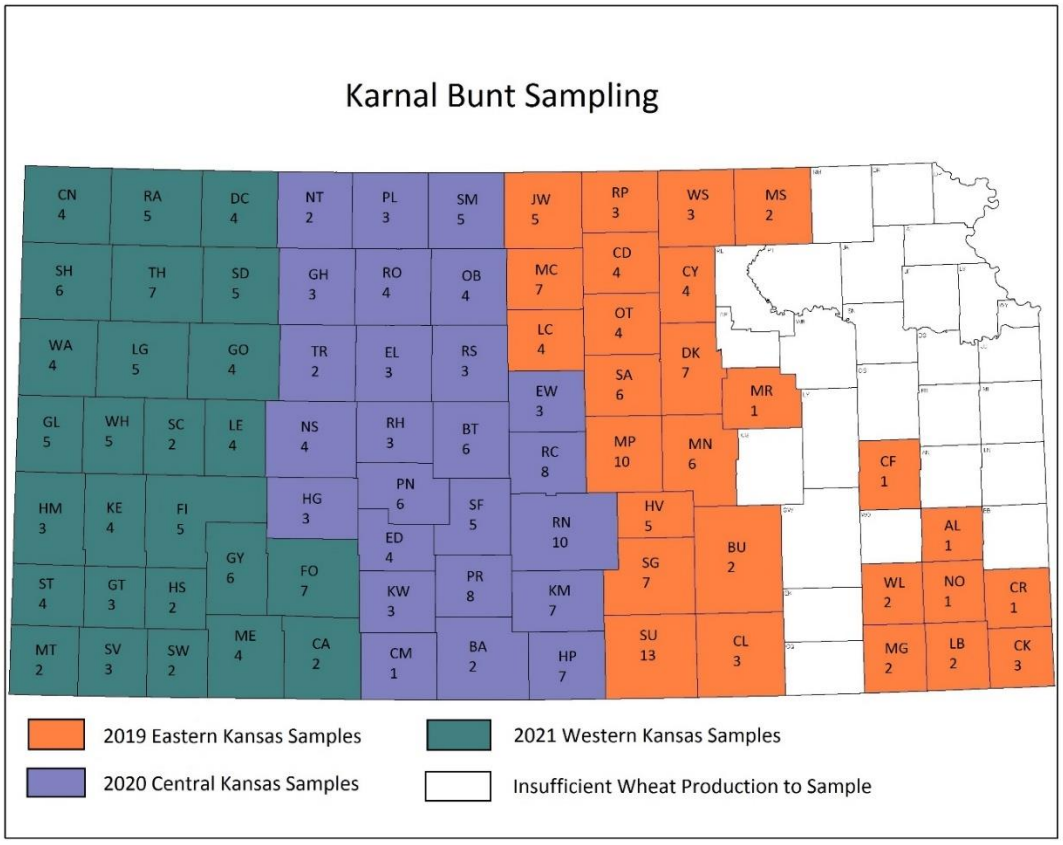
June 3, 2020 CAPS Committee Meeting Notes

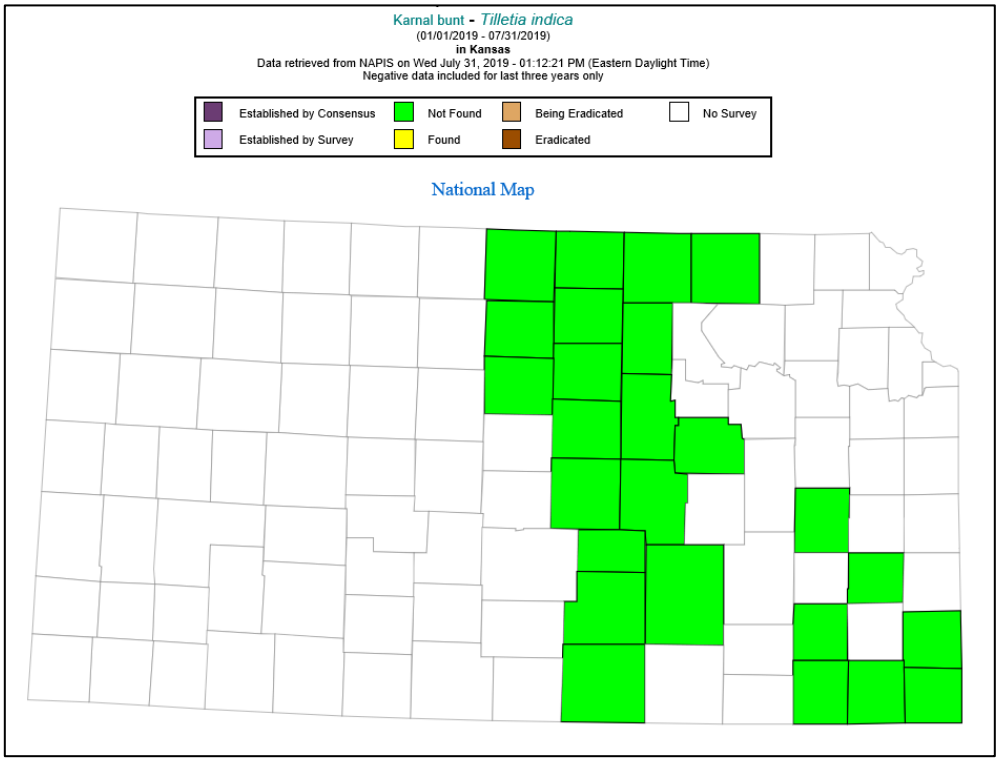
Zoom Meeting attendance: Ryan Armbrust (KFS), Barry Cole (USDA-APHIS-PPQ), Cherie Copeland (USDA-APHIS-PPQ, PSS), Taro Eldredge (KDA Entomologist), Walter Fick (KSU Agronomy), Braden Hoch (KDA Hemp Specialist), Gaelle Hollandbeck (KDA Plant Pathologist), Megan Kennelly (KSU GPDN), Scott Marsh (KDA Weed Specialist), Laurinda Ramonda (KDA State Survey Coordinator), Jim Stack (KSU GPDN), Chris Steffen (KDWPT), Tim Todd (KSU Nematology), Jeff Vogel (KDA), Craig Webb (USDA-APHIS-PPQ)

CAPS Update:

2019 CAPS, PPA 7721 and Line Items:

- **Karnal bunt**
  - 88 samples taken in 25 counties, 108 were planned in 27 proposed in the eastern part of the state – survey done by KDA staff – All negative. Twenty samples not taken because of refusals.

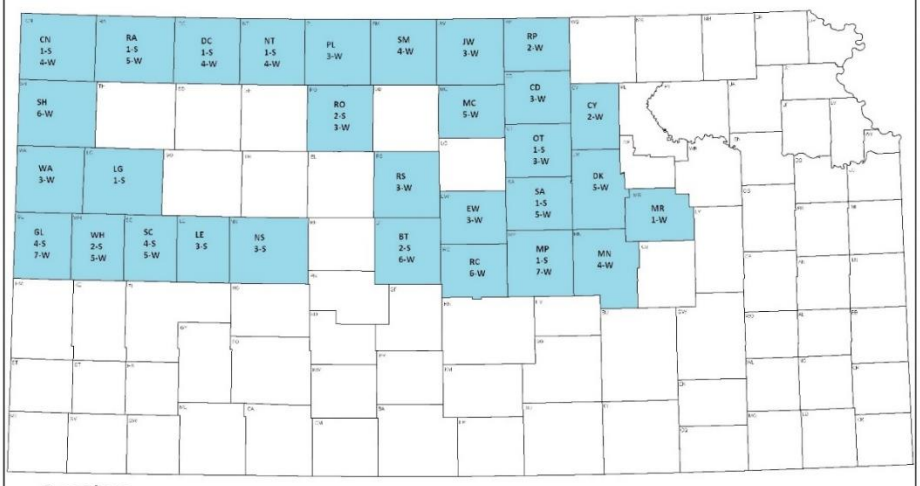




- **<u>Small Grains Commodity Survey</u>**

  - First year of two-year survey - 110 wheat fields, 28 sorghum fields in 29 counties in the north.
  - <u>Trapping</u> – Egyptian Cottonworm (*Spodoptera littoralis*) and Old World Bollworm (*Helicoverpa armigera*) – 1 bucket trap for each at each location. Small Brown Planthopper (*Laodelphax striatellus*) – 1 sticky card trap for each location, no lure.
  - <u>Visual</u>- Sunn pest (*Eurygaster integriceps*)
  - Wheat - March 25 – September 3, sorghum - July 16 – October 10
  - Negative for all target pests

2019 Small Grains Survey



S=sorghum
W=wheat

Reported Status of

Egyptian cottonworm - *Spodoptera littoralis*

(01/01/2019 - 12/10/2019)

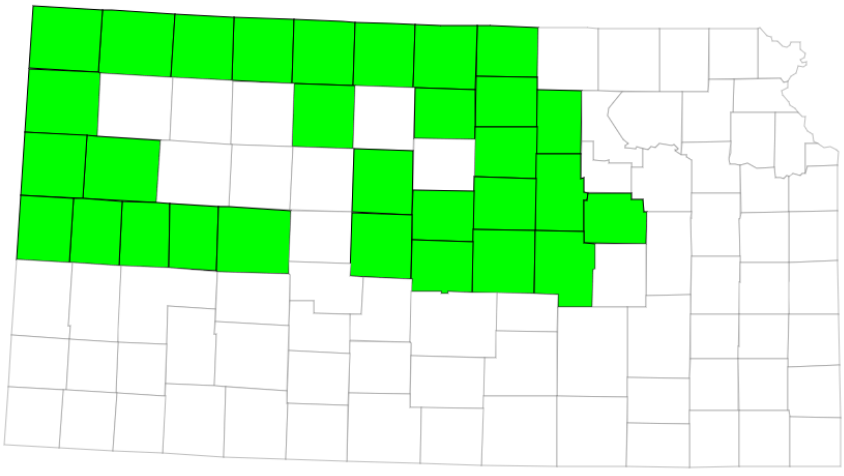
in Kansas

Data retrieved from NAPIS on Tue December 10, 2019 - 05:08:08 PM (Eastern Daylight Time)

Negative data included for last three years only

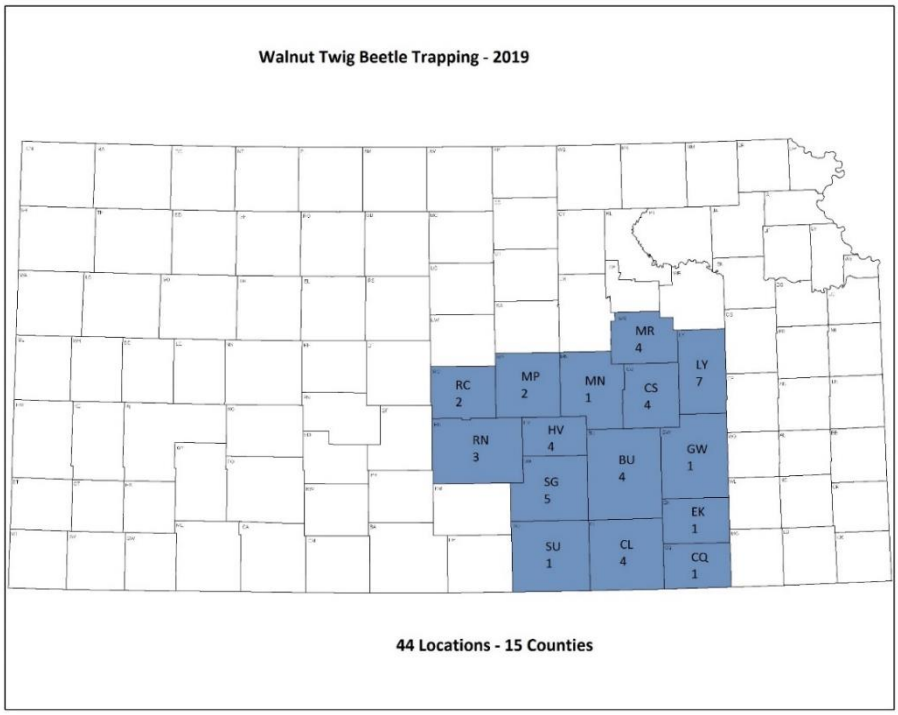
Established by Consensus	Not Found	Being Eradicated	No Survey
Established by Survey	Found	Eradicated	

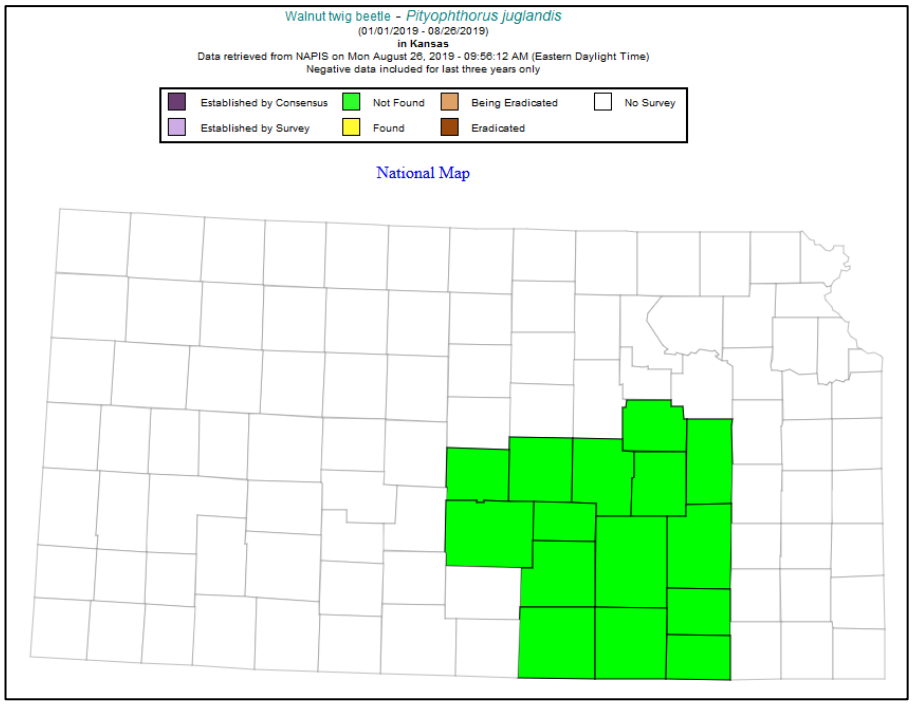
National Map



2019 Plant Protection Act 7721(PPA 7721):

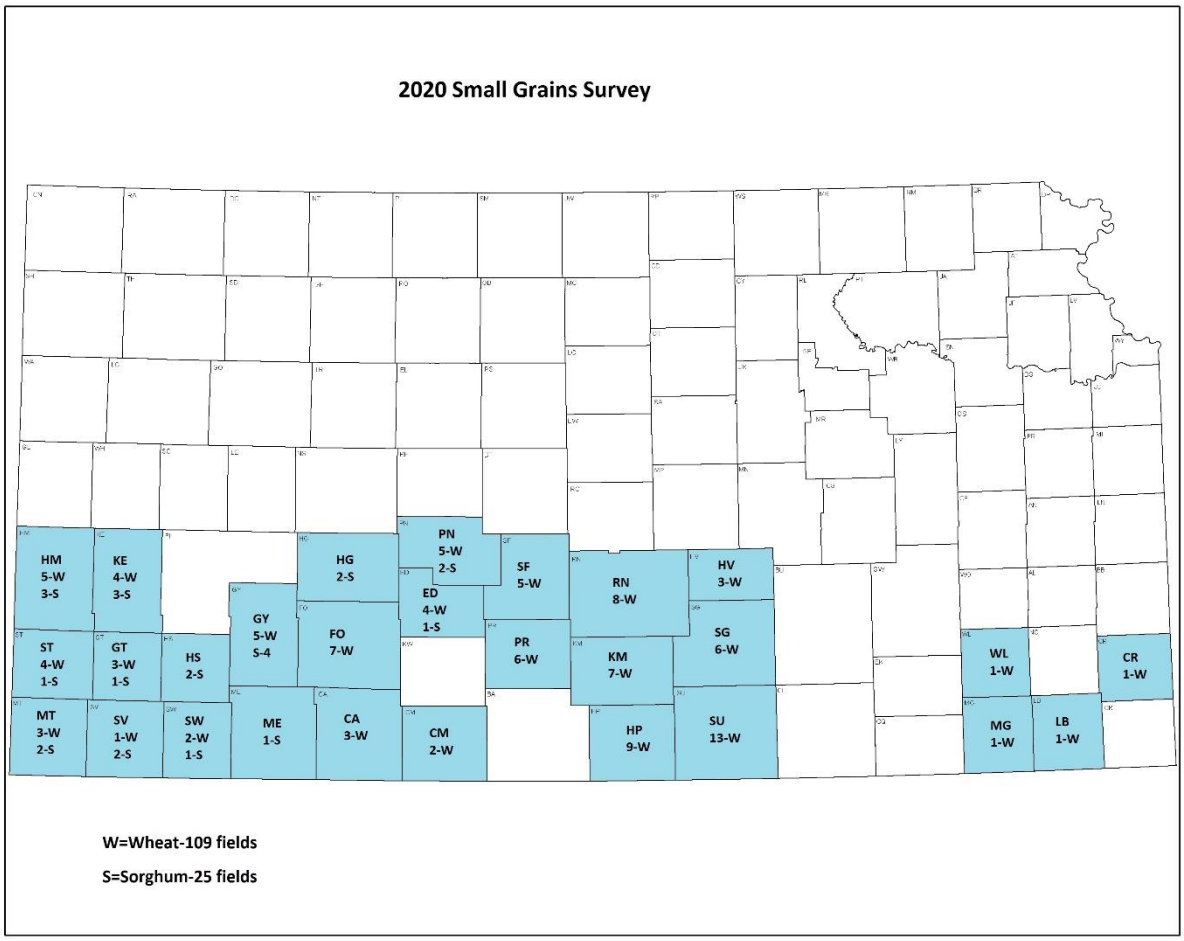
- **Walnut Twig Beetle/Thousand Cankers Disease Survey**
  - 44 sites with 1 trap at each site in 14 south central counties
  - Trapping occurred from June 5 – August 13.
  - All negative.



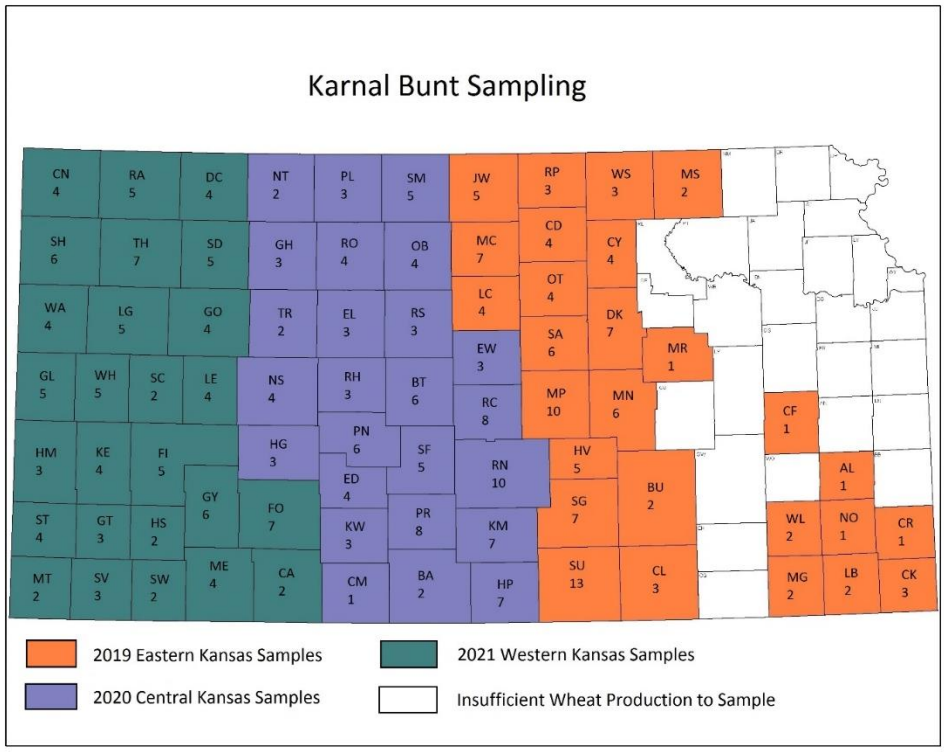


2020 Planned Surveys:

- **Small Grains Survey**
  - 109 fields of wheat and 25 fields of sorghum in 28 southern counties – One site for every 25,000 acres of wheat and sorghum – Survey will be done in 2021 because of COVID-19. Unable to get it started.
  - April to June for wheat
  - June to September for sorghum
  - Trapping – Egyptian Cottonworm (*Spodoptera littoralis*), Old World Bollworm (*Helicoverpa armigera*) – bucket trap with lure - 1 trap for each at each location
  - Small brown planthopper (*Laodelphax striatellus*) – yellow sticky card, no lure - 1 trap for each at each location
  - Visual - Sunn pest – sweep net

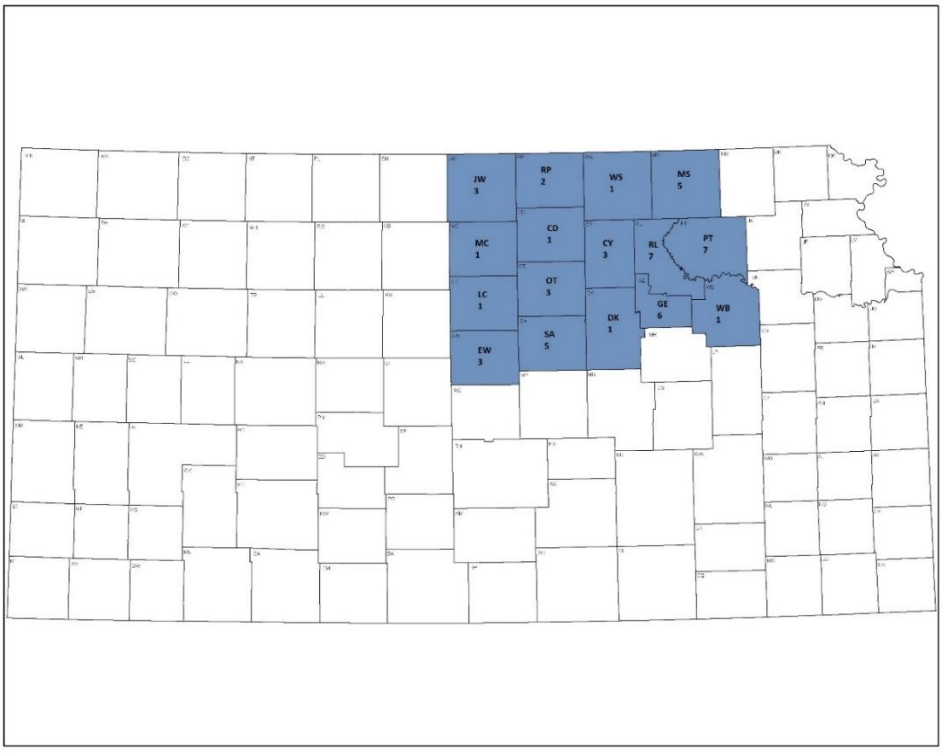


- **<u>Karnal bunt</u>**
  - 109 samples in 25 counties in the central part of the state – survey done by KDA staff



Plant Protection Act 7721(PPA 7721):

- **Walnut Twig Beetle/Thousand Cankers Disease Survey**
  - 50 sites with 1 trap at each site in 16 north-central counties by a seasonal employee
  - Trapping is supposed to occur from June to August 2019. This will begin July 6.



- ***P. ramorum* Nursery/Environs Survey**
  - Survey started May 12 by Gaelle Hollandbeck
  - Survey 10 nurseries or retail outlets for *P. ramorum*; sample up to 10 plants symptomatic for *P. ramorum* at each of the locations, sample standing or effluent water in 4 select nurseries with retention ponds; sample standing or effluent water from 2 public waterways (such as rivers, streams, or lakes) in each of 10 counties.
    - Retention ponds: 1 - Franklin, 2- Johnson, 1-Brown
    - Water baiting of public waterways: Shawnee, Douglas, Johnson, Wyandotte, Franklin, Bourbon, Crawford, Sedgwick, McPherson, Saline counties
    - Nurseries or retail outlets for survey and plant tissue sampling: 1-Sedgwick, 1-Brown, 1-Riley, 1-Shawnee, 1-Miami, 1-Franklin, 4-Johnson

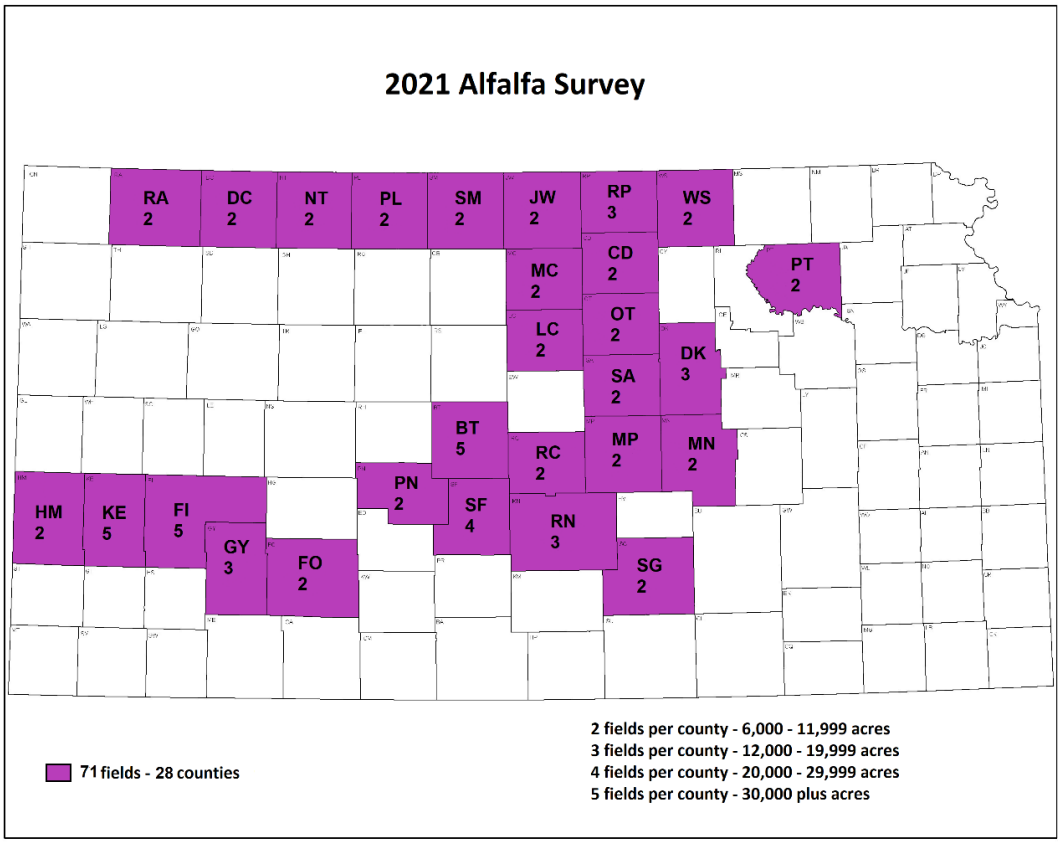
2021 Surveys:

- **2020 Small Grains -** (unable to do this year because of COVID19 postponed to 2021)

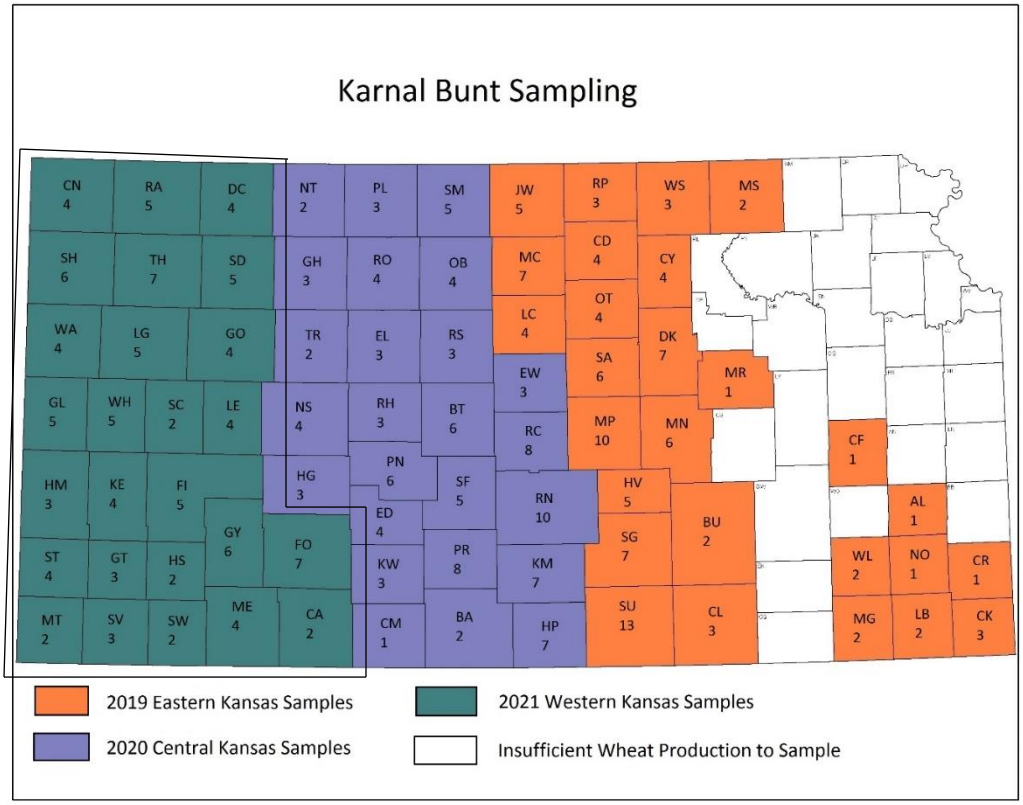
- **Alfalfa survey**

Scientific Name	Common Name	Survey Method	Trap
Candidatus Phytoplasma australiense 16SrXII-B	Australian grapevine yellows	visual	N/A
Spodoptera litura	Cotton cutworm	trap	Plastic Bucket Trap
Crocidosema aporema	Bud Borer	trap	Delta Trap
Heterodera medicaginis	Alfalfa cyst nematode	soil sample	N/A

Proposed sites:

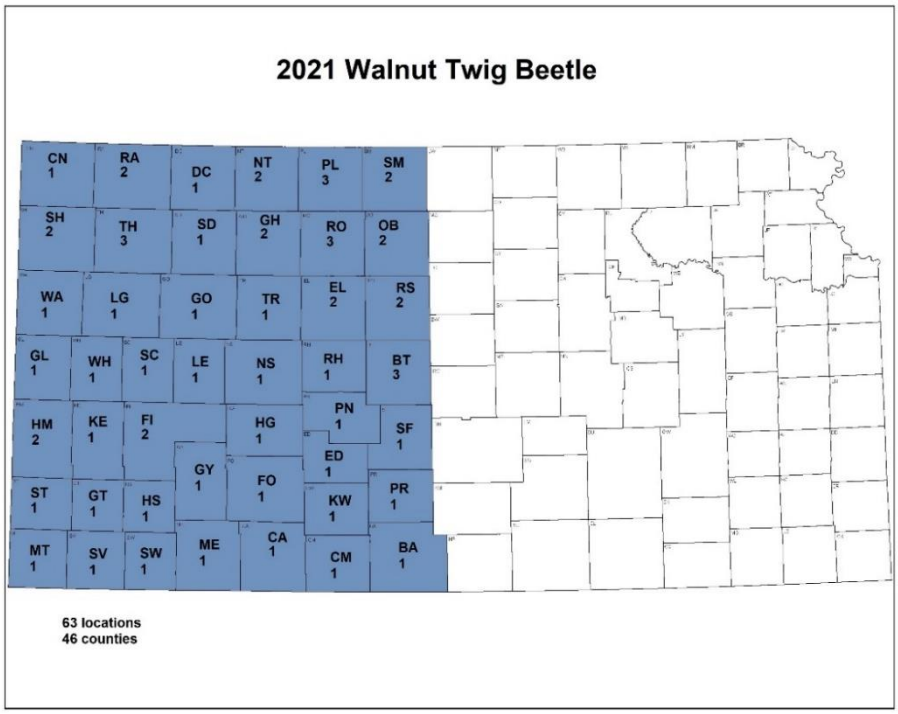


- Karnal Bunt survey – western part of state



PPA 7721:

- P. ramorum – repeat from this year
- Walnut Twig Beetle -western part of the state



USDA Update:

Craig:

- 2019 busy year even with 35-day furlough
  - 4,500 submissions
  - 10,000 tests
- P. ramorum trace forward – 372 samples
  - KS-29 samples
  - Getting samples from follow up re-inspections
- KS 7721 – P. ramorum survey – processed 4 samples so far and were negative
- Lab considered essential – full staff

Barry: (filling in for Shayne)
2019:

- Gypsy Moth
  - SE quadrant of state – 393 traps – none found
- Bark Beetles and Rosy Gypsy Moth – 13 sites, 3 traps at each site none found
- Grasshoppers – 72 sites in 36 counties
  - National Grasslands – several hotspots but no species of concern
- Japanese Beetle
  - McConnel, Forbes, Eisenhower airports – No regulatory action required

2020:

- Gypsy Moth
  - NE quadrant of state – 10 sites
  - Bark Beetle and Rosy Gypsy Moth – same part of state as Gypsy Moth
- Shayne is currently filling in for the Ralstonia response as Operations Manager

- Considered essential and office is staffed

KDA Update:

Jeff:

- COVID 19
  - Work from home
  - Limited routine work started 2 weeks ago
  - Limited over night travel to start in a couple of weeks
  - July back to new normal possibly
  - Callery pear survey had 1 week done in March

Scott:

2019:

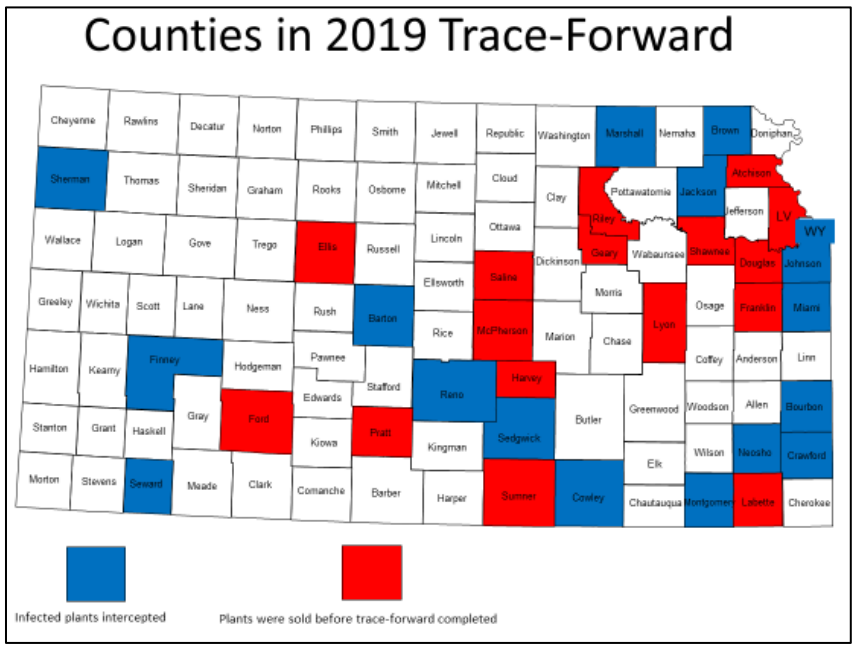
- Spotted Knapweed
  - Released biocontrol in Nemaha county
  - Found biocontrol from previous releases
  - Found a new one that wasn't released – nearest release was in Nebraska
  - Some fields have died off had died off when went to release
- Canada Thistle
  - Norton county release postponed due to COVID
  - North part of state – looking at a pathogen to release for biocontrol

Gaelle:

- P. ramorum

  2019 :
  - Trace forward – 60 Walmarts, 1 Home Depot – visited stores May 31-June 7
  - Submitted to Craig's lab – able to hand deliver samples
  - Samples were delivered to lab between May 31 and June 18, results received between June 7 and June 25
  - 61 stores – 27 samples – 20 came from trace forward
  - Walmart – 19 samples with 18 positives
  - Home Depot sample was negative
  - All non-trace-forward samples (from Sutherlands) were negative
  - 7 counties - product destroyed on site after checking with Agdia *Phytophthora spp.* strips – no samples taken if were positive, just destroyed plants
  - 10 counties – product destroyed on site after checking with Agdia *Phythophthora spp.* strips – samples were taken after a positive Agdia *Phytophthora spp.* strip for a lab verification of *P. ramorum*
  - We intercepted plants in a total of 17 counties (Barton, Bourbon, Brown, Cowley, Crawford, Finney, Jackson, Johnson, Marshall, Miami, Montgomery, Neosho, Reno, Sedgwick, Seward, Sherman, Wyandotte)
  - 34 counties possibly infected – 15% of possibly infected plants were destroyed; the rest were sold before trace-forward was completed

  2020:
  - Delayed start for PPA 7721 survey
    -done water samples – culvert water, fishing lakes, streams, park ponds, rivers
    -so far negative *P. ramorum*
  - Ralsonia trace forward
    -USDA and KDA
    -Geraniums from Guatemala - Fantasia Pink Flare
    -Michigan had first geraniums to test positive for Ralstonia
    -4 possible sites in KS – Wichita, Kechi, Hutchinson and Montezuma
    -USDA policy is to destroy and not test – follow bio-security protocols
    -No positives found in KS



Taro:

- Newsletters are attached to notes
- Unable to monitor for EAB – new counties in 2019 Jackson and Miami
- European Pepper Moth – 2019 some positives but not concerned – most likely can't over winter
- Japanese Beetle and Brown Marmorated Stinkbug – gradually moving west
- 2020 survey work is postponed until 2021
- Exotic Bark Beetle Early Detection Rapid Response (EBB EDRR) – grant through Kansas Forest Service will be postponed to 2021
- Spotted Wing Drosophila – collaboration with Ray Cloyd to survey for distribution is postponed to 2021
- Emerald Ash Borer – 1 trap tree was done on KSU campus
  - Checking out calls from un-infested counties
  - 2019 bark peel – found EaB parasitoid larvae and native parasitoid
- Looking for someone to do PCR for Thousand Cankers Disease
- Biocontrol
  - Canada Thistle – looking to do
  - Spotted Knapweed – recovered Larinus from previous release, found a native fruit fly – Europhora
  - Wanting to rear biocontrol that was released in 2019
- Japanese Beetle
  - Did risk assessment
  - Wanting to change from a category 2 to a category 3 state

Braden:

- Report is attached to notes

KSU Update:

Ryan:

- Report is attached
- Not much survey or field work occurring because of COVID
- P. ramorum doesn't seem to be on radar yet this year
- Northwest KS survey for pine wilt in collaboration with KDA – other diseases seem to be more prevalent such as diplodia
- EBB EDRR – postponed to 2021

- Callery pear – 1 week was able to be done – funding good for 5 years – postponed to 2021 to continue -Looking at genetics for spread and invasiveness
- Shawnee and Franklin county – transferred funds from KFS grants for treatment in those counties
- 2021 sentinel walnut trees – try to align with PPA 7721 Walnut Twig Beetle survey if funding is approved
- Drippy Blight – passive look for Red Oak – also looking for Hermes Scale – possible connection
- Oak Wilt Workshops – Metro KC in late 2020 or early 2021
- Burr Oak problems – looking at grant – multi-state – NE, KS, SD, ND – Oak Gall wasps
- Remote sensing planned for 3 watersheds for Bush Honeysuckle

Jim:
- Ralstonia – processed samples from another state – all negative
- Michigan not over yet there
- Have a large supply of test kits available
- Can help with testing of Geosmithia
- Assays are available
- Next concern is wheat blast

Walt:
- Old World Bluesem – in almost every county in KS
- Still watching Sericea Lespedeza
- Salt Cedar – National Grasslands – biocontrol hasn't been seen anymore
- Black Swallow Wort – Morris county southwest of council grove – difficult to control
- Callery Pear, Phagmities, Bush Honeysuckle -all getting more aggressive in KS

Tim:
- Alfalfa cyst nematode
  - 2008 – first sample in Kearney county – not officially reported until 2019
  - Found in Montana and Utah
  - Worried about economic damage in southwest KS
  - Closely related to Soybean cyst nematode (SCN) – don't know how wide-spread it is
  - Hard to tell apart from SCN – can be mistaken
  - Narrow host range – alfalfa

Meghan:
- Kudos to the diagnostic lab and their work during COVID – Judy, Chandler, Craig, Jim, Tim

KDWPT Update:

Chris:
- Zebra mussels
  - La Cygne Fishing Lake – new infestation
  - Sampling body of waters greater than 20 acres
  - Focusing on areas where not infested
- Bait shops
  - Red swamp crayfish found – traced back to wholesaler – released in Butler county – has a disease, Crayfish Plague – could be new strain than what is in natives – not for sure of impact
  - Keeping an eye out for Rustic Crayfish – found in surrounding states – not found here
  - Eurasion water milfoil, phagmities – biggest issue is to treat
  - Cheyenne Bottoms – aerial spraying
  - Milfoil – biocontrol is available.

KAquatic
NuisanceSpecies
AS

Kansas ANS Management Program

Report for 2020 Kansas CAPS meeting

Submitted May 12, 2020 **by: Chris Steffen, KDWPT ANS Coordinator**

ANS Program Summary

The Kansas Aquatic Nuisance Species Management Plan was approved by the ANSTF in May 2005. The goals of the plan are to prevent new introductions of ANS to Kansas, prevent dispersal of established populations of ANS, eradicate or control to minimize the adverse ecological, economic, social, and public heath effects of ANS, educate all aquatic users of ANS risks, and to support ANS research in Kansas. The coordinated efforts contained within the plan are designed to protect residents of Kansas and the state's aquatic resources from the multitude of potential losses associated with ANS plants and animals.

- KDWPT ANS Coordinator Chris Steffen was appointed by Governor Kelly to the Western Governors' Association's newly formed Western Invasive Species Council. The council was created to improve the coordination of efforts to manage invasive species (plants and animals, both aquatic and terrestrial) amongst the 19 western states.

- On September 4th, the Kansas Department of Wildlife, Parks, and Tourism hosted a stop featuring Asian Carp for Senator Moran's 2019 Conservation Tour. The event was held at Kaw Point Park at the confluence of the Kansas and Missouri Rivers. Participants of the tour, including Senator Moran, were first provided an overview of ANS and Asian Carp and then loaded into electrofishing boats to experience the Asian Carp on the river first-hand. The educational event and electrofishing activities were well received by participants and the event was covered by local news stations.

- A KDWPT funded project looking at demographics, distribution, and natal origin of Asian Carp in the Kansas River continues to make progress. UNL Master's student Jake Werner has finished his second (and final) field season. The objectives of the project are to:

    1. Determine the origin and large-scale movements of invasive carps (i.e., black carp, grass carp, bighead carp, and silver carp) found throughout the lower Kansas River as water and otolith chemistry allow

2. Attempt to identify invasive carp spawning aggregations, if and where they occur in the lower Kansas River, and relate potential recruitment events to climatic or hydrological variables
3. Identify presence and upstream extent of black carp
4. Determine flows required for successful upstream passage of Bowersock Dam
5. Compare body condition and abundance and of native fishes (e.g., bigmouth buffalo, gizzard shad) above and below Bowersock Dam (This objective has been dropped due to very low catch rates of gizzard shad and bigmouth buffalo).

Sampling was conducted in the summers of 2018 and 2019 on three sections of the Kansas River: segment one is between the confluence with the Missouri River and the WaterOne Coffer Dam, segment two is between the WaterOne Coffer Dam and Bowersock Dam, and segment three is between the Bowersock Dam and the Topeka Weir.

- Otoliths were extracted from both Bighead and Silver Carp over the course of the project.
  - Ablation of otoliths for microchemistry analysis is complete, but data has not yet been analyzed.
- Water microchemistry samples for Sr, Ba, Mg, and Ca composition in the Kansas River and the Missouri River above and below the confluence with the Kansas River were collected during 3 events and have been analyzed. This information will be used in conjunction with otolith microchemistry to address objective 1.
- eDNA samples have been collected, but results are not yet available. Results will be used to address objective 3.
- For population demographic sampling, electrofishing (traditional and dozer trawl) and mini-fyke nets were used. No Asian Carp have been collected in segment three (above the Bowersock dam). Both Bighead and Silver Carp adults were captured in segment one and two. No juvenile Bighead Carp have been captured; juvenile Silver Carp were captured in both segments one and two, but were far more abundant in segment one.
- Field work for the project is complete. Analysis of data and completion of Master's Thesis is expected by end of 2020. Publications will follow.

- Increased capacity (personnel) of ANS program – added 1 new FTE (60% of time devoted to ANS duties) to establish and manage watercraft inspection and decontamination (WID) program. Position will also address aquatic vegetation concerns and have education and outreach duties.

- Regulatory changes
  - Added Marbled Crayfish to Prohibited Species list.
  - Prohibited the movement of live crayfish, leeches, amphibians and mussels. They may only be used within the common drainage where caught and cannot be transported above any upstream dam or barrier. This rule now aligns the regulations for all aquatic bait with our rules for the movement of fish.

- Updated and clarified ANS designated waters. Asian Carp section previously noted “tributaries of the MO River,” which was not specific enough for law enforcement needs. Now all individual streams are named.

- Zebra mussels were detected in Lyon State Fishing Lake in June of 2019.
    - Previously, zebra mussels were discovered in El Dorado Reservoir in 2003; Winfield City Lake in December 2006; Cheney Reservoir, and Perry Reservoir in 2007; Marion Reservoir and Lake Afton in 2008; Milford and Wilson Reservoirs in 2009; Council Grove City Lake and John Redmond Reservoir in 2010; Council Grove, Melvern, and Kanopolis Reservoirs and Jeffery Energy Center Lakes (2) in 2011; Coffey County-Wolf Creek Lake and Chase County State Fishing Lake in 2012; lakes Shawnee and Wabaunsee and Clinton and Glen Elder (Waconda Lake) Reservoirs in 2013; Pomona Reservoir in 2014; Paola City Lake (Miola Lake) in 2015; Wellington City Lake in 2015; Hillsdale and Cedar Bluff Reservoirs in 2016; and Osage State Fishing Lake, Tuttle Creek Reservoir, and Geary State Fishing Lake in 2017.
    - The 110 other waterbodies sampled for zebra mussel veligers were negative.

- Red Swamp Crayfish were documented in the wild for the first time in Kansas. The crayfish were first detected during a routine bait shop inspection. An investigation in conjunction with law enforcement determined that the crayfish were sourced from a pond in Butler County. Unfortunately, the population has been established for 5+ years and has spread into a nearby creek; eradication will not be attempted. Inspections were conducted at 90 other bait shops across the state with no further incidents. ANS literature was distributed to the bait shops during inspections.

- Outreach was continued through a campaign designed to utilize a variety of media outlets, including internet ads, radio ads, etc. For 2019, Geo-targeting was used to increase the likelihood that users at (or near) a lake would see ANS ads when they opened their Facebook account. As part of a larger goal to improve the efficiency of our education and outreach efforts, we compared targeting ANS Facebook ads at zebra mussel infested lakes vs. non-infested lakes. Users at infested lakes had significantly higher click rates than those at uninfested lakes. Our interpretation is that ANS education at outreach efforts should be continued (or possibly increased) even after a lake becomes infested with zebra mussels.

- Kansas continues to participate in the *Don’t Let it Loose* campaign. The program has been well received and very popular with pet shop owners. We are supplying additional bags as pet shops request them. We plan to continue purchasing bags in the future and revisiting the locations.

- KDWPT continues to contribute funding, hatchery space, and employee time to WAFWA’s YY Consortium. It is hoped that advancements in YY (Trojan male) technology will lead to opportunities for prevention, control or extermination of common carp, white perch and other invasive fishes. Idaho is having success using the technology on invasive Brook Trout.

- Fish disease sampling was conducted at all four state fish hatchery facilities and 3 private fish farm locations. None of the fish tested showed signs of significant disease. In addition, hatchery staff were trained to conduct health sampling should a disease outbreak require immediate collection of samples.

- ANS literature and outreach materials were distributed to all KDWPT offices, state parks, nature centers, baitshops, marinas and at educational events.

- ANS signage was maintained at ANS infested waters and prevention awareness signs were placed at uninfested lakes.

KANSAS DEPARTMENT OF AGRICULTURE—PLANT PROTECTION & WEED CONTROL

Winter 2019
Volume 66, Issue 4

Kansas Department of Agriculture Entomological News

SURVEY & MANAGEMENT

Spotted knapweed (*Centaurea stoebe micranthos*, aka *C. maculosa*) biocontrol

Figures 1–2. SKW. (1) State Weed Specialist, Scott Marsh and author in a field of SKW in north-central KS. (2) Feeding damage on SKW seed heads showing characteristically black-tipped bracts giving them a "spotted" appearance. Fig. 1 photo courtesy, Amy Jordan.

For many years, spotted knapweed (*Centaurea stoebe micranthos*) has been on the radar as a problematic invasive weed in Kansas with Kansas Department of Agriculture-Plant Protection & Weed Control (KDA-PPWC) (https://agriculture.ks.gov/docs/default-source/pp-2013-weed-reports/noxious-and-invasive-weed-update---spring-2013.pdf?sfvrsn=e681a7c1_0). A non-native forb native to a wide range of Eurasia, spotted knapweed (SKW) is a problematic perennial that has routinely taken over rangeland (Figs. 1–2).

Robust establishment of SKW has the negative impact of: (1) reduced forage quality; (2) increased water runoff (as much as +56%) and soil sedimentation (as much as +192%); (3) decrease in overall surrounding plant diversity. Allelopathy, chemical (cnisin) inhibition of growth in competitors is known, but there is disagreement on extent and significance on native plants (Sheley *et al*. 1998; Story *et al*. 2006; Tyser & Key 1988).

SKW was first detected in Victoria, British Columbia, Canada in 1893. It is believed that material was brought in through contaminated alfalfa and discarded soil ballasts[1]. SKW, along with the notorious diffuse knapweed (*Centaurea diffusa*) was historically soon recognized as a problematic adventive weed and control measures were installed. As one of North America's first biological control initiatives, over the course of decades, 13 species of knapweed (*Centaurea* spp.) feeding insects from their native

[1]Interestingly, many adventive ground-dwelling beetles (Coleoptera) are thought to originate from discarded soil ballasts in Northeastern U.S. Although most of these beetles have no direct impact on human activity, they indirectly do so by outcompeting native fauna. In many areas of New England, much of the soil beetle fauna primarily constitutes of adventive European fauna. Contextually: during colonial times, British ships would arrive in the U.S. with soil ballasts for the sole purpose of exporting American goods. The European born soil ballasts were indiscriminately discarded on American soil, likely being the main contributor to the introduction of Western European ground-dwelling insect fauna that are now widely established in the U.S. (Lindroth 1957).

Agent	Common name	Weed attacked	Type of agent	States established
Agapeta zoegana	Sulphur knapweed moth or yellow-winged knapweed root moth	CENMA, CENDI[a]	Root-boring moth	MT, OR, WA
Bangansternus fausti	Broad-nosed seedhead weevil	CENMA, CENDI	Seedhead weevil	MT, OR, UT
Chaetorellia acrolophi	Knapweed peacock fly	CENMA	Seedhead weevil	MT, OR
Cyphocleonus achates	Knapweed root weevil	CENMA	Root-boring/gall weevil	CO, MT, OR, WA
Larinus minutus	Lesser knapweed flower weevil	CENMA, CENDI	Seedhead weevil	MT, OR, WA
Larinus obtusus	Blunt knapweed flower weevil	CENMA	Seedhead weevil	WA
Metzneria paucipunctella	Spotted knapweed seedhead moth	CENMA	Seedhead moth	ID, MT, OR, WA
Pelochrista medullana	Brown-winged root moth	CENMA, CENDI	Root-boring moth	Not established in United States
Pterolonche inspersa	Gray-winged root moth	CENDI	Root-boring moth	MT
Sptenoptera jugoslavica	Bronze knapweed root borer	CENDI	Root-boring/gall beetle	CA, ID, MT, OR, WA
Terellia virens	Green clearwing fly	CENMA	Seedhead fly	MT, OR
Urophora affinis	Banded gall fly	CENMA, CENDI	Seedhead fly	CA, ID, MT, OR, UT, WA
Urophora quadrifasciata	UV knapweed seedhead fly	CENMA, CENDI	Seedhead fly	ID, MT, OR, UT, WA

[a] WSSA-Bayer Code: CENMA—spotted knapweed, CENDI—diffuse knapweed.

Table 1. Biological control agents released for DKW and SKW. Source: Sheley *et al*. 1998.

range were introduced in an effort to quell their spread (Sheley *et al*. 1998) (Table 1). Despite several ecological characteristics that seemingly suggest diffuse knapweed (DKW) as a more problematic species, studies and monitoring efforts have repeatedly shown success of biocontrol insect releases on controlling DKW populations. Contrastingly, efficacy of biocontrol on SKW is somewhat inconclusive (Knochel *et al*. 2010; Seastedt *et al*. 2007). Unlike SKW, DKW will readily break at the base and spread seed via a tumble-weed like manner. On the other hand, SKW, while having a thin, light seed, potentially capable of wind dispersal, will typically extend their range through peripheral enlargement of existing stands (Sheley *et al*. 1998).

When biocontrol works, it is elegant. The appeal is that it does not rely on chemicals and the biocontrol agents self-multiply, spreading and persisting in the environment, lowering pest populations below a threshold level with economic impact. The theory behind classic biocontrol is based on the "enemy release hypothesis". The idea that when non-native organisms establish in new areas, they are released from natural enemies that keep their populations in check in their native environment. Therefore, identifying and releasing these natural enemies alongside non-native populations will restore this check and balance relationship.

Biocontrol of invasive plants is considered to be successful initiatives overall (Clewley *et al*. 2012), and studies on SKW biocontrol sheds some light on how our efforts may fare in Kansas. Ideally a biocontrol agent is host-specific and has a strong negative effect on hosts (e.g. kills the host). In this regard, all 13 species of bioconotrol insects released to tackle knapweeds in the US have proven to be host specific (Table 1). While *Urophora* spp. (a seed head-feeding fruit fly [Tephritidae]) appear to have very little direct effect on SKW seed production, *Larinus* spp. (a seed head-feeding weevil [Curculionidae]) are dominant control agents for DKW and for SKW in British Columbia and Minnesota (Seastedt *et al*. 2007). *Cyphocleonus achates* (weevil, family Curculionidae) with its root-feeding larvae have a proven ability to cause plant mortality. An 11 year-long study of *C. achates* effect on SKW densities at two sites in Montana have shown significant decrease in SKW populations (77% and 99% each). Although six other biocontrol agents were released during the study, only the two sites containing *C. achates* showed significant decline in SKW (Story *et al.* 2006). With increasing reports of successful biocontrol of SKW, following those with DKW, "the multiple releases of biological control agents against these two *Centaurea* species [SKW and DKW] may represent a less-than perfect but successful biological control effort…The combination of flower head insects and root-feeders appear to provide results consistent with a 'cumulative stress' effect on target species,…and the comparison of results reported here with the Montana findings by Story et al. (2006) suggest that this effect can be generated with different combinations of insects." (Seastedt *et al.* 2007). With high enough insect density, biocontrol attenuates the ability of SKW to exploit favorable habitats, and SKW densities can be reduced in most habitats (Maines *et al*. 2013). Furthermore, biological control can intensify the efficacy of other control methods (Maines *et al*. 2013), such as the use of herbicides like picloram (e.g. an active ingredient in

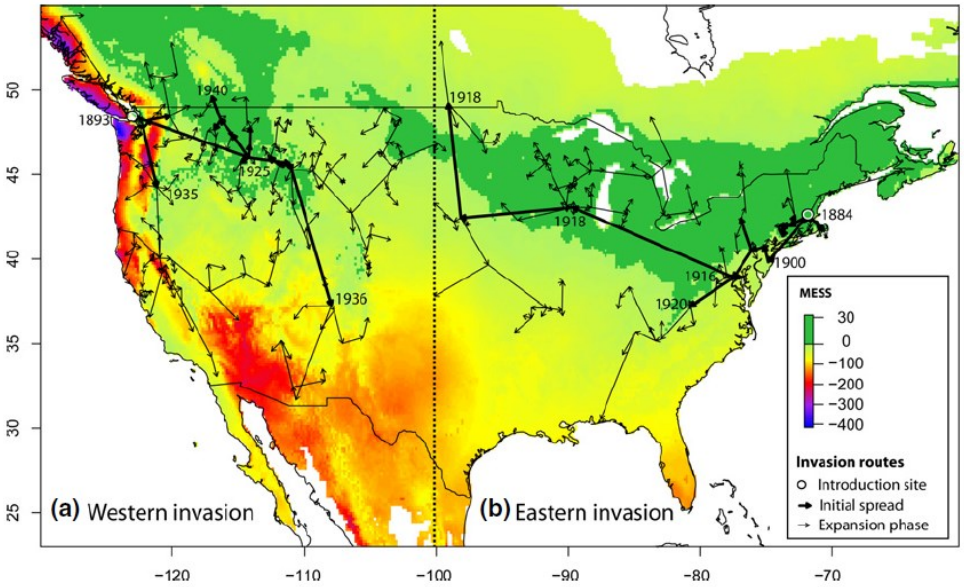


Figure 3. Pattern of SKW spread from (a) western and (b) eastern introduction sites. Arrows and dates indicate introduction sites with think and thin arrows corresponding to initial spread and expansion phases, respectively. Dark green = most, blue = least suitable environments. Source: Broennimann *et al*. 2014.

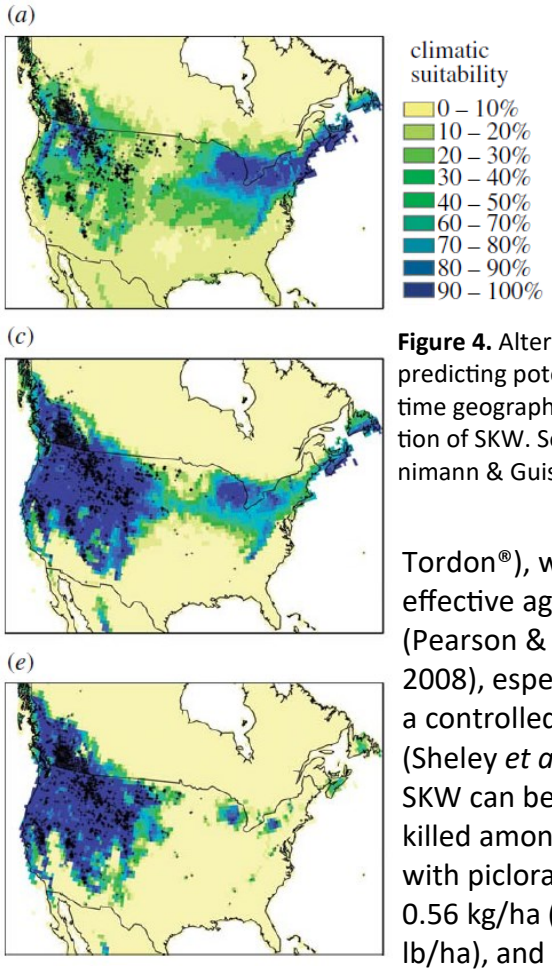


Figure 4. Alternative models predicting potential present time geographical distribution of SKW. Source: Broennimann & Guisan 2008.

Tordon®), which is effective against SKW (Pearson & Fletcher 2008), especially after a controlled burn (Sheley *et al*. 1998). SKW can be selectively killed among grasses with picloram at 0.42—0.56 kg/ha (0.93–1.23 lb/ha), and gross return from hay four years after treatment should be over $100/ha compared to $14/ha in an untreated field (figures based on Western Canada in the 1970s) (Harris & Cranston 1979).

Through a previous survey initiative by KDA-PPWC, SKW populations were mapped out for the northeastern portion of the state. Although populations are not yet dense nor extensive, due to SKWs highly invasive history in other regions of the US and Kansas being a relatively suitable environment for SKW establishment (Broennimann & Guisan 2008, Broennimann *et al*. 2014) (Figs. 3–4), KDA-PPWC released biocontrol agents from Colorado as a control measure. This year, KDA-PPWC had another opportunity to re-release biocontrol agents to target SKW. Similar to the previous release, two or three species of weevils were released: (1) a root-feeding *Cyphocleonus achates*; (2) a seed head feeding *Larinus* spp. (there are two very similar species, *L. minutus* and *L. obtusus*, and our source did not clarify the species being provided). At the release site, we observed establishment of *Larinus* from the previous release (later determined to be *L. minutus*), but no signs *of Cyphocleonus achates*. 200 specimens each were released onto SKW plants. The goal is to establish a healthy population of the insects at the release site to utilize in additional releases at other sites in Kansas. Breeding and subsequent new releases of biocontrol agents to other sites in Kansas will be conducted in conjunction with careful monitoring of SKW populations to ensure it is not spread during our control efforts using insects.

Interestingly, several seed heads were brought back and a seed head-feeding fly, *Urophora quadrifaciata* was reared out from one of the seed heads. Two species of *Urophora*, *affinis* and *quadrifaciata* were first introduced into North America in the 1970s and have rapidly spread. Therefore, it is unsurprising that *U. quadrifaciata* has found its way into Kansas. It is likely that small patches of SKW have acted as islands for progressive spread of the fly. Nearby, the flies are known from Arkansas and may have been a source of spread into Kansas.

Figures 5–6. Releasing SKW biocontrol agents in northcentral Kansas. Beetles were mailed overnight in tubes with some plant material (pictured). Each tube contained 50 adults. (1) *Cyphocleonnus achates*. (2) *Larinus* sp./spp. Photo courtesy, Amy Jordan.

into Kansas.

KDA-PPWC will continue to monitor SKW populations in conjunction with the biocontrol agents that have been released. According to previous research, *C. achates* is an important component of SKW biocontrol (Story *et al*. 2006). Accordingly, we will continue to re-release *C. achates* if they do not establish from this year's release. KDA-PPWC believes that cumulative stress due to multiple seed and root-feeding insects will be the most promising approach to controlling SKW with biologicals in Kansas.

A lot of information about SKW and their identification are available online (see Further Reading below). If you believe there is a strong population of SKW in your area in Kansas, please contact KDA-PPWC (see last page for contact info). Help KDA-PPWC and Kansas by making sure not to move spotted knapweed in hey bails. You can request for a Weed Free Forage Inspection here (https://agriculture.ks.gov/kda-services/weed-free-forage-inspection).

NOTE: Above management practices were aggregated from available literature and are not official recommendations by the Kansas Department of Agriculture. As with all herbicide applications, it is extremely important to read and follow label instructions and state regulations. The importation and release of non-native biocontrol agent(s) requires proper permitting and clearance with the state of Kansas. Questions concerning weed management should be directed to your local Weed Director(s).

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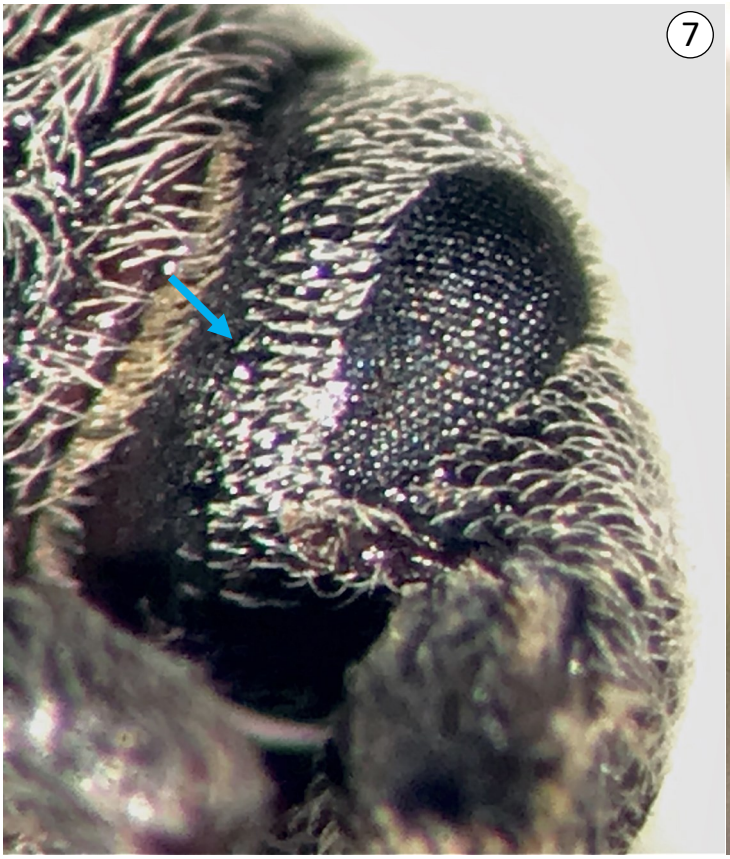
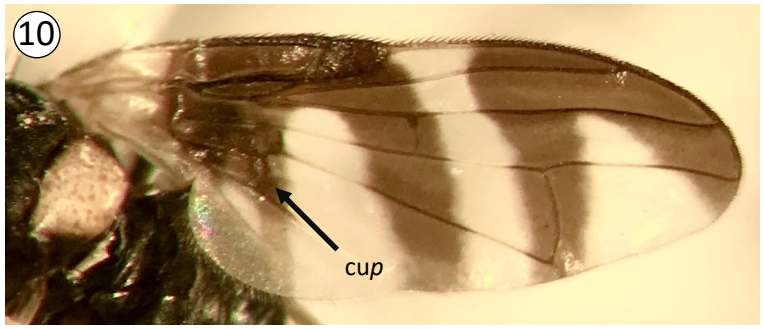


Figures 7–8. Specimens of *Larinus minutus* established in KS from previous release showing diagnostic characters according to Gültekin & Anderson 2017. (7) Gena with bi– and trifurcate scales. (8) Aedeagus gradually narrowing apically with apex of ventral plate strongly triangularly narrowed.



Figures 9–10. *Urophora quadrifaciata* reared from a seed head collected at biocontrol release site. (9) Head and prothorax showing diagnostic setation for the genus. (10) Fore wing with diagnostic venation and patterning for the species.

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Further Reading

KDA-PPWC Noxious and Invasive Weed Update (https://agriculture.ks.gov/docs/default-source/pp-2013-weed-reports/noxious-and-invasive-weed-update---spring-2013.pdf?sfvrsn=e681a7c1_0 • https://agriculture.ks.gov/docs/default-source/pp-weed-reports-2017/noxious-and-invasive-weed-update---fall-2017.pdf?sfvrsn=d81683c1_0 https://agriculture.ks.gov/docs/default-source/pp-weed-reports-2017/noxious-and-invasive-weed-update---fall-2017.pdf?sfvrsn=d81683c1_0 • https://agriculture.ks.gov/docs/default-source/pp-weed-reports-2017/noxious-and-invasive-weed-update---spring-2017.pdf?sfvrsn=f789bcc1_0).

University of Nebraska-Lincoln Extension, EC 173, *Noxious Weeds of Nebraska: Spotted and Diffuse Knapweed* (http://extensionpublications.unl.edu/assets/pdf/ec173.pdf).

Washington State Noxious Weed Control Board, Information and Identification, *Selected Knapweeds of Washington* (https://www.nwcb.wa.gov/pdfs/Knapweed-2010.pdf).

- USDA-APHIS, Program Aid Number 1529, *Biological Control of Spotted and Diffuse Knapweeds* (https://www.invasive.org/publications/aphis/knapwpub.pdf).

YEAR-END RECAP—2019

CAPS—Cooperative Agricultural Pest Survey

The Cooperative Agricultural Pest Survey (CAPS) is a program that coordinates and funds states to survey for exotic pests with the aim to detect introductions and establishments early for rapid response. This year, KDA-PPWC continued our efforts in monitoring for pests of agricultural small grains (i.e. wheat and sorghum).

Small grains pest survey

This year, we continued surveying for exotic insects that are known to be serious pests of small grains outside of the U.S. Four pests were targeted: (1) sunn pest (Hemiptera: Scutelleridae: *Eurygaster integriceps*); (2) small brown planthopper (Hemiptera: Delphacidae: *Laodelphax striatellus*); (3) Egyptian cottonworm (Lepidoptera: Noctuidae: *Spodoptera littoralis*); (4) Old World bollworm (Lepidoptera: Noctuidae: *Helicoverpa armigera*). Two pheromone baited bucket traps targeting each moth species, yellow sticky card trap for the planthopper, and fields were swept with a net for the sunn pest. 110 sites for wheat (Fig. 11) and 28 sites for sorghum (Fig. 12) were sampled across 29 counties (Table 2): Barton, Cheyenne, Clay, Cloud, Decatur, Dickinson, Ellsworth, Greeley, Jewell, Lane, Logan, Marion, McPherson, Mitchell, Ness, Norton, Ottawa, Phillips, Rawlins, Republic, Rice, Rooks, Russell, Saline, Scott, Sherman, Smith, Wallace, Wichita.

(1) Sunn pest: no positive detections.

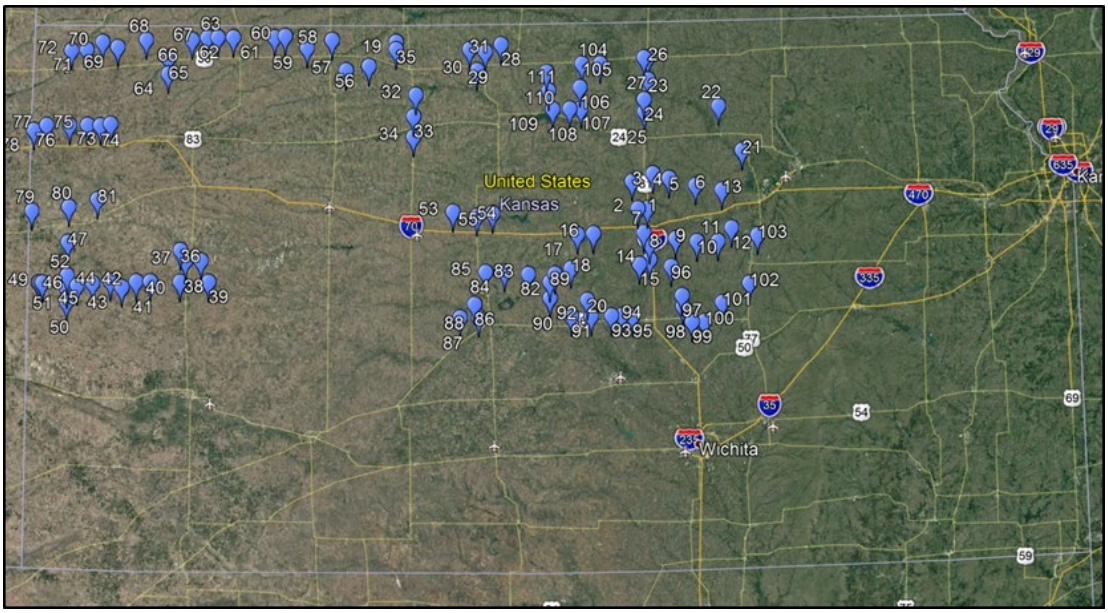


Figure 11. CAPS, small grains pest survey, wheat sites. Map courtesy, Laurinda Ramonda.

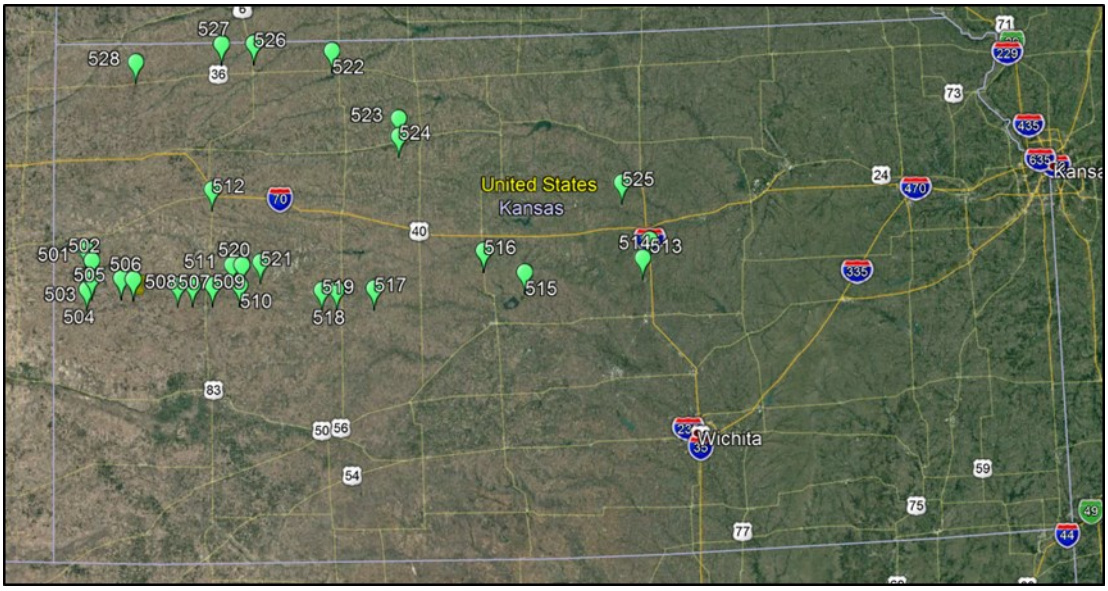


Figure 12. CAPS, small grains pest survey, sorghum sites. Map courtesy, Laurinda Ramonda.

(2) Small brown planthopper: 11 planthopper (Delphacidae) specimens were sent off for identification, but none were positive for small brown planthopper. All identified planthoppers are native of limited to no economic importance (https://sites.udel.edu/planthoppers/) and are not known to be vectors of plant diseases (Table 3).

(3) Egyptian cottonworm: 1,022 moth specimens were recovered and sent off for identification.

(4) Old World bollworm: 43,689 moth specimens were recovered and sent off for identification.

A total of 45,534 moth specimens were sent off for identification. 11,006 specimens (~24%) were identified. A list of identified moths and their counts are presented in Table 4.

KDA-PPWC plans to continue the small grains pest survey in 2020, focusing on southern Kansas.

Table 2. Summary of CAPS, small grains pest survey site and traps counts across 29 counties. Data courtesy, Laurinda Ramonda.

Commodity	Sites	Traps
Wheat	110	330
Sorghum	28	84

Table 3. Planthoppers collected during CAPS, small grains pest survey.

Identification	Count
Kosswigianella sp.	1
Muirodelphax avensis OR *parvulus*	9
Muirodelphax sp.	1

Table 4. Moths collected during CAPS, small grains pest survey.

Family	Identification	Count
Blastobasidae	*Hypatopa*	21
	Pigritia fidella	3
Crambidae	*Achyra rantalis* (garden webworm)	3
	Hahncappsia pergilvalis	94
	Loxostege	6
	Nomophila nearctica (lucerne moth)	6
	Ostrinia nubilalis	1
	Udea rubigalis	1
	Udea	1
Erebidae	*Caenurgina*	9
	Hypena scabra (green cloverworm)	6
Gelechiidae	*Chionodes mediofuscella* (black-smudged Chionodes moth)	1
Gelechioidea	Undet.	1
Geometridae	Undet.	1
	Anavitrinella pampinaria	1
	Digrammia colorata (creosote moth)	1
	Orthonama obstipata (the gem)	1
Noctuidae	Undet.	6
	Autographa californica (alfalfa looper)	2
	Caradrina montana	3
	Condica videns (white-dotted groundling moth)	8
	Dargida diffusa (wheat head armyworm)	3
	Dypterygia rozmani (American bird's-wing moth)	2
	Euxoa auxiliaris (army cutworm)	4
	Helicoverpa zea (corn earworm)	1,0180
	Heliothis	365
	Leucania	6
	Leucania stolata	1
	Megalographa biloba (bilobed looper)	1
	Mythimna unipuncta (true army worm moth)	3
	Peridroma saucia (variegated cutworm)	38
	Psychomorpha epimenis (grapevine epimenis)	1
	Resapamea passer (dock rustic moth)	1
	Resapamea	63
	Schinia	1
	Spodoptera	2
	Spodoptera ornithogalli (yellow striped army worm)	4
Pterophoridae	Undet.	6
Pyralidae	*Tlascala reductella* (Tlascala moth)	1
Pyraloidea	Undet.	2
Tortricidae	*Celypha cespitana* (celypha moth)	1
	Clepsis consimilana (privet tortrix)	6
Microlepidoptera	Undet.	65
Macrolepidoptera	Undet.	232
Total		1,1006

Plant Protection Act Survey

The Plant Protection Act 7721 (formerly called Farm Bill) financially supports surveys, research and management of pests and other topics related to the agricultural interested of the United States. This year we are continuing our survey for the walnut twig beetle (*Pityophthorus juglandis*).

Walnut twig beetle (*Pityophthorus juglandis*)

The walnut twig beetle (WTB) survey began on June 13th and concluded on August 13th, 2019. 44 Lindgren funnel traps were deployed in 15 counties with 1 trap/site (Butler, Chase, Chautauqua, Cowley, Elk, Greenwood, Harvey, Lyon, Marion, McPherson, Morris, Reno, Rice, Sedgewick, Sumner) (Fig. 13). In addition, 22 walnut bolts were set up alongside Lindgren funnel traps as an alternative method for detecting WTB, but also to monitor the coexistence of wood boring insects and the fungal pathogen *Geosmithia morbida*, the causal agent of thousand cankers disease.

This year, we similarly implemented a dry-trap regiment as in previous years. However, due to the unseasonably wet field season, many of the traps were found to contain a significant amount of rain water. Consequently, many of the traps demonstrated significant specimen decay, which subsequently attracted carrion beetles. Many traps were overflowing with carrion beetles (especially Histeridae [clown beetles]: *Saprinus* spp.; Silphidae [carrion beetles]: *Nicrophorus* spp. & *Silpha* spp.; Staphylinidae [rove beetles]: *Aleochara* spp.). Possibly due to the wet field season and the overwhelming odor of decay, no traps recovered bark beetles (Scolytinae) and wood boring beetle bycatch was overall noticeably depauperate.

Insects are currently being reared out of the walnut bolts that were set out, and results are pending. However, due to the size of holes and amount of frass, it appears that no scolytines are in the bolts but are instead occupied by larger wood borers like longhorn beetles (Cerambycidae). Beetles recovered will contribute to pending survey for *G. morbida* in the environment in Kansas.

KDA-PPWC plans to continue surveying for WTB in 2020. Additionally, there are tentative plans to survey for *G. morbida* in the environment in Kansas. The work plan is currently being prepared, but we plan to survey for the fungus by focusing on other wood boring beetles feeding on walnuts (*Juglans* spp.). The motivation is to: (1) detect the coexistence of *G. morbida* and non-WTB wood boring beetles in the presence of walnut; (2) demonstrate widespread prevalence of *G. morbida* in the environment in Kansas; (3) demonstrate the lack of thousand cankers disease in Kansas despite the presence of *G. morbida* (minimal canker development can and is expect, just not "thousand(s) of cankers"). Depending on our findings, KDA-PPWC will reevaluate the quarantine involving the thousand canker disease complex.

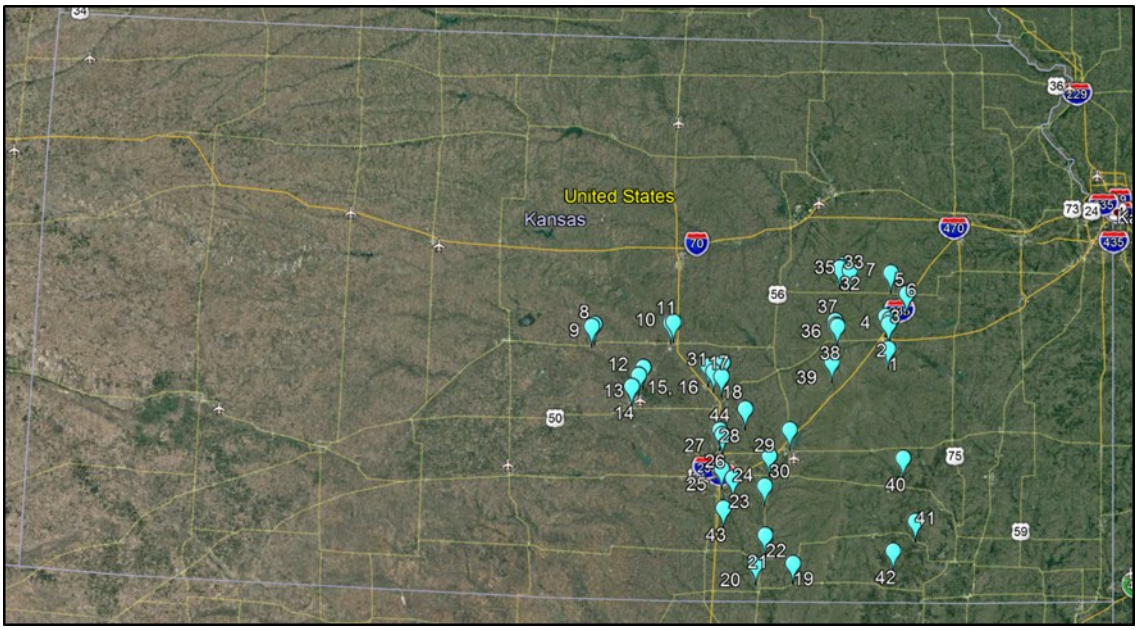


Figure 13. PPA, walnut twig beetle survey sites. Map courtesy, Laurinda Ramonda.

Emerald ash borer (*Agrilus planipennis*)

This year, KDA focused emerald ash borer (EAB) monitoring efforts to counties surrounding the front line of their distribution in eastern Kansas. Additionally, areas with high traffic farther west of their front line was monitored, including Hays, Wichita and Wilson Lake (Fig. 14).

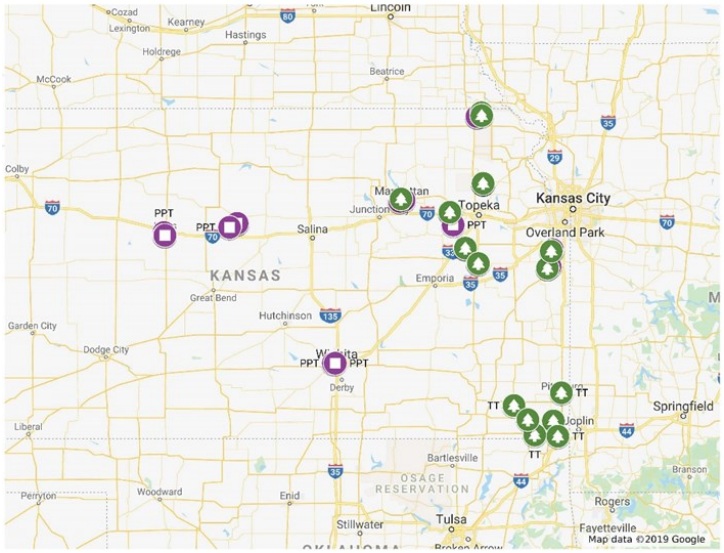


Figure 14. EAB survey sites. Purple square = purple prism traps; green trees = girdled trap trees.

- Purple prism traps: KDA set up 30 purple prism traps across 9 counties (Brown, Ellis, Jackson, Miami, Osage, Riley, Russell, Sedgwick, Wabaunsee). There were no positive detections.
- Girdled Trap Trees: Working with Kansas Forestry Service (KFS), Kansas State University Extension, and local cooperators, KDA set up 16 traps trees (Figs. 15–16). One trap tree near Hiawatha was not accessible due to delayed harvest in the adjacent field and will be left for a two-year girdle, along with a tree in southeastern Kansas.

  EAB adults and larvae were recovered from three trap trees in two counties: Paola and Spring Hill in Miami Co., and just south of Denison in Jackson Co (Figs. 17–18). These detections represent new county records for EAB in Kansas, and KDA is working on expanding the quarantine (Fig. 19). Trees from Spring Hill and Denison were notable for their extremely high density of EAB, and likely represented multiple years of colonization and damage (Fig. 20).
- Public Reports: Staff continue to follow up on public reports of possible EAB infestations. This year, KDA-PPWC joined KFS to survey poor ash trees at Osawatomie Golf Course, Osowatomie, Miami Co. While we noted many secondary wood boring insect damage, including cerambycids and scolytines, EAB was not found.

KDA-PPWC will continue to monitor the spread of EAB, and together with KFS and KSU Extension will work to inform the public as this adventive invasive wood boring beetle extends its western range through Kansas.

Figures 15–16. EAB survey work. (15) Trap tree peeling in Spring Hill in cooperation with KFS. (16) Dropping an ash tree near Denison in cooperation with KFS.

In addition to EAB, other non-target insects were recovered during surveys. Non-target metallic wood boring beetles (Buprestidae) that were recovered from traps are listed in Table 5. Notably, a silken parasitoid wasp cocoon was recovered from an EAB gallery

during a tree peel. It is thought to be a species of Braconidae, and likely *Atanycolus* sp., a native genus known to readily parasitize EAB in North America. According to the literature (Duan & Schmude 1999), late season *Atanycolus* require a period of diapause (cold spell) for development. The specimen is currently trying to be reared out for identification and understanding the role of native parasitoids on EAB in Kansas.

Figures 17–18. EAB recovered during survey work. (17) EAB adult recovered from a trap tree near Denison. (18) EAB larva recovered from a trap tree in Spring Hill.

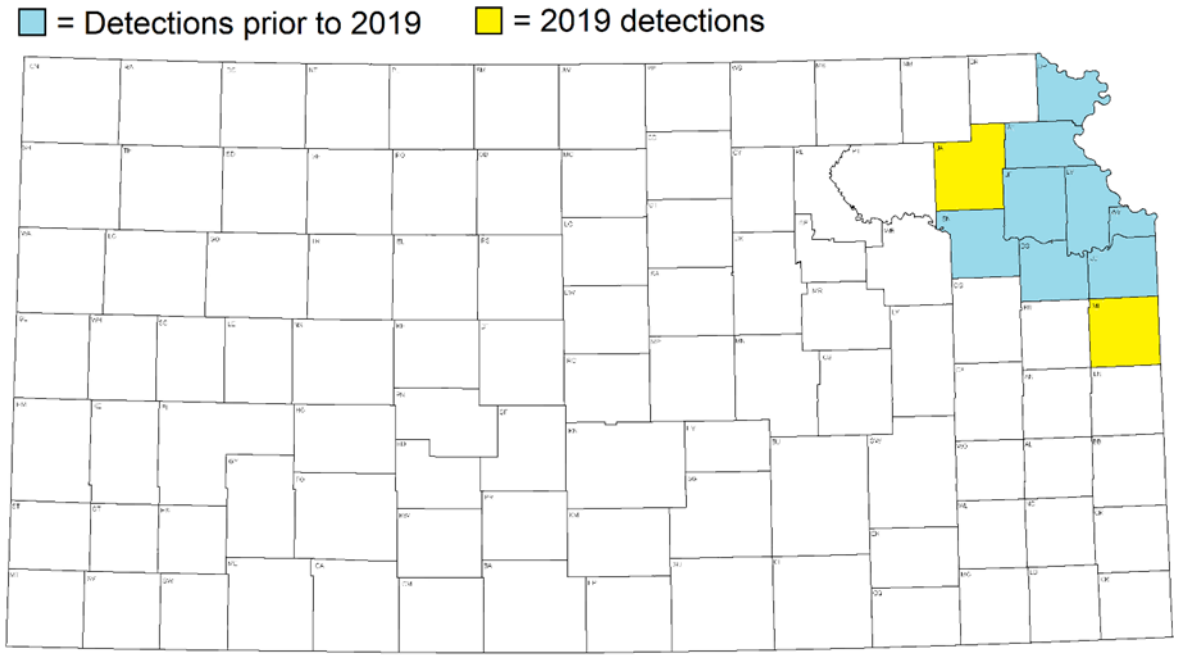


Figure 19. Current distribution of EAB in Kansas, 2019.

Figure 20. A severely stressed trap tree from near Denison, demonstrating such heavy infestation that EAB larvae are no longer forming the characteristically serpentine larval galleries—sign of a compromised host immune system.

Table 5. Metallic wood boring beetles collected during EAB survey trapping.

Species	Count
Agrilus ferrisi	1
Agrilus leconti	12
Anthaxia fisheri	1
Chrysobothris harrisi	2
Chrysobothris sexignata	8

Brown marmorated stink bug (*Halyamorpha halys*)

Brown marmorated stink bug (BMSB) was first detected in Douglas Co. in 2011 and later reported in the Journal of the Kansas Entomological Society . Subsequently, BMSB came to the attention of KDA-PPWC through reported sightings in Johnson Co., follow-up trapping efforts by KDA and a sighting in Douglas Co.

This year we continued our survey efforts using pheromone baited traps. 18 traps were placed across four counties (Douglas, Leavenworth, Johnson, Shawnee). Three from Johnson and one trap from Shawnee Co. recovered BMSB, the latter representing a new county record for Kansas. Although specimens were not abundant in Johnson Co. traps, due to specimens being recovered consecutively over the years, BMSB is likely wide spread and well established in the area. Six specimens were recovered from a single trap at Washburn University in Shawnee Co. The high abundance may illustrate that BMSB is already established in parts of Shawnee Co., and presence on a university campus may be due to unintended movement by students (Fig. 21).

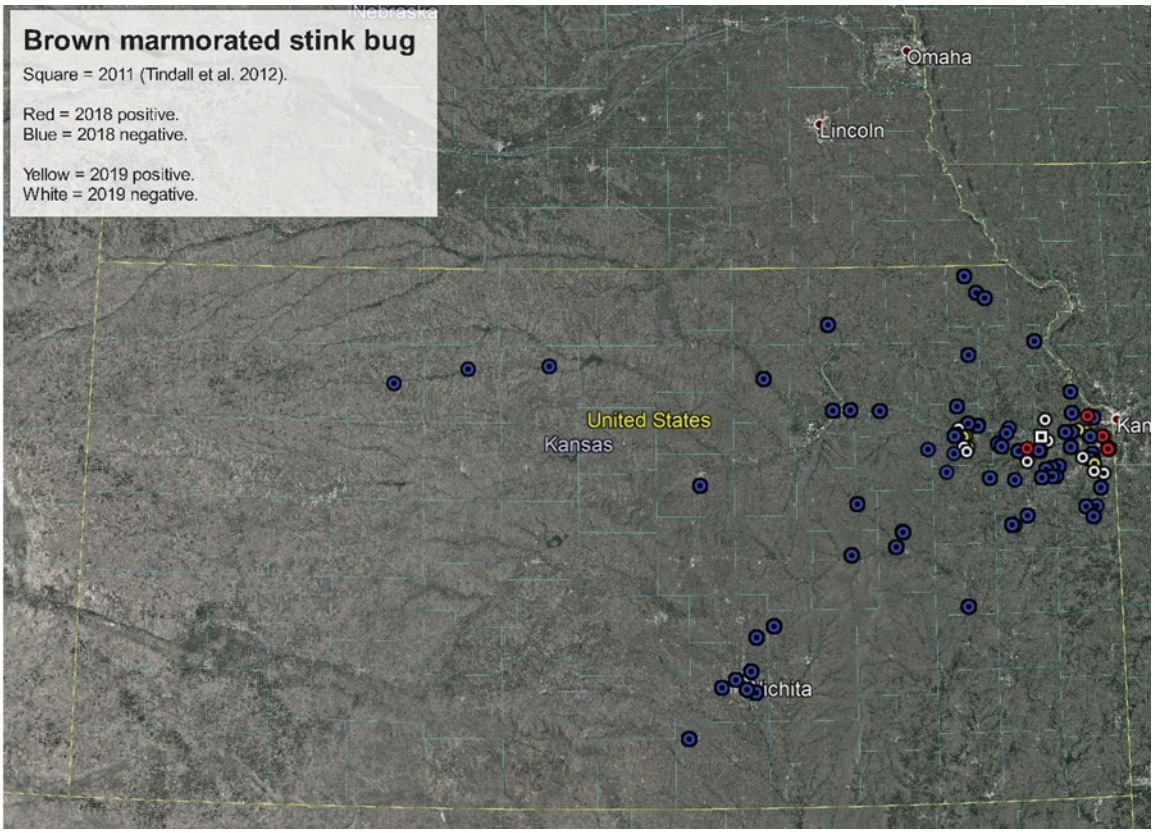
Although not yet known to cause noticeable damage, due to their highly polyphagous nature and economic importance, KDA-PPWC will continue to monitor and survey for BMSB in 2020.

At this juncture, it is becoming apparent that BMSB is making a movement westward through Kansas and will be a matter of time before they become

Species	Count
Chinavia hilaris	4
Euschistus tristigmus	1
Euschistus variolarius	11
Thyanta calceata	2

Table 6. Stink bugs collected during BMSB survey trapping.

Figure 21. BMSB survey and summary of known



widely established with the state.

Other non-target stink bugs were recovered from BMSB traps (Table 6). All are commonly collected species from Kansas, likely attracted to BMSB pheromones due to similar and/or shared chemistry.

Gypsy moth (*Lymantria* spp.)

KDA-PPWC had no positive finds in traps set in 2019. KDA set 52 traps across 33 counties throughout the state (Fig. X): Allen, Anderson, Barber, Bourbon, Butler, Comanche, Douglas, Edwards, Franklin, Geary, Gove, Graham, Harper, Johnson, Kingman, Kiowa, Lane, Leavenworth, Logan, Lyon, Montgomery, Morton, Ness, Norton, Pratt, Riley, Scott, Shawnee, Stafford, Stevens, Trego, Wichita, Wyandotte.

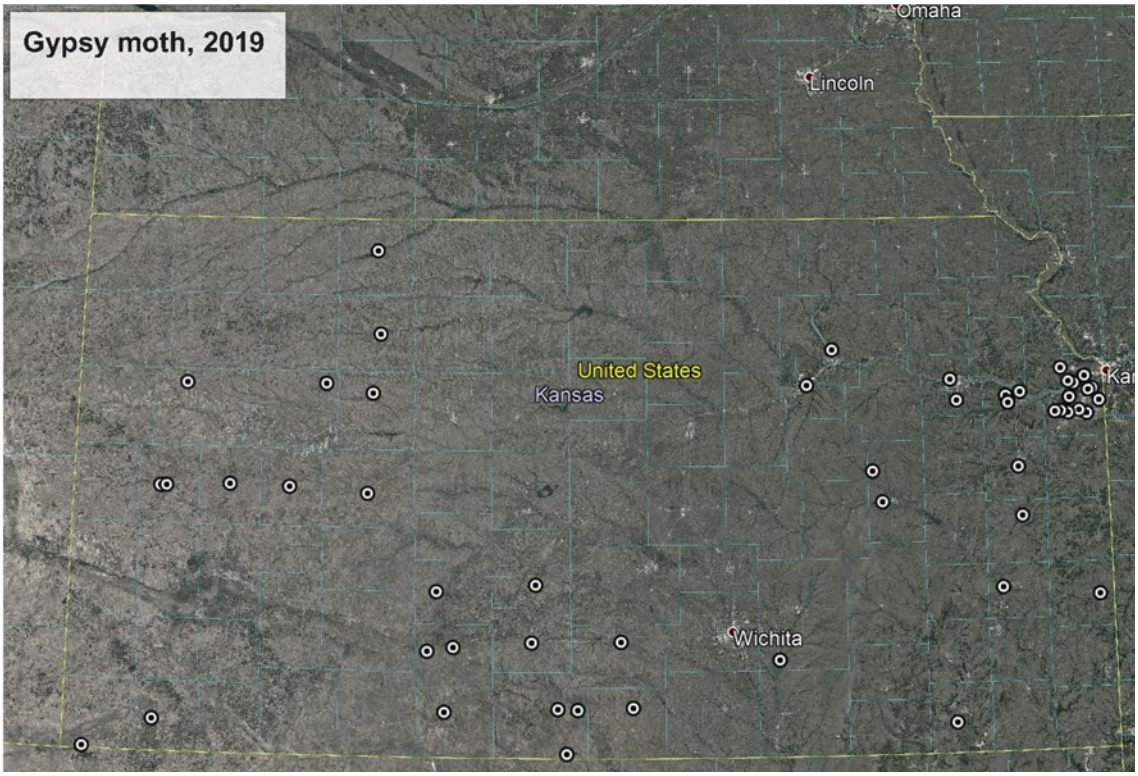


Figure 22. Gypsy moth survey sites, 2019.

European pepper moth (*Duponchelia foveolate*)

For the second year in a row, KDA-PPWC trapped for European pepper moth (EPM). This exotic moth is originally from Southern Europe and Northern Africa. Larvae, the destructive life stage, are highly polyphagous and are recorded to feed on over 70 different plants. Larvae prefer very moist soils and because EPM are unable to overwinter in Kansas, known instances of EPM in Kansas are likely being brought in with greenhouse stock imported from southern states. This year, EPM was detected from three different greenhouses (Fig. X). In two of these operations, only one or two specimens were recovered and are not believed to be a serious problem in Kansas. The third house had over 50 specimens recovered from it, and the very wet soils from overwatering is thought to be a contributing factor there. However, due to the EPM's inability to overwinter in Kansas and little evidence to suggest they are a major issue in Kansas greenhouses, KDA-PPWC will be concluding EPM survey work in 2019.

Figure 23. EPM caught in sticky trap. Arrow indicating diagnostic finger-like wing pattern of fore wing.

Japanese beetle (*Popillia japonica*)

In order to comply with the Japanese Beetle Harmonization Plan, KDA-PPWC has continued efforts to survey for Japanese beetle in 2019. This year, there were two new county records: Pratt and Sumner counties. Of the two, the detection in Sumner county only included a single specimen, and under the Harmonization Plan does not fulfill the necessary requirements to be considered "infested" as of the present.

KDA-PPWC is currently in the midst of reevaluating its stance on the state of JB in Kansas. Part of this process involves reviewing historical records on JB distribution through time in Kansas and formulating a risk assessment for Kansas concerning JB.

KDA-PPWC will continue to monitor for JB in 2020 and is additionally looking into the possibility of cooperating with out of state agencies to explore the release of biocontrol insects to control JB in Kansas.

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- Ensure Kansas plants and plant products entering commerce are free from quarantined pests.
- Provide customers with inspection and certification services.

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Acknowledgments

We would like to thank: Dan Bean and Palisade Insectary, Colorado Department of Agriculture (CDA), for providing us with spotted knapweed (SKW) biocontrol agents; John Kaltenbach, Biological Control Specialist with CDA for helpful discussion on SKW biocontrol and potential for Japanese beetle biocontrol initiatives in Kansas; Wade Petersen, Entomologist with Washington State Department of Agriculture-Plant Protection Division for identifying the many moth samples and specimens from our 2019 CAPS survey; Joshua Vlach, Entomologist with Oregon Department of Agriculture for identifying planthoppers from our 2019 CAPS survey.

And last but not least, Kansas Forestry Service, Kansas State University Extensions, folks with the cities of Burlingame, Lyndon, Paola, and Spring Hill, and the numerous local land owners that made this year's emerald ash borer survey possible.

KANSAS DEPARTMENT OF AGRICULTURE—PLANT PROTECTION & WEED CONTROL

Spring 2020
Volume 67, Issue 1

Kansas Department of Agriculture Entomological News

COVID-19 UPDATE SPECIAL EDITION

Summary

- Due to the situation concerning COVID-19, KDA-PPWC is currently suspending all planned survey work until further notice.
- Due to present delays, EDRR, emerald ash borer and *Geosmithia morbida* surveys will not take place until 2021.
- KDA-PPWC is optimistic we may be able to resume some surveys, including our spotted wing Drosophila-, small grains-, walnut twig beetle-, spotted knapweed biocontrol agents-, and Canada thistle biocontrol agent surveys.

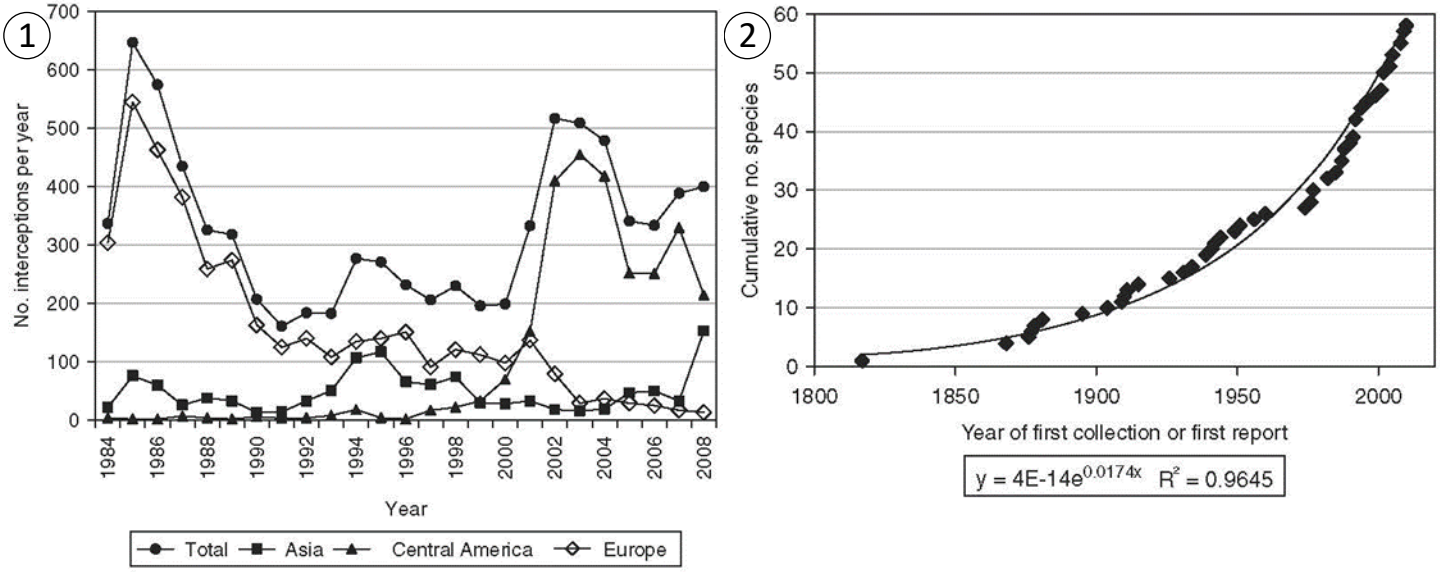
Original Plan for 2020

We had a big year of entomological surveys planned here at KDA-PPWC, but due to the situation surrounding COVID-19, we are reluctantly suspending all survey work until further notice. While some surveys may resume, pending changes in state and departmental policy, several surveys have already suffered too much delay and are unfortunately postponed until 2021.

EDRR (Early Detection Rapid Response)

Due to heightened international commerce, the potential for introducing new exotic species has never been more acute. Furthermore, the potential for a newly introduced exotic establishing as a novel pest in North America is of equal concern Figs. (1–2). The National Invasive Species Council highlights that while the exclusion and prevention of introducing non0native species is the most effective, following these efforts up with early detection and a rapid response is a critical second line of defense, generating the best chance for eradication.

Bark and ambrosia beetles are a diverse specialized group of weevils (Curculionidae: Scolytinae). As the name implies, bark and ambrosia beetles are wood boring beetles that can potentially impact the health of host trees. While bark beetles primarily bore galleries underneath the bark of trees, ambrosia beetles bore into the xylem (vascular tissue responsible for water transport), or heartwood of trees. The term ambrosia beetle is applied to an array of scolytines that have independently evolved a symbiotic relationship with fungi on which they feed. While bark beetles feed directly on wood, ambrosia beetles inoculate chambers within trees with various fungi which they tend, grow and feed upon. Because ambrosia beetles feed on the fungi they bring with them, they do not generate elaborate galleries as do bark beetles. However, due to the unusual symbiotic relationships that ambrosia beetles have struck with fungi, they often demonstrate odd reproductive strategies that make them more prone to establishing in



Figures 1–2. (1) Total number of annual woo-associated scolytines intercepted at US ports and continents of origin. (2) Cumulative number of new exotic scolytines detected in continental USA. Source: Rabaglia *et al*. 2019.

gies that make them more prone to establishing in novel areas.

~1,700 species of Scolytinae are known from North America, of which >60 species are exotic. Between 1984–2008, >8,000 scolytines have been intercepted at port of entry in the United States. Due to the concern of introducing additional exotic scolytines, in 2001, USDA Forest Service, APHIS, National Plant Board, and National Association of State Foresters began a pilot project for the early detection and rapid response (i.e. EDRR) of scolytines in America. This has since developed into a program and the Forest Service has continued a national annual survey since 2007.

It has been 10 years since EDRR has been conducted in Kansas (Fig. 3), and this year (2020) we were awarded Forest Service funding to conduct an EDRR survey here in Kansas. Unfortunately, traps must be deployed in mid-April and we have missed this crucial window due to the COVID-19 quarantine. Fortunately, this funding will be made available to us so that we may pick up this survey next year in 2021.

References

- Rabaglia, R.J., A.I. Cognato, E.R. Hoebeke, C.W. Johnson, J.R. Labonte, M.E. Carter, J.J. Vlach. 2019. Early Detection Rapid Response: A 10-year summary of the USDA Forest Srvice program of surveillance for non-native bark and ambrosia beetles. *American Entomologist*, 65(1): 29–42.
- Haack, R.A. & R.J. Rabaglia. 2013. 3. Exotic bark and ambrosia beetle sin the USA: potential and current invaders. Pp. 48–74. *In*: *Potential Invasive Pests of Agricultural Crops*, J. Peña (ed.). https://doi.org/10.1079/9781845938291.0000.

Table 1. EDRR participation. Source: Rabaglia *et al*. 2019.

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CA	AK	AR	CA	CA	CA	CA	AK	CA	CA
CO	AL	AZ	FL	CO	CO	FL	CA	FL	DC
FL	CA	DE	GA	FL	CT	GA	FL	GA	FL
GA	FL	HI	IL	GA	FL	NC	GA	IN	GA
KY	ID	IL	LA	MD	GA	NY	GU	MD	MI
LA	IN	KS	MA	MI	KY	PA	IL	MS	MT
MD	MA	ME	NJ	MS	LA	PR	IN	NY	NY
MI	MI	MT	NY	NC	NY	TX	MO	OR	PA
MN	MO	NJ	OH	NY	OH	VA	NY	PA	TX
NH	MS	NV	PA	OK	PA		PA	TX	
NY	NC	PA	SC	OR	SC		PR		
OH	NE	RI	TX	PA	TX		TX		
OR	NJ	SD	WA	TX	UT				
SC	NM	TN		UT	WA				
TX	NY	VT							
UT	VA	WI							
WA		WV							
WY		WY							
Total number of states and territories in each year									
18	16	18	13	14	14	9	12	10	9

Emerald ash borer (*Agrilus planipennis*)

For 2020, similar to previous years, we had planned to continue surveying for emerald ash borer (EAB) along the western front of its invasion here in Kansas. 7 western front counties (Brown, Franklin, Linn, Nemaha, Osage, Pottawatomie, Wabaunsee), Wichita in Sedgwick Co., and several localities at the

southeastern corner of the state were planned (Fig. 4). This year, only girdled trap trees were planned as part of the survey, eliminating the purple prism traps due to poor efficacy. While we were able to set up a trap tree in Pottawatomie Co. prior to the current quarantine, due to the seasonal sensitivity of trap tree deployment, all further EAB survey work will be suspended until 2021.

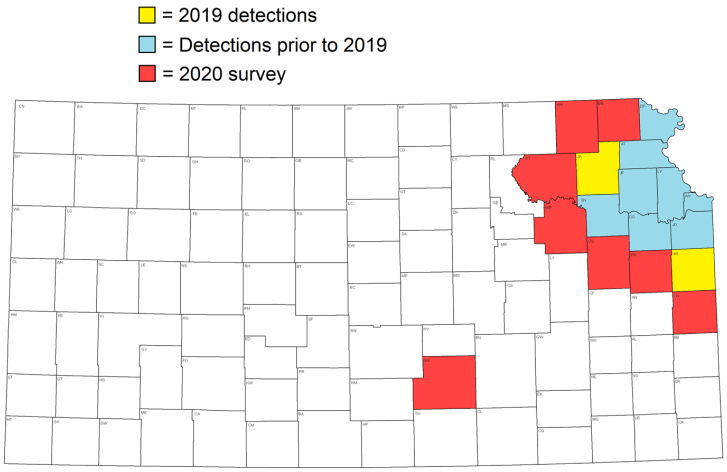


Figure 4. 2020 EAB survey plan.

Geosmithia morbida **(thousand canker disease causing fungus)**

Geosmithia morbida is the fungal pathogen that causes thousand canker disease (TCD) of walnut. As a high value timber commodity, KDA has been actively monitoring for the disease and the fungus vectoring bark beetle (walnut twig beetle [WTB]: *Pityophthorus juglandis*) for several years. However, research on this disease is increasingly demonstrating that: (1) G. morbida is common in the environment; (2) *G. morbida* + WTB causes TCD; but (3) *G. morbida* + non-WTB wood-boring beetles do not cause TCD. KDA's current quarantine (since 2014) on TCD encompasses both the fungus and the beetle as an effort to control the introduction and spread of TCD in Kansas. As an effort to have our quarantine on TCD to accurately reflect the science on the disease, KDA-PPWC is planning to conduct a survey of *G. morbida* in KS to demonstrate that G. morbid is present in the environment with sufficient ubiquity but is not causing TCD. Several eastern states including Missouri have conducted surveys of *G. morbida* on non-WTB wood-boring beetles and have found the fungus to be surprisingly abundant in the absence of TCD of walnut. KDA-PPWC is essentially making efforts to conduct our own survey for G. *morbida* as other states have here in KS.

The plan was to implement girdled trap trees, similar to our emerald ash borer survey, in order to rear out non-WTB wood-boring beetles from walnuts in Kansas and screen these beetles for *G. morbida* using a PCR-based molecular assay. Similar to the EDRR and emerald ash borer surveys, we were aiming to set up trap trees in between mid-April and early May. However, due to the COVID-19 quarantine, we have been unable to meet this required window of opportunity. Although this survey will not take place this year, we are planning to pick it back up in 2021.

References

- Moore, M., J. Juzwick, F. Miller, L. Roberts, M.D. Ginzel. 2019. Detection of Geosmithia morbida on numerous insect species in four eastern states. *Plant Health Progress*, 20: 133–139.
- Green Horizons, Fall 2018, 22(3). University of Missouri Extension. http://agebb.missouri.edu/agforest/archives/v22n3/gh2.php

Spotted wing Drosophila (*Drosophila suzukii*)

Spotted wing Drosophila was (SWD) first introduced into the United States in 2008 and has rapidly spread to many states, including a first detection in Kansas in 2013. A pest of berries and grapes, adults lay eggs into fruit where the larvae feed and develop, rendering affected fruits unmarketable in the process. While berries and grapes are major commodities in KS, relatively speaking, the damage SWD can cause to those involved in their production can be significant. Management of SWD is heavily influenced by timing of management practices. In conjunction with Kansas State University, we are looking to survey for SWD and their seasonal activity with the cooperation of growers in Kansas. Understanding the phenology of SWD in Kansas will help inform growers how to time pesticide applications and manage fruits by utilizing cold storages, for example. Although we have missed

the beginning of SWD activity in Kansas due to the COVID-19 quarantine, we are hopefully that we may minimally begin a piolt survey to better inform us for 2021.

Further Reading

K-State Research and Extension (https://bookstore.ksre.ksu.edu/pubs/MF3158.pdf).

Small grains survey

Similar to 2019, KDA-PPWC was awarded CAPS funding to survey for high profile exotic pests of small grains in Kansas that have yet to establish. It is presently unclear whether we will be able to conduct this survey this year due to the COVID-19 quarantine, but we are hopeful that we may resume when the quarantine is lifted.

Walnut twig beetle (*Pityophthorus juglandis*)

Similar to 2019, KDA-PPWC was awarded Plant Protection Act funding to survey for walnut twig beetle the vector for *Geosmithia morbida*, the pathogenic fungus responsible for thousand canker disease of walnut. It is presently unclear whether we will be able to conduct this survey this year due to the COVID-19 quarantine, but we are hopeful that we may resume when the quarantine is lifted.

Spotted knapweed biocontrol (*Centaurea stoebe micranthos*)

This year, we had made tentative plans to: (1) continue releasing biocontrol agents targeting the invasive spotted knapweed; (2) survey for the establishment of *Cyphoceonus achates* (which has yet to establish in Kansas; (3) potentially set up another site for the establishment of biocontrol agents. Due to the unforeseen setbacks due to the COVID-19 quarantine, we are uncertain whether we will be able to continue as planned. We are hopeful that we will be able to do releases as planned but are optimistic that surveys will continue as planned as they take place later in the summer.

Canada thistle biocontrol (*Cirsium arvense*)

Previously, KDA-PPWC had conducted releases of biocontrol agents targeting Canada thistle. However, it is presently unclear whether the releases have led to establishment. This year we are planning to revisit release sites to survey for the establishment of Canada thistle biocontrol agents and potentially supplement with additional releases in the future. Despite the COVID-19 quarantine, due to a late-season survey, we are optimistic that we will be able to continue as planned after the quarantine has lifted.

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Acknowledgments

We would like to thank and acknowledge the brave nurses and doctors on the front line of this COVID-19 epidemic, risking their lives to help those that are in desperate need. Furthermore, we would like to thank everyone braving these uncertain times and patiently adhering to our governor's stay-at-home orders. Finally, our hearts go out to those directly impacted by COVID-19 and wish for them the best.

AD ASTRA PER ASPERA
Kansas
Department of Agriculture

Industrial Hemp Update in Kansas

CAPS Meeting
June 3, 2020

Braden Hoch
Kansas Department of Agriculture
Industrial Hemp Supervisor
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Authorized activities with industrial hemp in Kansas (current program)

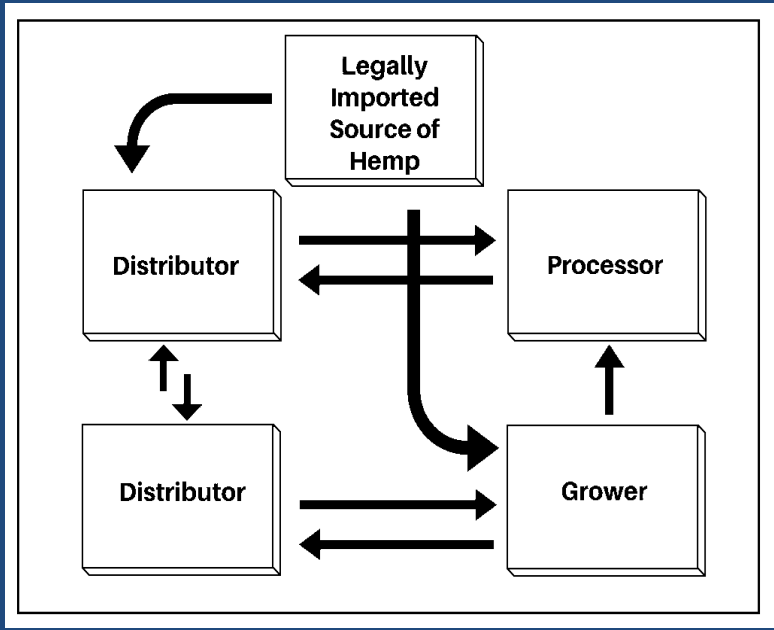


Figure 1: Activities authorized by 2018 Supp. K.S.A. 02-3902. (research, growing, cultivation, distribution, transportation, handling, storing, processing, etc.)

Table 1: Active licenses by type program; 2019 program licenses expired 02/01/2020.

License Type	2019	2020**
Grower	190*	214
Distributor	20	21
Processor	35	23
University***	9	7
TOTAL	**254**	**265**

*There were 213 active grower licenses for 2019, but 23 licensees withdrew.
**2020 information updated 06/03/2020
***Kansas State University Research and Extension (KSRE).

Kansas Department of Agriculture

Activities conducted by licensed growers in Kansas

Table 2: Acreage licensed, planted, and harvested as of 06/03/2020.

	2019		2020	
Activity	Acreage	# of counties	Acreage	# of counties
Licensed	~5,800	70	9,920	71
Planted	2,782	59	146	13
Harvested*	1,831	52	0.27	4

- Approximately 90% of the planted acreage in 2019 was grown for the floral material [cannabidiol (CBD) production]
- In 2019, 99% of the planted acreage was grown outdoors.
- As of 01/08/2020, approximately one-third of the Kansas growers sold their industrial hemp.

Kansas Department of Agriculture

Developing Commerical Regulations

Statute authorizes the promulgation of rules and regulations

2019 Senate Sub. for HB 2167
April 18, 2019

Discuss statute and the need for regulations with stakeholders

2018 FB and IFR Driving Regulations

KDA develops initial draft of regulations

Repeat as necessary

Stakeholders review draft regulations and suggest revisions

Comment Period: Aug. 22 - Sept. 13, 2019
Public Meeting: Aug. 30, 2019

KDA reviews suggested revisions and edits regulations

Develop final version

USDA Approval Process

Submission: Jan. 23, 2020
Approval: April 14, 2020

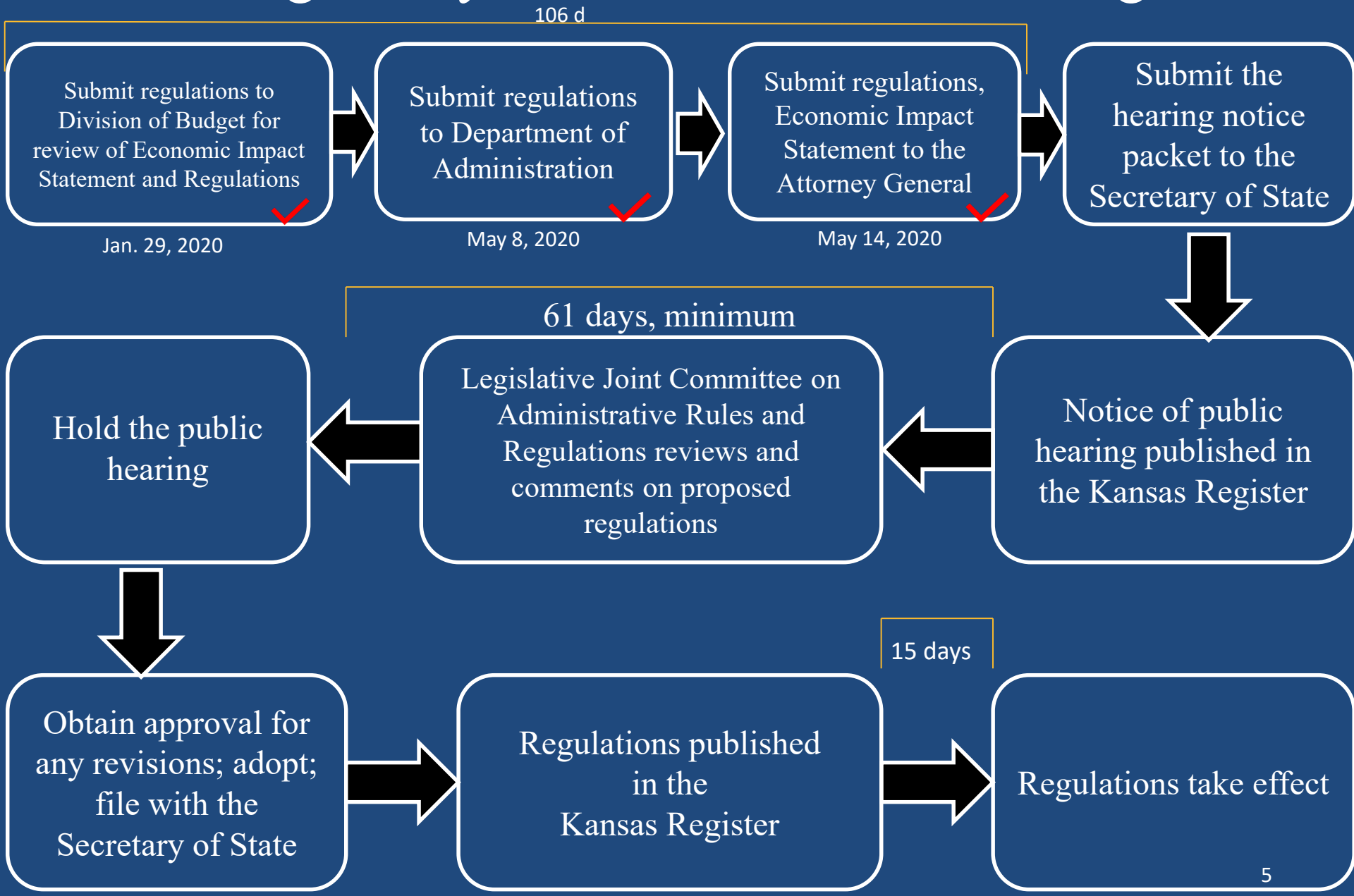
Follow Regulatory Process

Began Jan. 29, 2020
(~115 d from the KS IHRP)

*See next slide

Adoption and enforced

Kansas Regulatory Process- Commercial Program



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Mike Beam, Secretary

Laura Kelly, Governor

NEWS RELEASE
April 16, 2020

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With USDA Approval, Kansas Moves One Step Closer to Commercial Hemp Program

MANHATTAN, Kan. — The U.S. Department of Agriculture announced today that it has approved the plan submitted in January by the Kansas Department of Agriculture to regulate a Commercial Industrial Hemp Program in Kansas. This approval is a critical formal step in the process to establishing the new commercial hemp program; however, the program will not be active in Kansas until completion of the process for adoption of rules and regulations.

"This is great news for Kansas, as it moves us one step closer to establishing a commercial program for industrial hemp," said Jeff Ochampaugh, who serves as chair of the Industrial Hemp Advisory Board. "It's important for Kansans to understand, though, that our program won't be active until the regulations are adopted."

The formal adoption process for the Commercial Industrial Hemp Program regulations is underway, as they are being reviewed by several state entities including the Division of Budget, the Department of Administration, the Attorney General, and the Joint Committee on Administrative Rules and Regulations. Once the regulations have been reviewed by those bodies, they will be subject to a public hearing which must be announced in the Kansas Register 60 days prior to the hearing.

Given the timeline of the formal adoption process, it is anticipated the Commercial Industrial Hemp Program will be finalized no earlier than early fall 2020. At this time, the industrial hemp industry in Kansas continues to function under the Industrial Hemp Research Program regulations.

For more information about the industrial hemp program in Kansas, go to agriculture.ks.gov/industrialhemp.

###

2019 Survey- Insect Pests (self-reported)

- Did the hemp crop experience pest (insect) damage? Rate the extent of the pest pressure. n = 55
  - High pest pressure- 11%
  - Little pest pressure- 58%
  - Moderate pest pressure- 16%
  - No pest pressure- 15%

- What type(s) of pests (insect) were observed? Check all that apply. n = 47
  - Aphid- 49%
  - Caterpillars- 62%
  - Stem borer- 23%
  - Mites- 19%
  - Other pests-15%

  (cucumber beetles, grasshoppers, grubs, "Asian beetles")

Kansas Department of Agriculture

2019 Survey- Disease (self-reported)

- Did the hemp crop experience disease? Rate the extent of the disease observed. n = 55
  - Little disease 55%
  - Moderate pest pressure- 7%
  - No pest pressure- 38%

- Which type(s) diseases symptoms were observed on the hemp? Check all that apply. n = 33
  - Leaf spot - 73%
  - Mold/mildew- 9%
  - Stem canker- 9%
  - Root rot- 33%
  - Other- 6%

Kansas Department of Agriculture

Pesticide Products

EPA approved 10 products in December for use on industrial hemp. (https://www.epa.gov/pesticide-registration/pesticide-products-registered-use-hemp).

Below is a list of those products that are registered with the Kansas Department of Agriculture for use on industrial hemp (hemp). This list does not imply endorsement of the products by KDA, since, being a regulatory agency, KDA cannot endorse or recommend pesticide products. Additionally, the list does not imply endorsement of the products by the registrant. The list is not deemed to be complete as it is simply a capture from the database at a point in time.

Active ingredient: Extract of Reynoutria sachalinensis. Product type: Inducer of Plant Resistance to Fungal and Bacterial Pathogens
MBI-106 12 Biofungicide EPA Reg. No. 84059-21
Pacesetter EPA Reg. No. 84059-21

Active ingredient: Bacillus amyloliquefaciens strain F727. Product type: Fungicide.
AMPLITUDE EPA Reg. No. 84059-28
AMPLITUDE ST EPA Reg. No. 84059-28 (seed treatment)
STARGUS EPA Reg. No. 84059-28

Active ingredient: Extract of Reynoutria sachalinensis. Product type: Fungicide and Fungistat
REGALIA BIOFUNGICIDE EPA Reg. No. 84059-3
REGALIA CG EPA Reg. No. 84059-3

Kansas Department of Agriculture

NEW PROJECT PROPOSAL

Form Instructions: When copy and pasting into text fields please paste as "plain text".

Project Information

* The Submission (FY) refers to the current Fiscal Year.

	Program	Mega-Region	Submission (FY)*	Additional Project ID (to be added by Mega-Region)	Report Type New Proposal (NP)
Project Number:	**EM**	NC-North Central	**20**		**NP**

Project Title: (150 chars) Sentinel Walnuts: Monitoring Decline and Change in Western Kansas Walnuts for Early Detection of Thousand Cankers Disease

Years of Funding Requested: 3 Years

Final Year of Project: 2022

Proposed Budget Summary (This table is auto-generated from Budget Information sections)

Year 1 EM Total	Year 2 EM Total	Year 3 EM Total	Total EM Funds	Total Funds (All)
$ 36,856	$ 29,586	$ 32,765	$ 99,207	$ 201,413

Subject Description

Subject Common and Scientific Names:

walnut twig beetle (Pityopthorus juglandis)

thousand cankers disease fungus (Geosmithia morbida)

Host Common and Scientific Names:

black walnut (Juglans nigra)

EM Priorities Addressed (check all that apply)

- ☐ **Environmental Change and Impacts** – long-term effects on forests and forest pests
- ☐ **Unusual weather events** – deviations from normal patterns and related effects
- ☑ **National Risk Map Validation** – filling data gaps in insect & disease risk models
- ☑ **Tree mortality** – deviations from expected levels
- ☑ **Invasive species** – forest disturbances from insects, diseases and/or plants
- ☐ **Fire Disturbances** – Fire risk, fuel loading, ecological impacts, and/or restoration of damaged ecosystems

Briefly describe the project being developed (250 characters):

An existing walnut "sentinel tree" GIS layer will be leveraged to monitor condition change/decline associated with risk of regional spread of Thousand Cankers Disease. Data will be used, in part, to strategically place Walnut Twig Beetle traps.

Project Details

Background - Give a brief description of the Project including scientific framework and management implications (750 chars)

Since first being described in 2008 in Colorado, Thousand Cankers Disease (TCD) has been detected in nine western and three eastern states, but not yet in Kansas or Missouri. However, TCD has been found in several eastern Colorado towns near Kansas, along highways that lead eastward to the native range of black walnut in eastern Kansas and Missouri. Shortly after TCD was described, a project that aimed to identify black walnut "sentinel trees" across Kansas that could be monitored for symptoms of TCD succeeded in locating these trees throughout the state, but has not been able to be fully implemented due to lack of funding. Systematic monitoring of these trees will allow for early detection of decline, and identify targets for WTB trapping.

Methods - Give a brief description of methods including data availability (1500 chars)

An existing GIS layer with locations of black walnuts across the state of Kansas will be verified and used to establish a baseline. Initial focus will be on western Kansas. Condition information will be collected with the mobile ESRI Collector app, to include geospatial information, reference photos, and standardized condition class adapted from Community Forestry standards; Dead/Dying, Fair, Poor, Good. A subset will be selected for further assessment by A) the Gap Light Analyzer tool and Walnut Tree Health Index, & B) 3D photogrammetry modeling collected with an agency-owned sUAS. Results of these condition classifications and changes in condition will be used to inform follow-up placement of Lingren funnel traps for Walnut Twig Beetle (WTB), the insect component of TCD.

Field collection of condition data and reference photos will be collected by Kansas Forest Service (KFS), Kansas State Research & Extension (KSRE) agents, and Kansas Department of Agriculture (KDA) field staff. All sUAS operations will be conducted by agency-approved and FAA Part 107 certificated remote pilots, using agency-owned sUAS systems. Interpretation and assessment of data, and implementation of trapping, will be coordinated by KFS and KDA specialists, to include KFS Forest Health Program Leader, KFS Forest Entomologist, and KDA State Entomologist.

All data collected in this project will be made available to partners including the Kansas Department of Agriculture and the USDA Forest Service.

Keywords (300 chars):

black walnut, Juglans nigra, Thousand Cankers Disease, Walnut Twig Beetle, TCD, WTB, sentinel trees, condition monitoring, change detection, sUAS, canopy

Products - Give a brief description of anticipated products. (750 chars)

Major product of this project will be a GIS layer with data to include condition class by year, photo references for change detection, and updated geospatial information.

Secondary product will include canopy-based Walnut Tree Health Index data, and 3D canopy models of a subset of these "sentinel trees" for canopy change detection.

Tertiary product will be an updated GIS layer of locations of "sentinel trees" that can be prioritized for trap placement through weighted risk factors such as change in condition, location relative to pathways such as highways and campgrounds, etc.

Final product will be a comprehensive report (with dataset) provided to partners and presented at USFS FHP meeting at conclusion of project.

Schedule of Activities - Listing of major events and timeline (750 chars)

Spring 20 - Meet w/ field staff & partners to coordinate data collection, train for consistency
Summer 20 - Initial condition data collection via Collector
Winter 20/21 - Quality control & assess data for condition change; ID data gaps
Spring 21 - Meet w/ field staff to ID priorities for data collection (data gaps); progress report to USDA FS
Summer 21 - Collect condition class data for gaps; collect second round of condition for previously included trees; begin 3D modeling of subset
Winter 21/22 - Quality control & assess data for change; ID target areas for trapping
Spring 22 - Meet w/ field staff to plan season; place traps; progress report to USDA FS
Summer 22 - Finish field data collection & 3D modeling; prepare final report to USDA FS

Describe stakeholder involvement in this project - (e.g. How involved are managers and/or Forest Health Protection partners involved in this project?) (750 chars)

While traps for WTB have been deployed and monitored throughout Kansas, a purposeful linkage to declining walnuts has been lacking, especially in the western part of the state nearest to known infestations in CO. With a limited number of traps available, KDA and KFS both recognize the value in placing traps at locations with highest risk of infestation, to maximize staff time efficiency and monitoring effectiveness. This project fills a data gap, and its success will contribute to a meaningful increase in the objective data available to conduct a strategic and effective forest health monitoring program in Kansas, supported by the Kansas Forestry Association (KFA). Additionally, data from this project will improve planning within the region.

Justification

Please describe how this project addresses each of the following Evaluation Monitoring selection criteria:

a. Linkage to Forest Health Monitoring Program (How does this project build on previous FHM work or products?) (500 chars)

Previous FHM work resulted in development of a standardized paper data sheet for use in identifying symptomatic walnuts for subsequent survey work. In addition, FHM has produced a paper "Check-Off List" for selecting walnuts to sample for TCD. Neither of these products has an electronic component such as a GIS layer for follow-up analysis and change detection monitoring, and neither product is linked to an objective protocol for assessing canopy condition.

b. Significance/Impact of forest health issue (How does this project fit in to the Forest Health agenda?) (500 chars)

Walnut is a significant component of eastern Kansas forests and also a widely-planted timber tree in plantations. While these trees are within the native range of black walnut, they are also at the western-most edge of this forest type, and are more stressed and at-risk than walnuts in the heart of the forest further east. Multiple infestations in eastern Colorado along travel corridors leading east to significant walnut populations present a large risk of TCD entry, as seen on the attached map.

c. Scientific basis (How is this project supported by theory and practice?) (500 chars)

Walnut Twig Beetles are not strong flyers, and pheromone-baited Lindgren traps are limited to a small effective trapping radius. Limited numbers of traps, combined with limited staff capacity to place, monitor, and process traps, result in coarse survey for WTB. By identifying higher-risk candidates for strategic trap placement, early detection of WTB is more likely. The Ash Tree Health Index, an objective canopy thinning metric developed for EAB, will be adapted for walnuts.

d. Priority issue (What is the importance for managers and the general public?) (500 chars)

This project aligns with priorities in section 3.1.1 of the KS Forest Action Plan, "Issues that Threaten Kansas Forest Health" regarding TCD risk to 26.2 million black walnuts, calling for "systematic monitoring and trapping to ensure early detection." This project also meets FHM priority issues of filling data gaps in the insect/disease risk map (National Risk Map Validation) investigating deviations in expected mortality (Tree Mortality) & invasive insect forest disturbance (Invasive Species).

e. Cost/economic efficiancy (Describe how the cost of the project is balanced by the returns.) (500 chars)

The estimated economic loss to Kansas if TCD becomes established is more than $160 million; $851 million for Missouri. Early detection and comprehensive monitoring for TCD can mitigate or delay this loss, while preserving the opportunity for agencies and landowners to develop and implement strategies to respond to TCD. Lack of condition data for walnuts in Kansas leaves decision-makers in the dark, but this project will result in relevant, actionable data that will benefit stakeholders.

Year 1 Budget Information (For a summary of total project costs, see page 1)

Fiscal Year (FY): 2020

Budget Type	Budget	Requested EM Funding	Non-Federal Match**	Leveraged Funds***	Match Source	Leveraged Source
ADMINISTRATION	Salary	$ 13,330	$ 11,568		KFS	
	Travel for Data Collection	$ 4,350				
	Travel to Meetings*					
	Travel for Other	$ 2,030				
PROCUREMENT	Contracting	$ 2,500	$ 5,000	$ 1,000	KDA, KSRE	KFA
	Equipment	$ 2,500				
	Supplies	$ 795				
INDIRECT	Overhead	$ 11,351	$ 5,148		KFS	
	Other		$ 15,139		KFS	
	SUBTOTAL	$ 36,856	$ 36,855	$ 1,000		

Overhead Rate % (Describe in Notes): 45

Year 1 Total: $ 74,711

Year 1 Notes (1000 chars):

KDA: Kansas Department of Agriculture
KSRE: Kansas State Research & Extension
KFA: Kansas Forestry Association
KFS: Kansas Forest Service
$15,139 listed as INDIRECT, Other Non-Federal Match comes from documented VFD cards through KFS, as consolidated match.
Includes USDA-approved overhead indirect rate of 44.5%, which rounds to 45 in the text field above.
Additional details are available in the attached spreadsheet budget.

* Funds allocated for "Travel to Meetings" in year 1 will only be approved for proposals requesting a single year of funding.
** Non-Federal Matching (cost sharing) funds are raised from outside sources to increase the level of support provided by the Federal Government. This includes both cash and in-kind contributions.
*** Leveraged Funds are raised from outside sources to increase the level of support provided by the Federal Government (including cash and in-kind contributions) beyond the non-Federal matching requirements.

Year 2 Budget Information (For a summary of total project costs, see page 1)

Fiscal Year (FY): 2021

Budget Type	Budget	Requested EM Funding	Non-Federal Match	Leveraged Funds	Match Source	Leveraged Source
ADMINISTRATION	Salary	$ 13,330	$ 11,568		KFS	
	Travel for Data Collection	$ 4,350				
	Travel to Meetings					
	Travel for Other					
PROCUREMENT	Contracting	$ 2,500	$ 5,000	$ 1,000	KDA, KSRE	KFA
	Equipment					
	Supplies	$ 295				
INDIRECT	Overhead	$ 9,111	$ 5,148		KFS	
	Other		$ 7,870		KFS	
	SUBTOTAL	$ 29,586	$ 29,586	$ 1,000		

Overhead Rate %: 45

Year 2 Total: $ 60,172

Year 2 Notes (1000 chars):

KDA: Kansas Department of Agriculture
KSRE: Kansas State Research & Extension
KFA: Kansas Forestry Association
KFS: Kansas Forest Service
$7,870 listed as INDIRECT, Other Non-Federal Match comes from documented VFD cards through KFS, as consolidated match.
Includes USDA-approved overhead indirect rate of 44.5%, which rounds to 45 in the text field above.
Additional details are available in the attached spreadsheet budget.

Year 3 Budget Information (For a summary of total project costs, see page 1)

Fiscal Year (FY): 2022

Budget Type	Budget	Requested EM Funding	Non-Federal Match	Leveraged Funds	Match Source	Leveraged Source
ADMINISTRATION	Salary	$ 13,330	$ 11,568		KFS	
	Travel for Data Collection	$ 4,350				
	Travel to Meetings	$ 2,200				
	Travel for Other					
PROCUREMENT	Contracting	$ 2,500	$ 5,000	$ 1,000	KDA, KSRE	KFA
	Equipment					
	Supplies	$ 295				
INDIRECT	Overhead	$ 10,090	$ 5,148		KFS	
	Other		$ 11,049		KFS	
	SUBTOTAL	$ 32,765	$ 32,765	$ 1,000		

Overhead Rate %: 45

Year 3 Total: $ 66,530

Year 3 Notes (1000 chars):

KDA: Kansas Department of Agriculture
KSRE: Kansas State Research & Extension
KFA: Kansas Forestry Association
KFS: Kansas Forest Service
$11,049 listed as INDIRECT, Other Non-Federal Match comes from documented VFD cards through KFS, as consolidated match.
Includes budget for travel to FHM/FHP meeting to present report on project.
Includes USDA-approved overhead indirect rate of 44.5%, which rounds to 45 in the text field above.
Additional details are available in the attached spreadsheet budget.

Project Contacts (a single Funding Coordinator must be selected)

FHP Sponsor

Name: Jim Kruse | Title: Service Center Leader
Institution: USDA Forest Service | Phone: 303-236-9541
Email: jkruse@fs.fed.us | Time commitment: 0
Project Role: FHP Sponsor | Funding Coordinator: ☐

Principal Investigators

Name: Ryan Armbrust | Title: Forest Health Program Leader
Institution: Kansas Forest Service | Phone: 785-532-3276
Email: rarmbrust@ksu.edu | Time commitment:
Project Role: Coordinator/Administrator | Funding Coordinator: ☑

Name: Ryan P. Rastok | Title: Forest Entomologist / District Forester
Institution: Kansas Forest Service | Phone: 785-863-2221
Email: rrastok@ksu.edu | Time commitment:
Project Role: Forest Entomologist | Funding Coordinator: ☐

Name: Taro Eldredge | Title: State Entomologist
Institution: Kansas Dept. of Agriculture | Phone: 785-564-6796
Email: Taro.Eldredge@ks.gov | Time commitment:
Project Role: Survey Coordinator / Entomologist | Funding Coordinator: ☐

Cooperators

Name: Jami Seirer | Title: District Forester
Institution: Kansas Forest Service | Phone: 785-624-3138
Email: jseirer@ksu.edu | Time commitment:
Project Role: Field staff | Funding Coordinator: ☐

Name: John Klempa | Title: District Forester
Institution: Kansas Forest Service | Phone: 620-805-3923
Email: jdklempa@ksu.edu | Time commitment:
Project Role: Field staff | Funding Coordinator: ☐

Name: Bob Buhler | Title: Area Field Staff
Institution: Kansas Dept. of Agriculture | Phone: 785-207-1507
Email: Bob.Buhler@ks.gov | Time commitment:
Project Role: Field staff | Funding Coordinator: ☐

Additional Information in Support of Proposal

List additional documents being sent in support of the project. (e.g., graphics, photos, spreadsheets, etc.) (750 chars):

PDF: map with layers including 2010-2011 GIS point data locations of walnut sentinel trees, walnut native range, average daily traffic flow on highways, Colorado walnut TCD locations.

Spreadsheet: detailed three-year budget for project.

Citations: (2000 chars)

Atchison, Robert., et al. "Kansas Forest Action Plan", Kansas State University, October 2015.

Cary Institute of Ecological Sciences. https://www.caryinstitute.org/science/scientific-staff/our-scientists/dr-charles-d-canham/gap-light-analyzer-gla . 2019. Web.

Kees, Aubree M., et al. "Flight capacity of the walnut twig beetle (Coleoptera: Scolytidae) on a laboratory flight mill." Environmental entomology 46.3 (2017): 633-641.

Peters, Matthew P., Louis R. Iverson, and T. Davis Sydnor. "Emerald Ash Borer (Agrilus planipennis): Towards a Classification of Tree Health and Early Detection." (2009). Additional information: https://www.nrs.fs.fed.us/disturbance/invasive_species/eab/local-resources/downloads/ATHI_overview.pdf

Seybold, Steven J., et al. "Detecting and identifying the walnut twig beetle: Monitoring guidelines for the invasive vector of thousand cankers disease of walnut." UC IPM Program, University of California Agriculture and Natural Resources. 13 pp. www.ipm.ucdavis.edu/thousandcankers (2013).

Smitley, David, Terrance Davis, and Eric Rebek. "Progression of ash canopy thinning and dieback outward from the initial infestation of emerald ash borer (Coleoptera: Buprestidae) in southeastern Michigan." Journal of Economic Entomology 101.5 (2008): 1643-1650.

USFS. “Walnut and Pecan Decline/Dieback Reconnaissance Survey”. https://www.fs.fed.us/foresthealth/fhm/sp/tcd/Recon_Juglandaceae_Survey_protocol_2010.pdf. 2010:1

USFS-NRS. "Check-Off List for Selecting Symptomatic Black Walnut to Sample for TCD" https://www.fs.fed.us/foresthealth/fhm/sp/tcd/TCD_CheckList.pdfNorthern Research Station. U.S. Forest Service July 2010: 1-2

DRIPPY BLIGHT OF RED OAK

This disease has not yet been reported in Kansas, but is known to be prevalent in Boulder, CO.

Bacterial wilt with no effective treatment post-infection.

Symptoms mimic drought or blight/wilt, but are associated with presence of Kermes scale (above).

Treatment is through control of the vector (Kermes scale), likely through horticultural oil application.

For red oak group trees, if summer wilting/thinning, Kermes scale, honeydew/sooty mold are present, please note the tree, take a photo, and collect a sample for follow-up.

Symptoms could be mistaken for Tubakia blight, which was prevalent in Kansas this year (wet weather).

For questions and/or reports, please contact Ryan Armbrust, Forest Health Program Leader, Kansas Forest Service, at 785-532-3276 or rarmbrust@ksu.edu

Reporting Infestations of Callery Pear (Pyrus calleryana) in Kansas

Thank you for your interest in mapping the location of infestation of callery pear seedlings in Kansas!

For many years, callery pear and its cultivars ('Bradford', 'Cleveland Select', 'Aristocrat', etc.) have been widely planted in Kansas. While this tree is valued for its adaptability to tough sites, consistent spring flowers and fall color, and relative lack of insect problems, it is not without weaknesses. The susceptibility of 'Bradford' and other cultivars to narrow crotch angles and resultant storm damage led to the release of cultivars with improved branch angles.

Unfortunately, pears require cross-pollination to produce viable seed, and while monocultures of a single clone such as 'Bradford' did not produce viable seed, there is now significant genetic variability in the landscape and therefore ample opportunity for cross-pollination and production of viable seed.

These seeds, spread by birds, have now become established in diverse landscapes across Kansas, from Kansas City to southeast Kansas, from the I-70 corridor through Wichita and portions of the Flint Hills. For many of the same reasons callery pear was valued in the landscape as a tough tree, it is now proving difficult to eradicate as it spreads into areas where it is an unwanted disrupter and displacer of native and/or desirable vegetation.

Moving from anecdotal accounts of infestations to an objective distribution map will allow all affected parties and stakeholders the opportunity to take early-intervention control steps, and seek to direct limited resources to areas where control efforts will be most effective.

To that end, a systematic but distributed collection of data will greatly increase the actionable knowledge base, which is where professionals like yourself come in.

A network of field-based professionals from the Kansas Forest Service, Kansas Department of Agriculture, Kansas State University Research & Extension, and similar partners can utilize the powerful but easy-to-use tools provided by the National EDDMapS project; the Early Detection and Distribution Mapping System, available as an app or online at www.EDDMapS.org

This guide will provide a brief overview of the identification of callery pear seedlings, and information on how to find training on how to submit reports via the EDDMapS app and EDDMapS online.

Using EDDMapS

There are comprehensive resources on best practices for report submission on the EDDMapS website, which can be found here: https://www.eddmaps.org/tools/

There are (at least) two apps, available on Apple and Android app stores, that can report into the EDDMapS system.

- EDDMapS West: focused on states in the western half of the country, but callery pear is not yet listed as one of the pre-loaded species.
- EDDMapS Pro: more features/options than EDDMapS West, with callery pear pre-populated as an option.

For questions and/or reports, please contact Ryan Armbrust, Forest Health Program Leader, Kansas Forest Service, at 785-532-3276 or rarmbrust@ksu.edu

Identification of Callery Pear Seedlings

An important distinction must be made before any discussion of callery pear's identification can take place; for the purpose of this project, only "escaped seedlings" should be mapped, NOT landscape trees that were planted purposefully!

One of the best ways to get a "feel" for ID of this species is to browse the photo gallery available at: https://www.forestryimages.org/browse/subthumb.cfm?sub=10957

Flowers

Perhaps the easiest season to ID callery pear is in early spring, when a proliferation of white flowers will make seedlings stand out in locations where they do not belong. While some natives, such as sandhill plum and American plum, will also bear white flowers at this time, plum thickets are often more dense, localized, and shorter than a callery pear infestation. In addition, callery pears can often be spotted as a lone tree at the margin of a woodland, field, or right-of-way, in areas where plums do not typically persist.

Leaves

Leaves are often dark green, somewhat shiny to waxy, and exhibit good reddish-orange fall color, emerging after flowers have faded. Margins are sometimes wavy, but seedlings can exhibit diversity of forms.

Fruit

Callery pear fruit is borne in clusters of small, marble-sized tan-colored pears. This fruit is somewhat persistent in fall and early winter.

Form, Branching, Bark

Callery pears have a diversity of growth habits, but seedlings often show a strongly pyramidal (upright) growth habit. Branches will occasionally bear thorns, especially in wild seedlings. Bark is dark brown and furrowed on larger trees, smooth on seedlings.