Grain Inspection Handbook

Montana Standards

Book 1 – Chapter 1

Mustard Seed:

Including

Yellow Mustard, Oriental Mustard, Brown Mustard and Mixed Mustard

INDEX

1.1 - DEFINITION OF MUSTARD SEED

Mustard Seed (*Sinapis alba* L., *Brassica hirta* and *B. juncea*) shall consist of 50.0 percent or more of whole mustard seed before the removal of dockage. The term mustard seed shall not include wild mustard seed.

Whole kernels are kernels with one-fourth or less of the kernel removed.

Basis of Determination: Normally, a visual appraisal of the sample is sufficient to determine if it meets the definition of mustard seed. However, if analysis is necessary, make the determination before the removal of dockage on a portion of approximately 25 grams.

1.2 - GRADE AND GRADE REQUIREMENTS

Mustard Seed shall be any tame cultivated mustard seed which is divided into four classes. Mustard Seed is divided into three numerical grades and sample grade. Special grades are provided to emphasize special qualities or conditions affecting the value of the mustard seed. Special grades are added to and made a part of the grade designation. They do not affect the numerical or sample grade designation.

Table No. 1 - Mustard Seed Grade and Grade Requirements

							Conspicuous Admixture						
Grade			Damage			Other Classes	Conspicuous Inseparable Seeds or Detrimental Weed Seeds			Other			
	TW Yellow	TW Brown Oriental	Heat	Green Damaged	DKT		Inseparable Black Admixture \1	Other Distinctly Detrimental Weed Seeds \2	CI Total	Excreta	Stones	Other Admixtures \3	CA Total
1	54.0	52.0	0.1	1.5	1.5	0.5	0.1	0.3	0.3	1	0.05	1.0	1.0
2	52.0	51.0	0.2	1.5	3.0	2.0	0.2	0.5	0.5	1	0.05	1.5	1.5
3	50.0	50.0	0.5	1.5	5.0	5.0	0.3	0.7	0.7	1	0.05	2.0	2.0

\1 Cow Cockle, Bedstraw, Wild Mustard, Canola, Rape Seed
\2 Pigweed, Smart Weed, Foxtail, Buckwheat, and other weeds seeds
\3 Wheat, Barley, Lentils and other crops, plus Wild Oats

Sample Grade:
mustard seed which does not come within the requirements of grades No. 1,2 or 3; or
mustard seed which has a sour, musty or commercially objectionable foreign odor; or
mustard seed which is heating or of distinctly low quality

1.3 - GRADE DESIGNATIONS

Use the following guidelines when assigning grades on pan tickets and certificates.

a. The abbreviation “MT”,

b. The abbreviation “NO” and the number of the grade or the words “Sample Grade”,

c. The class of mustard seed,

d. The applicable special grade(s) in alphabetical order,

e. The words “Total Dockage” and the percentage thereof.

1.4 - PERCENTAGES

Determine percentages on a weight basis to a nearest tenth percent except for, stones and ergot. Report stones and ergot to the nearest hundredth percent. Calculate percent by dividing the weight of the material removed by the weight of the portion used and multiplying by 100. Upon request by applicant, stones will be recorded by count as well as by the percentage.

Table No. 2- How Factors Are Recorded

NEAREST TENTH PERCENT	NEAREST HUNDREDTH PERCENT	BY COUNT
Conspicuous Admixture Damaged Kernels (Total) Heat-Damaged Kernels Green Damaged Kernels Inseparable Black Admixture Other Distinctly Detrimental Weed Seeds Moisture Other Classes Sound Test Weight per Bushel	Ergot Stones	Animal Filth Garlic Bulblets Glass Insects Large Debris Stones Unknown Foreign Substance(s) or a Commonly Recognized Harmful or Toxic Substance(s)

1.5 – BASIS OF DETERMINATION

DISTINCTLY LOW QUALITY: The determination of distinctly low quality is made on the basis as a lot as a whole at the time of sampling when a condition exists that may or may not appear in the representative sample and/or the sample as a whole.

CERTAIN QUALITY DETERMINATIONS: Each determination of rodent pellets, bird droppings, other animal filth, broken glass, dockage, live insect infestation, large stones, moisture, temperature, garlic, and unknown foreign substance(s), and a commonly recognized harmful toxic substance(s) is made on the basis of the sample as a whole. When a condition exists that may not appear in the representative sample, the determination may be made on the basis of the lot as a whole at the time of sampling.

ALL OTHER DETERMINATIONS: Other determinations not specifically provide for under the general provisions are made on the basis of grain when free from dockage, except the determination for odor is made on either the basis of grain as a whole or the grain when free from dockage.

Table No. 3 – Basis of Determination

Lot as a Whole	Sample Before the Removal of Dockage	After the Removal of Dockage	After the Removal of Dockage and Conspicuous Admixture
Distinctly Low Quality Infestation Heating Odor	Infestation Moisture Dockage Odor Animal Filth Glass Unknown Foreign Substances Kind of Grain	Conspicuous Admixture Sclerotinia Stones Ergot Odor Other Material Oriental Mustard Seed Yellow Mustard Seed Brown Mustard Seed	Inseparable Black Admixture Other Other Distinctly Detrimental Weed Seeds Damaged Kernels (Total) Heat-Damaged Kernels Distinctly Green Kernels Odor

A general procedure based on the "basis of determination" definition is followed in the inspection and grading of mustard seed. However, the procedure may vary according to the test required to determine the grade. The following sections of this chapter are arranged in a logical sequence typically followed in the inspection and grading of mustard seed.

1.6 – HEATING

Mustard Seed developing a high temperature from excessive respiration is considered heating. Heating seed in its final stages usually produces a sour or musty odor. Care should be taken not to confuse seed that is heating with seed that is warm and moist because of storage in bins, railcars or other containers during hot weather.

Basis of Determination: Determine heating on evidence obtained at the time of sampling.

Certification: Grade heating mustard seed MT Sample Grade and record the "Heating" on the pan ticket and in the "Remarks" section of the certificate.

1.7 – 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, or on the crushed strips (used to determine heat damage and distinctly green damage). When the crushed strips are used, determine the odor

immediately after crushing. Odors detected at the time of sampling must be recorded on the work record.

Table No. 4 – Odor Classification Examples

SOUR	MUSTY	COMMERCIALLY OBJECTIONABLE FOREIGN ODORS
Boot Fermenting Insect (acrid) Pigpen Smoke a/	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 Mustard Seed: When heat-damaged kernels are present, mustard seed gives off an odor very similar to smoke. Mustard 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 cause mustard seed to heat and give off a Musty or Sour odor.
Musty or sour odor in mustard 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.

Commercially Objectionable Foreign Odor: Commercially objectionable foreign odor is 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 mustard seed contains a fumigant or insecticide odor that prevents a determination as to whether any other odor(s) exists, apply the following guidelines:

a. Allow the sample to aerate in an open metal container not to exceed four (4) hours; and

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 inspector is used, whenever possible, on sample containing a marginal odor. The consensus approach is not required if no odor or a distinct odor is detected.

Certification: Grade mustard seed containing a "distinct" musty, sour, or commercially objectionable foreign odor as MT Sample Grade. Record the words "Musty", "Sour", or "Commercially Objectionable Foreign Odor" on the pan ticket and in the "Results" section of the certificate.

1.8 – ANIMAL FILTH, GLASS AND UNKNOWN FOREIGN SUBSTANCE

Basis of Determination: Determine animal filth, glass, and unknown foreign substances on the basis of the sample as a whole (approximately 400 grams).

Certification: Grade mustard seed "Sample Grade" if the level of animal filth, glass, and unknown foreign substances exceeds the limits set forth in Table No. 5, and record the actual count on the work record and in the "Results" section of the certificate.

1.9 – DISTINCTLY LOW QUALITY

Consider mustard seed distinctly low quality when it is obviously of inferior quality and the existing grade factors or guidelines do not properly reflect the inferior condition.

Basis of Determination: Use all available information to determine whether the mustard seed is of distinctly low quality. Determine distinctly low quality on the lot as a whole or the sample as a whole.
Large Debris: Mustard Seed containing two or more stones, pieces of glass, pieces of concrete, or other pieces of wreckage or debris which are visible to the sampler and too large to enter the sampling device is considered distinctly low quality.

Other Unusual Conditions: Mustard Seed that is obviously affected by other unusual conditions (including diatomaceous earth) which adversely affects the quality of the mustard seed and cannot be properly graded by use of the grading factors specified or defined in the standards is considered distinctly low quality.

Certification: Grade distinctly low quality mustard seed as MT Sample Grade. Record the word "Distinctly Low Quality" and the reason(s) why on the pan ticket and in the "Remarks" section of the certificate.

1.10 – MONTANA SAMPLE GRADE

Basis of Determination: Determine MT Sample Grade factors, before the removal of dockage on the lot as a whole and/or a portion of approximately 400 to 800 grams. When a condition exists that may not appear in the sample, the determination may be made at the time of sampling.

Table No. 5 – Montana Sample Grade

FACTOR	NUMBER/WEIGHT LIMITS 1/	BASIS
Any grading factor	Excess of limit for MT NO.	Sample
Animal Filth	3 or more	Lot/Sample
Glass	1 or more	Lot/Sample
Heating	Presence	Lot
Large Debris*	2 or more	Lot/Sample
Odor	Presence	Lot/Sample
Other Unusual Conditions*	Presence	Lot/Sample
Stones	Any number in excess of 0.05%	Lot/Sample
Unknown Foreign Substance(s) or a commonly recognized harmful or toxic substance(s) 2/	1 or more	Lot/Sample

1/ Record count factors to the nearest whole number.
2/ Includes pelletized material other than feed pellets which are considered conspicuous admixture.
* For Distinctly Low Quality, see Section 3.9

Certification: Grade mustard seed MT Sample Grade when one or more of the limits in Table 5.0 are exceeded. Record the reason(s) why on the pan ticket and in the "Remarks" or "Results" as appropriate section of the certificate.

1.11 – MOISTURE

Moisture is the water content in grain as determined by an approved device.

Basis of Determination: Determine moisture before the removal of dockage on a portion of approximately 350 grams.

Certification: Record the percentage of moisture on the pan ticket and the certificate to the nearest tenth percent in the "Factor" section of the certificate.

1.12 – DOCKAGE AND CONSPICUOUS ADMIXTURE

Dockage is material, other than mustard seed that can be easily removed with sieves and/or a cleaning device. Also, underdeveloped, shriveled, and small pieces of mustard seed that cannot be recovered by properly rescreening or recleaning.

Conspicuous Admixture is all matter other than mustard seed, including but not limited to ergot, sclerotinia, stones, cow cockle and wild mustard, which is conspicuous and readily distinguishable from mustard seed and which remains in the sample after the removal of machine separated dockage. Conspicuous admixture is added to machine separated dockage in the computation of total dockage.

The adjusted percentage of conspicuous admixture is added to the percentage of machine separated dockage in the computation of total dockage.

Basis of Determination: The dockage determination is made on a representative portion if the original sample; (submitted sample 400 grams, entire sample when less than 400 grams;).

Procedure: The procedure for determining dockage and conspicuous admixture is performed in 2 steps: machine cleaning and handpicking.

Step 1: Procedure for Determining Dockage with the S. Howes Eureka Cleaner.

The percentage of dockage shall be that ascertained by the method provided for the S. Howes Eureka Cleaner or by any method or standard cleaning machine giving equivalent results. Dockage shall be determined by the method indicated under Paragraphs 1, 2, and 3 below:

Paragraph 1 – Yellow Mustard Seed – Dockage

The air blast shall be adjustment -	No. 1 on dial No. 1
	No. 2 on dial No. 2
	No. 2 on dial No. 3
	No. 3 on dial No. 4

Unless such air blast tends to remove whole seed, of mustard, in which case all adjustments shall be on number one. The No. 7 sieve shall be used as the top sieve and 1/17th as the bottom sieve, but depending upon the size of the seed and kind of fine seed in the sample; the No. 6, 6-1/2, or 7-1/2 can be used as the top sieve and the 1/16 as the bottom sieve providing there is no whole seed of cultivated mustard seed removed thereby.

Paragraph 2 – Brown Mustard Seed and Oriental Mustard Seed – Dockage

The air blast shall be set on all the adjustments in Paragraph number one. The 1/12th shall be used as the top sieve and 1/22nd as the bottom sieve, but depending upon the size of the seed; the 1/13th may be used as the top sieve providing there is no whole seed removed.

Paragraph 3– Rescreening

Any whole seed removed over the top sieve shall be reclaimed by hand picking mustard seed out of the dockage that goes over the 1/12th sieve.

To avoid repeating operations. Check the dockage for live weevils and other insects injurious to stored grain and sample grade factors. Live weevils and other live insects injurious to stored grain and sample grade factors are considered dockage but, when present in excessive quantities, are also considered in the determination of the special grades "Infested," and "MT Sample Grade" as the case may be.

Step 2: Procedure for Determining Conspicuous Admixture by Handpicking.

Cut down the mechanically cleaned sample to a portion of not less than 10 grams.
Handpick the 10-gram portion for conspicuous admixture (matter other than mustard seed) which is readily distinguishable by visual inspection.
Determine the percentage of total conspicuous admixture. Also determine the percentage of stones, ergot, sclerotinia, inseparable black, other distinctly detrimental weed seeds, and other admixtures on the hand-picked portion.

Ergot: is a hard, reddish-brown or black grain-like mass of certain parasitic fungi that replaces the kernels of certain grains. When determining for the presence of ergot, refer to interpretive Line Slide No OF - ERGOT

Sclerotinia: are the black resting bodies of the fungi Sclerotinia and Claviceps. When determining for the presence of sclerotinia, refer to Interpretive Line Slide No. OF-SCLEROTINIA.

Inseparable Black: includes weeds of Cow Cockle, Bedstraw, Wild Mustards including ball mustard, cultivated rape seed, canola, plus any other weed seed which is black or dark in color and is essentially equivalent in size and shape as mustard.

Other distinctly detrimental weed seeds including but not limited to seeds of redroot pigweed, prostrate pigweed, lambs quarter, smart weed (fan weed or field pennycress), shepherd's purse, foxtails, and wild buckwheat.

Total CI is computed as the summation of inseparable blacks and other distinctly detrimental weed seeds.

Stones: are concreted, earthy, or mineral matter and other substances of similar hardness which will not disintegrate readily in water.

Other Admixture: includes wheat and other cultivated crops such as barley and lentils. Also includes wild oats.

Computing Total Dockage: In computing the total dockage, all mechanically separated dockage shall be computed on the basis of the sample as a whole. The percentage of conspicuous admixture (handpicked dockage), which is determined on the basis of the weight in grams of the portion used for the hand separation, must be multiplied by the fractional proportion of mustard seed remaining after the removal of the mechanically separated dockage.

Proceed as follows:

A. (Weight of Dockage divide by original sample weight) times 100 equals percent mechanically separated dockage.

B. (100 percent minus percent mechanically separated dockage) divided by 100 equals change of base factor.

C. (Weight of handpicked separation, including inseparable black admixture, other distinctly detrimental weed seeds, excreta, stones, and ergot, sclerotinia other admixture divided by weight of handpicked sample) times 100 equals percent conspicuous admixture.

D. (Weight of stones divided by weight of handpicked sample) times 100 = percent of stones.

E. (Weight of ergot divided by weight of handpicked sample) times 100 = percent of ergot.

F. (Weight of sclerotinia divided by weight of handpicked sample) times 100 = percent of sclerotinia.

G. (Weight of inseparable black admixture divided by weight of handpicked sample) times 100 = percent of inseparable black admixture.

H. (Weight of other distinctly detrimental weed seeds divided by weight of handpicked sample) times 100 = percent of other distinctly detrimental weed seeds.

I. Percent other conspicuous admixture times change of base factor equals percent other conspicuous admixtures (adjusted). 1/.

J. Percent stones times change of base factor equals percent stones (adjusted).1/.

K. Percent ergot times changed of base factor equals percent ergot (adjusted).1/.

L. Percent sclerotinia times change of base factor equals percent sclerotinia (adjusted).1/.

M. Percent inseparable black times change of base factor equals percent inseparable black (adjusted)1/.

N. Percent other distinctly detrimental weeds seeds time change of base factor equals percent other distinctly detrimental weed seeds (adjusted).1/.

O. Percent other conspicuous admixture (adjusted) plus percent mechanically separated dockage equals Total Dockage.

1/. The adjusted percentages of inseparable black admixture, other distinctly detrimental weed seeds, stones, ergot, sclerotinia, and other admixtures are recorded on the certificate.

Certification: Record the Total Dockage and the percentage to the nearest tenth percent as part of the grade designation (e.g. MT No. 1 Yellow Mustard, Total Dockage 2.1%). Also in the "Remarks" section of the certificate record the following:

Mechanical Dockage and the percentage
Handpicked Dockage and the percentage
Total Dockage and the percentage

1.13 – TEST WEIGHT PER BUSHEL

The weight per Winchester bushel (2,150.42 cubic inches) as determined using an approved device or as determined by any device and method which give equivalent results in determining test weight per bushel.

Basis of Determination: Determine test weight per bushel on a dockage-free portion.

Certification: Record test weight per bushel on the pan ticket and the certificate to the nearest tenth percent.

1.14 – SPECIAL GRADES AND SPECIAL GRADE DESIGNATIONS

Special grades draw attention to unusual conditions in the grain and are made part of the grade designation.

The definitions and examples of the designations for special grades in cultivated mustard seed are:

A. ERGOTY MUSTARD SEED. Mustard seed that contains more than 0.05 percent ergot. Example: MT. NO. 3 Yellow Mustard Seed, Ergoty, Total Dockage 1.2%

Ergot is a hard, reddish-brown or black grain-like mass of certain parasitic fungi that replaces the kernels of cultivated mustard seed and other grains. When determining the presence of ergot, refer to Interpretive Line Slide No. OF-12.0.

Basis of Determination: Determine ergoty on a dockage-free portion of approximately 250 grams. Ergot also functions as conspicuous admixture.

Certification: When applicable, record the word "Ergoty" on the pan ticket and the certificate in accordance with Section 3.3, Grade Designations. Record the percentage of ergot to the nearest hundredth percent on the pan ticket and upon request in the "Remarks" section of the certificate.

B. GARLICKY MUSTARD SEED. Mustard seed that contains more than two green garlic bulblets or an equivalent quantity of dry or partially dry bulblets in approximately a 500 gram portion shall be considered Garlicky mustard seed.

Example: MT. NO. 2 Yellow Mustard Seed, Garlicky, Total Dockage 0.7%

Basis of Determination: Determine garlicky before the removal of dockage on a portion of approximately 500 grams.

Characteristics of Bulblets:

A. Green garlic bulblets are bulblets which have retained all of their husks intact.

B. Dry or partially dry garlic bulblets are bulblets which have lost all or part of their husks. Consider bulblets with cracked husks as dry.

C. Three dry or partially dry garlic bulblets are equal to one green bulblet. Garlic bulblets apply in the determination of "Garlicky" but also function as dockage or other material as the case may be. (Reference: Interpretive Line Slide No's OF-13.0 and OF-13.1.)

Certification: When applicable, record the word "Garlicky" on the pan ticket and the certificate in accordance to Section 3.3 Grade Designations. Upon request, record the number of garlic bulblets in whole and thirds on the pan ticket and the "Remarks" section of the certificate.

INFESTED MUSTARD SEED: Mustard seed that is infested with live weevils or other live insects injurious to stored grain.

Example: MT.NO. 1 Yellow Mustard Seed, Infested, Dockage 10.0%

The presence of any live weevil or other live insects injurious to stored grain found in the work sample indicates the probability of infestation and indicates that the mustard seed must be carefully examined to determine if it is infested. In such cases, examine the work sample and the

file sample before reaching a conclusion as to whether or not the mustard seed is infested. Do not examine the file sample if the work portion is insect free.
Live weevils shall include rice weevils, granary weevils, maize weevils, cowpea weevils, and lesser grain borers. Other live insects injurious to stored grain shall include grain beetles, grain moths, vetch bruchids, and larvae.

Basis of Determination: Determine infestation on the lot as a whole and/or before the removal of dockage. For specific guidelines, see Table No. 6.

Table No. 6 – Insect Infestation Guide

SAMPLE DESIGNATION	INFESTED LEVEL 1/
REPRESENTATIVE SAMPLE – Applies to submitted samples, lots probe-sampled, and D/T-sampled railcars/trucks. Examine work portion and file sample. (Do not examine file sample if work portion is insect free.)	2 lw* Or 1 lw = 5 oli * Or 10 oli*
LOT AS A WHOLE (STATIONARY) – Applies at the time of sampling for lots probe-sampled.	Same
LOT AS A WHOLE (CONTINUOUS LOADING) – 2/ Applies to: - each railcar when inspected under Cu-Sum. - each subsample for sacked grain lots. - each component sample for barge lots and ship lots 3/	Same
* lw = live weevil, oli = Other live insects injurious to stored grain.	
1/ Samples containing infestation at these levels are infested. 2/ Minimum sampling rate for online operations is 500 grams per 2,000 bushels. 3/ Minimum component size is approximately 10,000 bushel.	

Certification. When applicable, record the work “Infested” on the pan ticket and certificate in accordance with Section 1.3, Grade Designation.

1.15 – PROCESSING THE WORK SAMPLE

At this point, determinations have been made for kind of grain, infestation, heating, odor, animal filth, glass, unknown foreign substances, garlic bulblets, distinctly low quality, sample grade criteria, moisture, test weight per bushel, dockage, conspicuous admixture, sclerotinia, stones and ergot. Now divide the work sample into fractional portions for those determinations required after the removal of machine separated dockage and conspicuous admixture. Table No. 7 shows portion sizes. Note that the sample may require as many as six cuts using the Boerner divider for the determination of some of the factors.

Table No. 7 – Approximate Analytical Portion Size

FACTORS	GRAMS
Damaged Kernels	10
Heat-Damaged Kernels	5
Distinctly Green Kernels	5
Conspicuous Admixture	5

1.16 – CLASSES OF MUSTARD SEED

Mustard seed is divided into four classes. The classes Yellow, Brown or Oriental mustard seed may include not more than 5 percent of tame mustard seed of other classes. In applying these limits only such seed as can be positively identified as "other Classes" shall be considered as of a class other than the predominating class. This has particular reference to the presence of small yellow seeds in the class "Yellow Mustard Seed" and to the presence of brown colored seeds in the class "Oriental Mustard Seed".

Basis of Determination/Procedure: Determine the percentages of Yellow, Brown, and Oriental mustard seed by the color of the seed coat on a portion of approximately 10 grams after the removal of dockage.

1. Yellow Mustard Seed (*Sinapis alba* aka *Brassica hirta*).

Color: light, creamy yellow to yellow; occasionally, a seed coat is light or yellowish-brown.
Size: large. 2 to 3 mm in diameter.
Shape: spherical but occasionally oval (rounder than Brown or Oriental mustard seed).
Surface: texture is similar to an orange peel or a grapefruit, white hilum.

2. Brown Mustard Seed (*Brassica juncea*).

Color: reddish to dark-brown
Size: small, less than 2 mm in diameter.
Shape: oval.
Surface: predominate netting; texture is similar to a golf ball; black hilum.

3. Oriental Mustard Seed (*Brasica juncea*).

Color: predominantly yellow to dark-yellow, with from 3% to 10% ranging from light-brown to brown.
Size: small, less than 2 mm in diameter.
Shape: oval.
Surface: fine netting which is not nearly as predominant as for Brown Mustard Seed; light brown to dark brown hilum.

4. Mixed Mustard Seed

This class shall include any mixture of tame mustard seed not provided for in the classes Yellow, Brown, and Oriental Mustard Seed and shall be graded according to the predominating class in the mixture.

Note: Table 1 of the mustard standards state limits of 0.5% of "other classes" in number one, 2.0% in number two, and 5.0% in number three of each of the classes of Yellow, Oriental and Brown mustard seed. In applying the above definitions to these limits only such seed as can be positively identified as "other classes" shall be considered as of a class other than the predominating class. This has particular reference to the presence of small yellow seeds in the class "Yellow Mustard Seed," and to the presence of brown colored seeds in the class "Oriental Mustard Seed".

1.17 – DAMAGED KERNELS

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

Damaged Mustard Seed: Mustard and pieces of mustard seed that are frost–damaged, distinctly green-damaged, heat–damaged, immature, mold-damaged, sprout –damaged, or weather-damaged are considered damage.

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

2. Distinctly Green-Damaged Kernels: Mustard and pieces of mustard seed kernels which are a distinct green throughout the kernel. (Reference: Interpretive line print Canola 1.0)

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

4. Immature Kernels: Mustard and pieces of mustard seeds which are immature with a wrinkled appearance. Immature kernels should not be mistaken for frost damaged kernels.

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

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

7. Weather Damaged: Mustard seeds and pieces of mustard seeds which are badly discolored by weather conditions. (Reference: Interpretive line print Canola 3.0)

Basis of Determination: The determination for damaged kernels shall be made on a representative portion cut from the work sample after the removal of dockage and conspicuous admixture. Use the portion which was used for picking conspicuous admixture. Note that this portion must be reweighed.

Procedure: The steps for determining the various damaged are as follow:

A. Handpick the 10-gram portion (clean of dockage and conspicuous admixture) for distinctly shrunken or shriveled kernels (frost damaged), kernels discolored by mold, rimed kernels (kernels that are completely covered with a whitish coloration), sprouted kernels, excessively weathered kernels, and any other kernels of mustard seed that are distinctly damaged. These kernels are other-damaged kernels (Reference: Interpretive Line Slide No Canola 3.0).

B. Cut down the balance of the 10-gram portion to approximately 5 grams.

C. Sprinkle the 5-gram portion across the damage seed counter to fill the 100-hole board (must be repeated five times) or the 500-hole board.

D. After each filling (total of five fillings when using the 100-hole board) and before crushing, tape and observe for inconspicuous admixture.

E. With a roller, crush the mustard seed, examine the rows and count the number of heat-damaged kernels, distinctly green kernels, and seeds that are obviously not mustard seeds (inconspicuous admixture).

F. After the strip (all five strips when using the 100-hole board) has been crushed and kernels counted, calculate the percentage of each type of damage.

All percentages of damage, except for distinctly green and heat-damaged kernels, shall be determined upon the basis of weight. The percentage of distinctly green and heat-damaged kernels shall be determined on the basis of count.
To compute damaged kernels (total), add the percentage of distinctly green, heat-damaged, and other-damaged kernels of mustard seed.

Proceed as follow:

A. (Weight of other-damaged kernels divided by the weight of representative portion) times 100 equals' percent other-damaged kernels.

B. 500 minus number of non-mustard seed kernels equal the number of mustard seed kernels.

C. (Number of heat-damaged kernels divided by the number of mustard seed kernels) times 100 equals the percent heat-damaged kernels.

D. (Number of distinctly green kernels divided by the number of mustard seed kernels) times 100 equals the percent distinctly green kernels.

E. Percent other-damaged kernels plus percent heat-damaged kernels plus percent distinctly green kernels equals the percent damaged kernels (total).

Example:

Weight of representative portion	10.11 grams
Weight of other-damaged kernels	0.10 grams
Number of non-mustard seed kernels	10
Number of heat-damaged kernels	25
Number of distinctly green kernels	12

a. 0.10 g divided by 10.11 g = 0.0098 x 100 = 0.98% other damaged kernels.

b. 500 – 10 = 490 mustard seed kernels.

c. 25 kernels divided by 490 kernels = 0.0510 x 100 = 5.10% heat-damaged kernels.

d. 12 kernels divided by 490 kernels – 0.0244 x 100 = 2.44% distinctly green kernels.

e. 0.98% + 5.10% + 2.44% = 8.52 percent damaged kernels

(Add in hundredths) (Round to 8.5%)

Certification: Show the percentages of heat-damaged, distinctly green, and damaged kernels (total) on the work record and certificate to the nearest tenth of a percent.

1.18 – INSEPARABLE BLACK ADMIXTURE

Inseparable Black; includes seeds of Cow Cockle, Bedstraw, Wild Mustards including ball mustard, cultivated rape seed, canola, plus any other weed seed which is black or dark in color and is essentially equivalent in size and shape as mustard.

1.19 – OTHER DISTINCTLY DETRIMENTAL WEED SEEDS

Other distinctly detrimental weed seeds including but not limited to seeds of redroot pigweed, prostrate pigweed, lambs quarter, smart weed (fan weed or field pennycress), shepherd's purse, foxtails, and wild buckwheat.

1.20 – ASSIGNMENT OF GRADE

After each determination, record the appropriate results on the pan ticket. After completing the analysis, compare these results with the limits for each grade factor for the appropriate type of mustard seed as specified in the grade table shown in section 3.2. Following the guidelines in section 3.3 enter the grade in the appropriate space on the pan ticket.