

TITLE: **Foundation for the Expansion of Botany Education at the Morris Arboretum**

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DATE: **April 2012**

ABSTRACT:

The Morris Arboretum identifies education and promoting the relationship between plant and people as a huge part of its mission and has long been regarded as the center for botanical knowledge in the Philadelphia region. Though historically botany education has been present at the Arboretum, it has diminished in recent years. In order to uphold our mission and reputation, the idea of the Arboretum launching a botany certificate program was proposed. This project focuses on finding similar programs that might be a model for our program, surveying our regional market, gauging the interest of our current constituents and evaluating the cost of such a program. It is my hope that these findings will be used to inform any decision made about such a program here at the Arboretum.

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HISTORY

Since its opening in 1933, education has been an integral part of the mission of the Morris Arboretum. Upon Lydia Morris's death, her will stated that the Arboretum should be turned over to the University of Pennsylvania and that its exceptional collection of native and exotic plants be used for education purposes. Using the news bulletins from Morris Arboretum archives, I began to piece together a history of educational activities at the Arboretum, specifically focusing on botany learning. I found that the Arboretum has been committed to botany education in various forms since the beginning.

When the Arboretum opened to the public in 1933, the first director, Rodney H. True, instituted a winter lecture series. This program consisted of a series of indoor lectures for the Arboretum's constituents throughout the winter months. These lectures were highly botanical in nature, focusing on topics such as Dutch elm disease and diseases of the plane tree. Though these lectures were only open to associates, or members, they appear to have been very well attended.

After the death of Rodney True in 1940, J.R. Schramm took over as director. There only mentions of a few "Lecture Tours" throughout the 1940's, which consisted of a presentation and then a walk around the garden. Records from the 1940's are incomplete, so it is not certain with what frequency these lectures were taking place, but they seem to have dropped off. This is also evidenced by John Fogg's declaration upon taking over as director in 1954.

"A great deal needs to be done to increase our educational offerings and even to offer regular courses of instruction comparable to those given at the Arnold Arboretum, NYBG, and the Morton Arboretum."¹

This quote implies educational activities were dropping off in the 1940's. It is likely that this is due to World War II. With such societal unrest, Arboretum Associates probably had less time to devote to such things.

After the War, Dr. John Fogg takes on the role of director and under the new leadership, regularly scheduled lectures begin again and the Summer Course is instituted. The Summer Course was a woody plant class accredited through the University of Pennsylvania. The class was attended by mostly university students for credit, but there were also many teachers, professionals and interested people in attendance. This class appeared to be hugely successful and ran for almost twenty years.

It wasn't until the 1960's that the Arboretum started charging a fee for lectures. In 1963 Dr. Edgar T. Wherry taught an ecology series that was made up of four lectures and a field trip. The Arboretum charged twelve dollars for this. These types of courses continued throughout the 1960's, most with heavily botanical themes. As the number of courses offered increased, there became a need for one place to publish them all.

In 1971 the Arboretum printed its first separate publication solely for listing class offerings. Within this brochure, there were many botanical science offerings including *Wildflower Families*, *Botany for Gardeners* and *Plant Nomenclature*. These classes were listed

in a botany series, which implied that when a participant had completed a set of required classes, he or she would receive a certificate of completion. Throughout the 1970's the Arboretum continued to offer such botany classes but there was no mention of the certificate in publications over the next ten years.

What is now the Widener Visitor Center underwent its transformation from horse stable and garage to visitor center in 1982. Part of this renovation was creation of the Fogg Lab, which was an intended laboratory teaching space. It is my assumption that the addition of this new teaching space made the Arboretum more equipped for handling large volumes of classes, and consequently the botany certificate program was re-launched in the 1983 course brochure. Throughout the next couple of years the series ran with varying attendance and eventually in 1988, the series was cancelled. Verbal accounts I received from Arboretum staff that were heard during that time suggest it was due to dwindling participation; however I was not able to find attendance or registration records to support these claims.

Since then, the Arboretum has continued to have a robust educational program with a wide variety of classes. Though botany continues to be a part of the class offerings, it is often in conjunction with horticulture or on a trip. The teaching expertise of the botany department at the Arboretum has largely been utilized by the University of Pennsylvania over the past twenty years, leaving little room for teaching at the Arboretum.

CERTIFICATE PROGRAMS

The idea of having a certificate program in botany at Morris came from the desire of the botany and the education departments to increase our commitment to botanical learning, uphold our reputation as a regional authority in the plant science field, and utilize our expert staff. With our staff botanists, Dr. Tim Block and Dr. Ann Rhoads teaching fewer classes at the University, they possess more time to devote to teaching at the arboretum.

When I began my research, I first endeavored to define what a certificate program is and what similar botany certificate programs look like. Very little research has been done about the viability of certificate programs, let alone botany certificate programs. However, I managed to find some relevant research. A graduate student at Cornell University did their thesis on the evaluation of certificate programs at public gardens. This is the definition she compiled for a certificate program at a public garden:

“A certificate at a public garden is a series of courses on a plant referenced theme, offered on the site of the public garden. Participants must pass each individual course with some measure of attendance and performance, and completion of all the courses in the series results in some recognition of achievement.”²

This is a good summation of what defines a certificate program. There are a few, possibly unexpected, things to note. First is that the certificate be offered on-site at the public garden. Second is the reference to some measure of attendance and performance. This is vague and offers room for interpretation, but does imply that students are evaluated in some manner.

Next, I began examining the advantages of having a certificate program. Simply based on prior knowledge of continuing education programs at public gardens, I was reasonably sure that financial gain was not a primary motive. Without financial gain, that leaves public interest and institutional values and mission as the key reasons for offering a certificate. Public interest will be discussed later but there is research supporting institutional mission as a primary reason for running a certificate program.

“A certificate program represents a high level of commitment to education by a public garden because these programs cover large quantities of information in-depth over time, thus increasing the possibility for long-term, behavioral and attitudinal change, as well as the opportunity for application of knowledge, in addition to technical mastery”³

This seems very relevant to Morris, as our mission implies a deep commitment to education and plants. So if the Arboretum was to add a botany certificate program, it would bolster our commitment to botany and education, and possibly our reputation. This quote also implies a commitment to the community served by suggesting that a certificate program would potentially affect long-term attitudinal change and application of knowledge. Additionally, I identified the reasons in which participants usually take certificate programs. In no particular order they are for professional development, personal growth, entertainment, and socialization.³ These seem to be the same reasons that our students take our classes.

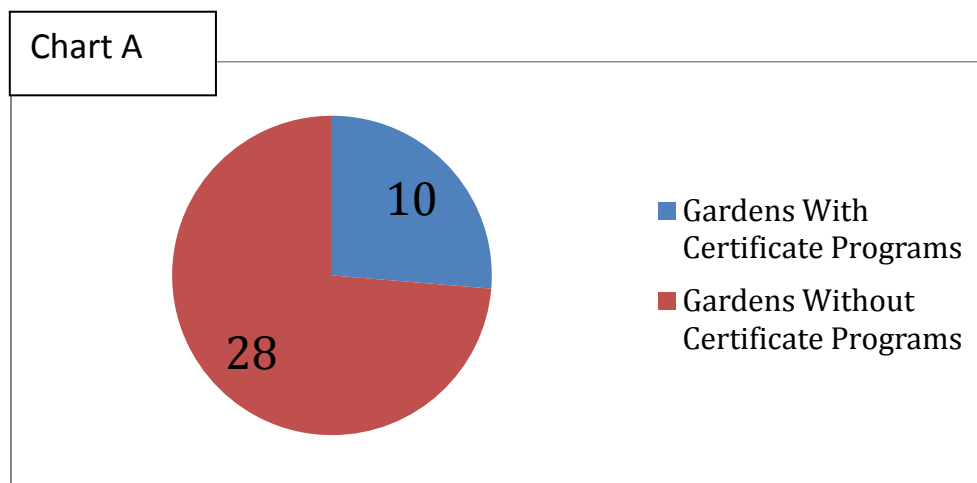
Subsequently, I reviewed certificate programs throughout the nation that closely resembled what we could do at Morris. Three programs that I studied in-depth for this project were the New York Botanical Gardens Botany Certificate Program, The North Carolina Botanic Gardens Certificate in Native Plant Studies, and Costal Maine Botanic Gardens Certificate in Native Plants and Ecological Horticulture. These institutions represent very different types of public gardens and as such their certificate programs have differences, as an informal interview with a staff member from each of these programs revealed. It might be more useful to describe what they have in common.

Completing each of these programs is a significant time commitment. The average amount of class time it takes a student to complete each of these programs is 155 hours. That does not include any outside work, or homework, that students may be asked to do. The average price point per hour of instruction is \$14. This totals \$2,170 to complete the whole program. None of these programs are designed for completion in a year, however. Students are welcome to take as long as they like, but they are all designed to make two year completion possible. These programs also follow a similar formula consisting of required core classes and then a specified number of elective classes.

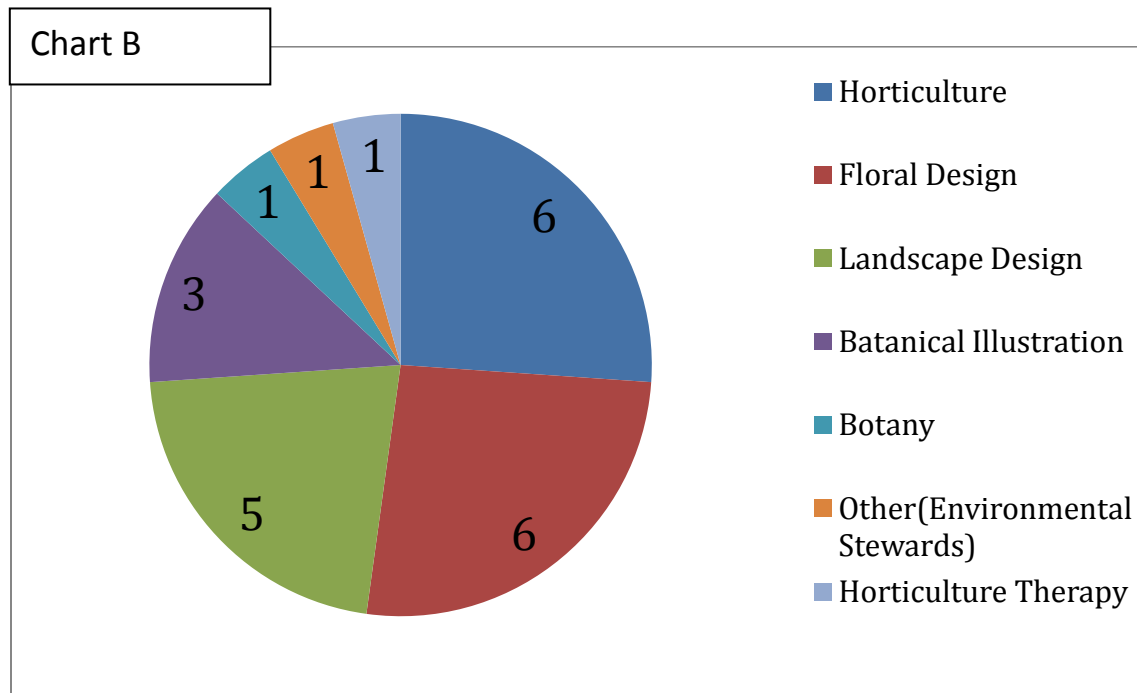
REGIONAL DATA

From here I wanted to learn more about what programs are being offered in our region. Using the American Public Gardens Association's data base of registered public gardens, I surveyed those in the Mid-Atlantic Region. I defined Mid-Atlantic as NY, NJ, DE, PA, VA, WV and MD. Here are some key results I gathered from this inquiry.

- I. Out of 73 public garden institutions, only 38 have adult education programs.
- II. Out of those 38 gardens with education programs, 10 have certificate programs, as I have defined them earlier. This is displayed in Chart A.



III. Certificate programs were then divided by topic. This is displayed in Chart B. I will note here that many gardens had more than one certificate program, which is why the number of programs in this chart exceeds ten. Of the twenty-three certificate programs, only one is a botany certificate. The most popular programs appear to be horticulture and floral design.



It's worth mentioning that even though there is only one pure botany certificate program, other programs incorporate botany knowledge such as plant identification and ecology. The lack of comprehensive botany programs in the Mid-Atlantic region could be a result of lack of interest or could be a niche that few institutions have the expertise to fill. Unfortunately, this inquiry did not indicate which of those is more likely.

SURVEY

Subsequently, I attempted to capture the level of interest for a botany certificate program among Morris Arboretum members and class takers. To accomplish this I developed an eleven question survey to deploy electronically. The survey was sent on January 13, 2012 to 7,489 class takers and members. Before discussing the results, the limitations of the survey should be pointed out. I received a very low participation rate of about 1%. This is not ideal for reliable data. Another consideration is that most certificate programs rely on branding and marketing of the program to gain interest. Since we have not made any marketing efforts, this might be reflected in the results.

The full results of the survey are attached as Appendix 1. The overall response to a botany certificate program and certificate programs in general was not very positive. Though the majority of respondents indicated they would be “Somewhat Interested” in deepening their knowledge of botany by taking classes at Morris, the majority then said that they would be “Not At All Interested” in completing a botany certificate program. Questions were also asked to discern what topics people would be most interested in learning about. The results indicated that “native plants” and “plant identification” were the subjects of most interest.

COST ANALYSIS

Finally, I conducted a cost analysis to find out how much it would cost to run a certificate program and how many students we would need to not lose money. The cost analysis is attached in full as Appendix 2. It attempts to gather all the costs associated with the first year of running a botany certificate program and then determine the potential generated revenue. I operated on a few assumptions in this analysis. One is that our program would consist of four core classes and four elective classes over the year, totaling 72 hours of instruction. The next is that the instruction would be done by our staff and would account for 5% of two full time employees. Coordination would account for another 5% of a botany staff member’s time. Another assumption is that half the classes would take place after hours at the Arboretum taking into account a visitor services staff and facilities staff. On top of this a 20% overhead was added for any unforeseen costs. To price the classes I used an average of our current prices to come up with a \$13-15 per hour cost for members and non-members respectively.

I found that without the potential cost of marketing and onetime cost of microscopes, year one of the botany certificate program would cost the Arboretum \$17,170. Consequently, we would need at least 17 to 18 students per class to recover our costs.

In the spring of 2012 Dr. Tim Block taught an Introduction to Botany class. This class was structured much like a core class of a certificate program, running over six weeks and totaling twelve hours. There were in fact, seventeen students registered for the class, however about half of the class was comprised of Morris Arboretum staff members, who attended classes free of charge. This leaves us pretty far from recovering our initial costs.

CONCLUSION

From this research, I have gleaned that launching a botany certificate program at the Morris Arboretum would strengthen our commitment connecting people and plants through education and possibly more firmly assert the Arboretum as a region plant science expert. However the lack of positive response from the survey and the high cost of the certificate program present significant challenges. Therefore I would think it unwise to commit to a comprehensive botany certificate program at this time. I would recommend continuing to offer classes such as Introduction to Botany and more advanced and specialized classes such as Plant Physiology, Mycology, and Aquatic Plants. Offering classes on native plants and plant identification are also recommended, as those topics were ranked of high interest in the survey. It is my hope that this information will aid in the decision making around botany education at the Arboretum.






REFERENCES

- 1 Fogg, John. (1955). *Morris Arboretum Bulletin: April 1955*.
- 2 Waresowe, Julie A. (2004). *Certificate Program Evaluation at Public Gardens*. Cornell University.
- 3 Sachatello-Sawyer, B., Fellenz, R.A., Burton, H., Gittings-Carlson, L., Lewis-Mahony, J., & Woolbaugh, W. (2002). *Adult museum programs: Designing meaningful experiences*. Walnut Creek: AltaMira Press.
- 4 New York Botanic Gardens. www.NYBG.org
- 5 North Carolina Botanical Gardens. www.ncbg.unc.org
- 6 Costal Maine Botanic Gardens. www.mainegardens.org






Appendix 1

Morris Arboretum Member and Class Participation SurveyMonkey Survey






1. How interested would you be in deepening your knowledge of botany by taking classes at the Morris Arboretum?

		Response Percent	Response Count
Very Interested		20.0%	26
Somewhat Interested		40.0%	52
Neither Interested Nor Uninterested		15.4%	20
Somewhat Uninterested		10.0%	13
Not At All Interested		14.6%	19
Please provide any additional comments pertaining to your answer above.			28
answered question			130
skipped question			0

2. How important is it to obtain a certificate of completion in a subject of interest to you?

		Response Percent	Response Count
Very Important		9.2%	12
Somewhat Important		19.2%	25
Neither Important Nor Unimportant		19.2%	25
Somewhat Unimportant		6.9%	9
Not At All Important		45.4%	59
Please provide any additional comments pertaining to your answer above.			14
answered question			130
skipped question			0



3. If offered, how interested would you be in completing a certificate program in botany at the Morris Arboretum?

		Response Percent	Response Count
Very Interested		7.7%	10
Somewhat Interested		19.2%	25
Neither Interested Nor Uninterested		21.5%	28
Somewhat Uninterested		7.7%	10
Not At All Interested		43.8%	57
Please provide any additional comments pertaining to your answer above.			8
answered question			130
skipped question			0




4. Please indicate your level of interest in learning about each of the following topics:

	Very Interested	Somewhat Interested	Neither Interested Nor Uninterested	Somewhat Uninterested	Not At All Interested	Response Count
Native plants	60.0% (36)	28.3% (17)	10.0% (6)	1.7% (1)	0.0% (0)	60
Plant identification	60.0% (36)	33.3% (20)	6.7% (4)	0.0% (0)	0.0% (0)	60
How plants function	36.7% (22)	40.0% (24)	18.3% (11)	3.3% (2)	1.7% (1)	60
How plants interact with their environment	40.0% (24)	43.3% (26)	15.0% (9)	1.7% (1)	0.0% (0)	60
Plant specimen pressing and mounting	13.3% (8)	26.7% (16)	33.3% (20)	13.3% (8)	13.3% (8)	60
Field study	28.3% (17)	50.0% (30)	10.0% (6)	6.7% (4)	5.0% (3)	60
Plant evolution	21.7% (13)	36.7% (22)	21.7% (13)	16.7% (10)	3.3% (2)	60
History of botany	21.7% (13)	20.0% (12)	33.3% (20)	21.7% (13)	3.3% (2)	60
Please provide any additional comments pertaining to your answer above.						2
answered question						60
skipped question						70





5. Are there any other botany-related topics you would like to learn about?

		Response Percent	Response Count
Yes		25.0%	13
No		75.0%	39
If Yes, please list the topics below.			14
answered question			52
skipped question			78

6. When would you be most likely to attend a class?

		Response Percent	Response Count
Mid-week, daytime classes		31.7%	19
Mid-week, evening classes		35.0%	21
Weekend classes		33.3%	20
Please provide any additional comments pertaining to your answer above.			8
answered question			60
skipped question			70

7. What learning experience are you most interested in?

		Response Percent	Response Count
One-day field trips		16.7%	10
Multi-day field trips		5.0%	3
Single-session classes		53.3%	32
Multi-session classes		25.0%	15
Please provide any additional comments pertaining to your answer above.			10
answered question			60
skipped question			70

8. Please rank the reasons for why you have chosen or would choose to take classes at the Morris Arboretum over another institution. Only one response per column.



	1 (most applicable reason)	2	3	4	5 (least applicable reason)	Response Count
Convenience	41.7% (25)	28.3% (17)	11.7% (7)	8.3% (5)	10.0% (6)	60
Quality of classes	63.3% (38)	30.0% (18)	5.0% (3)	0.0% (0)	1.7% (1)	60
Reputation of institution	58.3% (35)	16.7% (10)	16.7% (10)	5.0% (3)	3.3% (2)	60
Unique classes	45.0% (27)	26.7% (16)	15.0% (9)	10.0% (6)	3.3% (2)	60
Networking with people of similar interests	25.0% (15)	28.3% (17)	16.7% (10)	13.3% (8)	16.7% (10)	60

Please provide any additional comments pertaining to your answer above.






2

answered question	60
skipped question	70

9. Gender:

		Response Percent	Response Count
Male		22.4%	28
Female		77.6%	97
	answered question		125
	skipped question		5

10. Age range:

		Response Percent	Response Count
Younger than 24		0.8%	1
25-35		11.2%	14
36-50		31.2%	39
51-70		44.0%	55
71 and over		12.8%	16
answered question			125
skipped question			5

11. Please provide your email address if you would like to enter a drawing to receive a \$50 continuing education gift certificate for the Morris Arboretum.

	Response Count
	85
answered question	85
skipped question	45

Page 2, Q1. How interested would you be in deepening your knowledge of botany by taking classes at the Morris Arboretum?

1	Not enough spare time right now.	Jan 29, 2012 4:34 PM
2	Particular interest in native meadows	Jan 18, 2012 4:50 AM
3	Having children and a job prevents me from participating in such things.	Jan 16, 2012 3:28 PM
4	limited hours with getting to class	Jan 16, 2012 7:44 AM
5	Too busy	Jan 14, 2012 10:25 AM
6	I am very interested in the topic, but can't usually find the time to actually attend a class.	Jan 14, 2012 8:11 AM
7	I would be very interested in learning more about botany, especially issues that are relevant to plants and trees within the region.	Jan 14, 2012 7:43 AM
8	I just have a huge commitment at work that precludes this now.	Jan 13, 2012 8:44 PM
9	would like to take a class for "dummies" on landscaping (how do I keep my arbor vitae alive? or how do I fix the roses that are growing weirdly in my yard)	Jan 13, 2012 7:11 PM
10	As a biologist with a heavy botany concentration, I probably know more botany than would be presented in a class at the Arb	Jan 13, 2012 3:34 PM
11	particularly local genotype native plants	Jan 13, 2012 2:10 PM
12	I live just outside Washington, DC.	Jan 13, 2012 2:06 PM
13	I love my garden but a class would be too much for me I am too old	Jan 13, 2012 2:05 PM
14	Weekends are best for me.	Jan 13, 2012 1:29 PM
15	I love plants, know little about them. Would like to learn IF the info. is presented in an exciting hands on way.	Jan 13, 2012 12:33 PM
16	Gardening as a strong hobby would be a wonderful outcome. As a teacher, bringing my students for a field trip.	Jan 13, 2012 12:07 PM
17	I'm a very engaged longtime gardener and fairly knowledgeable but open to learning.	Jan 13, 2012 11:22 AM
18	i would take it if it pertained to my personal garden.	Jan 13, 2012 11:05 AM
19	As a Master Gardener I'm always looking to understand more about plants - this would be super	Jan 13, 2012 11:02 AM
20	I have taken classes with Paul Meyer years ago and love to garden. I also was a volunteer for a short time.	Jan 13, 2012 10:52 AM
21	The interaction with the environment--and plants role in our more urbanized life of today would be of most interest.	Jan 13, 2012 10:39 AM
22	I would only be interested in an overview of the subject and not in depth	Jan 13, 2012 10:19 AM

Page 2, Q1. How interested would you be in deepening your knowledge of botany by taking classes at the Morris Arboretum?

	class. My interest lies only in the generalities of plants. i.e.the plant parts name and briefly their function.	
23	I'd LOVE to do this, but currently have a 5 month old baby at home, so would be unlikely to sign up for any such classes in the next 2 years - at that point most likely if they were toddler-focused.	Jan 13, 2012 9:51 AM
24	I attended classes last Fall that were billed as continuing education for professionals. I found the content to be well below my own amateur level of understanding and did not learn anything new.	Jan 13, 2012 9:41 AM
25	I don't live in the Philadelphia region, so although I am interested I wouldn't be able to attend classes.	Jan 13, 2012 9:26 AM
26	No time.	Jan 13, 2012 9:21 AM
27	I probably wouldn't have any interest, but with a really interesting topic, I could be swayed.	Jan 13, 2012 9:19 AM
28	I haven't so far been interested, but after meeting Tim Block and hearing him speak - I'm WAY more interested.	Jan 13, 2012 9:18 AM

Page 2, Q2. How important is it to obtain a certificate of completion in a subject of interest to you?

1	For a portfolio.	Jan 29, 2012 4:34 PM
2	or work towards a degree	Jan 18, 2012 7:06 AM
3	I need continuing education credits.	Jan 16, 2012 7:47 AM
4	I take classes for personal knowledge and enjoyment	Jan 14, 2012 6:31 AM
5	Have already obtained ana certificate in landscaping. No interest in any other certificate for the time being.	Jan 13, 2012 5:23 PM
6	I am a seasoned Gardner and now persuing studies in horticulture.	Jan 13, 2012 2:43 PM
7	good way to certify attendance for CEUs	Jan 13, 2012 2:10 PM
8	I live just outside Washington, DC.	Jan 13, 2012 2:06 PM
9	I'm an MD. could i be MD, professional botanist too?	Jan 13, 2012 11:05 AM
10	I would just want to learn--not to get a degree	Jan 13, 2012 10:39 AM
11	I would not be using it in a career situation	Jan 13, 2012 10:19 AM
12	If I were interested in taking a class, I would want a certificate.	Jan 13, 2012 9:21 AM
13	Unless there's a benefit to having a certificate of completion, I wouldn't see it as important.	Jan 13, 2012 9:19 AM
14	I'm an amateur. I did think about landscape design...but after one class - decided to leave it to the professionals	Jan 13, 2012 9:18 AM

Page 2, Q3. If offered, how interested would you be in completing a certificate program in botany at the Morris Arboretum?

1	I am a graduate student, part-time, in 3 years I will be finished and then I could consider studying botany.	Jan 29, 2012 4:34 PM
2	It would be great if it was something I was able to afford	Jan 13, 2012 2:43 PM
3	I live just outside Washington, DC.	Jan 13, 2012 2:06 PM
4	if it means i could work p/t for a little pay at the arboretum.	Jan 13, 2012 12:33 PM
5	I am 72 years old, botany was never high on my list	Jan 13, 2012 11:41 AM
6	I would love a botany program they are so hard to find now.	Jan 13, 2012 9:55 AM
7	Provided the course has the appropriate level of academic rigour.	Jan 13, 2012 9:41 AM
8	I'm involved with the Board and I feel I should really deepen my understanding. The challenge - my travel schedule!	Jan 13, 2012 9:18 AM

Page 3, Q1. Please indicate your level of interest in learning about each of the following topics:

1	pretty much anything about plants would interest me	Jan 13, 2012 10:00 AM
2	Having had a tour of the archives - the mounting and pressing was fascinating - though I can't say I'd have occasion to do it myself.	Jan 13, 2012 9:21 AM

Page 3, Q2. Are there any other botany-related topics you would like to learn about?

1	systematics how plants interact with humans restoration plant communities	Jan 18, 2012 7:13 AM
2	dragonflies.moths, buterflies	Jan 15, 2012 5:44 PM
3	Permaculture	Jan 14, 2012 8:14 AM
4	Diseases of plants	Jan 13, 2012 6:21 PM
5	Dendrology	Jan 13, 2012 2:25 PM
6	botanical illustration	Jan 13, 2012 2:13 PM
7	Year round gardening in this hemisphere	Jan 13, 2012 12:08 PM
8	Medicinal plants Food Plants and how we have bred them from the orginal wild forms	Jan 13, 2012 11:06 AM
9	How do plants help in reclamation of contaminated land and/or wetlands	Jan 13, 2012 10:48 AM
10	Water gardening plants	Jan 13, 2012 10:20 AM
11	Botanical Illustration	Jan 13, 2012 10:08 AM
12	ethnobotany, different applications of plant identification	Jan 13, 2012 10:00 AM
13	Invasive plants and how to control them	Jan 13, 2012 9:28 AM
14	Native plant gardening, ecological gardening, restoration ecology	Jan 13, 2012 9:25 AM

Page 3, Q3. When would you be most likely to attend a class?

1	or weekend	Jan 18, 2012 7:13 AM
2	Honestly this is the crux for me. Making time.....	Jan 15, 2012 2:28 PM
3	Both weekend and mid week evening (I could only pick one)	Jan 13, 2012 11:41 AM
4	Work full-time during the day - can't do day time courses	Jan 13, 2012 11:06 AM
5	I am retired and can attend anytime	Jan 13, 2012 10:54 AM
6	weekends if late afternoon or evening	Jan 13, 2012 10:00 AM
7	also weekend classes in the daytime	Jan 13, 2012 9:28 AM
8	Challenge to answer. I travel a lot during the week, but I spend most weekends in NJ with Dad. So if it was a class a month or something, I could hang in for the weekends.	Jan 13, 2012 9:21 AM

Appendix 2

Botany Certificate Program Budget Year 1: Fall 2012, Spring 2013	Per Unit	Total
Expenses:		
Staff Time		
Coordination: Tim	5%	
Teaching: Michael	5%	
Teaching: Tim	5%	
Facilities	36 hours	
Visitor Services	36 Hours	
Administration	\$100	
Total:		14,325
20% Overhead:		\$17, 170
One Time Expenses:		
Microscopes	10 at \$1,000	\$10,000
Total:		\$27,170
Revenue for Classes:	Price per Hour of Class	
	\$ 13.30-15 member v. non-member	
2 Students per Class	72 hours x 13.3 or 15 x 2 students	\$1,915-2,160
3 Students per Class		\$2,872-3,240
4 Students per Class		\$3,830-4,320
5 Students per Class		\$4,788-5,400
6 Students per Class		\$5,745-6,480
7 Students per Class		\$6,703-7,560
8 Students per Class		\$7,660-8,640
9 Students per Class		\$8,618-9,720
10 Students per class		\$9,576-10,800
11 Students per Class		\$10,533-11,880
12 Students per Class		\$11,491-12,960
13 Students per Class		\$12,448-14,040
14 Students per Class		\$13,406-15,120
15 Students per Class		\$14,364-16,200
16 Students per Class		\$15,321-17,280
17 Students per Class		\$16,279-18,360
18 Students per Class		\$17,236-19,440
19 Students per Class		\$18,194-20,520