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Fungicide disease control basically involves products that are (1) lethal to the fungus, or (2) inhibit fungal germination, growth or multiplication. Some fungicides are "broad spectrum", inhibiting a wide range of pathogens and other are "narrow spectrum", having a specific activity for only a few fungi.

*Helminthosporium* leaf spot fungicides prevent infection by the fungus rather than cure the disease. Thus effective fungicide control occurs only on plant parts to which fungicides are applied and only for the period fungicides remain on the plant. Contact fungicides must be applied at regular intervals to maintain protection on turfgrass leaf surface. Since control is achieved by a protective coat of fungitoxic chemical on the plant surface the fungicide must be applied uniformly. New, unprotected shoot growth is constantly being formed within the turf stand. These limitations must be recognized whenever you use fungicides to manage plant diseases. Certainly fungicides do help in a turf leaf spot management program but they will not replace a poor leaf spot management program or substitute for no leaf spot program at all.

In summary, of the general disease management methods, three are suitable for *Helminthosporium* leaf spot management consideration. These are resistant lines, sanitation and protection, while exclusion and eradication have limited value. The guts of a leaf spot management program is proper cultural management. Turf managers where *Helminthosporium* leaf spot is a threat should consider the effects of modified mowing, watering, and fertilizing practices. Further, they should consider de-thatching and if needed, modifying the turf environment. Lastly, apply fungicides as needed. If the results of these efforts are unsatisfactory, renovate by over seeding with resistant cultivars or reestablish completely including necessary soil and site preparations.

**Factors**

early spring application nitrogen and auxin-like herbicides might temporarily retard leaf spot symptoms by promoting youthfulness in rapidly growing leaves.

**Summer**

A. Appearance of Symptoms.
1. Minimal appearance of small leaf spots under a normal, relatively dry summer environment.
2. Moderate to heavy leaf spot symptoms during wet summers or with irrigation.

B. Factors Involved.
1. Increasing day length and temperature, and reduced levels of moisture would normally reduce infections and decrease disease development on individual leaves. These factors would keep leaf spots relatively small.
2. Excessive rainfall or irrigation during summer will compensate for higher temperatures and increase infections. Applications of nitrogen and herbicides under these circumstances would further enhance disease severity. Some preliminary evidence suggests that high temperature stress combined with nitrogen and (or) herbicides may greatly enhance leaf spot symptoms on irrigated turf during the summer months.

**Fall**

A. Appearance of Symptoms.
1. Early fall number and size of leaf spots increases.
2. Late fall to early winter leaf spot symptoms become severe, including yellowing and blighting of entire leaves. Turf may appear to have a yellow undercover.

B. Factors Involved.
1. Increasing moisture, shorter day lengths, and lower temperatures increase number of infections and enhance senescence of leaves. Enhanced senescence predisposes leaves to more severe disease development.

2. By late fall and early winter decreasing day length becomes a primary factor in enhancing leaf aging, and older infected leaves respond by blighting.
3. Nitrogen applied in late summer or early fall may have some delaying effect on senescence and for a period slow yellowing of older infected leaves.
4. Late summer to early fall applications of herbicides may enhance yellowing of older infected leaves by increasing the rate at which the leaf reaches senescence.

**Winter**

A. Appearance of Symptoms.
1. No leaf spot symptoms on dormant grasses. Winter may be the most important season for fungal colonization of dead tissues.
2. Grasses remaining green under snow cover and especially unfrozen soil will continue to show leaf spotting, yellowing, and blighting typical of late fall.

B. Factors Involved.
1. Provided adequate moisture is available, mycelium will grow slowly down to 36 degree F. Such growth could be important to colonization of dead tissue and an increase in spore production the following spring.
2. The potential availability of nitrogen, especially slow release forms, during winter months could provide an important nutrient source for pathogens and aid colonization of dead tissue.
3. Kentucky bluegrass will often remain green under snow cover, especially if the ground is unfrozen, and if nitrogen fertilizer is applied in the late fall. Under such circumstance leaf spotting and yellowing will persist as long as temperatures are 36 degrees F. or above.
Starting with Merion, many leaf spot resistant cultivars have been developed. Almost all of the new bluegrass releases have good leaf spot resistance. The nature of the genetic resistance is not known. The resistant cultivars are generally low growing, broad leaved plants while the susceptible varieties are usually tall growing, fine leaved, stemmy types.

A number of fungicides can be used to control Helminthosporium leaf spot. Some of the better known broad spectrum fungicides commonly used are Actidione, Thiram or TGF, Daconil 2767, Dyrene, Kromad and others. Unfortunately, fungicides are expensive and time consuming to apply. The best control is the planting of leaf spot resistant cultivars and there is a long list to choose from. However, under severe conditions, even the genetic resistance of the best cultivars can break down and fungicide application may be necessary.

Plant breeders have been very successful in developing leaf spot resistant varieties. Two basic techniques have been used in bluegrass breeding: plant selection and hybridization.

Plant selection is the most basic breeding technique in existence. It simply involves the selection of superior plants that occur naturally, prosper and spread under close cut turf conditions. Often these plants can spread to enormous size; the plant selection that became Touchdown was over 50 feet in diameter. Some of the better known plant selections are Merion, Baron, Fylking, Glade, Windsor, "Victa and Parade.

Bluegrass hybridization is a much more recent breeding technique. It has only been used for the past ten to 15 years but has resulted in the development of a number of improved leaf spot resistant varieties such as Adelphi, Bonnie-blue, Bristol and Majestic.

Hybridization is difficult in Kentucky bluegrass due to its unusual type of reproduction and seed formation. Kentucky bluegrass is facultatively apomictic, which means that most of the seed it produces bypasses the normal sexual reproduction cycle of grasses. This seed is an identical genetic copy of its mother plant. Only a small percentage of seed produced will be genetically different from the mother plant.

From a breeding standpoint, this unusual type of seed formation is both good and bad. It is good in that exact duplicates of superior plants can be produced year after year with no variation and no danger of losing a variety due to genetic shift. It is bad in that crossing is quite difficult because few hybrids are produced. Most of the seed derived from crossing will be identical to the mother plant and thus useless to a breeder. For every 1,000 plants derived from a cross perhaps only 20 to 50 hybrids might be produced. Since only one of a thousand hybrids might show commercial promise, huge numbers of plants have to be grown from seed produced by crossing two parent plants.

Kentucky bluegrasses are usually crossed in the greenhouse during the spring. In the summer the crossed seed is germinated and individual spaced plants are set out in the field. The next summer the mature plants are observed and the hybrids identified. Seed of the best appearing hybrids is harvested, cleaned, and used to plant a small turf plot of many standard varieties and the new hybrids are carefully compared with the check varieties. The resistance to various types of Helminthosporium leaf spot and melting-out of the hybrids is closely observed. It is essential that new hybrid variety intended for fine turf use has good leaf spot resistance.

The success rate among new bluegrass hybrids is very low. Perhaps only one in 500 or 1,000 hybrids will combine the characteristics of good turf quality, good disease resistance and good seed production necessary in new, improved varieties.

Despite the difficulties, several active bluegrass breeding programs are continuing in the U.S. and Europe. It is from these programs that a continuing source of new varieties will be forthcoming. The perfect variety will never be achieved, but hopefully breeders can keep developing varieties that get closer to that ideal.
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OUTMODED FOUNDATION PLANTING HAUNTS LANDSCAPE DESIGN PROGRESS

By Fred K. Buscher and Jot D. Carpenter, area extension agent in horticulture and chairman of the Department of Landscape Architecture respectively, Ohio State University.

Foundation planting is a landscape term which has been used for more than 60 years to describe a method of planting around the base of buildings. Before the turn of the century, foundation plantings were called base plantations, and later, base plantings. These plantings were designed to overcome the rigid architectural styles of the era and provided a more harmonious transition from the lawn to the base of the walls of the building with plants arranged in a natural manner.

The origin of the term "foundation planting" is difficult to document, but references to it can be found in articles on landscape gardening as far back as 1914. Plants have always been used near buildings, but planting a row of shrubs (deciduous or evergreen) in a straight line across the front of a building is a comparatively recent American idea. This practice has been condemned over the last 30 years as no longer necessary. Foundation plantings are criticized today when used in an eclectic manner instead of part of the landscape design of residential properties.

Unfortunately, the expression "foundation planting" has become so popularized by the horticultural press and landscape industry that planting the front of a house is one of the first considerations of the new homeowner. Consequently, much of this is overdone today. The problems of the foundation planting in today's landscape are still very real, as they were in 1900.

Many of the books written on landscape and garden design before and after World War I made an appeal to make the country more beautiful. The objective of these landscape books was to help in the artistic development of the home grounds of the suburban and moderate-size city lot homeowner. There was little reference to landscape planning for the small city lot residential property where most of the people lived. Information for the small home gardener could be found in the garden magazines or larger homes in the city and suburbs could be used as models.

Another purpose of the garden design books was to provide horticultural information for those in the landscape business and those with a desire to know more about the beautification and improvement of their properties. Many persons engaged in the landscape industry today either grew up on a farm or lived in a small house on a narrow city lot with little planting.

Writers at the turn of the century recommended using more plants about the foundation area of the house. H. Kellaway, an early writer, suggested that most buildings would look bold and bare if they did not have some plants at their base. Plants would soften the sharp line and create a softening effect so the building would appear as part of the total landscape composition.

Base plantings were criticized before the turn of the century. One writer warned to avoid the overuse of shrubs. The house should not look as though it grew out of a thicket or that the cultivation of shrubs was the owner's chief concern.

Instead, the late 19th century writers suggested the massing of plants in the angles of porches, steps and bay windows. To avoid the straight rows of plants, garden designers even suggested breaking European influence on architecture following the Civil War, such as Victorian style (top), and the warm air furnace encouraged use of foundation planting. Misuse of foundation planting (bottom).
the plantings, allowing the foundation to be seen resting on the grass giving a semblance of stability to the house.

By 1922, foundation planting was well entrenched in landscape vocabulary. One definition of the term included: groups of shrubbery located along the base of a building. The objective of the foundation planting was to hide unsightly walls, soften the hard lines of the architecture, provide some measure of privacy, and unite the building with the ground. Some of the terminology is still used today to justify foundation planting, such as: to tie the building to the ground, to soften it, and to conceal scars. Landscaping the front of a house with a row of shrubs was highly criticized for not improving the appearance of the house. Instead the emphasis was always on irregularly massing shrubs at the corners of the house.

No base planting was considered necessary for houses which were set close to the ground. In this event, the lawn could extend up to the lines of the porches, but group plantings should be massed at the corners of the house. When enough of the foundation showed above grade, Gridland suggested that only dwarf plants should be used and larger types placed at the corners and in the blank spaces between windows. There was always concern not to plant in front of a window as this would interfere with light and ventilation. Garden designers urged that base plantings should have curving lines and to avoid the monotonous rows of shrubs. The lines of the planting beds should extend out at the corners and recede into the face of the building. Both tall and low growing plants would add to the effect of this method of base plantings.

Going further back in history, there was little concern by the average homeowner over extensive landscaping plans. For example, before the Civil War, the front yards of the smaller houses were usually only 6 to 10 feet deep. Some of the larger houses were set back from the street. Most houses had fences for protection from livestock running at large. A visitor to New York in 1850 complained that pigs rooted in the gutters and that cattle were herded in droves through the streets.

After the Civil War in America, changes began to occur in architectural style and residential construction which had some effects on the types of landscape planting. The expression “front yard” was used to describe the area around the house open to the public view. The term was not the most appropriate, but at that time, a garden was considered a place for vegetable or flowers to be kept out of public view in the back.

The picket fences started to disappear from the American landscape scene as pioneer conditions
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began to fade, although some fences remain to continue the customs. Houses were set further back from the street with larger, more open and showy front yards. It was during this period in American History that the front yards became a major feature in residential landscape design. The habit of living in the garden, as was also the custom in England and Europe, began to decline in America, and with it, the need for privacy in the front and back yards was less important.

Between 1850 and the early 1900's the influence of Andrew Jackson Downing and his followers dominated American landscape design and thought. They advocated the so-called natural style of landscape planting of the larger estates and parks. This involved curving drives, walks, and isolated planting beds, at times placed without good reason. The natural style featured several exotic ornamental trees or shrubs in the front yards such as the copper beech and weeping birch. Later, the electric blue spruce was a front yard feature. Even shrubs were planted as single specimens or in beds in the front lawns. Later, the native plants began to replace the exotic European specimens once considered to be more important.

The end of the Civil War brought an end to the Greek and Roman revival style of architecture in America. Architects and builders began to experiment with the Gothic, the Egyptian, the Romanesque, the Byzantine, and the contemporary French. Out of all this, a Victorian style developed.

This was also a time when new materials, new tools, and manufacturing processes became available to the builders. Low-cost steel replaced handwrought iron. The manufacture of Portland cement boosted brick and masonry construction. Plate glass manufacture was industrialized. Wood was the most abundant building material of this time. There were new power tools to cut, turn, twist, and shape the wood into the symbols of the Victorian period.

The European influence on residential architecture began to show up in the homes of the newly rich after the Civil War. This was considered the darkest period of American residential architecture. It was the time of the pseudo manor, Victorian, Gothic and French Mansard along with beds of geraniums and cannas, iron deer, and open lawns. At the close of the century, authentic revivals of architecture began again and brought an end to the excesses of the Victorian age with improved domestic architecture.

The custom-built houses with high foundations occurred about the same time houses were placed further back from the street and set in an open lawn. Thus, the planting of shrubs and vines next to the house and porches began, and foundation plantings became the style. In those years, such a foundation planting was deemed necessary to hide the foundation and otherwise soften the break between the house and lawn.

Another fact that contributed to the building of exposed basement foundation walls was the new concept of central heating and introduction of the warm air furnace. The basic heat sources before the gravity warm-air furnace were steam or hot...
Air furnace was installed below the rooms to be heated, requiring a relatively deep basement. It was considered much better to have a shallow basement than one dug too deep, as the height could be overcome by planting at the base of the house when there was sufficient soil for the fill. Porches also had influence on the foundation planting. The trend for out-of-door living after the turn of the century brought about another change in house design. It caused architects to complain that porches were the greatest trial they had. The porch was absent in the homes of early America, England, and France. By the 1920's, the typical house was the two-story "packing box" cube with a porch across the front. This was one of the most difficult houses to plant successfully. With this type of building, the landscape designers were justified in suggesting a foundation planting where previously it would have been condemned.

Although the steam heating system was first developed by James Watt in 1770, a major drawback in its development was high cost and a lack of trained fitters in the smaller towns and villages to install the system. By 1894 was a fairly well developed basic source of heat in houses. The hot-air furnace was installed below the rooms to be heated requiring a relatively deep basement. To reduce digging to make sufficiently deep basements, some foundations were laid at ground level, or a little below grade. The excavated soil was terraced against the exposed basement wall. High foundations were not always considered problems. It was considered much better to have a shallow basement than one dug too deep, as the height could be overcome by planting at the base of the house when there was sufficient soil for the fill.

Porchs were ugly from an architectural standpoint and difficult to add to a well designed house. The houses which are the most pleasing are the ones that porches were the greatest trial they had. The porch was absent in the homes of early America, England, and France. By the 1920's, the typical house was the two-story "packing box" cube with a porch across the front. This was one of the most difficult houses to plant successfully. With this type of building, the landscape designers were justified in suggesting a foundation planting where previously it would have been condemned.

The landscape architects, gardeners, and writers played a major part in the landscape improvement of the communities during the 1930's but their suggestions were beyond the reach of the majority of Americans who lived in small houses on narrow city lots, on farms, or in small towns and villages. Much of the gardening information for the "average" American was obtained from the garden magazines where the original source of information came from the garden and landscape books. The pattern for landscape designs of the small houses was copied in a selective manner from the larger homes, but without the changes necessary due to scale and site differences.

By the early 1930's many of the people in the towns and cities of the United States lived in multifamily dwellings. From the time when foundation plantings were used to cover the exposed masonry of houses and up to and beyond the middle 1930's, the average American lived in small houses. The characteristic of the small urban home is compactness in high density population. The houses were most often two-family. Single houses were on narrow lots of 35-50 feet wide and 100-150 deep. These properties had small front and back yards with a minimum of space for gardens and shrubs.