

2020

The Utilization of User Fees to Manage Research Facilities at Public and Land Grant Universities Survey Results

KENNEDY MAYFIELD-SMITH, ALEXA J. LAMM, ROBERT N. STOUGAARD



**UNIVERSITY OF
GEORGIA**
College of Agricultural &
Environmental Sciences

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Suggested Citation

Mayfield-Smith, K., Lamm, A. J. & Stougaard, R. N. (2020). *Research facility fee utilization assessment findings*. Athens, GA: Department of Agricultural Leadership, Education and Communication.

About the Authors

Kennedy Mayfield-Smith – Graduate assistant, Department of Agricultural Leadership, Education and Communication, University of Georgia

Alexa Lamm, Ph.D.- Associate professor, Department of Agricultural Leadership, Education and Communication, University of Georgia

Robert N. Stougaard, Ph.D.- Assistant dean for research, College of Agricultural and Environmental Sciences, University of Georgia

Acknowledgments

This work is supported by the Associate Dean of Research in the College of Agricultural and Environmental Science at the University of Georgia and would not have been possible without the cooperation and assistance of agricultural experiment station directors, facility directors, research overseers and department heads at a number of public and land grant universities.

Background

We investigated the extent to which Colleges of Agriculture have implemented user fees to help fund shared research facilities. As background, in 2015 the APLU funded a survey to assess capital infrastructure and deferred maintenance issues at schools of agriculture. The total deferred maintenance costs were estimated at 8.4 billion dollars.

To be sure, many research directors and facilities managers struggle to find the necessary funds for the maintenance, repair and replacement of basic infrastructure needs. In turn, faculty are increasingly being asked to help finance and support the infrastructure necessary to conduct research.

The purpose of this project was to explore how research user fee systems are designed, implemented and managed at public and land grant universities. The project focused on three distinct research areas: greenhouses, growth chambers, and field crop research facilities.

Methods

The study used a basic quantitative survey research design to address the research objectives. The survey was initially distributed to an expert panel that included staff, faculty, and administrators specializing in the operation and management of greenhouse, growth

chamber, and field crop research facilities. After the expert panel review, minor changes were made to the instrument. The research protocol was then reviewed and approved by the University of Georgia Institutional Review Board before study initiation. The survey was then prepared for online distribution using Qualtrics, an online survey platform.

The survey population for the study consisted Agricultural Experiment Station (AES) Directors represented in the Association of Public and Land-grant Universities (APLU). Potential respondents (N=80) were identified through an agricultural experiment station research director list maintained by the National Information Management and Support System.

Customized invitations describing the purpose of the survey and containing links to the instrument were emailed in January 2020. The original email was followed up with two reminders and then closed with 36 responses (45% response rate). Respondents represent 26 states and three U.S. territories. The data was analyzed descriptively using SPSS 25.

Survey Limitations and Adjustments

It was brought to the investigators attention that while user fees may be charged for some facilities, they are not charged for all of them leading to confusion when answering survey questions. To combat this confusion questions in the first portion of the survey could be further broken down by asking respondents if the institution charges a facility fee for the specific type of facility they had selected in the previous question. Accessing respondents posed a challenge as well. An updated AES director list would be immensely helpful in reaching out to each institution. Based on the targeted demographic and feedback received from respondents perhaps a focus group or in person survey method is worth looking into.

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Results

Facilities Overview

Respondents were asked to indicate the type of on and off campus research facilities their university had available. Next respondents were asked if they assess fees for the use of any of these facilities. If they did not assess user fees, the respondents were asked if they were interested in pursuing this concept (Figure 1.) Institutions that do utilize user fees are represented by the darkest green (1). Institutions who were definitely interested in the assessment of user fees are represented by the medium shade of green (2) while institutions who were possibly interested in the utilization of user fees are represented by the lightest shade of green (3). Institutions without responses were left blank.

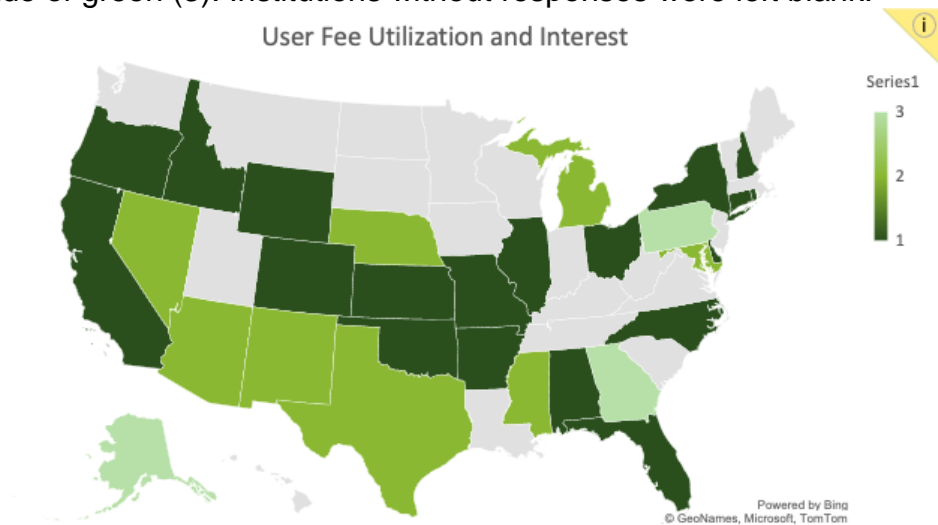


Figure 1

Out of 36 respondents, 20 indicated that they assess user fees as a means to assist in covering facility operating expenses.

Greenhouse User Fee Management

User Fee Policy

Twenty respondents indicated that they employ user fees for greenhouse research facilities. While a few institutions have recently implemented this practice, the vast majority of respondents indicate that fee systems are well established and have been in place for 10 to 20 years (Table 1). Overall, the assessment of user fees for greenhouses is more common than for any other type of research facility.

Table 1. Average length of time a user fee policy has been in place at greenhouse facilities expressed as percentage of respondents.

	<10 Years	10-20 Years	21-30 Years	Unknown
<i>Policy Age</i>	35	45	10	10

Administration

The majority of greenhouses are administered by AES Directors. Greenhouse facilities managers are the second most common administrative lead (Figure 2). This is followed by administrative combinations, where department heads share responsibility with different unit leadership positions. Additionally, there are a few examples where department heads serve as the sole administrative lead. These results indicate that the majority of greenhouse facilities are administered centrally. However, user fees also are assessed at independently managed greenhouses.

Greenhouse Administration

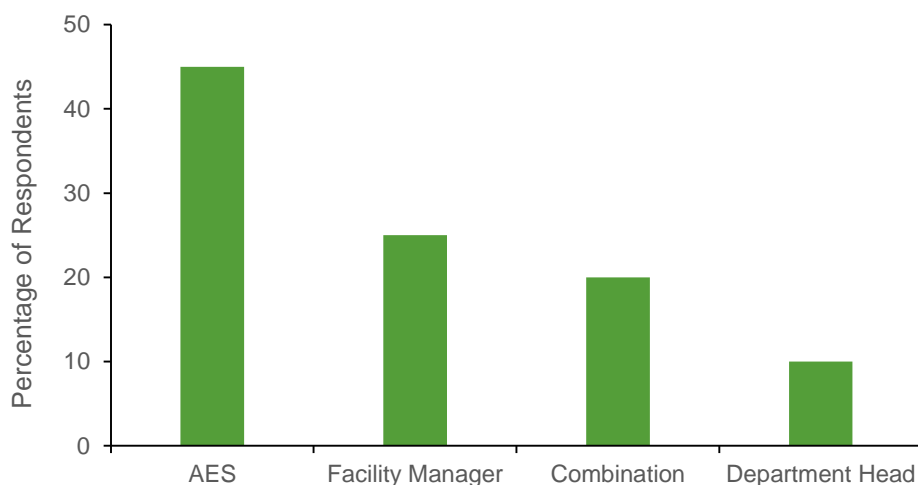


Figure 2

Fee Determination

Not surprisingly, the administrative unit lead typically determines fee schedules. Greenhouse fees are determined by the AES Director in 35 percent of the cases (Figure 3). This is closely followed by advisory committees at 25 percent. Facility managers and administrative combinations determine fees in 15 percent of the cases. The combination systems represent a hybrid of different leadership units who jointly determine the fee rate. And in one instance, fees are determined by the Provost. These results also reflect a centralized greenhouse management system. Within individual institutions, greenhouse fees vary among facilities in 50 percent of the cases. Fee variation occurs as a result of differing locations and administrative leadership, as well as the quality of the greenhouse space.

Fee Determination

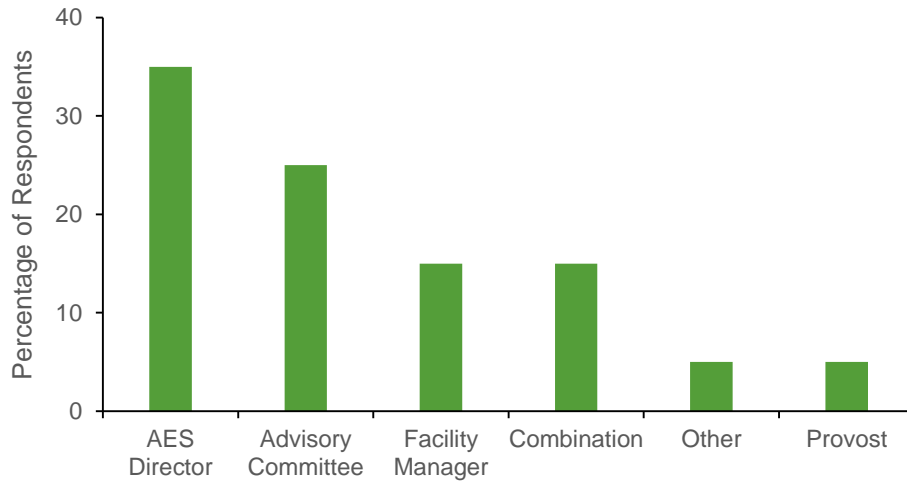


Figure 3

User Fee Assessment Criteria

The most important factor in determining greenhouse user fees is the area utilized by the experiment (e.g. bench, bay, section). Duration of the experiment and services rendered are also important, with both being cited by 65 percent of the respondents (Figure 4). As a result, greenhouse fee structures are commonly expressed in dollars/area/month with other fees being incurred if additional services are provided. Another important factor is the quality or type of greenhouse facility. Greenhouse facilities can be quite variable, and so too, the fees that are assessed. Other considerations mentioned include whether the user was external or internal to the administering unit.

Greenhouse Fee Assessment Criteria

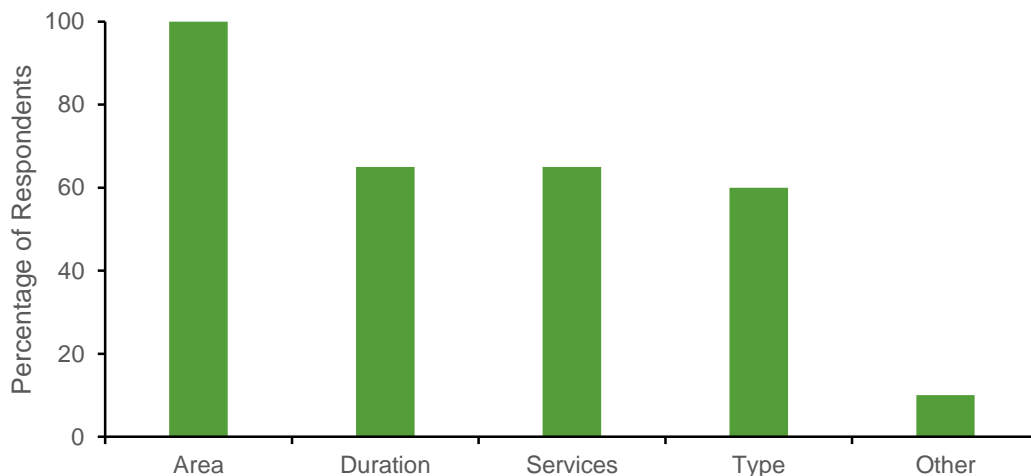


Figure 4

Space Allocation Criteria

Greenhouse space is prioritized based on project type as well as project needs and importance (Figure 5). Project type considers whether the space is being used for research, teaching, extension or by an external user, whereas project needs include items such as BSL containment, photoperiod, and study size. Greenhouse space is also allocated on a first come first served basis as well as by project duration. Other allocation methods include the use of an oversight committee. In some instances, user fees are being assessed, yet greenhouse space is allocated to specific projects based on historical usage. So, while user fees can help contribute to fair space allocation among faculty, space assignments can be regulated by other policy directives.

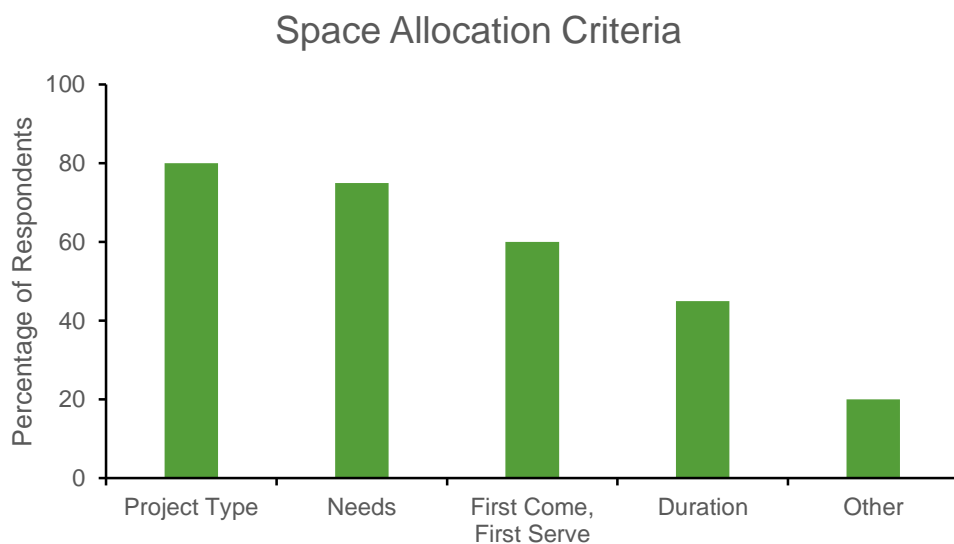


Figure 5

Services Included

Greenhouse user fees also are a function of the services provided. For greenhouse services, respondents most often selected greenhouse maintenance as the most important service. Greenhouse maintenance could include general repair, replacing lights and cooling pads, environmental monitoring, and cleaning of facilities. Study maintenance (fertilization, irrigation, pest management) as well as providing basic materials (potting media, stakes and fertilizer) are other important services associated with greenhouse user fees (Figure 6). Help with establishing studies and assistance with data collection are considered less important.

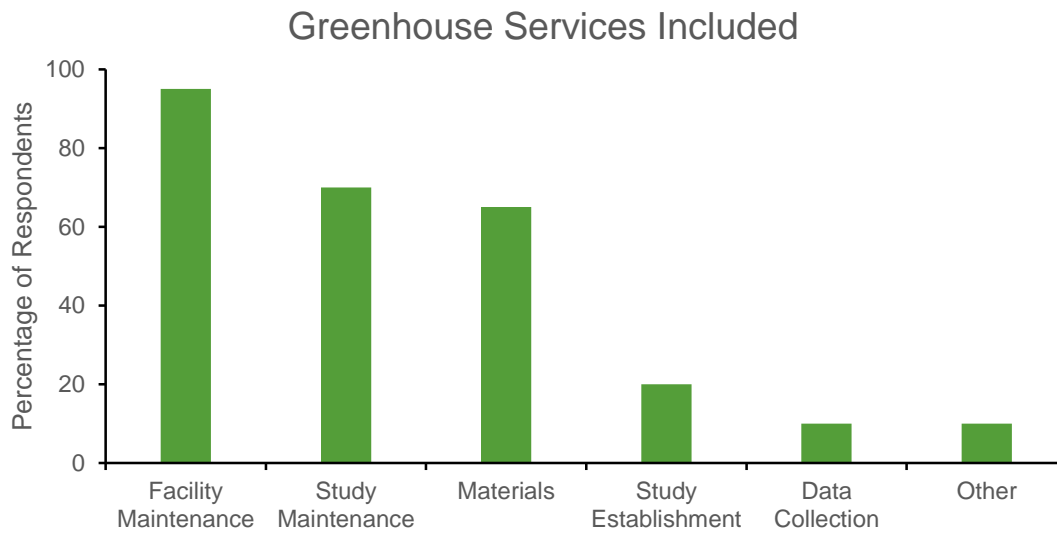


Figure 6

User Fee Revenue Allocation

The majority of greenhouse user fees are directed back to the greenhouse facility, followed by AES Directors and Departments, respectively (Figure 7). Other systems include allocations to an advisory committee as well as shared allocation between administrative unit leaders.

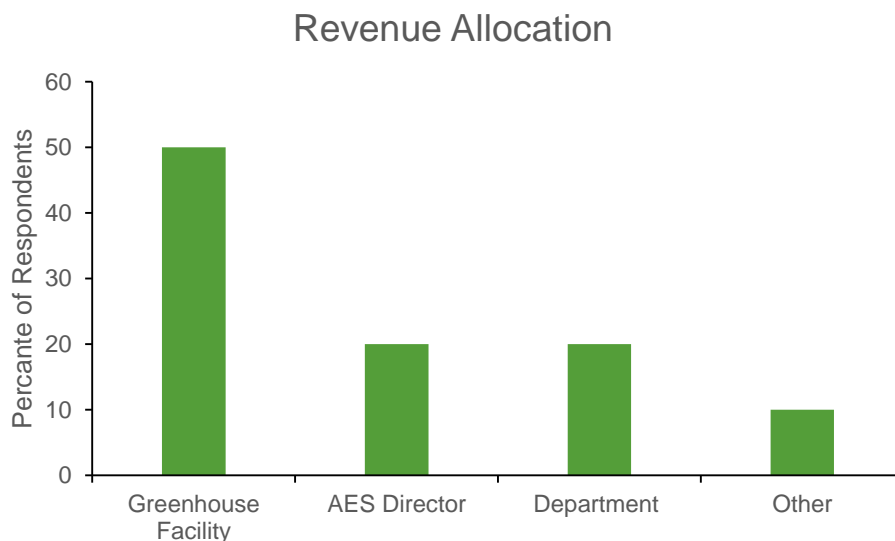


Figure 7

Percentage of Greenhouse Costs Recovered

The main impetus for establishing user fees is to provide funds to help maintain the research infrastructure. In this regard, the survey results demonstrate that greenhouse user fees are primarily used to help defray expenses associated with greenhouse maintenance and operation as well as repair and replacement costs (Table 2). Secondly, the fees are used toward direct material expenses and to help defray labor costs. In fact, 50 to 55 percent of the respondents don't attempt to recover costs in these latter two categories. However, of those institutions that do recover direct material costs, several recoup more than 50 percent of those expenses.

Table 2. Percentage of greenhouse costs recovered

Costs Recovered	0	1 to 25	26 to 50	51 to 75	76 to 100
	(%)				
Operation & maintenance	20	25	40	10	5
Repair and Replacement	20	40	35	5	0
Direct material costs	50	5	25	5	15
Personnel	55	25	15	0	5

Summary

The use of fee schedules to subsidize the operation and maintenance of greenhouse research facilities is a well-established practice. The majority of greenhouse facilities are administered centrally, but independently managed greenhouse units also assess user fees. Both scenarios rely heavily on advisory committees to develop use policies and set fee schedules. Advisory committees often function independently, but also work in conjunction with one or more administrative leads.

Fees are primarily a function of the greenhouse area utilized, duration of the experiment and services provided, but also depend on greenhouse type and quality of the facility. In return, faculty benefit from improved greenhouse repair and maintenance, provision of basic greenhouse materials, and daily study maintenance and facility oversight. To that end, the collected fees are generally allocated back to the greenhouse research facility to help pay for these items.

Other benefits cited by respondents include creating a fair and equitable way to allocate space, more efficient use of greenhouse and headhouse space, technical assistance for researchers and access to mechanical expertise.

Growth Chamber User Fee Management

User Fee Policy

Fifteen institutions assess fees for the use of growth chamber facilities. In comparison to greenhouse systems, growth chamber user fees seem to be a relatively new concept, with many of the policies being initiated within the past 10 years.

Table 3. Average length of time a user fee policy has been in place at growth chamber facilities expressed as percentage of respondents.

	<10 Years	10-20 Years	21-30 Years	Unknown
<i>Policy Age</i>	47	33	13	7

Administration

Similar to greenhouses, growth chamber facilities are most often managed by AES Directors and facilities managers (Figure 8). Both administrative types are cited at 33 percent, and again indicates a centrally managed system. Administrative combinations are also common, being identified in 20 percent of the cases. In all instances the administrative combination includes the facility manager along with different unit leadership positions. In a few instances, growth chambers are managed by specific departments, and in some cases, by individual faculty.

Growth Chamber Administration

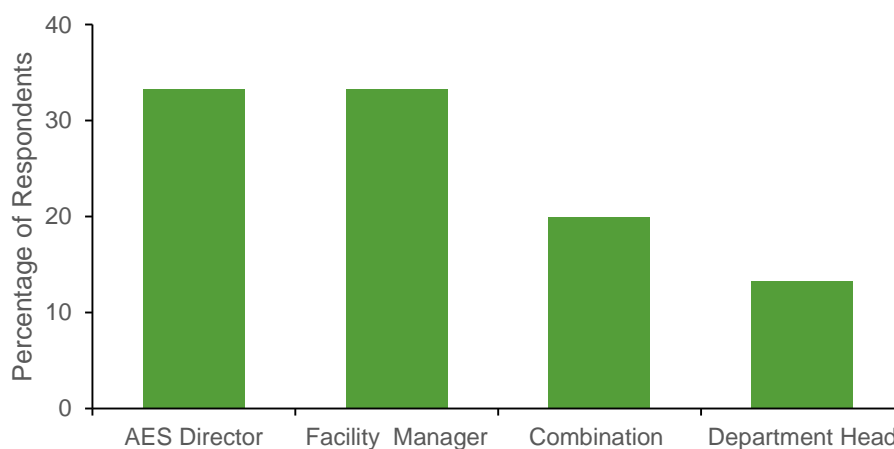


Figure 8

Fee Determination

Growth chamber fee schedules are determined in a manner similar to that of greenhouses, with advisory committees (40%) and AES Directors (33%) most often setting rates (Figure 9). In contrast to greenhouse systems, facility managers are seldom responsible for setting growth chamber fees. So, while facility managers often administer growth chamber facilities, the data indicate they rely on advisory committees to determine fee schedules. Growth chamber fees are also determined at a low frequency by Provosts and Department Heads, while one institution utilizes a facilities service center to determine fees. Growth chamber fee schedule assessments are applied consistently throughout an institution in 60 percent of the cases but vary 40 percent of the time depending on ownership and quality of the growth chamber.

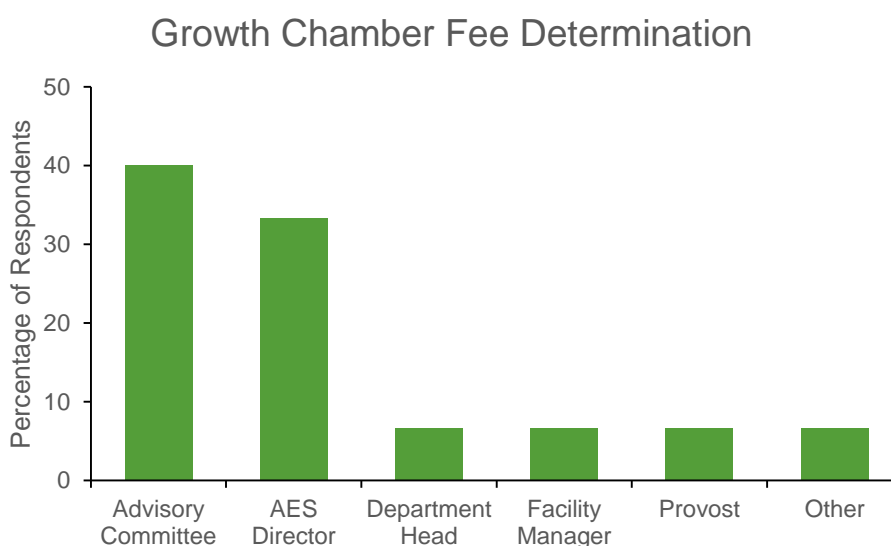


Figure 9

User Fee Assessment Criteria

When asked how growth chamber fees were assessed, area utilized and duration of the experiment were equally important and were the primary considerations impacting fee assessment (Figure 10). As such, growth chamber fee schedules are calculated in a manner similar to that of greenhouses and are also expressed in dollars/area/month. The type and quality of the facility is also an important consideration, but it is not as critical as it is for greenhouses. This may be due to greater overall similarity in type and quality of growth chamber facilities relative to greenhouses. Fees are also assessed for services provided, but this type of charge is less common than it is for greenhouse facilities. Other fee assessments are based on whether growth chamber use is internal or external to the administrative unit.

Growth Chamber Fee Assessment Criteria

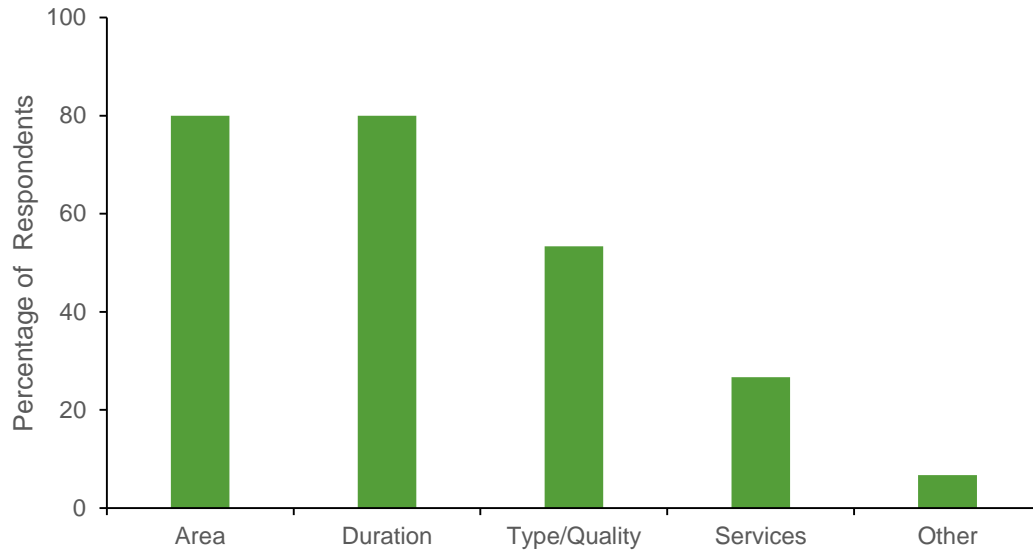


Figure 10

Space Allocation Criteria

Growth chamber research space is allocated based on project type, first come first serve, project needs and project duration, respectively (Figure 2). Project type considers whether the space is being used for research, teaching, extension or by an external user, whereas project needs include items such as humidity, temperature and photoperiod requirements. Growth chamber space is also allocated based on input from advisory committees, as well as ownership of the unit. In the latter case, ownership is typically an individual faculty member or a department.

Space Allocation

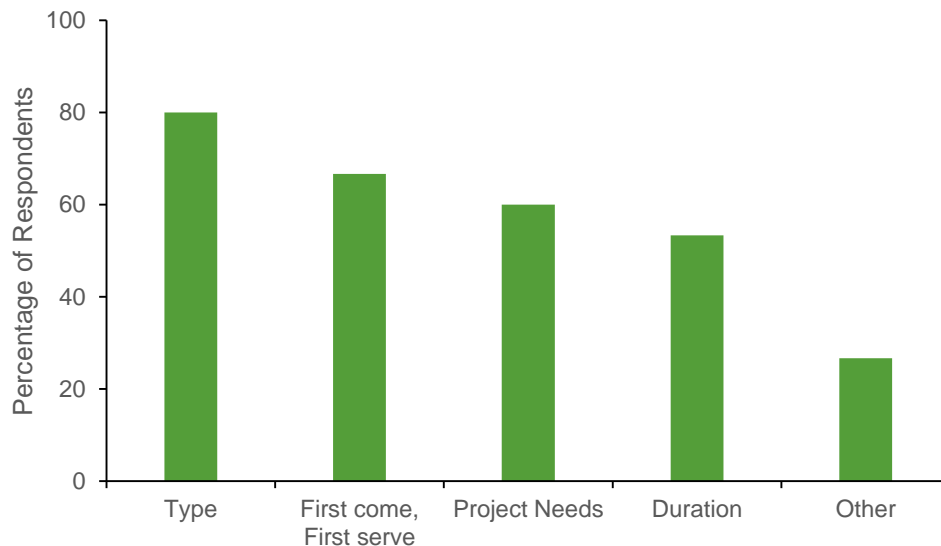


Figure 11

Services Included

Growth chamber maintenance is considered the most important service, and could include changing lights, environmental monitoring and general repairs and cleaning. Basic materials and study maintenance are of secondary importance, while study establishment and data collection are least important (Figure 12).

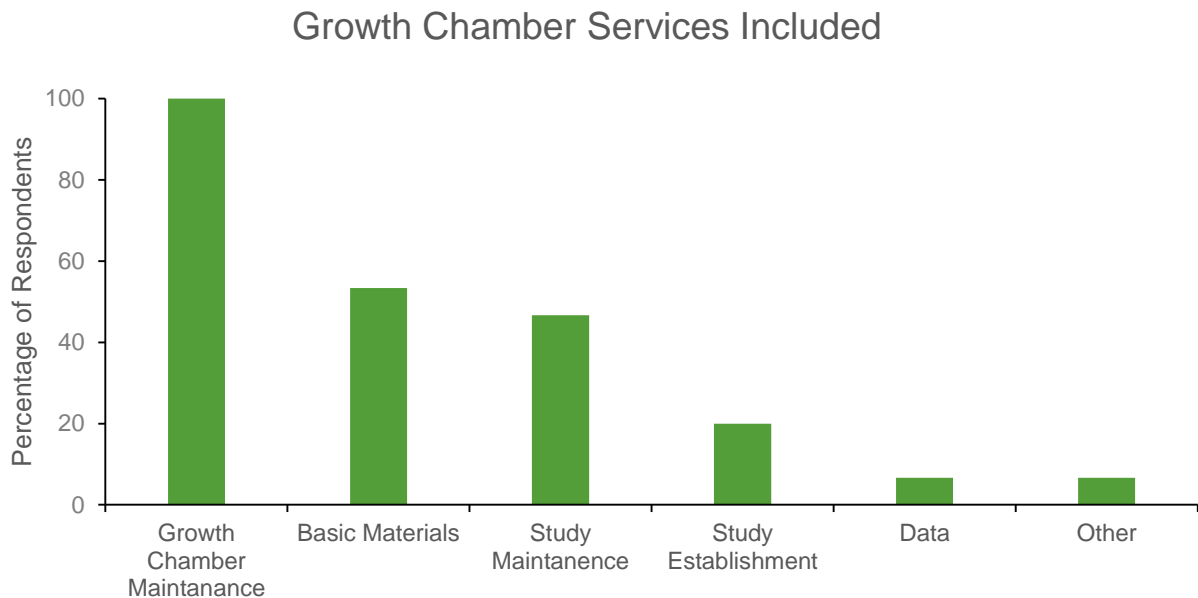


Figure 12

User Fee Revenue Allocation

The majority of the revenues are directed back to the growth chamber facility. Less frequently, revenue is allotted to the administering department. Other scenarios include funds assigned to a combination of administrative partners, returned to a centralized management body such as an advisory committee or to the plant growth facilities core service center.

Growth Chamber Revenue Allocation

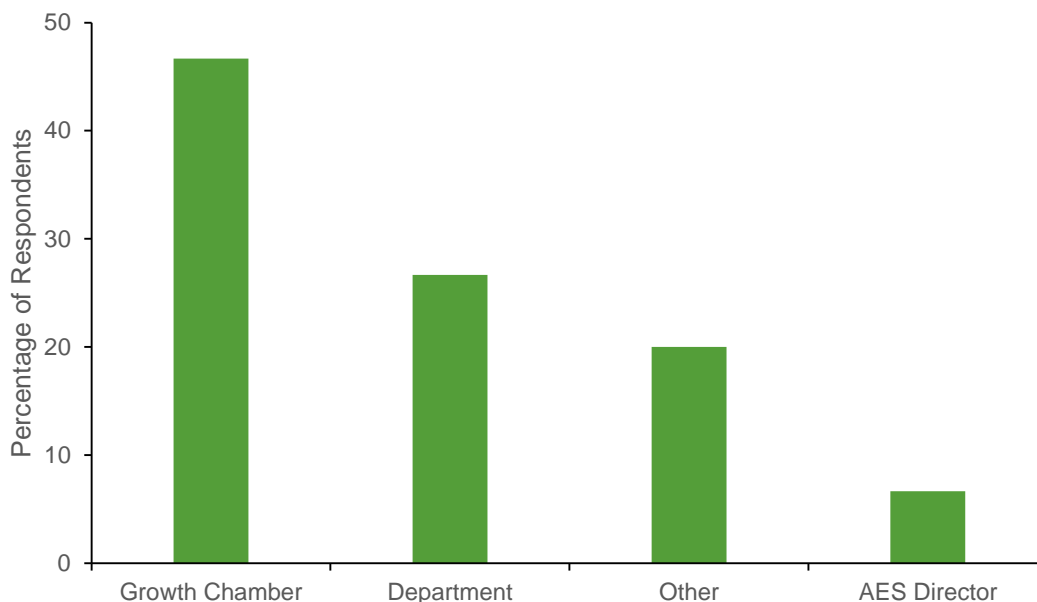


Figure 13

Percentage of Growth Chamber Costs Recovered

Of the revenue returned to the growth chamber facility, the majority of the funds are directed to maintenance and operation, and repair replacement expenses (Table 4). This makes sense inasmuch as growth chamber maintenance is viewed as the most important service associated with fee assessments. A smaller percentage of fees are allocated to material costs and personnel expenses. Relative to greenhouse expenses, growth chamber user fees tend to recover a higher percentage of total costs.

Table 4. Percentage of growth chamber costs recovered

Costs Recovered	Percentage of Respondents				
	0	1 to 25	26 to 50	51 to 75	76 to 100
	(%)				
Facility operation & maintenance	27	27	20	7	20
Repair and replacement	60	20	13	0	7
Direct material costs	20	33	27	7	13
Personnel	67	0	13	7	13

Summary

The adoption of fee schedules for growth chamber facilities is a relatively recent event, with most systems being initiated within the past 10 years. Most growth chamber facilities are administered by the AES Director or by a facilities manager. In the latter case, fees are typically determined by advisory committees. Fee schedules are generally based on the area utilized and the duration of the experiment. Nevertheless, the benefits derived from growth chamber user fees closely resemble those outlined by greenhouse user fees, and highlight the importance of technical support directed to facility operation and maintenance throughout

the year. Equipment replacement and upgrades, and increased efficiency in space utilization and allocation are also recognized benefits associated with user fees.

Field Crop User Fee Management

User Fee Policy

Fifteen of the respondents indicated that they employ user fees to help with the financial support of field crop research facilities. The implementation of this type of policy also is relatively recent, with most institutions initiating this assessment within the past 10 years or so. The increased adoption rate of such policies suggests a growing realization that additional funds are needed to operate and maintain these facilities.

Table 5. Average length of time a user fee policy has been in place at field crop facilities expressed as percentage of respondents.

	<10 Years	10-20 Years	21-30 Years	Unknown
<i>Policy Age</i>	40	27	13	20

Administration

The AES Director is the most common administrative lead, followed by Department Heads. Administrative combinations are also common, being identified in 20 percent of the cases. In most instances the administrative combination includes the AES Director and facilities manager. Facility managers rarely are cited as the administrative lead for field crop research facilities. Relative to greenhouse and growth chambers, a higher percentage of field crop research facilities are managed by individual departments.

Field Crop Administration

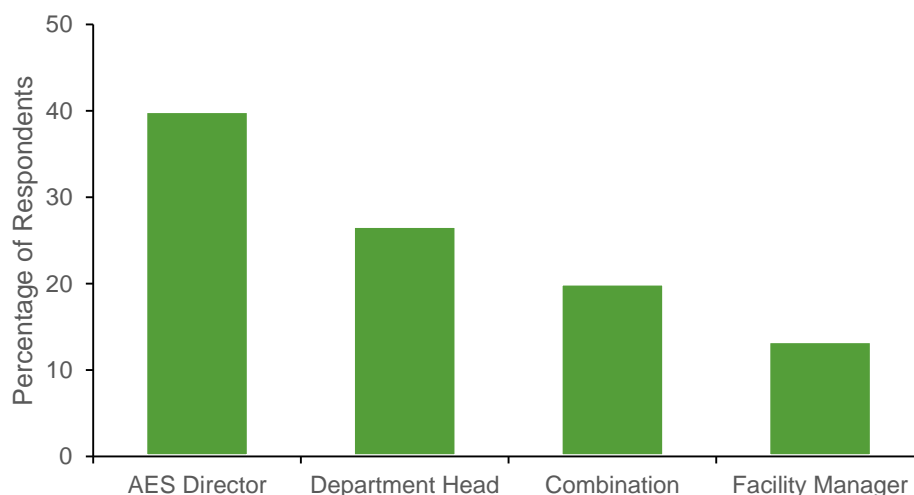


Figure 14

User Fee Determination

There is wide variation in who determines user fees at field crop research facilities (Figure 15). The top selections are AES Directors and facilities managers at 33 and 20 percent, respectively. Advisory committees and administrative combinations are utilized by 13 percent of the respondents, while Provost and Department Heads determine fees in 7 percent of the cases. In addition, one institution uses an internal cost analysis to determine fees.

These results indicate that AES Directors and Department Heads often delegate fee determination to others, such as advisory committees and/or facilities managers. It's interesting to note that while the facility managers have little administrative authority over the facility, they often determine the fee schedules.

Within an institution, fees are uniformly applied in 67 percent of the cases. When fees did vary it was largely associated with the location of the facilities and the differences in direct expenses attributed to producing various types of crops.

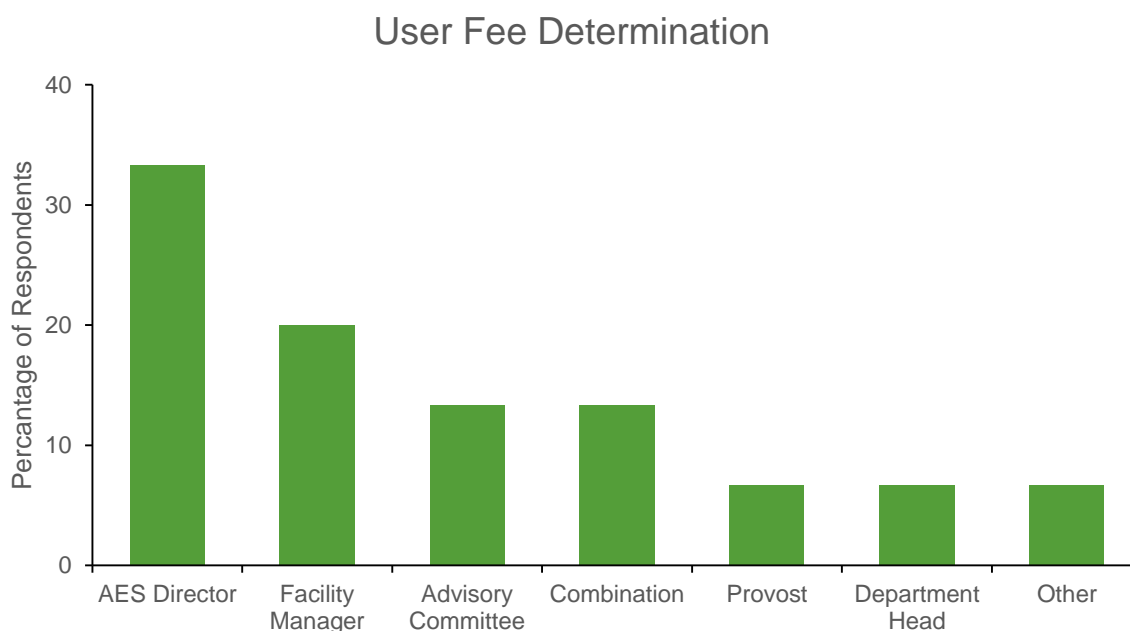


Figure 15

User Fee Assessment Criteria

Fee assessment at field crop research facilities largely depends on the size of the experiment and the services rendered (Figure 16). As such, fees are often expressed on a dollar per acre basis. The commodity grown is also a consideration, as some crops require more intensive inputs and management than others. The duration of the study also is a contributing factor, and is a consideration with perennial crops and multi-year experiments.

Field Crop Research Facility User Fee Assessment

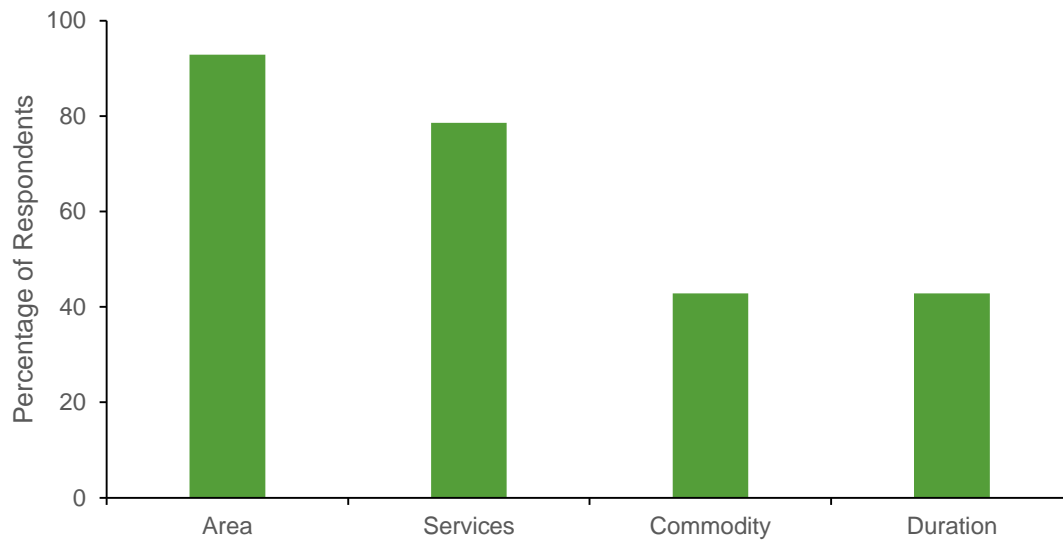


Figure 16

Space Allocation Criteria

As mentioned above, area utilized is a major contributing factor in determining fee schedules at field crop research facilities. Space allocation is largely determined by project needs such as rotational considerations, pest prevalence, or access to irrigation (Figure 17). Project type also impacts space allocation, and considers whether the project pertains to research, teaching, extension or is external to the institution. Space is also allocated based on a first come first served basis. The duration of the experiment is another consideration. And in one instance space was assigned through the use of an oversight committee.

Space Allocation

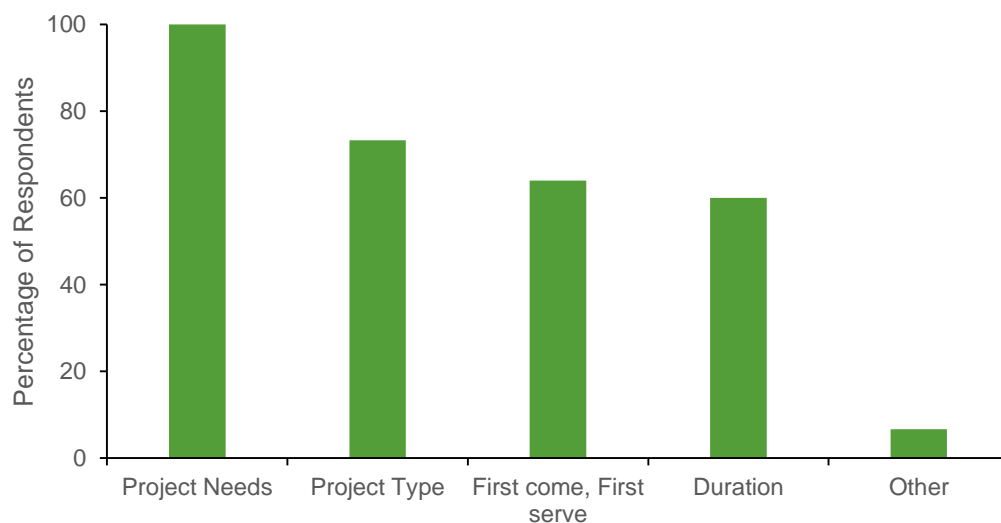


Figure 17

Services Included

The provision of basic materials is considered the most important service, followed closely by study maintenance (Figure 18). Basic materials could include providing items such as seed and fertilizer, while study maintenance considers activities such as mowing, pest management, and irrigation. Study establishment is another important service covered by field crop user fees, and may include assistance with seedbed preparation, staking study areas and planting. Data collection is not an important consideration in fee schedules.

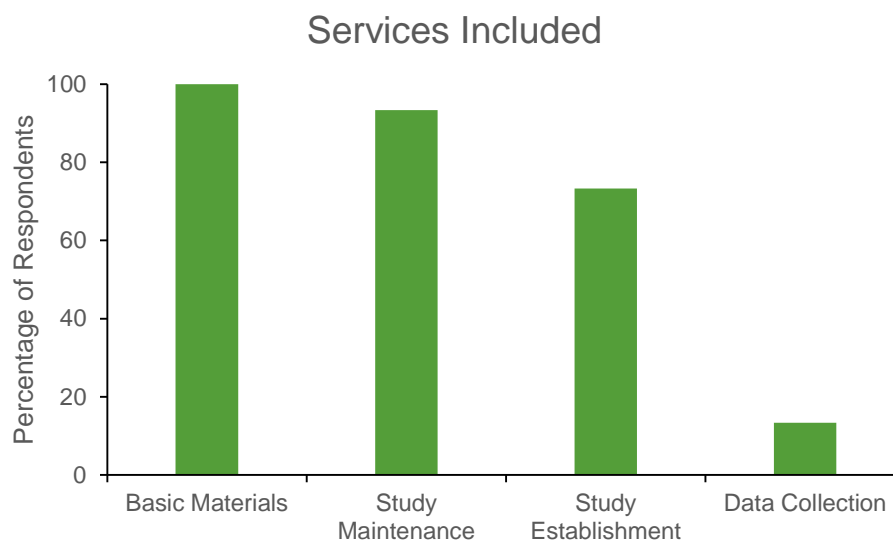


Figure 18

User Fee Revenue Allocation

The revenue generated from user fees generally flows back to support the research facility (Figure 19). Variants of this allocation method exist where the revenue is shared between the research facility and the AES Director. Finally, there are a few cases where revenues are directed to an individual administrative lead.

User Fee Revenue Allocation

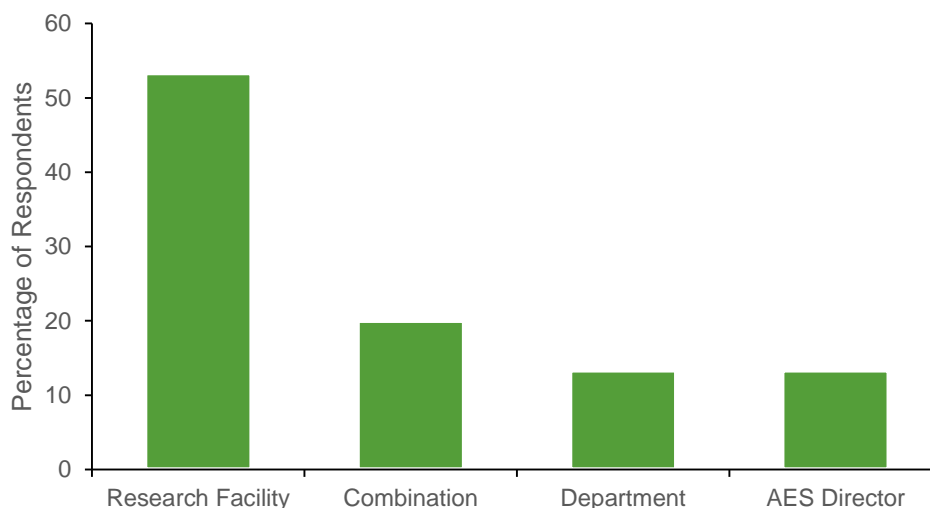


Figure 19

Percentage of Field Crop Research Facility Costs Recovered from User Fees

Of the revenue returned to the field crop research facility, most managers use these funds to help defray expenses associated with facility operation and maintenance and direct material costs (Table 6). Secondly, the fees are used to help offset labor costs and repair and replacement expenses.

Table 6. Percentage of field crop costs recovered through user fees

Costs Recovered	Percentage of Respondents				
	0	1 to 25	26 to 50	51 to 75	76 to 100
	(%)				
Facility operation & maintenance	14	36	36	14	0
Replacement and repair	29	50	14	0	7
Direct material costs	21	29	21	0	29
Personnel	36	29	36	0	0

Farm Revenue Allocation

Field crop research facilities also generate income from the production and sale of commodities. These funds can potentially be used to support the research infrastructure. Towards that end, farm revenue is distributed in a manner similar to that of user fee revenue, with the majority of farm income being directed to the field crop research facility (Figure 20). However, relative to user fee revenue, a larger percentage of farm revenue is allocated to the

AES Director. Less frequently, farm income is allocated to an individual department, or is shared between the research facility and AES Director.

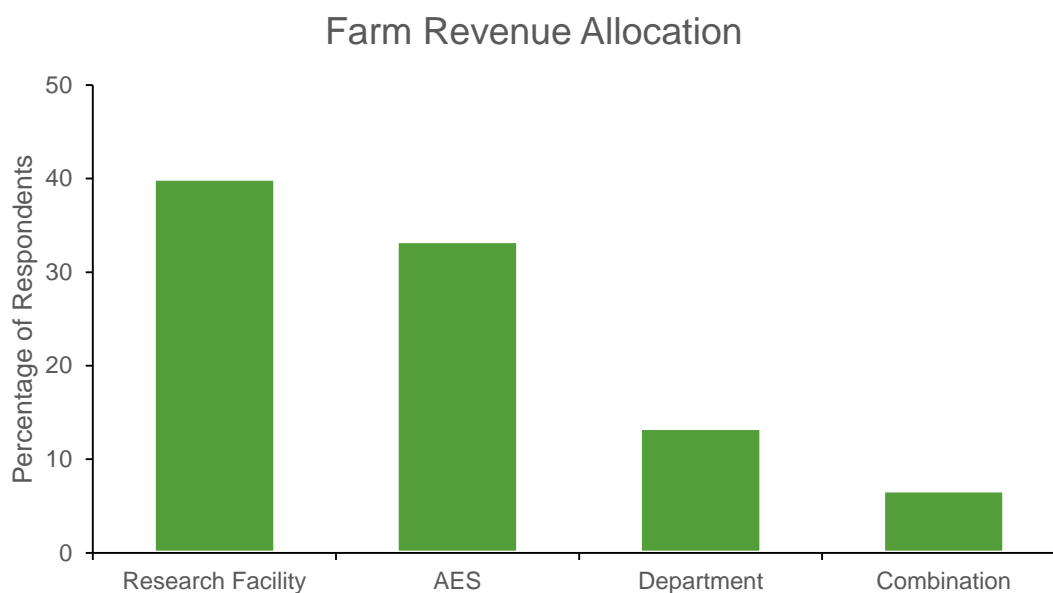


Figure 20

Percentage of Field Crop Research Facility Costs Recovered from Farm Income

The survey results show that farm income is applied in a manner similar to user fee income (Table 7). That is, farm income is mostly used to help support the operation and maintenance costs of the facility, as well as direct material costs. This income stream is also used to help pay for personnel and repair and replacement costs, but to a lesser extent. Respondents who selected other indicated that they had no or minimal farm income.

Table 7. Percentage of field crop costs recovered through farm income

Costs Recovered	0	1 to 25	26 to 50	51 to 75	76 to 100
	(%)				
Facility operation & maintenance	43	29	36	7	0
Replacement and repair	50	36	29	0	0
Direct material costs	71	21	7	0	14
Personnel	79	14	29	0	0
Other	86	0	0	0	14

Summary

The assessment of user fees to help support field crop research facilities is a fairly recent policy change. Most field crop research facilities are administered centrally, with the AES Director as the most common administrative lead. There is wide variation in who determines

user fees at field crop research facilities, but AES Directors and facilities managers are most often cited. User fee assessments generally depend on the size of the experiment and the services provided.

The benefits provided to faculty from user fees include provision of basic inputs and materials required to conduct experiments, assistance with study establishment, and overseeing in-season maintenance of experiments. Additional benefits cited include dedicated staff with agronomic and mechanical expertise, better overall service and improved farm operations, and fair space allocation practices for faculty.

The revenue generated from user fees generally flows back to the research facility. Most farm income also is returned to the research facility, but a significant portion also is returned to the AES director. Both revenue streams are most often used to pay for direct material expenses and for operation and maintenance costs.

Conclusions

Regardless of the research facility, certain common themes are evident with respect to the implementation and management of user fees. Typically, user fees have been adopted where facilities are administered centrally. A centralized system requires a facility management approach that treats space as a shared asset across multiple researchers and departments. Overall, this provides for efficiencies and avoids duplication of critical facility functions, personnel and equipment.

User fees, in particular, make more efficient use of space by providing faculty with a financial incentive to minimize their project area and to conduct experiments quickly. One respondent noted that “Space charges reduce the chances of a faculty member holding onto prime space without a genuine need for that footprint, as there is now a cost to do so.” Another respondent noted “User fees result in better planning, timely study termination and turning over space efficiently.” Another stated “It has led to faculty being more accurate on requesting land resources”. In short, fees ensure that faculty have a stake in the game.

Policies and fee schedules are generally determined by the AES Director, a faculty advisory committee, or a combination of the two. In particular, the use of advisory committees can provide a broad base for input, a sense of ownership by the users, and transparency with respect to how funds are generated and spent.

Typically, fee schedules are based on the size of the experiment and the services provided. Key services for greenhouse and growth chamber users include facility operation and maintenance, and repair and replacement. In contrast, users of field crop research facilities most benefit from the provision of materials needed to conduct the studies, and as well as assistance with study establishment and in-season maintenance.

The majority of user fees are allocated back to the specific facility. Greenhouse and growth chamber revenues are generally used to help pay for expenses associated facility maintenance and operation, and repair and replacement costs. This is in keeping with what respondents report as the most important service associated with user fees. Likewise, user fee revenues from field crop research facilities are used to defray costs related to the operation and maintenance of the facility, but a significant portion also is used toward direct

material costs. This not surprising considering the cost of seed, fertilizer and other essential inputs that are basic to field crop research.

Although user fees improve the financial stability of research facilities, the operational costs are still subsidized by administrative budgets. In particular, personnel costs appear to be the most highly subsidized expense, providing a hard dollar security net for employees.

Overall, in institutions where user fees are applied, the end result is to help provide faculty with well maintained, functioning research facilities.