

Macroanalytical Procedures Manual (MPM)

V-8. Spices, Condiments, Flavors, and Crude Drugs

E. Supplemental Method for Whole Chili Pepper Pods, *Capsicum* spp. L.

November 2024

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E. Supplemental Method for Whole Chili Pepper Pods, *Capsicum* spp. L.

(1) Scope

This method supplements Section 8.A, by describing procedures specific for whole chili pepper, *Capsicum* spp. L., pods.

(2) Applicable Documents

- [CPG Sec 525.200 Capsicum Pods, Ground Capsicums Excluding Paprika, Ground Paprika - Adulteration with Insect and Rodent Filth, Mold, Mammalian Excreta | FDA](#)

(3) Defects

Chili peppers can be attacked by insects both in the field and in storage. There are several major field pests that can be found in dried chili pods. Coleopteran pests include the pepper weevil, *Anthonomus eugenii* Cano (Elmore 1934, Capinera 2014) (**Figures V-8-E-1A and 1B**), and the Cuban pepper weevil, *Faustinus cubae* (Boheman) (Capinera 2014). The pepper weevil adult ranges in size from 2.0 mm to 3.5 mm. Its coloration ranges from black to a deep reddish-brown and it is covered with numerous scales. The Cuban pepper weevil is typically brown in color and has a rough appearance. A key characteristic for identification of adult specimens is that each femur has a sharp projection or tooth. However, the Cuban pepper weevil lacks this characteristic projection. FDA laboratories typically find the following Diptera in capsicum pods: Drosophilidae, Lonchaeidae, Muscidae and Tephritidae, with the Lonchaeidae being the most frequent (D. Gross, personal communication, April 9, 2024). The Muscidae normally found in *Capsicum* by FDA are the pepper fruit fly (*Atherigona orientalis*) and, on rare occasions, *Muscina* sp. (D. Gross, personal communication, April 9, 2024). Internal mold and yeast in dried peppers can be an issue as well (Leyendecker 1950, 1954). Other defects are like those already addressed in Section 8.A. See (**Figures V-8-E-1-4**) for examples of defects observed in dried capsicums.

(4) Procedure: Determination of Contamination in Chili Peppers Caused by Arthropods, Animal Excreta, and Extraneous Material

Sample size should consist of six (6) subsamples, each with a minimum of 454 g. Examine as in Section 8.A(4). Examine the entire contents of the subsample. It is recommended to wear personal protective equipment such as gloves and goggles while handling chili peppers to reduce contact with the chili oil, which can be an irritant to the eyes and skin. Report findings as in Section 8.A(4)d.

(5) Procedure: Determination of Arthropod Damaged/Infested, Moldy, and Otherwise Reject Chili Peppers

a. Sample Preparation – Varieties of chili peppers vary in size. For whole chili pepper pods 10 cm or less in length (such as Chiltepin, Chile de Arbol, Habaneros, Pequin,

Tepin, and similar chilis), examine 100 g - 125 g from each of the six (6) subsamples. For whole chili pepper pods over 10 cm in length (such as Ancho, Cascabel, Chipotle, Guajillo, Jalapeño, Paprika, Pasilla, Poblano and similar chilis) examine 250 g – 300 g from each of the six (6) subsamples. Take corresponding amounts to examine after performing procedure 8.E(4).

b. Visual Examination – Cut open each chili pod and examine it both internally and externally for reject material visible to the naked eye or up to 10x assisted magnification. After the initial examination, higher magnification may be used to confirm findings as necessary. If the magnification exceeds 10x in the initial analysis, then it should be stated in the report of the results.

c. Classification or Reject Material--Classify and report rejected material by weight according to Section 8.A(5). Note: do not reject peppers which show abiotic stress, naturally occurring cracking or “stretch marks”, due to moisture issues with the soil. This is especially common in jalapeño peppers (**Figure V-8-E-7**). If the cracking has led to the development of mold, then the peppers need to be analyzed carefully for defects due to mold.

FIGURES

Figure V-8-E-1. The pepper weevil, *Anthonomus eugenii* Cano. **A.** Chili pods with arval feeding damage indicated by the arrows (scale bar: 1mm). **B.** weevil *A. eugenii* Cano adult (scale bar: 1mm). **C.** Chili pods with lepidoptera larval excreta pellets indicated by the arrow on *Capsicum* sp. L. (15x). (Source: Photos courtesy of H. Loechelt-Yoshioka, FDA)..... 4

Figure V-8-E-2. Examples of Diptera found in capsicum pods. The pepper fruit fly, *Atherigona orientalis* Schiner (Diptera: Muscidae): **A.** Adult, **B.** Larva, **C.** Cephaloskeleton of the larva (200x), **D.** Posterior spiracles of the larva (200x). **E.** Cephaloskeleton (200x) and **F.** Posterior spiracles of the lance fly larva (Diptera: Lonchaeidae)(400x). (Source: Photos courtesy of D. Gross, FDA)..... 5

Figure V-8-E-3. Pepper pod, *Capsicum* sp. L. with mold/yeast. **A.** Internal mold. **B.** Dried jalapeño pod showing internal mold with fruiting bodies (scale bar: 1.0mm). **C.** Internal mold covering seeds (scale bar: 1.0mm), **D.** Mold stained with lactophenol cotton blue (scale bar: 50.0µm). **E.** Arrows pointing to encrusted yeast inside a chili pepper pod (scale bar: 1.00mm). (Source: Photos courtesy of H. LoechelYoshioka, FDA)..... 6

Figure V-8-E-4. Extraneous material. **A.** Sand found inside a chili pepper (scale bar: 1.00mm). **B.** A rock found after sieving a chili pod sample (Scale bar: 1.0mm). (Source: Photos courtesy of H. Loechelt-Yoshioka, FDA)..... 7

Figure V-8-E-5. Jalapeño pepper showing abiotic stresses with normal skin cracking present at maturity. This is not classified as a reject (Source: Photo courtesy of Bruce Watt, University of Maine, Bugwood.org)..... 7



Figure V-8-E-1. The pepper weevil, *Anthonomus eugenii* Cano. **A.** Chili pods with arval feeding damage indicated by the arrows (scale bar: 1mm). **B.** Weevil *A. eugenii* Cano adult (scale bar: 1mm). **C.** Chili pods with lepidoptera larval excreta pellets indicated by the arrow on *Capsicum* sp. L. (15x). (Source: Photos courtesy of H. Loechelt-Yoshioka, FDA).

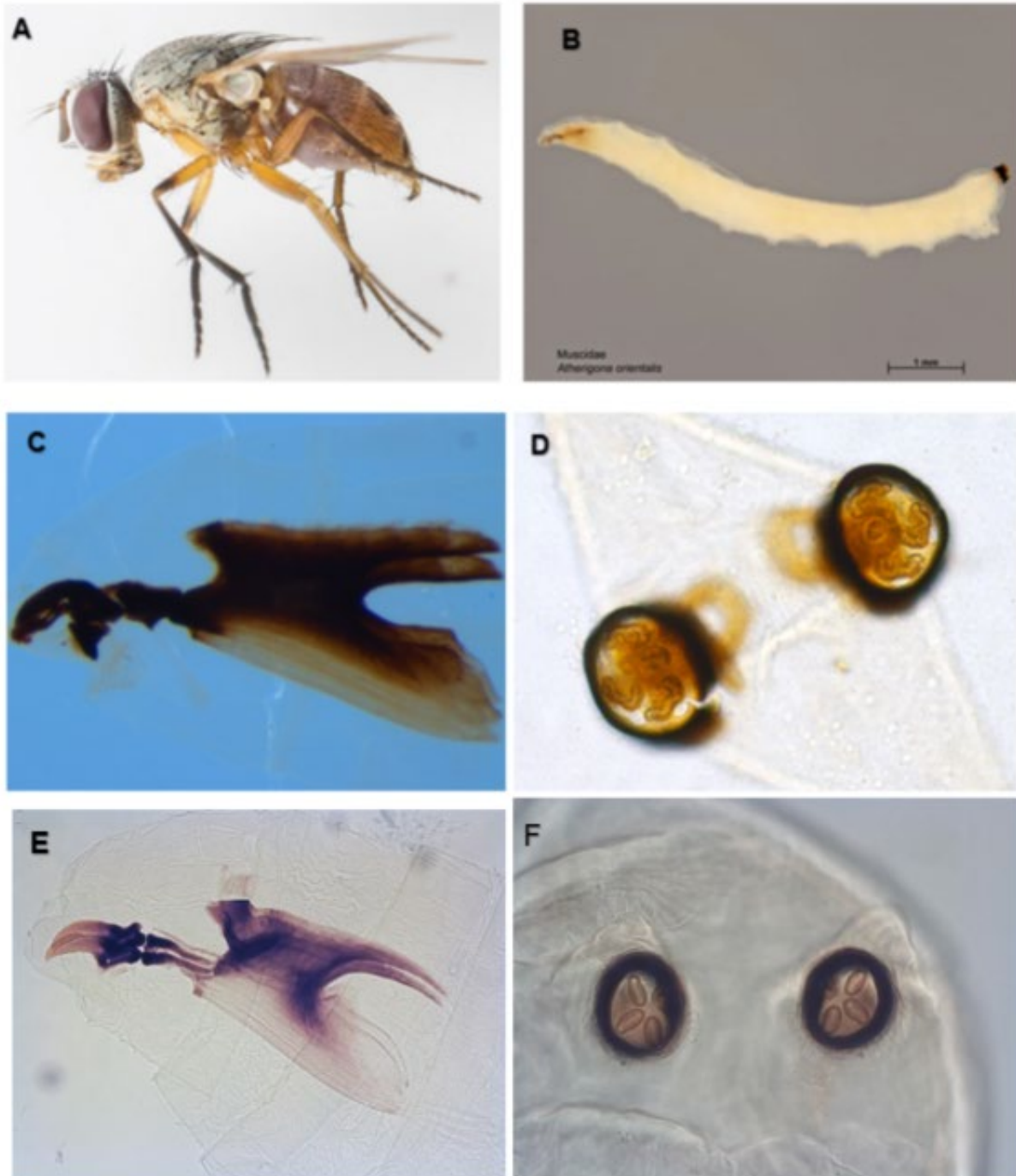


Figure V-8-E-2. Examples of Diptera found in capsicum pods. The pepper fruit fly, *Atherigona orientalis* Schiner (Diptera: Muscidae): **A.** Adult, **B.** Larva, **C.** Cephaloskeleton of the larva (200x), **D.** Posterior spiracles of the larva (200x). **E.** Cephaloskeleton (200x) and **F.** Posterior spiracles of the lance fly larva (Diptera: Lonchaeidae) (400x). (Source: Photos courtesy of D. Gross, FDA).

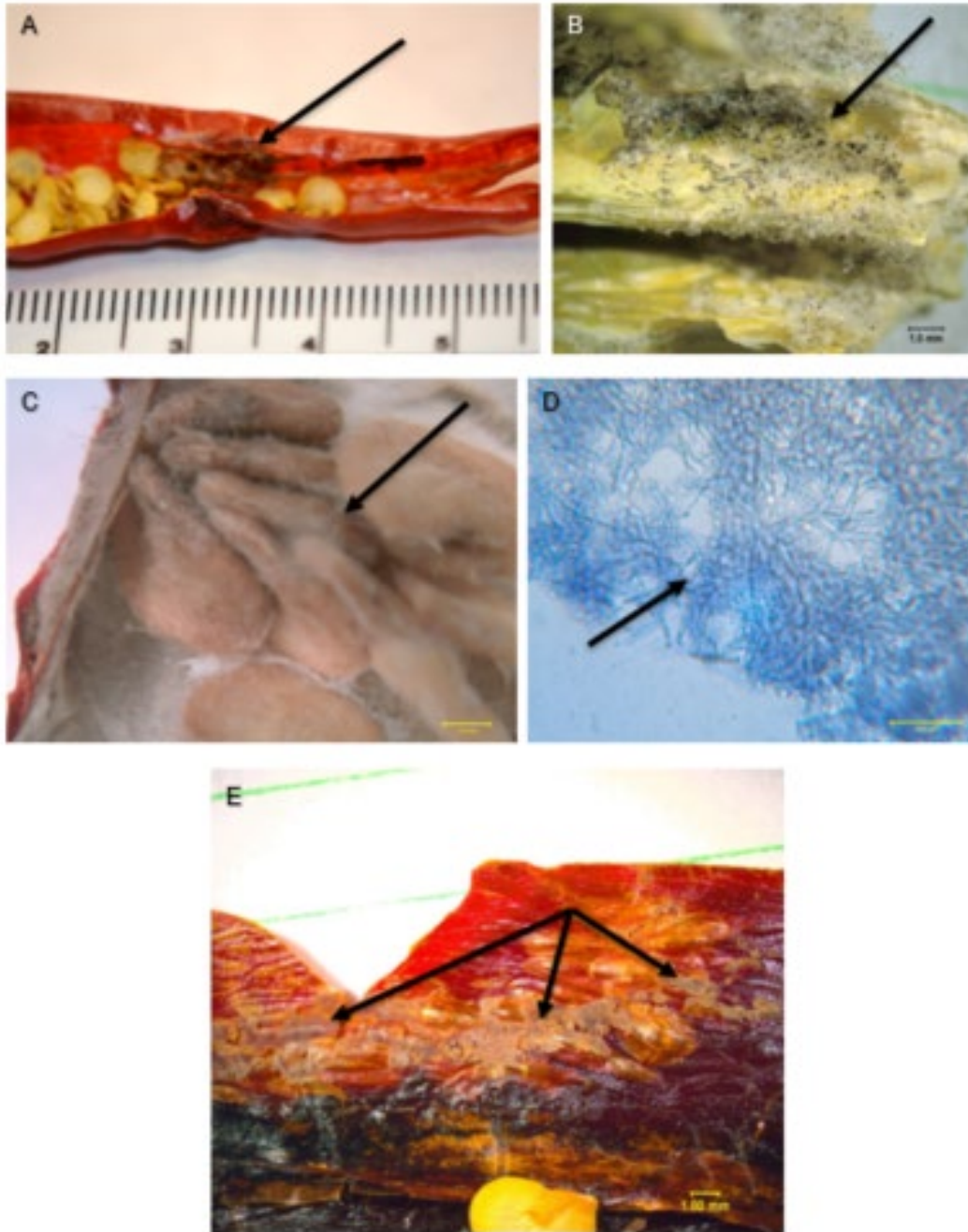


Figure V-8-E-3. Pepper pod, *Capsicum* sp. L. with mold/yeast. **A.** Internal mold. **B.** Dried jalapeño pod showing internal mold with fruiting bodies (scale bar: 1.0mm). **C.** Internal mold covering seeds (scale bar: 1.0mm), **D.** Mold stained with lactophenol cotton blue (scale bar: 50.0µm). **E.** Arrows pointing to encrusted yeast inside a chili pepper pod (scale bar: 1.00mm). (Source: Photos courtesy of H. Loechelt-Yoshioka, FDA).

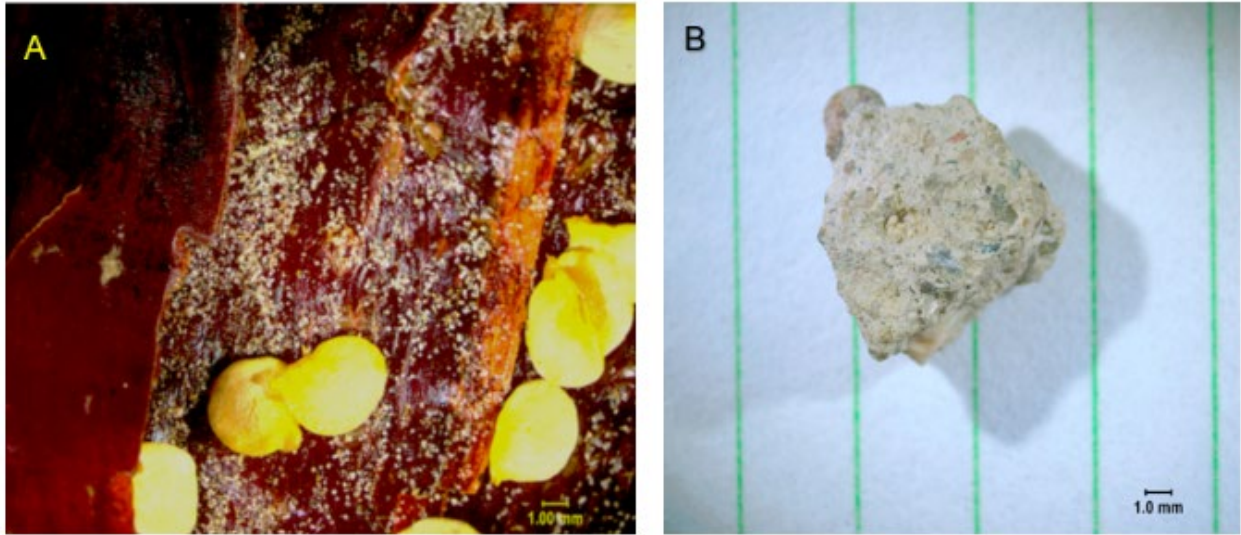


Figure V-8-E-4. Extrinsic material. **A.** Sand found inside a chili pepper (scale bar: 1.00mm). **B.** A rock found after sieving a chili pod sample (Scale bar: 1.0mm). (Source: Photos courtesy of H. Loechelt-Yoshioka, FDA).



Figure V-8-E-5. Jalapeño pepper showing abiotic stresses with normal skin cracking present at maturity. This is not classified as a reject. (Source: Photo courtesy of Bruce Watt, University of Maine, Bugwood.org)

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Additional Information

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Revision History

Version No.	Purpose of change	Date
V0	New process	2024