



Romancing the Foam No. 93



The Beatles just released the White Album. It's late 1968 or early 1969 and I owe my friend Ray. He helped me in a medical emergency and may have saved my life. Ray is fifties button down collar v-neck sweater smooth in an era of pony tails and tie-dye. Ray is more DA shaped by Brylcreem. This girl is calling him and he wants her to go away. I can handle it Ray. I take the call. I explain that Ray is not in the mood to talk with anyone right now. You have to promise not to tell anyone this. Ray has a wooden ear and while he was on a date last week, when kissing a girl good night, his ear fell off. Now Ray is mortified and doesn't want to see anyone. I told her his friends felt bad because to kid around we would light wooden matches on his ear and we were worried that we may have screwed the ear up. He is going to get it fixed – he may even get a plastic one. The girl was quite sympathetic. Two weeks later when Ray decides to see her she won't get close to him for fear of knocking the ear off.

Weed killer beer strikes me as a wooden ear type issue. It hit the streets last Thursday when the German Munich Environmental Institute (Umweltinstitut München e.V.) released a report announcing that Germany's top 14 selling beer brands contained levels of glyphosate that exceeded the levels for pesticides allowed by the European Union (EU) Drinking Water Directive by as much as 30 times the standard. Obviously pesticide laden beer violates the sacred German beer purity law (Reinheitsgebot) and challenges the status of one of Germany's finer products.

Monsanto brought glyphosate to market in 1974 under the tradename Roundup. Roundup kills broadleaf weeds and grasses by disrupting their metabolism. Plants get the biggest dose of Roundup through their leaves so it only works on actively growing plants. Monsanto had genetically engineered a Roundup resistant soybean when paired with Roundup ensured weed-free farming. As of 2013 the 173.2 million planted acres of genetically engineered crops in the US included corn, soybeans, cotton, canola, sugarbeets, alfalfa, papaya, and squash.

I dislike Roundup and Roundup Ready crops because of the kind of agricultural system they encourage, not because they make beer poisonous. I find the Munich Environmental Institute's announcement a little misleading because in North America we are used to health based standards and usually consider a pesticide to be worse than an herbicide. The European Union (EU) is different. Their definition of

March 2, 2016



pesticide includes any organic insecticide, herbicide, fungicide, nematocide, acaricide, algicide, rodenticide, slimicide, and related products such as growth regulators and any relevant metabolites, degradation and reaction products. Even if the chemical breaks down and is no longer toxic, it still falls under the EU Directive for pesticides in drinking water. The EU developed the Directive in 1980. The Directive is not a health-based toxicity standard. The EU set the maximum quantity allowed in drinking water for any individual pesticide at 0.1 parts per billion (ppb or $\mu\text{g}/\text{l}$) and for all pesticides combined at 0.5 ppb. They chose 0.1 ppb because that is the lowest level the equipment of the time could detect. Here are the 14 beers and the glyphosate levels detected:



Beer	Parts Per Billion ($\mu\text{g}/\text{l}$)	Parts Per Million (mg/l)
Hasseröder Pils	29.74	0.02974
Jever Pils	23.04	0.02304
Warsteiner Pils	20.73	0.02073
Radeberger Pilsner	12.01	0.01201
Veltins Pilsener	5.78	0.00578
Oettinger Pils	3.86	0.00386
König Pilsener	3.35	0.00335
Krombacher Pils	2.99	0.00299
Erdinger Weißbier	2.92	0.00292
Paulaner Weißbier	0.66	0.00066
Bitburger Pils	0.55	0.00055
Beck's Pils	0.50	0.00050
Franziskaner Weißbier	0.49	0.00049
Augustiner Helles	0.46	0.00046

March 2, 2016



The lowest detectable level is not necessarily toxic and health based standards are more than an order of magnitude higher. The World Health Organization sets a health based drinking water value of 0.9 parts per million (ppm or mg/L) for glyphosate, the US Environmental Protection Agency (EPA) has set a drinking water limit of 0.7 ppm and Canada's Drinking Water Guideline for glyphosate is 0.28 ppm.

All the German beers pass the health based standards. The EPA considers a short term ten day exposure of 20 mg/L (ppm) of glyphosate safe for a 22 lb. (10-kg) child or a 7 year exposure of 1 mg/L per day. What does that do to our beer drinking? Hasseröder Pils has the highest glyphosate concentration of 29.74 ppb. It would take 1,895 12 ounce bottles per day for ten days to exceed the ten day exposure and 95 bottles per day for 7 years to exceed the 7 year exposure for a 22 lb. child. The Munich Environmental Institute's study found the lowest concentrations (0.46 ppb) of glyphosate in Augustiner Helles. Exceeding the Canadian standard (0.28 ppm) would require drinking 1,715 12 ounce bottles of Augustiner Helles per day for a lifetime.

While I am not concerned about the toxicity of glyphosate in beer, I am concerned that it is there in the first place. Glyphosate is moderately persistent in soil with a half-life averaging 44 to 60 days. Less than 1% of the glyphosate in the soil is absorbed by plant roots and it has little effect on seeds planted in the ground. Farmer's primarily use Roundup on genetically engineered Roundup Ready (Roundup resistant) crops. The levels in beer should be reasonably low because there is no genetically engineered Roundup Ready malting barley or wheat in production in North America (<http://ambainc.org/content/58/gm-statements>) and it is doubtful it is used on German malting barley. Some farmers may use Roundup as a desiccant on certain crops just before harvest allowing an earlier harvest and putting less strain on harvest machinery by reducing the amount of green material in the fields. Malt producers do not like glyphosate used on malting barley because it reduces the percentage of barley that germinates during malting and some think that it encourages the growth of fusarium, a fungus that can ruin beer. Chemical residues in barley can also negatively affect yeast growth during the brewing process. The American Malting Barley Association states that the malting and brewing members of the association will not knowingly buy malting barley treated with glyphosate and that the North American malting and brewing industry will test for residues (<http://ambainc.org/stream/item/6/amba-disapproves-of-post-heading-herbicide-treatments>).

Maltsters pay a premium for malting barley and have rigorous specifications for malting barley. Farmers must restrict the amount of nitrogen fertilizers used on malting barley to meet the required low protein levels so they have lower yields. Basically, treating your barley with Roundup before harvest converts your malting barley into lower priced feed barley.

North American Maltsters are testing for glyphosate. There are no published tests for glyphosate in North American beer but due to their testing of barley for glyphosate, I would assume levels below detect levels. If you are concerned about glyphosate levels in beer, you can find a list of American Malting Barley Association members here: <http://ambainc.org/content/16/membership-information>. Drink beer made from malt produced by the maltsters who belong to the association. There is also a list of brewers that also belong to the association.

March 2, 2016



I reviewed malt specifications for the EU and the only place where glyphosate may be used as a desiccant is the UK where higher rainfall requires pre-harvest treatment. The British Beer and Pub Association set a glyphosate Maximum Residue Level of 20 mg/kg (16.6 ppm). I could not find any malt specifications in English for the rest of Europe, but continental maltsters, with lower rainfall rates typically would not use glyphosate as a desiccant. Beer made from Belgian and German malt will probably have lower glyphosate levels than beer made from UK Malt. So does the glyphosate get into beer? Probably the same way it is showing up in organic food products and other commercial goods that are not treated with glyphosate containing products such as Roundup - drift. When farmer A applies Roundup to his or her field, the wind blows some of the Roundup onto adjacent fields.

According to the National Potato Grower, drift, also known as off-target movement, can account for anywhere from 1% to 20% of the amount of glyphosate applied to the field and can have effects up to half a mile away. The Wine Business Blog reported that in late May 2014, aerial spraying on Bouldin Island in the Sacramento-San Joaquin River Delta caused damage in vineyards 35 miles or more apart. Drift wreaks havoc with vineyards, damaging the vines and may make grapes unfit for sale as glyphosate is not approved for use on grapes. It also can wipe out orchards and hop fields. Organic farms damaged by drift may lose their organic accreditation for 3 years.

The Journal of Pesticide Reform has found glyphosate reduces the ability of legumes to fix nitrogen in the soil and harms fungi in the soil that help plants absorb nutrients. In aquatic environments it harms algae and plankton at the bottom of the food chain and may do the same thing to earthworms and



other small animals in the soil. Farmers using herbicide tolerant genetically engineered crops can maintain their yields increasing the application of fertilizers, pesticides and other nutrients which in the long run undermines the sustainability of the system.

So as I'm drinking my mug of Franziskaner Weißbier, the focus on the toxicity of weed killer beer strikes me as a wooden ear moment. I cannot say definitively whether or not the beer is safe but if it is in beer in trace amounts then it is probably in a lot of other places where it should not be in trace amounts. It threatens non-genetically engineered crops and it promotes a non-sustainable agriculture system. Glyphosate is like a drunk relative who shows up where least expected, disrupts everything, embarrasses all involved and will not go away. That is what freaks me out.