

RUTGERS COOPERATIVE EXTENSION

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NEW JERSEY AGRICULTURAL EXPERIMENT STATION

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**Rutgers Plant Diagnostic Laboratory  
and  
Nematode Detection Service**



**1998 Annual Report**

THE STATE UNIVERSITY OF NEW JERSEY  
**RUTGERS**

# Rutgers Plant Diagnostic Laboratory and Nematode Detection Service 1998 Annual Report

Mr. Richard Buckley  
Laboratory Coordinator

## Introduction

The mission of the Rutgers Plant Diagnostic Laboratory and Nematode Detection Service (RPDL-NDS), a service of the New Jersey Agricultural Experiment Station (NJAES), is to provide the citizens of New Jersey with accurate and timely diagnoses of plant problems. These goals are achieved in cooperation with Rutgers Cooperative Extension (RCE) and the research faculty at Cook College/NJAES. Since its establishment in April of 1991, the Plant Diagnostic Laboratory has examined over 8,750 samples submitted for plant problem diagnosis, nematode analysis, or identification. The laboratory has become an integral part of Rutgers Cooperative Extension and Cook College/NJAES programs by providing diagnostic and educational services and by assisting with research. This report summarizes the activities of the RPDL-NDS during the calendar year 1998, the laboratory's seventh full year of operation.

## History

The Rutgers Plant Diagnostic Laboratory was established in 1991 with an internal loan and is projected to become self-supporting. The laboratory was established by the dedicated efforts of RCE faculty members Dr. Ann B. Gould and Dr. Bruce B. Clarke, Specialists in Plant Pathology, Dr. Zane Helsel, Director of Extension, and Dr. Karen Giroux, past Assistant Director of NJAES. Without their vision and persistence, this program would not exist.

On April 1, 1991, a laboratory coordinator was hired on a consultant basis to renovate laboratory space and order equipment. The laboratory is currently located in Building 6020, Old Dudley Road, on the Cook College Campus. This space belongs to the Depart-

ment of Plant Pathology, who paid for renovations to the facility. We acknowledge the Department's generosity and thank them for their monetary support.

The Rutgers Plant Diagnostic Laboratory began accepting samples on June 26, 1991. At that time, the majority of equipment and supplies were in place. A full-time diagnostician (program associate) was hired September 1, 1991, and the laboratory coordinator was hired on a permanent basis on November 1, 1991.

## Staff and Cooperators

Richard J. Buckley is the coordinator of the RPDL-NDS. He was promoted to this position from program associate in October of 1993. Mr. Buckley received his M.S. in Turfgrass Pathology from Rutgers University in 1991. He has a B.S. in Entomology and Plant Pathology from the University of Delaware. He also received special training in nematode detection and identification from Clemson University. Mr. Buckley has work experience in diagnostics, soil testing, and field research. He is responsible for sample diagnosis, soil analysis for nematodes, and the day-to-day operation of the laboratory. Mr. Buckley's former position as program associate remains unfilled.

In 1998, the laboratory was also staffed, part-time, by an undergraduate student, Ms. Sophie Penkrat. Ms. Penkrat worked for the laboratory as a part-time and summer employee for five years. She left this spring and was replaced by Ms. Sabrina Tirpak. Ms. Tirpak, a junior in the Department of Plant Science, has been an excellent replacement and has become an integral part of the daily activities of the laboratory.

Two additional part time employees were added to the staff this year. In January, Mr. Deepok Matadha, a graduate student in the Department of Entomology,

came on board to assist with identifications of insects. Mr. Matadha is assigned to the laboratory part-time for his graduate assistantship. We hope to have his assistance for several seasons as he completes his degree. In August, Ms. Clare Liptak, former Somerset County Agricultural Agent, was also added to the staff to serve as Home Horticulturalist. Ms. Liptak will be responsive to the residential clientele for sample diagnosis. She will also assume leadership in marketing laboratory services to all client groups.

Additionally, the laboratory benefits from the assistance of faculty in the Departments of Entomology, Plant Pathology, and Plant Science. In the Department of Plant Pathology, Dr. Ann B. Gould (Laboratory Faculty Coordinator) and Dr. Bruce B. Clarke have devoted hundreds of hours to laboratory business from the inception of the diagnostic laboratory concept through its eventual set-up and operation. Additional faculty and staff in this department who have provided substantial assistance during 1998 include: Dr. James White, mycology; Dr. Donald Kobayashi, phyto bacteriology; Dr. Steve Johnston, vegetable pathology; Dr. Brad Hillman, virology; Dr. T. A. Chen, Plant Pathology, Chair, for administrative assistance; and Pradip Majumdar, Mark Peacos, and Marshal Bergen for general assistance.

We would also like to thank Dr. John Meade and Dr. Richard Innicki of Plant Science for assistance in weed identification and diagnosis of herbicide injury; Dr. George Wulster of Plant Science for assistance with problems on horticultural crops; and Dr. Raul Cabrera for assistance with problems in nursery production. Our sincere gratitude goes to Ms. Ethel M. Durky of the University of Maryland Plant Diagnostic Laboratory. Her advice and assistance has been instrumental in the set-up and operation of the RPDL-NDS.

## **LABORATORY POLICY**

The RPDL-NDS receives samples from a variety of clientele. According to laboratory policy, samples for diagnosis from residential clients may be submitted only after screening by appropriate county faculty or staff. If the sample requires more than a cursory diagnosis, it may be submitted, along with the appropriate payment, to the laboratory for evaluation. The county office provides the appropriate form, including instructions for proper sample selection and submission. Samples from professional clientele may be handled as above or may be submitted directly to the laboratory.

Detailed records are kept on all samples. A written response, including the sample diagnosis, management and control recommendations, and other pertinent information, is mailed or sent by FAX to the client. Additionally, the client is billed if payment does not accompany the sample. Copies are forwarded to the appropriate county faculty for their records. Commercial growers are contacted by telephone or FAX to help them avoid delay in pest treatments.

## **OPERATIONS**

### **Diagnostics**

During 1998, the RPDL-NDS examined 1,466 specimens submitted for diagnosis or identification (Table 1A) and assayed 132 soil samples for nematodes (Table 2). Compared to 1997 levels, this represents a 9% increase in plant samples and a 1% decrease in nematode samples. As expected, the majority of samples were submitted during the summer months.

The Nematode Detection Service began accepting soil samples on July 1, 1992, after the retirement of Dr. Jack Springer. In 1998, the Nematode Detection Service processed 132 soil samples for nematode assays. The decrease in nematode samples is due in part to the success with nematode detection on golf courses. Many of the golf turf clients have identified nematodes as potential problems on golf greens and have begun to sample the greens for nematodes as they develop integrated management programs. This active management by golf course superintendents, using laboratory services as part of their integrated pest management programs, initially resulted in an increase in sample submissions. As problem areas were identified and controlled, sample submissions subsequently dropped. Regular monitoring of the "hot spots" will still be required, but large scale sampling may not be necessary for these clients.

Of the specimens submitted to the RPDL-NDS for diagnosis or identification in 1998, 66% were from commercial growers; 25% were from residential clientele; and 9% were submitted from research faculty at Rutgers University (Table 3). Of the samples submitted to the Nematode Detection Service, 96% were from commercial growers; 3% were from Rutgers research projects; and 1% were from residential clients. We expect that the number of nematode samples submitted from residential clients will remain low, since much of this clientele is not familiar with nematode pests.

**Table 1A. RPD-L-NDS Plant Sample Submissions by Month—Rutgers University  
—1994 to 1998.**

Month	1994	1995	1996	1997	1998
January	11	22	27	27	32
February	14	22	21	24	26
March	31	51	50	51	52
April	56	59	60	121	118
May	70	137	84	125	166
June	146	161	206	202	240
July	172	147	271	222	243
August	135	246	192	178	233
September	75	106	155	173	161
October	55	61	82	95	113
November	28	49	36	22	54
December	29	7	22	30	28
<b>Total:</b>	<b>822</b>	<b>1068</b>	<b>1206</b>	<b>1269</b>	<b>1466</b>

**Table 2. RPD-L-NDS Nematode Sample Submissions by Month—1994 to 1998.**

Month	1994	1995	1996	1997	1998
January	0	6	0	0	1
February	0	0	0	1	0
March	14	1	35	6	4
April	41	24	16	22	14
May	3	6	17	14	8
June	9	14	37	33	20
July	55	18	80	30	31
August	25	19	21	25	18
September	11	11	4	9	17
October	14	10	9	7	10
November	40	13	11	0	1
December	7	7	12	0	8
<b>Total:</b>	<b>219</b>	<b>129</b>	<b>242</b>	<b>147</b>	<b>132</b>

Although samples from research programs represent a relatively small percentage of the total number of plant and soil samples received, they are an extremely important component. Research samples allow the diagnosticians to cooperate with university faculty on problems often of great importance to the State of New Jersey. The problems associated with these samples are challenging, and occasionally lead to the diagnosis of a new disease.

Turfgrass and ornamentals may represent the largest agricultural commodities in New Jersey. In support of New Jersey as an urban agriculture state, it follows that the vast majority of samples submitted for diagnosis to

the laboratory (79%) were either turfgrass or ornamental plants (Table 4). The wide variety of turf and ornamental species grown under diverse environmental conditions in our state results in a large number of problems not readily identifiable by growers or county faculty. Furthermore, pest diagnosis and plant identification for commercial growers of other crops are still handled by extension specialists and county agents in other parts of the state, at no charge. This practice limits the number of production agriculture samples sent to the laboratory. Soil samples submitted to the laboratory for nematode analysis were primarily from golf turf, with most of the remaining samples originating from production agriculture. The majority of the

**Table 3. RPD-L-NDS Sample Submissions by Origin—1998.**

Sample Origin	Number of Plant Samples	Percent of Total	Number of Nematode Samples	Percent of Total
Commercial Growers	964	66%	127	96%
Residential	368	25%	1	1%
Research Programs (Rutgers University)	134	9%	4	1%
<b>Total:</b>	<b>1466</b>	<b>100%</b>	<b>132</b>	<b>100%</b>

**Table 4. RPD-L-NDS Sample Submissions by Crop Category—1998.**

Crop	Number of Plant Samples	Percent of Total	Number of Nematode Samples	Percent of Total
Turf	564	38.5%	97	73%
Ornamentals	600	40.9%	2	2%
Field Crops	4	0.3%	6	5%
Vegetable	42	2.9%	11	8%
Fruit	35	2.4%	16	12%
Insect ID	169	11.5%	0	0
Plant ID	34	2.3%	0	0
Fungus ID	18	1.2%	0	0
<b>Total:</b>	<b>1466</b>	<b>100%</b>	<b>132</b>	<b>100%</b>

samples from production agriculture were from several growers in southern New Jersey who specialize in small grains, potatoes, peaches, and carrots. In addition, nematode samples from growers who are establishing vineyards are increasing. Special thanks go to the IPM agents in vegetable, fruit, and field crops for their support.

Samples were submitted to the RPDL-NDS from all of the counties in New Jersey (Tables 5A and 5B). The majority of samples, however, were submitted from counties in close proximity to the laboratory or from counties with dense populations that have disease problems associated with turf and ornamentals in residential landscapes or on golf courses. Disease prob-

lems on these commodities are difficult to diagnose and are, subsequently, submitted to the laboratory. Furthermore, many citizens in central New Jersey contact Rutgers University directly for assistance with plant-related problems and are then referred to the laboratory. The profile also identifies county faculty that promote and utilize RPDL-NDS services.

Approximately 18% of the samples submitted for diagnosis to the laboratory were from out-of-state (Table 5A and 5B). Nearly all of these samples were turf. Due to his national reputation and his strong support for the laboratory, Dr. Bruce Clarke has helped the Rutgers laboratory develop into one of the premier

**Table 5A. RPDL-NDS Sample Submissions by County-1994 to 1998.**

In-State	1994	1995	1996	1997	1998
Atlantic	40	42	42	57	81
Bergen	60	62	71	85	75
Burlington	31	54	67	97	67
Camden	25	37	42	37	38
Cape May	10	9	16	25	55
Cumberland	14	7	8	15	22
Essex	30	22	20	22	23
Gloucester	26	61	19	21	21
Hudson	0	6	1	16	9
Hunterdon	37	31	22	27	25
Mercer	65	47	44	28	42
Middlesex	85	119	129	157	141
Monmouth	59	77	58	87	101
Morris	34	53	90	56	90
Ocean	17	56	63	37	39
Passaic	19	44	69	68	50
Salem	9	11	12	6	14
Somerset	51	52	54	91	150
Sussex	6	13	15	13	10
Union	20	56	27	63	82
Warren	33	29	30	30	26
Rutgers Research	74	67	81	32	62
<b>In-State Total:</b>	<b>725</b>	<b>953</b>	<b>981</b>	<b>1070</b>	<b>1466</b>
<b>Out-of-State:</b>	<b>97</b>	<b>115</b>	<b>225</b>	<b>199</b>	<b>243</b>
<b>Total:</b>	<b>822</b>	<b>1068</b>	<b>1206</b>	<b>1269</b>	<b>1466</b>

golf turf diagnostic facilities in the country. Many golf course superintendents send samples to Dr. Clarke, who always forwards them to the laboratory for diagnosis. Golf turf samples were submitted to the laboratory from 18 states, several from states as far away as Florida, New Mexico, and California. Since there are very few laboratories in the country that diagnose turfgrass diseases, these superintendents have continued to submit samples to the RPDL-NDS. Furthermore, many golf turf professionals at other universities often refer their clients to Rutgers for second opinions or when they are on leave. The charge for out-of-state samples is substantially higher to help defray the cost of in-state samples. This area of client development is one of the fastest growing areas in the laboratory.

Of the plant specimens submitted to the RPDL-NDS for diagnosis or identification, 40% were associated with biotic disease-causing agents (Table 6). Injury to 8% of the samples was caused by insects and related arthropods, and 37% were associated with abiotic injuries and stresses (e.g., environmental extremes, nutrient deficiencies, poor cultural practices, poor soil conditions, etc.). Another 15% included insect, plant, fungal, and substance identification. The overall breakdown in sample submissions is typical of that reported by other diagnostic laboratories in the United States.

Insects account for most of the organisms identified by the laboratory. The number of insect identifications is more than double that of last season. The laboratory

**Table 5B. RPDL-NDS Nematode Submissions by County—1994 to 1998.**

In-State	1994	1995	1996	1997	1998
Atlantic	1	2	16	7	7
Bergen	13	3	2	0	1
Burlington	58	38	40	35	5
Camden	9	15	37	14	25
Cape May	1	0	2	1	2
Cumberland	23	10	2	2	1
Essex	4	4	1	2	1
Gloucester	7	10	22	10	2
Hudson	0	0	0	0	0
Hunterdon	1	2	1	2	3
Mercer	15	0	21	0	7
Middlesex	4	7	5	1	4
Monmouth	7	1	0	0	3
Morris	7	5	5	4	6
Ocean	0	0	0	0	1
Passaic	3	0	3	2	5
Salem	23	3	9	0	8
Somerset	3	0	0	0	0
Sussex	1	0	2	0	0
Union	0	0	0	0	1
Warren	0	0	0	0	0
Rutgers Research	0	0	18	1	4
<b>In-State Total:</b>	<b>180</b>	<b>100</b>	<b>184</b>	<b>81</b>	<b>86</b>
<b>Out-of-State:</b>	<b>39</b>	<b>29</b>	<b>58</b>	<b>66</b>	<b>46</b>
<b>Total:</b>	<b>219</b>	<b>129</b>	<b>242</b>	<b>147</b>	<b>132</b>

**Table 6. RPD-L-NDS Plant Sample Submissions by Diagnosis—1998.**

Diagnosis	Number of Samples	Percent of Total
Disease (biotic)	584	40%
Insect	113	8%
Identification	217	15%
Other	552	37%
<b>Total:</b>	<b>1466</b>	<b>100%</b>

is benefiting from an increased cooperation with the Department of Entomology. The assignment of an entomologist to the laboratory and an effort to refer clients properly and directly to the laboratory by the Department of Entomology will continue to enhance our efforts to serve New Jersey residents with accurate insect identifications. It is our hope that this cooperative effort continues to grow in the coming years.

In 1998, the mean response time for samples diagnosed in less than 21 days was 1.5 days. This is a decrease in response time from the 1997 mean response time of 2.1 days. The rapid response time is attributed largely to the presence of our competent staff. The additions of Mr. Matadha from Entomology and Ms. Liptak as the Home Horticulturalist helped account for the decrease. Furthermore, Ms. Tirpak, our student assistant, has developed into an employee who can easily fulfill most of the responsibilities of a program associate or horticultural consultant. Adequately trained staff is essential to the continued growth and efficient operation of the laboratory.

A laboratory response was prepared in less than three days for most (88.4%) of the samples submitted (Table 7), and 95% of our clients received a response in less than a week. A number of the samples took longer than ten days to diagnose. In these cases, special consultation was required for an accurate diagnosis, and the clients were advised of progress throughout the period. Since nematode samples deteriorate rapidly in storage, virtually all of the nematode processing was finished in less than three days.

### Other Laboratory Activities

**Teaching.** In addition to providing diagnostic services, the staff of the RPD-L-NDS provides educational services to Cook College/NJAES, Rutgers Cooperative Extension, and other agencies (Appendix II). Many of these educational services generated additional income for the laboratory.

In 1998, Mr. Buckley participated in a number of short courses offered by the Office of Continuing

**Table 7. Sample Response Times—1998.**

Response Time	Number of Samples	Percent of Total
0 to 3 days	1296	88.4%
4 to 6 days	85	5.8%
7 to 10 days	51	3.5%
11 to 21 days	27	1.8%
> 21 days	7	0.5%
<b>Total:</b>	<b>1466</b>	<b>100%</b>



Professional Education. Mr. Buckley is an instructor in the Rutgers Professional Golf Turf Management School. In past semesters, he has taught three courses in both the spring and fall sessions: Diseases of Turf; Diseases and Insect Pests of Ornamental Plants; and Insect Pests in Fine Turf. Two more classes were added in the fall of 1998: Weed Identification and Principles of Pest Management on the Golf Course. This ten week teaching commitment consists of one two-hour lecture in each class per week, for a total of 50 hours of contact time. In 1998, Mr. Buckley also provided assistance with laboratory activities for the students. Ms. Clare Liptak also spent countless hours assisting Mr. Buckley in evaluating weed collections for this course. Mr. Buckley's efforts in the Professional Golf Turf Management School generated \$16,195 in income for the laboratory in 1998.

Mr. Buckley participated in several other Office of Continuing Professional Education short courses in 1998. These courses include: Professional Grounds Maintenance; Urban Forestry; Professional Parks Maintenance; Golf Turf Management School; Three Week Preparatory Course; the Home Gardeners School; Introduction to Golf Turf Management; Landscape Integrated Pest Management; An Intelligent Approach; Athletic Field Maintenance; and the Home Depot Garden Center Management Workshop. The income generated by these activities with the Office of Continuing Education was \$1,850.

Mr. Buckley served as the course coordinator for the Pest Management in Landscape Turf Short Course. This was the fifth year for this one-day program. The income generated by this program with the Office of Continuing Education was \$1,062. Mr. Buckley and Mr. Lane Treadway, a graduate student in the Department of Plant Pathology, coordinated and presented a Turf Disease Diagnosis program for the sales crew of Michael Fisher and Son Golf Turf Products. The laboratory earned \$750 for this effort.

Mr. Buckley participated as an invited speaker in several Rutgers Cooperative Extension programs. These programs included: North Jersey Ornamental Horticulture Conference, Turfgrass and Tree days; Central Jersey Turf and Ornamentals Institute, Monmouth, Middlesex, and Somerset Counties; Christmas Tree Growers Twilight Meeting in Gloucester County; IPM Training Somerset County; Landscape IPM Turf Field Day; and Camden County Turfgrass Management Education Day. Lectures in

support of the Mercer, Middlesex, Ocean, and Somerset County Master Gardener Programs also were given. Additionally, Ms. Clare Liptak lectured in support of the Master Gardener programs in Somerset, Passaic, and Union County. The Laboratory received compensation of \$600 for these efforts.

Mr. Buckley also earned income for the RPDL-NDS as an invited speaker for New Jersey Turf Expo; Reed and Perrine-Turf Care Seminar; Certified Tree Experts Training; Bergen County Landscape Contractors Trade Show; Skylands Association Professional Landscape Seminar; Brooklyn Landscape Gardeners Conference; New Jersey Shade Tree Federation Annual Meeting; and the Greener Thumb Garden Center Employee Training Course. The income from these talks was \$725.

Other educational services provided by the staff of the RPDL-NDS, for which the laboratory received no compensation, included lectures in undergraduate and graduate courses including The Plant Clinic and Principles of Plant Pathology. Mr. Buckley also participated in the filming of several television shows developed by Extension Faculty in Middlesex County. Short presentations, describing how to utilize RPDL-NDS services, were given to several groups and at several Office of Continuing Professional Education short courses.

**Extension Publications.** During 1998, the RPDL-NDS staff contributed regularly to the Plant & Pest Advisory. The laboratory staff wrote a brief article on laboratory activities for each issue of the newsletter by Rutgers Cooperative Extension and the New Jersey Agricultural Experiment Station. The newsletter was published bi-weekly from March to September and monthly from September to December.

One extension factsheet was co-authored in 1998. Several other extension factsheets were also written during the year and are currently under review.

Clarke, B.B., Buckley, R. J., and Treadway, L. 1998. Chemical Control of Turf Diseases. Rutgers Cooperative Extension Publication FS184.

**Service.** Mr. Buckley served as a member of the Rutgers Cooperative Extension Home Horticulture Working Group. At Ag Field Day, he organized and staffed a well-attended "Plant Problem Question and Answer Booth." He also volunteered to staff an information booth at the Display Gardens Open House.

## Marketing

The RPDL-NDS developed a 15 minute slide presentation to help advertise laboratory services to various grower groups. Copies of this presentation are available on loan to anyone who wishes to advertise the laboratory's services. Numerous presentations of this program were made throughout 1998 by the staff of the Plant Diagnostic Laboratory.

An advertising brochure was developed in 1992 for general distribution at county offices, grower meetings, and other activities. This brochure briefly describes the services of the RPDL-NDS and how to access them. To date, well over 20,000 copies of this brochure have been distributed. The brochure is currently being reviewed and revised. Once again, special thanks goes to the Department of Continuing Professional Education, who placed a copy of the advertising brochure in each short course educational packet distributed.

To help advertise laboratory services at grower meetings or other activities, a mobile display unit was developed. This display unit briefly describes the services of the RPDL-NDS and how to access them, and is available on loan to anyone who wishes to advertise the laboratory services. Ms. Liptak has taken over the responsibility of representing the laboratory with the display unit at fairs, trade shows, and other events. She has updated the presentation of the display with a literature rack to provide selected extension publications to the attendees of these events. Her initiative brought the display to the Eastern Regional

Nurserymen's Association trade show and to the New Jersey Turf Expo. As a result of client interest at the ERNA show, packets of laboratory submission forms were provided to several garden center operators for distribution to interested customers. These packets of laboratory information subsequently will be offered at all appropriate events. The events at which the display was utilized included: Ag Field Day, the Rutgers Gardens Open House, Turf Field Day, Turf Expo, and the ERNA Trade Show. Several events are planned for 1999.

## Funding

The Plant Diagnostic Laboratory is expected to be self-supporting. Funding for the laboratory is generated by charging clientele for diagnostic services and educational activities.

The 1998 fee schedule for diagnostic services and nematode assays was:

Residential Clients	\$20.00/sample
Commercial Growers:	
Fine turf	\$50.00/sample
All others	\$20.00/sample
Out-of-State Growers	\$75.00/sample

Over \$55,795 was generated from diagnostic services and nematode assays during 1998, representing a 1% increase in income over 1997.

**Table 8. Plant Diagnostic Laboratory Sample Submissions—No Charge Requests.**

Client Category	Number of Samples
RCE County Faculty/Program Associates	84
RCE Specialists	11
Rutgers Research Programs (not RCE)	33
Rutgers Non-Research Faculty/Staff	41
Direct Mail/Walk-ins	61
Other Government Agencies/University	7
<b>Total:</b>	<b>237</b>

A sample submission form and the appropriate payment accompanied the majority of samples received from residential clientele. Most commercial samples were accompanied by a submission form; however, the majority of these submissions did not include payment. In most cases, commercial growers preferred to be sent a bill. Almost 100% of the clients billed have remitted payment, and, the laboratory continues to recover outstanding accounts from past years. Almost all of the samples diagnosed for research programs at Rutgers University were paid for by transfer of funds.

Laboratory policy allows Rutgers employees, county faculty, extension specialists, and selected government agencies to submit a small number of samples "free of charge." These samples are to be used for educational development and government service. The laboratory also receives a number of direct requests for free service from the public. In many cases, letters are sent to the "Department of Agriculture" or to some other non-address. These requests for information eventually find their way to the laboratory. The Plant Diagnostic Laboratory processed 237 "no charge" samples in 1998 (Table 8). These samples accounted for 14% of the samples processed. The value of these "no charge" requests was \$4,740.

Income generated from all laboratory activities covered 100% of the non-salary expenses incurred in 1998. Expenses were increased in 1998 due to the addition of staff. Capitol expenses for microscopes, computer equipment, and reference material required substantial laboratory resources. For more detailed budget information, see Appendix I.

## Future Directions

As in the past, the top priority for 1999 will be to generate more income. To accomplish this, we will continue to advertise laboratory services. Ms. Liptak has generated a list of trade shows, field days, fairs, and educational programs to attend with the display unit. Continued cooperation with the Office of Continuing Professional Education and other educational activities are expected to generate additional funds.

Other priorities in 1999 include: the development of additional educational materials in the form of bulletins, fact sheets, and slide sets in cooperation with extension faculty; focusing on ways to add and train labor for the laboratory during its busiest periods; finding and moving into suitable permanent facilities as soon as possible; and professional improvement

(which includes participation in professional societies).

We are constantly evaluating the immediate and future needs of the State for additional services. Your suggestions are welcome.

## Plant Disease Highlights

The occurrence and severity of plant diseases are strongly influenced by environmental conditions. The 1997 growing season was greatly affected by a year with an unseasonably warm winter, a cool, wet spring, and a July to August period of drought. Diseases favored or enhanced by these conditions were especially prevalent.

### Ornamentals

As usual, a vast majority of ornamental plants submitted to the laboratory were affected by abiotic agents. The symptoms of these problems appeared as leaf scorch, premature defoliation, branch dieback, early and late fall color, and an overall decline in plant vigor. Planting problems and poor site conditions were a primary cause of many plant failures. The cumulative effects of several seasons of erratic and extreme weather also contributed strongly to many plant failures.

Of the diseases that were caused by biotic agents, several leaf spots, anthracnose, scabs, needlecasts, and rusts were diagnosed. These leaf diseases are enhanced by frequent spring rains. Cankers caused by the fungi *Botryosphaeria*, *Atropellis*, and *Cytospora* were prevalent in trees and shrubs injured during the drought of 1995. *Cytospora* was the most common fungal canker and was especially prevalent on various species of maple. Root-infecting pathogens detected this year on a variety of ornamental plants included *Phytophthora*, *Pythium*, *Fusarium*, and *Rhizoctonia*.

Of particular note is the increased incidence of bacterial leaf scorch in shade trees. A record number of oak samples tested positive for the disease during September and October. Since the bacterium that causes the disease affects xylem tissue, symptom expression is enhanced during periods of moisture stress. Sixteen historic trees in a Trenton Revolutionary War era cemetery were diagnosed. The disease is often more abundant in southern New Jersey; however, this season's samples were also submitted from several Bergen County sites.

The pest problems most commonly diagnosed were caused by spruce mites and various scales; however, many samples also had evidence of bark beetle or borer activity. Like the cankers, borer problems originated with drought conditions in 1995. White pine had a particularly tough season with borers. Presumably, these trees were predisposed by excess moisture in the root zone from spring rains. Flat-headed borers were also quite common in new plantings of susceptible species.

In the greenhouse, root rot caused by *Pythium*, *Rhizoctonia*, and *Thielaviopsis* continue to be the most common problem. Botrytis gray mold is always a problem. Nutrient and salt problems are also prevalent. Several growers submitted samples to the laboratory of a variety of plants that tested positive for the tospoviruses, impatiens necrotic spot or tomato spotted wilt.

### **Turf**

It was not an easy year for fine turf in New Jersey and the mid-Atlantic region. Cool, wet conditions in the spring, particularly thirteen straight days of rain in

May, stimulated pink snow mold and red thread. At least 50 samples of pink snow mold were diagnosed during the period. Furthermore, the red thread was electrifying. Red thread is easy to diagnose under those conditions, so samples were limited. Regardless of sample numbers, red thread may be the most common disease on turf in the state. Heat stress was not a problem this summer, so most golf turf did quite well. Anthracnose continues to be the most common summer disease on golf courses. Brown patch and pythium blight are also very common. This fall, the region suffered from an epidemic of gray leaf spot. In a repeat of 1995, most of the perennial ryegrass on certain golf courses was lost to the disease. This year also saw the disease move to residential lawns.

### **Vegetables, Fruits, and Field Crops**

In vegetables, root knot nematode in carrot and lesion nematode in potato continue to be primary problems. Nematodes have also been problematic for several small grain growers in Southern New Jersey.

## APPENDIX I. Rutgers Plant Diagnostic Laboratory and Nematode Detection Service-Budget

**Table 9. RPDL-NDS Approximate Expenditures in 1998 (excluding salaries).**

Salaries & Benefits: (student help)	\$11,868.90
Supplies and Services: Diagnostic supplies Printing/advertising References/publications Equipment maintenance Office supplies Photographic services	\$15,621.28
Capital Equipment: (one-time purchase)	\$14,201.08
Communications(approximate): Telephone/FAX Postage	\$2000.00
Travel: Travel to give paid talks Travel to professional meetings Marketing expenses	\$2656.06
<b>Total Expenditures</b>	<b>\$46,347.32</b>

**Table 10. RPDL-NDS Income in 1998.**

Sample fees:	\$ 50,530.00
Unpaid sample fees:	525.00
Lecture fees: Professional Golf Turf School O.C.P.E. Short Course Coordinator O.C.P.E. Short Course Instructor Other	16,195.00 1,062.00 1,850.00 2,075.00
Value of no-charge samples:	< \$4,740.00 >
<b>Total potential revenue:</b>	<b>\$76,977.00</b>
<b>Total Income:</b>	<b>\$ 72,237.00</b>

**Table 11. RPDL-NDS Estimated Expenditures for 1999.**

Seasonal labor:	12,500
General operating:	12,500
One-time equipment cost:	5,000
Marketing	2,500
Educational development and travel:	2,500
New facility renovation?	?
<b>Total Estimated Expenditures 1999:</b>	<b>\$ 35,000</b>

**Table 12. RPDL-NDS Estimated Income for 1999<sup>1</sup>.**

Estimated TURF Sample Income: 40% @ \$50	\$ 32,000
Estimated OUT-OF-STATE Sample Income: 20% @ \$75	24,000
Estimated ALL OTHER Sample Income: 40% @ \$20	12,800
Estimated LECTURE FEE Income:	20,000
<b>Total Estimated Income for 1999:</b>	<b>\$ 88,800</b>

<sup>1</sup> based on 1600 samples submitted in 1999.

# Appendix II. Complete Listing of Lectures Presented During 1998.

*Richard J. Buckley, Laboratory Coordinator, Plant Diagnostic Laboratory*

Date	Title of Presentation	Audience	Location	Number of handouts	Type of participants <sup>1</sup>
1-3/98	Diseases of Turfgrass(10 Lectures)	Professional Golf Turf Management School	Cook College	20	T
1-3/98	Diseases of Ornamentals(10 Lectures)	Professional Golf Turf Management School	Cook College	20	T
1-3/98	Insects of Turfgrass(10 Lectures)	Professional Golf Turf Management School	Cook College	20	T
1/6/98	Understanding White Grub Problems in Turfgrass	North Jersey Ornamental Horticulture Conference	Morris Co.	2	A,I,T,L
1/7/98	What's Buggin' You? Visual Clues for Insect Pest Diagnosis	North Jersey Ornamental Horticulture Conference	Morris Co.	2	A,I,T,L
1/8/98	Managing Diseases in Landscape Turf	Professional Grounds Maintenance Short Course	Cook College	2	T,L
1/16/98	Controlling Tree Diseases	Urban Forestry Short Course	Cook College	2	A,L
1/23/98	Plant Pathology	South Brunswick High School Career Day	Middlesex Co.	1	C
1/28/98	Problem Insects and Pesticide Use	Professional Parks Maintenance Short Course	Cook College	3	T,L
1/29/98	Turf Diseases You'll Never Forget	Reed and Perrine Turf Seminar	Monmouth Co.	2	T,L
1/30/98	Diseases of Turfgrass	Golf Turf Management School; Three Week Preparatory Course	Cook College	2	T,L
2/3/98	Diseases of Turfgrass	Golf Turf Management School; Three Week Preparatory Course	Cook College	2	T,L
2/3/98	Diagnosis of Plant/Pest Disorders	Landscape IPM: An Intelligent Approach	Cook College	2	A,T,L
2/18/98	Recognition and Management of Cool Season Turf Diseases	Turfgrass Management Education Day	Camden Co.	2	T,L
2/18/99	Integrated Management of Summer Patch Disease	Turfgrass Management Education Day	Camden Co.	2	T,L
2/19/98	Diagnosing Turfgrass Problems	Greener Thumb Training for Garden Center Employees	Morris Co.	2	A,I,L,T
2/25/98	Turf Disease Problems and Their Control	Athletic Field Maintenance Short Course	Cook College	3	L,T
2/25/98	1997 Plant Disease Update	Landscape '98 Conference and Trade Show	Hudson Co.	2	A,I,L,T
3/2/98	Understanding White Grub Problems in Turfgrass	Brooklyn Landscape Gardeners Conference	New York, NY	3	L,T
3/2/98	Managing Diseases of Landscape Turf	Brooklyn Landscape Gardeners Conference	New York, NY	2	L,T
3/3/98	Effective Use of the Plant Diagnostic Laboratory	Introduction to Golf Turf Management Short Course	Cook College	2	T
3/3/98	Managing Diseases of Landscape Turf	Central Jersey Turf and Ornamentals Workshop	Monmouth Co.	2	A,T,L
3/4/98	Managing Diseases of Landscape Turf	Central Jersey Turf and Ornamentals Workshop	Monmouth Co.	2	A,T,L
3/5/98	Managing Diseases of Landscape Turf	Diseases of Perennial Ryegrass Central Jersey Turf and Ornamentals Workshop	Somerset Co.	2	A,T,L
3/14/98	Managing Diseases in Landscape Turf	Diseases of Perennial Ryegrass Home Gardeners School	Cook College	3	H
3/26/98	Diagnosing Plant Disease	Home Depot Management Training Program	Cook College	3	I
4/9/98	Plant Pest Diagnosis	Master Gardener Training	Ocean Co.	3	H
4/22/98	Plant Diagnostic Workshop	Master Gardener Training	Mercer Co.	1	H
5/9/98	Tree Diseases	ISA CTE Training Program	Monmouth Co.	3	A,L
5/13/98	The Microscope and Turf Disease Diagnosis	Michael Fisher and Sons Sales Training	Cook College	5	T
6/3/98	Christmas Tree Disease Problems	South Jersey Christmas Tree Growers Twilight Meeting	Gloucester Co.	3	A
6/11/98	Pest Walk	Master Gardener Training	Monmouth Co.	1	H
7/14/98	Common Diagnostic Procedures	Plant Clinic 16:765:536	Cook College	2	C
8/17/98	Identification of Turf Insect Pests	Landscape IPM Turf Field Day	Monmouth Co.	5	T,L
9/23/98	Key Pests of Shade Trees	Skylands Association Professional Landscape Seminar	Bergen Co.	2	A,L
10/24/98	Shade Tree IPM: To Spray or Not To Spray?	NJ Shade Tree Federation Annual Meeting	Atlantic Co.	2	A,L
11/9/98	Diagnosing Plant Problems	Master Gardeners Training Program	Somerset Co.	3	H
11/12/98	Nematodes	Principles of Plant Pathology 16:765:531	Cook College	10	C
11/13/98	Diagnosing Plant Problems	Master Gardeners Training Program	Middlesex Co.	3	H
12/3/98	Turf Insect Pests	Pest Management in Landscape Turf	Cook College	3	T,L
12/3/98	Common Turf Diseases	Pest Management in Landscape Turf	Cook College	3	T,L
12/5/98	It's a Bug Eat Bug World	IPM Training	Somerset Co.	2	A,T,L
12/8/98	Troubleshooting Lawn Problems	NJTA Turf Expo '98	Atlantic Co.	3	L,T
10-12/98	Weed Identification (10 Lectures)	Professional Golf Turf Management School	Cook College	20	T
10-12/98	Principles of Pest Control on the Golf Course(10 Lectures)	Professional Golf Turf Management School	Cook College	20	T
10-12/98	Diseases of Turfgrass(10 Lectures)	Professional Golf Turf Management School	Cook College	20	T
10-12/98	Diseases of Ornamentals(10 Lectures)	Professional Golf Turf Management School	Cook College	20	T
10-12/98	Insects of Turfgrass(10 Lectures)	Professional Golf Turf Management School	Cook College	20	T

Audience Addressed: A=Arborist; C=College (Academic); G=Greenhouse; H=Residential Clientele; I= Industry; L=Landscape Professionals; N=Nursery Growers; T=Turfgrass Managers; X= Christmas Tree Growers.

## Appendix III. Complete Listing of Lectures Presented During 1998.

*Clare S. Liptak, Horticultural Consultant, Plant Diagnostic Laboratory*

Date	Title of Presentation	Audience	Location	Number of handouts	Type of participants'
10/26/98	Botany for Gardeners	Master Gardeners Training Program	Somerset Co.	1	H
10/30/98	Botany for Gardeners	Master Gardener Training Program	Union Co.	1	H
12/17/98	Plant Identification Techniques	Master Gardener Training Program	Passaic Co.	1	H

Audience Addressed: A = Arborist; C = College (Academic); G = Greenhouse; H = Residential Clientele; I = Industry; L = Landscape Professionals; N = Nursery Growers; T = Turfgrass Managers; X = Christmas Tree Growers.

Desktop publishing by Rutgers Cooperative Extension/Resource Center Services

 Printed on recycled paper

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N.J. AGRICULTURAL EXPERIMENT STATION  
RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY  
NEW BRUNSWICK**

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