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 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 Pilloids 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.