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# LAWN ESTABLISHMENT





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BY J. B. BEARD, P. E. RIEKE, K. T. PAYNE,  
R. C. SHEARMAN, AND J. F. WILKINSON,  
Department of Crop & Soil Sciences

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## Basic Steps to Lawn Establishment

Proper lawn establishment is one of the keys to a dense, weedfree lawn. A uniform stand of desirable turfgrass species must be achieved as quickly as possible. The basic steps for proper turfgrass establishment are:

1. Control weedy perennial grasses, such as quackgrass and bentgrass.
2. Remove topsoil and stockpile for future use.
3. Complete the final rough grade.
4. Till the soil deeply and remove stones, roots, stumps and other debris.
5. Redistribute the topsoil from the stockpile.
6. Modify soil if needed.
7. Apply fertilizer and/or lime as indicated by soil test results.
8. Till the fertilizer and lime into the upper 3 to 4 inches of soil.
9. Complete the final grade.
10. Roll and level final seedbed.
11. Select adapted turfgrass species and cultivars for the quality and cultural level desired.
12. Seed or sod.
13. Roll to insure good soil contact.
14. Apply a mulch, if seeded.
15. Keep soil moist until establishment is achieved.

## Site Preparation

Remove all debris, including large stones, roots, stumps and construction materials. Do not bury debris in pits on the establishment site. If any perennial weedy grasses such as quackgrass or creeping bentgrass are present, it is preferable to control them before proceeding with site development. Weedy perennial grasses can be controlled with a nonselective herbicide, such as amitrol or dalapon (see Extension Bulletin E-653 "Lawn Weed Control"). Apply these materials when the weedy grasses are actively growing and the plants are 6 to 10 inches tall. A 6-week waiting period for amitrol and 8 weeks for dalapon are necessary before the treated area can be seeded or sodded. Amitrol and dalapon should be handled with care and applied only as the directions on the label indicate.

**Grading.** Remove the topsoil and stockpile nearby when extensive grading is necessary. Wet areas and



standing water can be prevented through proper contouring for adequate surface drainage. A slight grade (at least 1%) sloping away from buildings is suggested. Avoid steep slopes since they are difficult to establish and maintain. Contours can be used to attract attention or blend in with natural or artificial landscape features, such as trees, rock gardens or artificial ponds. Topsoil should be redistributed after the rough grade is established. The area should be allowed to settle following contouring. Uneven settling of the soil is most common around buildings and over water and sewer trenches. Careful packing of the soil will reduce this hazard. Several deep irrigations will also aid the settling process.

### Soil Modification

Proper soil preparation is essential for uniform rapid establishment, whether sodding or seeding a turf. The first step should be to determine if the existing soil is acceptable for a permanent lawn. Advance planning to save topsoil before construction can reduce soil preparation problems. A uniform soil mix, 6 inches in depth, is desirable. Sandy loam to loam soil textures are preferred, but turfs can be grown on soils of less desirable texture. Soils with a high clay content are prone to compaction, while sandy soils require more frequent irrigation and fertilization for a desirable turf. Both types of soil can be modified to improve their properties.

Soils of high clay content can be modified with 2 to 3 inches of peat, sand, or other coarse aggregates, such as calcined clay to improve soil physical properties. Extremely sandy soils can be modified by mixing 1 to 2 inches of peat and 1 to 2 inches of soil that is higher in clay content (such as clay loam) with the existing soil. In either case, these materials should be mixed with the existing soil to a total depth of at least 6 inches.

If soil modifications are made, avoid the addition of soils containing perennial weedy grass seeds, rhizomes, or stolons. These weeds cannot be selectively removed from the desired turfgrasses after establishment.

Sample the soil after modifications have been made to obtain accurate fertilizer and lime recommendations. Be certain to use clean equipment when sampling to avoid the possibility of contamination and obtaining erroneous results. Collect soil samples to a depth of 4 inches from at least 10 locations in the establishment site. Air dry about one-half pint of soil, package securely, and send it to your local agricultural extension agent or a reputable commercial laboratory for testing.

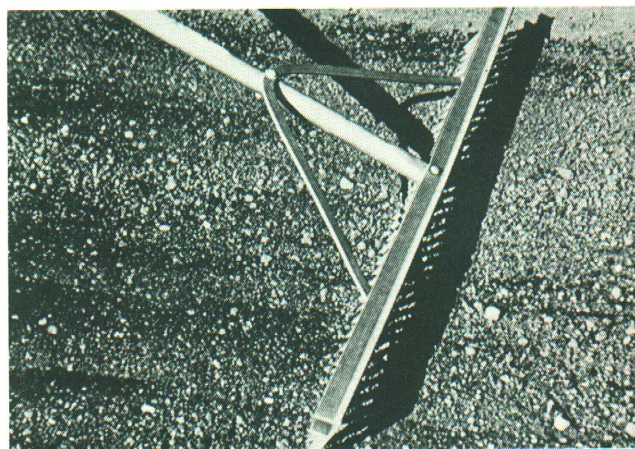
### Fertilization and Liming

**Fertilization.** Phosphorus and potassium applications should be based on a soil test if available. When test information is not available, a general recommendation for seeding is 15 to 20 pounds per 1000 square feet of 1-1-1 ratio fertilizer (such as 10-10-10). Rates as high as 30 to 40 pounds can be used if the area is to be sodded, but the nitrogen concentrations should be reduced. For example, a 5-20-20 or similar fertilizer would be acceptable. As a general rule, do not apply more than 2 pounds of actual nitrogen (N) per 1000 square feet during the establishment period. The fertilizer should be thoroughly incorporated into the upper 3 to 4 inches of soil.

**Liming.** The ideal soil pH for most turfgrasses is 6.0 to 7.0. Lime should be applied only if the soil test indicates that the pH is below 6.0. The amount of lime applied should be based on a soil test. Excessive amounts of lime should be avoided, especially on sandy soils. The lime should be thoroughly incorporated in the upper 4 to 6 inches of soil during one of the initial cultivations. Soil pH's above 7.5 can be lowered by the application of elemental sulfur or use of an acidifying fertilizer, such as ammonium sulfate.

### Seedbed Preparation

The final grade of the lawn can now be established. Light rolling at this time will firm the seedbed and delineate low spots or irregularities that can be corrected through a final raking. These site and seedbed preparation steps should be followed for both seeding and sodding.



The final raking should provide a loose, smooth surface.



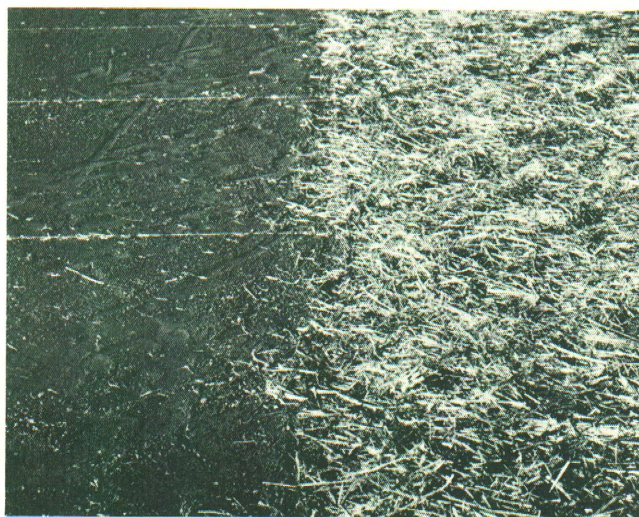
## Seeding

Soil moisture and temperature conditions are most favorable for rapid establishment during the late summer in Michigan. The preferred time to seed is between August 15 and September 10 in Southern Michigan and from August 10 to September 1 in Northern Michigan. If August establishment is not possible, early spring seeding is an alternative. However, excessive soil moisture and severe competition from annual weeds can be a problem during spring establishment. Mid-summer plantings are frequently unsuccessful because of high temperatures, lack of moisture, and competition from annual, weedy grasses.

Proper seeding means uniform seed distribution at the recommended rate. It is best to seed when wind activity is minimal (early-morning or late-evening) due to the light, chaff-like nature of turfgrass seeds. It is desirable to seed one-half of the total amount in one direction and the remaining half perpendicular to the original direction. Either centrifugal or drop-type spreaders may be used for seeding.

**Raking.** After seeding, rake lightly to provide a thin soil covering over the seed. Turfgrass seeds should not be covered by more than 0.3 inch of soil. The seeded area should then be rolled lightly to provide good moisture contact between the seed and soil. A cultipacker-seeder is very effective on extensive lawn areas.

**Mulching.** Mulching provides favorable moisture conditions during establishment and reduces soil erosion and seed loss. Straw is commonly used. It should



Mulching provides favorable moisture conditions and reduces soil erosion.

be spread uniformly over the seedbed at 60 to 80 pounds per 1000 square feet. Be sure the straw is free of weed seeds and vegetative plant parts of bentgrass, quackgrass, and nutsedge. Once the straw is in place, it can be stabilized by rolling, watering and/or a twine netting if wind displacement is a problem. An asphalt spray is often used to stabilize straw on large areas. Coarse burlap or excelsior are frequently used on steep slopes of limited size where seed washing and soil erosion are severe problems. Burlap bags can be cut open and staked down at the corners.

Approximately one-half of the straw mulch should be removed when the grass has grown to a height of 1.5 to 2.5 inches. This will permit greater light penetration and insure rapid, uniform establishment.

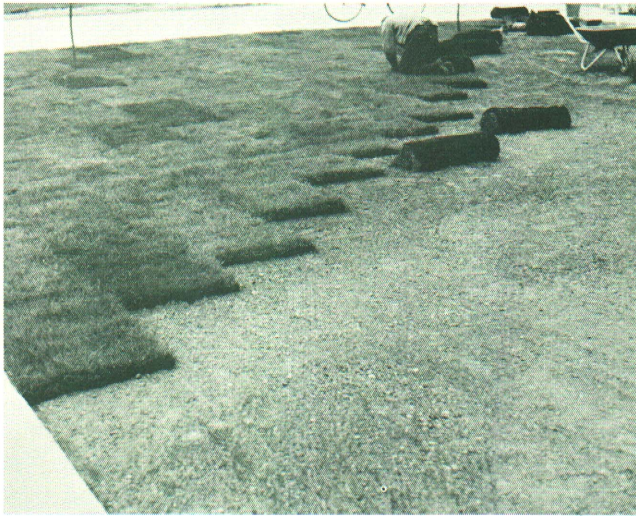
**Irrigation.** One of the most important practices for effective turfgrass establishment is irrigation. The soil surface should be kept moist at all times. Young seedlings can die within several hours if soil surface moisture stress occurs. Daily, light sprinkling at noon or early afternoon is suggested. Water should be applied lightly to avoid puddling of the soil and washing of the seed. It may be necessary to irrigate several times daily to maintain adequate moisture at the soil surface if no mulch is used. The turfgrass plant usually develops an adequate root system about 3 to 4 weeks after seeding so that the irrigation frequency can be reduced.

## Sodding

Sodding can be done at any time during the growing season when the soil can be prepared and adequate moisture provided. The sod purchased should be of uniform shoot density, high quality, and free from weeds such as quackgrass, bentgrass, annual bluegrass, or nutsedge. The seedbed should be moist at the time the sod is transplanted to insure rapid rooting.

Sod should be transplanted in a brick-like pattern by staggering the ends of the sod pieces. Avoid stretching the sod during laying. Stretched sod may shrink developing cracks between sod pieces during drought periods. Edges of the sod should be in contact but not overlapping. Once in place, the sod should be rolled to insure good contact with the soil. Roots will dry out rapidly if air pockets are left between the sod and the soil. When sodding a slope, it may be necessary to peg the sod strips to prevent slippage. Irrigate to a soil depth of 6 inches as soon as possible after transplanting and before wilting of the sod occurs. Thereafter, a daily light irrigation at midday is required to maintain adequate surface moisture during the transplant rooting period of 2 to 3 weeks.





Transplant the sod by staggering the pieces in a brick-like pattern.

### Post-Establishment Care

A newly seeded or sodded turf should be mowed when leaves of the grass reach a height of 2.5 to 3.0 inches. Mow to a height of 1.5 to 2.0 inches the first time. Whether clippings are returned or removed depends upon the quantity. To facilitate establishment, apply 0.5 pound of nitrogen (ammonium nitrate or urea) per 1000 square feet when the young seedlings reach a height of 1.5 inches. The fertilizer should be watered into the soil immediately to prevent foliar burn.

**Weed Control.** When seeding, it may be necessary to control broadleaf weeds that germinate during the establishment period. Certain broadleaf herbicides can injure the root system of young seedling turfgrasses if applied at a juvenile stage. Thus, the initial broadleaf weed control application should be delayed at least 4 to 5 weeks after germination.

If a spring seeding is made, annual weedy grasses should be controlled through the use of (1) a pre-emergence herbicide such as siduron, or (2) a post-emergent application of an organic arsenical such as DSMA or AMA. DSMA or AMA applications should be delayed at least 8 to 10 weeks after establishment.

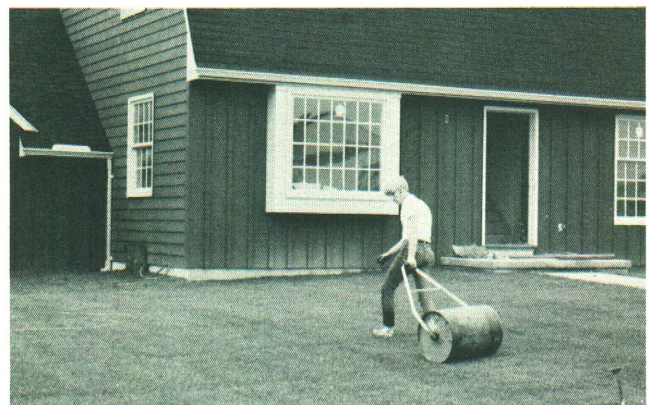
Proper timing of the herbicide application is important. Delaying broadleaf or weedy annual grass herbicide applications too long can cause excessive competition for the slower growing turfgrass seedlings and cause serious loss of stand. Additional information on lawn weed control may be obtained in Extension Bulletin E-653, "Lawn Weed Control."

### Selecting an Adapted Turfgrass Species

Selection of an adapted turfgrass species is essential to the establishment of a quality permanent turf. Using turfgrass species or cultivars (varieties) not adapted to a particular environment, soil condition, intensity of culture, or use, will likely result in failure or an inferior quality turf. Intensity of culture refers to the degree of fertilization, irrigation, and pest control practiced. Permanent turfgrasses, such as Kentucky bluegrasses, and fine-leaf fescues should compose a major portion of most lawn turfs in Michigan. Low priced, rapid-establishing seed mixtures are a poor buy if they contain large portions of temporary and weedy perennial grasses which are unsuited for a permanent, quality turf in Michigan.

**Seed Quality.** Seed quality is determined by seed production and processing practices. The two most important aspects of turfgrass seed quality are (a) purity and (b) germination. These two qualities are determined through standard analytical tests conducted by a reputable seed laboratory. A seed purity analysis involves a physical determination of the percentages of (a) pure seed, (b) other crop seed, (c) weed seed, and (d) inert matter present in a seed lot. The minimum purity range for Kentucky bluegrasses and fine-leaf fescues are 90-95% and 95-97%, respectively. Germination percentages are determined with standard conditions and procedures that are set by the Association of Official Seed Analysts. Ranges for minimum acceptable germination of Kentucky bluegrasses and fine-leaf fescues are 75-80% and 80-85%, respectively.

**Seed Labeling.** The seed label provides a guide to the buyer for purchasing quality seed. Most states have specific laws requiring the labeling of turfgrass



Rolling the sod will eliminate air pockets and insure root contact with the soil.



seeds that are sold commercially. The label contains an official statement as to the species or cultivar (variety) present, percent germination and date tested, and purity. The percentages of (a) pure seed, (b) other crop seed, (c) weed seed, and (d) inert matter are usually included on the label. The price of a seed lot is frequently determined by its germination and purity.

### Blends and Mixtures

A lawn may include a wide range of soil and environmental conditions. Mixtures and/or blends of desirable perennial turfgrass species offer advantages for adaptation to these varied conditions. Mixtures of Kentucky bluegrass and fine-leaf fescue are generally used when seeding or sodding shaded sites. A blend containing only cultivars of Kentucky bluegrass is commonly used when sodding or seeding unshaded areas.

**Blends.** Blending involves a combination of two or more cultivars of the same species, such as Kentucky bluegrass. A blend is usually suited to a broader range of soils, environments and cultural intensities than a monostand of a single cultivar. In addition, blending generally reduces the incidence of any one disease at any given time.

**Mixtures.** A seed mixture is composed of two or more different perennial turfgrass species. Its chief

advantage is that each species within the mixture will be better adapted to certain conditions than the other components. Shade, sandy soils, poorly drained soils, or exposed sub-soil are conditions which require specific turfgrass mixtures. Two important criteria in selecting components for a mixture are the degree of shade and intensity of culture.

A guide to turfgrass mixture selection is given in Table 1. Quality turfgrass mixtures which fall within the percentage ranges listed may be purchased, or the species may be purchased individually and mixed. Percentages are on a weight basis.

Creeping bentgrass, redtop, tall fescue, and timothy should not be used in most lawn seed mixtures. They eventually become patchy and otherwise undesirable. These weedy, perennial grasses cannot be selectively removed from the desirable turfgrasses with herbicides now available.

### Turfgrasses

**Kentucky bluegrass.** Kentucky bluegrass (*Poa pratensis*) is the most widely used turfgrass in Michigan and is best adapted to well-drained, fine textured, fertile soil. It is a perennial, cool-season turfgrass species having good sod forming characteristics due to an extensive rhizome system. A mowing height of 1.5 to 2.0 inches is preferred. Kentucky bluegrass is not generally adapted to shaded conditions. The annual nitrogen requirement is 3 to 7 pounds of actual

Table 1. Selection of the Appropriate Turfgrass Mixtures for Michigan Based on Establishment Site Characteristics\*

Site Description		Intensity of culture	Seed Mixtures (% weight basis)			Seeding Rate (pounds per 1000 sq ft)
Exposure	Soil moisture and irrigation conditions		Kentucky bluegrass	Fine-leaf fescue	Special purpose turfgrasses	
sun	unirrigated	medium to low	30-40	60-40	10-20 (perennial ryegrass)	3.0-4.0
sun	irrigated	high	50-70	50-30	—	1.5-2.5
shade	dry	low	30-20	70-80	—	3.0-5.0
shade	wet	low	20-10	50-70	30-20 (rough bluegrass)	2.0-3.5
sun	dry and sloping	low	30-20	40-60	30-20 (perennial ryegrass)	4.0-5.0

\*Any quality turfgrass mixture falling within the percentage ranges listed would be suitable.



nitrogen per 1000 square feet, depending on cultivar and soil type. Appropriate cultivar selections should be determined by soil type, degree of shade, and turfgrass quality desired. Table 2 outlines some of the important characteristics of the more commonly available Kentucky bluegrass cultivars.

**Fine-leaf fescue.** Fine-leaf fescues (*Festuca rubra*) are cool season turfgrasses with a fine-leaf texture that are well adapted to sandy soils, droughty sites, shaded conditions, and low intensity of culture. It is superior to Kentucky bluegrass in establishment vigor and when mixed with Kentucky bluegrass often serves as a valuable companion grass. Excessive nitrogen fertilization or irrigation will cause severe thinning of fine-leaf fescue turfs. Normally 1 to 3 pounds of actual nitrogen per 1000 square feet per year is adequate. A minimum cutting height of 1.5 inches is recommended. All commercially available fine-leaf fescue cultivars are susceptible to the leafspot diseases. Leafspot causes extensive thinning of the turf during mid-summer.

Red fescue and chewing's fescue are two fine-leaf fescue species most commonly grown in turfs for Michigan. Red fescue spreads by rhizomes, while chewing's fescue lack this characteristic, being primarily bunch-type species. Chewing's fescue has a rapid establishment rate on sandy soil sites. The commonly available fine leaf fescue cultivars are described in Table 3.

### Special Purpose Turfgrasses

Rough bluegrass (*Poa trivialis*) forms a light-green prostrate turf that is adapted to moist shaded conditions. It is superior to Kentucky bluegrass in establishment vigor, but will not tolerate traffic, or hot, dry conditions. It does not blend well with most turfgrasses due to its light green coloration. Rough bluegrass is not recommended except for moist, shaded sites where fine-leaf fescues will not persist.

Creeping bentgrass (*Agrostis palustris*) is a vigorous, prostrate growing perennial turfgrass that tolerates close mowing (to 0.25 inches). Creeping bentgrass is used primarily on putting greens and fairways of golf courses. It requires intensive, costly care, including use of fungicides due to its susceptibility to many diseases. As a result, the use of bentgrasses for lawns in Michigan is limited. Creeping bentgrass can be a serious weed when it infests Kentucky bluegrass turfs. The creeping bentgrasses are favored by wet soils, close-mowing of from 0.5 to 1.0 inches, and high fertility rates, ranging from 5 to 8 pounds of actual nitrogen per 1000 square feet per growing season.

### Temporary Turfgrasses

Perennial ryegrass (*Lolium perenne*) has an erect bunch-type growth habit. It is characterized by rapid seed germination and establishment rate. Most of the unimproved perennial ryegrass cultivars are difficult to mow because of a tough, fibrous leaf that results in undesirable mowing quality. These perennial ryegrass cultivars tend to behave as short-lived perennials due to a lack of winter hardiness. The use of ryegrasses has been limited to temporary or companion turfs where a rapid cover is needed to control soil erosion until the more desirable permanent turfgrass species become established.

Several improved perennial ryegrass cultivars are now available that have a less rapid vertical growth rate, are lower growing, and less competitive with the desired species. They also have a darker green color and a more desirable mowing quality. Included among these cultivars are (a) Manhattan, (b) NK-200, (c) Norlea, and (d) Pennfine. The first three cultivars have improved winter hardiness, but are still subject to serious injury about one out of every three winters in Michigan. Pennfine is not acceptable for Michigan growing conditions due to its lack of low temperature hardiness.

Italian ryegrass (*Lolium multiflorum*) is an annual, bunch-type turfgrass species. It is slightly superior to perennial ryegrass in germination and establishment vigor. Its light-green color, coarse-leaf texture, and rapid vertical shoot growth rates make this species undesirable for use in mixtures with Kentucky bluegrass and fine-leaf fescues.

Redtop (*Agrostis alba*) is a gray-green short-lived perennial grass which was used for many years in expensive seed mixtures. It tends to thin out under close mowing and high fertility. As a result, it persists as scattered tufts which disrupt the turfgrass uniformity and quality. It has good tolerance to wet, acidic soils. However, redtop is of little value in quality turfs and should not be used in lawn mixtures.

### Unadapted Turfgrass Species

Tall fescue (*Festuca arundinacea*) should not be confused with the fine-leaf fescues. It is a very coarse-textured, short-lived perennial turfgrass species under Michigan growing conditions. Tall fescue has good tolerance to intense wear, heat stress, and drought. However, tall fescue is susceptible to snow mold and low temperature injury in Michigan. The most common cultivars are Kentucky-31 and Alta. Both are quite similar in performance. Due to its coarse leaf texture and susceptibility to low temperature kill, tall fescue is not well suited for home lawns in Michigan.



It has limited use on sport turfs and areas of intense traffic where extensive wear is prevalent. The available tall fescue cultivars do not have sufficient winter hardiness for extensive use in Michigan.

Zoysiagrass or Japanese lawngrass (*Zoysia japonica*) is a perennial, warm season turfgrass. Zoysiagrass turns straw colored with the first hard freeze in the fall and remains brown until early summer. It is established vegetatively by sprigs or plugs and generally requires two growing seasons for establishment. Meyer and Midwest are relatively winter hardy cultivars in southern Michigan. Emerald will winter-kill severely. Although Zoysiagrass is widely advertised and is satisfactory for use in warmer climates, it is not recommended for use in Michigan lawns.

**Table 2. Description of some Kentucky bluegrass cultivars commercially available for Michigan.\***

Cultivar	Characteristics
<b>Baron</b>	Good low temperature color retention and spring greenup rate; rapid establishment rate; good leafspot and <i>Typhula</i> blight resistance; medium-slow vertical rate of shoot growth.
<b>Fylking</b>	Relatively slow vertical growth rate; prone to thatching; good low temperature color retention; good establishment rate; good resistance to leafspot and stripe smut; susceptible to powdery mildew and <i>Fusarium</i> blight.
<b>Merion</b>	Relatively slow vertical shoot growth rate; prone to thatching; good low temperature hardiness and drought tolerance; poor spring green-up rate and winter color retention; slow establishment rate; excellent leafspot resistance; very susceptible to powdery mildew and stripe smut; responds to higher nitrogen fertility levels.
<b>Nugget</b>	Excellent low temperature hardiness; poor spring green-up and winter color retention; good resistance to leafspot and powdery mildew.
<b>Pennstar</b>	Good low temperature hardiness and color retention; good establishment rate; good leafspot and stripe smut resistance; susceptible to dollar spot, <i>Fusarium</i> blight, and powdery mildew.
<b>Sodco</b>	Slow vertical shoot growth rate; slow establishment rate; moderate resistance to leafspot and stem rust.
<b>Adelphi</b>	Relatively slow vertical shoot growth rate; excellent low temperature color retention and spring green-up rate; good establishment rate; good resistance to leafspot; moderate resistance to stripe smut and leaf rust.
<b>Galaxy</b>	Relatively slow vertical shoot growth rate; excellent low temperature color retention and spring green-up rate; good resistance to leafspot, moderate resistance to leaf rust.

Cultivar	Characteristics
<b>Bonnieblue</b>	Medium dark green color; good spring green-up rate; excellent establishment rate; excellent leafspot resistance.
<b>Windsor</b>	Medium vertical shoot growth rate; responds to high levels of nitrogen; good spring green-up; moderately susceptible to leafspot and powdery mildew; susceptible to stripe smut.
<b>Cougar</b>	Excellent drought tolerance; poor low temperature color retention; good establishment rate; very susceptible to leafspot; moderately susceptible to stripe smut and powdery mildew.
<b>Kenblue</b>	Rapid vertical growth rate; good low temperature color retention and spring green-up rate; good establishment rate; very susceptible to leafspot; resistant to stem rust; moderately susceptible to powdery mildew.
<b>Newport</b>	Excellent low temperature color retention; poor low temperature hardiness and drought tolerance; medium to poor establishment rate and recuperative potential; susceptible to leafspot, dollar spot, stripe smut, and leaf rust; good resistance to powdery mildew.
<b>Park</b>	Rapid vertical shoot growth rate; erect growth habit; medium low temperature hardiness and drought tolerance; good spring green-up rate; excellent establishment rate.
<b>Prato</b>	Moderate vertical shoot growth rate; medium establishment rate; susceptible to leafspot, very susceptible to stripe smut, and stem rust; moderately resistant to powdery mildew.

\*Blending of Kentucky bluegrass cultivars is preferable to growing a single cultivar.

**Table 3. Description of fine-leaf fescue cultivars commercially available for use in Michigan.\***

Cultivar	Characteristics
<b>Pennlawn</b>	Medium dark green color; mixes well with Kentucky bluegrasses; intermediate drought tolerance; moderately susceptible to red thread; susceptible to leafspot.
<b>Highlight</b>	Medium green color; fine-leaf texture; poor drought tolerance; good resistance to red thread; moderately susceptible to leafspot.
<b>Jamestown</b>	Medium dark green color, fine texture; high shoot density; good resistance to red thread and <i>Fusarium</i> patch; susceptible to leafspot.
<b>Wintergreen</b>	Dark green color; good low temperature color retention and spring green-up; prefers low intensity of culture; moderately susceptible to leafspot disease.

\*Blending of fine-leaf fescue cultivars is a preferred practice to growing a single cultivar.