1980

Spring 1980 Conference Issue

John O'Connor

William A. Meyer

TURF BULLETIN

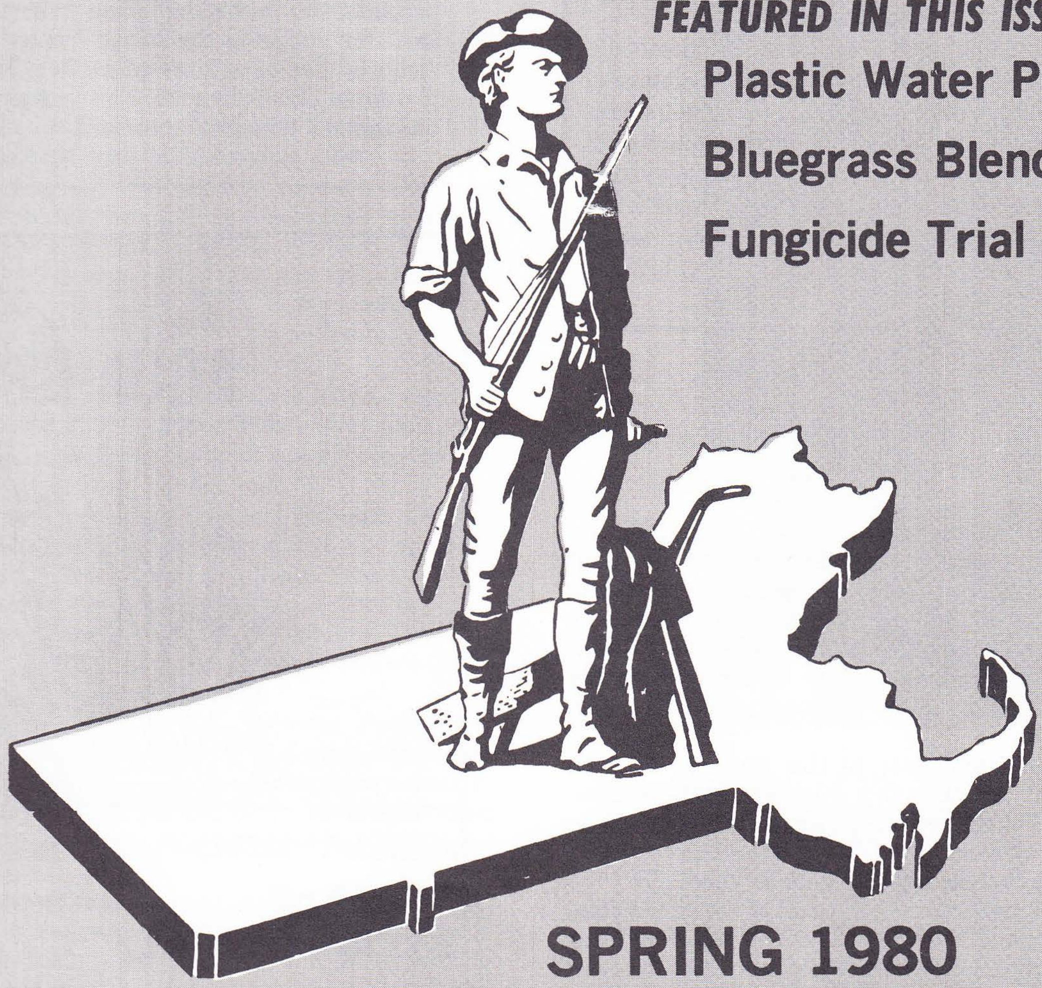
MASSACHUSETTS TURF AND LAWN GRASS COUNCIL INCORPORATED

FEATURED IN THIS ISSUE:

Plastic Water Pipe

Bluegrass Blends

Fungicide Trial Results



SPRING 1980 CONFERENCE ISSUE

BETTER TURF THROUGH RESEARCH AND EDUCATION

EDITOR
Malcolm J. Chisholm
191 Lincoln Ave.
Amherst, Mass. 01002

SECRETARY-TREASURER & ADVISOR
Dr. Joseph Troll
RFD No. 2 Hadley, Mass.

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The Massachusetts Turf and Lawn Grass Council Incorporated is chartered under the laws of the Commonwealth of Massachusetts as a non-profit corporation. The turf council seeks to foster "Better turf through research and education."

More detailed information on the subjects discussed here can be found in bulletins and circulars or may be had through correspondence with the editor.

January 10, 1980

Dear Readers;

Pat Kristy and I worked on this issue together and we hope it will be informative and helpful. I have spent the last four seasons involved with turf and golf course management in central New England. I hope this experience and my further studies will benefit the "TURF BULLETIN." In particular I have dealt considerably with and would appreciate any information on sand topdressing programs.

In central Massachusetts, at this time, we have no snow whatsoever. We hope this won't effect the surface of graduate student Steve Rackliffe's unseeded six thousand square foot all sand green. We are anxious to report results of his heat stress experiments to you.

It is my hope to be of benefit to all of you in the competitive New England Turf Industry. The best way I can be of service and utilize the resources at my disposal is to hear from you about any problems, or matters of interest. All correspondence will be answered.

Malcolm J. Chisholm

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The "TURF BULLETIN" expresses it's appreciation to the "Long Island Arborist Association Inc." for notice of the Ninth Annual "Long Island Arborist Tree Conference" on Feb. 9, 1980. It is unfortunate our Spring 1980 issue was not published on time for this announcement.

Editor

Plastic Water Pipe: How Well Does it Hold up?

Undisturbed PVC may even outlast its usefulness

By John O'Connor
Engineering Editor

Many of us use plastics, but who ever admits to liking them? Traditionalists damn the fact that synthetics replaced natural materials, and have succeeded in making the word "plastic" a synonym for artificial. The energy-conscious know that plastic products are fabricated from petroleum, and blame them for contributing to higher prices and scarcer fuel supplies. Conservationalists condemn manufacturers of plastic products for encouraging Americans to be a throw-away society. Environmentalists report, with doom in their voices, that plastic products buried for years in a sanitary landfill survive almost unchanged.

It's easy to forget that the reason that plastic has become so widely used is its ability to substitute for more expensive materials — and often with a performance improvement. Most plastic products were not developed by greedy manufacturers to replace a natural material with a more profitable one, but were produced in response to a need. This is the case with plastic water pipe.

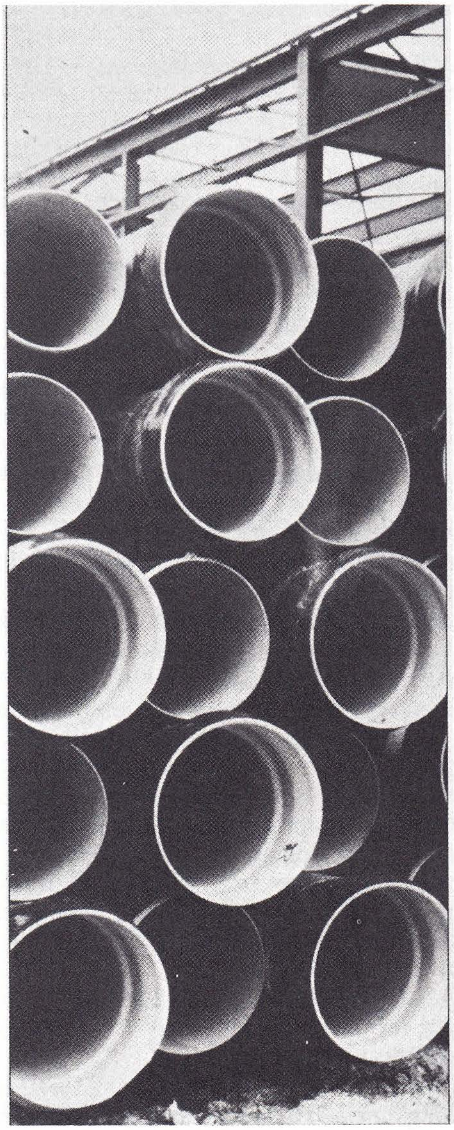
Polyvinyl chloride — PVC — the most common plastic used for water mains, was discovered near the end of the 19th century, but many years passed before it was put to any useful purpose. In fact, the scientists who discovered the material found that it was so resistant to change that they decided that it would be too difficult to form or process for useable applications.

It was the 1920s before German scientists began to attempt to use PVC and the 1930s before they formed it into the first PVC pipe. Some installations of this pipe are still providing satisfactory service today.

World War II provided the real impetus for the growth of plastic pipe. Germany's iron ore and mineral resources were lost to her, at the same time that the country was facing the reconstruction of metropolitan sewer and water systems destroyed in combat. The Germans turned to PVC pipe on a large scale to replace these collection and distribution systems.

In this country, the National Science Foundation began in 1951 to develop a listing and testing service to certify that various plastic pipe products were manufactured to meet acceptable standards. In 1959, NSF first tested and certified plastic pipe for potable water service.

The American Water Works Association (AWWA) established its Standards Committee on Thermoplastic Pressure Pipe in 1968. In 1975, the AWWA published the results of seven years of work by that committee, the *AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water.* This standard, and the pipe manufactured to meet it, are more commonly referred to by the standard number, AWWA C900. C900 pipe are manufactured to meet one of three pressure classes: 100, 150, and 200. The higher the number, the thicker the pipe wall. Most utilities use class 150.



Publication of C900 marks the full acceptance of plastic pipe by this nation's water suppliers. A just-published survey conducted by the AWWA confirms this acceptance. Of 514 utilities responding to the survey, approximately 40% currently are installing plastic mains, and approximately 43% are installing plastic services. Overall, some 61% of the respondents have used or now are using plastic pipe in their distribution systems.

In 1977, the last year for which full data were available, the respondents purchased 563 miles of plastic pipe for mains, and 422 miles of plastic pipe for services.

Of those utilities that use plastic for mains, just over half use it exclusively or nearly so. Of those using plastic pipe for services, 70% use it for at least 90% of their installations.

Suppliers of plastic pipe, although reluctant to release specific sales figures for competitive reasons, admit that acceptance of plastic pipe is coming far more rapidly than they had expected. One supplier reports that sales are running one-third ahead of forecasts.

The primary advantage of plastic mains, mentioned by more than 40% of the respondents to the AWWA survey, is installation benefits:

- Flexibility
- Less demanding equipment requirements
- Faster installation
- Smaller crews
- Easier tapping
- Simpler bedding
- Easier cutting
- No leakage
- Easier handling
- Lighter weight
- Longer lengths
- Good delivery

The next most apparent advantages, mentioned by 15% of the respondents each, are external and internal noncorrodibility and lower initial cost. At the same time, a few respondents pointed out that plastic pipe was more expensive than its asbestos-cement counterpart.

Other advantages cited included better *C* factors of flow characteristics, easier repair, and less susceptibility to ground movements. Long life was mentioned by a few respondents, although not as many as had expressed concern with the shorter historical records compiled for plastic pipe as compared to other materials.

Another characteristic cited by both proponents and opponents was strength. Some expressed approval that plastic is stronger than asbestos cement, while others were concerned that it is not as strong as cast or ductile iron. The latter group were particularly apprehensive about potential damage during dig-in-situations.

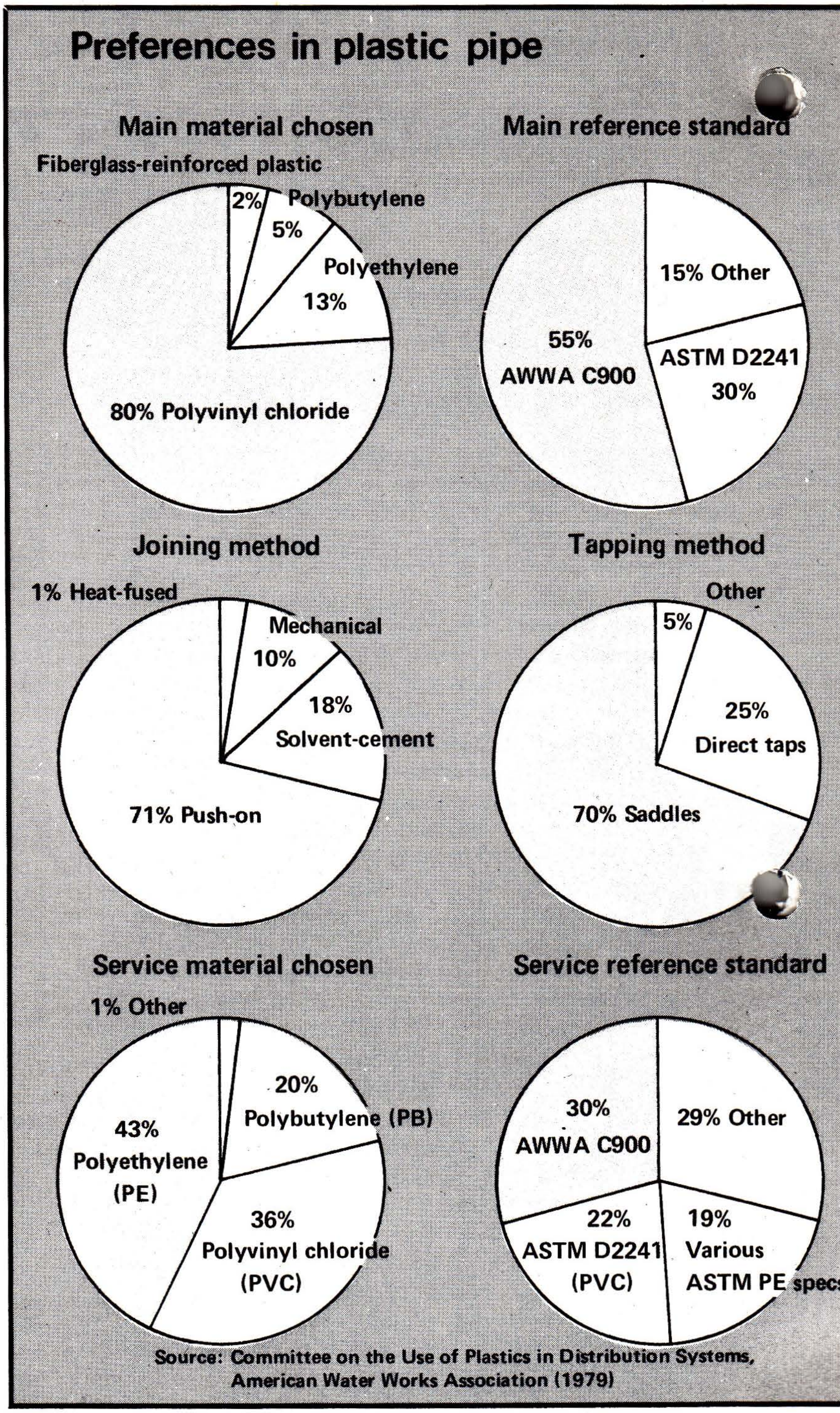
Survey respondents cited other disadvantages, too — even when they choose plastic pipe. The primary disadvantage is problems during cold weather:

- Difficulty in thawing
- Brittleness
- The necessity for deeper burial to avoid freezing
- Excessive contraction

The next most frequently cited disadvantage is difficulty in locating buried non-metallic pipe. Other disadvantages include the need for very careful bedding and backfilling, tapping problems, and problems with solvent-weld joints. In connection with the latter, the survey disclosed a definite trend away from the use of solvent-weld joints in favor of push-on and mechanical joints. The use of solvent cement had declined from 30% of joints to 18%, while the use of push-on joints had increased from 62% to 71%, and the use of mechanical joints from 6% to 10%. The other alternative, heat-fused joints, continue to be used by only a few utilities.

Small numbers of respondents cited other disavantages of plastic pipe:

- Deterioration in direct sunlight
- Costly and often unavailable transition fittings



- Duplication of the inventory of pipe, fittings, and tools when more than one pipe material is used.
- Former problems with poor quality control
- Electrical grounding problems
- Rodent attacks on the pipe.

A potential user of plastic pipe first learns that the term "plastic" is not an adequate description for the material. Just as the term "rock" covers materials that range in properties from granite to mica schist, so does the generic title "plastic" include a variety of materials that vary widely in characteristics. Not all of these, of course, are used in the manufacturing of piping.

By far the most popular material for plastic water mains is polyvinyl chloride. Among those who responded to the AWWA survey by reporting that they used plastic mains, 80% use PVC. This is not surprising, because AWWA C900, the only standard published by that organization for plastic pipe larger than three inches, covers only pipes made of this material.

The other plastics used for mains include polyethylene (PE), 13%; polybutylene (PB), 5%; and fiberglass-reinforced plastic (FRP), 2%. No apparent trend exists in terms of changing utility preferences among these pipe materials.

Water utilities are more diverse in their choice of plastic materials for services. For these smaller diameter lines, polyethylene is the material most frequently chosen. Currently, 43% of the users select PE, although that percentage is a decline from the 59% who chose PE in an earlier survey.

PVC is a strong second choice, with 36% of the respondents selecting this material. This is a dramatic increase from the earlier survey, which found only 11% choosing PVC. The third popular service material is polybutylene. One out of five utilities currently chooses PB, down from the 29% that chose it in the earlier survey.

AWWA currently has published standards for small diameter (1/2 through 3-inch) PE and PB pressure pipe, but the standards were adopted too recently to have been used by many of the survey respondents. Most of the utilities who selected plastic services reported that they had specified that it meet either one of the ASTM standards or C900.

The major difference between PVC pipe and PE and PB pipe is that the PVC normally is furnished in rigid 20-foot lengths, while the other two pipes are furnished — at least in the two-inch or smaller sizes normally used for services — in coils. This flexibility makes it easier to handle and install.

Polyethylene pipe is resistant to rupture from freezing, but it is not suitable for exposure to high temperatures. For this reason, some utilities select PB pipe, which, although similar in other characteristics to PE pipe, offers extra durability under higher temperatures. If, for example, a hot water heater should malfunction and cause a backup of hot water into the cold supply line, PB would offer an extra margin of safety.

Fiberglass-reinforced plastic (FRP) pipe is not used for services and is used only for a small percentage of mains. The reason is that FRP is marketed primarily as a more economical alternative to PVC in larger pipe sizes. FRP actually is a composite pipe: an inner pipe of PVC, which offers the outstanding flow characteristics and chemical resistance of that material, wrapped with fiberglass reinforcing to provide greater structural strength.

Like PVC, FRP is manufactured in outside diameters that match those of iron pipe. Because of FRP's greater strength, however, it has thinner walls when manufactured to withstand equal pressures. This means that is has a greater inside diameter, and therefore can carry greater flows in the same size pipe.

Another advantage of FRP is its failure mode. Unlike PVC pipe, which fails by bursting, FRP fails by allowing the water in the pipe to "weep" through the walls. This minimizes the probability of a catastrophic failure.

Probably less important to waterworks personnel, who are accustomed to dealing with heavy cast iron and concrete pipe, is the additional weight saving offered by FRP and PVC pipe. Depending upon the pressure rating, FRP usually weighs about half as much as PVC pipe of the same outside diameter. This is a definite handling and installation advantage.

In many ways, installation of plastic mains differs little from installing cast iron mains. The lighter weight of the plastic makes handling easier, and the 20-foot lengths mean that fewer joints are required. Conversely, plastic pipe does not have the structural strength of iron, and bedding and backfilling require more attention. A knowledge of proper installation techniques is vital for water utility personnel, whether they may be doing their own installation on a small system extension, or overseeing the work of a contractor.

A good installation begins with pipe that is in good condition. Incoming shipments should be inspected on arrival. The packaging should be intact, and the load show no signs of shifting or rough treatment. Although individual pipe can be unloaded by hand, the preferable

Fitting it all together

A distribution system manager contemplating the use of plastic mains for the first time might be discouraged by the thought of the inventory of cast iron fittings still on hand in the utility yard. Must these all be replaced with their plastic counterparts?

The answer is no. In fact, most plastic pipe — at least in sizes of 4-inches or larger — is joined by iron tees, bends, and valves. It would be prohibitively expensive to fabricate from plastic a relatively small number of large items of close dimensional tolerances. For that reason, plastic pipe catalogs invariably include cast iron mechanical joint fittings for use with the plastic pipe lengths.

PVC pipe meeting AWWA C900 is available in outside diameters that match those of either steel pipe or cast iron pipe. The water utility should be careful to ensure that its pipe is furnished in cast iron ODs. If is does so, then assembly is a simple matter that does not require adapters or complicated procedures. There are, however, some minimal precautions, as detailed in the Johns-Manville *Installation Guide* for its *Blue Brute* PVC wate pipe:

- Be sure the correct rubber ring is used with the cast iron bell or fitting, i.e., *Tyton* ring with *Tyton* bell; mechanical-joint rubber ring with mechanical-joint fitting, etc. Do not use the PVC rubber ring in a cast iron bell or fitting.
- The bevel on the end of the pipe spigot should approximate the cast iron bevel, which is shorter and steeper than the PVC bevel. The reason for this is that the depth of the cast iron bell or fitting is shorter than the PVC bell. The reduced length of taper will allow a greater flat sealing surface and minimize the possibility of the gasket seating on the bevel, which could result in leakage.
- When connecting to mechanical-joint or flanged fittings, a beveled spigot is not required and is not recommended. Cut off the beveled end of a pipe before inserting it into a mechanical-joint fitting.

If the utility has PVC pipe furnished in iron pipe size (IPS) diameters, it must use special gaskets, known as duck-tipped gaskets, to assemble the pipe into standard AWWA mechanical-joint bells.

The weight of cast iron or other metallic fittings, such as valves and fire hydrants, should not be carried by the PVC pipe. A concrete cradle should be installed under these heavy items to carry their weight. Similarly, properly engineered concrete thrust blocking should be poured to carry the loads wherever the pipeline changes direction, changes size, or stops at a dead end. Thrust blocking also is necessary at valves and hydrants, where horizontal forces are generated when the devices are closed.

Each fitting in a hydrant run-out — the branch tee, the gate valve, and the hydrant itself, if all are separate — must be supported by its own concrete foundation. A concrete base poured around the hydrant base will serve as a thrust block, an anchorage against frost heave, and a foundation that will eliminate washouts from the water discharged through the hydrant drain.

Tri-Plex Shade
Tri-Plex General
Tri-Plex Blue
Tri-Plex Rye

procedure is to use a fork lift or wheel loader with forks to remove pipe packages. During unloading, particularly in cold weather, care should be taken to prevent the pipe from impacting against rocks, other pipe, or similar items.

If possible, pipe should be stored at the jobsite in the packaging provided by the manufacturer. Place the packages of pipe on level ground in stacks no higher than eight feet. If pipe are stacked individually, stack height should not exceed five feet.

Pay particular attention to avoiding compression, deformation, or other damage to the bell ends. Remember that the coefficient of thermal expansion of plastics is high. In cold weather, the pipe will shrink. The packaging may loosen, allowing the pipe to move.

Although plastic pipe is tough enough that some who work with it consider it almost indestructible, it deforms more easily than cast iron or concrete. For this reason, proper trench preparation and backfilling are very important.

The trench bottom should be excavated to the correct line and grade prior to the laying of any pipe. It should be smooth and free of oversize stones and frozen material. If the excavation is in rock or similar material, at least four inches of additional material should be removed from the trench bottom and replaced with sand or other selected backfill that will provide proper cushioning for the pipe. Likewise, if the material in the bottom of the trench is unstable, it should be excavated and replaced with material that will uniformly support the weight of the loaded pipe. Bell holes — small additional excavations in the trench bottom — should be provided to prevent point loading under the bells.

All pipe and fittings should be lowered into the trench using suitable equipment. Dropping pipe into the trench may cause an impact failure that will not be detected until the pipe is under pressure. An impact-damaged pipe interior will show only a slight longitudinal indentation, but the inside will be cracked. As soon as the interior is filled with water under pressure, the pipe will split.

The most popular method of joining pipe sections is the push-on joint. Push-on joints, which are preferred by nearly three-quarters of the utilities using plastic mains, utilize pipe with one end formed into a bell to receive the straight or spigot end of the next pipe. Watertightness is assured by a gasket.

In laying, the crew first ensures that the interior of the pipe, particularly the gasket groove in the bell end, is clean. Then, a worker seats the gasket in the groove according to the manufacturer's instructions. He lubricates the spigot end with the supplied lubricant, and slides it into the bell end until the two are seated.

Some manufacturers mark their spigot ends with a reference mark that indicates correct seating. It is important for the installation crews to comply with this mark. If the pipe is installed in cold weather, for example, and the spigot pushed all the way home, expansion during warmer conditions cannot be accommodated.

Gasketing and lubrication also require attention. Some suppliers manufacture more than one type of gasket, so the utility should ensure that the proper one is being installed. Color coding provides a quick method of checking.

Likewise, the lubricant must be of a type that will not damage the pipe or gasket, and that is approved for use in potable water systems. A non-approved lubricant may harbor bacteria. To prevent gasket movement, lubricant should be applied only to the spigot, never to the gasket or its seat.

When pipe must be cut to meet fittings, hydrants, or the like, the cut must be square across the pipe. PVC pipe can easily be cut using a fine-toothed hack saw or handsaw, or a portable saw with a steel blade or abrasive disc. Marking the pipe around its entire circumference helps to ensure a square cut.

The newly cut spigot end also must be beveled to match the factory bevel. This can be done either with a

Maximum burial depth for PVC pipe

Source: Handbook of PVC Pipe, Uni-Bell Plastic Pipe Assoc. (Dallas, TX, 1979)

* ASTM D2321	Description of backfill	**	Depth of backfill above pipe (feet): 3, 5, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30
I	Graded angular stone		
II	Coarse sand and gravel with small amount of non-cohesive fines	90%	
		80%	SATISFACTORY; CAUTION
III	Fine sands, sand-clay, gravel-clay mixtures	90%	
		85%	
		75%	NOT RECOMMENDED
		65%	
IV	Silts, silty clays, and inorganic clays of medium to high plasticity and liquid limits	85%	CAUTION
		75%	
		65%	NOT RECOMMENDED
V	Organic, frozen or debris-laden materials		

*Embedment classification (ASTM D2321)
**Proctor density (AASHTO T-99)

Maximum long-term pipe deflection, not including live loads or surcharges: 5% 7.5% +7.5%

special tool provided for the purpose, with a coarse file or rasp, or with a portable sander with an abrasive disc. Before the cut pipe is used, it should be marked with a new reference mark for proper seating. Manufacturers' literature includes a table of correct distances to the reference mark for various pipe sizes, but it is simpler and just as accurate to use the factory-marked end of a length of same-size pipe as a marking guide.

For making service connections to plastic mains, some 70% of utilities use service clamps or saddles. Another 25% use direct taps. Direct taps generally are suitable for the thicker-walled pipe, that meeting the pressure requirements of AWWA C900 Class 150 and 200, and in sizes of six inches and above. Service connections to four-inch pipe and to Class 100 pipe of any size should be made with a saddle or service clamp.

Service clamps for plastic pipe should provide full support around the circumference of the pipe, with no lugs that will dig into the pipe when the saddle is tightened. In addition, the clamp should provide a minimum of two inches of bearing area along the length of the pipe to ensure that the pipe will not be distorted when the saddle is tightened.

One critically important factor affecting pipe performance and deflection during its working life is the placement of the haunching material. Haunching material is the portion of the backfill that is placed from the original trench bottom or bedding to the springline, the widest part of the in-place pipe. Haunching material must be placed under the pipe curve (haunch) and well compacted to provide adequate side support. At the same time, careful techniques are necessary to ensure that the pipe is not displaced either vertically or laterally from its proper alignment.

Next, the initial backfill is placed to cover the pipe to a depth of at least 12 inches. This material should be placed by hand, with little effort made to compact it. Backfill may be placed by machine above this level, but no rolling equipment should be allowed in the trench until the pipe is covered with at least 18 inches of backfill. Compaction requirements above this level should be determined by the nature and use of the surface. If possible, prevent excessive loading of the pipe by avoiding compaction altogether and returning to fill depressions as the fill settles.

Before placing the line in service, the utility should follow its normal testing and disinfection procedures. After that, it can forget these permanent mains and concentrate on the water it is delivering through them.

"Better Turf Through Research and Education"

Forty-ninth Annual Turf Conference and Fourth Industrial Show

March 4, 5, and 6, 1980
Civic Center Springfield, Massachusetts
(I-91, Exit 6 from South, Columbus Avenue Exit from North)

Sponsored by Massachusetts Cooperative Extension Service
Massachusetts Turf and Lawn Grass Council
Golf Course Superintendents Association of New England

PLEASE BRING THIS PROGRAM WITH YOU

REGISTRATION
Lobby-Plaza Entrance

8:30 AM - 4:00 PM Tuesday, March 4, 1980
8:00 AM - 4:00 PM Wednesday, March 5, 1980

TUESDAY, MARCH 4

—Morning—

9:00 AM - 12:45 PM Industrial Show Open
Exhibition Hall
Snack Bar Available

—Afternoon—

GENERAL SESSION
Banquet Room

Chairman: Dr. Joseph Troll
University of Massachusetts

1:00 Welcome
Dr. James B. Kring, Acting Dean
College of Food and Natural Resources
University of Massachusetts

1:15 Effective Listening: Developing Your Ear-Q
Dr. Lyman Steil
Communications Cons. Association
St. Paul, MN

2:45 Break

3:00 Maintenance at the Golden Horseshoe Country Club
Mr. David C. Harmon
Colonial Williamsburg Foundation Golf Course
Williamsburg, VA

3:45 12,000 Years of Forest History in New England
Dr. Robinson J. Hindle
University of Rhode Island
Kingston, RI

4:30 - 6:30 Industrial Show Open
Exhibition Hall
Cocktails Available

4:45 Annual Meeting
Massachusetts Turf and Lawn Grass Council
Banquet Hall

WEDNESDAY, MARCH 5

GOLF COURSE SESSION
Banquet Room

Chairman: Prof. John M. Zak
University of Massachusetts

—Morning—

9:00 Fairway Renovation
Mr. David Portz
Brookside Country Club
Allentown, PA

9:30 Root Pruning Around Greens
Mr. Larry Bunn
R. F. Morse and Co.
Wareham, MA

10:00 Trees, An Integral Part of the Golf Course Scene
Mr. James Snow, Agronomist
USGA Green Section
Far Hills, NJ

10:30 Communication — In Orbit!
Mr. Francis Gallagher
Wilmington, DE

11:00 - 2:00 Industrial Show Open

—Afternoon—

2:00 Fine Points of Union Contract Negotiations
Mr. Edward Horton, CGCS
Westchester Country Club
Rye, NY

2:45 Implementing Long Range Planning
Mr. Stephen G. Cadenelli, CGCS
The Country Club of New Canaan
New Canaan, CT

3:15 Perennial Ryegrass: A Cultural Practice on New England Golf Courses
Dr. Kirk Hurto
University of Massachusetts

3:45 Bentgrasses
Dr. Joseph Duich
Pennsylvania State University
University Park, PA

4:30 - 6:30 Industrial Show Open

—Evening—

7:00 Banquet and Winter School Graduation
Banquet Room

The Lighter Side
Dr. John Denison, Director
Stockbridge School
University of Massachusetts

WEDNESDAY, MARCH 5

ALTERNATE SESSION
College Room

Chairman: Mr. Charles Mruk
Boots Hercules Agrochemicals Co.
Providence, RI

—Morning—

9:00 Turfgrass Cultivars and Seed
Mr. Eugene W. Meyers
O. M. Scott and Sons
Marysville, OH

9:45 Lawn Brown Spots — Disease, Stress, or Insects?
Dr. James Fenstermacher
Chemlawn Corp.
Wickford, RI

10:30 Landscape Development in Large Residential Communities
Mr. W. Chuck Wilson, Manager
Landscape Service
Leisure Technology Corp.
Los Angeles, CA

11:00 - 2:00 Industrial Show Open

—Afternoon—

2:00 Maintenance Practices at Hershey Gardens
Mr. William Bowman, General Manager
Hershey Gardens
Hershey, PA

2:45 Painting Athletic Fields for Special Events
Mr. George P. Toma, Stadium Supt.
Kansas City Royals Baseball Club
Kansas City, MO

3:30 Riding Along the New Jersey Turnpike
Mr. David Grimm
New Jersey Turnpike Commission
Hightstown, NJ

4:30 - 6:30 Industrial Show Open

THURSDAY, MARCH 6

8:30 - 10:00 AM Industrial Show Open

GOLF COURSE SESSION
Banquet Room

Chairman: Dr. Kirk Hurto
University of Massachusetts

10:00 Effects of Phosphate Placement on Establishment of Annual Bluegrass and Penncross Creeping Bentgrass
Prof. John M. Zak
University of Massachusetts

10:20 Research and Observations on Watering and Fertilization for Bentgrass Survival
Dr. Ralph E. Engel
Rutgers University
New Brunswick, NJ

11:00 Disease is Absolute — Health is Relative
Dr. Houston B. Couch
Virginia Polytechnic Institute and State University
Blacksburg, VA

11:45 Lessons from 1979 — Applications in 1980
Mr. Stanley J. Zontek, Northeastern Director
USGA Green Section
Far Hills, NJ

CONFERENCE PLANNING COMMITTEE

Golf Course Superintendents Association of New England

Anthony B. Caranci — Max Mierzwa

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Massachusetts Turf and Lawn Grass Council

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Blend Bluegrasses for Best Disease Resistance

By Dr. William A. Meyer, vice president-research
Turf-Seed, Inc., Hubbard, Oregon

The primary objective of a lawn care company is a satisfied customer with an attractive lawn. Having the most disease-resistant and well-adapted varieties in a customer's lawn should reduce the inputs needed to maintain a high-quality lawn.

Most of the turf areas in the northern United States planted before the early 1950's consisted of common Kentucky bluegrass and fine fescue mixtures. The seed sources of Kentucky bluegrass used for these lawns were collected by stripping wild naturalized stands. A majority of the plants from these common bluegrass lots were susceptible to *Helminthosporium* leaf spot. Delta and Geary are two varieties developed in the 1930's, respectively, that were also susceptible to leaf spot. Park, Newport, Prato and Kenblue were later developments that also are susceptible.

Merion was the first Kentucky bluegrass variety that would be considered an improved type. This low-growing, turf-type bluegrass was found to be widely adapted throughout the cool-season growing area of the United States, and also possesses a good level of resistance to leaf spot disease. Unfortunately, this variety was later found to be susceptible to powdery mildew, stem rust, stripe smut and *Fusarium* blight.

Since the mid to late 1960's, many varieties were released that were considered to be more resistant than Merion to stripe smut and the other previously mentioned diseases. Unfortunately, some varieties were later found to be more susceptible to dollar spot than other varieties and also have very poor winter color and spring green-up. Fylking and Pennstar were later found to be more susceptible to *Fusarium* blight.

Despite the tremendous effort put forth to date to develop the perfect variety of Kentucky bluegrass, most recommendations today call for a blend of three or four disease-resistant, well-adapted varieties to develop the best available Kentucky bluegrass turf. The blends should be designed to compensate for the known weaknesses of the individual varieties. More information is needed on the compatibility of varieties in a blend. The very aggressive varieties — such as Touchdown, A-34 or Brunswick — can be used in blends as a lesser percentage because of their competitive abilities.

The accompanying table lists the varieties of improved turf-type Kentucky bluegrass that are presently available as seed or that should be available this coming fall. Lawn care businessmen can use this table as a guide in choosing varieties for blends. They should strive to choose varieties for blends by considering which disease or environmental stresses are most prevalent in their customer's lawns.

There is still much breeding and selection work to be done to find Kentucky bluegrass varieties with even better levels of disease resistance and environmental tolerances. Varieties with improved levels of insect resistance are also badly needed to make the care of lawns an easier task.

TABLE 1. RELATIVE PERFORMANCE OF IMPROVED TURF-TYPE KENTUCKY BLUEGRASSES[A]

VARIETY	HELMINTHOSPORIUM LEAF SPOT	STRIPE SMUT	FUSARIUM BLIGHT	POWDERY MILDEW	DOLLAR SPOT	STEM RUST	STRIPE RUST	LEAF RUST	SHADE TOLERANCE	HEAT TOLERANCE
A-34[B]	+	+	—	=	+	=	=	C	+	=
Adelphi	+	+	+	—	+	+	=	+	—	+
Aquilla	=	+	=	+	=	+	=	=	—	
Baron	=	=	=	—	=	=	=	=	=	=
Birka	+	+	=	+	=	—	=	+	+	=
Bonnieblue	+	+	=	—	=	+	=	+	=	=
Bristol	+	+	+	+		+	=	+	+	+
Columbia	+	+	+	=	+	+	=	+	=	+
Fylking	+	=	—	—	=		=	=	—	—
Glade	=	+	+	+	=	+	=	+	+	=
Majestic	+	+	=	—	+	+	=	+	—	=
Merion	+	—	=	—	=	—	=	=	—	+
Nugget	+	+	=	+	—	—	=	+	+	=
Parade	+	+	+	=	+	+	=	+	=	+
Plush	=	+	=	=	=	+		=	=	=
Ram I	=	+	=	=	=	=	=			
Shasta	+			—		=	+	=	—	
Sydsport	+	+	=	=	=		=	=	=	=
Touchdown[B]	+	+	=	+	=	—	—	+	+	=
Victa	=	=	=	—	=	=	=	=	=	=

1. Relative Performance of Improved Turf-type Kentucky Bluegrasses[A]

A. + means that this variety has an improved level of disease resistance or environmental tolerance when used in a blend.
= means that this variety has had an average level of disease resistance and environmental tolerance being considered and shouldn't change the level of turf performance up or down considerably in a blend.
— means that this variety will most likely produce a negative effect in a blend with reference to the disease or environmental stress being considered.

B. These tow varieties are very competitive in blends and tend to predominate under high maintenance levels and short cutting heights.

C. Information not available.

Dollar Spot Fungicide Trials — 1979

University of Massachusetts

The efficacy of several fungicides per se and in combination with other fungicides was compared to that of standard chemicals for the control of dollar spot, *Sclerotinia homoeocarpa.* Chemicals were applied at several rates and intervals to determine their significant effects on the control of the disease.

The test site was a 2' x 45' area of Emerald and Seaside creeping bentgrass established on a silt loam at the University of Massachusetts South Deerfield Station. The turfgrass area was mowed twice weekly at 0.25 inch. To enhance fungus infection by natural means, only 2 lbs. of nitrogen per 1,000 sq. ft. were applied during the season. Additional increments of nitrogen were applied in September and the turf was irrigated only after fertilization.

The area was divided into 126 randomized 5' x 5' plots. There were 40 chemical treatments, each replicated three times, plus 6 randomized control plots. All treatments were initiated on June 1, 1979. Eighteen treatments were reapplied approximately every three weeks; the remaining treatments were applied biweekly (Table 1). Most chemicals were applied by a pressurized hand sprayer, two granular fungicides by a drop spreader. Results are shown in Table 1.

Little inoculum and infection occurred on the grass in the test site. Although grass in the control plots did exhibit slightly more injury than the fungicide-treated turf, there was some difficulty in determining chemical efficacy. In fact, injury to turf caused by the fungus was no more than an average of 5 percent of 3 treatment replications.

All standard fungicides recommended for the control of the dollar spot appeared to give excellent control of the disease. 1991 plus Bayleton (treatment 10) and 1991 plus DPX and Bayleton (treatment 15), applied at high rates, were phytotoxic, causing the turf to discolor and thin out. All Acti-dione plus iron treatments enhanced turf color as expected and gave good control of dollar spot. Daconil and both F-71614DSB and F8272A, each of which contained a fertilizer, also improved turf color and gave effective disease control. The 0.5 and 1.0 rates of CGA 64251 were not as effective as the 2 oz. rate. BFN 8099 appeared to give some control when applied at the higher rate of 6.3 oz.

Table 1. Treatment number, treatments, rates of application, and degree of dollar spot disease - 1979.

Fungicide	Rate Oz/1000 ft^2	6/1	6/15	6/22	6/29	7/13	7/19	7/23	8/22	8/31
1 DPX	2.0	-	-	-	-	-	-	+	+	+
2 DPX	4.0	-	-	-	-	-	-	+	-	-
3 DPX	8.0	-	-	-	-	-	-	-	-	-
4 DPX +1991*	2.0+2.0	-	-	-	-	-	-	+	+	-
5 DPX +1991*	4.0+4.0	-	-	-	-	-	-	+	+	-
6 1991 + Daconil*	2.0+3.0	-	-	-	-	-	-	+	+	+
7 1991 + Bayleton*	2.0+4.0	-	-	-	-	-	-	+	+	+
8 1991 + Bayleton*	1.0+2.0	-	-	-	-	-	+	+	+	+
9 1991 + Bayleton*	0.5+1.0	-	-	-	-	-	⊕	⊕	-	-
10 1991 + Bayleton*	4.0+8.0	-	-	-	-	-	-	+	-	+
11 1991 + DPX + Bayleton*	1.0+1.0+4.0	-	-	-	-	-	-	+	-	+
12 1991 + DPX + Bayleton*	1.0+1.0+2.0	-	-	-	-	-	+	⊕	+	+
13 1991 + DPX + Bayleton*	0.5+0.5+1.0	-	-	-	-	-	-	+	-	-
14 1991 + DPX + Bayleton*	.25+.25+0.5	-	-	-	-	+	+	-	-	+
15 1991 + DPX + Bayleton*	4.0+4.0+8.0	-	-	-	-	-	-	⊕	+	-
16 Bayleton*	4.0	-	-	-	-	-	-	⊕	-	-
17 F-71614DSB	25.0	-	-	-	-	-	-	-	-	-
18 F8272A*	38.0	-	-	-	-	-	+	+	-	-
19 Acti-dione TGF	1.0	-	-	-	-	-	+	+	-	+
20 Acti-dione TGF	2.0	-	-	-	-	-	+	⊕	-	+
21 Acti-dione R2	1.6	-	-	-	-	-	-	-	+	-
22 Acti-dione Thiram	2.0	-	-	-	-	-	+	+	-	-
23 Acti-dione Thiram	4.0	-	-	-	-	-	-	+	-	-
24 Acti-dione TGF + $FeSO_4$	1.0+1.0	-	-	-	-	-	-	-	+	+
25 Acti-dione TGF + $FeSO_4$	2.0+2.0	-	-	-	-	-	+	⊕	-	+
26 Acti-dione R2 + $FeSO_4$	1.2+1.0	-	-	-	-	-	-	+	-	-
27 Acti-dione Thiram + $FeSO_4$	2.0+1.0	-	-	-	-	-	-	-	-	-
28 Acti-dione Thiram + $FeSO_4$	4.0+2.0	-	-	-	-	-	+	+	-	-
29 Daconil 2787	3.0	-	-	-	-	-	-	⊕	+	⊕
30 Daconil 2787	6.0	-	-	-	+	-	-	⊕	+	-
31 Daconil 500	2.0	-	-	-	-	+	+	⊕	-	-
32 Daconil 500	5.0	-	-	-	-	-	-	+	-	-
33 BFN 8099	0.6	-	-	-	-	⊕	-	+	+	-
34 BFN 8099	2.5	-	-	-	+	-	+	+	+	-
35 BFN 8099	6.3	-	-	-	-	-	+	+	-	-
36 CGA 64251*	1.0	-	-	-	-	-	+	-	-	⊕
37 CGA 64251*	2.0	-	-	-	-	-	-	+	-	+
38 CGA 64251	0.5	-	-	-	-	-	+	⊕	-	-
39 CGA 64251	1.0	-	-	-	-	-	-	⊕	+	+
40 Chipco*	2.0	-	-	-	-	-	-	+	⊕	-
41 Check	-	-	-	+	+	-	⊕	⊕	⊕	⊕

*Fungicides applied on triweekly basis on 6/1, 6/22, 7/13, 8/3, and 8/22; all other fungicides applied biweekly on 6/1, 6/15, 6/29, 7/13, 7/26, 8/10, and 8/28.

\+ = mycelium but no infection.

⊕ = injury related to infection but no more than 5 percent average of 3 replications.

NASSAU-SUFFOLK

LANDSCAPE GARDENERS ASSOCIATION INC.

On Tuesday, March 4, 1980, the Nassau-Suffolk Landscape Gardeners' Association, a professional organization on Long Island for men and women in landscaping, landscape maintenance business, and related fields will be hosting their 12th annual Professional Turf and Plant Conference at the Salisbury Restaurant, Eisenhower Park, East Meadow, Long Island, New York, from 8:00 a.m. to 5:00 p.m. The conference is being held in cooperation with Cooperative Extension of Nassau and Suffolk Counties.

The program for the day will feature topics of timely importance to the industry on and around the Long Island area. Topics such as "Turfgrass Clippings — Alternatives to Dumping," and "Pricing For Profit," are just two subjects on the agenda, and specialists in the field, such as Dr. A. Martin Petrovich, and Mr. Ransome Blakely, will be on hand to present their ideas. Also scheduled for the day is the New York State Pesticide Core Exam and the Commercial Ornamental and Turf Exam.

In addition to the program, there will be an extensive trade show, in which various vendors will be exhibiting new products for the industry.

Pre-registration for the conference is $18.00, and includes a continental breakfast, and lunch. Registration at the door is $20.00.

For further information please call 265-0297.

University of Massachusetts Turfgrass Research Fund

Research Contributions—March 7, 1979—December 3, 1979

Cape Cod Turf Managers Association	$ 200.00
Robert Osterman	100.00
Metropolitan GCSA	300.00
Stockbridge Turf seniors	200.00
Upjohn Co.	750.00
Boots Hercules Agrochemicals	500.00
Wilbraham Country Club	50.00
Amesbury Golf & Country Club	100.00
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Paul Christ	25.00
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Du Pont de Nemours	300.00
New England Sod Producers Association	500.00
	$6,175.00

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