



Glyphosate Use as a Pre-Harvest Treatment: Not a Risk to Food Safety

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Glyphosate is labeled as a pre-harvest weed control treatment in wheat and other cereal grains. This practice has recently received a lot of media attention bringing up questions about the safety of our food supply due to use of glyphosate. In the southern Great Plains and in the southeastern U.S., glyphosate is sparingly used as pre-harvest weed control option in wet years. Occasionally, wet field conditions after the wheat has matured, creates a prime environment for summer annual weeds to grow at a rapid rate. Actively growing weeds in an otherwise dead wheat field can present harvest issues. In this instance, a grower may choose to apply glyphosate to prevent harvest problems. Harvest problems caused by weeds might include damage to field equipment; increased grain moisture (which can cause storage problems) and foreign material or “trash” in the harvested grain. This practice would be expensive to a farmer who already has a tight bottom line when growing wheat. A glyphosate application could run as much as \$6.50 per acre just for the chemical.

In some spring wheat areas, farmers may use these applications to achieve more uniform drying of wheat plants, while controlling weeds. If applied according to label restrictions, these applications would be made after the crop is physiologically mature. This means the grain is already made and the crops are simply dying because the plant machinery is shutting down.

For those unfamiliar with the wheat plant, it is important to note that the grain is not exposed prior to harvest. Individual grains are encased in the glume. Think of the glume as an envelope covering the seed from the elements and holding it in place until harvest. The threshing process in the combine separates the grain from the glume and the glume is discarded, even in whole wheat.

Because the glume is discarded, the wheat coming into the consumer market does not have unsafe levels of herbicide residue on it from late season glyphosate applications. The main protection from herbicide residues in food is the Environmental Protection Agency’s (EPA) residue limit set for each commodity where pesticides are likely to be present. Many raw agricultural commodities and consumer products made from these raw commodities have allowable glyphosate residue tolerances set by the EPA (Table 1). Wheat is considered a

cereal commodity and is assigned a residue tolerance of 30 parts per million on grain at post-harvest timing. All cereal grains except rice have a residue limit (current as of May 2015). However, the EPA further breaks down wheat into other consumer products such as wheat bran and wheat flour. In this case, the EPA does not set a tolerance for wheat bran or wheat flour because glyphosate residues do not concentrate in the grain. Likewise, cooking oils including soybean, corn and canola oil do not have residue tolerances set, since glyphosate is not concentrating inside the seeds pressed for oil.

To give a relatable example, sweet corn has a residue limit of 3.5 parts per million. This is the amount of glyphosate allowable on this product at purchase. Studies investigating glyphosate residues on wheat as soon as three days after the application, recovered 20 times LESS glyphosate than the EPA allowable tolerance on a food (sweet corn) commonly eaten.

Table 1. EPA tolerance limits for glyphosate on common agricultural commodities.

<i>Commodity</i>	<i>Tolerance Allowable (ppm)</i>
Egg	0.05
Fish	0.25
Popcorn, sesame seed; rice; peanuts; strawberries	0.1
Apples; grapes; other berries; stonefruits; bananas	0.2
Asparagus; cucumber; squash; melons; citrus; okra	0.5
Tree nuts (almond, pecan, walnut); dried tea	1.0
Sweet potato	3.0
Sweet corn (husk off)	3.5
Poultry	4.0
Quinoa; carrots	5.0
Hop	7.0
Dry peas	8.0
Canola seed; soybean seed	20.0
Corn; barley; oat; sorghum; wheat	30.0
Wheat Four; Wheat Bran	none set
Canola; corn; soybean oils	none set

Glyphosate Safety

Many of the crops consumed as food everyday receive glyphosate applications, therefore EPA requires residue research on glyphosate be extensive. This means the food supply is safe with regard to glyphosate residues.

The Acute Oral LD₅₀ for glyphosate and some other common household products are listed in Table 2. Glyphosate is much safer to ingest orally than many other products purposefully consumed everyday including caffeine, aspirin and table salt. An average woman weighing 150 pounds would need to consume a full half-gallon of formulated glyphosate at once to reach this threshold. An average man at 210 pounds would need to consume 0.7 gallon of formulated glyphosate. On the other hand, it would take less than 0.5 ounces of pure caffeine to reach the same level of toxicity in the human body.

Table 2. Acute Oral LD50 of some common herbicides and common household products. This is the amount of a product consumed on a per-weight basis that would kill 50% of a population. For example, if 10 people consumed the 50% lethal dose (LD₅₀), five of them would die.

<i>Compound</i>	<i>LD₅₀ (mg/kg)</i>
Nicotine	9
Paraquat (Gramoxone)	125
Caffeine	192
Bleach	192
Household ammonia (10%)	350
Tylenol	338
Codeine	427
2,4-D	666
Aspirin	1,240
Atrazine (Aatrex)	3,090
Table salt	3,320
Glyphosate (Roundup)	4,900

To put this in perspective, glyphosate is applied as a pre-harvest weed control at 22 ounces per acre. An average wheat harvest in Oklahoma of 35 bushels per acre would yield 1,750 pounds of grain, assuming the wheat weighs 50 pounds per bushel. If every last bit of glyphosate were still on that harvested grain, the pound of wheat it takes to bake a loaf of bread would contain 0.012 ounces of glyphosate and an average weight woman described above would need to consume 938 one-pound loaves of bread AT ONE TIME to reach the Acute LD₅₀ dose. The average American will only consume 4,376 loaves of bread in an entire lifetime.

This is to help remind us that our food supply is safe. Glyphosate and other pesticides are used in this country at rates much lower than a generation ago. The careful discretion of a farmer who needs to spend as little money as possible to raise a good crop.

References

[EPA] Environmental Protection Agency. 2015. Electronic code of federal regulations: Title 40: Protection of Environment. Chapter I—Environmental protection agency Subchapter E-Pesticide programs Part 180: Tolerances and exemptions for pesticide chemical residues in food, Subpart C: Specific tolerances §180.364: Glyphosate; tolerances for residues.

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