

Grain Inspection Hand Book

Montana Standards

Book 1 – Chapter 9

Crambe

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BOOK 1, CHAPTER 9  
CRAMBE

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## 9.1 - BACKGROUND

This chapter establishes procedures under Montana Standards, as amended, for the factor analysis of crambe seed.

### History:

Crambe (*Crambe abyssinica* Hochst.) is believed to be a native of the Mediterranean area. The oilseed crop contains inedible oil used for industrial products. It has been grown in tropical and subtropical Africa, the Near East, Central and West Asia, Europe, United States, and South America. It was first used as a crop in 1933 at the Boronez Botanical Station, U.S.S.R., and has been a part of a Swedish breeding program since 1949.

Crambe was introduced to the U.S.A. by the Connecticut Agricultural Experiment Station in the 1940s. Evaluations for strains of the crop began in Texas in 1958. Crambe has since been successfully grown in several areas of the United States.

### Uses:

The oil extracted from crambe seed is used as an industrial lubricant, a corrosion inhibitor, and as an ingredient in the manufacture of synthetic rubber. The oil contains 50 to 60% erucic acid, a long chain fatty acid, which is used in the manufacture of plastic films, plasticizers, nylon, adhesives, and electrical insulation.

Crambe is being promoted as a new domestic source of erucic acid, which has primarily come from imported rapeseed oil. Supplies of industrial rapeseed are less-plentiful since the development of varieties (Canola) that have no erucic acid content. The United States uses up to 40 million pounds of high-erucic acid oil annually mostly imported from Poland and Canada. Although rapeseed is grown domestically, crambe oil contains 8 to 9% more erucic acid than industrial rapeseed oil, and the crop is better suited to the higher rainfall areas of the U.S.

Defatted crambe seed meal can be used as a protein supplement in livestock feeds. The meal contains 25 to 35% protein when the pod is included and 46 to 58% protein when the pod is removed. It has well-balanced amino acid content and has been approved by the FDA for use in beef cattle rations for up to 5% of the daily intake.

The meal has not been approved for nonruminant rations because it may contain glucosinolates, which may be broken down in digestive systems to form harmful products that can cause liver and kidney damage, and appetite depression. Untreated, oil-free crambe meal may contain up to 10% thioglucosides, which are toxic to nonruminant animals, such as hogs and chickens. However, subjecting whole seed to moist heat before processing can deactivate the enzyme, and the glucosinolates remain intact through the oil extraction process.

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*Source: University of Wisconsin Cooperative or Extension Service, Department of Agronomy, Madison, WI 53706, Telephone (608)-262-1390, Center for Alternative Plant and Animal Products, 340 Alderman Hall, University of Minnesota, St. Paul, MN 55108, Telephone (612)-624-4217*

## 9.2 - GENERAL INFORMATION

There are no classes, subclasses, or grades for crambe seed. Inspection is on a factor only basis. The factors analyzed are foreign material and test weight per Winchester bushel.

## 9.3 - DEFINITION OF CRAMBE SEED

Crambe seed (*Crambe abyssinica* Hochst) consist of 50.0 percent or more of whole crambe seed before the removal of foreign material. Whole kernels are kernels with more than three-fourths of the kernel present.

Basis of Determination: A visual appraisal of the sample is sufficient to determine if it meets the definition of crambe. However, if analysis is necessary, make it before removing foreign material on a representative portion of approximately 25 grams.

## 9.4 - FOREIGN MATERIAL

Foreign material is all material other than crambe seed that you can remove from the original sample by use of an approved device according to procedures prescribed in the Federal Grain Inspection Service (FGIS) instructions.

Basis of Determination: Foreign material is determined on a representative portion of the original sample of sufficient size to provide approximately 1 1/8 to 1 1/4 quarts of mechanically cleaned crambe seed and approximately 30 grams of crambe seed cut from the mechanically cleaned sample.

Foreign material is determined in two steps: mechanically separated foreign material and handpicked foreign material.

STEP 1: Procedure for determining mechanically separated foreign material using the Carter Dockage Tester:

1. Set air control on 5.
2. Set feed control to 2 1/2.
3. Insert No. 2 riddle in the riddle carriage.

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4. Insert No. 8 triangle hole sieve in the middle sieve carriage.
5. Insert No. 2 round hole sieve in the bottom sieve carriage.
6. Run sample portion through the Carter Dockage Tester.
7. Monitor the crambe seed removed by the aspirator, making sure the hulls in the air collection pan are empty. If the hulls are not empty and contain mature seeds, adjust the air setting down.

Mechanically separated foreign material is: aspirated material in air collection pan; materials over No. 2 riddle (excluding crambe seed); material that passed through the No. 2 sieve (bottom collection pan). Combine crambe seed that passed over the No. 8 sieve and over the No. 2 sieve to form the mechanically cleaned sample.

STEP 2: Procedure for determining handpicked foreign material:

- A. Cut approximately 30 grams from the mechanically cleaned sample.
- B. Handpick the 30-gram mechanically cleaned sample and remove all material other than crambe seed.

Calculating Foreign Material:

- |        |   |
|--------|---|
| Step 1 | (Weight of mechanically separated foreign material ÷ Original sample weight) x<br><br>100 = Percent of mechanically separated foreign material. |
| Step 2 | (100 – Percent mechanically separated foreign material) ÷ 100<br>= Change of base factor.   |
| Step 3 | (Weight of handpicked foreign material ÷ Weight of handpicked portion) x 100 = Percent of handpicked foreign material.                          |
| Step 4 | (Percent of handpicked foreign material) x (Change of base factor) = Adjusted percentage of handpicked foreign material.                        |
| Step 5 | Percent of mechanically separated foreign material + Adjusted percentage of handpicked foreign material = Percent of foreign material.          |

## 9.5 - TEST WEIGHT

Test weight is the weight per Winchester bushel (2,150.42 cubic inches) as determined using an approved device according to procedures prescribed in FGIS instructions.

Basis of Determination: Determine test weight after the removal of mechanically separated foreign material on a portion of sufficient quantity to overflow the kettle and before the removal of handpicked foreign material.

Certification: Record test weight results on the work record as displayed on the electronic scale or in whole and tenth pounds to the nearest tenth pound. Record the test weight on the certificate in whole and tenth pounds to the nearest tenth pound.

## 9.6 - DAMAGED KERNELS

Damage must be distinct. In general, a kernel of crambe shall be considered damaged when the damage is distinctly apparent and of such character as to be recognized as damaged for commercial purpose.

Frost Damaged: Crambe and pieces of crambe seeds which are distinctly shriveled or shrunken (frost damaged) to the degree illustrated shall be considered damage. (Reference: Interpretive line print Canola 3.0)

Heat-Damaged Kernels: Crambe and pieces of crambe seeds which are materially discolored and damaged by heat. (Reference: Interpretive line print Canola 2.0)

Mold Damaged: Crambe and pieces of crambe seeds containing the amount of surface mold depicted shall be considered damage. (Reference: Interpretive line print Canola 3.0)

Sprout Damage: Crambe and pieces of crambe seeds that are sprouted shall be considered damage. (Reference: Interpretive line print Canola 4.0)

**Note: Crambe seeds are larger than canola seeds and the area of coverage for damages need to be larger than area depicted in the line print for canola.**

Basis of Determination: The determination for damaged kernels shall be made on a representative portion cut from the work sample after the removal of foreign material.

Certification: Show the damaged kernels (total) on the work record and certificate to the nearest tenth of a percent.

**9.7 - ODOR**

Basis of Determination: Determine odor on evidence obtained at the time of sampling and on the sample either before or after the removal of dockage. Odors detected at the time of sampling must be recorded on the work record.

**Table 1**

SOUR	MUSTY	COMMERCIALY OBJECTIONABLE FOREIGN ODORS
Boot Fermenting Insect (acid) Pigpen Smoke <u>A/</u>	Ground Insect Moldy	Animal hides Decaying animal & vegetable matter Fertilizer Fumigant Insecticide Oil products Skunk Smoke (evidence of fire-burnt material) Strong weed

A/ Consider smoke odors as sour unless there is evidence of fire-burnt material.

Odors from Heat-Damaged crambe: When heat-damaged kernels are present, crambe seed gives off an odor very similar to smoke. Crambe seed containing a “smoke” odor is considered as having a “Sour” odor unless evidence of a fire-burnt material is present in the lot or the original sample. If evidence of a fire-burnt material is present in the lot or the sample, the smoke odor is considered a commercially objectionable foreign odor.

Musty or Sour Odors: High temperatures resulting from excessive respiration causes crambe seed to heat and give off a Musty or Sour odor.

Musty or sour odors in crambe seed includes musty, sour, earthy, moldy, ground odor, or a rancid, sharp, and acrid insect odor. An acrid insect odor (usually referred as “lesser grain borer” odor) is considered sour. An insect odor other than acrid (usually referred to as “bran bugs” odor) is considered musty.



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Commercially Objectionable Foreign Odor: Commercially objectionable foreign odor are odors that are foreign to grain and render it unfit for normal commercial usage.

Fumigant or insecticide odors are considered objectionable foreign odors if they linger and do not dissipate. When a sample of crambe seed contains a fumigant or insecticide odor that prevents a determination as to whether any other odor(s) exist(s), apply the following guidelines:

- A. Allow the sample to aerate in an open metal container not to exceed four (4) hours;
- B. If the fumigant odor persists after four (4) hours, consider the sample as having a commercially objectionable foreign odor and grade it accordingly.

The inspector(s) is responsible for making the final determination for all odors. A consensus of experienced inspectors is used, whenever possible, on samples containing marginal odors. The consensus approach is not required if no odor or a distinct odor is detected.

Certification: Record the type of odor on the pan ticket and in the “Results” section of the certificate.