Work Product of Center for Food Safety

November 2012

Exposure to Herbicide Residues and Herbicide-Resistant Crops

Herbicide-resistant crops facilitate direct "over-the-top" or "post-emergence" application of the associated broad-spectrum herbicide directly to the growing plant to kill weeds through all or much of the growing season. This post-emergence usage pattern is impossible with most conventional crops, since the herbicide (e.g. glyphosate) would damage or kill it; thus, the use of herbicides like glyphosate with conventional crops is restricted primarily to "pre-emergence" or "burndown" applications (before sprouting) to clear the field of weeds at the start of the season.[1] Some crops naturally have low-level tolerance to certain herbicides; for instance, 2,4-D can be applied post-emergence at low rates (e.g. up to about 0.5 lb/acre) to conventional corn, but higher rates will often damage it.[2] When such a naturally tolerant crop is genetically engineered for resistance, however, much higher rates can be applied without risk of crop injury; thus, Dow's 2,4-D-resistant corn is practically undamaged at rates as high as 4 lbs./acre.[3] Herbicide-resistant crops thus facilitate either entirely new or greatly increased post-emergence use of the associated herbicide(s).

One consequence of "over-the-top" application of herbicides to herbicide-resistant crops is increased residues of the HR crop-associated herbicide in or on those crops and commodities derived from them, which can mean higher levels of herbicide residues in the foods we eat. Herbicide residues can result from direct spraying of the pertinent crop or crop component; systemic movement of the herbicide to the pertinent crop component

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[1] Broad-spectrum herbicides such as glyphosate are occasionally used in "spot" treatments to remove thick infestations of weeds in conventional crops, where the need to kill competing weeds justifies some crop loss. Another relatively minor use of herbicides like glyphosate is "preharvest" applications to mature (conventional) crops, in situations when a farmer has let weeds proliferate to such an extent that they would interfere with harvesting. This use – often called a "rescue treatment" – is infrequent because farmers normally control weeds early in the year, since letting them proliferate reduces yield, often substantially. Preharvest applications have recently become more common in grain (e.g. wheat) crops, and can lead to relatively high residue levels.

[2] Dow Patent (2009). "Novel Herbicide Resistance Genes," Inventors Terry R. Wright et al, assigned to Dow AgroSciences LLC, Pub No. US 2009/0093366 A1, April 9, 2009, Table 25, paragraph 0354.

[3] Dow (2011). "Petition for Determination of Nonregulated Status for Herbicide Tolerant DAS-40278-9 Corn," Dow AgroSciences, submission to USDA, revised 4/12/11, p. 103.

after absorption by the plant; and, in the case of meat and meat byproducts, from accumulation of the herbicide in the animal's tissues following ingestion of herbicide-bearing grain, forage or other crop byproduct.

While USDA regulates herbicide-resistant crops, EPA regulates herbicide residues. Developers of herbicide-resistant crops often petition EPA to establish new, or raise existing, maximum allowable levels (i.e. tolerances) of herbicide residues to facilitate introduction of the corresponding HR crop.[4] EPA has generally granted these petitions. Such petitions to EPA are normally submitted before petitions to USDA to deregulate (i.e. approve) the HR crop, although there is no set timeframe for coordination of such requests, or responses to them. Below, we document some of the tolerance changes associated with herbicide-resistant crops, which are given in units of parts per million (ppm).

It should be noted at the outset that we have found it extremely difficult to follow tolerance changes over time. One source is Federal Register notices in which EPA announces specific tolerance decisions (e.g. for glyphosate residues on "corn, field, grain"); we cite such rulemaking documents wherever possible, but do not have a complete list of them. A second source is the Code of Federal Regulations, which gives snapshots of all tolerances for particular pesticides as of a particular date under CFR Title 40, Part 180 (e.g. § 180.364 for glyphosate tolerances), which is regularly updated online. CFS has periodically downloaded such snapshots, which provide a means to narrow down the period in which specific tolerance decisions were made. A complicating factor alluded to further below is EPA's frequent and confusing redefinitions of tolerance categories. Some tolerance decisions specify the herbicide-resistant crop, while others do not.

At present, nearly all GE herbicide-resistant crops withstand either glyphosate or glufosinate, the former far more prevalent than the latter. Aventis CropScience (now part of Bayer CropScience) developed a number of glufosinate-resistant LibertyLink crops. At the request of Aventis, EPA established new tolerances for residues of glufosinate in or on food and feed products derived from glufosinate-resistant versions of canola, cotton, corn,

[4] In many cases, the HR crop developer also manufactures the associated herbicide. For instance, Monsanto developed both Roundup Ready crops and Roundup; Bayer sells both glufosinate-resistant (LibertyLink) crops and glufosinate; Dow manufactures 2,4-D and is poised to introduce 2,4-D-resistant crops. However, other manufacturers of the pertinent herbicide might also apply to EPA for tolerance changes.

rice, soybean and sugar beet.[5] In the same rulemaking, EPA also established glufosinate tolerances for various meat products derived from cattle, goat, hogs, horse, poultry and sheep. Glufosinate-resistant canola, corn, cotton, and most recently soybeans are planted commercially, but not rice or sugar beets.

Far more prevalent are Monsanto's glyphosate-resistant Roundup Ready (RR) crops. Below we cite some of the new or increased glyphosate tolerances linked to their introduction. The major RR crops are corn, soybeans, cotton, canola, alfalfa and sugar beets. Other firms have already developed, or are in the process of developing, their own glyphosate-resistant crops.

Roundup Ready corn was introduced in 1998. The glyphosate tolerance for corn grain was 0.1 ppm in 1996,[6] and was increased ten-fold sometime in the following four years to reach 1 ppm by the year 2000.[7] This same rulemaking tripled the tolerance for corn forage from 1 ppm[8] to 3 ppm (see entry for "corn, field, forage."). EPA doubled the corn forage tolerance to 6 ppm in 2003.[9] Today, the corresponding tolerances stand at 5 ppm for "corn, field, grain" (a five-fold and 50-fold increase over the levels in 2000 and 1996, respectively) and 13 ppm for "corn, field, forage," with an additional tolerance of 100 ppm for "corn, field, stover."[10]

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[5] USEPA (2003). Glufosinate-Ammonium; Pesticide Tolerance. *Federal Register*, Vol. 68, No. 188, Sept. 29, 2003: 55833-55849. "Tolerances are established for residues of the herbicide glufosinate ammonium … in or on the following food commodities derived from transgenic canola, transgenic cotton, transgenic field corn, transgenic rice, transgenic soybean and transgenic sugar beet that are tolerant to glufosinate ammonium."

[6] USEPA (1996). Permanent Tolerances by Pesticide: Aug 1996 TIS, page 139, see entry for "Grain, crops." At this time, there was no separate glyphosate tolerance listing for corn grain.

[7] USEPA (2000b). "Glyphosate; Pesticide Tolerance," Final Rule, Federal Register, Sept. 27, 2000, Vol. 65, No. 188: 57957-57966, http://www.epa.gov/EPA-PEST/2000/September/Day-27/p24318.htm. See entry for "corn, field, grain" in the table at the end of the document. Note that the glyphosate tolerance for corn grain was not altered in this notice, but rather had already had been increased from the 0.1 ppm level prevailing in 1996.

[8] USEPA (2000a). "Glyphosate; Pesticide Tolerance," Final Rule, Federal Register, Aug. 30, 2000, Vol. 65, No. 169: 52660-52667, http://www.epa.gov/EPA-PEST/2000/August/Day-30/p22168.htm.

[9] USEPA (2003). "Glyphosate; Pesticide Tolerance," Final Rule, Federal Register, June 18, 2003, Vol. 68, No. 117: 36472-36476.

[10] CFR (2012). Code of Federal Regulations: Title 40, Part 180, § 180.364 Glyphosate; tolerances for residues, current as of November 21, 2012. See: www.ecfr.gov/cgi-bin/text-idx?region=DIV1;type=boolea...n3=Section;view=text;idno=40;node=40%3A25.0.1.1.28.3.19.131;rgn=div8. The "corn, field, stover" tolerance was not listed in the corresponding CFR listing of glyphosate tolerances as of September 15, 2009, and thus must have been established since then.

The first of two Roundup Ready sugar beet events was deregulated by USDA in a Federal Register notice dated January 8, 1999.[11] Allowable residues of glyphosate on sugar beets were raised by EPA four months later from 0.2 ppm for sugar beets generally to 10, 10 and 25 ppm for sugar beet roots, tops and dried pulp, respectively.[12] In the same rulemaking, EPA established what appear to be new tolerances for canola: canola meal (15 ppm) and canola seed (10 ppm). Monsanto introduced Roundup Ready canola in 1997. In the rulemaking, EPA noted that: "The residues from treatment of sugar beets and canola include residues in or on sugarbeet and canola varieties which have been genetically altered to be tolerant of glyphosate." The canola seed tolerance has since been doubled to 20 ppm.[13]

Monsanto began conducting field tests of Roundup Ready alfalfa in 1998. EPA raised the glyphosate tolerances for alfalfa forage from 75 to 175 ppm, and for alfalfa hay from 200 to 400 ppm, in the year 2000.[14] Monsanto filed its first petition for deregulation of Roundup Ready alfalfa with USDA in 2003; a revised version was submitted in 2004; and Roundup Ready alfalfa was first approved in 2005.

The original Roundup Ready cotton was introduced in 1997; Roundup Ready Flex cotton, which is labeled for a nearly 50% higher application rate (32 ounces/acre vs. 22 ounces/acre of Roundup), was introduced in 2006. Glyphosate tolerances for "cotton, undelinted seed," and "cotton, gin byproducts" were 15 ppm and 100 ppm, respectively, in the year 2000,[15] and have since been raised to 40 ppm for seed and 210 for gin byproducts.[16] The tolerance for gin byproducts had increased to 175 ppm by 2009,[17] and

[11] See Federal Register notice at http://www.aphis.usda.gov/brs/aphisdocs2/98_17301p_com.pdf, last visited November 26, 2012.
[12] USEPA (1999). "Glyphosate; Pesticide Tolerance," Final Rule, Federal Register, April 14, 1999, Vol. 64, No. 71: 18360-18367. See section III(C). Magnitude of Residues, for the preexisting tolerance for "beets, sugar" of 0.2 ppm.
[13] CFR (2012), op. cit.
[14] For old and new tolerances, respectively, see tables at end of following rules: USEPA (2000a), op. cit.; and USEPA (2000b), op. cit.
[15] USEPA (2000b), op. cit.
[16] CFR (2012), op. cit.
[17] CFR (2009). Code of Federal Regulations, Title 40, Part 180, Section 180.364: Glyphosate; tolerances for residues, June 22, 2009.

soon thereafter was raised again, to 210 ppm, specifically to facilitate introduction of Bayer CropScience's GE glyphosate-resistant (GlyTol) cotton.[18]

Glyphosate tolerances for soybeans have also increased substantially. In 1987, tolerances stood at 15 ppm for "soybean, forage," 15 ppm for "soybean, hay," 20 ppm for "soybean, hulls," and 6 ppm for "soybean, seed."[19] Today, the corresponding tolerances are 100 ppm (forage), 200 ppm (hay), 120 ppm (hulls) and 20 ppm (seed).[20] Monsanto began developing Roundup Ready soybeans in the 1980s, and began field-testing in 1989.[21] The soybean seed tolerance was raised from 6 ppm to 20 ppm in 1992,[22] and Roundup Ready soybeans were deregulated by USDA in 1994.[23] The ostensible reason for raising tolerances for soybean seed and soybean hulls was to facilitate preharvest application of glyphosate to soybeans (USEPA 1987, op. cit.). As noted above, however, soybean farmers seldom make preharvest applications of herbicides. It is likely that the increased tolerances served primarily (or at least, double-duty) to pave the way for post-emergence application of glyphosate to Roundup Ready soybeans.

The glyphosate tolerance for "aspirated grain fractions" (grain dust, fed to livestock) was set at 100 ppm in 2003,[24] and has since been raised to 310 ppm.[25]

Monsanto has also sought tolerance increases for glyphosate residues on rice, wheat and creeping bentgrass to support introduction of glyphosate-resistant versions of those crops,[26] though none have been deregulated or grown commercially.

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[18] USEPA (2009). "Glyphosate; Pesticide Tolerances," Federal Register, June 24, 2009, Vol. 74, No. 120: 29963-29966. "Cheminova, Inc. has requested a Section 3 registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) for application glyphosate to glyphosate-tolerant cotton, including Bayer GHB614 cotton (GlyTol cotton), a genetically modified cotton being commercialized by Bayer Crop Science. As a result, the petitioner has requested that the current tolerance for cotton, gin byproducts be increased to 210 ppm."

[19] USEPA (1987). Interagency memo on glyphosate toxicology, relating to potential adverse effects of glyphosate on the pituitary gland, see: http://www.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-103601_12-Jan-87_229.pdf.

[20] CFR (2012), op. cit.

[21] See http://www.isb.vt.edu/getRelDetail.aspx?bp=89-034-11r.

[22] USEPA (1992). "Pesticide Tolerances and Food and Feed Additive Regulations for Glyphosate," Final Rule, *Federal Register,* Sept. 16, 1992, Vol. 57: 42700.

[23] See FR notice at: http://www.aphis.usda.gov/brs/aphisdocs2/93_25801p_com.pdf.

[24] USEPA (2003), op. cit.

[25] CFR (2012), op. cit.

[26] USEPA (2002). "Notice of filing pesticide petitions to establish a tolerance for certain pesticide chemicals in or on food," Federal Register, April 17, 2002, Vol. 67, No. 74: 18894-18899. "The tolerances proposed for rice

Derivatives of the major crops that are now primarily Roundup Ready, corn and soybeans, are widely used in human foods. Field corn is used to make cornflakes, corn chips, tortillas, taco shells, corn flour, corn grits and similar products, as well as high-fructose corn syrup, corn oil, and numerous additives in processed foods (e.g. corn gluten). Soybeans are used to make tofu, tempeh and similar soy-based products,[27] soybean oil-based margarine, and ingredients in processed foods, such as lecithin.

However, the majority of these and other glyphosate-resistant crops enter the food chain indirectly, as animal feed. Most field corn grain is fed to livestock (or turned into fuel ethanol, with byproducts fed to animals). Alfalfa is a forage crop fed mainly to livestock (especially dairy cows). Soybeans and canola are pressed for oil, and the remaining soybean and canola meal components of these crops serve as protein-rich animal feeds. Forage, hay, hulls and other non-seed components of corn, soybeans, cotton and sugar beets are also often fed to livestock. Corn silage (immature corn plants, harvested whole and fermented) is a major animal feed, especially for dairy cows. Whole cottonseed, cottonseed meal and gin byproducts of cotton are also fed to animals. Sugar beet tops and dried pulp can also serve as minor components of animal feed.

Since animal feed is a major use of crops that are now primarily glyphosate-resistant, and glyphosate tolerances for those crops (and various components) have been raised significantly to facilitate their introduction, it seems likely that glyphosate residues in the organs, meat byproducts and/or the meat of those animals has risen, increasing human exposure to glyphosate residues in food.

As of 1996, glyphosate tolerances relating to animal components were as follows: 4.0 ppm for the kidney and 0.5 ppm for the liver of cattle, goats, hogs, horses and sheep; and 0.5 ppm for both the kidney and liver of poultry.[28] The current list has no tolerances for kidney or liver, but rather only single tolerance listings for the "meat byproducts" of cattle, goat, hog, horse and sheep (all set at 5.0 ppm). Poultry tolerances are set at 0.1 ppm

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and wheat commodities, and the grass, forage, fodder, and hay group include both conventional and glyphosate tolerant rice, wheat, and creeping bentgrass."

[27] However, tofu, tempeh, and similar products are made from food-grade soybean varieties that are seldom if ever genetically engineered.

[28] USEPA (1996), op. cit.

for meat and 1.0 ppm for meat byproducts.[29] CFS found no standard definition for "meat byproducts" in EPA's Food and Feed Vocabulary Lookup.[30] An EPA scientist contacted by CFS indicated that EPA utilizes USDA's definition of "meat byproducts,"[31] which is "any [animal] part capable of use as human food, other than meat." Thus, glyphosate tolerances relating to animal products have been both broadened and increased since 1996. While only liver and kidney were permitted to have glyphosate residues in 1996, today such residues are permitted in any edible organ or non-meat tissue of the animal, as well as in poultry meat. In addition, the glyphosate tolerance for kidney has been raised from 4 to 5 ppm, and the tolerance for the more commonly eaten liver has been increased by an order of magnitude, from 0.5 to 5.0 ppm.

Roundup Ready crop systems have spurred a worsening epidemic of glyphosate-resistant weeds, which now infest an estimated 38-60 million acres of U.S. cropland,[32] creating market opportunities for crops resistant to other herbicides.[33] Of the 16 GE crops awaiting approval by USDA, 12 are herbicide-resistant,[34] several to two or three herbicides each. Dow has corn resistant to 2,4-D and ACCase inhibitors and soybeans resistant to 2,4-D and glufosinate. Monsanto has dicamba-resistant soybeans. BASF has imidazolinone-resistant soybeans, while Bayer has isoxaflutole-resistant soybeans. All or most will come stacked with additional resistance to glyphosate. Many other HR crops are planned.[35]

Herbicide-resistant crops raise several concerns. First, they eliminate the risk of crop injury that has greatly constrained use of the associated herbicides up to this time. If

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[29] CFR (2012), op. cit.

[30] See http://cfpub.epa.gov/oppref/food_feed/index.cfm and http://cfpub.epa.gov/oppref/food_feed/groupbyterm.cfm.

[31] In an email dated Dec. 10, 2012, EPA Senior Scientist Sue Hummel indicated that EPA utilized USDA's definition of "meat byproduct" at http://www.fsis.usda.gov/Help/glossary-m/index.asp: "Any part capable of use as human food, other than meat, which has been derived from one or more cattle, sheep, swine, or goats. This term, as applied to products of equines, shall have a meaning comparable to that provided in this paragraph with respect to cattle, sheep, swine, and goats."

[32] For 38 million acre estimate, see: Syngenta (2009). "Leading the Fight against Glyphosate Resistance," http://www.syngentaebiz.com/DotNetEBiz/ImageLIbrary/WR%203%20Leading%20the%20Fight.pdf. For 60 million acres, see: Bomgardner, M (2012). "War on Weeds," Chemical & Engineering News 90(21): 20-22. http://cen.acs.org/articles/90/i21/War-Weeds.html.

[33] Kilman, S. (2010). "Superweed outbreak triggers arms race," Wall Street Journal, 6/4/10. June 4, 2010. http://www.hawaiiseed.org/downloads/articles/GMO-superweeds-herbicides-WSJ-6-4-10.pdf

[34] See top two tables at: http://www.aphis.usda.gov/biotechnology/petitions_table_pending.shtml, last visited 11/27/12.

[35] Green, J et al. (2007). "New multiple-herbicide crop resistance and formulation technology to augment the utility of glyphosate," Pest Management Science, DOI: 10.1002/ps.1486

the new HR crops are widely adopted, they will certainly lead to massive increases in herbicide use, just as RR crops have dramatically increased glyphosate use.[36] Second, HR crop systems promote not only greater use of herbicides, but application directly to the crop later in the season, increasing the likelihood of higher residues at harvest time. Third, some of the herbicides associated with HR crops are toxic and/or persistent, raising concerns about harm to human health from exposure to their residues, for instance isoxaflutole, a probable human carcinogen,[37] and 2,4-D.[38] Though glyphosate has a reputation of relative safety, a large number of studies suggest potential harmful effects from exposure to it and formulations that contain it.[39] Fourth, some HR crops are engineered to resist herbicides via action of an enzyme that converts the herbicide to a metabolite (breakdown product) that is non-toxic to the plant, but which in some cases may be as or more toxic to humans and animals. Dow's 2,4-D-resistant corn and soybeans transform 2,4-D into 2,4-dichlorophenol (2,4-DCP), which is not included in current 2,4-D tolerance expressions and may pose toxicity concerns.[40] DuPont-Pioneer has developed GE glyphosate-resistant corn and soybeans to contain an enzyme that transforms glyphosate to *N*-acetyl-glyphosate, and successfully petitioned EPA to have the latter included in the tolerance expression for the former.[41] This enzyme acts not only on glyphosate, but on native plant compounds, transforming them into novel or unusual forms that may pose food safety concerns.[42] Fifth, HR crops designed to be used with multiple herbicides will likely harbor higher residue levels of multiple herbicides at once. For instance, Dow and

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[36] Mortensen DA, Egan JF, Maxwell BD, Ryan MR, Smith RG (2012). "Navigating a Critical Juncture for Sustainable Weed Management," Bioscience 62(1): 75-84.
[37] See: http://www.centerforfoodsafety.org/wp-content/uploads/2012/11/Bayer-FG72-soy-CFS-science-comments-9-11-12.pdf.
[38] See http://www.centerforfoodsafety.org/wp-content/uploads/2012/04/24-D-Health-Scientists-Letter.pdf.
[39] Reviewed in: PANAP (2009). "Glyphosate Monograph," Pesticide Action Network Asia and the Pacific, by Dr. Meriel Watts, November 2009. http://www.panap.net/sites/default/files/monograph_glyphosate.pdf. See also: Seralini, G-E. et al (2012). "Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize," Food and Chemical Toxicology 50(11): 4221-31.
[40] CFS (2012a). "Comments to EPA on Notice of Receipt of Applications to Register New Uses of 2,4-D on Enlist AAD-1 Corn and Soybean," Center for Food Safety, June 22, 2012, pp. 39-43, 47-48. http://www.centerforfoodsafety.org/wp-content/uploads/2012/11/CFS-24-D-Comments-to-EPA-FINAL-6-22-12.pdf.
[41] USEPA (2008). "Glyphosate; Pesticide Tolerances," Federal Register, December 3, 2008, Vol. 73, No. 233: 73586-73592.
[42] CFS (2007). "CFS comments to USDA regarding its environmental assessment of DuPont Pioneer's GAT soybeans, event 356043," Center for Food Safety, Dec. 4, 2007, pp. 13-21. http://www.centerforfoodsafety.org/pubs/Dupont%20GAT%20Comments%20FINAL%2012-4-07.pdf.

Monsanto will market products combining glyphosate with 2,4-D and dicamba, respectively, for use with their crops. This marketing of package systems comprising multiple HR crop seeds and premix herbicide products appears to be an industry-wide strategy[43] that promises "a new era" and "a very significant opportunity" for chemical companies, in the words of a Dow scientist.[44] Finally, herbicide use on HR crops fosters more rapid evolution of resistant weeds than other uses of those same herbicides,[45] and thus will drive an accelerating spiral of increasing herbicide use, resistance, and introduction of new crops resistant to additional herbicides. The history of glyphosate tolerance increases with Roundup Ready crops suggests that these new HR crops will be accompanied by substantially increased tolerances as well. Both farmers and consumers will likely be increasingly exposed to higher levels of more herbicides.

EPA is currently considering a request from Dow to register 2,4-D for use on 2,4-D-resistant corn and soybeans,[46] and requests from Monsanto and BASF to register dicamba for use on Monsanto's MON 87708 dicamba-resistant soybeans,[47] under FIFRA. In addition, Monsanto had previously petitioned EPA to register a different version of dicamba for use on dicamba-resistant soybeans,[48] and also to establish new tolerances for dicamba residues on soybean forage (45 ppm) and soybean hay (70 ppm) under the Federal Food Drug and Cosmetic Act.[49] These requests are currently under consideration by EPA. Many similar tolerance increase requests are expected in tandem with new HR crop introductions.

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[43] Green, J et al. (2007), op. cit.
[44] As quoted in Kilman (2010), op. cit.
[45] For glyphosate and RR crops, see: Neve, P. (2008). "Simulation modeling to understand the evolution and management of glyphosate resistance in weeds," Pest Management Science 64: 392-401.
[46] CFS (2012a). "Comments to EPA on Notice of Receipt of Applications to Register New Uses of 2,4-D on Enlist AAD-1 Corn and Soybean," Center for Food Safety, June 22, 2012, pp. 39-43, 47-48. http://www.centerforfoodsafety.org/wp-content/uploads/2012/11/CFS-24-D-Comments-to-EPA-FINAL-6-22-12.pdf.
[47] USEPA (2012). "Pesticide Products; Receipt of Applications to Register New Uses," Federal Register, August 22, 2012, Vol. 77, No. 163: 50686-50688, items 4 & 11. For CFS comments, see September 21, 2012 entry at: http://www.centerforfoodsafety.org/campaign/genetically-engineered-food/crops/policy-comments/.
[48] USEPA (2010a). "Pesticide Products; Registration Applications," Federal Register, August 18, 2010, Vol. 75, No. 159: 51045-51047, item 10.
[49] USEPA (2010b). "Notice of Receipt of Several Pesticide Petitions Filed for Residues of Pesticide Chemicals in or on Various Commodities," Federal Register, August 4, 2010, Vol. 75, No. 149: 46924-46926, item 4.