



Canadian Grain Commission Commission canadienne des grains

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# Visual Identification of Small Oilseeds and Weed Seed Contaminants

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Grain Biology Bulletin No. 3

December, 2000



# **Visual Identification of Small Oilseeds and Weed Seed Contaminants**

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*Handbook on Varietal Identification by Kernel Characters of Barley, Wheat and Small Oilseeds; Part III.* by C.H. Owen and M.M. Ainslie: Minister of Agriculture, Canadian Grain Commission; Ottawa, Canada; 1971.

## Introduction

*Visual Identification of Small Oilseeds and Weed Seed Contaminants, Grain Biology Bulletin No. 3* has been produced as a tool for assisting grain inspectors in seed identification related to grain grading of small oilseeds crops. Users should be aware that weed seeds discussed in the bulletin represent a very small number of species of weed seeds that could potentially occur in oilseeds crops. The weed seeds discussed in this bulletin were selected based on being problematic in grain cleaning, end product quality or similarities in visual seed identification to oilseeds crops or other weed seeds of concern.

Seed descriptions are based on sound seed and what is generally considered normal. With any seed there can be variations from the norm due to: maturity, environmental factors such as weathering, disease and other factors which may change the visual features of the seeds. These factors can impact on the size, shape, colour and overall appearance of a given seed.

Basic information has been provided to assist inspectors in the task of seed identification, however, the skills and knowledge required to be a qualified seed analyst proficient in identifying a wide range of weed seeds is beyond the scope of this bulletin. If in doubt as to the identification of a seed, it is recommended that grain inspectors consult with an accredited seed analyst or seed testing laboratory.

## Notes:

Seed descriptions are from reference sources where indicated and from the author's personal observations. References are numbered to correspond to the bibliography.

Seeds used for the author's observations are maintained in the Grain Biology Seed Herbarium by the Grain Biology Unit, Grain Research Laboratory, CGC. Seeds were verified by the Seed Biology Unit, CFIA, Agriculture Canada.

A glossary of terms used is included at the end of the manual.

## VISUAL IDENTIFICATION OF SMALL OILSEEDS

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Small oilseeds, as defined in the Canadian Grain Commission *Official Grain Grading Guide*, include flaxseed, canola and domestic mustard seed. For the purposes of this manual, identification of flaxseed is not included and small oilseeds will refer to domestic mustard seeds and canola/rapeseed.

A high level of proficiency in identification of classes of small oilseeds and the weed seeds that occur in them is essential for grain inspectors engaged in commercial grading of these seeds. This proficiency can be attained only by a concentrated study of the seeds under suitable magnification and in conjunction with accurate descriptions of seed characteristics and identification techniques.

Some seed characteristics are reasonably apparent to the naked eye but, in some instances, the most important characteristics must be discovered under a microscope. A careful examination of the seeds and the recognition of individual characteristics and combinations of characteristics are essential to proper identification. Initially, grain inspectors use a small 10-power hand lens to examine samples. Final determinations are made using a binocular microscope at the magnification best suited for the specific analysis.

Characteristics and terminology used to describe the various classes and types of small oilseeds are intended to provide a description of appearance that can be readily interpreted, particularly when used in conjunction with physical examination of the seeds. The ability to distinguish pure classes of domestic mustard seed can be attained quite easily, but recognition and segregation of mixtures of these classes from wild mustard seed and canola or rapeseed are much more difficult.

### Classification

The small oilseeds described in this manual include domestic mustard seed and canola/rapeseed indigenous to western Canada. There are different varieties grown for each class but these are virtually indistinguishable within a given class. As there are no official standards of varietal purity established for small oilseeds for grading purposes this manual has not attempted to classify varieties according to visual distinguishability.

#### Domestic Mustard Seed

Classes include yellow mustard, oriental mustard and brown mustard.

#### Canola and Rapeseed

Canola and rapeseed are differentiated based on their end-use purposes as defined by the term "canola".

Canola - The term canola applies to varieties of *Brassica napus* and *Brassica rapa* that meet the canola standards for low levels of erucic acid and glucosinolates. Canola grain is a mixture of the two species in varying proportions. The production of canola varieties is widespread in western Canada.

Rapeseed – Rapeseed varieties do not meet the standards for canola quality. They are generally of high erucic acid content (H.E.A.R.). Both *Brassica rapa* and *Brassica napus* could potentially have rapeseed quality varieties. Rapeseed is produced in small volumes and usually under contract.

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The seeds of canola and rapeseed may not be visually distinguishable.

*Brassica napus* - The seed of the two quality types of *Brassica napus* are not visually distinguishable.

*Brassica rapa* - The two types of seeds of *Brassica rapa* are not always distinguishable from each other as they are the same species and therefore have many similar features. However, seeds of older varieties of rapeseed quality *Brassica rapa* may be visually different than canola quality varieties of *Brassica rapa*. Occasionally seeds of rapeseed quality *Brassica rapa* are found in canola and these seeds must be recognized as *Brassica rapa*. They are not regarded as weed seeds. (See "Descriptions and Drawings for Individual Species" for more details.)

## Weed Seeds

Some weed seeds commonly found as impurities in small oilseeds are also described in this manual. One noteworthy weed seed is wild mustard which is classed as a primary noxious weed seed in Canada. Wild mustard belongs to the same botanical family as the small oilseeds described in this manual. Wild mustard seed is included in established tolerances for Inconspicuous Admixtures in the official definitions for grading small oilseeds. It is sufficiently different in characteristics from domestic mustard seed to be readily distinguishable, but it is more difficult to recognize and segregate when mixed in samples of canola or rapeseed.

## Identification Procedure for Grain Inspectors

The procedure followed in identifying small oilseeds is different from the grading of wheat and barley. This is because oilseeds are much smaller and most results are determined with the aid of a microscope. However, the basic principles of identification are maintained.

Through experience most samples consisting mainly of one class of oilseed can be recognized as such. A closer examination for purity is made using a small 10-power hand magnifying lens. When samples contain mixtures of other classes, a more precise examination is carried out under higher magnification using a binocular microscope.

The sample is thoroughly mixed and divided to a portion of a prescribed weight. This portion is then placed in a rectangular plastic tray having two shallow depressed channels. The seeds are placed in one layer along the two channels and then passed through an illuminated area directly under the lens of the microscope. The inspector then picks out the admixture with a hand or electric tweezer and weighs the amount finally segregated to determine the percentage. The size of the sample analyzed will be determined by the class or type of seed being analyzed and the apparent level of admixture.

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## Other Considerations

While the visual features of seeds are relatively unchanged over time, there are situations that could impact on small oilseeds' seed identification and grading.

Plants are living organisms, which may evolve and adapt to changes in their environment. Breeding programs produce new varieties of plants and the seeds of these new varieties may be similar to other existing seeds.

Domestic mustard breeding programs are selecting for canola quality *Brassica juncea*. It is possible that these new varieties will have no additional distinctive external seed characteristics. Seeds of mustard quality *Brassica juncea* may therefore be visually indistinguishable from canola quality *Brassica juncea*.

The impact of the development of GMO (genetically modified) canola and mustards is presently unknown. Modification of the genetic content of the seed is not usually marked by distinctive changes in the external visual features of the seed. Therefore, GMO and non-GMO seeds currently are visually the same in appearance.

An existing problem is the evolution of herbicide tolerant weed seeds. Tolerances to chemicals allow weeds to flourish in the field and this could cause an increase the number of weed seeds found in harvested crops. Weed seeds that are specified as detrimental in graded grain, according to the *Official Grain Grading Guide* or by the contract specifications of customers, are then likely to increase. This will have an impact on the grades applied.

## SEED CHARACTERS USED IN THE IDENTIFICATION OF SMALL OILSEEDS AND WEED SEEDS

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The identifying characters described and used in this publication are found only on the external surface of the seeds. Their usefulness for identification varies. Characters of major importance are colour, size and shape of the seed and nature of the seed coat. Other characters used in conjunction with these features have limited use. These include the hilum or seed scar and radicle.

**Colour**—Seeds may vary from pale to dark yellow in yellow domestic mustard seed; dark yellow to tan with infrequent brownish seeds in oriental mustard seed; varying shades of reddish-brown in brown mustard seed; varying shades of reddish-brown to grayish-black and black in common wild mustard seed and rapeseed; shades of yellow to reddish-brown to grey-black or nearly black in canola depending on the canola varieties. Lack of maturity may affect the true colour of the seeds. Colour is one of the most important characteristics used to identify species of *Brassica* and *Sinapis*. For example, yellow mustard seed, oriental mustard seed and rapeseed in bulk are distinguishable from each other by their colour.

**Size and Shape**—See Figure 1. The size of small oilseeds varies from the larger seed of domestic yellow mustard seed and some varieties of *Brassica napus* to the smaller seeds of brown mustard. There is considerable overlapping in this characteristic in the different classes but it is sufficiently consistent to be a very useful characteristic in identifying some species of *Brassica* and *Sinapis*. Weed seeds commonly found in these oilseeds also vary significantly in their size and shape.

The shape of the seeds of some oilseed classes or their varieties is consistently spherical; others are oblong or oval. Some have a longitudinal groove or depression with a ridge along the length of the centre of the groove associated with the position of the radicle; others may be flattened at one or both ends. The shape may vary in immature or poorly developed seed but is a reasonably useful characteristic in the identification of well-developed mature seed, particularly when applied to common wild mustard seed and canola/rapeseed.



**FIGURE 1**

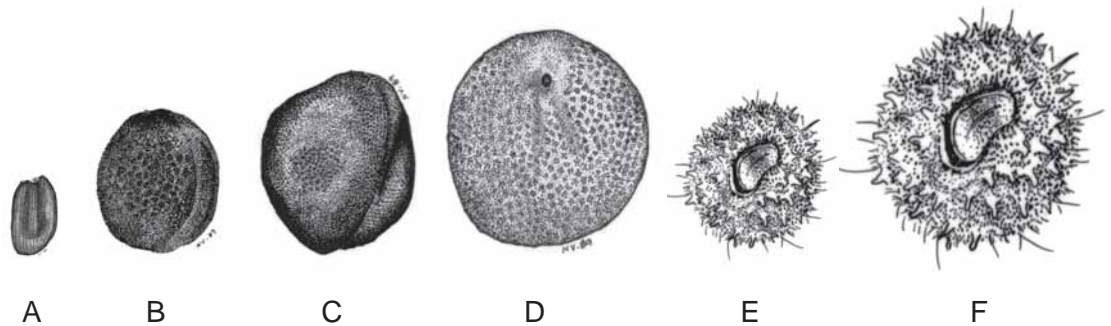
### Relationship of Sizes

In this manual drawings are enlarged and therefore the size depicted is not comparable from seed to seed.

The following pictograph provides approximate relational sizes of some seeds to help the user understand the differences in size.

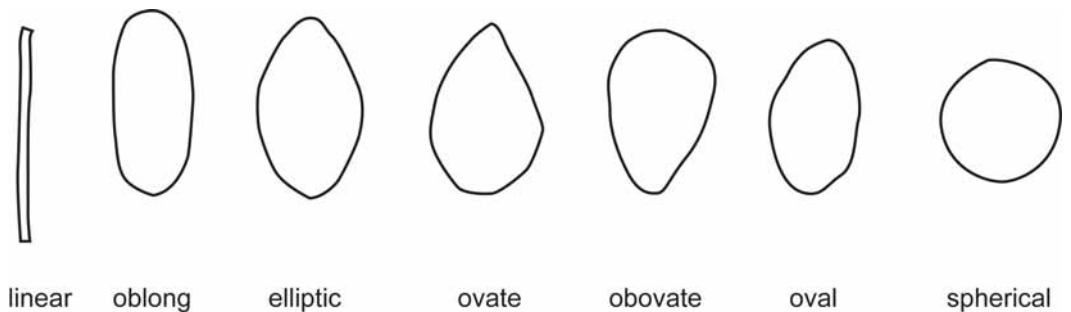
Scale (approximate)

1cm measured = 1mm of actual size



- A. Flixweed at approximately 1 mm.
- B. Canola (*Brassica rapa*) at approximately 2 mm.
- C. Canola (*Brassica napus*) at approximately 2.5 mm.
- D. Yellow mustard at approximately 3 mm.
- E. Cleavers at approximately 2 mm.
- F. Cleavers at approximately 3+ mm.

### Outline Shapes (adapted from Felfoldi, p. 276)



## SEED CHARACTERS USED IN THE IDENTIFICATION OF SMALL OILSEEDS AND WEED SEEDS

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See Figure 2

**Seed Coat**—This is the outer protective covering of the seed. Useful identification features include the reticulations on the seed coat, the nature of the stippling and the relative size of the interspaces.

The **reticulations** are the network of ridges that appear on the seed coat. They may vary in prominence and arrangement. In some cases the pattern may resemble lace or netting; in others the lines may be more parallel and may radiate from the axis of the seed in a sunburst pattern and others may not appear to have any definite pattern. The prominence and texture of the **ridges** must be considered in conjunction with the pattern of the reticulations. They may be sharply defined, smooth and barely discernible, or coarse and rough.

The **interspaces** are the spaces contained within the network of lines or reticulations. They vary with the pattern of the reticulations, but generally they are best described as flat, convex or concave. The interspaces around the middle of the seed are more consistent in character than those at the ends which tend to vary more with the shape of the individual seed within classes or varieties.

The **stippling** is the small particles within the interspaces which may appear as dots or granulation.

Combinations of seed coat patterns are not always entirely consistent within classes or varieties but they do provide a very useful aid to identification. A binocular microscope is necessary to evaluate seed coat characteristics. The magnification used will depend on the individual preference but in some cases the identifying characteristics may be more easily recognized at low magnification.

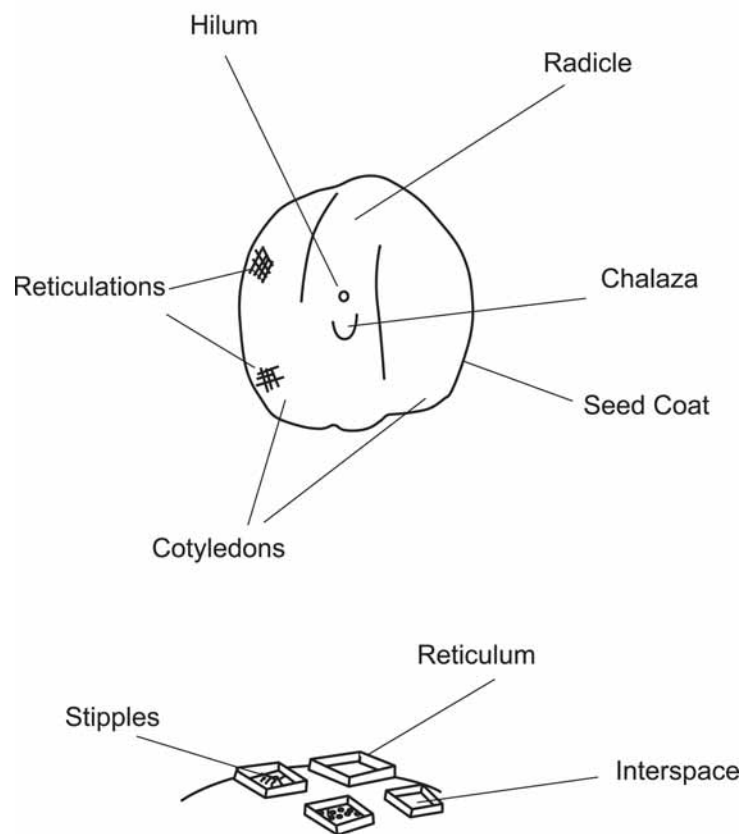
**Hilum or Seed Scar**—The hilum or seed scar does not appear to be a very useful identifying character because of its variations within the same species. Some analysts attempt to use the nature of the hilum as an identifying characteristic but there is not always a consistent pattern.

**Chalaza**—A small raised mark near the hilum. This is also considered as a minor characteristic as no consistent value as an identification characteristic has been established. The chalaza has not been used as an identification tool in this manual.

**Radicle**—The primary root of the seed embryo between the pair of cotyledons. This appears in some classes as a ridge within a groove along the side of the seed. The combination of the groove and the ridge has some value as an identification characteristic. For example, it is evident in more seeds in samples of canola or rapeseed than in samples of wild mustard seed.

FIGURE 2

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## Descriptions and Drawings for Individual Species

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## DOMESTIC MUSTARD SEED

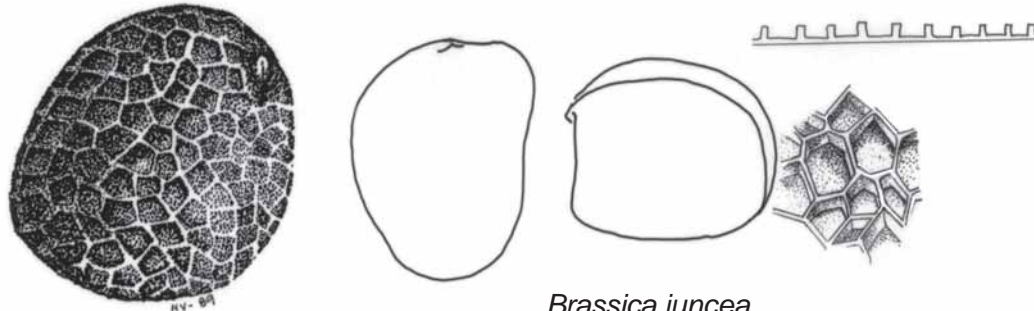
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### *Brassica juncea* (L.) Czern. et Coss.

- Common Name:** oriental mustard  
**Family Name:** Brassicaceae (syn. Cruciferae)
- Shape:**
- outline - oval, obliquely-oval
  - hilum end may be broadly flattened at an angle
  - seed may be flattened longitudinally from the hilum to apex such that the radicle is along one side.
  - the radicle groove ranges from almost non-existent to broad and shallow to broad and deeper (crease-like)
  - the radicle may lay flat with the surface of the seed or lie below the edges of the cotyledons or may bulge slightly beyond
- Colour:**
- yellow to dark yellow with a small percentage of brown seeds
- Seed Surface:**
- prominent reticulations
  - distinctly netted with fine, prominent, cord-like lines over the entire seed surface
  - netting remains prominent right up to the hilum
  - interspaces are large and flat with small stipples contained within
  - hilum with a flush or slightly raised white linear ridge on a circular area that is the same colour or slightly darker than the seed coat
- Size:**
- length 1.6-3 mm, width 1.2-2.1 mm (approximate sizes)

### *Brassica juncea* (L.) Czern. et Coss.

- Common Name:** brown mustard  
**Family Name:** Brassicaceae (syn. Cruciferae)
- Shape:**
- outline - spherical or oval, seed tends to roll
  - occasionally hilum area slightly flattened
  - occasionally seed may be flattened longitudinally from the hilum to apex
  - the radicle area less distinct than in other *Brassica species*, generally non-existent or groove broad and shallow
- Colour:**
- light brown to dark reddish brown
- Seed Surface:**
- reticulations, netting, and interspaces same as oriental mustard above
  - hilum with a flush or slightly raised white linear ridge on a dark brown or black circular area
- Size:**
- 1.5-2 mm in diameter
- Reference Numbers:**
- 6

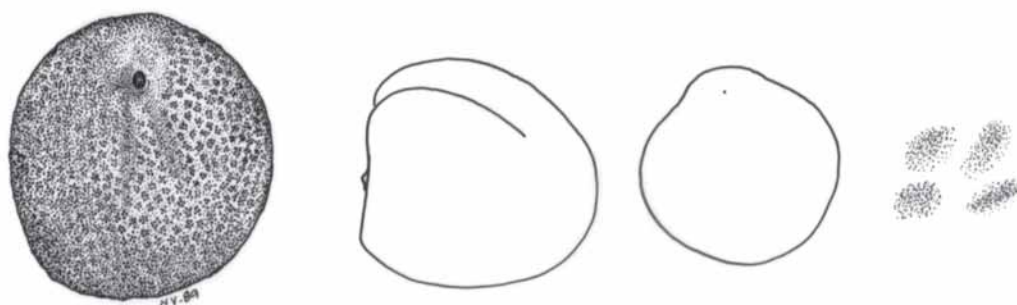


## DOMESTIC MUSTARD SEED

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### *Sinapis alba* L.

- Common Name:** yellow mustard (white mustard)  
**Synonym:** *Brassica hirta* Moench., *Brassica alba* Boiss.  
**Family Name:** Brassicaceae (syn. Cruciferae)
- Shape:**
- outline - oval or spherical
  - seeds may be flat at the hilum end
  - seeds may be flattened longitudinally from the hilum to apex such that the radicle area is along one side
  - radicle groove ranges from non-existent to a broad shallow groove to a prominent raised radicle ridge
- Colour:**
- light creamy yellow to yellow
- Seed Surface:**
- faintly reticulated
  - reticulations are usually partially obscured by a thick waxy surface
  - reticulation lines wide and flat
  - interspaces very small and shallow with no stipples
  - overall appearance is like an orange peel
  - hilum is a small white spot in a deep yellow or light tan circular area
- Size:**
- diameter 2.0-3.0 mm
- Reference Numbers:** • 5



*Sinapis alba* - yellow mustard

## CANOLA AND RAPESEED

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[see "Classification, Canola and Rapeseed", p. 3.]

### *Brassica napus* L.

**Common Name:** canola or rapeseed

**Family Name:** Brassicaceae (syn. Cruciferae)

**Shape:**

- outline - approximately spherical, obliquely-spherical, squarish
- seeds generally broadly flat at the hilum end
- seeds may be flattened longitudinally from the hilum to apex such that the radicle is along one side
- radicle groove ranges from almost non-existent to broad and shallow to broad and deep (crease-like) where the cotyledons are distinctly spread apart by the groove
- the radicle may be slightly raised within this groove or may lay flat within it

**Colour:**

- reddish (especially when immature), grey, grey-black, black

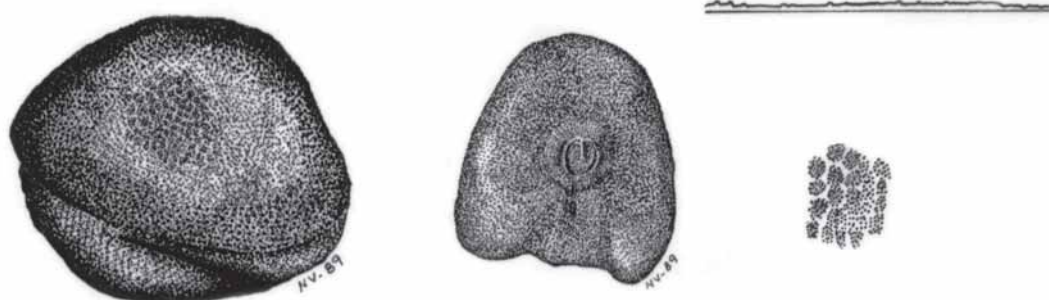
**Seed Surface:**

- faintly reticulated, may be barely discernable
- interspaces small and shallow
- small shiny stipples cover the seed surface for an overall granular or sugary appearance
- hilum with a flush or slightly raised white linear ridge; on lighter coloured seeds this linear scar may be seen to partially bisect a darker coloured circular area that is slightly convex

**Size:**

- length 1.1-2.6 mm, width 1.3-2.3 mm

**Reference Numbers:** • 2, 5



*Brassica napus*



## CANOLA AND RAPESEED

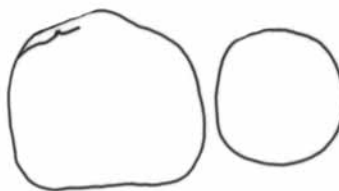
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### *Brassica rapa* L. - canola quality

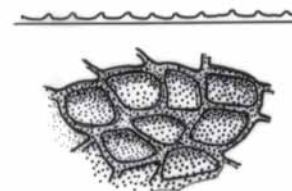
- Synonym:** *Brassica campestris* L. - previously used to refer to Polish rapeseed, but currently *Brassica campestris* is only used with reference to wild forms of this species
- Common Name:** canola
- Family Name:** Brassicaceae (syn. Cruciferae)
- Shape:**
- outline - oval, oblong, obliquely-oblong, occasionally spherical
  - hilum end may be slightly flattened
  - seeds frequently flattened longitudinally from the hilum to apex such that the radicle is along one side
  - radicle groove ranges from almost non-existent to faint and shallow to deep and well defined
  - the radicle may lay flat with the surface of the seed or lie below the edges of the cotyledons or may bulge prominently beyond
- Colour:**
- mixed colours including yellow, yellow-brown, red-brown, red-grey, dark brown and mottled colours
- Seed Surface:**
- seeds are reticulated but in some cases reticulation is faint or obscured
  - interspaces medium size and slightly concave
  - small shiny stipples cover the seed surface
  - appears lightly netted and moderately granular
  - hilum with a flush or slightly raised white linear ridge; ridge is within a slightly convex darker coloured (light brown to black) circular area; white ridge not always present on yellow coloured seeds
- Size:**
- approximate: length 1.5-2 mm
- Reference Numbers:** • 5

### *Brassica rapa* L. - rapeseed quality

- Common Name:** Polish rapeseed
- Shape:**
- as above
- Colour:**
- red-brown, grey, grey-black; these varieties do not contain yellow seeds
- Seed Surface:**
- as above, generally reticulations are obvious to distinct
- Size:**
- approximate: length 1.5-2 mm
- Reference Numbers:** • 5



*Brassica rapa*



## WEED SEEDS

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### *Sinapis arvensis* L.

**Synonym:** *Brassica kaber* (D.C.) L.C. Wheeler

**Common Name:** wild mustard, charlock

**Family Name:** Brassicaceae (syn. Cruciferae)

**Remarks:** Immature wild mustard seeds may be very shrunken and folded in; a fuzzy seed pod material may adhere to the seed surface.

**Shape:**

- outline - spherical, occasionally immature seeds are oval
- occasionally seeds will be slightly off-shaped with slightly flattened areas due to crowding in the seed pod

**Colour:**

- highly variable; tan, orange-brown, red-brown, brown, grey, black
- hilum area may be a different colour than the rest of the seed
- occasionally seeds may be distinctly two different colours (eg. orange/black)

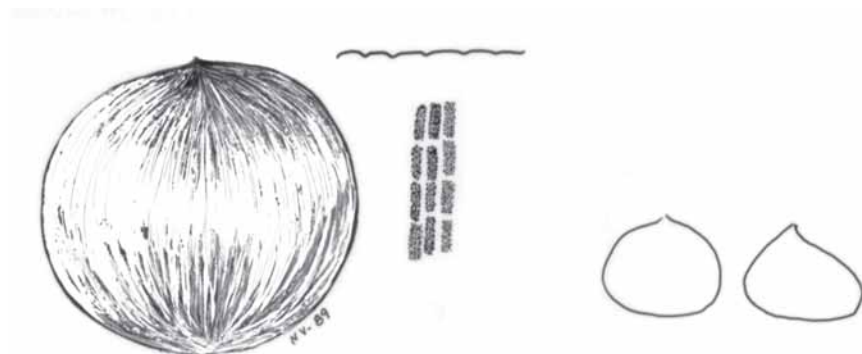
**Seed Surface:**

- general appearance is smooth with no radicle ridge or groove
- actually finely reticulated or faintly granular
- reticulations may appear as faint striations that radiate from the hilum in a sunburst pattern
- hilum linear; white, even with the seed surface or slightly raised
- on lighter coloured seeds hilum may run into a very small, dark, circular area

**Size:**

- diameter 1.3-1.7 mm

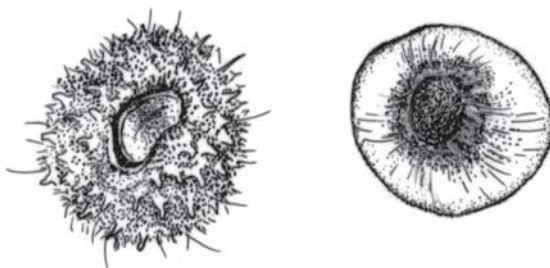
**Reference Numbers:** • 5, 6



*Sinapis arvensis* - wild mustard

### *Galium aparine* / *spurium* L.

<b>Common Name:</b>	cleavers ( <i>Galium aparine</i> L.) false cleavers ( <i>Galium spurium</i> L.)
<b>Family Name:</b>	Rubiaceae
<b>Remarks:</b>	The two cleavers species of concern in small oilseed crops are <i>Galium aparine</i> and <i>Galium spurium</i> . For seed identification purposes there are limited features that distinctly separate these two species, and given that both species are undesirable, they are often placed together as <i>Galium aparine</i> / <i>spurium</i> and called cleavers.
<b>Shape:</b>	<ul style="list-style-type: none"><li>• outline - spherical, oval or kidney shaped (side view)</li><li>• one side of the seed is rounded and the other side has a depression in the centre; the seed is almost hollow through this depression</li></ul>
<b>Colour:</b>	Outer Surface: <ul style="list-style-type: none"><li>• <i>aparine</i> - grey, greyish-brown, buff, brown; <i>spurium</i> - brown, grey-brown</li></ul> Inner Surface: <ul style="list-style-type: none"><li>• if the spines are rubbed off the inner seed surface is golden-brown to brown</li></ul>
<b>Seed Surface:</b>	Outer Surface: <ul style="list-style-type: none"><li>• surface of both species covered with stiff hooked spines 0.2mm (<i>spurium</i>) to 0.8mm (<i>aparine</i>) long</li><li>• spines arise from small tubercles on the seed coat (<i>aparine</i>) or directly from the seed coat (<i>spurium</i>)</li><li>• both species may have smooth seeds but this is less common</li></ul> Inner Surface: <ul style="list-style-type: none"><li>• nearly smooth, lightly netted</li></ul>
<b>Size:</b>	<ul style="list-style-type: none"><li>• variable - the two species overlap</li><li>• diameter (excludes spines): <i>aparine</i> 1-4 mm, <i>spurium</i> 1.2-2.5 mm</li></ul>
<b>Reference Numbers:</b>	• 1, 6, 8



*Galium aparine/spurium* - cleavers

## WEED SEEDS

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### *Vaccaria hispanica* L.

**Synonym:** *Saponaria vaccaria* L.

**Common Name:** cow cockle

**Family Name:** Caryophyllaceae

**Shape:**

- outline - roughly spherical
- usually with a broad shallow depression on both sides of the hilum which may extend around the seed

**Colour:**

- black
- when immature may be orange to reddish-brown

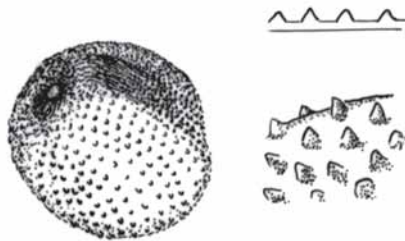
**Seed Surface:**

- covered with small tubercles which give the seed a rough spiky appearance
- tubercles more or less regular in arrangement
- surface appears dull, however when magnified the tips of the tubercles are often shiny
- hilum concave, circular to oval in shape (looks like a small open mouth)
- hilum may have small remnants of whitish seed stalk attached

**Size:**

- diameter 2.0 to 2.7 mm

**Reference Numbers:** • 5, 6



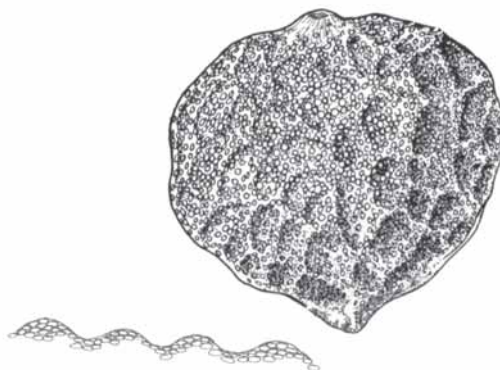
*Vaccaria hispanica* - cow cockle

## WEED SEEDS

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### *Neslia paniculata* (L.) Desv.

- Common Name:** ball mustard  
**Family Name:** Brassicaceae (syn. Cruciferae)  
**Remarks:** The seed unit of ball mustard most often found is actually a nutlet, which is a dry indehiscent fruit (illustrated) containing one seed. The actual seed without the shell may be found on occasion.
- Shape:** Fruit:  
• outline - broadly oval, heart-shaped  
• oval in cross-section  
• a ridge runs from the hilum to the apex where the two halves of the nutlet join together  
• apex usually comes to a fine point with a tiny circle at the tip  
• hilum is small, squarish-oval to circular in shape; hilum may be somewhat sunken with slightly flared edges  
Seed:  
• outline - oval  
• radicle thick and forms a prominent ridge in the radicle groove  
• radicle tip frequently extends beyond the hilum
- Colour:** Fruit:  
• buff, grey, grey-brown; surface may be tinged green or purple  
Seed:  
• yellow to yellowish-brown  
• there is a distinct, reddish-brown circular spot near the hilum
- Seed Surface:** Fruit:  
• prominently netted; interspaces are concave, broad and shallow  
• ridges and interspaces covered with small wart-like protuberances  
• overall appearance is coarsely granular  
Seed:  
• faintly wrinkled, almost smooth  
• slightly shiny
- Size:**  
• Fruit: length 2.2-2.5 mm, width 2.5-2.8 mm  
• Seed: length 1.9-2.2 mm, width 1.0-1.3 mm
- Reference Numbers:** • 2, 5, 6, 10



*Neslia paniculata* - ball mustard

## WEED SEEDS

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### *Descurainia sophia* (L.) Webb.

**Common Name:** flixweed

**Family Name:** Brassicaceae (syn. Cruciferae)

**Shape:**

- outline - obliquely oblong to obliquely obovate
- flattened in cross-section
- on each seed face a longitudinal groove starts at the radicle tip and runs approximately one-third the distance from the long edge of the seed outlining the radicle
- this groove often curves at the apex and travels back towards the hilum
- the radicle tip is even with or extends slightly past the hilum
- whitish seed stalk remnant may be attached at hilum

**Colour:**

- golden to bright red-orange

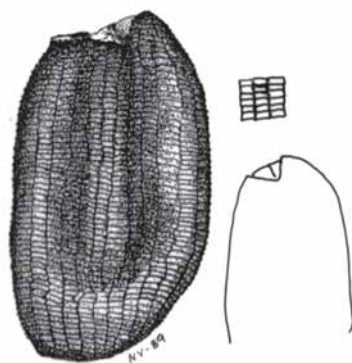
**Seed Surface:**

- finely reticulated in a distinct regular ladder-like mesh pattern in parallel rows
- shiny or oily looking

**Size:**

- length 0.8 - 1.2 mm, width 0.4 - 0.6 mm

**Reference Numbers:** • 5, 9, 10



*Descurainia sophia* - flixweed

## WEED SEEDS

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### *Descurainia richardsonii* (Sweet) O. E. Shultz.

**Common Name:** gray tansy mustard

**Family Name:** Brassicaceae (syn. Cruciferae)

**Shape:**

- outline - irregular, obliquely oblong or obliquely obovate
- somewhat flattened in cross-section
- on each seed face a longitudinal groove starts at the radicle tip and runs approximately one-third the distance from the long edge of the seed outlining the radicle
- this groove often curves at the apex and travels back towards the hilum
- radicle tip extends beyond the hilum
- radicle may appear twisted
- hilum end notched, frequently with white seed stem tissue attached
- apex often comes to a slightly rounded point

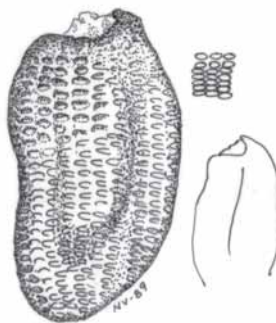
**Colour:** • dark reddish brown; hilum end darker, almost black

**Seed Surface:**

- distinctly reticulated with a honeycomb pattern
- overall roughened appearance; oily

**Size:** • length 0.9-1.1 mm, width 0.4-0.7 mm

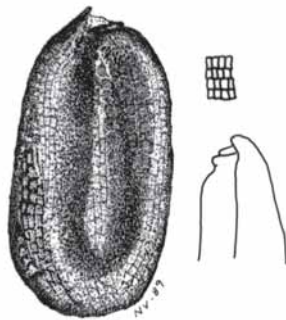
**Reference Numbers:** • 5



*Descurainia richardsonii* - gray tansy mustard

### *Capsella bursa-pastoris* (L.) Medick.

- Common Name:** shepherd's-purse  
**Family Name:** Brassicaceae (syn. Cruciferae)
- Shape:**
- outline - oblong to obovate
  - uniformly flattened in cross-section
  - on each seed face a longitudinal groove starts at the radicle tip and runs approximately one-third the distance from the long edge of the seed outlining the radicle
  - this groove often curves at the apex and travels back towards the hilum
  - the seed may have the appearance of being drawn-in at the hilum end like a pouch
  - hilum end notched, often with white seed stem tissue attached
- Colour:**
- dark reddish-brown to golden red-brown
  - hilum end is usually noticeably darker - may appear black
- Seed Surface:**
- finely netted
  - appears roughened
- Size:**
- length 0.9 - 1.2 mm, width 0.4 - 0.6 mm
- Reference Numbers:** • 6



*Capsella bursa-pastoris* - shepherd's-purse



## WEED SEEDS

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### *Sisymbrium altissimum* L.

**Common Name:** tumble mustard

**Family Name:** Brassicaceae (syn. Cruciferae)

**Shape:**

- outline - variable, but usually oblong and often angled, seems boxy
- somewhat flattened in cross-section
- long edges of seed nearly parallel
- at the hilum the edges are slightly pinched together; a slight white seed stalk remnant may be attached
- the apex is squarish
- one seed face is flattened or slightly curved; the opposite side is often angled such that if the seed is placed on one of the parallel edges the seed slopes length-wise from the centre towards each end (looks like a roof)
- on each seed face there is a longitudinal groove (deeper on the angled face) outlining the radicle

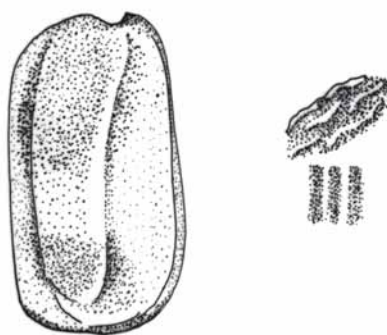
**Colour:**

- yellow-brown, light brown, greenish-yellow, greenish-brown
- the groove and edges of the seed are often outlined in dark green or purplish lines; this colouring may also appear as speckles beneath the seed surface

**Seed Surface:** granular appearance, greasy looking

**Size:** length 0.8 to 1.1 mm x width 0.5 to 0.6 mm

**Reference Numbers:** 5, 6, 10



*Sisymbrium altissimum* - tumble mustard

### *Erysimum cheiranthoides* L.

**Common Name:** wormseed mustard

**Family Name:** Brassicaceae (syn. Cruciferae)

**Shape:**

- outline - variable; irregular, obliquely oblong or obliquely obovate
- radicle ridge frequently twisted
- prominent radicle ridge outlined by a distinct groove
- radicle tip extends beyond the hilum
- hilum end frequently with white seed stem tissue attached
- apex often comes to a point

**Colour:**

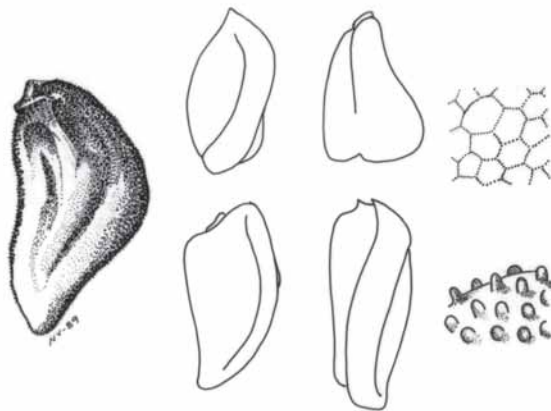
- yellow to orangy- or reddish- brown
- hilum end darker, almost black

**Seed Surface:**

- almost smooth; faintly reticulated or faintly granular
- often dull

**Size:** • length 1.0-1.4 mm, width 0.3-0.6 mm

**Reference Numbers:** • 5, 10



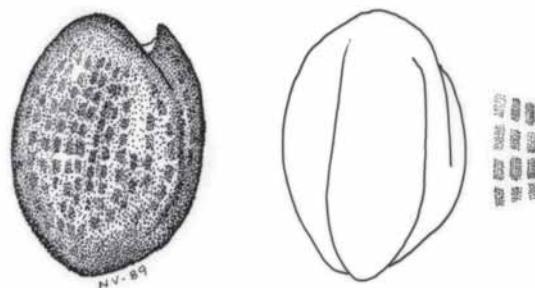
*Erysimum cheiranthoides* - wormseed mustard

## WEED SEEDS

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### *Erucastrum gallicum* (Willd.) O. E. Shultz

- Common Name:** dog mustard  
**Family Name:** Brassicaceae (syn. Cruciferae)
- Shape:**
- outline - oval to obovate
  - not flattened, oval and plump in cross-section
  - on each seed face a longitudinal groove starts at the radicle tip outlining the radicle
  - this groove may curve at the apex and travel back towards the hilum
  - groove not always prominent
  - radicle may form a prominent ridge
  - hilum end notched and frequently with white seed stem tissue attached
- Colour:**
- golden brown, red brown, light brown
  - hilum end darker in colour
- Seed Surface:**
- reticulated with an irregular net pattern
  - granulation visible in the interspaces
- Size:**
- length 1.0-1.2 mm, width 0.6-0.8 mm
- Reference Numbers:** • 6



*Erucastrum gallicum* - dog mustard

## WEED SEEDS

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### *Thlaspi arvense* L.

**Common Name:** stinkweed, field pennycress

**Family Name:** Brassicaceae (syn. Cruciferae)

**Shape:**

- outline - oval, ovate or obovate
- flattened in cross-section
- on each face a narrow groove extends through the middle from the hilum to approximately half-way down the seed
- hilum is notched and gives the appearance of a slightly open beak
- slightly elongated at hilum
- remnant of white seed stem tissue frequently attached

**Colour:**

- dark reddish-brown to black
- slightly glossy or iridescent

**Seed Surface:**

- covered with distinct concentric ridges or loops like a fingerprint
- these ridges and the spaces between them are transversely pitted giving a roughened appearance

**Size:**

- length 1.6-2 mm, width 1.1-1.4 mm

**Reference Numbers:** • 5, 6, 10



*Thlaspi arvense* - stinkweed

## WEED SEEDS

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### *Conringia orientalis* (L.) Dumort.

**Common Name:** hare's-ear mustard

**Family Name:** Brassicaceae (syn. Cruciferae)

**Shape:**

- outline - roughly oval or oblong
- radicle thick and forms a prominent ridge; this ridge is outlined by a groove that extends to the apex
- the tip of the radicle extends beyond the cotyledons at the hilum end
- a prominent whitish seed stalk remnant often remains attached

**Colour:**

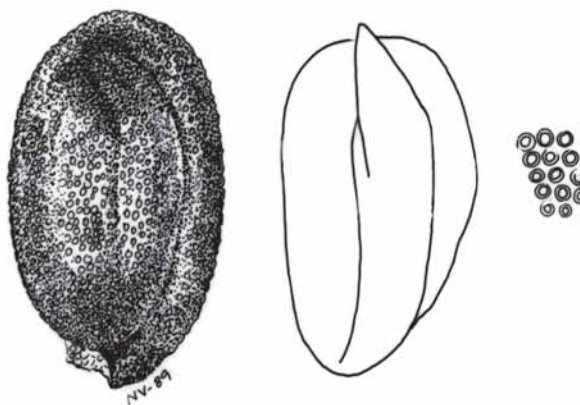
- reddish-brown to dark brown
- may have a bronzy-orange surface layer that settles in the grooves and pits

**Seed Surface:**

- appears roughened and granular
- when magnified this surface has a distinctive pattern of pits that appears as circles within circles

**Size:** • Length 2.2-2.8 mm, width 1.0-1.3 mm

**Reference Numbers:** • 6, 10



*Conringia orientalis* - hare's-ear mustard

## GLOSSARY

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<b>apex</b>	the tip, the end furthest from the point of attachment
<b>cotyledons</b>	seed-leaf, first leaves of the embryo
<b>elliptical</b>	widest point near the middle, tapering gradually and equally to slightly pointed ends, no parallel sides
<b>embryo</b>	germ; the young plant enclosed in a seed; consists of the radicle, one or more cotyledons and the plumule
<b>funicle</b>	the stalk of the ovule and later the seed where it is attached to the placenta
<b>granular</b>	surface finely roughened by minute rounded protuberances
<b>hilum</b>	the scar left on the seed when it separates from the funicle (point of attachment)
<b>interspaces</b>	the spaces between reticulations
<b>linear</b>	narrow, elongated, with nearly parallel sides
<b>micropyle</b>	a minute opening in the seed coat, situated at one end of the hilum
<b>oblique</b>	slanted or tilted, unequal sides
<b>oblong</b>	somewhat elongated, about two to four times longer than broad, the sides almost parallel, rounded at both ends
<b>obovate</b>	inverted egg shape, broadest slightly above the middle, hilum at the narrow end
<b>oval</b>	broadly elliptical, rounded at both ends, curved sides, about twice as long as broad, widest in the middle
<b>ovate</b>	egg-shaped in outline, broadest below the middle, scarcely twice as long as broad; if longer or wider, describe as narrowly or broadly ovate; hilum at the broad end
<b>radicle</b>	the embryonic root, base of the future root
<b>reticulate</b>	network of fine ridges, resembling a net, lattice-like
<b>ridge</b>	an elongated raised area
<b>seed coat</b>	outer protective surface of the seed
<b>seed face</b>	for seeds that are flattened from hilum to apex (have two broad sides), each flattened (broad) side is called a seed face
<b>seed scar</b>	see hilum
<b>seed size</b>	length is the measurement from hilum to apex; width is the measurement mid-distance from the hilum to apex and is generally at the widest part of the seed
<b>seed stalk</b>	see funicle
<b>spherical</b>	rounded shape where all points are equidistant from the center
<b>tubercles</b>	small, rounded, wart-like protuberances

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