

CU IN THE WOODS

Clemson Extension Forestry and Wildlife Newsletter



WINTER ACTIVITIES FOR THE BOBWHITE MANAGER

By W. Cory Heaton

The cold gloomy days of winter have arrived once again. Winter can be tough for any species of wildlife, but this is especially true for bobwhites. This is the time of year when one can really evaluate the success of their management program. Did we make enough cover to protect the birds from the elements? How about the influx of avian predators? Have our management practices created a sufficient feed supply to carry the birds through the winter? There are lots of what-ifs, but this is a great time of year to survey your habitat and identify the areas that need improvement.

Winter has always been an active time of year for habitat management activities. Tree plantings and prescribed burning are in full force, but what else can a manager do during the winter? Winter is a great time for early successional habitat management. Prescribed burning is commonly used to accomplish this task, but managers could also utilize disking or mowing to accomplish similar results. Disking is the most unique of early successful habitat management practices. Unlike burning or mowing, disking actually turns the soil over and can help to move seed stocks up or down in the soil profile. The vegetation response to disking may look much different than that observed following a prescribed burn of similar timing.

Winter disking allows the manager to promote vegetation production that is dominated by annual grasses and forbs. Species like partridge pea and ragweed are familiar to every bobwhite manager, and these species respond favorably to winter disking. Winter disking promotes favorable habitat for bobwhites and many other early successional species. In addition, the practice incorporates plant material into the soil. This plant matter begins to break down and nutrients are released back into the soil. Organic matter additions to the soil improve not only soil fertility, but also the soil's ability to retain moisture. The soil moisture holding ability greatly influences the ability of plants to survive and be productive during the hot and dry summer months. The nutritional quality and quantity of vegetation is greatly determined by soil fertility and moisture, and disking can create excellent cover and abundant food resources throughout the growing season and hopefully throughout the dormant season.

I am often asked how and when to disk. Disking intensity is really up to the manager. Light disking is all that is required for the sake of promoting annual grasses and forbs.

Continued on page 2

UPCOMING EVENTS

SC 4-H Forestry Clinic

February 21-23, 2020

John De La Howe School- McCormick

Contact: Jaime Pohlman

jaime@clemson.edu

Woodland Series- Technology

March 6, 2020

Newberry Extension Office

March 20, 2020

Cypress Gardens- Moncks Corner

Contact: Ryan Bean

rbean@clemson.edu

Woman Owning Woodlands Workshop

March 7, 2020

Ridgeland, SC

Contact: Janet Steele

jmwatt@clemson.edu

Forest Health and Invasive Species

March 19, 2020

Sandhill REC- Columbia, SC

Contact: Ryan Bean

rbean@clemson.edu

5hrs Cat. 1 CFE's available

Invasive Species

March 26, 2020

Edisto REC- Blackville, SC

Contact: Janet Steele

jmwatt@clemson.edu

5hrs Cat. 1 CFE's available

Woman Owning Woodlands Invasive Species

March 27, 2020

Sandhill REC- Columbia, SC

Contact: Janet Steele

jmwatt@clemson.edu

Find more events:

www.clemson.edu/extension/forestry

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Winter Activities for Bobwhite Manager Cont.

By light, I mean making one to three passes that are between three to six inches deep. Some sites will require much more intensive disking. This is especially true for sites dominated by fescue. In these areas you may have to disk as if you were prepping the soil for planting. It has been my observation that disking every other year in the winter provides favorable vegetation response for the bobwhite manager. Managers should look at developing a rotation that allows them to disk a portion of their habitat every two to three years. I tend to avoid going three years between disking as this can lead to some encroachment issues with woody species. I am always amazed at how fast trees can grow. Under ideal growing conditions, trees may become too large for the operation of a disk in three years. Remember the main goal of early successional habitat management is not to let the land turn back into a forest. Disking activities should never remove all the habitat in a single year. Winter cover and feed availability are critical to the success of bobwhite management. The last thing we want to do is disk all of the available early successional habitat in the winter. I suggest developing a rotation that allows a quarter to a third of the habitat to be disked each year. This way you maintain the majority of the habitat each winter.

Another valuable practice for bobwhite managers is to establish cover crops in their food plots. Small grains like wheat, rye, and oats work exceptionally well for this. Ideally, one would want to plant small grains October through mid-November, but we can get satisfactory results from small grains planted in January. These cover crops offer forage value to deer and turkey during the winter, but they also provide valuable seed sources and bugging habitat at the beginning of the nesting season. The main purpose of cover

crop plantings is to improve soil conditions for our wildlife plantings. The idea is to produce a lot of biomass that can later be planted into or disked into the soil. As discussed earlier, this biomass greatly improves the ability of the soil to retain moisture and may serve as a slow release fertilizer as nutrients are made available through the bacterial breakdown of the organic matter. The benefits of cover crops definitely outweigh the cost associated with their establishment. Managers with growing season food plots will notice a big difference in the quality of forage produced following cover crops. The Natural Resources Conservation Service (NRCS) (see link below) has been very active in the field of cover crops in recent years. Bobwhite managers could learn a lot about the topic by visiting their website.

Don't let the cold gloomy days of winter keep you inside. Get out there and take a serious look at the fruits of your management activities. Identify those areas where improvements are needed and make a plan to address the issues. Grab the jumper cables and get that tractor fired up. I know it can be a lot of fun once that tractor is dragging the disk right, but don't get too carried away. Remember, we only want to disturb a quarter or third of the habitat on any given year. If your management plans include food plots, consider planting cover crops to improve the soils and enhance future food plot plantings. I will close by reminding everyone to take good notes on their management activities and observations. No two properties are the same, and as such, responses to management activities may vary from site to site. Having good notes will allow you to identify what seems to be working best on your property.

Links to additional resources-

NRCS Northern Bobwhite Project-

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/fishwildlife/?cid=nrcseprd1299624>

County Forestry Association Meetings

Aiken

Date: February 20th

April 16th

Contact: Stephen Pohlman
spohlma@clemson.edu

McCormick

Date: February 3rd

Topic: Ips. Beetles

Contact: Tom Brant
jbrant@clemson.edu

Salkehatchie

Date: March 12th

Contact: Stephen Pohlman
spohlma@clemson.edu

Edgefield

Date: March 9th

Contact: Stephen Pohlman
spohlma@clemson.edu

Newberry

Date: February 11th

Topic: Turkey Population Trends

Contact: Jeff Fellers
fellers@clemson.edu

Saluda

Date: March TBD

Contact: Stephen Pohlman
spohlma@clemson.edu

USING HACK-AND-SQUIRT METHOD TO CONTROL UNDESIRABLE VEGETATION

By Jeff Fellers

Hack-and-squirt, sometimes referred to as frill-and-spray, is a herbicide application method that applies the herbicide into the stem (trunk) and is used to target specific undesirable trees. There is a slight variance between hack-and-squirt and frill-and-spray. Generally, hack-and-squirt refers to a cut or series of cuts around the trunk of the tree determined by tree diameter. Frill(girdle)-and-spray



Figure 1: The downward cut that creates a cup for the herbicide. Photo Credits Stephen Enloe, UF/IFAS

refers to a continuous cut around the diameter of the tree. These herbicide application methods are efficient, economical, and easy for a landowner to use as a vegetation management tool. Typically, this method is more effective for smaller areas as it can be time-consuming for large treatment areas.

The beauty of the hack-and-squirt method is that applications can be made at any time of the year with a few exceptions. Spring, when the sap is flowing, is typically not a

good time for hack-and-squirt, since the sap can push the herbicide out of the wound and cause the application to be ineffective. Also, during a drought is not a good time to apply herbicides as your kill rate will be greatly reduced. Winter is a great time to be out on your property using the hack-and-squirt method to control undesirable vegetation.

The tools needed and the application method for hack-and-squirt are simple. A machete or hatchet and a spray bottle are

really the only tools needed. The hatchet is used to make a downward angle cut (approximately a 45-degree angle) in the stem of the tree (figure 1). The height of the cut should be a comfortable working height for the applicator which is typically around the waist area. The cut is then filled with herbicide using the spray bottle (figure 2). There is no need to overfill since the herbicide that runs out of the cut will be wasted. Depending on the label, generally, 1/2 to 1 ml of herbicide is applied to the cut. Larger trees may require more “hacks” around the stem. Typically, the label will define the spacing and it will vary for different herbicides. For instance, it may read one hack for every three inches in diameter.

In Table 1, several herbicides are listed that are labeled for hack-and-squirt or frill-and-spray. Keep in mind that there are various trade names that sell herbicides with the listed active ingredient. The table only lists a few common ones as examples. Make sure you read the label before you buy any herbicides to make sure it does list hack-and-squirt or frill-and-spray as an application method. The label is the law and it is very important that the label is followed for your safety and the health of the environment. Plus, if these methods are not listed, you may be wasting your time and money.



Figure 2: Herbicide application to the cut. Photo Credits Stephen Enloe UF/IFAS

References:

Mississippi State Extension: Applying Herbicides with the Hack-and-Squirt Method <http://extension.msstate.edu/sites/default/files/publications/publications/p3276.pdf>

North Carolina State Extension: Accomplishing Forest Stewardship with Hand-Applied Herbicides <https://content.ces.ncsu.edu/accomplishing-forest-stewardship-with-hand-applied-herbicides>

Penn State Extension: Using Hack-and-Squirt Herbicide Applications to Control Unwanted Trees <https://extension.psu.edu/using-hack-and-squirt-herbicide-applications-to-control-unwanted-trees>

Table 1. Hack-and-Squirt (frill and spray) and injection herbicides

Active Ingredient	Herbicide Trade Names	Application Method	Time of Year/ Sap Flow Period
2, 4-D	2,4-D Amine, 2,4-D Amine 4	Frill or girdle: 2.5 oz per gallon of water	Any time of year but best during growing season. Avoid peak sap flow in spring
Dicamba	Vanquish	Frill or girdle: continuous overlapping cuts with a 1:1 or 1:3 mixture.	Any time of year. Avoid times during heavy sap flow in spring
Glyphosate	Accord XRT II, Roundup Pro	Hack-and-squirt: apply 1 ml per 2 to 3 inches of trunk diameter to evenly spaced cuts (50% to 100% solution). Frill or girdle: as tree diameter increase better results are achieved with continuous frill. (25% to 100% solution)	Best during growing season after full leaf expansion. Avoid peak sap flow in spring
Imazapyr	Arsenal	Hack-and-Squirt: apply 1 ml per cut, make at least one cut for every 3 inches in diameter, space cuts evenly (100% solution) Frill: 2-inch interval between cuts, thoroughly wet cuts (25% to 100% solution)	Any time of year. Avoid times during heavy sap flow in spring
Triclopyr (amine)	Garlon 3A	Hack-and-squirt: apply 0.5 ml (undiluted) or 1 ml diluted (1:1) and make a continuous circle around tree Frill or girdle: same as above	Any season Avoid times of heavy sap flow in spring

UPDATING SOUTH CAROLINA STUMPAGE PRICES

By Puskar Khanal

The Northeast and Appalachia regions have been exporting large volumes of hardwood logs and lumber to China, but this lucrative market has dropped by almost a third after the trade war started. US hardwood exports to China - worth \$2 billion annually - are currently reeling from 25% tariffs, and the impacts are being felt across the supply chain. Overall, the southern sawtimber stumpage prices have been almost flat over the last ten years, but pine pulpwood prices have shown some promise over the same period.

Sawtimber stumpage price trends:

The pine sawtimber prices indicated a higher rate of decline than the mixed hardwood sawtimber prices in the third quarter of 2019. Statewide, South Carolina pine sawtimber stumpage (standing timber) prices, on average, were \$23.11/ton in the third quarter of 2019. It is a decline of about 4.6% as compared to the prices for pine sawtimber in the previous quarter. For mixed hardwood sawtimber, statewide prices, on average, were \$24.41/ton in the third quarter. It is a decline of about 1.2% as compared to the prices for mixed hardwood sawtimber in the previous quarter.

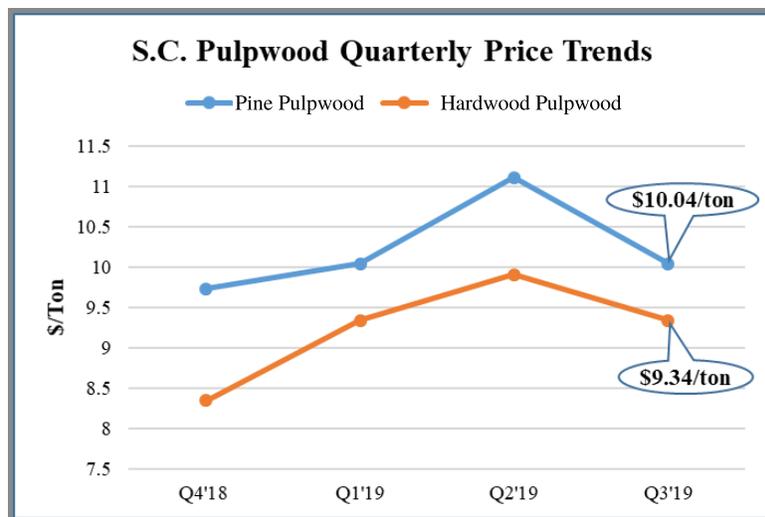
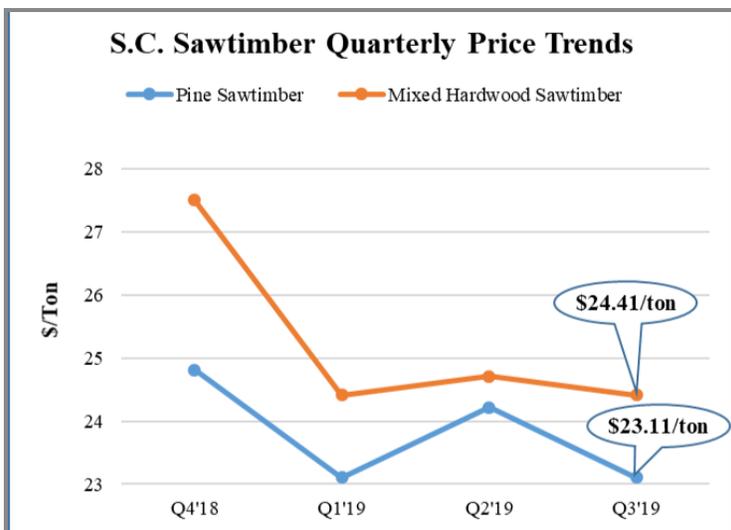
Pulpwood stumpage price trends:

South Carolina statewide pine pulpwood prices, on average, were \$10.04/ton in the third quarter of 2019. It is a decline of above 9.6% as compared to the prices in the last quarter. For mixed hardwood pulpwood, the statewide stumpage prices, on average were \$9.34/ton in this quarter. It is a decline of about 6% as compared to the prices in the last quarter.

However, stumpage prices for both sawtimber and pulpwood in your local markets could vary significantly as compared to the above statewide averages depending on size and species composition, quality of timber, total acres and volume, logging operability, distance from nearby mills, and overall market condition. Managed timber stands with large, straight, and quality trees with clear logs (logs without knots or branches) that could be used for lumber, veneer, or export products generally get a higher price. This means properly managed trees in good health and of good quality would likely get a higher stumpage price than unmanaged trees. Trees that are blown down or broken during hurricanes or ice storms also have residual value, but their value would be somewhat less than standing trees.

One common mistake some landowners make while selling their timber, is to accept the first offer without waiting for other offers. Competitive bidding by timber buyers tends to ensure that fair market value for timber is offered.

For more information, please refer to the SC Forestry Market Quarterly Updates Archive, <https://www.clemson.edu/extension/timber-market/>



HEMLOCK CONSERVATION COALITION FORMS IN THE UPSTATE

By Carolyn Dawson

Two years ago, retired US Forest Service Ranger, David Hedden entered the Oconee County Extension office and politely asked if anyone was doing anything to save the hemlock trees in the Upstate. In case you were not aware, there is a tiny insect named the Hemlock Woolly Adelgid (HWA) that is threatening the existence of the eastern and Carolina hemlocks trees. The prognosis for hemlocks is not good. If you have them, it is not a matter of if they will get the insects and die, but when. Luckily for David, he stopped by the Oconee County Extension office and the seed was planted to turn concern and passion into actions.

A year prior, Clemson Extension hosted a meeting featuring Donna Shearer, founder of Save Georgia's Hemlocks, to help educate the public about the issue of the Hemlock Woolly Adelgid. Donna has an extremely successful non-profit organization that treats thousands of hemlock trees in Georgia every year with the help of volunteers. We decided to ask her to return to help educate us on how to get a similar organization started in Upstate South Carolina. With her support, knowledge, and guidance, Clemson Extension invited several agencies and organizations to meet up and form the Hemlock Conservation Coalition (HCC). The meeting was successful with participants from the US Forest Service, SC Forestry Commission, SC State Parks, USFS Southern Research Station, Clemson University, Clemson Extension, and several non-profit organizations in attendance.

The HCC's goal is to identify, educate, treat, and protect as many hemlocks as possible in South Carolina. As we speak, we are applying for grants to help fund the treatment of our hemlocks in city municipalities, conservation easements, and other specifically designated areas. The US Forest Service and state parks in Oconee County have been treating their hemlocks for years, therefore it was not an area of focus. In addition to HCC, David and his wife Carla recently received a 501(c)(3) status to start their non-profit organization called Carolina Hemlocks. Through their efforts, they have identified and documented close to 300 trees in Walhalla alone that are in need of treatment.

Last May, the HCC and Carolina Hemlocks held an inaugural Meet, Greet, and Treat Meeting to introduce their organizations and start recruiting volunteers. In October, they held a Treatment Demonstration Workshop, and they plan to hold several more volunteer treatment workshops in 2020.

So, perhaps you are curious as to how the hemlocks are treated. Glad you asked! There is an easy, safe, and fairly inexpensive treatment you can do to ensure the trees will live. Mind you, the treatment will need to be repeated at a minimum of every three years but could last up to five years. If treated, your hemlocks should continue to thrive. The treatment involves using the pesticide imidacloprid which is not restricted. In fact, it is the chemical found in many flea and tick topical medications. The treatment for trees is not strenuous and consists of a method called soil drenching. Basically, you rake the leaves or mulch away from the trunk, poke several holes around the base of the tree and pour the treatment liquid in them. Then, finish by replacing the leaves. Be sure to read the label for correct dosing amounts as well as the required personal protective equipment to wear while using it.

Hemlocks are considered a keystone species of the Appalachians. They provide shelter, protection, nesting, and food for many species of animals. They also help moderate stream temperatures which could impact trout habitat. The loss of our hemlocks is predicted to have major impacts on forest ecosystems throughout the eastern United States. The HCC desires to ensure the survival of the hemlock tree species in the Upstate of South Carolina.

If you have Hemlocks on your property and would like education and/or assistance on how to treat them, the HCC and Carolina Hemlocks would love to help. For more information contact: Carolyn Dawson, Clemson Extension Forestry Agent at (864) 638-5889 or Dawson4@clemson.edu.



Soil drench treatment of a hemlock for control of the Hemlock Woolly Adelgid
Photo credit: Carolyn Dawson

ROUNDING UP THE EVIDENCE -Featured in *November/December 2019* issue of *Forest Landowner* magazine

By *David Coyle*

Roundup® causes cancer! Join the class action lawsuit! If you've seen the news lately, you might think that glyphosate, the commonly used active ingredient in many herbicide formulations (including Roundup®) is a cancer-causing agent. Heck, a simple Google search turns up a slew of different law offices, all of whom are more than happy to help you in your quest against Monsanto and Roundup®. Verdicts from high-profile lawsuits in California have gone in favor of the plaintiff – the person suing Monsanto – asserting that their long-term use of Roundup® caused their cancer. Look, I'm no toxicologist. I'm not an oncologist either. Heck, I'm not even a lawyer. And I most definitely don't work for any chemical company. I'm an Extension Specialist and faculty member at a land-grant university, which means I take data and make recommendations. I am also a scientist, and as one of those, I look at everything very objectively. I examine data, statistics, and experimental designs. I check to see if the science was done appropriately to make the conclusions that are made. We'll come back to this, but first, why are we even talking about glyphosate?

Controlling unwanted vegetation is extremely important to nearly all facets of forest management. Want to maximize timber production? Gotta control competing vegetation. Want to create the best deer habitat possible? Some plants are good to have, and some aren't – get rid of the ones that aren't if you want the deer. Want to have a beautiful forest for hiking and camping? Not all green is good, and invasive species can quickly turn your picturesque woods into a dense, green carpet.

There are several ways to eliminate unwanted vegetation. Prescribed fire can help in some cases, but this tactic is not feasible in all areas. Hand-pulling or other mechanical methods can work, but these are generally high in cost and effort and may not be appropriate methods for certain forest types. Goats are being used more commonly, especially in environmentally or socially sensitive areas (like green spaces in cities or steep embankments near water) – just put up a temporary fence, turn 'em loose, and watch as a herd of adorable goats munches away at any and all vegetation. While these management strategies all have their place, probably the most common way land managers deal with unwanted vegetation is with herbicides.

Herbicides are chemical formulations that interfere with plant growth. These herbicides commonly have trade names like

Garlon®, Arsenal®, or Roundup®; part of the herbicide formulation is an active ingredient (AI), such as triclopyr, imazapyr, or glyphosate. AIs disrupt or interfere with cell growth in some form. Triclopyr, for example, mimics a plant growth hormone called auxin, and when sprayed on a plant causes the plant to undergo disorganized, uncontrolled growth, which leads to the death of the plant. Imazapyr halts the production of a critical amino acid plants need to grow. Each herbicide (and AI) on the market is made to target a specific process in plants.

Glyphosate is one such AI. Commonly known as Roundup®, this chemical was discovered to have herbicidal properties in 1970 by Dr. John Franz, who at the time was a chemist working for what was then the Monsanto Company (it was recently acquired by Bayer, and the Monsanto name is no longer used – it's just Bayer). Glyphosate works by blocking the activity of an enzyme in one of the biochemical processes in plants. This process, called the shikimic acid pathway, only occurs in plants and is essential for plant growth – without it functioning properly, the plant cannot grow – hence why glyphosate is effective. Monsanto marketed glyphosate as Roundup® in 1974 and held the patent on the chemical until 2000 – meaning from 1974 to 2000, the only place you could get glyphosate was in Roundup® herbicide, which was made by Monsanto. But, when the patent expired, it became legal for any company to produce glyphosate. And, because glyphosate was one of the most widely used herbicides in the world, many companies did just that. Nowadays, glyphosate can be purchased as many different trade names (e.g. Accord®, Rodeo®, Touchdown®, or any number of generic names like Gro-Chem Glyphosate 360). It can be ordered from agricultural specialty dealers or purchased off the shelf of big box stores, and it's marketed to both professionals and homeowners. It is a widely-used and extremely useful and effective herbicide in forestry and is used on countless acres annually to control unwanted vegetation.

It should be noted that every chemical AI used for any pesticide goes through an assessment by the United States Environmental Protection Agency (EPA). Glyphosate has gone through this review, and lest some suggest there's a political aspect to this sort of thing, it's worth pointing out that the EPA under Presidents Clinton, Bush, Obama, and Trump all found glyphosate, when used according to label directions, posed no risk to human health and was not a carcinogen. That's thirty-six years and four Presidential administrations (two Democrat, two

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Rounding Up The Evidence Cont.

Republican) all coming to the same conclusion. To me, as a scientist, that's pretty strong data and conclusions.

The key point in those conclusions comes down to six words: when used according to label directions. In the United States, the pesticide label is the law. The label dictates how to apply the pesticide, how to mix the pesticide, what sort of personal protective equipment (PPE) to wear, and under what conditions the pesticide should be applied. In looking at some of these recent verdicts, in one case the plaintiffs (Alva and Alberta Pilliod) admitted they never used any protective clothing. So right away, by the letter of the law, they're using glyphosate illegally. Does this then make the manufacturer liable for damages? Furthermore, it is nearly impossible to determine what exactly caused a particular type of cancer. In some cases, the cause is more easily ascertainable, but in the case of non-Hodgkin's lymphoma (the type of cancer the aforementioned couple had) scientists do not know what causes it. If scientists who study cancer don't know what causes cancer, is it likely that a jury (comprised of mostly non-scientists) can make that determination? Again, in looking at the information available, in this particular case, it sure looks like the Pilliods had a good lawyer – because I cannot find any data to suggest glyphosate causes cancer. And I've looked.

So why should those of in forestry be concerned with glyphosate trials and verdicts? Because if we lose glyphosate as a management tool, we've lost a very important, affordable, and effective tool in the management of unwanted (and often invasive) plants. Yes, there are other herbicides, but none are like glyphosate. It's broad-spectrum (works on

all types of plants), becomes inactive in soil, breaks down in sunlight, and poses little danger to the environment. And if glyphosate gets banned, what's next? Don't get me wrong, if a product is dangerous, I most certainly don't want it on the market. But there is no valid scientific evidence to suggest glyphosate is dangerous when used appropriately. Yes, there are risks in using pesticides. There are also risks in driving, being in the sun, and eating chicken wings (back in 2004 a man died after taking part in a spicy chicken wing eating contest!). Point being, there are risks in everything – it's all about minimizing that risk and taking proper precautions.

Anti-glyphosate folks will point to a 2015 report from the International Agency for Research on Cancer (IARC) that classifies glyphosate (along with red meat and coffee) as "probably carcinogenic to humans" (of note, things classified as "known human carcinogens" include processed meat like bratwurst, alcohol, and sunlight). Scientifically, their analysis is flawed, their interpretations of data are questionable, and the conflicts of interest with this group are many. Since this report, many additional evaluations and reports have happened. For example, in 2017 the European Chemicals Agency determined glyphosate not to be a carcinogen, and in 2018 the European Food Safety Authority determined that current exposure levels of glyphosate are not expected to pose a risk to human health.

So, the next time someone tells you something will cause cancer and/or should be banned, please take a moment to consider the source and the data. If you're not comfortable doing this, get ahold of a forestry professional or your local Clemson University Extension Agent. It's our job to interpret data and help you – the landowner – make informed decisions.

NEW AGENT SPOTLIGHT- SEAN BOWERS

Please welcome Sean Bowers as the Forestry and Wildlife Agent for Dillon, Georgetown, Marion, Williamsburg, and Horry counties. Sean comes to Extension from Four Aims Forestry in Knoxville, TN, where he worked as a consulting forester. His previous employment includes experience with Stanley's Greenhouse and Plant farm in Knoxville TN after graduating from the University of Tennessee - Knoxville with a BS in Forestry. His interests are focused on hardwood management, managed fire, endangered plant communities restoration, and invasive species removal. Sean was born and raised in Roanoke, Virginia. He moved to Knoxville, TN in 2013 for school and stayed in the area until 2019. He enjoys hiking, camping, hunting, and fishing. Sean can be reached by email at sbower3@clemson.edu or phone at 843-904-9318.



THE DAUNTING LIFE OF AN OAK SEEDLING

By Stephen Peairs

The life of the oak is filled with woe as it must constantly battle for survival. Difficulty first presents itself to the oak as a young acorn. Few acorns produced during a mast crop will germinate and form a seedling. Though acorns have a high germinative capacity between 75 and 95 percent, each must become situated in a favorable microenvironment to begin formation into a seedling. If the acorn is not able to situate itself below the litter layer and contact mineral soil, it is doubtful a seedling will begin to form. Those select few acorns that do indeed germinate must then avoid several dangers including changes in the environment and impacts from grazing by insects and animals. Seed desiccation, the loss of seed moisture content, that occurs in the winter dormant season is yet another major cause of seed loss. Research has shown that only 18% of white oak acorns studied were sound enough to germinate and approximately 6% of these seedlings had a fair chance to survive. If the acorn successfully germinated and the oak seedling has formed, then first life hurdle has been cleared.

For those acorns that do survive, adequate light must be available for the seedling to grow and become an overstory tree. An oak's ability to become established is not solely related to environmental conditions, but more to their ability to persist. Oak seedlings can exist, but not grow, in the understory with lesser light conditions for a couple of decades while waiting on changes in light penetration to occur. In such sunlight limited situations, a seedling will go through a continuous cycle of sprouting and the ensuing experience of top dieback due to lack of photosynthesis. If our oak cannot advance and grow in size, the probability that it will not survive increases. Eventually, the seedling will deplete its carbohydrate reserves and mortality ensues.

Without some type of disturbance (extreme weather, logging, insect outbreak, etc.) in this stage of our seedling's life, light conditions will only change when a larger tree dies creating

a canopy gap. However, if larger shade-tolerant trees surround the seedling, the oak will become overtopped and remain stunted due to conservative growth rates of oaks. Slow growth rates also hinder an oak's ability to compete against faster-growing species, such as yellow-poplar, to capture available growing space. Thus, the oak must also prevail over its competing neighboring tree species. Hang in there little oak for only the strong will survive.

Human activity through forest management can help our oak. Introducing a process of disturbance via silviculture methods that mimic those that resulted in oak-dominant stands will assist our oak with maintaining a competitive nature. If the oak seedling can show early dominance in its local environment, odds dramatically improve for it to survive and establish a place of prominence in the upper crown classes. We can implement different timber harvesting methods to stimulate the prominence of our oaks, but in many cases, the oak will need further assistance. An example of when one might use an additional method is after a clearcut harvest. Through oak reproduction, recruitment is often elevated following a clearcut harvest. Since these seedlings and sprouts have slow growth rates, they are rapidly overtopped by pioneer tree species and herbaceous vegetation. Therefore, herbicide treatments can be implemented to eliminate plant competition.

If we can help the stem to remain competitive and establish itself in a more superior crown classification, the tree may exist for hundreds of years until it experiences mortality from natural causes. In the case of northern red oak, longevity can be up to 500 years while white oak has an average life span of 200-300 years. It is in the early stage of the oak's life that we must apply what we have learned to promote development. Proper use of fire, herbicide applications, and the creation of oak shelterwoods are a few methods that can help our oaks win the war on the ground.

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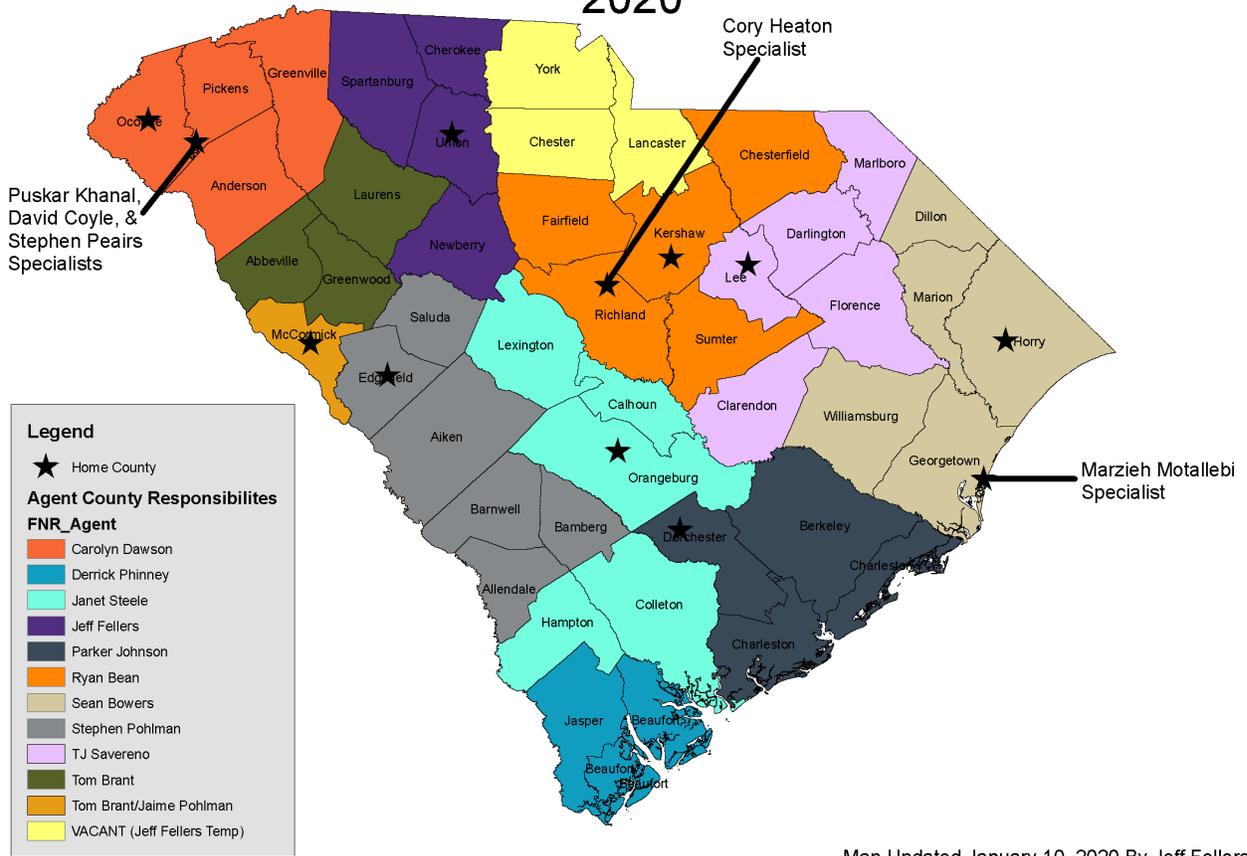


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Forestry & Wildlife Agent Coverage Across South Carolina 2020



Map Updated January 10, 2020 By Jeff Fellers

Agent

Ryan Bean
Tom Brant
Sean Bowers
Carolyn Dawson
Jeff Fellers
Parker Johnson
Derrick Phinney
Jaime Pohlman
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Background

Forestry, Cost Share Programs, Prescribe Fire, Soil Types
Forestry, Prescribed Fire, Herbaceous Weed Control
Forestry, Hardwood Management, Prescribed Fire
Forestry, Conservation, Forest Health, Firewise
Forestry, Geographic Information Systems
Wildlife Management
Forestry, Biomass, and Bioenergy
Natural Resource Education, 4-H
Forestry, Thinning, Hardwood valuation, Food Plots
Wildlife Management, Native Vegetation, Invasive Species
Forestry, Ownership Transition

Specialist

Dave Coyle
Cory Heaton
Puskar Khanal
Marzieh Motallebi
Stephen Peairs

Background

Forest Health and Invasive Species Specialist
Wildlife Management Specialist
Forest Economics Specialist
Ecological Economics, Carbon Credits
Forestry, Silviculture Specialist, Hardwood Management

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