



## ANNEX 6 TO THE CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF MYCOTOXIN CONTAMINATION IN CEREALS (CAC/RCP 51-2003)

### PREVENTION AND REDUCTION OF CONTAMINATION BY ERGOT AND ERGOT ALKALOIDS IN CEREAL GRAINS

#### RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMP)

1. The recommended practices are in principle relevant for all cereals but in particular applicable to the crops most sensitive to ergot sclerotia contamination, such as rye, triticale, sorghum and pearl millet. The increased prevalence of ergot sclerotia in wheat may also be an emerging issue in some countries.
2. Good Agricultural Practices include methods to reduce *Claviceps* (mainly *C. purpurea*) infection and ergot alkaloids contamination of cereals during crop growth and development, harvest, storage, transport and processing. Besides the *Claviceps* species, other sources of ergot alkaloids are *Aspergillus fumigatus* and certain *Acremonium* and *Penicillium* species. [This Annex refers to the control of the \*Claviceps\* species only. These sources are not considered in this Code of Practice Annex.](#)

#### Planting and crop rotation

3. Refer to paragraph 11 in the general Code of Practice.

#### Tillage and preparing for seeding (Planting)

4. Refer to paragraphs 12-16 in the general Code of Practice.
5. Early and simultaneous flowering of the crop is the best way to counteract *Claviceps* infection. The following recommendations help to prevent *Claviceps* infection of cereals:
  - a. Ensure [use of ergot-free seeding material and](#) good establishment with optimum plant populations, applications of fertiliser and plant growth regulators and good drainage.
  - b. Ensure good control of grass weeds (especially those that are hosts to *Claviceps*) within a field. Particular attention should be paid to grass weed populations on the headlands of a field. Both cultural and chemical methods should be used. [The control of grass weeds should be continued, especially when ergot contamination is known to have occurred on a field. control of grass weeds should be continued in particular after a contamination by ergot has occurred on a field.](#)
  - c. The laying of sufficiently wide tramlines for agricultural vehicles to avoid the green shoots that increase the risk of infection, may be considered.
6. Where the preceding cereal crop had been infected with ergot disease (or where there is a substantial grass weed population that was infected with ergot disease):
  - a. The cultivation of the subsequent cereal crop should be by inversion ploughing.
  - b. Ploughing should not then be used in the subsequent cereal crop as this may return sclerotia to the land surface.
  - c. Where minimal cultivations are used, the seed depth should be at least 5 cm (0.16 ft).
  - d. Alternatively, the field should be kept free from cereal production in the second year.
  - e. Where low and zero tillage crop rotation practices are normally followed, other mitigation measures take on greater importance ([measures at pre-harvest stage, drying and cleaning](#)).

#### Pre-harvest

7. Refer to paragraphs 17-23 in the general Code of Practice.
8. Consider a partial harvesting of the crop as an option. Field/subsections with a high incidence of ergot, may be threshed separately, while ensuring the safety of humans and animals. More sclerotia can be found near a field margin (greater than 1 m) in comparison with zones deeper in the field (at least 30

m from field margin). Separate harvesting of field borders (3-4 m zone) could significantly decrease ergot sclerotia in the yield.

### Harvest

9. Refer to paragraphs 24-27 in the general Code of Practice.
10. Air-stream cleaning should be used, as far as possible, to remove ergot sclerotia and dust from the grain.

### Drying and cleaning before storage

11. Refer to paragraphs 28-33 in the general Code of Practice.
12. Sclerotia present in the harvested grain have a softer, more supple structure than the harvested cereal grains.
  - a. Therefore any sticky material from the sclerotia could adhere to the surface of the grain. In addition, breakage can occur very easily, and the very fine ergot dust could become deposited on the grains' surface.. Thus, it is important that the ergot sclerotia are removed from the cereal grain as soon as practicable.
  - a-b. In addition, it is important to eliminate as many ergot sclerotia and dust particles as possible at each stage of the food processing chain to prevent carryover to the next stage of processing. It is important to eliminate as much ergot sclerotia and dust particles as possible at each stage of the food processing chain to prevent carryover to the next stage of processing.

### Storage after drying and cleaning

13. Refer to paragraphs 34-43 in the general Code of Practice.

### Transport from storage

14. Refer to paragraphs 44-46 in the general Code of Practice.

### Processing and cleaning after storage

15. Refer to paragraphs 47-54 in the general Code of Practice.
16. Colour sorting based on the clear-cut distinction between the colour of ergot sclerotia and that of cereal grain should be considered, since this is an efficient method to remove sclerotia. Other recommended separation techniques, such as weigh selectors, gravity tables or indented cylinder separators (trieurs) may also be used.
17. Following the use of the above-mentioned separation techniques, other processes that support the cleaning of the cereal (scrubbing, brushing, peeling and scouring) should be considered in order to remove the ergot dust on the surface.
18. To prevent ergot dust from accumulating in the milled flour, the flour filter in the crusher area of the mill unit may be replaced as appropriate. Ensure that any dust is removed well before the milling process including, the option of removing and replacing the flour filter in the crusher area of the mill unit.
19. All waste material should be disposed of in a manner to prevent re-entry into the food or feed supply chain.