

Approaches to Managing Intermediate Wheatgrass for Dual-Use Forage and Kernza® Perennial Grain Production

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Images: Jérémie Favre (L), Mette Nielsen (R)

A note on Kernza® intermediate wheatgrass development:

This document includes suggestions for how to grow Kernza® intermediate wheatgrass for dual-use forage and grain production* in the U.S. Upper Midwest.

Intermediate wheatgrass (scientific name *Thinopyrum intermedium*) is a perennial grass species related to wheat. While it is commonly planted in the U.S. as a forage grass, breeding programs at The Land Institute and the University of Minnesota have used the species to develop a promising new perennial grain crop. Selection for grain size, disease resistance, and other traits have advanced to the point that early-adopter farmers are now beginning to experiment with planting the crop. This document is meant to be a resource created for, and in partnership with, those farmer innovators.

Kernza® is the trademarked name of the edible perennial grain harvested from the intermediate wheatgrass plant. The trademark is held by The Land Institute, a research-based non-profit organization in Salina, Kansas. Additional history can be found at kernza.org and forevergreen.umn.edu.

Throughout this document the plant/crop is referred to as “Kernza intermediate wheatgrass”.

Kernza intermediate wheatgrass is actively being researched and developed at research institutions and on farms. This is a new and experimental grain crop, and markets are in the early stages of development. Farmer knowledge, experience, and input are key to moving this work forward. This document offers recommendations for how to grow Kernza intermediate wheatgrass, but it is not a precise blueprint for how to do this.

The information in this document represents current knowledge on the crop, although many unknowns still exist and research is ongoing. Growing Kernza intermediate wheatgrass while the plant and grain are still in development may not result in a commercially viable crop. At this point in time it is recommended that farmers plan to grow Kernza intermediate wheatgrass as a dual-purpose grain and forage crop rather than expecting a reliably profitable grain harvest. This is to mitigate some of the risk inherent in growing a new and experimental grain crop.

Please refer to the “Obtaining Seed and Becoming a Kernza Grower” companion document if you are interested in planting the crop. Future versions of this document will include new research developments and grower experience; feedback is encouraged.

This document was developed by Green Lands Blue Waters, the University of Minnesota Department of Agronomy and Plant Genetics, the University of Wisconsin–Madison Agronomy Department, the Forever Green Initiative, The Land Institute, and farmer partners.

***As of March 2019, no regulated agricultural chemicals (including pesticides and herbicides) have been approved for production of intermediate wheatgrass grown for Kernza grain.**



Kernza intermediate wheatgrass. *Image: Kathryn Turner*

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Site Selection and Suitability

Field selection for Kernza intermediate wheatgrass production should consider a field's drainage patterns, proximity to surface water, slope, and aspect. The crop can handle water shortages better than water logging, but ample moisture is needed during the critical grain filling phase to ensure viable yields. Fields that are prone to flooding should be avoided. Coarse-textured soils with low water holding capacity can be used, particularly in higher rainfall regions.

The deep, dense root system and perennial nature of the plant supports important ecosystem services such as water quality and quantity control. If planted down-slope in the direction of runoff and between runoff sources and surface waters, Kernza intermediate wheatgrass can intercept surface water and filter it of nutrients and sediment before the runoff water reaches surface water. Fields with significant slopes and fields at risk for erosion can be planted with the crop, as long as the crop is established before severe rain events.

Kernza intermediate wheatgrass's expansive root system and long growing period also help the crop use nitrogen efficiently. Research has shown that Kernza intermediate wheatgrass has the potential to reduce nitrate leaching to groundwater compared to fertilized annual crops. It could be a useful crop for areas that are prone to nitrate leaching, or in areas where nitrate leaching can contaminate drinking water sources (i.e., wellhead protection areas and drinking water management areas).

Site Preparation

Kernza intermediate wheatgrass should be seeded in late summer. The plants require vernalization (a cold period during winter) to induce heading the following spring. If a field is seeded in the late summer, it will produce seed heads the following year. If a field is seeded in the spring, it will produce vegetative biomass the first year, but will not produce grain until the following summer. Late summer seeding is highly recommended for improved stand vigor and decreased weed competition. In the Upper Midwest, the target planting window is between

August 15 and September 1. This timing is early enough that the plants can establish root systems before going dormant for the winter, yet late enough so that an early season annual crop can be grown and harvested in the field during the same growing season. Late August plantings can be beneficial to first-year competitiveness of the crop with spring-germinating weeds, and thus result in increased forage and grain yields.

Planting after legumes like alfalfa, pea, or a forage clover can result in nitrogen benefits and is recommended. Other options include planting after sweet corn, silage corn, or a short-season soybean. Kernza intermediate wheatgrass can be planted after spring wheat, oats, or other small grains that winter kill. However, small grains can produce competitive volunteers and host diseases that could impact the establishing Kernza crop. Planting after a cereal grain that can overwinter is strongly discouraged.

As you prepare to plant Kernza intermediate wheatgrass, remember that the seeds are small—currently about one fifth the size of wheat seeds. Before planting, fields can be worked to reduce residue, kill weeds, and loosen soil. After tillage, a roller or cultipacker should be used to form a firm, even seedbed. A second, no-till approach is possible, but only if weeds from the previous crop are not an issue. The no-till approach is feasible with drills that have good residue clearing or cutting capabilities ahead of the disks and press wheels. This is needed to achieve good soil-to-seed contact. Otherwise, no-till seedbeds can lead to inadequate soil-to-seed contact and uneven germination. No-till with a good drill results in much better seed-soil contact and emergence than planting in loose, tilled ground. It can also be easier to control depth in no-till soil versus loose soil. Ensure that drill down-pressure is high enough to achieve soil contact, but not too high to place seeds below a 0.5-inch depth.

Seeding and Stand Establishment

Kernza intermediate wheatgrass should be planted shallowly (up to about 0.5 inches) using a Brillion-type seeder or drill. The seed drill can be used to plant the crop at a rate of 10 to 15 lb./acre, depending on the percent germination of the seed lot, with a target of 12 lb./acre of pure live seed. Row spacing choices may be limited due to equipment constraints, however drilling on 6 to 12-inch rows is recommended. Narrow rows reduce weed pressure but may lead to high competition among the plants in later years, which can result in yield declines as the stand ages. Another option is to use a rotoator or similar tillage machine where spacing can be adjusted. In this case you can seed the crop in wider 24 to 36-inch rows to facilitate interrow cultivation for weed control.

A gentle rain promotes germination after seeding. Expect to see germinated seedlings emerge about five days after the first soaking rain, although this will depend on soil temperature and moisture conditions. Late planting dates can lead to delayed germination and can dramatically reduce biomass and grain yields.



Seedlings are usually red and green and look slimmer than wheat. Farmers are sometimes surprised that this perennial grass doesn't look more like wheat. Fields seeded with Kernza intermediate wheatgrass resemble a grass pasture more than they resemble a field of wheat. A strong stand that has potential for good yield in the first year will usually have eight to 20 seedlings per foot of row. However, first year stands with just one seedling per foot of row can have good yields by year two, because the plants will grow abundantly and spread by rhizomes after the first year.

Kernza intermediate wheatgrass seedlings. *Image: Lee DeHaan*



A first year stand of Kernza intermediate wheatgrass in early May. The stand was seeded in late August of the previous year.



A second year stand of Kernza intermediate wheatgrass in late April, 2016. The stand was seeded in the fall of 2014. *Images: Jacob Jungers*

Kernza Intermediate Wheatgrass at a Glance

Typical Height 3 to 5 feet

Seeding Depth 0.5 inch

When to Plant Seeds Late summer

Seeding Rate 8 to 15 lb. bulk seed/acre, with goal of at least 1 to 2 plants per linear foot, if planted in rows. If you're worried about weeds, plant at a higher rate

Seed Size About 20% the size of wheat

Fertility Nitrogen levels are critical, but optimum rates are still unknown and depend on the age of the stand

Time Until Emergence Variable; typically 3 to 5 days after rain

Row Spacing 6 to 12-inch rows (24 to 36 inch rows are better for stand longevity, but only if equipment is available to manage weeds)

Nutrient Management: Conventional

Soil tests will help determine nutrient needs, although farmers will need to self-diagnose based on factors unique to their fields. Test phosphorus levels between 10 to 20 parts per million should be sufficient for Kernza intermediate wheatgrass. On highly productive soils, first year stands have been successful without added fertilizer. After the first year, fertilizer rates of 40 to 80 pounds of nitrogen per acre have increased yields. If you want a fall forage crop, fertilize with nitrogen right after grain harvest to get good fall growth. If nitrogen is too low in the spring when Kernza intermediate wheatgrass begins to grow, then heads will not be initiated.

Split nitrogen applications done in the spring and fall may reduce lodging and leaching and increase nutrient use efficiency of the plant. Fall nitrogen fertilizer should be applied when soil is below 50 degrees Fahrenheit, but not yet frozen. If using urea, it should be applied just before an average rain event or during a time of the year when air temperature will not exceed 60 degrees Fahrenheit. This is to reduce volatilization losses. However, excess precipitation soon after fall nitrogen fertilization can result in nitrate leaching or loss via surface runoff.

Soil can be tested in the spring of each cropping year to monitor and manage soil fertility throughout the life of the stand, although ideal nutrient levels are still being researched.

Nutrient depletion can occur by year two of Kernza intermediate wheatgrass stands; therefore, fertilizer requirements in year four may be much greater than in year one. Research to identify optimal fertilizer rates for different stand ages is ongoing.

Nutrient Management: Organic

As with conventional nutrient management, soil tests will help determine nutrient needs for an organic system, although farmers will need to self-diagnose based on factors unique to their fields. Manure, compost, or other organic fertilizers can be applied in fall or winter based on nitrogen needs. Use of organic fertilizer amendments high in organic matter, like manure and compost, should provide adequate phosphorus and potassium input. If relying on legumes for

nitrogen fertility, additional phosphorus and potassium may be needed to satisfy the crop's requirements, particularly after year two of the stand. New research into intercropping Kernza intermediate wheatgrass with legumes to provide nitrogen is underway. When planting Kernza intermediate wheatgrass following a legume crop, consult university resources to determine nitrogen credits (e.g., [University of Minnesota Extension nutrient management guidelines](#)).

Animal manures can be used to add nutrients such as nitrogen. Before applying manure, determine the nutrient content of the material and availability of nutrients for crop use. Availability of nitrogen can vary widely depending on climate and soil conditions. Most states have guidelines for estimating nutrient content in manures (e.g., <https://extension.umn.edu/manure-land-application/manure-characteristics>).

Weed Management

Controlling weeds is important, even for those species that may not hinder grain production through competition. Given the relatively small seed size of Kernza intermediate wheatgrass compared to annual grains, separation of harvested weed seeds from Kernza intermediate wheatgrass grain can be difficult.

The first step to control weeds is to plant Kernza intermediate wheatgrass in a field that is not heavily infested, especially with perennial weeds like quackgrass, Canada thistle, and bindweed. If perennial weeds are present when Kernza intermediate wheatgrass is planted, then they can become an ongoing problem. Annual weeds are an issue in year one but are then mostly outcompeted in subsequent years. Weed pressure generally decreases in second and third year stands as the crop becomes well established and more competitive. However, as stands age (>4 years), weed pressure can increase again and require management.

Mowing over the top of Kernza intermediate wheatgrass in spring can limit annual grass and broadleaf weed pressure. Fields should be mowed before crop stems begin to elongate. To do this, set the mowing height high so that the first nodes of the crop are not clipped from vegetation and scalping is prevented.

Another method of weed control is inter-row cultivation. If you have access to a rotovator or similar tillage machine, it can be adjusted to leave strips of live vegetation. Consider planting the crop into wide rows (24 to 36 inches) and use a rotovator or cultivator to keep the inter-row space clear of weeds.

Although a perennial grass such as Kernza intermediate wheatgrass is expected to tolerate common broadleaf herbicides used in small grain crops such as barley, oats, and wheat, **no regulated agricultural chemicals have been approved for production and harvest of Kernza grain from intermediate wheatgrass.** Consequently, herbicides cannot be legally applied to the crop at this time. This may change in the future due to ongoing research and new regulations.

Potential Pest and Disease Concerns

Insects. To date, there have been no incidences of devastating insect damage on Kernza intermediate wheatgrass research fields or farm fields; however, insect pressures have been anecdotally observed in larger plantings.

Pests to watch for include **thrips** (with microscopic stages feeding inside the florets), **wheat stem maggot** (causing single dead heads), **leafhoppers** (aster leafhoppers can vector aster yellows and feed on leaves), and **grasshoppers**.

Diseases. Kernza intermediate wheatgrass has not been grown long enough to show extensive disease concerns in the Upper Midwest. It is susceptible to some infection by most small grain diseases, although it is currently highly resistant to **rusts**, and other common and devastating grain diseases. Damage by **bacterial leaf streak** can be severe, causing near-complete defoliation. The disease is at its worst after periods of high temperatures and relative humidity. Bacterial leaf streak has not been found to damage grain yields so far but is expected to reduce forage yield and quality.



A first year stand of Kernza intermediate wheatgrass plants, widely spaced for research. The plant in the center shows signs of severe bacterial leaf streak infection. Adjacent plants are healthy, likely due to resistance to the disease. *Image: Lee DeHaan*

Kernza intermediate wheatgrass is mildly susceptible to **scab** (fusarium head blight). Although dangerous levels are rare, its presence can generate toxins in the seed that make it unusable. Small samples can be examined by hand to identify the presence of any scabby kernels.



The red dot on this Kernza intermediate wheatgrass plant shows where scab infection was introduced. *Image: Kathryn Turner*

The Kernza trademark license agreement is being revised with the expectation that seed lots will be tested for the deoxynivalenol (DON) toxin before grain or flour is sold (see **Food Safety Testing**, below). Seed lots containing scabby kernels must be discarded or cleaned to remove scabby kernels. Or, if levels are low enough, they can be used as animal feed.

In many cases buyers require additional testing for the presence of mold or other potentially harmful pathogens. Research is ongoing and industry requirements are shifting. Therefore, the licensing agreement for the sale of certified Kernza is expected to evolve in the coming years. Producers should review the licensing agreement carefully and be sure all requirements for

testing have been met before marketing their grain. In some cases, testing may be performed on seed lots only after dehulling and cleaning, whereas small lots that are processed locally may need to follow a different testing protocol.

Ergot is another disease of some concern. Infection is often greatest on upwind field edges that are not well pollinated. If ergot is observed in the field, avoid harvesting the infected areas along the field edge. Ergot contains toxins, and if present in harvested grain at dangerous levels, the black ergot bodies must be removed by cleaning. Note that some Kernza intermediate wheatgrass grains can be dark colored and potentially resemble ergot.



Kernza intermediate wheatgrass seed heads (or spikes) with ergot. *Image: Jacob M. Jungers*

Food Safety Testing

Research on Kernza intermediate wheatgrass pest and disease management is ongoing, and farmer feedback/experience is encouraged. Testing protocols and acceptable thresholds for Kernza intermediate wheatgrass are still being established. As cleaning and processing knowledge improve, Kernza intermediate wheatgrass specifications will be established and communicated to growers and producers to ensure quality grain enters the marketplace.

Plant Growth and Development

Kernza intermediate wheatgrass begins growing in late March to early April, depending on the year and location. During the first few weeks of development, all growth will be confined to roots and leaves. Plants will remain low-lying and tillers (leafy side shoots) will appear in mid-May. Next, the stem will begin to elongate. Leaf biomass also continues to grow to support the

increasing demand for energy during this period of rapid growth. The seed head will develop inside the stem and begin to swell when it is close to emerging (i.e., the boot stage). The seed head will emerge next, and flowers will open about two to three weeks later. The plants depend on wind for pollination. Seed development will typically occur in mid-July (although exact timing varies), and grain filling will take about three to four weeks before grain is mature, dry, and ready for harvest.



Kernza intermediate wheatgrass shoots at the start of elongation in spring. The node pictured is about 1 inch in height. *Images: Steve Culman*

Kernza Intermediate Wheatgrass Grain Harvest and Storage

Research to determine optimum harvest timing and conditions is ongoing and is critical to a profitable Kernza intermediate wheatgrass crop. There is still substantial variability in the rate at which the seeds develop and mature across a field and within a plant, which makes determining the optimum harvest timing difficult. Waiting too long to harvest (i.e., waiting until all seeds are mature), will result in higher rates of shattering and yield loss. Harvesting too early will decrease yields and lead to storage issues due to high moisture content. Check maturity by removing a few spikelets with your hands from various regions of the seed head (top to bottom). Strip the hulls away with your fingers and look to see if the seeds are brown and appear dry. If you squeeze a seed between two fingernails, it should not dent. The stem

and leaves will look rather green and moist at this time, but don't let this prevent you from harvesting grain if the seeds appear to be ready.

Direct Combining: Direct combining of the grain should only be considered if the stand is nearly weed-free. Green weeds in the stand can result in wet leafy material in the bin that will cause spoilage. Plants can be harvested when seed moisture reaches 35% or less. Usually, this condition requires a period of hot, dry weather, and harvest should probably not begin until morning dew has evaporated. Grain should be aerated immediately after



Combining Kernza intermediate wheatgrass in Lancaster, Wisconsin. *Image: Jérémie Favre*

harvest until considered dry at 13%. Run the combine head high to collect only the head and to avoid cutting green leaves and stems as much as possible.

If the grain is direct combined, growers should swath the standing residue to 3 inches and bale it, if possible. Residue left on the field can smother the crop when it tries to regrow.

Swathing: Swathing can be used to decrease shattering before grain harvest, and to dry down green biomass (including Kernza intermediate wheatgrass stems and weeds) for smoother combining. Optimal swathing time is earlier than optimal direct combining time. Grain can have a moisture content of



Kernza intermediate wheatgrass swathed and drying in a windrow in Madison, Minnesota. Note that stems are still green when cut. *Image: Jacob M. Jungers*

up to 50%. The seeds can be moist, but most should be brown or yellow with a few green seeds remaining. Swathing helps to limit shattering by killing the heads before the shattering layer can develop. Determination of optimal harvest timing requires more study, so these recommendations are from preliminary observations.

Use a swather with a draper windrower (as opposed to an auger windrower) to reduce shattering and seed breakage. If possible, don't swath before upcoming precipitation events. Try to plan the harvest so that you will have three to five days of dry weather after swathing and prior to combining. To encourage drying, cut swaths that leave 6 to 8 inches of stubble so that windrows are not lying on the soil surface.

Research to determine optimum storage conditions is ongoing and is critical to a profitable crop. Other than keeping grain below 13% moisture, too little is known at this time for detailed recommendations on storage conditions.

Post-Harvest Field Management

After harvest, residue should be removed from the field as soon as possible. Residue should be swathed to near ground level, baled, and removed, since tall-standing stubble and straw left in the field can limit fall regrowth and subsequent yields. In some regions, burning can also be used to remove residue. However, burning straw in a heavy windrow or pile can generate enough heat to kill the plants below. Burning may allow more effective control of insects and diseases but harvesting the residue for use as forage is expected to be economically advantageous if the straw can be used for feed or bedding on-farm, or sold. Where organic straw is in high demand this could be an additional source of revenue for organic Kernza intermediate wheatgrass growers. As long as the residue was green at the time of harvest, it will be of higher feed value than wheat straw and may be good winter feed for beef cattle.



Spring forage from Kernza intermediate wheatgrass in Lancaster, Wisconsin. *Image: Steve Kenyon*

Dual-Purpose (Forage and Grain) Crop Potential and Intercropping with Legumes

Kernza intermediate wheatgrass can be a dual-use crop—producing both grain and forage harvests—and intermediate wheatgrass has long been known to be a high-quality forage. In fact, it is recommended that early adopter Kernza intermediate



Kernza intermediate wheatgrass and red clover intercropping in Lancaster, Wisconsin. *Image: Jérémie Favre*

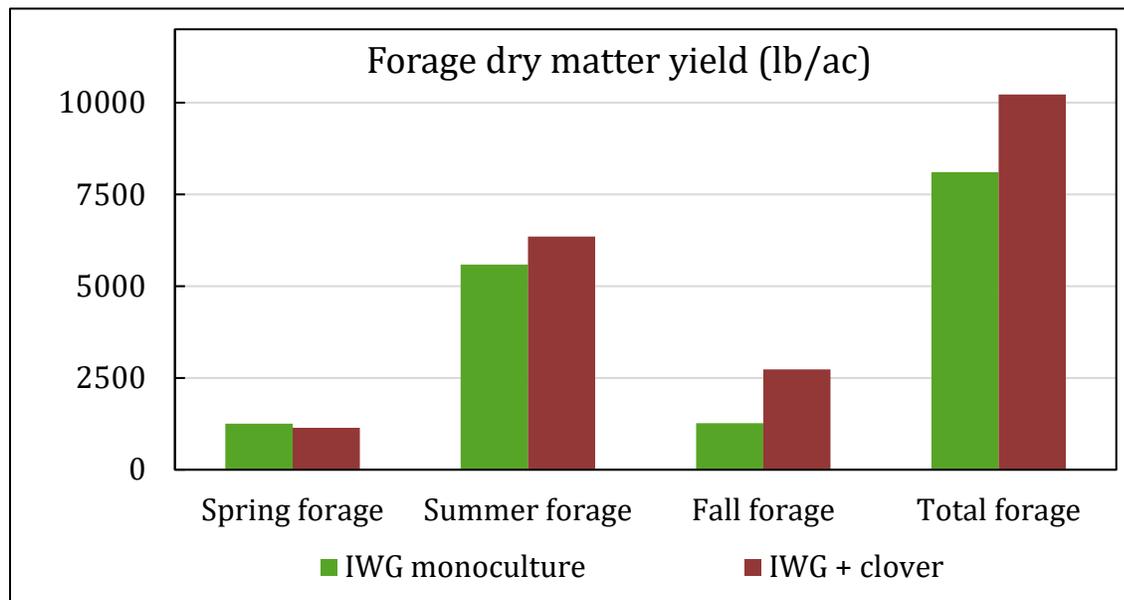
wheatgrass farmers grow the crop for both grain and forage to mitigate some of the agronomic and market risks associated with growing this new and evolving crop.

Leaves can be removed by cutting for hay or grazing during the spring and fall vegetative growth periods and used for forage. Biomass removal must take place before stem elongation in spring, with cutting restricted to above the first node. If the nodes are cut during spring forage harvest, the plants will not produce a seed head.

Intercropping Kernza intermediate wheatgrass with a forage legume can increase the forage nutritive value and yields significantly. However, research on intercropping is just beginning, and much more research is needed before specific recommendations are made. New research findings will be included in future versions of this document.

Figure 1. Forage Yield of Kernza Intermediate Wheatgrass

Forage yields of Kernza intermediate wheatgrass grown in monoculture and bi-culture with red clover across two southern Wisconsin locations (Arlington and Lancaster). (Modified from Favre and Picasso, 2018)



Forage yields of Kernza intermediate wheatgrass vary by location. Spring forage of Kernza intermediate wheatgrass has a high protein content and nutritive value (see **Table 1**) and can be fed to lactating dairy cows. At grain harvest, stems can be swathed low to the ground, baled, and used or sold as forage. This summer forage is superior to wheat straw.

After grain harvest, Kernza intermediate wheatgrass begins vegetative regrowth similar to other perennial grass crops. This fall forage is high quality and can be fed to dairy cows or beef cattle.



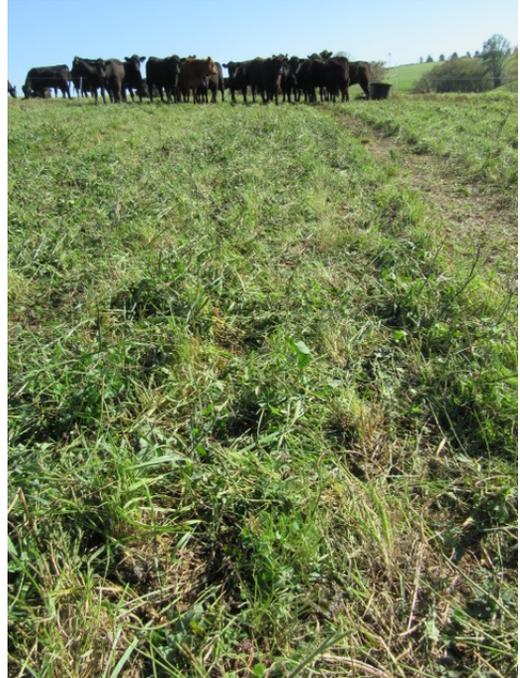
Beef cattle grazing on Kernza intermediate wheatgrass in Lancaster, Wisconsin in spring. *Image: Jérémie Favre*

Table 1. Yield and Nutritive Value of Kernza Intermediate Wheatgrass

Forage yields and nutritive value ranges of Kernza intermediate wheatgrass grown across several locations in the Upper Midwest.

Forage harvest timing	Yield	Crude Protein	Relative Feed Value
	lb./acre	%	
Spring	500-1500	20-25	180-230
Summer (post-grain harvest)	2000-7000	5-10	60-90
Fall	1000-3000	12-18	100-170

Management-intensive rotational grazing is advised on Kernza intermediate wheatgrass stands. However, if livestock are left on a particular portion of the field for more than a day or two, stand loss may occur (depending on how many animals are present). Continuous grazing should be avoided particularly in the spring, as livestock that graze too low can harm the developing seed heads. A residual height of 6 inches is recommended since over-grazing can weaken plants and decrease winter hardiness. Researchers are studying the effects of spring and fall grazing on subsequent grain yields. This information will be available to producers as soon as it is available.



Management-intensive grazing is highly recommended on Kernza intermediate wheatgrass stands. A residual height of 6 inches is encouraged. *Image: Jérémie Favre*

Agronomic Challenges

Kernza intermediate wheatgrass can be susceptible to lodging from high wind and precipitation events. Lodging is exacerbated at higher nitrogen fertilizer rates, which results in yield losses. One way to prevent lodging is to refrain from over-application of nitrogen, and/or to make split nitrogen fertilizer applications, applying in the spring and after harvest in the fall.

Grain yields are known to decline as Kernza intermediate wheatgrass stands age, especially in high fertility soils and narrow row spacing. Yield declines have been observed as early as year two or three and can exceed 50%. Preventing this yield decline is a top research priority.

Breeders are selecting for yield persistence and agronomists are investigating ways to reduce tiller density and stimulate seed head production with disturbance. For instance, spring grazing or burning of residue and new leaf growth prior to stem elongation may reduce self-competition and improve yield persistence, and are also likely to reduce height and associated lodging. Cutting or grazing must not damage developing seed heads, or grain production will

be reduced or eliminated for that season. However, the impact of spring forage removal on grain yield has not been studied enough to make recommendations.

In addition to yield decline and lodging, research on other agronomic challenges such as shattering—and recommendations on harvest and incorporation into rotation—are underway. Breeding and agronomic research to address challenges is active and ongoing, and updates will be provided in future versions of this document.

Stand Termination

Researchers are studying ways to regenerate Kernza intermediate wheatgrass plantings after harvest and experimenting with how to use close grazing and mowing as a no-till, herbicide-free way to eradicate the crop. At this point, expect the plants to produce useful grain for up to three or more years.

Once grain yields diminish, it may be best to use the field for forage, and then rotate it to another crop before planting it with Kernza intermediate wheatgrass again.

Stands can be eradicated by tilling or applying a broad-spectrum herbicide. Research on stand termination with the use of herbicides is ongoing. Optimal timing of tillage involves allowing plants to regrow a few inches after harvest, and then tilling. Or, plants can be removed in spring soon after they begin active regrowth. Further research is needed regarding what to plant next.

Acknowledgements

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Kernza® intermediate wheatgrass is actively being researched and developed. Future versions of this document will rely on ongoing research and grower experience; feedback is encouraged. Last edits to this document were made in March, 2019.

To offer feedback or to be added to a list to receive updated versions of this document as they are made available, contact:

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Obtaining Seed and Becoming a Kernza® Grower – Information from The Land Institute



Last Update 11 March, 2019 for release with Approaches to Managing Intermediate Wheatgrass for Dual-Use Forage and Kernza® Perennial Grain Production.

If you have read and understood the document “Approaches to Managing Intermediate Wheatgrass for Dual-Use Forage and Kernza® Perennial Grain Production” and are interested in becoming a Kernza® grower, this document is meant to guide you through some basic decision making questions that will help you understand whether Kernza® is a good fit for your system during the “Proof of Concept” phase of its development. Agronomic, genetic, and market changes are expected for the next 10 years and grower success depends largely on willingness to share information, data, and innovations with other growers, researchers, and other stakeholders.

Are Kernza® and my farm a good fit?

Kernza® is the only perennial grain crop currently marketed in the USA . Over the last 15 years, The Land Institute has endeavored to breed a perennial grain crop from a wild wheat relative, intermediate wheatgrass. The result is Kernza® perennial grain. Although the crop is still in beta form with R&D ongoing, it is now in pre-commercialization and found in niche products nationally. The Land Institute is committed to bringing this crop to scale in a responsible manner and working with growers who are committed to the experimental nature of the crop while ongoing genetic and agronomic improvements are achieved.

Seed quantities are limited and Kernza® growers’ success is dependent on some basic criteria. If you answer yes to most or all of the following questions, Kernza® might be a good crop for you to experiment with in your system:

1. Are you familiar with growing small grains or grasses?
2. Do you have interest in experimentation with a new crop where agronomic management techniques are still being developed?
3. Do you have access to planting equipment for small seeded crops (e.g. grain drill or a seeder and packer)?

4. Do you have access to harvesting equipment for grasses or small grains (e.g. a swather and a pickup head or a stripper header)?
5. Do you have expertise or are you interested in experimenting in adapting equipment intended for other crops to be successful with different grain sizes and plant types?
6. Are you interested in using Kernza® as a dual-purpose crop for grain and forage?
7. Do you have access to a baler for removing hay or straw after grain harvest?
8. Kernza® plants produce biomass that has been used as forage, hay, and straw. Do you have a market or use for forage, hay, or straw?
9. Is your operation located near other Kernza® growers or an institution involved in Kernza® research?
 - Kernza is currently being grown in CO, IA, IL, KS, MI, MN, MT, NE, NY, OH, OR, and WI. Outside regions housing these states, particularly in the Southeast, production is higher risk and will have less research/technical support.
10. Are you comfortable taking agronomic data on your plantings and sharing that data with other growers and researchers through The Land Institute or other partners?
11. Do you have interest in or land available to scale Kernza® production to at least 40 acres?
12. Do you have at least 6 weeks of temperatures between 32 and 50 degrees to trigger the plant to produce seed heads? Some rules of thumb are:
 - If you are in a region where winter wheat can be grown, Kernza® may be a viable crop.
 - States where Kernza® might be a good option are generally above 37 degrees of latitude, though high elevations in more southerly climes may also meet the requirements for grain production.
13. Are you comfortable working with an experimental crop with the risk of low yields and crop failures, but also with the promise of great ecological benefits?
14. If you are an organic farmer, are you aware that the establishment year can lead to very little or no production of commercially viable grain due to weed competition?
15. If you are a conventional farmer, are you aware that no herbicides or pesticides have been approved for use with Kernza® and that any production that is sprayed cannot be sold as grain for consumption?

The Land Institute is a 501(c)(3) nonprofit that has led the effort on developing Kernza® as a perennial grain crop, including developing identity preserve protocols, testing requirements, and has been instrumental in developing the grain market. The Land Institute owns the trademark on Kernza® and manages licensing agreements with growers and buyers to ensure quality products enter the marketplace. Therefore, The Land Institute is currently in charge of managing the seed supply.

If you believe Kernza® might be right for you, please contact The Land Institute:

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