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Proposed Maximum Residue Limit

PMRL2026-06

Ethylene bis-dithiocarbamate (EBDC) Fungicides: Mancozeb, Metiram, Maneb and Zineb

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Background

Regulatory amendments to maximum residue limits (MRLs)¹ are being proposed for ethylene bisdithiocarbamate (EBDC) fungicides, resulting from re-evaluations of EBDC fungicides in Canada.

Mancozeb, metiram, maneb and zineb are EBDC fungicides. Currently, residues of these pesticides on food commodities are regulated under the established MRLs for “Ethylenebis-dithiocarbamate fungicides” (EBDC) in the MRL Database, as there are no chemical-specific MRLs established for mancozeb, metiram, maneb or zineb in Canada. There are EBDC MRLs already set for the following food commodities: apples, broccoli, Brussels sprouts, cabbages, cauliflowers, celery, cucumbers, dry bulb onions, dry lentils, eggplants, endives, grapes, green onions, lettuce, mushrooms, pears, peppers and tomatoes. Use of mancozeb in Canada on other crops (such as ginseng, melons, sugar beets, potatoes, pumpkins and squash) are currently regulated under subsection B.15.002(1) of the Food and Drug Regulations, which requires that residues do not exceed 0.1 ppm.

Results of the re-evaluation of maneb and zineb

For maneb (REV2010-14) and zineb (REV2008-02), registrations have been cancelled in Canada. Therefore, no residues of maneb or zineb on food are expected.

Results of the re-evaluation of metiram

Under the authority of the *Pest Control Products Act*, Health Canada’s Pest Management Regulatory Agency (PMRA) granted continued registration of products containing metiram for sale and use in Canada after the re-evaluation process. As noted in the re-evaluation of metiram (RVD2018-20), the only food use supported is the foliar treatment of potatoes. The use of metiram on potatoes will remain regulated under subsection B.15.002(1) of the Food and Drug Regulations, which requires that residues not exceed 0.1 ppm.

Results of the re-evaluation of mancozeb

Currently, Canadian MRLs for all EBDC fungicides are set based on a residue definition expressed as manganese and zinc ethylenebis(dithiocarbamate) (polymeric) (in other words, mancozeb). As noted in the re-evaluation decision document for mancozeb (RVD2020-12), Health Canada has decided to replace the current residue definition for all EBDC fungicides, with a residue definition for mancozeb, with residues expressed as carbon disulfide (CS₂).

Under the authority of the *Pest Control Products Act*, Health Canada’s PMRA granted continued registration of products containing mancozeb for sale and use in Canada, after the re-evaluation process (RVD2020-12).

For mancozeb, the only food uses supported are apples, field-grown cucumbers, dry bulb onions, ginseng, grapes, melons (including cantaloupes but excluding watermelons), potatoes, pumpkins,

¹ A maximum residue limit (MRL) is the maximum amount of residue that may remain in or on food when a pesticide is used according to label directions.

squash, sugar beets, and field-grown tomatoes. To reflect the conclusions of the re-evaluation decisions on mancozeb, updated MRL actions are being proposed as outlined below.

Purpose of consultation

The purpose of this Proposed Maximum Residue Limit (PMRL) document is to:

- revoke the five established EBDC MRLs on apples, cucumbers, dry bulb onion, grapes and tomatoes and set new mancozeb-specific MRLs, as these uses continue to be supported for the registration of mancozeb.
- revoke all other EBDC MRLs for all cancelled uses. After revocation, residues of mancozeb in/on broccoli, Brussels sprouts, cabbages, cauliflowers, celery, dry lentils, eggplants, endives, green onions, lettuce, mushrooms, pears and peppers will be regulated under subsection B.15.002(1) of the Food and Drug Regulations, which requires that residues not exceed 0.1 ppm.

Dietary health assessment

In assessing the risk of a pesticide, Health Canada combines information on pesticide toxicity with information on the degree and duration of dietary exposure to the pesticide residue from food. The risk assessment process involves four distinct steps:

- 1) Identifying the toxicology hazards posed by the pesticide;
- 2) Determining the “acceptable dietary level” for Canadians (including all vulnerable populations), which is protective of adverse health effects;
- 3) Estimating human dietary exposure to the pesticide from all applicable sources (domestic and imported commodities); and
- 4) Characterizing health risk by comparing the estimated human dietary exposure to the acceptable dietary level.

Before making any decision on the continuation of a pesticide's registration in Canada, Health Canada must determine the quantity of residues that could remain in or on the food when the pesticide is used according to label directions and that such residues will not be a concern to human health (Steps 3 and 4 above). If estimated human exposure is less than or equal to the acceptable level (developed in Step 2 above), Health Canada concludes that consuming residues resulting from use according to approved label directions is not a health concern. The results of the dietary risk assessment can be found in Appendix I.

The proposed MRL is then subject to consultation to legally specify it as an MRL. An MRL applies to the identified raw agricultural food commodity as well as to any processed food product that contains it, except for certain instances where different MRLs are specified for the raw agricultural commodity and its processed product(s).

Consultation on the proposed MRL actions is being conducted via this document. Health Canada invites the public to submit written comments on the proposed MRL actions in accordance with the process outlined in the How to get involved section of this document.

To comply with Canada’s international trade obligations, consultation on the proposed MRLs is also being conducted internationally by notifying the World Trade Organization, as coordinated by the Canada’s Notification Authority and Enquiry Point.

Proposed MRLs

As a result of the updated dietary risk assessments for mancozeb (RVD2020-12), the thirteen established EBDC MRLs for broccoli, Brussels sprouts, cabbages, cauliflowers, celery, dry lentils, eggplants, endives, green onions, lettuce, mushrooms, pears and peppers are proposed for revocation. After revocation, residues of mancozeb in/on these crop commodities will be regulated under subsection B.15.002(1) of the Food and Drug Regulations, which requires that residues not exceed 0.1 ppm. For the mancozeb-registered uses (ginseng, melons, sugar beets, potatoes, pumpkins and squash), these will continue to be regulated under subsection B.15.002(1) of the Food and Drug Regulations, which requires that residues not exceed 0.1 ppm.

For all remaining uses that continue to be supported by the registration of mancozeb (in other words, apples, cucumbers, dry bulb onion, grapes and tomatoes), the MRLs will be revised to reflect the updated residue definition ([Table 1](#)).

Table 1 Proposed maximum residue limits for mancozeb

Common name	Residue definition	MRL (ppm) ¹	Food commodity
Mancozeb	Carbamodithioic acid, <i>N,N'</i> -1,2-ethanediyibis-, manganese(2+) zinc salt (2:1:1), including the metabolites containing the carbon disulfide moiety (CS ₂), measured and expressed as CS ₂	5.0	Apples, grapes
		2.0	Cucumbers, tomatoes
		0.5	Dry bulb onions

¹ppm = parts per million

MRLs established in Canada may be found using the Maximum Residue Limit Database on the Maximum Residue Limits for Pesticides webpage. The database allows users to search for established MRLs, regulated under the Pest Control Products Act, both for pesticides and for food commodities.

International situation and trade implications

Internationally, MRLs are used to facilitate trade of food commodities between countries. Canadian MRLs are established or amended based on a robust scientific risk assessment that demonstrates safety for people in Canada. [Table 2](#) and [Table 3](#) compare the MRLs proposed for mancozeb in Canada with the corresponding tolerances in the United States (U.S.) for mancozeb, and international Codex MRLs for dithiocarbamates.

The Codex Alimentarius Commission is an international organization under the auspices of the United Nations that develops international food standards, including MRLs.

The U.S. tolerances are listed by pesticide in the Electronic Code of Federal Regulations, 40 CFR Part 180. The term “**tolerance**” is used in the U.S. as another name for MRLs.

The Codex MRLs are listed by pesticide or commodity on the Codex Alimentarius Pesticide Index webpage.

Table 2 Comparison of proposed mancozeb Canadian MRLs, U.S. tolerances and Codex MRLs

Food commodity	Proposed Canadian MRLs for mancozeb (ppm) ¹	Established U.S. tolerances for mancozeb (ppm) ²	Established Codex MRLs for dithiocarbamates (ppm) ³
Apples	5.0	0.6	5 (Pome fruits group)
Cucumbers	2.0	2.0 (Vegetable, cucurbit, group 9)	2
Dry bulb onions	0.5	1.5	0.5
Grapes	5.0	1.5	5
Tomatoes	2.0	2.5	2

ppm = parts per million

¹ Reflects the revised Canadian residue definition for mancozeb for enforcement purposes as “Carbamodithioic acid, *N,N'*-1,2-ethanediybis-, manganese(2+) zinc salt (2:1:1), including the metabolites containing the carbon disulfide moiety (CS₂), measured and expressed as CS₂”.

² The US tolerances are established for residues of mancozeb (a coordination product of zinc ion and maneb (manganese ethylenebisdithiocarbamate)), including its metabolites and degradates. Compliance with the tolerance levels is to be determined by measuring only those mancozeb residues convertible to and expressed in terms of the degradate carbon disulfide.

³ Codex residue definition for compliance with MRLs in plant and animal commodities is total dithiocarbamates, determined as CS₂, evolved during acid digestion and expressed as mg CS₂/kg.

Table 3 Comparison of Revoked EBDC Canadian MRLs, U.S. Tolerances and Codex MRLs

Food commodity	Revoked EBDC Canadian MRL (ppm) ¹	Established U.S. tolerance for mancozeb (ppm) ²	Established Codex MRL for dithiocarbamates (ppm) ³
Broccoli	7.0	7	Not established
Brussels sprouts	7.0	Not established	Not established
Cabbages	7.0	9	5
Cauliflowers	7.0	Not established	Not established
Celery	5.0	Not established	Not established
Dry lentils	6.0	Not established	Not established
Eggplants	7.0	Not established	Not established
Endives	7.0	Not established	Not established
Green onions	7.0	Not established	Not established
Lettuce	7.0	3.5 (Lettuce, head)	0.5 (Head lettuce)
		18 (Lettuce, leaf)	10 (Cos lettuce)

Food commodity	Revoked EBDC Canadian MRL (ppm)¹	Established U.S. tolerance for mancozeb (ppm)²	Established Codex MRL for dithiocarbamates (ppm)³
Mushrooms	7.0	Not established	Not established
Pears	7.0	0.6	5 (Pome fruits group)
Peppers	7.0	12	1 (Peppers, sweet, including pimento or pimienta);

ppm = parts per million

¹ Reflects the current Canadian residue definition for EBDC fungicides as “manganese and zinc ethylenebis(dithiocarbamate) (polymeric)”. Following the revocation of the MRLs, all crops other than those specified in Tables 1 and 2 of this document will be regulated under subsection B.15.002(1) of the Food and Drug Regulations, which requires that residues not exceed 0.1 ppm.

² The U.S. tolerances are established for residues of mancozeb (a coordination product of zinc ion and maneb (manganese ethylenebis(dithiocarbamate))), including its metabolites and degradates. Compliance with the tolerance levels is to be determined by measuring only those mancozeb residues convertible to and expressed in terms of the degradate carbon disulfide.

³ Codex residue definition for compliance with MRLs in plant and animal commodities is total dithiocarbamates, determined as CS₂, evolved during acid digestion and expressed as mg CS₂/kg.

How to get involved

Health Canada invites the public to submit written comments on the proposed MRL actions up to 75 days from the date of publication of this document (by 12 May 2026). Please forward your comments to Publications. Health Canada will consider all comments received and a science-based approach will be applied in making a final decision on the proposed MRLs. Comments received will be addressed in a response to comments document found in Pesticides and pest management consultations. The established MRLs will be legally in effect as of the date that they are entered into the Maximum Residue Limit Database.

Appendix I Dietary risk assessment results

Mancozeb

A dietary assessment for mancozeb was published for consultation in PRVD2018-17. Based on the comments received, including a reduced use pattern that was proposed by the registrant, the dietary risk assessment was revised in the final re-evaluation decision for mancozeb (RVD2020-12). The results from the dietary risk assessment show that when mancozeb is used according to the Canadian label directions and the reduced use pattern, the dietary risks from mancozeb and its metabolite, ethylene thiourea (ETU) on food commodities continue to meet Health Canada's requirements for the protection of human health.

The acute dietary risk assessment results showed that exposure to mancozeb is less than 7% of the acute reference dose (ARfD), and exposure to ETU is less than 24% of the ARfD. The chronic (non-cancer) dietary risk assessment results showed that exposure to mancozeb is less than 1% of the acceptable daily intake (ADI), and exposure to ETU was less than 11% of the ADI. The lifetime cancer risk from dietary exposure to ETU resulting from the use of mancozeb was shown to be acceptable at 1×10^{-6} (one in a million). These results mean that dietary exposure to mancozeb and its metabolite ETU at the current level will not affect your health (RVD2020-12).

Following the re-evaluation of mancozeb, the MRLs proposed in [Table 1](#) are recommended in order to cover residues of mancozeb and the metabolite ETU. Dietary risks from exposure to residues of mancozeb and ETU in these commodities at the proposed MRLs were shown to be acceptable for the general population and all subpopulations, including infants, children, adults and seniors. Thus, the foods that contain residues as listed in [Table 1](#) are considered safe to eat.

References

REV2008-02 Discontinuation of Agricultural Pest Control Products under Re-evaluation and Proposed Changes to Maximum Residue Limits Update 5 – publication request page

REV2010-14 Discontinuation of Agricultural and Non-Agricultural Pest Control Products under Re-evaluation and Proposed Changes to Maximum Residue Limits Update 6 – publication request page

RVD2018-20 Metiram and Its Associated End-use Products – publication request page

PRVD2018-17 Mancozeb and Its Associated End-use Products – publication request page

RVD2020-12 Mancozeb – publication request page