

Will It or Won't It?

A Brome Recovery Discussion...

Meadowlark Extension District

Oskaloosa City Hall/NEK Heritage Complex



Where we came from...

- August 11, 2021
 - But what about before that?
 - September 2018
 - August 2017
 - August 2014
 - June through August 2013
 - Fall 2010 (damage still causing issues in to spring 2012)

The take home?

*I wish this was a new phenomenon –
but it's not.*

The question?

Why was this year so bad?

Armyworm feeding has been the most commonly associated culprit of brome issues from last fall. While new for some, it's likely present more than we like to think.

Where we came from...

- What do we know about armyworms?
 - They don't overwinter in Kansas – moths fly in from the south each spring
 - They don't always land in the same spots
 - Timing of arrival can be different from year to year
 - Natural pests may take care of many of them in any given year
 - We may see them almost every year – with less noticeable damage
 - Larvae move across stands en masse
 - Look for brown spots or birds
 - Mature size: 1 ¼ - 1 ½ "
 - Egg hatch to maturity takes just over two weeks (temperature dependent)
 - Entire life cycle: 3-4 weeks
 - Early stages do little damage
 - Look for them at the base of seedlings during cooler parts of the day
 - Feeding requirements increase as larvae grow – later instars do the most damage
 - Control becomes increasingly difficult as larvae develop and approach maturity
 - Multiple infestations are a possibility...

Where we came from...

- Treatment Triggers:
 - Fields with 25-30% of plants showing windowpane injury should be re-examined daily and treated immediately if stand establishment is threatened.
 - what the heck does 'stand establishment is threatened' even mean?
 - If larvae are young (3/4" or less) and damage is severe (4-5 half grown worms/square foot), consider control*

**NOTE: always read and follow product labels to make sure products are labelled, applied at the correct rate, and that withdrawal times are adhered to.*



Don't skimp on the carrier!

*Knowledge
forLife*

Stand establishment is threatened simply means: if feeding continues, it could contribute to stand loss. This is generally NOT wholly because of armyworm feeding, with other factors playing a role as well. Knowing the factors contributing to overall stand health is important to note as you start to evaluate armyworm feeding injury.

NOTE: Some states advocate for treatment at even lower levels.

Where we came from...



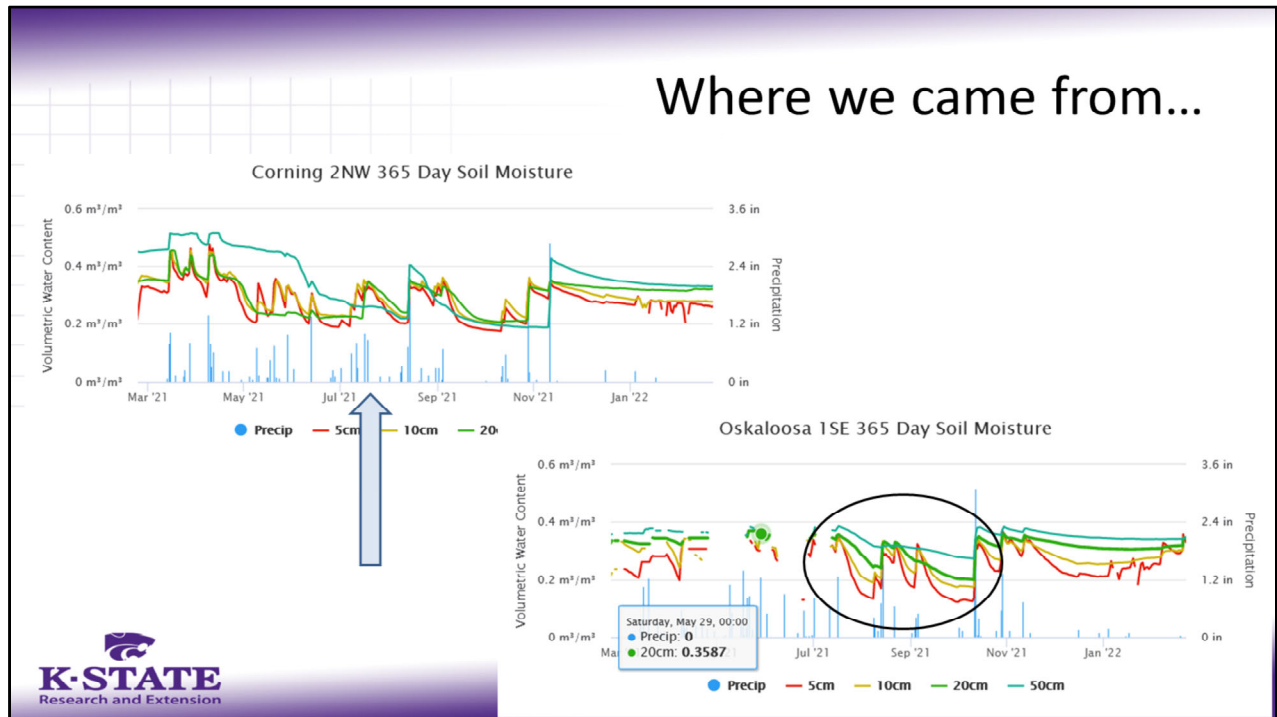
Where we came from...

- Knowing all of the above, what made it such an issue?
 - Late harvest
 - Dry conditions
 - Fertility?
 - Cutting height?
 - Spring frost injury?
 - Multiple feedings?
 - Injury in previous seasons?

***All of the
above??***

While blamed mostly on armyworm feeding, other factors played in to the level of damage as well...

Where we came from...



The arrow on the left and circle on the right indicate the time frame of early armyworm feeding reports. They coincided closely with drops in soil moisture from late season drought stress. Stands that may well have outgrown armyworm feeding seemed to stop because of the lack of moisture.

Where we are...

- **Stand Evaluation:**
 - **Good:** walk across the stand and note the differences.
 - Grass that had a chance to recover last fall will be markedly different.
 - Drag your foot along the ground in spots as well.
 - If everything seems to pull away from the soil surface and turn to powder = Not good.
 - **Better:** Walk the stand doing the above – with a shovel!
 - Break root masses apart and look for new shoots
 - If soil is crumbly with no structure, it could mean roots have shrunk away.
 - Can you see moisture differences between areas? Good moisture levels after a dry fall/winter MAY mean trouble...
 - **Best:** Look at roots underneath magnification
 - Outer roots will have a brown color to them
 - Inner roots white = good
 - Inner roots brown = could be trouble...

These are suggestions for how to do some stand evaluations. Be sure to walk the entirety of the stand and try to estimate the area damaged as you do. This will help determine the need for reseeding and amounts needed to do so as well as give an idea of lost production.



From upper left to lower right are images of square core samples pulled from a brome field in JA Co. Note the cover in the upper left and the increasing greenness as it takes off growing.



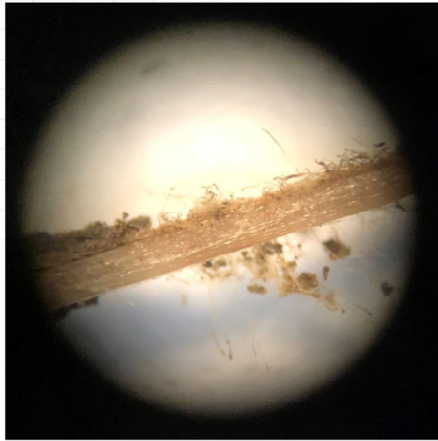
This is from the same field as the previous picture only further down the hill. Feeding was a little heavier than in the previous pictures, but this part of the field recovered before fall. There were no soil test differences across the three sets of samples on this farm.

Where we are...



This is from the bottom of the field where feeding was the worst and the stand seemed to get heavily fed on multiple times. The stand already had some issues from a weed pressure standpoint and had some wet areas as well and this became too much for it. There is some very slight level of regrowth, but it's very thin...

Where we are...

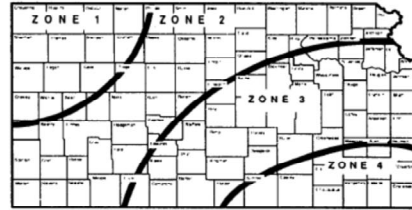


This is a picture of roots under magnification. The exterior color of roots may be fairly dark brown, but if you peel them back carefully, you'll start to notice more of a cream colored inner root, suggesting it is healthy.

The picture at right shows new shoots starting below ground. Shoots are 2+ weeks behind the more 'normal' areas of the field.

Three Options...

- Needs are short term (for sale/feeding)/supplies are (going to be) tight:
 - Procedure:
 - Estimate acres needing to be replanted.
 - Apply fertilizer (according to soil test if possible)
 - Purchase seed and plant
 - Pros:
 - Gets area reseeded sooner than later
 - Works best for small patches and overseeding situations
 - Cons:
 - Spring weather may not be as conducive as fall weather
 - The window is closing
 - Weed pressure will be high
 - **Yields will be reduced if large seeded areas are ready to harvest this summer at all...**
 - Scout for summer feeding!



	Zone 1	Zone 2	Zone 3	Zone 4
Fall	Aug 10-Sep 15	Aug 15-Sep 20	Aug 15-Sep 20	Aug 15-Oct 1
Winter	Nov 1-Mar 1	Nov 15-Feb 15	Dec 1-Feb 15 *	
Spring	Mar-Apr 1	Feb 15-Apr 1	Feb 15-Apr 1 *	

*Not Recommended

Figure 1. Optimum seeding dates for smooth brome.

For ease of discussion, I've broken your options in to three different categories.

If needs are immediate, consider seeding and planting this spring – but you'd better do so quickly and expect challenges. Even IF you can get a good stand of brome this spring, it is unlikely the reseeded area will contribute significantly to the farm's production this summer.

Seed prices have been above normal this spring, so factor that in to your budget as well. Be cautious about herbicide carryover issues when seeding as well. NOTE: spring seeded brome generally does not far as well as fall seeded brome.

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Fall 2021 was a hard year for brome growers. In most of the late-harvested (mid-to-late July) fields, when plants started to regrow, the armyworms were everywhere in eastern Kansas. Some of these fields were sprayed with insecticide two or three times, while the brome was using its reserves to grow new leaves and the worms were voraciously eating. As a result, some of these fields are dead and needing to be replanted. However some of them are significantly damaged and growers will need to decide on the best course of action.

For the dead fields, growers could seed brome in the spring, but weed pressure will be high. Controlling emerged weeds will be critical for successful establishment of a new stand. Light tillage or a non-selective herbicide can be used to control any emerged winter annual weeds. It is also likely that this stand allowed greater than usual weed seed production during the summer of 2021. It will be important to control these weeds in newly established brome grass. Herbicide options are limited in seedling bromegrass (Table 1). Mowing is a non-chemical option that could be considered to reduce weed competition and prevent weed seed production during establishment.

On the other hand, in some of the damaged fields, growers could wait to see if the brome will come back. In this case, controlling weeds during the spring and summer will be a need. Herbicides commonly used in established bromegrass are listed in Table 1. Care should be taken to observe plant-back intervals that may interfere with establishment if fall-seeding of bromegrass is needed.

Table 1. Herbicides labeled for use in smooth bromegrass. Consult label for appropriate rate and adjuvant selection.

Herbicide	Weeds controlled	Used in establishment	Plant-back interval	Suppression expected
2,4-D	Broadleaf	After 6 leaf stage	30 days	
Chaparral	Broadleaf	No	1 year	Yes
Cimarron Max	Broadleaf	No	2 months	
Cimarron Plus	Broadleaf	No	2 months	
Clarity	Broadleaf	No	45 days per 16 fl oz/A	May be injured with > 16 fl oz/A
Crossbow	Broadleaf	No	3 weeks	
DuraCor	Broadleaf	No	45 days	Yes
Facet	Annual grass/broadleaf	No	10 months	
Grazon P-1D	Broadleaf	No	60 days	Yes
GrazonNext HL	Broadleaf	No	Grasses may be reseeded in the fall following an application in spring or early summer	Yes
Milestone	Broadleaf	No	1 year	Yes
PastureGuard HL	Broadleaf	After tillering	3 weeks	
Plateau	Grass and broadleaf	No	26-36 months	Yes
Range Star	Broadleaf	> 6 leaves	3 weeks per quart	
Rave	Broadleaf	60 days after emergence	4 months	
Remedy Ultra	Broadleaf	No	3 weeks	
Tordon 22K	Broadleaf	After tillering	Grasses may be reseeded in the fall following an application in spring or early summer	Yes
Yukon	Broadleaf	No	2 months	

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements.

Sarah Lancaster, Weed Management Specialist



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Three Options

- Needs are short term – but reseeding brome isn't an option
 - Procedure:
 - Consider alternative forages
 - summer annual forages: pearl millet, sorghum-sudangrass, forage sorghum, crabgrass, etc. These crops can yield 4000 to 8000 lbs. of forage/acre.
 - Spring cereal forages: spring oats, spring triticale, and cereal rye; These crops can yield from 1500 to 4000 lbs. of forage/acre.
 - Others? <https://mccc.msu.edu/covercroptool/>
 - Pros:
 - More 'consistent' forage production?
 - Cons:
 - Seed availability
 - Cost of production (all of the above require some level of fertilization)
 - 'damage' to existing stand



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If reseeding right now isn't an option but you still have forage needs – and concerns about how to meet them, you might fit in to this category.

Alternative forages can be a good option. Check out these three links for different options:

- Cereal crop forages: <https://bookstore.ksre.ksu.edu/pubs/mf1072.pdf>
- Summer Annual Forages: <https://bookstore.ksre.ksu.edu/pubs/mf2871.pdf>
- Midwest Cover Crops Council selector tool: <https://mccc.msu.edu/covercroptool/> (has a nice interface to allow you to explore information about different crops as well)

CAUTION: while annual and perennial forage crops can exist together in the same stand, in many cases one crop will try to dominate over the other. A thick/healthy perennial crop stand likely has first priority when it comes to resources (light/moisture/fertility), thus inhibiting establishment of the annual crop. A struggling perennial crop stand may allow for establishment of the annual crop, but could potentially do so at the expense of the perennial crop. It's a delicate balance we sometimes have a hard time managing to encourage perennial crop persistence for the long term vs. annual crop production in the short term.

Three Options...

- Needs are long term and enterprise profitability can be maintained without maximum production
 - Procedure:
 - Monitor brome through spring
 - University of Illinois: if groundcover is 50% or less, renovate
 - Evaluate options for current stand:
 - Return to brome production
 - Convert to native grass production
 - Other?
 - Pros:
 - Better long term decision making process
 - Allows flexibility for managing input cost challenges
 - Cons:
 - No production = no revenue
 - 'Recovery' is delayed
 - There are no guarantees!

IF your forage needs can be met elsewhere, it would be nice to be able to make an evaluation after allowing for a recovery time period and determining input costs. Unfortunately, it will also delay any 'restart'.

Plant Growth & Development: Cool Season Grasses

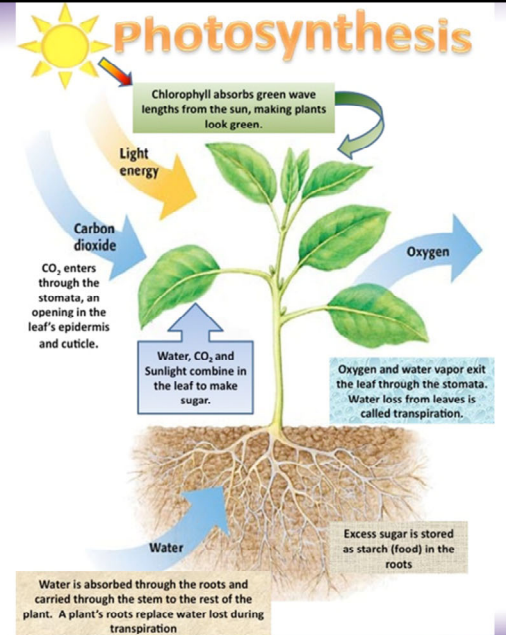
- Cool vs. Warm Season
 - When plants reach certain temperatures, they begin to grow
 - C3 species are cool season plants, growing well when temperatures are in the 40's through 75 degrees F.
 - C4 species are warm season plants, growing well when temperatures are from 70 – 95 degrees F

A little about plant growth and development, since managing that process will be what helps bring stands back in to production the fastest.

Cool season grasses will be greening up soon!

Simply put...

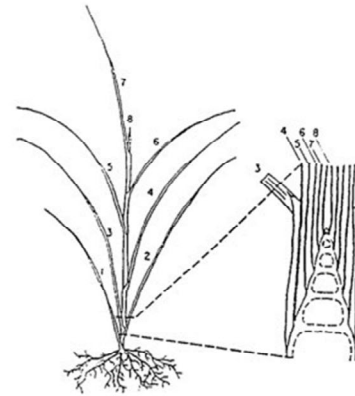
- Leaves grow
 - Sunlight captured and converted to carbohydrates, that's photosynthesis...
 - Energy is converted to proteins, fibers, oils, etc... as the plant develops new leaves/stems/seeds
 - Unused energy for those processes accumulates or is stored in roots and the plant crown
 - From here, we get regrowth after grazing and spring green up



We're trying to encourage photosynthesis – and that in some cases means we need to provide rest for the plant to do it's thing.

Vegetative growth notes...

- Chlorophyll development is rapid – but may not meet plant needs, requiring energy ‘draws’ from the plant crown until 2-3 leaves are formed***
- Leaves have a definite life span. Peak photosynthesis occurs when fully expanded, declining as they age until they can no longer support themselves and they die.



It's going to take time to replenish root systems from plants that may start with a weakened system. Rest will be key to allow plants to produce the energy they need.

Answering the 'why do I need to know this...' question!

- Think of your forage as consisting of two parts:
 - ABOVE ground, leaves grow, receiving energy from roots/crowns/stems/older leaves, developing until it can support itself. Once it can support itself via photosynthesis, it sends energy to other parts of the plant: Other leaves, Stems, Seeds, Roots**
 - BELOW ground, as the roots 'kicked' off that new plant, it reduced root mass to do so and awaits replenishment
 - So long as the above ground growth continues as it needs to, roots will be replenished. If something goes 'awry' in the process, bad things can happen!
- Understanding growth and development can help you maximize growth of both!

Ignoring roots OR leave can be an issue causing detrimental effects on the stand!

More leaf area in the early season = a faster growth rate providing plants the opportunity to store energy

Plants begin growth in the spring from dormant crown buds from carbohydrate reserves stored in the roots and crowns – the previous season.

- More energy = strong growth over a longer period
- *Spring growth can be as much as two weeks earlier when plants are vigorous.*

Where we're headed...

- Ahead of greenup:
 - Evaluate stands for potential injury using methods above
 - Estimate what your stand may or may not be able to do
 - Evaluate past practices we have some control over:
 - Harvest Timing
 - Fertility
 - Harvest Height
 - Armyworm Feeding Level?

Fertility

- Brome Crop Fertilizer Removal Rates (# actual nutrient/T of yield):
 - N: 30# (Urea is around \$.90-1.00 today/Ammonium Nitrate is around \$1.10)
 - P: 12# (18-46-0 is running around \$.90 for the P + N component)
 - K: 40# (\$.70/# of actual K)
- Soil test if at all possible
 - 15-20 cores/subsample
- Apply in a timely manner (late summer/fall for P/K when possible)
- K-State N response data (nearly 100 experiments), the average yield for unfertilized cool season grass was 1.35 tons of hay per acre

IF fertility is an issue, stands CAN benefit from a good fertility program. What does that look like?

A little more about fertility...

Source: Dave Mengel, Professor Emeritus, Kansas State University

N Rate (lbs N/acre)	Hay Yield (tons dry matter/acre)	Hay Yield Increase From 20 pounds N (tons dry matter/acre)
0	1.35	-----
20	1.80	0.45
40	2.20	0.40
60	2.52	0.32
80	2.78	0.26
100	2.97	0.19
120	3.10	0.13
140	3.15	0.05
160	3.14	-0.01

Source: https://webapp.agron.ksu.edu/agr_social/m_eu_article.throck?article_id=837



Probability and Magnitude of Fertilizer Response at Different P Soil Tests

P Test Level	Probability of Response	Magnitude of Response
<6	85-100%	70-100%
6-12	60-85%	30-50%
13-20	30-60%	10-25%
20-30	10-30%	5-10%
>30	0-10%	0-5%

The chart on the right is for crop production, but it does show the probability that we'll see responses when soil test levels are low (usually 10 ppm and below)

***You will likely NOT be able to 'fertilize' your way out...
but do NOT plan for failure – or that's exactly what you'll get...***

Non-Fertilized



Fertilized



Do NOT skimp on a fertility program, but it likely won't be a silver bullet. The non-fertilized area on the left looks pretty much the same as the one on the right with 40# of P last fall. It's not a quick fix, for sure...

Haying Height

- From the KSU Smooth Brome Production Handbook:
 - *Smooth brome should never be cut before the early heading stage or below a stubble height of four inches as stand reduction or loss can occur, particularly during dry soil conditions.*

Late cutting + low cutting heights essentially removes almost all of our green leaf area. When you do so, you stop growth for almost two weeks. If that puts you in a hotter/drier recovery window, you may be disappointed in how slowly the stand recovers – an how much damage it can handle.

Planning for those things we cannot control

- Weather:
 - Drought
 - Frost/Freeze Injury
- Prior season injury?
- Future armyworm infestations
 - <https://ipm.missouri.edu/pestMonitoring/faw/index.cfm>

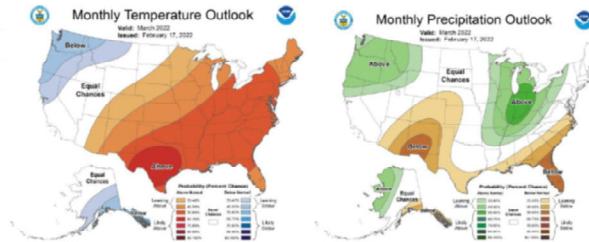


Figure 8. Climate Prediction Center Outlooks for the March.

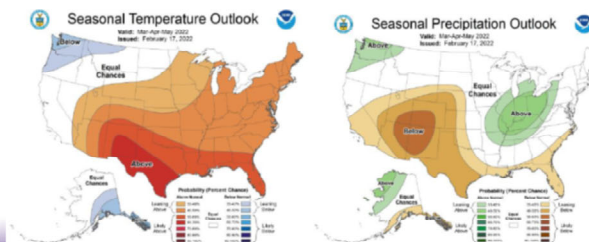


Figure 9. Climate Prediction Center Outlooks for the March through May timeframe.

The spring outlook isn't terribly positive right now. Moisture may be close to normal, but we do look to be warmer than normal.

Check out the link above for Missouri's armyworm monitoring sites.

Final Thoughts...

- Start stand evaluations soon.
 - Include a whole farm forage inventory
 - Optimize production from other forage stands when possible
 - Dig up plants to evaluate roots
- Eliminate other management factors that could damage the stand as well.
 - Damage cannot be eliminated but a well managed stand will withstand a lot
- Scout early and often for armyworms and know your options.

Treatment/Product Name	19 Sep (7 DAT)	26 Sep (14 DAT)
Fastac CS XL @ 2.4 fl. oz/a	0	1
Besiege XL @ 8.0 fl. oz/a	0	2
Stallion @ 6.0 fl. oz/a	0	2
Grizzly Z @ 2.5 fl. oz/a	0	0
Lorsban 4E @ 1.5 pt./a	3	3
Untreated	25	26
Untreated	18	20

No. of armyworms/larvae/ft²/total per 4 reps



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The chart at right shows multiple products and their effectiveness. Killing armyworms is not generally a problem with most products when applied in a timely manner with plenty of water as a carrier when larvae are small. All tend to 'hold' for at least a couple of weeks as well. Timing is generally every bit as important as product and most products (IF labelled can provide adequate control).

NOTE: ALWAYS read and follow label directions and make sure products are labeled! Chlorpyrifos containing products (like Lorsban) are increasingly restricted and will likely no longer be available for application.

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THANK YOU FOR ATTENDING!



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