K-STATE
Research and Extension

Zoysiagrass in Kansas

Zoysiagrass (*Zoysia* spp.) is a warm-season grass adapted to many Kansas lawns and golf courses. It forms a dense sod from aboveground and underground runners. Zoysia is heat- and drought-resistant and winter-hardy. One objection is that it greens up later in the spring than cool-season grasses such as Kentucky bluegrass or tall fescue and turns brown in the fall after a hard frost. This is a trade-off for its heat tolerance during the summer.

In Kansas, zoysia is mainly used for home lawns and golf courses where dense, low-cut turf is desired. Zoysia grows best in full sun. It will tolerate moderate shade, but the turf will be thinner in shady areas. When grown on alkaline soils, zoysia becomes chlorotic yellow, which limits its adaptability in much of western Kansas.

Advantages of Zoysia

- Heat-tolerant — thrives under high summer temperatures.
- Drought-tolerant — requires less water than cool-season grasses.
- Dense and tough; resists wear.
- Requires less nitrogen fertilizer than most other turfgrasses.
- Less susceptible to weed infestation and diseases.
- Requires less pesticides than most other turfgrasses.
- Will grow in full sun and moderate shade.
- Requires less mowing because of slow growth habit, and no mowing is needed after its dormancy.

Disadvantages of Zoysia

- Greens up late and turns brown early.
- Grows slowly; may require several seasons to establish a solid turf.
- Can develop thatch, which causes problems unless controlled. It is difficult to mow because of its tough, dense foliage.
- Does not tolerate wet or poorly drained soil.
- Some factors can enhance cold injury: heavy traffic; excessive shade; growth in low lying areas where water accumulates; excessive wind on high areas when soil is frozen.
- Recovers slowly after damage.

Zoysia Cultivars

Vegetative cultivars (must be sodded, plugged, or sprigged). Below you'll see the cultivars that are well adapted to the Midwest transition zone.

Meyer Zoysia

Meyer (*Z. japonica*) is the cultivar that has been widely used in Kansas and was released in 1951 from the USDA, Beltsville, MD, and the USGA, Far Hills, NJ. Several other cultivars of zoysiagrass have been released in the past 10 years and are adapted to the Kansas climate. K-State has worked closely with Texas A&M since 2004 in development and release of new zoysiagrass cultivars that have good cold tolerance.

Meyer zoysia on a tee and fairway in Overland Park, KS.

Chisholm Zoysia

Chisholm (*Z. japonica*) was released in 2012 from Texas A&M and K-State. It has a coarser leaf texture, but is deep-rooted, has good drought tolerance, and would perform well in southern Kansas. More details here: (*https://acsess.onlinelibrary.wiley.com/doi/abs/10.3198/jpr2014.04.0020crc*)

Chisholm zoysia in Haysville, KS.

Innovation Zoysia

Innovation was released from Texas A&M and K-State in 2015, and is the first zoysiagrass for our region that has a fine texture, high quality, and cold tolerance equivalent to Meyer. It was a breeding release that involved a cross between *Z. japonica* and *Z. matrella*. *Z. japonica* has the cold tolerance and *Z. matrella* has fine leaf texture. This is a unique cultivar with a finer texture than Meyer but also has cold tolerance. More details here: (*https://innovationzoysia.com/about/*)

Comparison of leaf texture between Meyer (left) and Innovation zoysiagrass.

Innovation zoysia in Haysville, KS.

Two additional vegetative cultivars will be released from K-State, Texas A&M, and Purdue in the near future.

Zenith Zoysia

Zenith (*Z. japonica*) is a seeded cultivar that was released in 1993 and has performed well in Kansas and is available through purchase online. It has been well established on several golf courses in the state and has performed very well. Details here: (*https://info.supersod.com/zenith-zoysia-specs*)

Zenith zoysiagrass on golf course tees and fairways in Junction City, KS.

Planting

Zoysia is usually planted by plugs, sprigs, sod, or strips of sod. Zenith zoysia can be seeded, but is relatively slow to germinate and expand.

Plugging. Home lawns are usually planted with plugs of sod. Plugs should be at least 2 inches in diameter and should have 2 to 3 inches of soil and roots. They are set into the lawn surface at 6- to 12-inch intervals. The closer spacings will give more rapid coverage, but will be more expensive. Plugs should be firmed into the soil so the tops align with the soil surface.

Sprigging. Sprigging is less expensive than plugging and may give a faster rate of cover, but it is more work and requires more initial care. It can be done on home lawns and golf courses. A sprig is a 4- to 6-inch piece of zoysia plant that includes runner, roots, and leaves, but not soil. Sprigs are obtained by tearing apart or shredding established sod. Sprigging into an existing lawn is usually not as successful as plugging due to competition from existing grass. Approximately 2 to 3 square yards of mature zoysia sod will be needed to sprig 1,000 square feet of soil surface.

Zoysia plugs planted – 2 inch diameter and 1 ft. apart.

Sprigging of zoysia. Sod is broken up and grass is penetrated into the soil to promote root development.

To prepare soil for sprigging, till and level the soil. Make shallow trenches 2 inches deep and 6 inches apart. Use fresh sprigs, do not allow them to get dry, and plant 4 to 6 inches apart in the row. When planted, one end of each sprig must be at least 2 inches below the soil surface, but part of each sprig must be above the ground. Attention to watering, fertilizing, controlling weeds, and mowing is vital to success after planting.

Sodding. Sod is established grass cut with a thin layer of soil attached and rolled out on the site — much like laying carpeting. Sodding gives instant lawn and erosion control but costs much more than plugging or sprigging. Good soil preparation is necessary for sodding. Laying sod over a compacted clay soil will eventually cause turf decline and problems. Newly laid sod needs to be irrigated frequently until it roots into the soil, then less often.

Strip-Sodding. Golf courses in Kansas have commonly used strips of sod that are sodded into cool-season turf. This requires a reduced purchase of total sod and the zoysia will then grow and spread across the area in 3 to 5 years. After sodding, the fairway area has to be managed to favor zoysia, not the cool-season turf. This would include lower mowing, summer fertlization, and irrigation to favor zoysia.

Seeding. Seeding zoysiagrass is generally less expensive than the description of establishment using the aforementioned vegetative strategies. Zenith zoysia is commonly used in Kansas and is typically seeded at 1 lb./1,000 sq. ft. Another available seeded cultivar is Compadre zoysia.

Sodding of Innovation zoysia.

When to plant. Zoysia should be planted early in the growing season to have time to develop a good root system before frost. Late summer plantings may cause winterkill, while early plantings may be damaged by a late freeze. Plugs and sprigs should be planted between late April and June. May is usually the best time for planting. Sod may be laid somewhat later in the season as long as there is enough time for the sod to knit into the soil before the end of the growing season.

Converting to zoysia. Golf course fairways and lawns can be converted to zoysia by plugging or adding narrow strips of sod into the existing cool-season grass. Keep the whole turf area mowed short (1 inch) to facilitate the spreading of the zoysia. Fertilize on a schedule to favor the zoysia. The zoysia will take two to five years to completely take over under normal circumstances. Sprigging and seeding should be done in areas where the existing turf has been removed with a herbicide such as glyphosate, which provides total removal, or the soil is fully tilled and leveled. If sprigged or planted in early June, nearly full coverage is possible by the end of the growing season if weeds are suppressed during grown-in.

Mowing

Correct mowing is important for zoysia management, and regular mowing is essential for quality. The most important aspect of mowing is frequency of cutting: no more than one-third of the grass should be removed at one time. Otherwise, the grass becomes stemmy, thatchy, and weedy. If you are maintaining a 1½ inch mowing height, for example, do not remove more than one-half inch of grass during any mowing.

Zoysia is mowed shorter than bluegrass or tall fescue because it is a creeping grass with a different type of growth than cool-season grasses. Mowing height can be adjusted according to type of turf use and level of maintenance. The shorter the grass is maintained, the more frequently it must be mowed.

Watering and fertilizing will increase mowing frequency. A satisfactory balance must be achieved between the three cultural practices.

Zoysia is a tough, thick, fibrous grass requiring a sharp blade and a heavy-duty lawnmower. Blades need to be inspected and sharpened frequently. A reel mower is

Strip sodding of zoysia in a fairway. *Photo courtesy Minor Park Golf Course, Kansas City, MO.*

preferred for zoysia, especially for close-cut turf, but the grass must not be allowed to grow tall between mowings. A rotary mower can be used for 1½ -inch-high turf. Vary the direction of mowing each time the grass is mowed. For example, golf course fairways mowed at ½ inch are mowed 3 to 4 times weekly during the summer.

Clippings may be caught for a neat appearance, but catching clippings does not prevent thatch (see section on thatch). Mowing height and frequency are more important for thatch prevention than clipping removal.

Watering

Zoysia is relatively drought-tolerant and does not need frequent watering. Older lawns that need frequent watering probably have excessive thatch. Watering too often causes shallow roots, thatch, and disease. It is much better to water thoroughly every week or two than to water several times per week. Regular watering will be needed only during hot, dry weather. Variable weather and soil conditions are important factors affecting watering. Good judgment is better than watering on a fixed schedule.

Morning is the best time to water. Late evening and night watering can favor disease development. If evening watering is most convenient for your work schedule, turn the water off 30 minutes before sundown so the grass can dry off before nighttime. Use a sprinkler that does not apply water faster than the soil can absorb it. Water that runs off is not only wasteful and costly, but does not benefit the grass.

Soak the soil to a depth of 6 to 8 inches and then wait as long as possible before watering again. This encourages deep rooting and helps prevent thatch and disease. It takes two to four hours to soak the soil, depending on soil conditions. Pushing a screwdriver into the soil is an easy way to determine how deep the soil is soaked.

Newly planted or sodded lawns may have to be watered more frequently than established lawns. But after the first week, begin changing to a less frequent watering schedule to encourage deeper rooting. Zoysia sod will not root into water-saturated soil.

Zoysia does not grow well in wet or poorly drained soils. Clay soils present a special problem because they do not drain well. In waterlogged soils, Zoysia roots may rot away, and then only surface roots remain.

Fertilizing

Fertilizer helps produce thick, green turf, but too much fertilizer, the wrong kind, or fertilizing at the wrong time may do more harm than good. Zoysia should not be fertilized as much as other grasses or it will produce excessive thatch. Because zoysia is a warm-season grass, it is fertilized during the warm months — May through August. It should not be fertilized in the fall or early spring. Fertilizing in early spring benefits weeds and promotes premature topgrowth before the roots begin to grow. Late fertilization may delay the natural dormancy before winter.

Nitrogen is the most important fertilizer element for turfgrass, but the soil does not supply sufficient amounts. Nitrogen increases green color, density, and growth. Zoysia should receive no more than about 2 pounds of actual nitrogen per 1,000 square feet per growing season. It is relatively common for some to apply 1.5 pounds of nitrogen per 1,000 square feet annually. It is best to space several nitrogen applications four to six weeks apart (commonly done between late May and the end of July).

Phosphorus and potash should be applied only if indicated by the soil test results. Since grass uses little phosphorus, it often accumulates to excessive levels in established areas that have been routinely fertilized with this element. Potash is used in larger amounts than phosphorus, but most Kansas soils contain adequate amounts.

Lime or sulfur should never be added to the soil unless their need is determined by a soil test. Lime makes the soil more alkaline; sulfur makes it more acidic. Using either element without a soil test increases the risk of making a minor problem more serious. The ideal soil pH of zoysia is 6 to 6.5, which is slightly acidic.

Thatch

Thatch management is vital for zoysia, as zoysia is more thatch-prone than other grasses. Thatch is a hidden organic layer of living and dead shoots, stems (stolons and rhizomes), and roots. Thatch accumulates gradually over the years and usually is undetected until it becomes a serious problem. More than ½ inch of thatch is excessive and can be detrimental. It restricts water, fertilizer, and air movement into the soil and favors disease development and insect activity. It also elevates the grass crown above the soil and the plant is then more susceptible to winter injury.

The roots retract from the soil into the thatch layer as it builds up over the years. Zoysia then loses much of its heat- and drought-resistance. To determine how much thatch a lawn has, cut out a small plug of turf, including some soil, with a knife or plugger. Look for a brown, compressed layer of organic matter.

A common misconception is that thatch is caused by clippings. Thatch builds up at the ground level mostly from surface roots, stems, and runners that are not cut off by the mower. Clippings decompose more readily than roots, stems, and runners because they are 90 percent water.

Infrequent mowing, mowing too high, frequent watering, and over-fertilizing with nitrogen accelerate thatch accumulation. Good management will help, but will not completely prevent thatch.

A thick layer of thatch in older zoysia cannot be removed all at once because most of the live roots will be in the thatch layer. Complete thatch removal will result in severe thinning of the turf. A series of renovations must gradually reduce the thatch over several years.

A heavy-duty dethatching machine with solid slicing blades is used for zoysia. The blades must be thin so they cut the live runners rather than yank them out of the thatch. The machine should be set so it cuts through the thatch, thinning rather than removing all of the thatch layer. Dethatching at the wrong time can result in a serious setback for the zoysia. June dethatching results in the least shock and the grass recovers most rapidly at that time because rhizome and stolon growth is most rapid. Fertilizing after dethatching also speeds recovery.

Thatch accumulation in zoysiagrass (the pen indicates the base of the organic matter just above the soil).

Core aerators are being used more today for thatchy lawns. Coring machines remove a core or plug of thatch and soil and leave it on the surface. The small holes they leave in the thatch and soil aid in root, water, and air penetration into the soil. Cores can be left to be broken up by mowing and watering; the soil added to the surface aids in thatch decomposition.

Some people set their mowers very low and scalp off all vegetation in early spring before growth begins. This seems to work if it is done yearly from when the zoysia is established. Do not attempt it on lawns when most roots are in an old thatch layer. Scalping is a dusty job that is hard on a mower and produces a lot of debris that needs to be removed.

Weed Control

During the period of vegetative establishment, there are options for preemergence herbicides that can be used to prevent annual grassy weeds from emerging and competing with zoysia. Weed control in seeded zoysia must be done after it has emerged and continues to grow. There is a limited selection of herbicides that can be used on recently planted zoysia and can be sought out.

A thick, well-managed zoysia area has good weed resistance during the growing season, but cool-season weeds can be a problem in early spring and late fall when the grass is dormant. Weeds usually invade turf after it has been damaged or weakened by insects or disease. Improper mowing, watering, or fertilizing can also lead to weed problems.

Cool-season broadleaf weeds such as dandelions, chickweed, and henbit should be controlled in the fall rather than in the spring when they bloom.

Crabgrass, foxtail, and other warm-season grassy weeds are not usually a problem in dense, well-established zoysia. Crabgrass preventers applied in early spring prevent annual grassy weeds while new zoysia is being established. After establishment, they should not be needed on a routine basis.

Cool-season perennial grassy weeds such as tall fescue can be unsightly while zoysia is dormant. A few clumps can be dug out, and if zoysia is completely dormant, more severe infestations can be controlled with a nonselective herbicide such as glyphosate.

Insects

Grubs, chinch bugs, and bill bugs can devastate zoysia if they are not controlled. Early detection and control are essential in preventing serious damage. Proper timing is as important as selecting the right control. Most insects are not a problem every year. Apply insecticides only when you are sure that there are enough insects to cause damage.

Under stress, insects cause more damage to turf. Thatch can also contribute to certain insect problems, and it impedes the penetration of insecticides into soil-active insects. Your local K-State Research and Extension office can help you identify insect problems and select the proper control.

Disease

Zoysia is not especially susceptible to disease, but some kinds of diseases do attack zoysia. One in particular that causes problems is called large patch (*Rhizoctonia solani*), which occurs in fall or spring. Diseases are strongly influenced by both environmental factors and cultural practices, especially over-watering and over-fertilizing. Thatch also may contribute to certain disease problems.

A routine spray schedule for disease is not recommended for home lawns, but they may be applied on golf courses where early detection and prevention are advised when disease problems occur. Proper cultural practices, especially mowing, watering, fertilizing, and controlling thatch, are the best defense against disease.

Large patch disease, which occurs in fall or spring on zoysia.

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