BEYOND PESTICIDES
701 E Street, SE ▪ Washington DC 20003
202-543-5450 phone ▪ 202-543-4791 fax
info@beyondpesticides.org ▪ www.beyondpesticides.org

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Ms. Michelle Arsenault
National Organic Standards Board
USDA-AMS-NOP
1400 Independence Ave. SW.,
Room 2648-S, Mail Stop 0268
Washington, DC 20250-0268

Re. CS: Newspaper and Other Paper

These comments to the National Organic Standards Board (NOSB) on its Fall 2017 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

Newspaper or other recycled paper without glossy or colored inks is listed at 7 CFR 205.601(b) as mulch and 205.601(c) as a compost feedstock. For some time, we have asked that the NOSB examine the current status of paper that might be used in organic production, particularly because of the now common use of colored inks in newspaper and the shift to soy-based inks. The Crops Subcommittee has received a technical review (TR) on the issue, and here we address issues from the perspective of information in that TR.

Is the current annotation still necessary?

Yes. Although there is a movement toward elimination of the worst of the heavy metals in colored inks (lead and cadmium), it is not complete, and the substitutes are not non-toxic. Although the 2017 TR says, "No human health risks were identified from the various glosses, coatings and laminates that are applied to 'glossy' paper, either as a primary risk through direct ingestion or as a secondary risk through the soil," these materials include toxic chemicals, including acrylonitrile, polyethylene (LDPE), styrene, butadiene, vinyl acetate, and polyvinyl chloride (PVC). Acrylonitrile is "highly poisonous" and classified by EPA as a probable human carcinogen (B1.)[1] Styrene is a neurotoxin,[2] and the National Toxicology Program (NTP) rates styrene as "reasonably anticipated to be a human carcinogen."[3] Butadiene is considered genotoxic, and the NTP considers 1,3-butadiene to be a known human

[1] https://pubchem.ncbi.nlm.nih.gov/compound/acrylonitrile.
[2] https://www.atsdr.cdc.gov/phs/phs.asp?id=419&tid=74.
[3] https://ntp.niehs.nih.gov/ntp/roc/content/profiles/styrene.pdf.

carcinogen, with exposure is highly correlated with incidence of leukemia.[4] Vinyl acetate and its metabolite acetaldehyde are genotoxic in human cells in vitro and on animals in vivo. It is considered a possible human carcinogen.[5] PVC is made from vinyl chloride, and contains phthalates. Dioxins are released from PVC during manufacture or landfilling. Vinyl chloride is considered a human carcinogen by NTP. Phthalates and dioxins are carcinogens and endocrine disruptors.[6]

Inks

"Colored ink has a different composition from black ink, and it is more highly variable. As previous technical reviews noted, formulations vary widely." (2017 TR lines 146-147.)

"Various elemental 'heavy metal' compounds are used as pigments in certain colored inks. The compound of greatest toxicological concern has been lead chromate ($PbCrO_4$) or 'chrome yellow' (U.S. NLM 2016). Another ink ingredient of toxicological concern is cadmium sulfide (CdS), also known as 'cadmium yellow'. Mercury is also used for a variety of pigments in inks, in particular mercuric sulfide (HgS) used for red pigmentation. Other elemental based pigments include cobalt blue ($CoAl_2O_4$), chrome green (Cr_2O_3), molybdate orange ($Pb(CrMoS)O_4$), Paris green ($Cu(C_2H_3O_2)_2 \cdot 3Cu(AsO_2)_2$), and Prussian blue ($Fe_4[Fe(CN)_6]_3$." (2017 TR lines 152-158.)

"The use of heavy metal based pigments has been reduced due to environmental and health concerns, but they remain in use for certain print applications. On the other hand, the use of colored ink in newspaper printing has increased. Many colored inks are proprietary formulations and some specific compositions are highly guarded trade secrets. Because of the proprietary nature of ink formulations, it is not possible to say how widely each formulation is used, although as hazardous substances they would presumably be reported on the individual ink's Safety Data Sheets (SDSs)." (2017 TR lines 162-167.)

Inks, including black inks and soy inks, contain compounds that persist in the environment. Heavy metals used in colored inks do not decompose. "While most inks do not contain heavy metals, some do. Because ink formulations are often proprietary and are highly variable, heavy metal content of printed paper can be determined only by analytical methods. Some states have regulations that limit the consolidated total metal content of lead, chromium, mercury and cadmium in a finished package to 100 parts per million (ppm). These regulations are aimed at protecting the environment during the disposal of post-consumer waste. Chlorinated yellow dyes are also non-biodegradable." (2017 TR, lines 475-484.)

"Some of the alternatives to metal based dyes—such as azo- and anthraquinone-based dyes—are considered possible carcinogens. During the 1990s in the UK, the trend was for lead, mercury and cadmium in colored newsprint to decrease below the detection limit. On the other

[4] https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~zDKVWB:1.
[5] https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~ytZAUJ:1.
[6] https://toxtown.nlm.nih.gov/text_version/chemicals.php?id=84.

hand, the increased use of colored ink in newsprint leads to an increase in elemental barium (Ba) and copper (Cu)." (2017 TR, lines 505-510.)

"USDA's Natural Resource Conservation Service (NRCS) recommends, 'Only use newspaper text pages (black ink); color dyes may be harmful to soil microflora and fauna if composted and used.' Azo dyes, which have been developed as alternatives to some of the metal based dyes, are biodegradable by several species of bacteria. However, chlorinated yellow dyes are non-biodegradable." (2017 TR lines 614-618.)

"Inks, coatings and other paper additives are documented to have environmental impacts. The Coalition of Northeastern Governors (CONEG) regarded the heavy metals in packaging to pose hazards to public health and safety, and to the environment. Paper products make up the largest part of this stream. To address this problem, CONEG prepared draft model legislation that limited the amounts of cadmium, lead, mercury, and hexavalent chromium in packaging. As of October 2016, the following states have adopted laws that limit these toxic substances in packaging: California, New York, New Jersey, Washington, Iowa, Minnesota, Connecticut, New Hampshire and Rhode Island." (2017 TR, lines 635-641.)

The U.S. and some other countries have banned lead and hexavalent chromium from pigments in food grade packaging, but not other uses. Not all countries –e.g., South Korea and China—have eliminated these metals. (2017 TR, lines 676-686.)

Colored toners may also contain heavy metals. "These patents disclosed over 100 different dyes and pigments that could be used. The formulations of the pigments were not fully disclosed in the patents. Many were azo- or anthraquinone-based, and a number included different metallic agents, including cadmium, chromium and copper." (2017 TR lines 173-176.)

Glossy paper ingredients

In addition to nonsynthetics used as fillers in glossy paper, synthetic chemicals may also be used. "Various petrochemical polymers, such as acrylonitrile, polyethylene (LDPE), styrene, butadiene, vinyl acetate, and polyvinyl chloride may also be used to create a glossy finish. Various resins are used to laminate the gloss and bind the polymer to the paper surface." (2017 TR lines 182-185.) LDPE and paraffin would not significantly degrade in soil. (2017 TR lines 499-500.)

"No human health risks were identified from the various glosses, coatings and laminates that are applied to 'glossy' paper, either as a primary risk through direct ingestion or as a secondary risk through the soil." (2017 TR, lines 688-689.)

Are there problems with paper that is allowed under the current annotation?

Food packaging is identified in the 2017 TR as possibly containing hazardous materials. Bisphenol A (BPA) may be used in newspapers. All inks contain persistent chemicals. Black inks may contain toxic solvents, and it is not clear whether soy-based inks contain those same solvents. There are some unanswered questions.

Paper additives.

"The prevalent reactant acid used in thermal paper is bisphenol A (BPA). BPA is also used in flyers, magazines, newspapers, napkins, paper towels, toilet paper and paper cups." (2017 TR lines 61-63.) "With the growing concerns about endocrine disruption related to BPA, its low dose toxicity, and the way it can enter the bloodstream through the skin, efforts are underway to find suitable replacements. Two are bisphenol F (BPF) and bisphenol S (BPS). These analogs of BPA appear to have in vitro estrogenic activity similar to BPA." (2017 TR lines 512-515.)

"Traditional paper processing has used gelatin as an additive since the 14th century CE, and "papermakers' alum," or aluminum sulfate, since the 17th century CE. Various fillers have been used nearly as long. Modern paper products also use a wide variety of synthetic polymers and co-polymers that change the functionality and performance of the paper compared with simple cellulose-starch blends. Aluminum foil and paraffin waxes are added to paper and paperboard used in food packaging." (2017 TR lines 49-54.)

Black inks.

"Black inks are composed primarily of oils, which may be of petroleum or vegetable origins, and carbon black, which is mostly produced from petroleum. Most modern newspaper inks or 'news blacks' are produced from naphthenic petroleum oils. The next most prevalent ingredient is carbon black, which is also primarily a petroleum derivative. Carbon black may also be produced from coal tar and may use rubber from recycled tires and recovered plastics. A number of solvents are used in commercial inks, including toluene, xylene, methyl chloroform, methyl isobutyl ketone, and hexane. Because of environmental considerations, these solvents are being replaced with water-based inks. While these inks have reduced solvents to less than 1% of the formulation, they are not solvent-free. Prior to the development of fossil fuels, ancient black inks about 4,500 years ago were made from animal or vegetable charcoal mixed with glue. Charred animal and vegetable material may make up a small fraction of current production of carbon black, but this is exceptional and not the industry norm." (2017 TR, lines 133-144.)

Inks, including black inks and soy inks, contain compounds that persist in the environment. (2017 TR, lines 475-477.)

Adhesives. (2017 TR, lines 188-203)

Various paper products have adhesives, including glues and starches derived from animals and plants. "Modern adhesives are mostly petroleum derivatives." (2017 TR, line 190.) Adhesives in corrugated cardboard "may include formaldehyde, urea, melamine, and starch based resins." (2017 TR, lines 191-192.) A wide variety of consumer and office products use various glues and adhesives. The TR says most adhesives are proprietary, but include polyvinyl alcohol, ethylene vinyl acetate, polyolefin, polyamide-based adhesives.

Waxes, Resins, and Polymers (2017 TR, lines 188-203)

Paper and cardboard may also be covered with waxes (mostly paraffins), resins (derived from pine tar, coal tar, or heavy crude petroleum), or polymers (including polyethylene, polyacrylimides and polyesters.)

Other ingredients

Paper may also contain chlorine compounds from bleaching (2017 TR line 437-438), chelating agents such as ethylene diamine tetraacetic acid (EDTA) and diethylene pentamine tetraacetic acid (DPTA), and sodium silicate (2017 TR lines 445-446), surfactants used to detach the inks from the fibers (2017 TR lines 447-448), enzymes used to promote de-inking (2017 TR line 448). A by-product of de-inking is a sludge that may contain inks, pigments, fibers, fillers, adhesives and coating compounds. (2017 TR line 453.) "The USDA is actively supporting the advancement of cellulose nanotechnology," which can be used to create paper. (2017 TR lines 462-464.)

Source issues

GMO trees

"[G]enetically modified trees have been developed and may be used for paper production. The traits for which trees are being genetically modified include reduced lignin, higher cellulose content, fiber structure that is more easily pulped by enzymatic action, insect and disease resistance, and rapid growth, among other traits. China began commercial plantings of genetically modified trees in 2002. The U.S. has permitted plantings of genetically modified papaya and one plum variety, but not commonly pulped species. Commercialization of genetically modified forest trees has faced challenges in the U.S. and elsewhere for reasons such as inadequate financial returns on investment, government regulation that limit plantings, and lack of public acceptance." (2017 TR lines 69-78.)

Recycled content

In general, there has been an upward trend in the percentage of paper made from recycled sources. Paper produced in the United States is estimated to be between one-third to almost one-half recycled content. The United States recovers and recycles a lower percentage of paper than other countries. In 2002, the United States used about 41% recycled paper in its manufacturing. (2017 TR lines 80-84.)

"Recovered paper can come from a number of different sources, and may be made into a variety of products based on the grade. The U.S. EPA recognizes five basic paper grade categories: old corrugated containers, mixed paper, old newspapers, high grade de-inked paper, and pulp substitutes. These five major categories are further segmented by sources, uses, and levels of contaminants. The Institute of Scrap Recycling Industries (ISRI) recognizes over 50 grades of scrap paper." (2017 TR lines 92-96.)

"Paper and paper manufacturing by-products that are unsuitable for recycling are more likely to be used as compost feedstock and mulch than higher grade recovered paper that can be used to make paper. In general, it is the lowest grade of paper that is relegated to mulch and compost feedstocks, since they are the lowest value products made from recovered paper." (TR lines 103-107.)

"Paper considered unsuitable for recovery, repulping or recycling into paper, or otherwise rejected by pulping mills, can still be used to make compost and may be used as a

feedstock in MSW compost. Reasons for rejection include the presence of food-soiled paper or napkins, and amounts too small to bale for transportation to the de-inking facility. However, some paper is also rejected due to toxic contaminants and other impurities. Plastics, motor oil, paint, glass, and other non-paper materials may interfere with the composting process, downgrade compost quality, or even render the compost harmful to soil organisms, plants and humans. The less pre-sorting done with recovered paper, the greater the perceived likelihood that it will have contaminants that interfere with recycling and composting (ISRI 2016)." (2017 TR lines 121-129.)

Additional annotation?

The current annotation is easy to understand and apply. However, the new information in the TR seems to indicate that it may be inadequate to delineate paper that –regardless of regulation– would be desirable for use by a grower. The CS should ask whether there is any way an additional annotation could be used by the grower. Could an annotation specifically oriented towards mulch products be helpful?

Additional Questions

It would be helpful to the grower if the NOSB would suggest guidance on sourcing paper to use for mulch and composting. To do that, the TR should be supplemented with information that is more oriented towards source. The TR has identified paper food packaging as a source of chemicals that growers might want to avoid, even if the annotation remains unchanged. It also appears that newspaper and other waste paper may have chemical additives that organic growers would like to avoid. The NOSB should seek out information about whether there are ways for growers to choose paper for mulch and compost that are free from toxic and endocrine disrupting chemicals.

Conclusion?

Unfortunately, we are unable to make a recommendation regarding the listing for newspaper and other paper. The new information only leaves us with more questions regarding how growers can ensure that the paper they use "fosters cycling of resources, promotes ecological balance, and conserves biodiversity," as required by law. We hope that the CS will keep this on its work agenda in order to address some of the issues raised here.

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors