (Logie, 2022). Because of these lower temperatures, they experience a shorter growing season than zones 7, 8, and higher.

Zone 6a (1 response out of 62 offices) showed no interest in lawn management or native plants throughout all four seasons. Harsher winters and shorter growing seasons may explain the lack of interest in lawn management. Current programming for zone 6a includes insect ID, lawn management, plant problem diagnosis, pesticide and fertilizer management, and invasive plants.

Zone 6b (1 response out of 62 offices) showed no interest in lawn management, weed management, pollinators, native plants, and invasive plants throughout all four seasons. Current programming for zone 6b includes plant problem diagnosis, plant maintenance, and pollinators.

Zone 7 (21 responses out of 62 offices)

Hardiness zone 7 spans across 28 states, including Virginia, Tennessee, Arkansas, Texas, New Mexico, and a few other Western states (Logie, 2022). The climate of areas located in zone 7 tends to be mild in temperature as opposed to other zones that have extremely high and low average annual temperatures. The last frost date for zone 7 occurs around April 15th, with the first frost date being around November 15th (Logie, 2022). Because of the warm, humid summers

and mild winters of zone 7, landscaping and lawn maintenance tend to be topics of interest for many inhabitants.

Zone 7a (8 responses out of 62 offices) showed great interest in plant problem diagnosis, pesticide and fertilizer management, and plant maintenance. Current programming for zone 7a addresses pollinators and plant maintenance predominantly. Interestingly, pesticide and fertilizer management and plant problem diagnosis were not addressed very frequently in zone 7a.

Zone 7b (13 responses out of 62 offices) showed great interest in plant problem diagnosis and plant maintenance. Current master gardener programming for zone 7b addresses lawn management and pollinators as their two most frequent programming topics. However, plant maintenance and plant problem diagnosis do not fall short. Weed management is the topic that is addressed the least frequently by offices in 7b. While comparing the data from zone 7b interests and current programming, pollinators proved to be the lowest topic of interest in zone 7b, but programming efforts were focused greatly on this subject.

Zone 8 (4 responses out of 62 offices)

Zone 8 spans throughout the southern United States, including a small portion of eastern Virginia. The Southeast, Midwest, Southwest, and parts of the Southwest experience average annual minimum temperatures of 10°F-20°F (Logie, 2022). Because minimum temperatures are much warmer than other zones in this study, some annual plants can over-winter in this zone, and it is not difficult to choose perennial plants that will thrive throughout the winter. The high temperatures in this zone may cause unusual weather patterns, which can affect plant growth in a variety of ways (Logie, 2022).

Zone 8a (4 responses out of X offices) showed great interest in plant problem diagnosis, as it had the highest response rate in all four seasons. This can be attributed to the high

temperatures and unusual weather conditions that may cause unique problems for growers in this zone. Native plants and plant maintenance were also topics of great interest in zone 8a. Pollinators and invasive plants had the lowest frequencies across the board. Current master gardener programming efforts in this zone were centered around pollinators, native plants, and plant maintenance.

Recommendations

The purpose of this project was to examine the content of the questions that come into the help desks and determine differences in content between hardiness zones and different seasons. These differences can lead to program topic prioritization for offices in particular zones as well as during each season. The first recommendation is that VCEMG administrators utilize the data from this study to allocate their resources towards topics that are of great interest to their communities. This will result in greater community support which will lead to more funding opportunities for continual improvement of master gardener programming (Franz, 2015). Recommendations for certain topics can be found below.

Recommendations- Practitioner

Recommendations were only made for offices located in zones 7 and 8, as they were the zones that had the highest response rates, and therefore more accurate conclusions can be made regarding these zones. Recommendations were made based on survey responses (27), not the number of VCEMG units (62). It is recommended that offices located in zone 7a focus their programming efforts on plant problem diagnosis, pesticide and fertilizer management, and plant maintenance as they were topics with a consistent response rate of 75% or more across all four seasons. The data shows that pesticide and fertilizer management and plant problem diagnosis were not being prioritized in current program planning. Only 12.5% of respondents in zone 7a

were incorporating pesticide & fertilizer management into their master gardener programming, and only 25% of respondents were incorporating plant problem diagnosis. Resources should not be allocated to pollinator education, as this topic had a consistent response rate of 25% or lower across all four seasons.

It is recommended that offices located in zone 7b focus programming efforts on plant problem diagnosis and plant maintenance as those were topics of great interest across the board, with consistent response rates of 85% or higher in all seasons except winter. Similarly, to zone 7a, pollinators was a topic of very little interest in zone 7b, with a response rate of 31% or lower in all four seasons, yet 79% of respondents in zone 7b were incorporating pollinators into master gardener programming.

It is recommended that offices located in zone 8a focus most of their programming efforts on plant problem diagnosis, native plants, and plant maintenance education, as those topics had consistent response rates of 75% or higher across all four seasons. 100% of respondents in zone 8a were incorporating pollinators into their master gardener programming efforts despite it having a response rate of 50% or below during three out of the four seasons.

Based on the findings, we now know that certain topics were not reported on during particular seasons in each zone. Because it is obvious that winter is the slowest season for the master gardener help desk, it is recommended that Extension staff focus staff training and educational preparation efforts during this time in order to equip themselves for the busy spring and summer seasons. The data shows topics that were of interest during particular seasons, meaning that Extension personnel should equip themselves with the proper materials and knowledge prior to those seasons to properly educate the community in a timely manner.

The last recommendation is that offices with master gardener units implement annual evaluations on their help desks. Although help desks are not used as frequently as they were in the past, the data can still provide helpful insight into what programs are of interest to Virginia communities. Currently, there is no data supporting help desk evaluations in Virginia. This study has proved the importance of help desk data in program planning for continuous program improvement. The self-determination theory of motivation can be used in conjunction with the results from this study to increase community engagement in Extension programs by allocating resources towards the topics that had the highest frequencies. High frequencies of certain topics arising from the help desk can indicate a need for better programming and education on those topics, and therefore community members may be more motivated to engage in certain programming that aligns with the topics that they are less educated on.

Recommendations for Future Research

Future research should be conducted on specific needs of Virginia communities. While the help desk data gathered in this study does provide insight into help desk inquiries in relation to current programs, it would be helpful to do a community-based needs assessment and compare results with help desk inquiries.

Protection of Human Rights

Respondent identification (phone numbers, addresses, names, etc.) is not necessary or pertinent in drawing conclusions and making recommendations in this study. Detailed information about help desk callers and master gardener coordinators were not relevant in the study, and therefore do not pose a risk to human rights. All information will be kept confidential and when pooled for analysis, will become anonymous.

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Appendix A:
Virginia Cooperative Extension Master Gardener Logic Model (Rutherford et al., 2022)

Logic model table with main columns: **Inputs** | **Outputs** (Activities, Participation) | **Outcomes -- Impact** (Short Term, Medium Term, Long Term)

Inputs	Outputs — Activities	Outputs — Participation	Outcomes — Short Term	Outcomes — Medium Term	Outcomes — Long Term
- State program leadership - Local program coordinator - Curriculum instructors - Support staff - Participants - Mentors - Instructors - Stakeholders - Time - Money - Volunteer management system - Technology - Marketing & advertising - Meeting space - Transportation - Training manual - Training materials & supplies	- Training courses; lecture and lab - Field trips - Site visits - Reading of training manual - Mentorship - Course-end examination - Course-end presentation - Evaluation survey tools	- Graduation from Master Gardener (MG) trainee to intern to full MG - Data collection of evaluation survey tools - Continuation of mentorship - MG volunteers participate in extension programs	- Increase in the number of MG volunteer trainees and interns - Increase knowledge of sustainable horticulture practices (MG and client) - Increase evaluation skills - Increase awareness of community needs (MG) - Increase awareness of community partners (MG) - Increase in self-confidence (MG) - Increased sense of belonging (MG) - Increase in research capabilities (MG & client) - Improve technology skills (MG) - Improve horticulture skills - Increase in the use of laboratory services at Virginia Tech (MG & client) - MG's reach out to mentor or coordinator for advice and leadership	- MG's interact with community partners - MG's conduct site visits - MG's use research-based information to inform the public about sustainable horticulture practices - MG's recruit future trainees - MG's use technology to correspond with the public - Increased adoption of sustainable horticulture practices (MG & client) - Increased sense of accomplishment (MG & client) - Increased use of evaluation survey tools	- Community increases the adoption of sustainable horticulture practices - Community partners are more aware of the impacts of the master gardener program - Friendships and community partnerships are sustained - Continuation of the master gardener program cycle

Assumptions/context:
- The training program has an established curriculum and statewide and national support groups.
- The master gardener program is often a continuing program and already active in communities.
- Potential to attract a younger and more diverse group of volunteers.
- Failures in recruitment and the retainment of volunteers could have negative effects on the program, leading to failures of long-term outcomes.

External Factors:
- State of the economy/job market
- Availability of instructors
- Access to technology
- Presence of a master gardener coordinator
- Ability of participant to pay training fees
- Participants availability to participate
- Community support
- Stakeholder involvement
- Availability of facility

Appendix B
Master Gardener Help Desk Survey

1. Thank you for choosing to participate in this research study! There are no foreseeable risks associated with this project. Participation is completely voluntary, and if you are uncomfortable with any of the questions, you may withdraw from the survey at any time. All of your personally identifiable information will remain confidential. Thank you for your time and support. The information provided will be used in a research project that has the potential to be published. To demonstrate your understanding and consent, please click I agree below:

☐ I agree

2. What type of community does your Extension office serve?
1. A large city (over 150,000 residents)
2. A suburb near a large city (100,000-150,000 residents)
3. A small city or town (25,000-50,000 residents)
4. A rural area (less than 2,500 residents)

3. What plant hardiness zone are you located in?
1. 5a
2. 5b
3. 6a
4. 6b
5. 7a
6. 7b
7. 8a

4. What is your role at your Extension office?
1. Paid staff
2. Agent
3. Volunteer
4. Volunteer coordinator

5. In the spring season, what topics most frequently arise through the help desk? (select all that apply)
1. Plant ID
2. Insect ID
3. Plant problem diagnosis
4. Lawn management
5. Plant maintenance (pruning, planting, etc.)
6. Pesticide & fertilizer management
7. Weed management
8. Invasive plants
9. Pollinators
10. Native plants
11. Other (please specify)

6. In the summer season, what topics most frequently arise through the help desk? (select all that apply)
1. Plant ID
2. Insect ID
3. Plant problem diagnosis
4. Lawn management
5. Plant maintenance (pruning, planting, etc.)
6. Pesticide & fertilizer management
7. Weed management
8. Invasive plants
9. Pollinators
10. Native plants
11. Other (please specify)

7. In the fall season, what topics most frequently arise through the help desk? (select all that apply)
1. Plant ID
2. Insect ID
3. Plant problem diagnosis
4. Lawn management
5. Plant maintenance (pruning, planting, etc.)
6. Pesticide & fertilizer management
7. Weed management
8. Invasive plants
9. Pollinators
10. Native plants
11. Other (please specify)

8. In the winter season, what topics most frequently arise through the help desk? (select all that apply)
1. Plant ID
2. Insect ID
3. Plant problem diagnosis
4. Lawn management
5. Plant maintenance (pruning, planting, etc.)
6. Pesticide & fertilizer management
7. Weed management
8. Invasive plants
9. Pollinators
10. Native plants
11. Other (please specify)

9. What topics are you currently educating the community on through Master Gardener programming?
This does not include the Master Gardener training program. (select all that apply)
1. Plant ID

2. Insect ID
3. Plant problem diagnosis
4. Lawn management
5. Plant maintenance (pruning, planting, etc.)
6. Pesticide & fertilizer management
7. Weed management
8. Invasive plants
9. Pollinators
10. Native plants
11. Other (please specify)