HYBRID RYE
PRODUCTION GUIDE

SEEDING
THE FUTURE
SINCE 1856

KWS

About KWS

KWS sows the future. Our high-yielding seeds and extensive knowledge make us a trusted partner of farmers - and we have been for generations. In this way, we contribute to solutions for the nutrition of a steadily growing world population. We are constantly improving genetic potential through excellent research and breeding programs. We tailor our seeds to the needs and requirements of our customers to deliver the very best quality, and we are a strong partner throughout the value chain.

KWS Group is a leading breeder of Hybrid Rye, with a long term hybrid breeding program established in the mid 1980's. Hybrid Rye was first introduced to the United States in 2016, and since its arrival, has flourished across many parts of the country.

Hybrid Rye is a highly efficient crop tailored to medium to light soils. High yield, quality and agronomic characteristics such as winter hardiness, drought tolerance, standing ability and disease resistance are a few of the key attributes of this new crop. High importance has also been placed on selecting and breeding varieties of Hybrid Rye with ergot resistance through our PollenPLUS® technology.

KWS offers Hybrid Rye varieties for both whole crop (for forage) or grain production (for feed grain, flour, and distilling). This new crop is taking the malting, milling, and livestock feeding industries by storm.

KWS believes this highly productive cereal offers new perspectives for farmers and end users alike!

Content

What is Hybrid Rye?

By hybridizing rye, KWS was able to influence several important aspects of the crop.

Hybridizing rye allowed for a rapid increase in yield potential by influencing the number of grains produced per ear and combining this advantage with robust hybrid vigor. Yield progression of Hybrid Rye continues to outstrip that of conventionally bred cereals. The yield benefit of Hybrid Rye over conventional rye has increased by almost 20% since the early 2000's and by over 45% since the 1980's when the KWS Hybrid Rye breeding activities first began.

Hybrid Rye (left) vs Triticale (Right)

Hybridization has also minimized the risk of ergot infection by allowing breeders to introduce our PollenPLUS® technology and by reducing the time required for pollination to occur.

Hybrid Vigor

Hybrid vigor simply means more growth above and below the soil surface. As you can see in the photo to the right, Hybrid Rye, even at a very early stage, exhibits more root activity, more lateral spread, more branching, and more fibrous root hairs which means improved stress tolerance and ultimately better nutrient uptake!

Further Benefits

Hybrid winter rye is a cold-hardy cereal crop. It can germinate in temperatures as low as 33°F in the fall and in the spring, it will start to grow at 38°F. Cereal rye can be established in a variety of soil types and qualities, including rich organic soils and poor sandier soils.

Rye is considered a long-day plant but must be exposed to short-days in early growth for flowering to be initiated. Rye has a higher photoperiod response than other cereals, making it well adapted to northern regions of the US.

Hybrid Rye seeds germinate quickly because of their ability to imbibe or absorb moisture easily. In general, for germination to begin, a seed needs to achieve a moisture content of about 35 - 45% of its dry weight. Growers have noticed fast germination even in seemingly dry soil.

Trials have shown Hybrid Rye competes intensely against weeds, reducing the viability of weed seed up to 60%. This competitiveness with weeds is two-fold. First, Hybrid Rye exhibits an allelopathic effect on weeds, meaning it produces biochemicals that can inhibit the germination of weed seeds. Secondly, hybrid vigor allows the plant to move through stem elongation faster than any other cereal allowing it to simply outpace and shade weed growth.

Break the weed resistance cycle with Hybrid Rye!

Benefits of Hybrid Rye

- Hybrid vigor - more biomass above and below the soil surface
  - Wider and deeper root system improves drought resistance
  - Better utilization of available nutrients in the soil
- Best winter hardiness of all cereals
- Good competition with weeds
  - Alleopathic growth inhibitors prevent weed seed development
  - Excellent shading = light reduction in the canopy
- Uniform crop height and maturity
- Good source of protein and highly digestible fiber as a forage option
- Very high yield potential
  - Highest yielding small grain on the market
- Drought tolerance
- 20% less water usage compared to winter wheat[1]
  - 18 gal/lb less than corn
  - 12 gal/lb less than wheat
- High disease resistance
- Built-in ergot protection via PollenPLUS®
  - Resistance to fusarium, strip rust, leaf blotch (scald), take-all (*gaeumannomyces graminis*)
  - Better straw stiffness - excellent lodging tolerance
  - Increased crop residue produced to reduce erosion
  - 1/3 more straw than wheat and barley
- CO_2 efficient and lower greenhouse gas footprint than other small grains and corn
  - 5 lbs less CO_2/bu than wheat and 6.7 lbs less than corn[2]
- Lower crop inputs needed
  - Lower seed, fertilizer and chemical use and minimal to no drying requirements
- Good utilization of manure applied both in Autumn and Spring
  - Hybrid Rye utilizes excess manure well and reduces soil nitrate levels following fall-applied manure.
  - Spreads seasonal workload - earlier manure application
- Crop rotation benefits
  - Increases yields in subsequent corn and soybean crops

1) Sparing use of resources | Nitrogen requirements (draft Fertilizer Ordinance, Dec. 16, 2015, N uptake for wheat 2.51 kg/dt, N uptake for rye 1.96 kg/dt); Water requirements (Lower Saxony State Authority for Mining, Energy and Geology 2011); Need for pesticides (LfL contribution margins and calculation data, LfL Bavaria, 2016); CO2 footprint (averages for the German NUTS 2 regions (BMEL, 2009))
2) University of Netherlands http://webapplicaties.wur.nl/software/feedprintNL/index.asp

From the Farmer

"Overall, Hybrid Rye has been a great fit for our operation, it meets the needs of what we were looking for to try... it economically sustains itself and it provides for better economics for the rest of our operation. Hybrid Rye is a very low input crop which gives us more time to do other things on the operation. We're never short of stuff to do. So, that's what we like about Hybrid Rye. It's low cost, low input, and low management."

-Shawn Feikema, Feikema Farms, Luverne, MN

Ergot

Ergot is a fungal disease affecting common cereals including rye and grasses during flowering. The mycotoxins that the fungus produces are highly toxic to humans and livestock.

The sclerotia (black ergot body) survives in the soil and produces a stalk that emerges at the same time as heading in most grasses and cereals producing thousands of ascospores spread by wind. When the cereals and grasses flower, their natural response is to receive pollen to produce a kernel. If there is little or no pollen, but ergot spores, they invade and replace the kernels with a hard, purple-black sclerotia or ergot body.

Ergot can still be a significant issue if there have been natural or man-made stresses on the plant which lead to poor pollen production or sterility. The plants natural response is to open the flower to receive pollen from elsewhere. Keep a good eye on the field during the last 3 weeks before the harvest and observe if some areas of the field have more ergot than other areas. If so, leave the infected areas and harvest them separately, so as not to infect the whole grain lot.

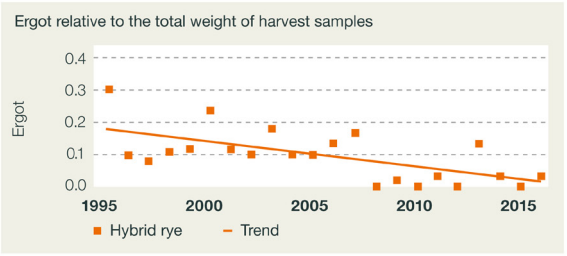
Ergot Agronomic Risk Factors

- Unsynchronized flowering - caused by wide row spacing – greater than 10”-12”.
- Poor depth control which leads to uneven emergence.
- Excessive physical damage and travel on the crop after elongation.
- Unbalanced fertilizer program.
- Field drown outs and edges can create extended tillering times.
- No-till farming or minimum tillage can pose a higher risk for ergot because sclerotia that are present will readily germinate.
- Sclerotia can survive on and in the soil for up to 1 to 2 years.
- Mis-applied growth regulator, fungicide and herbicide.

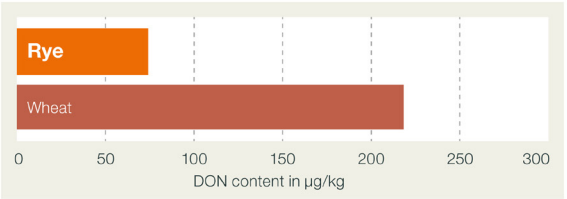
Best Management Practices to Reduce Ergot

- Monitor other crop and weed sources of inoculum like: barley, oats, fescue, triticale, perennial ryegrass, timothy, quackgrass, bromegrass, etc.
- Grass margins do pose a risk by providing a reservoir of secondary inoculum that could infect rye, particularly late tillers around the edge of the crop. You should consider mowing unwanted grass in and around field before heading to limit infection. Continued use of cereal and grass cover crops can perpetuate ergot presence from year to year.
- Use adaptive deep tillage to bury the sclerotia to avoid infections.
- Purchase new quality assured or certified seed each season.
- If irrigating, irrigate before flowering and then continue irrigation once flowering has completed. Hybrid Rye completes flowering within a day, so irrigation timing should not be interrupted.

PollenPlus® protects against ergot

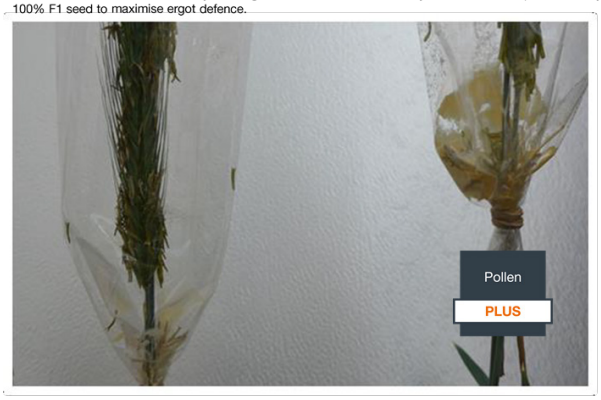


Less risk from Fusarium



Minimal Ergot Risk With PollenPlus®

KWS Hybrid Rye's produce immense quantities of pollen cutting the time needed for fertilisation to occur from several days to a matter of hours. The effect of this has been to significantly reduce the risk of ergot infection. Since the introduction in modern hybrids ergot infections has been virtually eliminated. KWS produces only 100% F1 seed to maximise ergot defence.



PollenPlus: The amount of pollen released by PollenPlus hybrids (right) v a competitor Hybrid (left)

PollenPLUS®

The innovative PollenPLUS® technology from KWS ensures significantly improved pollen formation in Hybrid Rye and effectively strengthens the plants' resistance to ergot: In June 2017, KWS filed a patent for the Rfp1 gene. This patented enhanced restorer gene used in Hybrid Rye increases pollen shedding which prevents the fungus from penetrating the stigmas. The flowers are fertilized faster, and the glumes close sooner – meaning the Hybrid Rye has the best possible ergot protection.

With PollenPLUS®, ergot infestation is considerably reduced. KWS believes the investment in 100% F1 PollenPLUS® hybrids allows for maximum ergot resistance and yield performance, benefiting both farmers and end users now and in the future.

The PollenPLUS® technology ensures greater pollen counts that repel floating ergot spores.

PollenPLUS® varieties have a higher pollen shedding capacity.

Agronomy

In order to get the best establishment with Hybrid Rye, ensure optimum seedbed preparation, seeding rate, seeding depth and a well calibrated planter.

SEEDING

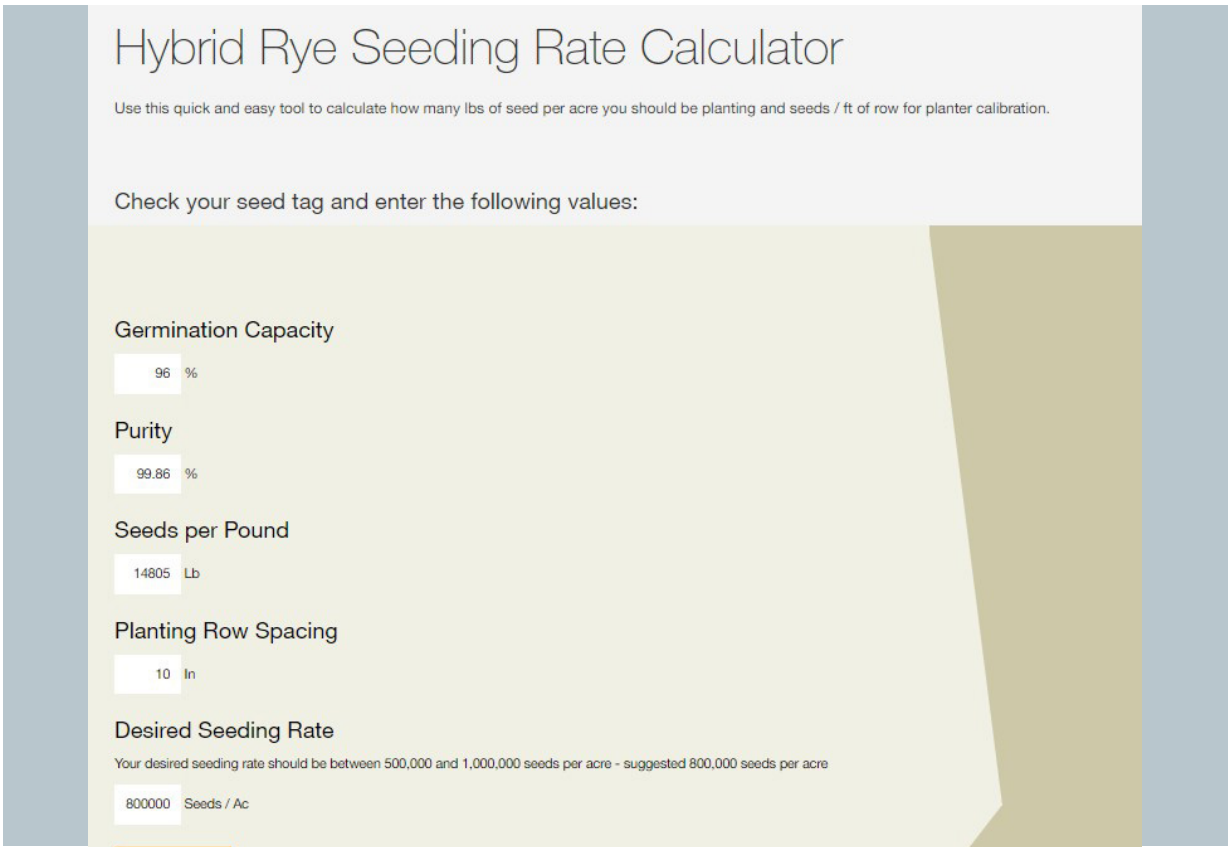
Planter Calibration - Use the QR code found on the seed tag and utilize the KWS Hybrid Rye Seed Rate Calculator to find the number of seeds your planter should be laying down per foot of row. **Seed rate calculator can also be found on our website.*

Before going to the field, calibrate your planter to align with the seed calculator. Now you are ready to plant the precise amount needed for your field and at a rate that Hybrid Rye will perform best.

Hybrid Rye will always be packaged and sold in units. **1 unit of Hybrid Rye seed is equivalent to 1 million viable seeds.

Ensure Success in the Field with these Tips:

- Drilling depth must be uniform at a depth of 1.0 inch. Control your planting speed to maintain consistent depth control
- Seedbed preparation is essential to achieve good seed to soil contact
- Seedbed should be firm, with minimal clods, and previous crop residue should be well distributed to ensure a uniform seeding depth for even germination
- Rolling can be used on soils that are very loose
- Yield is suppressed at seeding depths >1.5 inches



Evaluating the Stand in Spring

Evaluating your field will allow you to see if you have an adequate stand and yield potential. Evaluation should take place when you first start to see regrowth or green-up, which happens when temperatures start to get above freezing. It is always a good idea to bring a shovel to dig up some plants and a measuring device to calculate plants/square foot. Use the chart to the right for a guide:

Based on the row width established at planting, use the chart to determine how many inches of row length are needed to represent 1 square foot. i.e. if you planted 7.5 inch rows you will need to measure off 19.2 inches of a single row and use this area to count and calculate your plants per square foot.

Row Width (in)	Row Length (in)
6	24.0
7	20.6
7.5	19.2
8	18.0
9	16.0
10	14.4
12	12.0
15	9.6

Stand Evaluation.

1. Start with the roots - This is the first part of the plant to become active! If there is soil sticking to the roots and the roots are white, this means they are alive and healthy.
2. Evaluate plant and tiller density and mortality across the field in the spring - The aim is to have 17 plants per square foot, but if you have 10 plants per square foot that are evenly spaced this is adequate for good yields.
3. Note thin areas in the field - Spots with few plants could allow for additional late tillering which will be at risk for ergot because they will flower later than the main part of the field, when less pollen is available. Remember to recheck these thin areas before harvest to avoid bringing unnecessary ergot into your combine.
4. Evaluate tillering - The above evaluations will help you with your decision making on spring fertilization application.

Fertility - What You Need to Know:

Factors that will impact Hybrid Rye fertility management

Soil Test - Is essential to determine soil fertility levels and make good nutrient management decisions. Appropriate nutrient application can increase yields, reduce production costs and prevent surface and groundwater pollution.

Use Your Resources - Rely on your supporting business or expert to help with your fertilizer recommendations and applications.

Nitrogen Credits - Apply Nitrogen Credits for %Organic Matter, soybeans, forage and cover crop legumes and manure before calculating additional N applications. An average 30 units or more of N credits can be claimed from previous legume crops like soybean, peas, clover and alfalfa.

Soil Type & Conditions - It is not recommended to plant Hybrid Rye in water-logged soils. Heavy soils, where conditions are consistently wet in the spring, may limit machinery traffic for spring N applications. In these situations, split apply all Nitrogen in the fall.

Nitrogen Restricted Zones - Check whether or not you are in a fall Nitrogen restricted zone before applying more than 40 lbs N as fertilizer in the fall.

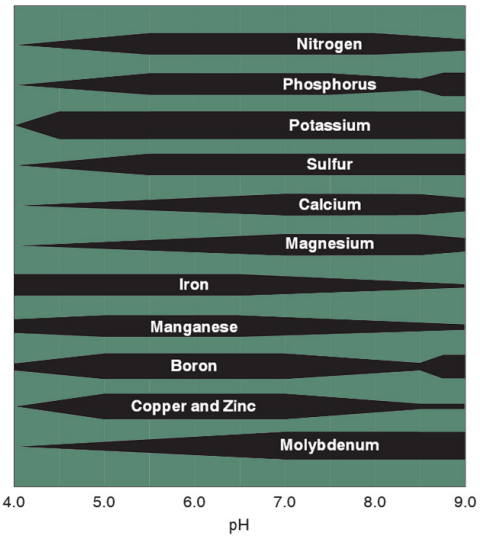
Application Rates - Do not exceed a total of 15 lbs/acre of N plus K fertilizers if placed in-furrow, with the seed.

Manure –

- Remember that state and local manure application requirements may be different.
- It is critical to recognize the run-off risks associated with solid vs. liquid manures before making manure application decisions.
- Fall is the best time to inject or incorporate manure into the soil before planting Hybrid Rye, especially if you're using manure as your N source.
- Utilize the Approximate Manure Nutrient Credits by Animal Type to help determine additional nutrient needs.
- Remember, the ammonium fraction of manure N is rapidly available, the organic form of N is slowly released and needs to interact with soil microbes both in the fall and very early spring, to ensure adequate mineralization and release. Use the University of Minnesota Manure Nitrogen chart (*https://extension.umn.edu/manure-management/manure-characteristics*) to examine your availability and loss of Nitrogen by manure type.
- A spring application of solid manure is not recommended because it takes too long for the N to become available for the Hybrid Rye to utilize. But, if spring manure application is necessary to relieve some of the manure hauling workload, apply early.
- Applied spring solid manure should not cover more than 25% of the leaf surface and should not exceed 20% of total N as spring application.
- Dribble bars are recommended for spring liquid manure application to distribute manure close to the ground in between the rows. Apply at a rate of 20% of your Nitrogen needs.

Utilize the pH and Nutrient Availability Chart for your soils

(See image below) - High pH and dry soils can reduce phosphorous and manganese availability for early development of the crop. Foliar applications of Manganese in the fall can increase winter hardiness by increasing sugar content in the plant. In the spring Manganese helps to increase root development to increase nutrient uptake.



pH and Nutrient Availability

Above image from: Illinois Agronomy Handbook, University of Illinois Urbana-Champaign

Fall & Spring Fertilization -

(100-150 Bu/Acre Yield Goal)

Phosphorus (P) & Potassium (K):

Fall apply 50-100% of your total Phosphorus and Potassium needs.

- Typical P Needs 20-30 lbs P205/Acre
- Typical K Needs 40-50 lbs K20/Acre

Spring apply remaining P & K

Nitrogen (N) & Sulfur (S):

Fall apply 20-40 lbs of N/Acre

Spring remaining Nitrogen based on your evaluated yield potential

- Typical N needs 40-50 lbs N/Acre

Spring apply Sulfur

- Typical S Needs 20-25 lbs/Acre in the Sulphate form

**For rate adjustments based on soil test levels and yield goals, see the University of Minnesota Rye Fertilizer Recommendations or Fertilizer Recommendations Guide from South Dakota State University.*

IMPORTANT: Avoid driving on the crop after stem elongation as this increases the risk of damaging developing plants. Damaged plants will be delayed in flowering which may result in higher incidence of ergot infection.

Hybrid Rye Nutrient Removal Table: (Per Bushel)*

	Phosphorus (P205)	Potassium (K20)	Sulfur (S)
Grain	0.45	0.30	0.10
Straw	0.20	1.50	0.15
Total	0.65	1.80	0.25

* Use the nutrient removal table, available soil test, previous crop and manure nutrient credits to aid in your determination of how much additional fertilizer should be applied to reach the expected yield goal.

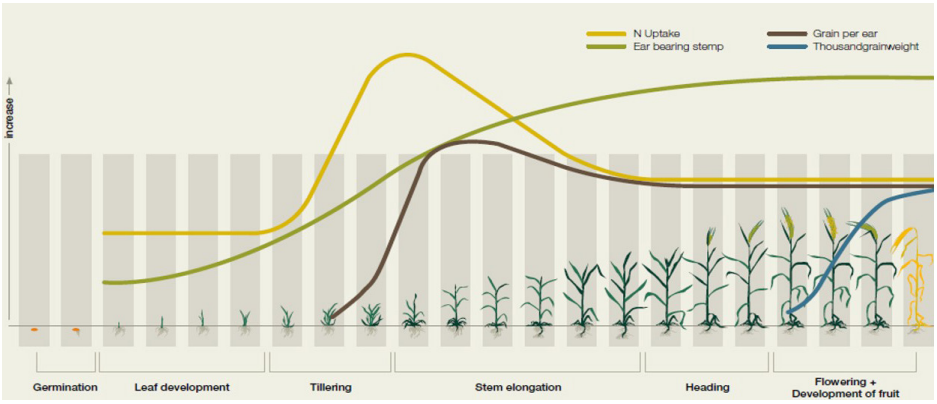
Hybrid Rye Total N Application =

expected yield in Bushels x 1.2 lbs/BU - N available in soil-credits

Micronutrients:

Manganese (Mn) is not a common micronutrient problem, but small grains like Hybrid Rye are more sensitive to Mn deficiency. Deficiencies in Hybrid Rye can occur on high pH soils (8.0 – 8.5) or recently limed soils. Dry soil conditions reduce availability of Mn and cold and wet soil reduce mineralization from organic matter (OM) and reduce root growth and root metabolism. Other nutrients in high amounts like Copper (Cu) Iron (Fe) and Zinc (Zn) can inhibit uptake also.

Manganese symptoms occur on the younger leaves, and it looks like a diffuse interveinal chlorosis. You can use soil and tissue tests to evaluate if the above parameters fit your soils. Check with your local advisor to see if a foliar application of Manganese Sulfate at 1 – 2 lbs / Acre can be applied or combined with an insecticide or fungicide application. This is the recommended rate for Manganese deficiency. There are Mn seed treatments on the market that help root elongation in cool soil and are usually combined with Zinc.



Nitrogen Uptake in Hybrid Rye

Final spring application of fertilizer should occur before or at the beginning of spring growth. In the image to the left, the yellow N uptake curve shows that 90% of Nitrogen is taken up right after tillering and through stem elongation.

KWS HYBRID RYE MANAGEMENT TIPS

Feekes Growth Scale	Feekes Growth Description	Fall Fertility	Planting	Seeding	Spring Fertility	Weed Control	Fungicide	Growth Regulator	Irrigation	Harvest
Fall Planning	*Soil test *Utilize Manure and Previous Crop Credits	100% P & K (Approx. 25 P & 40 K) 30-40 lbs of N	North - Early Sept. Midwest - Mid Sept. - Oct. South - Mid. Sept. - Late Oct.	0.8 unit/Acre (800,000 seeds) depth 1.0"						
Seedling Growth										
1	First leaf through the coleoptile, up to 3 leaves					✓				
Tillering										
2	Beginning of tilering, main shoot with 1 tiller				Remaining N plus 25 lbs of Sulfur as Sulfate form	✓		✗		
3	Tillers formed, leaves often twisted, plants prostrate					✓		✗		
4	Leaf sheaths begin to lenghten					✓	✓	✓	✓	
5	Leaf sheaths strongly erected						✓	✓	✓	
Stem Elongation										
6 Jointing	First node of stem visible at base of shoot						✓	✓	✓	
7 Jointing	Second node of stem formed; next to last leaf just visible						✓	✓	✓	
8 Jointing	Last leaf visible , but still rolled up, head beginning to swell						✓	✗	✓	
9 Boot	Ligule of last leaf just visible, swollen head						✓	✗	✓	
10 Boot	Boot Stage - head swollen but not yet visible						✓	✗	✓	
Heading										
10.1	First heads just visible, awns visible, head escaping sheath						✓	✗	✓	
10.2	25% of heading						✓	✗	✓	
10.3	50 % of heading						✓	✗	✓	
10.4	75% of heading						✓	✗	✓	
10.5	All heads exposed						✗	✗	✗	
Flowering										
10.5.1	Beginning of flowering in middle of head						✗	✗	✗	
10.5.2	Flowering complete to top of head						✗	✗	✗	
10.5.3	Flowering over at base of head						✓	✗	✓	
10.5.4	Flowering over, kernel watery ripe						✓	✗	✓	
Ripening										
11.1	Milky ripe								✓	
11.2	Soft dough, contents of kernel soft but dry								✓	
11.3	Hard kernel (25-35% moisture)									
11.4	Ripe for cutting									Test @ 18% moisture Be ready for Harvest soon at15% Straight cut to retain kernels

Commercial Fertilizer Products

Phosphate and Potassium containing fertilizers:

- Monoammonium Phosphate (MAP) a granular product, (11N-52P-0) Water soluble P2O5 = 82%
- Diammonium Phosphate (DAP) a granular product, (18N-46P-0) Water soluble P2O5 = 85%
- Ammonium Polyphosphate (APP) a liquid product, (10N-34P-0) Water soluble P2O5 = 100%
- Potassium Chloride (KCL) a granular product, (0-0-60K)
- Potassium Sulfate (SOP) a granular product, (0-0-50K-17S)

- **Limit Nitrogen Fertilizer Stabilizer use**, as nitrogen release may be too slow for adequate uptake during critical stages of Hybrid Rye growth.

Nitrogen containing fertilizers:

- Urea, a prill or granular product, (46N-0-0) analysis. The key to most efficiently using urea is to incorporate it into the soil during a tillage operation prior to planting. However, for your spring application, you can also blend it into the soil with irrigation water, or **0.25 inches of rainfall** is sufficient, so ammonia losses won't occur. Avoid urea applications on snow covered, frozen soil in the spring.
- Urea-Ammonium Nitrate (UAN) is a liquid fertilizer with (28N-0-0).

- **Cautious** Anhydrous Ammonia (NH3) a liquid under pressure. **Hybrid Rye has high sensitivity to NH3 and gas leakage into the seed zone can damage or kill the seed. The further the application from the seed and the longer you wait to plant, the better for the germinating seed.**

Sulphate (SO4)-2 containing fertilizers: supply Sulfur that is immediately available for plant uptake.

- Ammonium Sulphate (AMS) a granular product (with a 21N-0-0-24S analysis) is the most popular and readily available.
- Ammonium Thiosulphate solution (ATS) a liquid product (with an 12N-0-0-26S analysis) can be fall applied directly.
- Potassium Sulfate (SOP) a granular product, (0-0-50K-17S)

Streamer-bars or stream jets are a preferred fall and dormant / early spring N application tool for Hybrid Rye. Streamer-bar or stream jet applied UAN and ATS, used alone or mixed, are excellent N sources for spring application. **Do not** broadcast UAN or ATS due to unacceptable leaf burn and yield reduction.

Chemistry Recommendations

Hybrid Rye has 4 natural mechanisms to out-compete weeds for moisture, nutrients and sunlight.

1. Ability to grow and add biomass at temperatures down to the freezing point.
2. Ability to produce extensively wide and deep root system.
3. Ability to move quickly through stem elongation to produce a large above ground biomass. Hybrid Rye can produce 10 - 15 tillers per plant as compared to open pollinated rye and wheat which only produce 4 or 5 tillers.
4. Hybrid Rye is an "allelopathic" plant. It releases natural bio-chemicals from its roots into the soil that inhibit the germination and growth of weeds.

Sticky and thick roots help Hybrid Rye lessen weed pressure in the field.

Herbicide Weed Control

"Spray Early, Spray Small"

- Spray the Hybrid Rye EARLY, before elongation
- Rye is more susceptible to damage the later you spray
- First node application is too late for herbicide application
- Spray SMALL weeds for best control

Don't allow your weeds to get too big because they are harder to control and have already competed for nutrients, water and sunlight. Some dominant regional weed species are more aggressive and problematic and need to be controlled early in crop growth.

Plant Growth Regulators (PGR's)

High nitrogen carry-over from previous crops, manure applications and high seeding rates can create thin stems and increase the risk of lodging. PGR's enhance stem thickness and diameter to help strengthen the stem and decrease lodging, which avoids harvest delays, yield loss and reduced grain quality. Avoid application if crop is stressed by drought, disease or high temperatures.

Fungicide applications may be necessary under certain conditions and disease pressure. Hybrid Rye is more tolerant to many diseases that affect other cereals like fusarium, strip rust, karnal bunt and scald.

GROWTH REGULATORS TIMING

Palisade (Trinexapac-ethyl) - Feekes growth stage 4 (tiller elongation) through stage 7 (node formation)

FUNGICIDES TIMING

Miravis Ace (Pydiflumetofen, Propiconazole) - Apply Feekes growth stage 10.3 to Feekes 10.5.1 and 10.5.4

***see chart on page 12*

Herbicide Recommendations and Timing

Glyphosate acid equivalent	Fall Burndown before planting
Sharpen 2.85 SC (safufenacil)	Fall Burndown before planting
MCPA Amine/MCPE Ester*	Fall application
2,4-D Amine/2,4-D Ester*	Spring Application
Aim 2L (carfentazone)	Spring Application
Bromoxynil Products (bromoxynil)	Spring Application
Bronate Advanced (Bromoxynil + MCP Ester)	Fall or Spring Application
Huskie 2.06L EC (pyrasulfotole+bromoxynil)	Fall or Spring Application
Huskie FX 2.3L EC (pyrasulfotole+bromoxynil+fluroxypyr)	Fall or Spring Application
Orion 2.37L (florasulam + MCPA ester)	Fall or Spring Application
Peak (Prosulfuron)	Fall or Spring Application
Starene Flex .875L (fluroxypyr + florasulam)	Fall or Spring Application

Harvest Tips

Harvest of Hybrid Rye takes place from mid-July thru mid-August. Direct harvest of Hybrid Rye is preferred for best grain quality. KWS Hybrid Rye is very uniform in height, stiff strawed and has very good standability. This will help control your header height to reduce the amount of straw put through the combine.

Prepare for harvest as grain moisture nears 18% - it dries down very quickly. Sometimes the straw can still be green.

Avoid broken kernels:

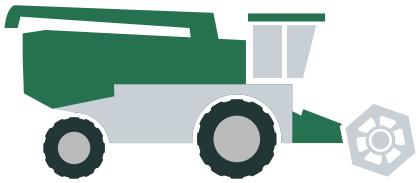
- Easy to thresh – ensure gentle harvest by slowing down the cylinder speed
- Harvest around 15% moisture
- An air bin is a great choice to dry the grain right after harvest, make sure to blow the air front through the bin to maintain quality.
- Make sure to calibrate your combine to recover the most grain possible
- For grain storage don't dry your rye below 13% moisture

Harvest Residue Management

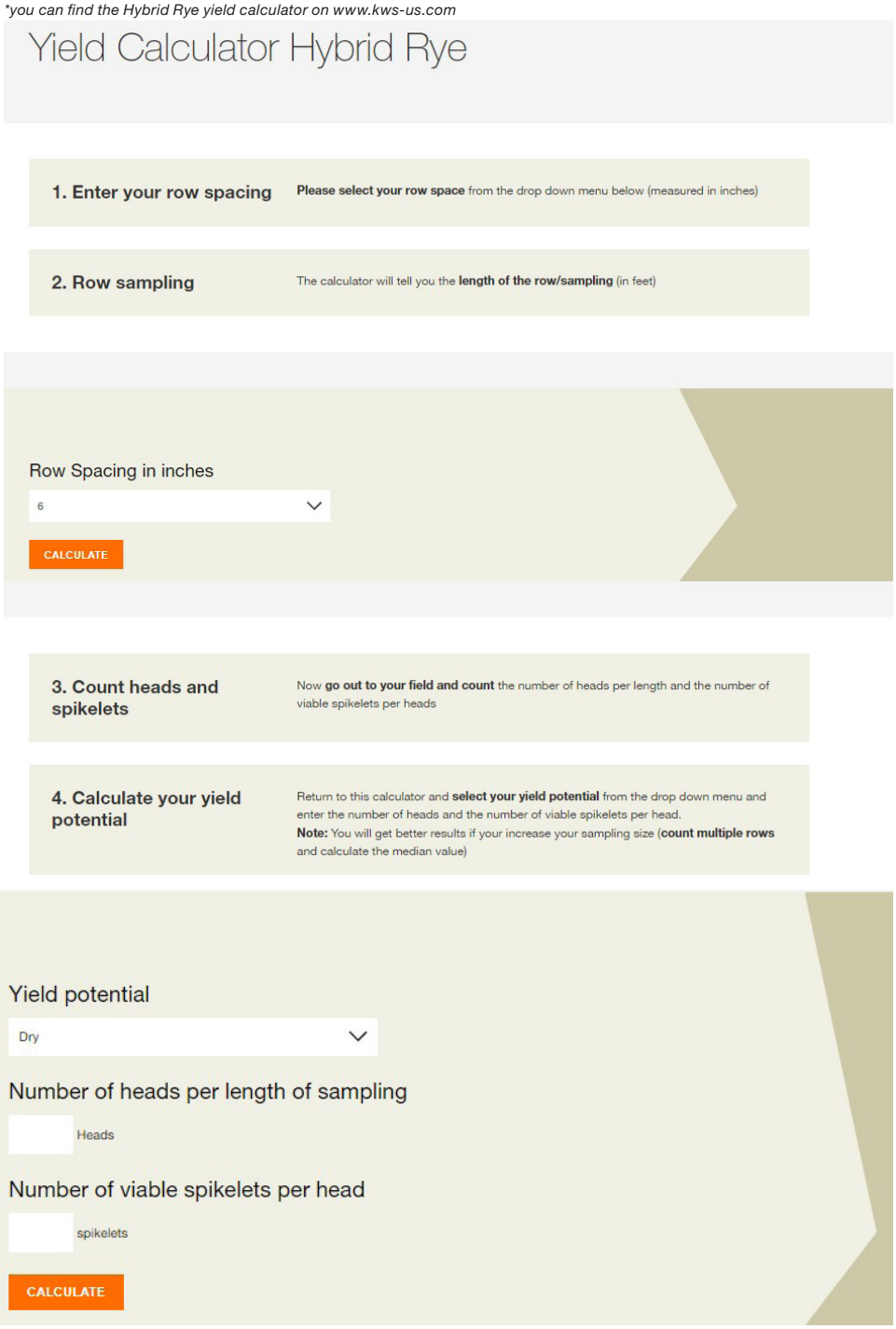
Hybrid Rye produces a lot of straw, about 1/3 more straw than wheat. Make sure if you're leaving the straw on the field to adjust straw chopper to uniformly spread the whole width of the combined area. Adjust header cutting height. Cutting closer to the ground will result in a thick mat of straw that will be difficult to manage. Tillage and subsequent seeding equipment will have challenges penetrating through the matted straw. Properly dispersed residue will breakdown easier and make it easier to establish the following crop.

To avoid volunteer rye in the following crop it will be important to have a strategy for handling the straw and stubble after harvest. Work the stubble lightly after harvest on an angle of the combine direction. This will help kernels to fall on to the soil surface and germinate. Use deeper tillage, if required, after you feel most of the rye has germinated.

If you are going to bale the straw, you might want to consider cutting high instead of trying to run everything through the combine, then re-cutting after harvest. You may also need to adjust your chopper for longer straw lengths.



*you can find the Hybrid Rye yield calculator on www.kws-us.com



KWS CEREALS, USA
Champaign, IL

www.kws.com/us Facebook:KWS.NorthAmerica @KwsUS_Rye