UNDERSTANDING SPRAY TANK CONTAMINATION: REDUCING YOUR RISK

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Although it happened many years ago, I remember my first experience with spray tank contamination as if it happened this past season. The year was 1991 and nearly constant rains had us moving from site to site in search of "dry" ground to drive on. Rigs buried in mud and partial loads left in tanks overnight were the norm. The rig was a Spray Coupe with a massive 40 foot boom. The culprit was a plant growth regulator based herbicide presumed to have been completely cleaned out prior to switching to soybeans. The proof that it was not completely cleaned out showed up 4-5 days later when the headlands and first pass were obviously injured – injured enough to be noticed in a windshield survey at 50 mph!

Fast forward to 2016. The equipment is larger. Pesticide labels now provide very specific cleanout procedures. And yet as I drive this state traveling between research trials, it seems that herbicide injury is just as prevalent as ever. Although spray drift can be blamed for some of the incidents, tank contamination with its classic appearance of straight lines and inverted-V shaped symptoms appears to be responsible for many of the cases. Applicator understanding of pesticide chemistry, formulation and herbicide injury symptoms is critical for proper sprayer cleanout and avoidance of these costly mistakes.

Understanding Tank Contamination

How a pesticide is formulated can play a role in determining its potential for tank contamination. Although it would seem that there are many pesticide formulations on the market, they can be subdivided into three general classes:

1) Petroleum based – includes emulsifiable concentrates (EC) and ester formulations. These formulations generally bloom into a cloudy emulsion when added to the tank and may form sticky residues on tanks and lines.
2) Water based – includes salt formulations such as glyphosate and amines. These formulations generally form a clear, true solution when added to the tank and are comparatively easy to clean out.
3) Clay based – includes wettable powders (WP), water dispersible granules (WDG), dry flowables (DF), flowables (F) and suspension concentrates (SC). In most cases the pesticide remains on very small clay particles which are dispersed in the spray tank during agitation and application. This clay has been known to settle out and accumulate in strainers, lines and other low spots in the plumbing. Physical removal of the clay is often necessary to achieve full cleanout.

Acknowledging the pesticide formulation will provide insight into the cleanout process, long before you check the label for the exact procedure for the products you are spraying.

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Herbicide mode of action, i.e. the chemistry of the pesticide being applied will play the greatest role in tank contamination. Group 2 products, especially sulfonyl ureas tend to cause some of the most significant problems. In addition, products which produce very noticeable injury symptoms at relatively low rates should be addressed with equally aggressive cleanout procedures. Some examples include contact herbicides (like PPO inhibitors applied POST) or products like plant growth regulators (dicamba, 2,4-d) and the bleaching symptoms of HPPD Inhibitors. The following chart addresses issues to watch out for within the herbicide mode of action categories:

Group	Site of Action	Comments
1	ACCase Inhibitors	Most group 1 herbicides are EC formulations potentially leaving oily residues. Greatest concern is contamination onto corn and other grass crops.
2	ALS Inhibitors	Sulfonyl ureas can be very difficult to effectively clean out. Raising the pH improves solubility and is essential to attaining proper cleanout.
9	EPSP Synthase Inhbitors	Glyphosate is water soluble and relatively easy to clean. Greatest concern is tendency for glyphosate to soak loose residues from previous applications.
4	Plant Growth Regulators	Minute residues of PGR's can leave visual symptoms on broadleaf crops. Amine formulations are easier to clean than ester formulations.
19	Auxin Transport	Includes the active ingredient diflufenzopyr which is a component of Status. Minute residues can leave very visual symptoms.
5,6,7	Photosynthesis Inhibitors	Generally EC and clay based formulations. Greatest concern is residues post-emergence to susceptible crops.
10	Glutamine Synthesis Inhibitors	Glufosinate is primarily a contact herbicide. Lack of cleanout may leave quick visual injury symptoms on susceptible crops.
13,27	Pigment Inhibitors	HPPD Inhibitors are mostly formulated as clay based. Be sure to check strainers, etc. Small residues can leave very visual bleaching symptoms
14	PPO Inhibitors	Residues rarely cause issues with soil applied applications. Post-emergence can cause stunting and necrotic spots so careful cleaning is necessary.
22	Photosystem 1 Electron Div.	Gramoxone is water soluble. Although achieving cleanout is relatively easy, minor residues will cause noticeable injury symptoms.
3	Seedling Root Growth Inhibitors	Several formulations. Although rarely problematic as tank contaminants, oil based EC formulations may hold residues of other tank mix partners.
8,15	Seedling Shoot Growth Inhibitors	Several formulations. Although rarely problematic as tank contaminants, oil based EC formulations may hold residues of other tank mix partners.