

CODEX ALIMENTARIUS COMMISSION



Food and Agriculture
Organization of the
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World Health
Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org

Agenda Item 9

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

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(Comments submitted on by Canada, El Salvador, Ghana, Indonesia, Peru, Republic of Korea, Sudan, USA and African Union)

Draft revision of the Code of practice for the prevention and reduction of mycotoxin contamination in cereals (CAC/RCP 51-2003) (general provisions) (at Step 7)

CANADA

Draft comments regarding CAC/RCP 51-2003 (REP15/CF, Appendix VII):

Para 3, last sentence: "The size and design of large grain storage structures and the ~~limited availability~~ **limitations** of technology often make precise monitoring of moisture and temperature in stored grain impractical."

Para 5: "The complete prevention of dissemination of mycotoxins by pre-harvest and post-harvest mycotoxigenic fungal species is not practically achievable, even when GAP and GMP are followed. Therefore, the ~~intermittent~~ presence of certain mycotoxins in cereal grains destined for food and animal feed use is to be expected. **As analytical methods advance, ever lower levels of mycotoxins are more accurately quantified leading to an increased incidence of detection of low level contamination.**"

Sub-heading before para. 11: "**Planting and Crop Rotation**"

Para. 11, last sentence: "When used in the same rotation, inclusion of soybeans, oilseeds, ~~and~~ pulses and forage crops may reduce the incidence and severity of pre-harvest infection."

Para. 12, first sentence: "When possible and practical, use certified seeds as free from mycotoxin **as possible**, prepare the seed bed for each new crop by plowing under or by destroying or removing old seed heads, stalks, and other debris that may have served, or may potentially serve as substrates for the growth of mycotoxin-producing fungi."

Para. 13: "Utilise the results of soil tests to determine if there is **a** need to apply fertilizer and/or soil conditioners to assure adequate soil pH and plant nutrition to avoid plant stress, especially during seed development stage of crop growth."

Para. 18: "As certain weed species can be host plants **s** for toxigenic fungi and competition of weed species during crop development can increase plant stress, it is important to control weeds in the crop by using mechanical methods, registered herbicides or other safe and suitable weed eradication practices utilising an integrated pest management program."

Para. 21: "Plan to harvest grain at low moisture content and full maturity, unless allowing the crop to continue to full maturity would subject it to extreme heat, rainfall or drought conditions. Delayed harvest of grain already infected by Fusarium species may cause ~~an~~ **significant** increase in the mycotoxin content of the crop. If mechanical drying equipment is available, earlier harvest may be helpful in limiting mycotoxin production during the final stages of crop maturation. Models could be used to predict the mycotoxin production based on environmental conditions, such as climate conditions and agricultural production conditions, being a guide to timely monitoring and surveying of mycotoxin levels."

Para. 21, comment on the second sentence: *Canadian research has shown that harvest date/delay have only minor, if any, impact on Fusarium and many other plant pathogens. Hence, it is suggested to remove the word "significant" as shown above for para. 21.*

Para. 24. **Methods of harvest and equipment used vary widely among grain-producing countries. Cutting of grain into swaths prior to combining or threshing by other means can contribute to contact with the soil and exposure to fungal spores.** As far as possible, avoid mechanical damage to the grain and avoid contact with soil during the harvesting operation. Steps should be taken to minimise the spread of infected seed heads, chaff, stalks, and debris (crop residues) onto the ground where spores may inoculate future crops. Mechanised harvest methods such as the use of combines result in large amounts of this crop residue being left in the field. Where crop rotation/ sequence and related tillage practices permit, it is preferable to incorporate this crop residue into the soil by ploughing of cultivation by other means.”

Para. 25. “During the harvesting operation, the moisture content should be determined in several spots of each load of the harvested grain since the moisture content may vary considerably within the same field. As far as possible, avoid harvesting grain with high moisture contents due to precipitation or morning dew and late afternoon as it takes a longer time to dry. If possible, **when preharvest monitoring or surveying of grain shows a field as having a higher *Fusarium* infection rate,** harvest **and store** grain ~~in from~~ such field(s) ~~as shown to have a higher infection rate by *Fusarium* ear blight through preharvest monitoring or surveying of grain~~ separately from **those** fields with a lower infection rate.”

Para. 26. “Harvested grain that has not been **mechanically** dried to a safe storage moisture level should not be stored or transported in bins, wagons or trucks for prolonged periods of time. Transit time for movement from field to drying facility should be minimised unless the grain is already at acceptable storage moisture levels before harvest. When necessary it is recommended that the trucks and containers ~~to~~ be opened, to increase aeration and minimise the condensation effects.”

Sub-heading before para. 27: **“Drying and Cleaning Before Storage”**

Para. 27, first sentence: “Avoid piling, ~~or~~ **heaping, or bin storage of** high-moisture, freshly harvested commodities for more than a few hours prior to drying or threshing to lessen the risk of fungal growth.”

Para. 28: **“Although it is not essential to sort or clean grain prior to drying or storage, W**hen necessary, pre-cleaning before drying can be carried out to remove large amounts of straw or other plant material that can carry mould or mould spores. **Sorting and washing methods can be utilised to clean the grain.**~~If cleaning equipment is available, it is advantageous to mechanically clean grain to remove foreign material, seeds of other plant species, and crop residues prior to transfer to storage structures.~~ However it is important that the grain is not damaged during the procedure and that **it is dried thoroughly if washing is used any grain that is washed as a method of cleaning is dried as soon as possible to an acceptable moisture level before being transferred to a storage structure, regardless of expected duration of storage.**”

Para. 29: “It is very important to ensure that moisture levels in harvested grains are low enough to permit safe storage for even relatively short periods of time ranging from a few days to a few months. A maximum level of 15% moisture is generally considered to be low enough to prevent further growth of pre-harvest fungi and germination of spores of fungi that typically infected grain and impart mycotoxins during storage, such as *Penicillium* and similar toxigenic moulds.”

Para. 30. “Freshly harvested cereals should be dried immediately in such a manner that damage to the grain is minimised and moisture levels are lower than those needed for fungal growth during storage. **While both moisture and temperature of grain can be reduced after harvested grain is transferred to storage bins and silos using mechanically forced aeration,** ~~it~~ is preferable to reduce grain moisture content to an acceptable level prior to transfer to storage bins and other storage structures. If it is not possible dry the commodities immediately, aerate them by forced air circulation and kept the period before drying as short as possible. Mechanical drying is preferred. Flat bed and re-circulating batch driers are adequate for small scale operations while using a continuous flow-dryer is preferred for large scale drying ~~for~~ **prior to** long storage periods. Grains should not be excessively dried or at excessively high temperatures to avoid deterioration in nutritional quality and suitability for milling or other processing. Avoid accumulating too much grain in the pre-drier storage or “wet tank”, especially when field conditions are warm. Store only enough that can be easily dried in a suitable time period.”

Para. 31. “If mechanical means of drying are not available, sun and open air drying should be done on clean surfaces; **to the extent possible,** grains should be protected from rain, dew, soil, pests, droppings from birds **and other sources of contamination** during this process. For **more** even and faster drying, mix or stir grains frequently in thin layers to dry evenly and quickly.”

Para. 32. “After drying, cereal grain should be cleaned to remove damaged and immature kernels and other foreign matter. Kernels containing symptomless infections cannot be removed by standard cleaning methods. Seed cleaning procedures, such as gravity tables and optical sorting, may remove broken kernels that are susceptible to infection.”

Para. 33: "It is important that bins, silos, sheds and other buildings intended for grain storage are dry, well-vented structures that provide protection from rain, snow, ground water, moisture condensation, and the entry of rodents, birds and insects that can not only contaminate grain but damage grain kernels to make them **more** susceptible to mould infection. Ideally, storage structures should be designed so as to minimise wide fluctuations in the temperature of the stored grain."

Para. 34: "Storage facilities should be cleaned prior to receiving grain to remove dust, **fungal spores**, grain, crop residues, animal and insect excreta, **soil**, insects, foreign material **such as stones, metal and broken glass**, and other sources of contamination."

Para. 35: "For bagged commodities, ensure that bags are clean, dry and stacked on pallets or incorporate a water-impermeable layer between the bags and the floor. The bags should facilitate aeration and be made of non-toxic food-grade materials, that do not attract insects **and/or** rodents and are sufficiently strong to resist storage for longer periods. When stored by the conventional system, bagged grains should enter storage with **a** moisture content **of** less than 1% of the reference moisture held by the bulk storage system."

Para. 36: "Determine moisture content of the lot, and if necessary, dry the crop to the moisture content recommended for storage. Fungal growth in grain is closely related with water activity (a_w), **commonly defined in foods as the water that is not bound to food molecules (such as milled grain products) that can support the growth of bacteria, yeasts, and fungi**. Although the appropriate moisture content for fungal growth on various grains is different, the **maximum a_w to avoid fungal growth** is basically the same. Researchers have shown that recommended a_w to avoid fungal growth is generally less than 0.70. In general, the moisture content of grains during storage should not be higher than 15%. Appropriate level of moisture content of grain should be determined based on cereal variety, kernel size, grain quality, storage period and storage condition (e.g. temperature). In addition, safe storage guidance may be provided to reflect the environmental situation in each region. Table 2 shows values of moisture content in relation to different water activities at 25°C for some cereals."

Para. 37: "**Ongoing monitoring of the condition of stored grain is essential to ensure the grain is kept at acceptable temperature and moisture levels and substantially free of rodents and stored product pests such as grain beetles, weevils and mites. Significant fluctuations in grain temperature and increases in grain moisture can provide favourable conditions for mold growth and production of mycotoxins. Physical damage to grain kernels during storage caused by rodents and pests, such as insects and mites, can also contribute to increases in mold growth.** The mycotoxin level in in-bound and out-bound grain should **also** be monitored when relevant, using appropriate sampling and testing programs that are appropriate to the mycotoxin system."

Para. 38, last sentence: "**When/After** spoiled grain has been removed, it may be necessary to aerate the remaining grains to lower the temperature to acceptable levels."

Para. 39: "For cold climate countries, it is important to note that reduction of grain temperature below 15 degrees Celsius that can occur during colder months of temperate grain producing regions will contribute to safe storage and prevention of mould growth and mycotoxin production. Extremely cold temperatures will also inhibit insect growth and reproduction, reducing **the** risk of insect damage **in turn facilitating which would otherwise facilitate** mould growth."

Para. 43, first sentence: "Transport containers, vehicles such as trucks and railway cars and vessels (boats and ships) should be dry and free of old grain, grain dust, visible fungal growth, **musty odour**, insects and any contaminated material that could contribute to mycotoxin levels in lots and cargoes of grain."

Sub-heading before para. 46: "**Processing and Cleaning After Storage**"

Para. 47. "Analytical testing can be used as a tool to monitor mycotoxin concentrations **in-throughout the cereal grains supply chain**. It is important that the cereal grains removed from storage for transport are tested at loading or unloading for mycotoxin concentrations before going into storage at grain processing facilities, **such as flour mills and feed manufacturing facilities**, especially when the risk of mycotoxin contamination is high **as a consequence of unfavourable conditions during grain production and harvest**. Lots containing higher levels of mycotoxin should undergo processing that significantly decreases mycotoxins **to acceptable levels in order** to guarantee a safe product to consumers."

Para. 48. "Brushing, scouring and peeling to remove hulls and bran layers of the grain can significantly reduce mycotoxin content **in grain destined for direct human consumption and milled grain products produced from the inner portions (endosperm) of the grain kernels**, as the outer parts of the kernel of most cereal grains typically contains higher mycotoxin levels or adhering contaminated dust. Such redistribution of the mycotoxins present in unprocessed grains can result in unacceptably high levels of mycotoxins such as DON in the separated hulls and seed coat (bran layers) fractions. Where these fractions are to be used for food use rather than being discarded, it is also important to monitor mycotoxin levels to ensure **foodsafety** in the **food and/or feed** products as consumed."

Para. 51: "For grain products and grain-derived foods that pass through a fermentation step, poorly preserved starter cultures **arecan be** significant sources of mycotoxin contamination. The starter cultures should be maintained pure, viable and sealed to prevent water entrance and other contamination."

EL SALVADOR

En general se apoya el avance del documento en los trámites del Codex.

GHANA

Position: We support the adoption of the revised Code of Practice for the prevention and reduction of mycotoxin contamination in cereals and its annexes. However, we wish to propose the following revision to the text in the last sentence of REP15/CF-Appendix VII, para 35 to ensure clarity.

When stored by the conventional system bagged grains should enter storage with moisture content **1% lower than** ~~less than 1%~~ of the reference moisture held by the bulk storage system.

Rationale: The COP has been updated with new information, moreover concerns raised on "terminology" during CCCF9 have also been clarified. We believe the recommendations in the COP are implementable and provide useful guidance, hence the document should be progressed through the Codex stepwise process.

INDONESIA

The followings are Indonesia comments:

Proposed Draft Revision Of The Code Of Practice For The Prevention And Reduction Of Mycotoxin Contamination In Cereals (CAC/RCP 51-2003) (Step 5)	Indonesia comments
<p>2. The severity of pre-harvest fungal propagation is highly dependent upon weather conditions varying greatly from year to year in grain-producing regions. The severity of pre-harvest infection and propagation of toxigenic fungi can also vary with the degree of damage caused by insects and other non-toxigenic fungi. Because of these factors, mycotoxin concentrations observed in grains at harvest vary widely from year to year. Reliable prevention of pre-harvest fungal infection <u>has proven</u> to be elusive, even with application of good agricultural practices (GAP) and commercially available fungicides. Cereal breeding has resulted in only modest gains in genetic resistance to the <i>Fusarium</i> ear blight (<i>Fusarium</i> head blight) of cereals in cultivars with acceptable quality, yield and tolerance to other important cereal diseases.</p>	<p>Indonesia proposes to replace the word "has proven" into "<u>has been proven</u>"</p>
<p>7. It is important for grain producers to realise that GAP, including storage and handling methods, represent the primary line of defence against contamination of cereals with mycotoxins, followed by the implementation of GMP during the handling, storage, processing and distribution of cereals for human food and animal feed. Processing industries also have a role to implement GMP where required, mainly during grain sorting, cleaning and processing.</p>	<p>Indonesia proposes to replace the sentence " , including storage and handling methods,...." into "<u>including post harvest, storage, handling procedures...</u>".</p>

PERU**GENERAL COMMENTS:**

Currently mycotoxins represent a major issue for its negative correlation to food safety and the damage they may cause to people. In developing countries it is widely believed that its most important effect is the ability of some of them to compromise the immune response and thus reduce resistance to infectious diseases. The most frequent mycotoxins are aflatoxins and ochratoxin A (OTA) the latter being the most toxic.

SPECIFIC COMMENTS:**Country position:**

"The prevention and reduction of mycotoxin contamination in cereals should be tackled at the source, i.e. in the cultivation phase and for this purpose it is important the development of good agricultural practices adapted to different areas of the plant, which allow that their application reduces its content exponentially over the years, based on: (a) the improvement of the health of the soil, (b) changes in nutrition and (c) promote resistance in plants against adverse effects.

It is recommend to investigate sampling plans for shipments of cereals (transported in bulk by sea), which may pose a threat to the health of people and animals."

REPUBLIC OF KOREAParagraph 9

Since paragraph 9 b) mentions "producers/handlers/processors," not only we agree with Canada's comment that "producers" should be included in paragraph 9, we also suggest the term "handlers" to be added in the sentence. Also, since the term "handlers" is not clear, its definition should be included in the COP.

Paragraph 35

The Republic of Korea proposes that the bagged grains should enter storage with reference moisture rather than 1% less than the reference moisture since expenses are required to maintain 1% less than the reference moisture.

Paragraph 39

"15 degrees Celsius" in paragraph 39 should be changed to "15°C" to be consistent with paragraph 38 ("2-3°C").

SUDAN

Comments at agenda item 10 are also applicable at this CRD.

USA

The United States recommends advancing the COP to Step 8 for adoption by the 39th Session of Commission. The United States also would not object to holding the draft COP at Step 7 pending advancement of the proposed draft annexes to the *Code of Practice for Prevention and Reduction of Mycotoxin Contamination in Cereals* (CAC/RCP 51-2003) (Agenda item 10) to Step 5 for adoption by the 39th Session of Commission.

AFRICAN UNION

Position: AU supports the adoption of a revised Code of practice. However, the meaning of the last sentence in para 35 is unclear and needs clarification and rewording.

Issue & Rationale: We previously supported the adoption of this general Code of practice, which is a revised version of the original Code (CAC/RCP 51-2003). It has now been updated with new information. Issues such as terminology raised at CCCF9 have now been clarified and the Code of practice is acceptable in its present form, apart from the clarity requested in the position above. The various Annexes to this general Code of practice will be dealt with under separate Agenda items (10 and 12).