Sayı: 17812098-TİM.AKİB.GSK.TAR.2026/62-678 Mersin, 13/02/2026
Konu: CCCF Elektronik Çalışma Grubu Çalışmalarına İlişkin Görüş Talebi Hk.

E-POSTA

Sayın Üyemiz,

Türkiye İhracatçılar Meclisinden alınan bir yazıda, Tarım ve Orman Bakanlığı Gıda ve Kontrol Genel Müdürlüğü'nden alınan bir yazıya atıfla, Kodeks Alimentarius Komisyonu Bulaşanlar Kodeks Komitesi (CCCF)'nin 2025 yılı haziran ayında gerçekleştirmiş olduğu 18. oturumunda gıdalarda kadmiyum kontaminasyonunun önlenmesi ve azaltılması için geliştirilen iyi uygulama kılavuzu hususunda kurulan Elektronik Çalışma Grubunun (EWG) çalışmalarının devam etmekte olduğu ve ülkelerin gözden geçirmesi için bir taslak kılavuz hazırlandığı belirtilmektedir.

Anılan yazıda devamla, Türk Gıda Kodeksi Bulaşanlar Yönetmeliği'nde meyveler, sebzeler, tahıllar, baklagiller, yağlı tohumlar, mantarlar, hayvansal ürünler ve balıkçılık ürünleri, kakao tozu ve çikolata, bebek ve devam formülleri, çocuk ek gıdası ile takviye edici gıdalarda kadmiyum için maksimum limitlerin belirlendiği bildirilmektedir.

Bununla birlikte, Ek'te yer alan taslak iyi uygulama kılavuzunda, kadmiyumun hangi gıdalarda kontaminasyona neden olduğu, kontaminasyon kaynakları, bu kontaminasyonun azaltılması ve önlenmesi ile ilgili iyi uygulamalara dair bilgilerin yer aldığı ifade edilmekte olup kılavuzun ekinde pirinç üretiminde uygulanacak önlemlere dair bilgiye ayrıca yer verildiği vurgulanmaktadır.

Ayrıca, uluslararası ticarette ülke çıkarlarımızın korunması için başta kılavuzda yer alan pirince dair oluşturulan önlemler olmak üzere, genel önleme ve azaltma önerilerinin yer aldığı hususların incelenmesi istenmektedir. Bahse konu taslağa ilişkin görüşlerin ve dahil edilebilecek ilave önerilerin, ayrıca varsa konuya ilişkin bilimsel çalışmalar ile uygulanan iyi uygulama kılavuzlarının iletilmesi talep edilmektedir.

Bilgileri ve bahse konu taslağa ilişkin görüşlerin ve dahil edilebilecek ilave önerilerin, ayrıca varsa konuya ilişkin bilimsel çalışmalar ile uygulanan iyi uygulama kılavuzlarının **17 Şubat 2026 Salı günü mesai bitimine kadar** tarim@akib.org.tr adresi üzerinden Genel Sekreterliğimize bildirilmesi hususunda gereğini rica ederim.

H.Okan ŞENEL
Genel Sekreter Yrd.

Ek: Gıdalarda Kadmiyumun Önlenmesi ve Azaltılması için Taslak Kılavuz (13 Sayfa)

Hasan Okan Şenel tarafından 5070 sayılı kanun gereğince güvenli elektronik imza ile imzalanmıştır.

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Agenda item XX **CX/CF 26/19/XX**

January 2026

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

Nineteenth Session
19-23 October 2026
Cairo, Egypt

CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF CADMIUM CONTAMINATION IN FOODS

(Prepared by the Electronic Working Group chaired by the United States of America)

FIRST DRAFT for CCCF19

BACKGROUND

1. The 17th Session of the Codex Committee on Contaminants in Foods (CCCF17, 2024) agreed to establish an Electronic Working Group (EWG) chaired by the United States of America (USA) to prepare a *Code of practice (CoP) for the prevention and reduction of cadmium contamination in foods* for consideration by CCCF18.

2. This work was approved at the 47th Session of the Codex Alimentarius Commission (CAC47, 2024) and is expected to be completed in 2027.[1]

3. It was agreed that the scope of the work would address measures, supported by scientific data, that prevent or reduce cadmium contamination as it relates to all aspects of food production from agricultural and aquacultural techniques, source-directed measures (reduction of cadmium in soil and water), drinking water, food ingredients and processing, and production and use of food packaging and storage products.

4. This work would build on previous work on cadmium, most recently the development of the *Code of practice for the prevention and reduction of cadmium contamination in cocoa beans* (CXC 81-2022).[2]

5. This work follows recommendations from the European Union (EU) and Japan in response to the circular letter CL 2022/85-CF[1] on the *Review of Codex Standards for Contaminants*[3] that a code of practice (CoP) should be considered before reviewing/revising cadmium maximum levels (MLs).

6. CCCF18 reviewed the draft CoP[4] and agreed to[5]:

- Return the *CoP for the prevention and reduction of cadmium contamination in foods* to Step 2/3 for redrafting and circulation for comment with the intent to achieve advancement to Step 5 at CCCF19 based on available data/information;
- Further develop the CoP, considering discussions and written comments submitted during CCCF18 and further develop the annexes on rice and seaweed, and additional annexes for commodities for which there are specific mitigation measures not covered under general provisions applicable to all foods;
- Request the Codex Secretariat to issue a CL on general and commodity-specific mitigation measures, including for cereal and cereal products (e.g., wheat and its derivatives, maize), vegetables (including leafy vegetables), pulses and legumes, fruits, and shellfish; and
- Integrate the *CoP for the prevention and reduction of cadmium contamination in cocoa beans* (CXC 81-2022) into the *CoP for the prevention and reduction of cadmium contamination in foods* when the general

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1 REP24/CAC47, para. 154, Appendix V

2 CCCF working documents and reports of its sessions including other relevant documents can be downloaded from the Codex/CCCF webpage: https://www.fao.org/fao-who-codexalimentarius/committees/committee/en/?committee=CCCF

3 CX/CF 23/16/4

4 CX/CF 25/18/6

5 REP25/CF18, paras. 48-52

provisions applicable to all foods in the main body of the CoP are completed or near completion.

WORK PROCESS

7. This first draft of the CoP consists of the general CoP and two commodity-specific annexes, rice (Annex I) and seaweed (Annex II).

8. The CoP incorporates comments received from conference room documents (CRDs) at CCCF18[6] and in response to circular letters (CL) 2025/10-CF and 2025/66-CF.[7]

9. Comments in CRDs and in CLs from CCCF18 were received from Argentina, Australia, Brazil, Burundi, Canada, Chile, China, East African Community, Ecuador, Egypt, El Salvador, European Union, Food Industry Asia (FIA), Ghana, Honduras, India, Indonesia, Institute of Food Technologists (IFT), International Commission for Uniform Methods of Sugar Analysis (ICUMSA), International Confectioners Association (ICA), International Union of Food Safety and Technology (IUFOST), Iran, Japan, Kenya, New Zealand, Panama, Philippines, Republic of Korea, Senegal, Singapore, Thailand, Uganda, United Arab Emirates, United Republic of Tanzania, USA, and Zambia.

10. One member provided information in response to CL 2025/66-CF that invited members and observers to provide information and/or data on existing risk management/mitigation measures for foods in general as well as measures that are commodity-specific for cereal and cereal products (e.g., wheat and its derivatives, maize), vegetables (including leafy vegetables), pulses and legumes, fruits, and shellfish.

11. Additional information is being requested to enhance the annexes or support the development of additional annexes for the second draft.

RECOMMENDATIONS

12. EWG members are invited to review and provide comment on this first draft of the CoP.

13. EWG members are invited to provide additional information on mitigation measures, including scientific publications and other non-published scientific information to support development of the CoP, in particular additional annexes for which there are specific and practicable mitigation measures not covered under the general CoP.

[6] meeting-detail | CODEXALIMENTARIUS FAO-WHO
[7] Circular letters | CODEXALIMENTARIUS FAO-WHO

APPENDIX I

PROPOSED CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF CADMIUM CONTAMINATION IN FOODS

(For comments at Step 2/3)

INTRODUCTION

1. Cadmium is a toxic heavy metal that occurs in the environment both from natural and anthropogenic sources. Exposure to cadmium can occur through ingestion, inhalation, and dermal contact. Dietary cadmium exposure is primarily associated with adverse effects on kidneys and bones. Cadmium is relatively poorly absorbed into the body, but once absorbed it is slowly excreted, with a half-life of between 10 to 33 years.

2. Sources of cadmium exposure include food, water, atmospheric deposition (e.g. from the burning of fuels, metal smelters), cigarette smoking, occupational exposures, and consumer products (e.g. batteries, paints, coatings, jewelry, and pigments used in pottery finishes, glassware, and on certain plastics). Food is the primary source of cadmium exposure for most people, with the exception of smokers, for whom tobacco is a significant cadmium source, or individuals with occupational exposures.

3. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) completed evaluations (2010, 2013, 2021) of cadmium in foods, including vegetables, fruits, meat and poultry offal, shellfish/molluscs, grains, nuts and oilseeds, and spices. At its 73rd session (2010), JECFA established a provisional tolerable monthly intake (PTMI) of 25 µg/kg bw, reflecting the long half-life of cadmium in humans. JECFA conducted additional dietary exposure assessments on cadmium at its 77th session (2013) and 91st session (2021), focusing on the contribution of cocoa products to cadmium exposure. The most recent JECFA assessment concluded that the main sources of dietary cadmium exposure are cereals and cereal-based products, vegetables, and fish and seafood.

4. Cadmium is present at low levels in most foods, with higher mean concentration ranges reported by JECFA for vegetables (0.006-0.1 mg/kg); meat offal (0.03-0.5 mg/kg), poultry offal (0.006-0.5 mg/kg); shellfish/molluscs (0.01-4.8 mg/kg); nuts and oilseeds (0.02-0.1 mg/kg); coffee, tea, and cocoa (0.0001-1.8 mg/kg); and spices (0.006-0.2 mg/kg). Certain mushrooms, rice, and seaweed, grown in certain geographic regions with higher cadmium, may also contain elevated concentrations.

5. Cadmium in food arises from numerous sources including soil and air. Cadmium occurs naturally in soils, including from sedimentary and shale rocks. Soil cadmium also results from mining and smelting operations, sewage sludge, manure, and phosphate fertilizers containing elevated levels of cadmium. Agricultural crops can take up cadmium from the soil. Atmospheric particles of cadmium from soil dust and from industrial activities (e.g. burning of fuels, metal smelters) can deposit on plant surfaces (e.g. leafy greens, wheat). Cadmium-containing crops, native vegetation, and soil are also a potential source of contamination of livestock.

6. Cadmium can also enter the food chain from water. Agricultural crops can take up cadmium from irrigation water. Surface waters contaminated with runoff from industrial activities or atmospheric deposition can be a potential source of contamination for wild-harvested or aquaculture-grown seaweed and seafood. For drinking water and water used in food preparation, cadmium contamination can result from cadmium impurities in zinc used in galvanized steel pipes or cadmium-containing solders in metal fittings used in water distribution systems.

7. Cadmium uptake by crops or aquaculture can also be affected by the availability of cadmium depending on soil and water chemistry (e.g. pH, chlorinity). Different crops, livestock, and aquatic species have different propensities to uptake and accumulate cadmium.

8. Cadmium contamination can also result from food processing and certain food packaging that results in cadmium migration. Galvanized steel for food preparation or food grinding can contribute to cadmium in foods. Cadmium sulfide and cadmium selenide have been used as red, yellow, and orange colour pigments in plastics and various types of paints. Brightly coloured ceramicware, glassware, and plastic tableware for food preparation or food packaging, when not properly prepared, can be a potential source of cadmium in foods.

9. In summary, low levels of cadmium in foods may be unavoidable, because of the ubiquitous presence of cadmium in the modern industrial world. However, good agricultural, aquacultural, and manufacturing practices, awareness of recommended standards, and broader public health efforts can minimize cadmium contamination of foods.

10. The Codex Alimentarius Commission has recommended maximum levels (MLs) for cadmium in various foods (*General standard for contaminants and toxins in food and feed*, CXS 193-1995)[1]. National competent authorities have also recommended or established cadmium standards in foods.

SCOPE

11. The objective of this CoP is to provide guidance to countries and industry on the prevention and reduction of cadmium contamination in foods. This CoP compiles practical information on measures to prevent or reduce cadmium in foods in the areas of source-directed measures, agriculture and aquaculture techniques, drinking water, food ingredients and processing, and production and use of food packaging and storage products. Because many useful interventions for reducing cadmium rely on actions by consumers, a section with suggestions on consumer practices is included as well. This CoP builds on measures identified in the *Code of practice for the prevention and reduction of cadmium contamination in cocoa beans* (CXC 81-2022).

Açıklamalı [EA1]: This statement will be amended when CXC 81-2002 is integrated into CoP.

RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMPs)

Source directed measures

13. National or relevant food control authorities should consider implementation of source-directed measures in the *Code of practice concerning source directed measures to reduce contamination of foods with chemicals* (CXC 49-2001). This includes controlling contaminants through compliance with national regulations on the discharge of pollutants into agricultural and aquaculture zones.

Agricultural

Crops

14. Cadmium uptake by crops is a function of cadmium levels in soil and other soil factors including pH, mineral content, and organic matter. Cadmium levels can vary in different soil types, throughout a field, and in different soil strata in a field. In general, cadmium uptake can be decreased, if practicable, by amending soil properties including increasing soil pH, adding zinc, adding soil organic matter, and decreasing chlorinity. Specific recommendations for assessing cadmium levels, testing soil parameters, and planting of crops and cultivars follow.

15. Cadmium in soil. It is important to be aware of cadmium sources in agricultural soils. Although elevated cadmium levels may occur naturally in the soil, cadmium levels can increase as a result of atmospheric deposition (e.g. burning of fuels, metal smelting), application of sewage sludge and manure, use of phosphate fertilizers not controlled for cadmium, and flooding with water contaminated with cadmium. Also, cadmium levels in cropland near rivers can be contaminated from mines or other industrial activities.

16. For crops prone to cadmium uptake, farmers should consider consulting with agricultural extension services or other relevant authorities for information on soil survey maps to determine if a crop field is in an area with known elevated cadmium levels. If a field is in an area with known elevated cadmium, it may be necessary to evaluate cadmium levels directly through a soil and water testing program. Cadmium levels can vary within a field, so specific information on cadmium levels across a field and at varying depths may be useful.

17. When planning soil testing, agronomists and farmers should consider the appropriate soil depth for testing and the method for composite sampling. Soil testing should be conducted at the root level, the most sensitive zone for cadmium uptake.

18. Other soil parameters. Because cadmium uptake in crops is influenced by soil properties, including pH, organic carbon content, zinc content, chlorinity, cation exchange capacity, redox potential, clay content, and oxides of iron and manganese, farmers, when possible, are recommended to conduct soil testing in areas with known or suspected elevated cadmium or consult with agricultural extension services or other relevant authorities for assistance with testing. Testing for cadmium, pH, organic carbon, and zinc in the soil are the most important parameters. Results from soil testing can be used to inform appropriate cadmium mitigation strategies.

19. Where available, soil characterization analysis should be conducted by accredited laboratories, using validated methods that include the use of certified reference materials and standards and that provide associated uncertainties. At least one composite soil sample (consisting of soil from at least 10 locations) per 4 hectare (10 acre) field should be collected. However, if the field is larger, collect at least one additional sample for approximately every additional 1 hectare (or 2 acres). If the field contains several distinct soil types, collect and

1 *General standard for contaminants and toxins in food and feed* (CXS 193-1995)

analyze a composite sample for each soil type.

20. Cadmium phytoavailability to crops is strongly affected by the pH of soil at the root depth. Cadmium is most mobile in acidic soils with a pH less than 5.5-6.0; in more alkaline soil (pH greater than 6), cadmium is less mobile, binding to organic matter and soil minerals. It is desirable to ensure soil pH is greater than 6, if cadmium uptake by crops is a concern.

21. The application of soil amendments (e.g. magnesium, sulphate, humus, charcoal, dolomitic limestone, spent mushroom substrate, farmyard manure, phosphate fertilizer, and zinc sulphate fertilizer) can decrease cadmium concentrations in crops by increasing pH or increasing cadmium binding capacity. The suitability and effectiveness of amendments varies depending on the characteristics of the amendments, the soil, and the crops.

22. When tilled to the root depth, addition of lime (calcium oxide) has been effective in increasing pH and decreasing cadmium uptake. However, it is important to verify that the added lime does not contain cadmium. In addition, soil pH should be tested before and after liming, to ensure cadmium levels are appropriately managed. Unnecessary liming can lead to elevated calcium levels in the soil, resulting in calcium binding to the soil, displacing cadmium, and increasing cadmium availability and solubility.

23. A greater amount of soil organic matter may improve retention of cadmium in the soil and thus may help to decrease cadmium uptake by crops. The use of organic fertilizers, such as treated manure or compost, with low cadmium levels that meet available standards set by competent authorities can increase the organic matter content of the soil.

24. Phosphate fertilizers applied to agricultural fields should contain low cadmium levels. To decrease cadmium uptake, phosphate fertilizers used on agricultural crops should meet available standards set by competent authorities with respect to the ratio of cadmium to phosphorus (Cd:P or Cd:P_2O_5).

25. Manures, composts, biosolids, and irrigated wastewater may also contain cadmium. In agricultural areas with known high cadmium soil levels, ensure that fertilizers (including phosphate fertilizers), manures, and irrigated wastewater that are low in cadmium are used.

26. Cadmium competes with zinc for uptake by plants, and cadmium is more likely to enter crops and accumulate in plants when zinc soil concentration is low. Thus, for crops grown where there is a deficiency of zinc in the soil, zinc levels should be increased at the root depth with zinc fertilizer. Farmers should consult with agricultural extension services or other relevant authorities for guidance on zinc fertilizer application.

27. Cadmium uptake in crops can also be affected by chloride content of irrigation water and soil, as higher chloride levels can increase cadmium phytoavailability. Monitoring chloride levels in irrigation water and soil may help with efforts to minimize cadmium uptake depending on soil conditions.

28. Cultivar choice. Because certain crops are more susceptible to cadmium uptake, before planting a new field, farmers may consider it helpful to consult with agricultural extension services or other relevant authorities to determine if the selected crop (e.g., leafy greens, root and tuber vegetables, rice, wheat) is prone to cadmium uptake.

29. For soils known to contain high levels of cadmium, it may be preferable to plant crop varieties with a lower potential for cadmium uptake, while considering the need for crop rotation. Low uptake crops or varieties have been developed through plant-breeding techniques and genetic engineering and are available in some countries. Examples include the development of lower-cadmium durum wheat cultivars in Canada and the United States and rice cultivars in Japan.

30. For rice, controlling flooding cycles can limit cadmium absorption into plants. Cadmium is less phytoavailable under flooded, anaerobic conditions. This is discussed in more detail in Annex I.

31. Measures to reduce cadmium levels in cocoa beans during cocoa cultivation include using cover crops to improve soil organic matter and to protect soil from erosion, removing pruned cocoa tree limbs and leaves from the ground, and applying liming products and zinc fertilizers. Additional recommendations are discussed in the *Code of practice for the prevention and reduction of cadmium contamination in cocoa beans* (CXC 81-2022).

Açıklamalı [EA2]: This will be amended when the Cd COP for cocoa beans is integrated into the general COP.

32. Field location. Agricultural fields should be located in areas separate from mining areas, smelting areas, industrial wastes, and sewage because these could be sources of cadmium. When establishing agricultural sites in urban areas or high-traffic areas, assess and manage potential cadmium exposure to crops and soil from sources, such as vehicular emissions, including through soil testing and application of soil amendments as needed; using protected cultivation methods (e.g., greenhouses, vertical farming systems with controlled environments); and monitoring of cadmium levels in produce.

Livestock

33. Livestock may take up cadmium by ingesting soil or water during grazing, consuming crops and feed with elevated cadmium, or consuming fertilizer directly. Grazing livestock on pasturelands near industrial sites or other areas containing elevated cadmium may increase the risk of cadmium exposure in those animals and ingested cadmium can be transferred to the meat products derived from the livestock.

34. Livestock should be prevented from grazing in areas with cadmium sources, including farm rubbish such as discarded metal (e.g., galvanized steel) that may be a source of cadmium.

35. For livestock grazing on pasturelands known to contain elevated cadmium, avoid overgrazing, particularly during drought and winter; place grain or feed supplements on elevated surfaces rather than on the bare soil; and avoid use of irrigation water containing elevated cadmium levels.

36. For cattle produced in areas with high cadmium soil levels, where there are no standards for cadmium in feed, and where kidney consumption is common, it may be prudent for kidneys of older cattle (e.g. > 2 years) to be excluded from the food chain.

37. Cadmium levels in offal should not exceed standards set by competent authorities, and where no levels exist, cadmium levels in offal should be as low as reasonably achievable.

38. Ingredients used in animal feed, including mineral additives such as phosphates, zinc sulphate, zinc oxide and seaweed and seaweed-derived products, may contain cadmium. Levels of cadmium in these feed ingredients should conform with standards set by competent authorities to ensure animals do not consume excess quantities of cadmium, and when no standards exist, cadmium levels should be as low as reasonably achievable.

39. Local and national competent authorities as well as agricultural extension services should make farmers aware of appropriate practices for reducing and preventing cadmium contamination of crops and livestock.

Farmed and wild-harvested seafood and seaweed

40. National or relevant competent authorities should consider measures to prevent or reduce cadmium contamination in seafood provided in the *Code of practice for fish and fishery products* (CXC 52-2003).

41. Cadmium tends to bioaccumulate in the viscera of seafood, in particular scallops, cephalopods, and crustaceans. For scallops, removal of the viscera (i.e. kidneys and digestive glands); for cephalopods, removal of the liver and ink sac; and for certain crustaceans, removal of the hepatopancreas (e.g., “brown crab meat” of crabs) are recommended prior to consumption to reduce cadmium exposure.

42. Agricultural runoff and other point sources containing elevated cadmium can lead to bioaccumulation of cadmium in marine or freshwater life (e.g. shrimp, crabs, mussels, oysters, and other shellfish) near coastal areas. Monitoring cadmium levels in water and in bioindicator species, such as bivalve molluscs, can provide information on the extent of contamination and inform water quality programs designed to reduce and prevent cadmium pollution.

43. Because levels of cadmium in molluscs grown in certain regions may be particularly affected by seasonal variations that impact rainfall, runoff, and anthropogenic activities, for these specific regions, it may be preferable to schedule mollusc harvesting based on local and regional cadmium data to minimize cadmium exposures.

44. Seaweed is known to bind and bioaccumulate cadmium from seawater. Growing seaweed in aquatic environments that have lower cadmium levels reduces the potential for elevated cadmium in the seaweed. This is discussed in more detail in Annex II.

45. Given the broad variety of factors affecting cadmium levels in different types of seafood and seaweed, including different uptake patterns, characteristics of the aquatic environment, and proximity to cadmium sources, regional-specific mitigation measures may be most appropriate. These could include consumer advice, standards set by competent authorities (e.g. regulatory limits), and regional guidance regarding shellfish and seaweed harvesting schedules to account for site location and seasonal variations. Regionally targeted measures also should consider the dietary patterns of local populations, including consumer advisories based on local consumption patterns.

46. Aquaculture may offer opportunities for greater standardization and control of cadmium levels as compared with wild harvesting. Feed management for aquaculture seafood and seaweed should ensure that feed products contain low cadmium levels, including when possible, avoiding the use of marine organisms or seaweed byproducts with elevated cadmium and testing commercial aquaculture feed and fertilizer for cadmium.

Drinking and processing water

47. Drinking water from private wells or public water systems could contain cadmium. Cadmium in private wells may result from naturally occurring cadmium in rocks and soil that leaches into groundwater. Cadmium also may result from impurities in the zinc used in galvanized steel pipes or cadmium-containing solders in metal fittings. The corrosivity of the water (e.g. low pH), the amount of cadmium in the plumbing system components, and the amount of water drawn through the plumbing system affect cadmium levels in drinking water and water used for food processing.

48. Administrators of water systems with high cadmium levels should replace, where appropriate, problematic galvanized steel service lines, pipes, or components. The corrosivity of the water should be monitored.

49. National or local competent authorities should consider establishing allowable cadmium levels or appropriate treatment techniques for controlling cadmium levels in drinking water. The World Health Organization (WHO) has established a guideline value for a maximum level for cadmium in drinking water of 0.003 mg/L.

Food ingredients and processing

50. Food producers should limit cadmium in foods to levels below recommended MLs in the *General standard for contaminants and toxins in food and feed* (CXS 193-1995) or standards established by national or local competent authorities for foods and food additives; this is particularly important for foods intended for infants and young children.

51. Where standards are not established, national or regional competent authorities could consider establishing standards limiting the concentration of cadmium allowed in foods that contribute to the highest exposures and for which there is an identified or high potential for an unacceptable health risk to consumers. In the absence of standards, national or local competent authorities or industry can monitor selected foods, including dietary supplements, to ensure that cadmium levels do not rise above normal background levels or are as low as reasonably achievable.

52. Food processors should choose food and food ingredients, including ingredients used for dietary supplements, that are below recommended MLs or specifications, or where no MLs or specifications are available, that are as low as reasonably achievable. Where feasible, they should consider whether the production areas where crops, seaweed, or shellfish are produced may contain elevated cadmium levels.

53. Food processors should consider having control measures in place to monitor incoming ingredients or verify that suppliers are providing ingredients that are below the recommended MLs or specifications, or where there are no MLs or specifications available, that levels are as low as reasonably achievable. Food processors should consider occasional testing of incoming raw materials and finished products for cadmium to verify that their control measures are functioning effectively.

54. More focused testing should be considered for ingredients or products known to contain high cadmium levels or that are intended for infants and children.

55. For foods for infants and children, consideration should be given to sourcing of raw materials and ingredients used in the manufacture of finished products to ensure levels of cadmium are as low as reasonably achievable.

56. During processing, removal of surface cadmium should be practiced, including by thoroughly washing vegetables, particularly leafy vegetables. Peeling root vegetables, where appropriate, can reduce cadmium levels. For example, for potatoes, higher levels of cadmium have been found in the skin versus the flesh.

57. Milling of grains can reduce cadmium concentrations, as the cadmium concentrations are generally higher in the outer layers of the grain compared to the inner parts. Milling durum wheat has been shown to decrease cadmium levels 29-37% in semolina in comparison to the whole grain.

58. Because filtration aids (specifically diatomaceous earth, bentonite, and charcoal filtration) used in processing fruit juices, wines, and beer can contain cadmium, selecting filtration aids, if available, with lower cadmium levels or washing filtration aids with solutions such as ethylenediaminetetraacetic acid (EDTA) or hydrochloric acid solution may reduce cadmium levels in the beverages. Alternative filtration methods also may be used, for example, ultrafiltration. The Codex Guidelines on Substances Used as Processing Aids (CXG 75-2010) provides guidance on filtration aids that can be used for processing beverages.

59. Food processors should ensure that the water supply for food processing complies with the MLs for cadmium established by the national or local competent authorities.

60. Food contact materials. Food processors should use food-grade metals for all metal surfaces that come into contact with food and beverages.

61. Galvanized steel that is used in food preparation and food conveyance applications should not be used with foods that have high acid content such as tomatoes, oranges, and limes because of the potential for cadmium leaching in acidic conditions.

62. Food processors engaged in milling should ensure that metal components used in grinding are not contributing cadmium to the final milled product.

63. National and local competent authorities could consider setting standards for cadmium migration and cadmium composition in food contact materials used in food processing or manufacturing.

Açıklamalı [EA3]: One member proposed that this paragraph be deleted, as when food grade metals are used in the appropriate manner as recommended they are expected to migrate only negligible levels of cadmium; the levels would not contribute significantly to dietary exposures to cadmium.

Would appreciate members response regarding this suggestion or if there is additional information available to support maintaining this paragraph.

Production and use of packaging and storage products

64. Packaging foods for sale in glazed ceramics containing cadmium should be avoided because these ceramics may leach significant quantities of cadmium into the foods when ceramics are not glazed at proper temperatures and for the required time.

65. Decorative ceramicware, glass, or metal food contact materials that can leach unacceptable quantities of cadmium should be clearly labelled as not for food use.

66. National and local competent authorities should consider setting standards limiting cadmium migration from cadmium-glazed ceramic ware and other cadmium-containing items, such as plastics and glassware, or metals and alloys that contain cadmium as an impurity, such as tin, that might potentially be used for food storage, food preparation, or tableware.

67. National and local competent authorities could consider implementing supply chain controls pertaining to the quality and composition of raw materials used in manufacture of food packaging and storage products for foods.

68. Data indicate that certain brightly coloured plastic tableware on the market can contain high levels of cadmium that can leach into food. Cadmium-containing dyes in plastic tableware, including those intended for use specifically by children, should be avoided, if possible, and at a minimum should comply with standards to ensure cadmium levels are as low as reasonably achievable.

Consumer practices and consideration of certain foods

69. Consumers should wash vegetables and fruit thoroughly to remove dust and soil that may contain cadmium. Peeling root crops can reduce cadmium levels. Washing hands before preparing food will also help remove any cadmium-containing dust or soil from hands.

70. National or local competent authorities should educate consumers about the potential risks of consuming local specialty foods, (e.g. organs of fish and shellfish; hepatopancreas of certain crustaceans) or collected wild foods (e.g. mushrooms, kidneys from game meat) that could contain elevated cadmium levels with consumer guidance regarding reducing or avoiding consumption.

71. The consumer advice should be targeted to particular populations who consume these local specialty foods that contain elevated cadmium levels to inform them of potential risks, and measures to reduce risks, including avoiding consumption of the foods (e.g., for high-risk populations such as pregnant women or young children or when cadmium levels are known to be of particular health concern) or limiting frequency of consumption, including if there are site-specific and seasonality constraints. The advice should be made available through local health advisories and posted where harvesting activities occur.

72. Consumers should be educated about the risks of cadmium exposure from geophagia, the practice of consuming clay or soil. Pregnant and lactating women and children should be discouraged from this practice.

73. Consumers should avoid use of decorative ceramics, glass, or metal for use in food preparation and storage that are labeled as not for food use.

ANNEX I

RICE

Introduction

1. In addition to mitigation approaches identified in the general part of the CoP, this annex addresses mitigation practices specific to rice.

2. Good Agricultural Practices and Good Manufacturing Practices include methods to reduce cadmium in rice through growing, harvesting, post-harvest, and processing practices.

3. Mitigation of cadmium in rice is most effective at the production stage, through management and cultivation of the rice, with primary mitigation methods including: 1) use of irrigation management to alter the solubility of the cadmium, 2) modifying the physicochemical properties of the rice paddy soil through addition of amendments to reduce cadmium availability, and 3) use of low-cadmium cultivars that uptake less cadmium from the soil.

Source-directed measures

4. Refer to paragraphs 13-15 of the general part of the CoP.

Agricultural measures (Growing/harvesting practices)

Açıklamalı [EA4]: One member commented on the use of crop rotation with non-cadmium accumulating crops to reduce cadmium. Additional information on this mitigation method is needed.

5. Refer to paragraphs 16-30 of the general part of the CoP.

6. Rice can be grown in flooded conditions (anaerobic), dry conditions (aerobic), or alternate wetting and drying conditions. Depending on soil properties, flooding conditions can reduce cadmium, while increasing arsenic levels.

7. Irrigation or flooding management can significantly affect the mobility of cadmium in rice paddy soil by modifying soil redox potential which affects the availability of micronutrients (e.g., iron, zinc, manganese) and cadmium. Cadmium concentrations in rice plants can be significantly reduced under flooded conditions, due to cadmium complexing with sulfide in the soil and becoming insoluble, reducing its phytoavailability to rice plants.

8. However, when applying irrigation management techniques such as flooding to reduce cadmium, consideration needs to be given to the soil properties and the effect of flooding on arsenic uptake. If arsenic concentrations in rice are of concern in a geographic region, risk managers should ensure that implementation of cadmium control measures would not increase arsenic concentrations in rice to unsafe levels.

9. Likewise, risk managers should ensure that arsenic rice control measures (e.g. *Code of practice for the prevention and reduction of arsenic contamination in* rice (CXC 77-2017)) do not increase cadmium uptake. In regions with calcareous soils (i.e. calcium rich), when fields are drained during rice growing to reduce arsenic levels, cadmium levels are not increased. However, in other regions with non-calcareous soils, and when managed at acidic pH, draining the field to minimize arsenic uptake during rice growing can significantly increase cadmium uptake.

10. Therefore, when growing rice in non-calcareous soil conditions, controlling flooding cycles to increase time spent in flooded conditions (e.g. three weeks before and after the flowering period) can limit cadmium absorption into plants, as cadmium is less phytoavailable under flooded, anaerobic conditions.

11. In addition to consideration of cadmium and arsenic levels stemming from flooding management, attention should be given to levels of nutrients (e.g., iron and zinc) to ensure levels are adequate to minimize cadmium uptake and ensure sufficient biofortification.

12. Iron in the soil forms plaques on root surfaces, which adsorb and precipitate cadmium, preventing uptake in the plant.

13. Calcareous soils can significantly reduce the phytoavailability of iron and zinc in rice, while increasing cadmium uptake, requiring addition of zinc- or iron-containing fertilizers.

14. If cadmium levels in soil and in irrigation water are low, use of alternate-wet drying irrigation (where fields are drained and reflooded one or more times during a growing season) to control arsenic levels, can maintain low cadmium levels in the rice.

15. Testing of soil for arsenic concentrations, together with cadmium and other soil properties (para. 17) may be important given the challenge of mitigating both cadmium and arsenic.

16. For rice crops, adjusting soil pH may not be sufficient to reduce cadmium (see para. 25) and this may need to be combined with flooding management.

17. When using flood management to control cadmium levels in rice, periodic testing of irrigation water for cadmium

and arsenic is recommended.

18. Since low-cadmium rice varieties tend to produce low cadmium rice even under aerobic soil conditions such as intermittent irrigation, flooding management may not need to be implemented to suppress cadmium absorption.

19. In fields where there is a manganese deficiency (an essential element for plant growth) and the rice being grown is a low-cadmium rice variety with a defect in the OsNRAMP5 gene, additional manganese may need to be added to support plant growth, as these low-cadmium rice varieties have reduced uptake of manganese in comparison to conventional rice varieties.

20. When using low-cadmium rice varieties, it is important to introduce varieties that are suitable to the growing regions and to evaluate the yield and growth of the varieties planted.

21. When managing cadmium levels in rice, multiple mitigation measures may be needed including the use of amendments to increase pH (for example, calcium carbonate), combined with low cadmium accumulation cultivars, and use of delayed drainage of paddy water during late grain filling phase (i.e., when rice grains form) to reduce cadmium grain levels.

22. If growing rice under flooded conditions does not reduce cadmium, consider covering cadmium-contaminated farmland with lower cadmium-containing soil to remediate the soil. Because paddy rice roots are usually found within 20 cm of the soil surface, even if the soil is contaminated with cadmium, it is possible to reduce cadmium in the rice crop layer to uncontaminated levels by covering with 20 to 40 cm of uncontaminated soil. However, such measures are expensive and not practical on large fields.

23. For specific growing regions, farmers/extension services should consult available regional-specific cadmium mitigation guidance documents to provide advice on the local conditions for growing and harvesting lower cadmium rice.

Post-harvesting and processing

24. Refer to paragraphs 50-52 of the general part of the CoP.

25. Polishing of rice may reduce cadmium concentrations, as the cadmium concentrations may be higher in the outer layers of the grain compared to the inner parts. For example, polishing rice may reduce cadmium concentrations 20-40%.

26. Washing rice using clean water prior to cooking can be used to decrease cadmium concentrations in the rice. Where practical, cooking rice in excess water (6 to 10 parts water to 1 part rice), then draining the excess water prior to consumption, may reduce cadmium in rice by 10 to 15%.

27. Rinsing polished rice in acid (e.g., citric, lactic, and malic) prior to cooking has been found to effectively reduce cadmium levels. The effectiveness of the cadmium reduction depends on the pH, washing time, temperature, water-to-rice ratio, and washing frequency.

ANNEX II

SEAWEED

Açıklamalı [EA5]: We are requesting additional information on mitigation practices (i.e., published papers/guidances), including on intermittent freshwater rinsing, substrate selection, substrate-free cultivation (e.g., rope-longline), and seasonal harvesting windows.

Introduction

1. In addition to mitigation approaches identified in the general part of the CoP, this annex addresses mitigation practices specific to seaweed (macro-algae).

2. Good Agricultural Practices and Good Manufacturing Practices include reducing cadmium in seaweed through growing, harvesting, post-harvest, and processing practices. Seaweed is either harvested naturally (wild seaweed) or from cultivated (aquaculture, farmed) crops.

Growing/harvesting practices

3. Refer to paragraphs 42, 44-45 of the general part of the CoP

4. Cadmium levels in different types of seaweed can vary based on several factors including ambient water quality, tidal and current patterns, varying uptake and biosorption mechanisms across species, and proximity of seaweed harvesting areas to contamination sources.

5. Testing and ongoing monitoring of cadmium water levels in growing areas is recommended to reduce potential for elevated cadmium in seaweed. This is particularly important in coastal areas identified as susceptible to human pollution.

6. When growing seaweed in land-based tanks, minimize the use of fertilizers that contain cadmium.

Post-harvesting and processing

Açıklamalı [EA6]: We are requesting additional information on the influence of processing on cadmium levels in seaweed, including freezing, blanching, dehydrating, and shredding/cutting.

7. Refer to paragraphs 49-52 of the general part of the CoP.

8. Processors should be aware that cadmium levels in seaweed vary significantly based on seaweed type they are manufacturing, geographic origin, and proximity to human activity, as well as age, season, temperature, pH, amount of sunlight, and nutrient concentrations and oxygen. Therefore, batch-specific testing may be needed for seaweed harvested at different times and in different locations. As more information on growing and processing measures to reduce cadmium in seaweed becomes available, it may be possible to select seaweed species with lower cadmium levels for processing and consumption. For example, data suggest that green seaweed (e.g. sea lettuce) has lower cadmium than brown or red (e.g. nori and wakame), as brown and red seaweed tends to bind more strongly to cadmium leading to higher cadmium concentrations. However, it is recognized that the desired flavor and usage of seaweed vary by species, and flavour profile may influence ability to select alternate species.

9. Washing or soaking seaweed, particularly using a high water to seaweed ratio, during processing can help reduce cadmium levels in the finished products, with increasing washing times resulting in reduced cadmium levels. Washing or soaking solutions (e.g. with sodium chloride) should be effective in reducing cadmium levels and should conform with appropriate standards developed by national or regional competent authorities.

10. The water used to wash seaweed (both seawater and fresh water) should be checked for cadmium levels. When washing seaweed during processing, when there is the possibility of elevated cadmium levels in the seaweed, appropriate measures such as periodic replacement of wash water are recommended

11. Fermenting, a seaweed processing step that follows washing or blanching, and is used to lower salt content, has been found to reduce cadmium levels.

Açıklamalı [EA7]: One member questioned the use of fermentation in processing seaweed, stating it is rarely used. We are requesting information on the use of fermentation to reduce cadmium in seaweed production/processing.

12. When cleaning and processing seaweed, it is advisable to sort seaweed lots based on harvest location/seaweed farm to allow traceback if elevated cadmium levels are identified in finished product testing.