Components, Utilization, and Support of Southern Turfgrass Research Units

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ADDITIONAL INDEX WORDS. experiment station, land-grant university, survey

SUMMARY. A survey of selected land-grant universities was conducted to gather information related to design and operation of their turfgrass research units. The objective of this survey was to help the University of Florida in planning a new research unit that will be constructed in 2004–05. The survey provided information related to turf area, building facilities, equipment, supplies, and maintenance. Type of monetary support, cost sharing, labor requirements, utilities, and capitol improvement outlays were documented. The number of support people and faculty with activities at the unit varied depending upon the location, with a mean of five research support people, two support staff, and seven faculty across all units. With the exception of fertilizers (50% donated vs. 50% purchased), most (>80%) of the chemicals, seed, and sod was donated to the units. About one-third of the monetary support for operating and general labor expenses for the units was from soft money and one-third from direct state support. Results from this survey provided ideas that could be used to design and staff a new turfgrass research unit or support for updating an existing unit. In addition, turfgrass industry representatives have an interest in the data since they provide a significant portion of the monetary support and supply of materials to turf research units.

Economic evaluations of agricultural research for the U.S. put the rate of return in the 20% to 60% range (Norton and Ortiz, 1992). University agricultural research, and resulting recommendations, are generally regarded as an essential component in technology transfer to local farmers (Rzewnicki, 1991). Topic-oriented field days at experiment stations have been found to be effective for providing information to the local farming community and the state University's effort to reach producers in the region (Long et al., 1995). These field days deliver locally generated information and offer the farmers the opportunity to view ongoing research that may provide timely answers to their problems. Turf managers and sod growers utilize information from research derived from turf unit (i.e., experiment station) research similarly to farmers producing more traditional agronomic commodities. Investments to maintain facilities and research are critical for creditability and maintaining industry support. Changing economic conditions and increased urbanization has resulted in new challenges in turfgrass science. Due to increased land and

research costs with decreasing support, existing and future turf units may be scaled back. Turf units in more urban areas may be forced to move further away from main campuses when land uses are re-prioritized by university administrations.

A survey was conducted in 2000 to determine the design and operation of turfgrass research stations. Wehner and Murray (1987) conducted a similar survey in 1979 to help develop plans for turf research facilities at the University of Maryland. They surveyed turf research units located in 50 sites in the U.S., reporting the number of scientists engaged in turfgrass research and how much of their research effort is spent on each of 10 subject areas (Wehner and Murray, 1987). The primary benefit from their survey was determining which research centers concentrated on certain subjects and which subjects were not being addressed. There is no published data that provides a broad overview related to turf unit staff support, money contribution, equipment, facilities, and management in addition to previously reported data on research subject areas, turf unit size, and number of scientists. The age of existing data (1979) also suggests a need for more current data. The objective of this survey was gather data to help plan a new research unit at the University of Florida. It was hypothesized that the information gathered could be used

to leverage within the university system and turfgrass industry for further support.

Materials and methods

The survey was sent in Fall 2000 to the schools represented in the Southern Extension and Research Association, Information Exchange Group 25 (SERA-IEG-25). The SERA-IEG-25 group (organized in 1967) represents turf programs at 15 southern land-grant universities. A primary objective of SERA-IEG-25 is to promote exchange of program information, methods, and directions (SERA, 1998). The representatives of 25 turf experiment stations, including satellite units were surveyed (Table 1). In addition to southern region land grant universities, one regional university and three other land grant universities that have prominent turf programs were surveyed (Table 1). The primary concentration was on southern schools, since the survey information was going to be used to aid University of Florida (Gainesville) plan a new turf research facility.

Ninety-six percent of the surveys were returned completed. The only southern region school surveyed that did not return the questionnaire indicated that they recently lost their turf unit due to construction and were looking to rebuild within the next 4–6 years. Turf units that constitute the universities primary site of turf research were considered a primary unit. The satellite or non-primary turf research areas were labeled as secondary units.

The questionnaire was designed to use structured responses with occasional opportunities for personal comments. The questions were formulated to provide information related to turf area, building facilities, equipment, supplies, and maintenance. The research at the stations was categorized to focus on specific disciplines. Monetary support, cost sharing, labor requirements, utilities, and capitol improvement support was documented.

Small sample size precluded statistical analysis between schools. Furthermore, it was not an objective to quantify differences between programs in this survey. Consequently, most data are presented on a percentage basis. Data references in relative terms such as greater or higher are from a numerical standpoint only.

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Table 1. Southern Extension and Research Association, Information Exchange Group 25 (SERA-IEG-25) universities and their turf unit location that participated in a survey designed to gather design and research information related to their turf research units. The turf units were classified as either primary units or secondary units based on proximity to campus and concentration of faculty use.

Primary turf units	Secondary units
Auburn University, Auburn, Ala.	Clemson University, Florence, S.C.
Clemson University, Clemson, S.C.	University of Arkansas, Little Rock
Kansas State University, Manhattan ^z	University of Florida, Belle Glade
Louisiana State University, Baton Rouge	University of Florida, Jay
Michigan State University, East Lansing ^z	University of Georgia, Athens
Mississippi State University, Starkville	Western Kentucky University, Bowling Green ^z
North Carolina State University, Raleigh	
Oklahoma State University, Stillwater	
Purdue University, West Lafayette, Ind. ^z	
Texas A&M University, College Station	
Virginia Tech University, Blacksburg	
University of Arizona, Tucson	
University of Arkansas, Fayetteville	
University of Florida, Gainesville	
University of Florida, Ft. Lauderdale	
University of Kentucky, Lexington	

^zNot a SERA-IEG-25 school. These three schools were surveyed due to their prominent turfgrass research and extension programs.

Table 2. Questions and responses from a survey answered by predominantly southern turfgrass research units regarding total land use area (acres) and distance (miles) of turf unit from primary turf faculty's office.

	Mean	Median	Range
<i>The total land area of your turf unit (in use and fallow)?</i>			
	------(acres) ^z -----		
Primary unit	18	15	5-53
Secondary unit	8	8	5-20
<i>Total land area of your turf unit in use?</i>			
	------(acres)-----		
Primary unit	13	10	5-35
Secondary unit	8	5	2-20
<i>Approximate distance of turf unit's land area from office of primary turf faculty?</i>			
	----- (miles) ^z -----		
Primary unit	4	2	1-10
Secondary unit	9	5	2-30

^z1 acre = 0.4047 ha; 1 mile = 1.6093 km.

Results and discussion

In terms of total area, the range for all turf units was 5 to 53 acres (1 acre = 0.4047 ha), with a mean of 18 acres for primary units and 8 acres for secondary units (Table 2). The primary units had an average of 5 acres available that were not currently in use. Land is often held for future growth or special needs. The distance between faculty offices and turf unit varied from less than 1 mile to approximately 30 miles (1 mile = 1.6093 km). Several schools noted that as land value near campus

increased or when land on campus was needed for new building construction, they were forced to move their turf units further away.

When categorizing land area based on type of research, landscape turf was generally the primary focus, followed by golf course specific areas (Table 3). In one instance golf greens made up 95% of the turf area at a secondary unit. There was much less space devoted to athletic-specific turf or utility turf areas. Turf area is generally a function of demand for work and grant support. In Florida, the associations

that most commonly support research work are golf course related. Due to acreage within the states, the home lawn-type turf is commonly planted to address the issues faced by this large constituent group. The lower level of maintenance required for utility turf (e.g., roadside vegetation) often results in fewer management issues that are considered critical to address.

The primary types of research conducted at the surveyed turf units were almost equally distributed among weed control and nutrition. A second tier of research types were cultivar development, pathology, physiology, and breeding. When turf breeding and development were combined, this constituted a significant area of evaluation. Since turf evaluation often constitute space planted plots, schools (six primary and two secondary) with active breeding and development programs need significant space for this type of research focus. Due to the specialty of some turf faculty, a number of turf units (primary and secondary) only conduct research in one or two areas of interest; therefore the range in values is large in most of the categories (Table 4). Similar results were found by Wehner and Murray (1987). They noted that it is not feasible for all turf units to have research in all subject areas. In the future, more regional tests for some types of research may be used to save time and money.

The majority of the equipment available was owned at units vs. on-loan or borrowed (Table 5). The primary units seem to be better supported by equipment loan programs than the secondary units. The visibility with campus may make it more attractive for equipment companies to provide support items due to perceived greater exposure. In addition, the satellite units may require less equipment since on average they are maintaining fewer acres. One primary unit had an association with an adjoining golf course that provided routine turf maintenance for much of their unit; therefore most of their equipment was borrowed as needed.

Equipment maintenance for major mechanical repairs was split between local distributors, staff mechanic, employee, and local golf course mechanic. Within the units there was a tendency to rely almost exclusively on one method among these four for major repairs (Table 6). For minor repairs there was

Table 3. Question and response from a survey answered by predominantly southern turfgrass research units regarding percent area devoted to specific research related to turf type.

Categorize the research focus currently under evaluation at your turf unit and indicated relative percent plot area in each category?

	Mean	Median	Range
	----- (%)-----		
Landscape			
Primary unit	31.9	30.0	0–69
Secondary unit	40.8	32.5	0–90
Golf course green			
Primary unit	19.3	20.0	1–50
Secondary unit	32.5	15.0	1–95
Golf course (non-green)			
Primary unit	29.1	25.0	0–50
Secondary unit	17.5	17.5	5–30
Athletic turf			
Primary unit	11.3	5.0	0–45
Secondary unit	0.8	0	0–5
Utility turf			
Primary unit	8.4	5.0	0–30
Secondary unit	8.3	0	0–25

Table 4. Question and response from a survey answered by predominantly southern turfgrass research units regarding percent area devoted to specific type of turf research category.

Categorize the research focus currently under evaluation at your turf unit and indicated relative percent plot area in each category?

	Mean	Median	Range
	----- (%)-----		
Nutrition			
Primary unit	18.9	15.0	0–80
Secondary unit	14.2	7.5	0–60
Breeding			
Primary unit	6.8	0	0–45
Secondary unit	13.3	0	0–70
Cultivar development			
Primary unit	16.8	20.0	0–50
Secondary unit	8.3	5.0	0–30
Pathology			
Primary unit	10.8	10.0	0–30
Secondary unit	15.8	2.5	0–80
Physiology			
Primary unit	12.2	10.0	0–40
Secondary unit	5.0	0	0–20
Entomology			
Primary unit	3.7	5.0	0–15
Secondary unit	8.3	2.5	0–25
Weed control			
Primary unit	19.2	10.0	0–50
Secondary unit	21.7	0	0–90
Other			
Primary unit	11.6	5.0	0–45
Secondary unit	13.3	0	0–80

Table 5. Question and response from a survey answered by predominantly southern turfgrass research units regarding percentage of on-site equipment owned vs. borrowed.

Percentage of equipment owned vs. on-loan vs. borrowed (short term)?

	Mean	Median	Range
	----- (%)-----		
Owned			
Primary unit	55.0	60.0	10–100
Secondary unit	79.2	87.5	50–100
On-loan			
Primary unit	39.2	30.0	0–90
Secondary unit	19.2	10.0	0–50
Borrowed			
Primary unit	5.8	0	0–70
Secondary unit	1.7	0	0–5

Table 6. Questions and responses from a survey answered by predominantly southern turfgrass research units regarding repair of on-site equipment.

	Mean	Median	Range
	----- (%)-----		

Percentage of major mechanical repairs to equipment are handled using the following method?

Local distributor			
Primary unit	31.4	10.0	0–100
Secondary unit	32.5	15.0	0–100
Staff mechanic			
Primary unit	30.0	0	0–100
Secondary unit	33.3	0	0–100
Employee			
Primary unit	23.9	10.0	0–90
Secondary unit	16.7	0	0–70
Local golf course mechanic			
Primary unit	14.7	0	0–90
Secondary unit	17.5	0	0–100

Percentage of minor mechanical repairs to equipment are handled using the following method?

Local distributor			
Primary unit	2.8	0	0–20
Secondary unit	2.5	0	0–15
Staff mechanic			
Primary unit	35.6	0	0–100
Secondary unit	33.3	0	0–100
Employee			
Primary unit	54.4	60.0	0–100
Secondary unit	55.8	67.5	0–100
Local golf course mechanic			
Primary unit	7.2	0	0–80
Secondary unit	8.3	0	0–50

Table 7. Questions and responses from a survey answered by predominantly southern turfgrass research units regarding source of expendable materials used by the turf unit.

	Mean	Median	Range
	----- (%)-----		
<i>Percentage of fertilizer purchased vs. donated?</i>			
Purchased			
Primary unit	45.1	50.0	0-100
Secondary unit	69.2	75.0	15-100
Donated			
Primary unit	54.9	50.0	0-100
Secondary unit	30.8	25.0	0-85
<i>Percentage of chemicals purchased vs. donated?</i>			
Purchased			
Primary unit	28.4	20.0	0-80
Secondary unit	38.3	32.5	0-100
Donated			
Primary unit	71.6	80.0	20-100
Secondary unit	61.7	67.5	0-100
<i>Percentage of seed purchased vs. donated?</i>			
Purchased			
Primary unit	15.0	10.0	0-75
Secondary unit	51.7	50.0	0-100
Donated			
Primary unit	85.0	90.0	25-100
Secondary unit	48.3	50.0	0-100
<i>Percent of sod purchased vs. donated?</i>			
Purchased			
Primary unit	6.7	0	0-70
Secondary unit	15.0	7.5	0-50
Donated			
Primary unit	76.7	100.0	0-100
Secondary unit	51.7	62.5	0-100

less reliance on local distributors and increased reliance on a staff mechanic or other paid employee. As with major repairs, within a unit most repairs were handled by one method but the method varied among units.

A number of questions were designed to determine how expendable materials were obtained for their turf unit since this may be an indication of support. Table 7 reviews the percentage of expendable materials purchased vs. donated. In some cases the relative differences may be related to acreage differences and the total amount of material needed. In terms of chemicals (e.g., pesticides) the majority of the amount was donated to the units. The chemical companies seem more willing to donate products directly to units than many other types of suppliers. Sod was a little more unique than

the other materials because some units indicated that they produced some of their own sod for re-use.

Approximately 70% of the units did not pay for water or electricity from their budgets (Table 8). The percentages were generally not a function of unit category or size. About 63% of the units share at least a portion of the general expenses across the faculty that uses the facility. Generally those that do not share expense either had only one dominant faculty using the turf areas so there was no one to share costs or the unit received adequate state funding and material donations to cover expenses.

Three-quarters of the turf units surveyed did not have a golf course adjoining their facility that served as part of their research area (Table 9), nor did not they have simulated golf holes

Table 8. Questions and responses from a survey answered by predominantly southern turfgrass research units regarding utility costs and expenses at the unit.

	Survey responses (%)	
	Yes	No
<i>Do you pay for water other than pumping cost?</i>		
Primary unit	28	72
Secondary unit	33	66
<i>Do you pay for electricity from your budget?</i>		
Primary unit	33	66
Secondary unit	17	83
<i>Do the individual faculty involved in the research at your turf unit participate in expense sharing for general expenses?</i>		
Primary unit	61	39
Secondary unit	67	33

Table 9. Questions and responses from a survey answered by predominantly southern turfgrass research units regarding supplemental turf facilities.

	Survey responses (%)	
	Yes	No
<i>Do you have a golf course that adjoins your facility that serves as part of your research area?</i>		
Primary unit	28	72
Secondary unit	17	83
<i>Have you built simulated golf holes with tee to green arrangement as part of your research area?</i>		
Primary unit	11	89
Secondary unit	17	83

(contiguous area with tee, fairway, and green) as part of the research unit. The concept of simulated golf holes has been suggested in Florida as a way to increase interest for field days. The general idea is that if the research area is maintained to look like a functional golf hole then the industry may be more accepting of the resulting data. If multiple holes are available, there is an opportunity for creative events for entertainment and fund raising, in addition to providing more realistic experiences for academic programs.

Building space and facility availability data was collected to determine space utilization. Only about a quarter of the facilities had on-site offices for faculty, but all the units had office space dedicated for support staff (Table 10.) The range in office space was large, but per person space was not evaluated. Over 50% of the units had some type of classroom/seminar space. Some

Table 10. Question and response from a survey answered by predominantly southern turfgrass research units regarding facilities and their approximate size (ft²).

Do you have the following facilities on-site at your turf research unit? If so, provide their approximate square footage of each?

	Universities with facilities	Mean size	Median size	Range
		----- ft ² z -----		
Faculty offices				
Primary unit	4	338	350	200–450
Secondary unit	2	145	145	140–150
Support staff offices				
Primary unit	16	418	250	75–800
Secondary unit	6	208	150	100–500
Classroom/seminar space				
Primary unit	11	2682	800	300–20,000
Secondary unit	3	633	600	300–1000
Wet laboratory				
Primary unit	6	1167	500	100–5000
Secondary unit	3	1100	1000	800–1500
Dry laboratory				
Primary unit	11	876	400	80–5000
Secondary unit	4	1300	1100	500–2500
Chemical storage				
Primary unit	14	347	262	100–1000
Secondary unit	5	520	200	200–1000
Greenhouses				
Primary unit	9	3056	2000	100–10,000
Secondary unit	4	1087	600	150–3000

^z1 ft² = 0.0929 m².

Table 11. Questions and responses from a survey answered by predominantly southern turfgrass research units regarding turf unit employees.

	Mean	Median	Range
	----- no. -----		
<i>Number of support staff (not involved in research) dedicated to operating your turf unit?</i>			
Primary unit	5.1	6.0	0–12
Secondary unit	4.2	3.0	0–9
<i>Number of support staff (not faculty) working in research at your turf unit?</i>			
Primary unit	2.6	2.0	0–8
Secondary unit	1.8	2.0	0–4
<i>Number of faculty that utilize plot space at your turf unit?</i>			
Primary unit	7.2	6.0	1–12
Secondary unit	3.7	3.0	1–6

units use large rooms for equipment or storage and then convert the space for teaching purposes when needed. The close proximity of the unit to traditional campus classroom buildings influenced the amount of classroom space available at the primary units. Wet laboratory facilities were not as common at the primary units as they were at the secondary units. This is likely due to existing building space on traditional campuses is more readily available, separate from the field unit. About two-thirds of all the facilities had dry laboratory space. The mean space allocated for dry laboratories was 48% greater at the secondary units than the primary units.

Most units have support staff people assigned to the unit for routine operations (Table 11). When asked subsequent to this survey, several faculty indicated that these support staff may also work on non-turf related duties depending on current demands at the unit (some units have several commodities other than turf). In addition to support staff for operations, staff may also be present on the unit in a research support role. Turf units often serve a number of faculty. On average the primary unit had seven faculty utilizing space; whereas the secondary units averaged about four faculty. Wehner and Murray (1987) reported these same primary turf units averaged three turfgrass faculty with one and three quarters involved directly in turfgrass research. This would suggest a 130% increase in turfgrass research faculty in 20 years. The survey did not address the number of part-time or hourly types of support workers.

Data related to research support for general operating expenses were variable (Table 12). Some programs are more conducive to grant support vs. those that may be more applied and therefore targeted more toward industry support (soft money). At Florida we are encouraged to include unit operating expenses as a line item in our grants, but this still contributes a small portion of most unit's budget. On average, state funding contributes a significant percentage of funding for units. Federal funding was among the lowest among those surveyed. Soft money, which may also be defined as unrestricted contributions, provided

Table 12. Question and response from a survey answered by predominantly southern turfgrass research units regarding type of research support for general operating expenses at the unit.

<i>Type of support and its percentage of total budget for general operating expenses and general labor?</i>			
	Mean	Median	Range
	----- no. -----		
Grants—line-item support			
Primary unit	2.8	0	0–30
Secondary unit	3.3	0	0–20
Grants—not specific			
Primary unit	16.7	10.0	0–95
Secondary unit	1.7	0	0–10
State support			
Primary unit	37.8	40.0	5–100
Secondary unit	30.0	22.5	5–70
Federal support			
Primary unit	3.3	0	0–50
Secondary unit	0.8	0	0–5
Soft money			
Primary unit	30.3	20.0	0–80
Secondary unit	58.3	65.0	10–90
Industry donations			
Primary unit	9.4	10.0	0–30
Secondary unit	5.8	7.5	0–10

a significant share of the unit's funding.

Knowledge of land use needs for different research areas was important for the University of Florida in planning for future faculty additions. The data was useful for estimating the land area needs for an entomologist and two turfgrass plant breeders hired subsequent to the survey. The University of Florida administration goal was to have the best turfgrass research unit among our peers, so results of this survey illustrated present limitations while providing a benchmark to measure ourselves in the future. Regardless of trends, the administration was adamant about including golf holes as a significant portion of the new University of Florida turfgrass unit. So, in some cases the data was used to justify components beyond the norm. Since the new University of Florida turfgrass research unit planned for Gainesville is approximately 250% larger than the existing unit, the relative numbers for other turf units in terms of turf area, building facilities, and maintenance staff was beneficial

to outlining field plans and budgets that were presented to the state's turf industry and University of Florida's administration.

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