

Welcome and Introductions

Aaron Reser - Welcome

- Kernza is still a relative wild idea
- Farmer experience should be at forefront, shaping research
- Goals for today
 - Research update
 - Guidance on Kernza growing
 - Commercialization update
 - Farmer experience

Don Wyse - Legislative Update

- Asking for \$5 million/ year in permanent funding
- Has been a 20 year process
- Senate file 134
 - Has been heard in the house
 - Literally today, this is going through Senate
 - Sen Westrom's Ag Finance Committee
 - Deadline is 2 1/2 weeks
 - Please sign on to distributed document requesting a hearing on Senate file 134

Kernza Overview- Jake Jungers

Overview

- How kernza fits into rotation
- Working Lands for Drinking Water Protection
- -perennial cropping in sensitive areas to prevent leaching and runoff of nitrates
- -increase soil organic matter
- -reduce emissions
- -reduce weed pressure
- Environmental impacts of water quality
 - Lincoln- Pipestone
 - Chatfield
- Supply chain research, with AURI
- Multi-stakeholder engagement in central sand plains
- "Working Lands for Drinking Water Protection"
 - BWSR pilot program
 - Funding from SARE and Walton Family Foundation

Agronomics

- Kernza life cycle
 - Planted in mid August- late summer
 - Vegetative growth through winter, 4-6 weeks in spring
 - Grain harvested in August
 - Vegetative growth through winter
- Planting trial
 - Planted on 9/1, 10/1, 12/15, 4/1, 5/1
 - The earlier you plant, the more seed is available the following year
 - Effect continues to next year
- Seeding rate

- o 6 lbs/acre vs. 12 lbs/acre
 - o Doubling seeding rate did not increase grain yield for three years
- Row spacing
 - o 6 through 30 inches
 - o Small effect- narrower rows produce more seed first year
 - o Wider rows produce more seed in subsequent years
 - o Grain yield is at highest in first year, declines in year two, three, and four
 - o Row spacing does not affect yield decline
 - o In another study, 12 inch row had greatest yield in 1st, 3rd, and 4th years
 - o Narrower rows had greater lodging
- Nitrogen rate
 - o AONR is between 70 and 77 lbs/acre
 - o More variability in 3rd year (some sites need more N than others?)
 - o 1st year- N not needed
 - o 2nd and 3rd year- small effect of N rate
- Split rate
 - o Might have increased yield at 71 pounds/ acre (max yield) (in Rosemount)
 - o In Staples (89 pounds/ acre - max yield) spring application did better than split
- Stand maintenance and renovation
 - o Year two- maintenance increases yield
 - o Year three- maintenance does not reduce yield decline
 - o Burning and mowing do not renovate a stand that is already sod bound
- Harvest timing
 - o 18-26 spikelets/ spike
 - o 4-7 florets/ spikelet
 - o Yield component analysis
 - Lower spikelets mature more quickly than upper spikelets
 - Seeds per spikelet decrease linearly beginning at 1500 GDD
 - Between physiological maturity (2250 GDD) and 2500 GDD (13% moisture- safe for grain storage) : 10 seeds lost / spike
 - Seed mass per spike plateaus between 2250 GDD and 2500 GDD
 - Take home- harvest earlier and mechanically dry for greatest yields
 - o Swathing time
 - Seed head moisture and seed moisture are highly correlated
 - Grain yield highest at early swathing time
 - Take home- swath early and pick up early
 - o Weather conditions affect windrow
- Guidelines
 - o Plant early- mid- August
 - o Seeding rates may not affect yield
 - o Narrow rows may lead to lodging
 - o Yields plateau at ~ 70 lbs/ acre
 - o N fertilizer does not affect year 1
 - o Inter-row disturbance increases yield
 - o Harvest at physiological maturity

Questions

- N rate plateau due to lodging?
 - o Maybe. Continuing to explore with shorter varieties

- o Jake thinks AONR will increase
- Kernza fertilized each season?
 - o Yes, typically fertilized each spring
- Direct harvest to reduce shatter?
 - o Yes. Direct combining early leads to wetter grain
 - o Combining later gets drier grain, but shatter
 - o Direct combining leads to dirtier seed
 - o Learning more about combines for seed this size
 - o Threshability (attachment to hull) is higher with combine
 - o Direct combining in August leads to weed wrapping
- Life cycle of planting in field? Underseeding? Forage?
 - o Companion cropping trial
 - Kernza underseeded in to annual grains, peas, flax
 - Harvested annual in summer
 - Kernza did not do well
 - Low establishment
 - o Don V. established in spring
 - Got yields that were a little better in spring
 - Spring under wheat, fall in fallow, fall in wheat stubble
 - Spring- lower stand count; higher yields
 - One year data; Roseau
- How does row spacing affect yields?
 - o try narrow row spacing in organic
- Why loss of yield in windrow?
 - o 2017- rain every three days; delay in picking up
 - o Predation?
 - o Data on chemical and microbial characteristics being analyzed right now
- How are you drying it?
 - o Still figuring that out
- Direct harvest with dessicant?
 - o Something we're exploring
 - o No herbicides approved for use with intermediate wheatgrass for seed production, so if you apply that you will not be able to sell the seed as food grain
- Did late planting impact yields of subsequent year?
 - o We did not, but Lee DeHaan did - greater yield in subsequent crop
- What was relationship b/t nitrogen and biomass?
 - o No yield losses with increased nitrogen
- PGR help with yields?
 - o Yes, Palisade increases yield and decreases lodging, however, again, there are no approved chemicals yet for Kernza seed that is sold
- Any data on grain quality?
 - o Not yet
- Weed control?
 - o Challenges in spring
 - o After year 1 IWG holds its own against weeds
- Does spacing affect weeds?
 - o More weeds in wider spacing
- Is it the thickening up of the stand or natural physiology causing yield decline?

- o Looking into this by planting neighbors around
- o Will be able to photograph roots through glass tubes in ground
- o Could be red: far red ratio of light
- No till establishment?
 - o No trials comparing no till with tilled establishment
 - o With no till, ensure adequate volunteer suppression
- Disease?
 - o Mostly resistant
 - o A few individual plants
- Potassium and lodging?
 - o Not yet
- Is General Mills only interested in organic?
 - o Organic is a focus
 - o Pesticide reduction is a focus in conventional supply chain
- Continuous cover?
 - o Yes; looking into it going forward
- What's the demand?
 - o It has outstripped the supply
- For seed production, can you use herbicides?
 - o -yes
- Any issues with disease or mycotoxin in grain?
 - o -some fungal and bacterial symptoms from wheat pathogens, but mostly isolated to individual plants
 - o -grain mycotoxin does occur and especially problematic in windrows
- For seed production, can you use herbicides?
 - o -yes
- Any issues with disease or mycotoxin in grain?
 - -some fungal and bacterial symptoms from wheat pathogens, but mostly isolated to individual plants
 - -grain mycotoxin does occur and especially problematic in windrows

Agronomic research update- Mitch Hunter

Legume intercropping

- MDA Legume Intercropping Trial
 - o Intercropping didn't affect yields; maybe a little yield bump
 - o More legumes led to lower grain yield
- IREE legume intercropping trial
 - o Alfalfa reduced IWG straw and grain yield in first year, but may have increased total yield if you include the alfalfa
 - o In year 4, alfalfa improved yield compared to monoculture
 - o In year 4, biculture yields were comparable to those of fertilized monoculture
 - o Alfalfa increased P and K levels in IWG biomass
- Question- can you inter-seed hairy vetch and/or field peas, maybe after harvest the first year? To use as a green manure. Peas would winterkill
 - o Vetch climbing stems could lead to lodging
 - o Winterkill legumes could help
- How does feed value change when you add alfalfa? How does harvest moisture change?

- o We are collecting weed quality data, but we don't have it here
- o Harvest moisture/ maturity seemed to be the same as other trials
- How about turnip and radish for P and K? Fall planted after grain harvest? Maybe with peas?
 - o Could work especially if you planted into wider rows

Forage Harvest- Mechanical

- Spring cutting, fall cutting, or both
- In the spring, the growing point is low, so you can cut pretty low
- At elongation, the growing point is a bit higher
- Effects of cattle or tractors compacting soil can hurt IWG
- In fall, growing point is below the soil
- Clipping in spring reduced number of spikes (could have harvested too late or too low)
- Forage yield was higher in narrow row spacing
- Cutting twice yielded greater biomass, but over time, reduced stand vigor
- Q: Was additional fertilizer applied to make up for clipping?
- A: Fertilizer was applied uniformly
- Some forage harvest increased straw yields
- Planting in narrower rows increased straw yield
- Forage harvest increased grain yield in years 1 and 2, but decreased in year 3; evened out in year 4

Grazing

- Grazing reduced lodging in a field that had overall very low lodging
- Grazing increased weed pressure and reduced straw and grain yield
- Earlier grazing was associated with higher grain yield than later grazing
- Could be due to wetter conditions → more trampling
- Dairy heifers gained just as well on IWG/ alfalfa as organic pasture

Summary

- Legumes intercropping has costs and benefits
- Dual use management could be a win-win (in dense stands)
- Narrow row spacings and double cuttings increased forage biomass
- Don't harvest forage in weak stand
- Mechanical forage harvest less risky, but more expensive- probably use dense stands for forage grazing

Questions

- Did you fertilize legume intercrops?
 - o No
- Perennial legumes?
 - o Yes - alfalfa, bundleflower, milkvetch, and white clover (middle two are native)
- Is there a northern limit on forage + grain dual use?
 - o Some trials in Roseau- collaborators are skeptical
 - o Window is 4-6 weeks in south of state; smaller window up north
 - o Probably will depend on season
- Is maturation dependent on GDD or day length?
 - o Harvest date in Roseau is 3 weeks later than St. Paul
- Metrics to determine weak or strong stand to determine cutting?
 - o End points have been established; cut-offs have not been established
 - o May determine percent cover by photos going forward
 - o Kernza looks weak when it establishes

- o Will take a few studies, but it's a good target
- Seeding rate the same in intercrop? Less weed pressure?
 - o Less weed pressure in biculture
 - o Seeding rate depended on study- the same in one study, rate matched per row not per area in another study
 - o As Jake mentioned, seeding rate not very important
- When did you plant the alfalfa?
 - o Grazing- mid-late September
 - o Alfalfa- late spring
 - o Trial w/ four legumes - IWG planted in fall
 - o Some trials, planted together; others, planted separately
- Warm season legume would have an advantage because it would come on after IWG in late summer, but in actuality they didn't fill in very much at all.
- Grazing
 - o -spring grazing reduced lodging at grain harvest
 - o -grazing reduced straw yield and grain yield
 - o -may be due to weak stands and high grazing impact
- Strip graze study
 - o -12 paddocks grazed for 2 days at a time compared to conventional pasture as control
 - o -grazing later in to the fall reduced kernza grain yield the next year
 - o -dairy heifers gained just as well on IWG/alfalfa as on a conventional pasture
 - o -mechanical forage harvesting is less risky than grazing but may be harder to justify economically

Breeding and Genetics - Jim Anderson

- Seed from 3rd cycle of TLI stock

Breeding targets

- Could be made into high protein, low protein, high gluten

Have 100 acre field of release

Released variety- MN1504

- Higher yield than TLI varieties. "Rush" is a forage variety
- Less yield than other candidates
- Shorter plant height

One variety where the yield went up

- Seed stock is becoming more free threshing and less prone to shatter

Still deciding- should it be a public release? Should it be licensed?

- UMN Breeding Program began in Fall 2011 with germplasm from The Land Institute, 60 genets resulting from 3 cycles of selection in Kansas
- Upcoming UMN release MN1504 - yielding 500 lbs acre average
- 6 environments worth of data over two years. MN1504 has higher yields compared to TLI materials and Rush forage variety
- MN1504 was chosen over other candidates due to strongest straw, lower height (113 cm), 0 on scale of 0-4 lodging - decision based on concerns about grower experience
- Major breeding targets include but are not limited to: thousand kernel weight, seed size, (larger seeds are easier to work with), reducing shattering, increasing threshability (dehulling)

- Future kernza varieties, “MN16”, are part of the second cohort coming through the pipeline, they’re looking better than MN15s, but these are two years behind in seed increase process
- Yield decline is a major focus - consciously selecting for candidates that don’t take the big dip in yield in the second year. Other candidates were removed if they performed well but had ergot, were very tall, etc.
- Population improvement: percent of breeding program population that is resistant to shattering (0-20% shattering) is increasing, same goes for free threshing
- Seed size increasing - the largest seed 13.9, 14.1 and 14.7 mg over selection cycles
- Variety will be released, will it be a limited release? Jim is looking for input.

Questions:

- No standard currently for test weight
- Yield differences across programs (agronomy and breeding) reflective of different methodologies
- What is happening in the plots that experienced higher yields in the second year (contrary to most other studies)?
- The Land Institute materials bred for KS environment, their poor relative performance in MN is a function of selection environment
- Environment that we’ve been testing in - St. Paul, residual herbicide certainly possible?

Was general combining increasing hulling percentage?

- Jim was quoting numbers after threshing

Yield in sward plots?

- 6” row spacing

Greater yield persistence in 2nd year implies greater persistence in 3rd year?

- We think so- planning to maintain 304 years going forward

Do you think 2nd year persistence is linked with 3rd year persistence?

- Don’t know

Herbicide effect?

- Most of what’s been grown on land- different crop every year
- Every organic system is going to be different
- Can’t predict to all environments

Pounds per acre - hulled?

- Have been threshed twice- still have some hulls; 80-90% dehulled

Percentage of hulls?

- 20% by mass

Comparing U of M to TLI- TLI is different environment

Absolute yields of new varieties may look lower, but it’s an artifact of data collection differences

No huge disease issue- some ergot.

Winter hardiness is an issue. It’s as good or better as winter rye; not a lot of winter kill data.

Winter kill has occurred when it sat under water for two months (December through March)- they still survived and produced seed. Late plantings can be killed

What were characteristics of MN1601 to lead to yield increase in second year?

- No idea yet

How hard is it to clean?

- Pretty easy to dehull
- Maybe you don’t need to worry about getting it dehulled straight out of the combine

Seed certification- Roger Wippler, Minnesota Crop Improvement

- Can be done in a number of ways- foundation to registration to certification to farmers, for example
- Seed is developed, planted, certified, planted, and then produced
- Could also be developed, planted, certified, then grown for grain
- Seed certification strategy: Foundation seed, breeder seed, registered seed,
- Fall 2017 foundation seed was seeded, planting in 2018, certified seed 2019, grain production in 2020, future seed production
- Transportation of seed is expensive
- Seed production: requires field inspection, seed testing, germination, and purity
 - Why? Need to maintain and protect integrity of new varieties. Established and identifiable.

Questions:

- Field inspections, occur annually, mid-July to mid-August (when stand is fully headed)
- Isolation requirements: 160 ft for seed production
- Royalty system has yet to be established
- Generally releases are public, where any farmer can participate in seed increases, others are exclusive or semi-exclusive due to needs for establishing production and handling protocols or market development/advertisement
- Timeline for decision making on release strategy - something will need to be decided before 2019 planting
- Grower has Land Institute C5 material - what to do with this material?
- In the next month or two - growers should have an idea of how much seed will be out there, farmers will want to know March or early April regarding how much they want to grow of MN1504
- Turn around from harvest to planting every year - can we get the material harvested, cleaned, transported then distributed for planting that same fall?
- Seed processing infrastructure in place? Roseau/LOW, Sprock (?) in SW MN, and now in Central MN - MN Native Landscapes - three main MN regions where we're trying to get the processing system in place
- If you're growing for seed and you use herbicides, it will not be able to go into the market for grain.
- General mills requires organic!
- When I drop off the grain, what do I call it?
- Fields must be inspected, tested, and examined for germination and purity to maintain variety integrity.
 - Be aware of weeds
 - Standards allow for 10% inert (broken seeds, stems...)
- If you decide to keep certified seed field 2nd year, can you?
 - Yes; will be inspected both years
- Field inspections are typically in mid-July - mid-August
- Isolation requirements- 160 feet (only an issue with older varieties)
- When you buy foundation or registered seed, certain standards have already been met
- Certain requirements must be met to meet "blue tag" certification
- How to harvest in mid-August and plant in mid-August?

Farmer Panel- Jade Estling and Carmen Fernholz

Jade

- lives at Lake of the Woods, where Minnesota and Manitoba meet, in a turf growing region. Started with 20 acres in 2014. Intercropping hasn't worked well- high humidity, goose predation. Organic and conventional.

Carmen

- Farms in Madison- straight west; next to South Dakota. 350 acres. Corn, soy, small grains. Started with two acres- did research on it from a farmer's perspective
- Planted MN1504- 15 (?) acres. Struggling with Canada thistle.
- Hog manure has helped increase grain yield without lodging
- Discing before rain led to weed infestation
- Wheat-3500 gal liquid hog manure - kernza : waiting to see how it goes

Q: How do you decide when to harvest?

- First two years swathed; then straight combined it
- Conventional production was harvested at 26% moisture- difficult; "wish I would have waited a few days." was trying to work with other crops

Have you timed it where you don't have to dry it down?

- Yes, but in a very humid environment this is difficult
- We need to understand how to manage windrow without shatter
- Decreased shatter will help a lot

Have there been years when there was a decrease in lodging?

- Has been standing pretty well
- Maybe crop wasn't heavy enough
- Organic manure is releasing throughout season due to mineralization

Have you seen a lot of lodging or ergot in organic versus conventional?

- Not really
- David Schmidt- Planted late (in October) almost none survived. Plov communication was difficult
- Jared Beck- Lots of weed competition the first year. Time window is short. Plov communication was difficult

How to seed?

- Calibrate your seeder ahead of time
- Seed it very shallow, but into a firm seedbed, like lawn seed. 1/2 to 3/4 of an inch. Might be wrong, but it's been working.
- Augering system
- Gandy air spreader
- Carmen packed ahead of the seeder
- Difficult to get the seed to flow through the seeder
- Carmen has used a Great Plains seeder (for native seeds)
- Truax might also work (also for natives)
 - o Plug some holes to adjust row spacing
 - o Set up for no-till planting
- Make sure the seed is clean- no pieces larger than 3/4"

- Jake has worked with both Truax and Great Plains drill; talk to him for details (duct tape is the key)

What is stubble height when you windrow

- Fairly high ~1 foot to 18 inches

Have you ever tried to cover crop or nurse crop?

- Some naturally occurring sweet clover and alsike clover
- Winter peas- hopefully they will contribute nitrogen and suppress weeds
- Western MN- plant no later than Aug 20; no till peas

Have you rotated out of kernza?

- No

Baling straw?

- Yes; last year
- Some dairies were interested
- One option is twin roller combine

Cattle like the bales of hay as well as the green material

Is there a concern of IWG roots plugging tile?

- Carmen's whole field is tile. He's never had an issue with alfalfa

Why are you organic?

- Because that's where the market is

Once Carmen adopted alfalfa, the soil fertility and quality, the whole system, really improved
Regenerative agriculture- marry the benefits of organic and conventional
It's about providing farmers with tools

Does anyone inject biosolids?

- Jared topdresses
- Carmen has not injected while it was growing; it impacts the cutting equipment

Did you see soil benefits (such as workability and drainage) maintain after discing up the kernza?

- Hasn't quite seen it yet
- In alfalfa, benefits have seen it for years and years
- CRP acres have been seen for decades

GLBW has funding to host webinars and training sessions for farmers

Kernza Markets and Commercialization Updates - Tessa Peters

1:55pm- 2:30pm

It's about quality control

- Fit for human consumption

- No pesticides or herbicides (since they aren't approved)
- Ensuring there are clean seed sources
- High quality necessary b/c of high cost
- Consolidate requirements for trademark license and to meet FDA requirements

Supply chain support is important

- If registered Kernza grower, you sign a license and know you have to produce a certain set of data
 - As registered Kernza grower, adhere to certain "specs" to get into market
 - Used to be cumbersome
- Growers want freedom to build own markets, go to local processors and manufacturers.
 - Growers wishing to sell to a certain buyer can persuade the buyer to become registered, giving the grower more freedom to choose who they sell to.
- TLI good at maintaining relationships and research, but want to provide more supply chain support
 - Want to support for growers, marketers, processors across the supply chain
- Main thing for growers to be aware of: TLI may be contacting you to register you as Kernza grower online and discuss with growers the requirements for licensing (provide data, etc..)
- Beyond 2019:
 - Want to request feedback, make sure the system is working
 - Make sure all partners along the supply chain understand they are in a unique position; all working on this problem together
 - At some point, the 'consortium' will need governing board made up of partners farmers, forever green, umn, etc
 - Help steer supply chain and economic direction of kernza market
- TLI's role
 - Research
 - Germplasm development (release varieties in 2-3 years)
 - Seed system coordination
 - Consortium admin
 - Quality assurance
 - Supply chain management
 - Education
 - Have some funding to do grower networking; share grower innovation
 - Grower network support
 - Market development
 - Telling broad story

Questions:

- Price points on any of this?
 - Difficult to determine b/c lack of data previously
- End game for Kernza? Always in niche?
 - TLI wants more perennial acres on land... But doesn't expect Kernza to get out of niche market for about 10 years (development phase)
 - Since there aren't a lot of businesses in supply chain, the price point numbers mostly exist based on 'what has happened'

- o How to determine price points: what does a farmer need to make? What is a business willing to pay?
 - Early supply chain development has many hurdles where some people lose money
 - Some say they would contract with growers to pay growers \$500.00/acre to grow Kernza
 - From reservations, acceptable prices ranged from \$200/acre to over \$1200/acre
 - Strong feeling we should be developing price point numbers
 - Lack of price points so far is not necessarily a lack of transparency-- there are just a lot of unknowns. The goal for TLI, is that that info would be available for registered Kernza growers
- o Comments relating to health of food that we are eating
 - Not the chemicals/GMO that kill us... It's the preservatives that are unhealthy
 - Need 'less food miles' on our food=fewer preservatives
 - Puffed Kernza was great
- o Carmen's comment on farmers and co-ops
 - Long way to go before we settle on price
 - To farmers-- look at co-op marketing system, where farmers form co-op then sit down with end users to define costs that are profitable for both grower and user
 - To establish new crops:
 - Farmers needs to put together co-op
 - Co-op/farmers then meet with end user of product to determine price
 - Mismanaged data may have deterred development of price points, but currently people are working to develop price points.
 - Need to have end-use stability
- o General mills interested in soil-- Not so much a question of how much will anyone pay per pound, but more of a question of 'how to rebuild soil?'
 - From general mills perspective, they see Kernza as a tool to help manage soil.
 - General Mills is trying to obtain goal of improved soil quality for growers
- o General mills not paying bare minimum for what they can get... Trying to invest in improved soil management
- o What is the Kernza's competitive ingredient?
 - Soil health
 - The pull to Kernza is not it's taste-- It is purchased *because* of its environmental benefits
 - City of Hastings-- in order to treat water for nitrate would cost nearly 6 million
 - The only way the farmer speaking will grow anything other than corn/soybean, is if investing in regenerative ag. It is a multi-generational farm, he wants to pass something down to his son, so he needs to make a profit. The consumer has no way of paying him back because he is interested in regeneration... Should focus on something marketable in Kernza (regeneration; nitrate reduction, carbon...)
 - TLI telling story of Kernza as environmental benefits are a 'value added'
 - Not enough products for consumer to support Kernza. Believes there will be economic tools explored for Kernza
 - Don't underestimate value of market.
- o Comment: Must look at *all three* aspects of sustainability when looking at developing new crop (environmental, social, economic)

- Consumers/interested people come from range of interests.. Worth noting that Kernza can be looked at as a solution from many different angles
- o Comment: Issue that has been raised or farm community is the price! All farmers want to know 'what will they pay me for growing?' You won't get the price right on the first try, but you have to send a signal out to growers
 - Trying to put a pause on new plantings until some of those price questions can be answered.
 - Will hopefully move towards a direction of having the answer soon. Need to work with lawyers and buyers, but figuring out price is a top priority.

Questions

Price points for conventional and transitional?

- Still collecting data...
- Should remain in niche market for at least a decade
- Patagonia originally supplied a per acre price, regardless of supply
- Two ways to figure it out- how much does a farmer need to make? How much can a business pay? So far, this has been collaborative. For example, Birchwood has been willing to take a cut to make sure farmer gets a fair price
- Birchwood is paying ~\$3.50/ lb; then it gets sent to a mill (not certified organic)
- \$500/ acre is what Jade gets from Patagonia
- Prices in poll were \$200 - \$1200 lbs/acre
- Opportunity cost plays a role
- The goal is to make this information more available

Who made the puffed kernza?

- An amish farmer in Ohio

Farmers need to look at a co-op marketing system to come to a price based on profitability on both ends

- Consortium may end up as non-profit or co-op

Jared is adamant that someone needs to be transparent about the going rate for Kernza

- The price is likely not being shared not out of a lack of transparency, but more out of a lack of consistent information – supply chains and pricing are developing/ evolving.
- Tessa is collecting and managing data

End users need price stability as well

Producers will sit on grain if there is no clear market, or if the price isn't where they want it

Tessa believes everyone has been willing to stick their necks out, but things are disorganized

Plovgh really messed things up, but we can still trust each other

Aaron says we are edging up against collusion because of how cooperative buyers and sellers have been

General Mills has been very interested in soil. The issue isn't the price, it's a question of using agriculture to rebuild soil. Are you seeing that kernza benefits your soil?

Hastings is having water issues. It will cost \$6 million to remediate nitrate issues- that's \$30/acre for every acre in soy and corn in area. Martin Larsen invests in regenerative ag, but has no way to recoup expense because corn ethanol is corn ethanol

We need more products available for consumers to support Kernza

In Kernza, there are many different types of stakeholders. Organic and conventional farmers, small farms, large farms

Larger Context and Unknowns- Jake Jungers, Mitch Hunter, Aaron Reeser

2:35pm- 2:55pm

- Shouldn't underestimate the value of clean water system
- The state has put numbers on what certain communities pay per household to clean nitrate drinking water
 - St Peters: ~\$1600.00 (see 25% by 25 report)
 - State is really considering whether that money could be more widely invested
 - The Working Lands Proposal: proposing to give growers a per acre payment to plant winter annuals/ perennial crops in wellhead protection areas to target nitrate leaching. 115 thousand acres of row crop corn/soy targeted (highly vulnerable row crop land in well-head protection area). We have enough seed to achieve this acreage increase
- Looking at getting long-term base funding for the research
- Policy support
 - EQIP practice standards approved funding for kernza (contour/buffer strips, filter strips, cross wind traps)
- Crop Insurance and Base acreage
 - Yield decline could add to crop insurance challenges
 - Crop insurance not looking very likely for Kernza in near future
 - Base acreage-
- Herbicide registration
 - Submitted paperwork in February for approval of using 24D. Unsure how long approval will take.
- Tile lines
 - Will Kernza plug tile lines if Kernza planted otop? Currently researching this. Anecdotally, majority of biomass is in upper 15-20 cm, maybe not enough deep roots to plug tile lines
 - Peak root biomass achieved within 1 year-- the lack of root buildup likely represents root turnover

May hear a different thing from local level; just let GLBW know if your NRCS staff is unaware of Kernza being allowed:

Policy

- EQIP- contour buffer strips and filter strips are approved for Kernza
- Standards 332, 393, 598c

Crop insurance

- No time soon- need more data
- RMA will likely write a different policy for year 1 and year 2
- Can we call it wheat? If you insure it as IWG, it will be insured at forage price

Base acreage

- If you are leasing the U land, you lose your base acreage
- If you are selling the U seed, you can maintain your base acreage
- Long term grass perennials do not lose Title I (legislation targeted at large acreage of grass for 10 + acreage)
- No worry at the time about losing base acreage

Herbicide registration

- Don Wyse has been working with Rutgers to submit 2, 4-D
- This is a slow moving process

Tile lines

- Looking into whether IWG plugs up tile

Identifying Future Research Priorities and Collaborative Next Steps

- How to fit into corn soybean rotation
 - Establishing later
 - Interseeding with Avenger with chains on back for light incorporation
 - rowbot
 - Helicopter
 - Seed earlier
 - 002 beans come off about labor day
- Nitrate scavenging- who's better?
 - Cereal rye?
 - Miscanthus?
 - Switchgrass?
- Use in buffer strips, especially unsaturated buffers upland
- Wildlife aspect
 - Birds?
 - Insects?
 - Gophers?
 - Food plots- measure waterfowl nesting density and success
 - Racoons?
- Can nitrate remediation cost be used to establish Kernza?
 - Economics of kernza establishment
 - Large scale nitrate scavenger
- Continuation of yield per yield- how to maintain?
- Herbicide residue and carryover
- Injecting liquid manure in between rows?
 - Injecting could control interrow plants?
- Top dressing liquid manure- spring or fall?
- Would irrigation affect grain or seed production?
- How to strategically integrate diversity?
- Spatial rotation
 - Plant kernza on wider rows
 - Interplant with something that will die (annual/ biennial)

- o Plant kernza on top of thing that just died
- Overproducing?
 - o Market is continuing to expand
 - o Tessa at TLI is contacted by large companies that express interest
 - o It is a risk
 - o Letting the market grow too quickly may be an issue
- Is it acceptable to use IWG forage after grain decline?
 - o Jade says yes- any way to make a profit
 - o Carmen says it would be a no-brainer if it could be part of an EQIP pasture
 - o Maybe it could be classed as “cropland grazing” not “permanent pasture”
- Chopping it and using it as an oatlage
- Willingness to pay consumer survey
- Get numbers for non cash benefits
 - o Reduced input costs
 - o Soil structure enhancement
 - o Weed management
 - o In non-cash units
 - o Carbon market and water market would help (and pollinators and pheasants...)
- View Kernza as paradigm shift, not silver bullet