What is seed quality?

Seed quality is very important in pulse production since the cost of seed and potential seed treatments are a significant part of input costs. “Quality” seed means no or very low infection levels of ascochyta blight and other seed-borne diseases, as well as a high rate of germination.

Planting seed that is free of ascochyta blight and other pathogens is the primary means to limit the introduction of the pathogen into a field and prevent early establishment of disease. Planting infected seed allows for an even distribution of the disease within the crop and increases the number of initial infection sites from which the disease will spread during subsequent rain events.

Example of ascochyta blight in chickpea: Since there is a high rate of seed-to-seedling transmission of the pathogen, even a small amount of infected seed can result in significant seedling infection in the field. For example, with a 0.1 per cent ascochyta-infected seed lot (one infected seed in 1000 seeds), potentially 175 infected seedlings per acre could result if planting density is 3 to 4 plants/ft².

What is the quality of the 2004 seed?

The 2004 growing season had great potential and crop canopies were lush and yield potential was high. However, the cool and moist conditions resulted in delayed crop development so that crops were greatly impacted by the severe frosts received on August 19 and 20 over much of the province. So although yields were high and considered above average for many crops, seed quality is considered below average. Some seed lots were exhibiting shrunken, green, frozen, discoloured and moulded characteristics. Hence this is the season to get your seed lot tested for quality: germination, vigour, and level of seed-borne diseases.

Seed testing labs throughout the province have been very busy. As of the end of November, labs have reported higher than average levels of ascochyta (Mycosphaerella pinodes) in field pea; a larger proportion of lentil samples infected with anthracnose (Colletotrichum truncatum); higher levels of botrytis and sclerotinia in all pulses; Stemphylium botryosum infection in lentils; higher levels of Fusarium avenaceum and F. poae in cereals; and high levels of Alternaria infection in the brassicas. Very few chickpea samples have been received, but are showing Ascochyta rabiei infection.

For past summaries of seed-borne diseases tested at provincial seed testing labs on pulses, refer to the Canadian Plant Disease Survey online at: www.cps-scp.ca/cpds.htm

The 2004 season has not yet been summarized since seed samples are still being tested.
What infection levels are safe to plant?

There are no existing guidelines for ‘safe’ infection levels in seed. This decision depends on a variety of factors affecting risk, including:

- The cost and availability of disease-free seed with good germination.
- The cost and availability of registered seed treatments.
- The weather conditions and disease pressure typical of that region/soil climatic zone.
- The type of pulse crop.
- The type of disease.
- Plans for infield scouting; availability and application of foliar fungicides.

Refer to Table 1 (pg. 4) for guidelines for planting infected pulse seed.

Seed Testing:

It is recommended to have seed tested at an accredited laboratory to assess the levels of seed-borne pathogens. Seed testing laboratories can test pulse seed to determine the level of seed-borne pathogens causing the diseases ascochyta, anthracnose, botrytis and sclerotinia. Testing for germination serves as an indication of overall seed quality. Preferably, buy only certified seed that has known good quality. Keep in mind that certified seed according to the federal seeds act has to meet standards for germination and purity, not for disease. Ask to see a copy of the seed lab report before purchasing the seed.

Protocol for Disease Testing in Seed Laboratories:

Accredited seed laboratories follow a protocol to test pulse seed for diseases:

- The seed sample is screened to remove the majority of debris or very shrivelled seed. However, this cleaning process is not as thorough as compared to a commercial seed cleaner. Producers who are planning to have their seed cleaned before planting should do so prior to testing to remove shrivelled, infected seed or to remove immature green seed. Or, producers can request the lab to screen or size the seed.
- A smaller representative sample is selected from the larger seed sample submitted and is surface sterilized with 10% bleach to remove any external contaminants. The seed sample is then drained.
- Under sterile conditions, the seed is plated onto petri dishes containing growth medium. Seed that is severely broken or chipped will not be used in the test. The sample size plated (200 to 1000 seeds) depends on the type of pulse crop and purpose of the test.
- The plates are incubated for 10 days after which the pathogen colonies growing out of seeds are counted. Diagnostic features such as colony appearance and presence of fruiting bodies are used in the identification.
What Does a Disease Seed Test Mean?

Remember that the sample submitted to the lab is only a small representation of a larger seed lot and is dependent on how the sample was collected. Due to the statistical nature of such a small sample, it may not accurately quantify the disease infection. For example, a 0% seed test does not necessarily guarantee the entire seed lot is free of disease. The % of infection tolerated is dependent on the type of disease and pulse crop (Table 1).

The number of seeds tested affects the accuracy of the test. For example, most pulse seed tests use a 400 seed sample but sometimes a 1000 seed sample is used. When you increase the number of seeds tested to 1000, it increases the probability of detecting a smaller amount of infected seed. For example, with chickpea, a 1000 seed test can detect 0.1% infection (1 in 1000), whereas a 400 seed sample test may have provided a 0% infection result. Therefore, a 1000 seed sample decreases the likelihood of getting a false negative and increases the chance of getting a true negative. The difference between 0% and 0.1% infection can be important when weather conditions favour disease development and spread. The ability to detect a lower level of infection is more important for chickpea than for lentil or field pea, and is also more important for seed growers than commercial growers.

Cleaning Seed:

Diseased seed is often shrunken or discoloured. However, some ascochyta-infected seed may look healthy but still be carrying the fungus. Botrytis infected seed is often shrunken. Cleaners and colour sorters can be used to remove some diseased or damaged seed. It is recommended that producers have their seed cleaned and sized to allow for consistent flow in seeding equipment. Seed testing labs will only clean your seed before testing if requested to do so.

Germination

It is recommended to have seed tested for germination to determine its suitability for planting seed. Germination can decrease in the bin over the winter, especially if the seed was immature or damaged at harvest. It is a good investment to have your seed re-tested in the spring for germination if the quality was questionable in the fall. To a certain extent, increasing the seeding rate will compensate for lower germination. However, if the reduced germination was a result of disease, an increased seeding rate will result in more disease inoculum in the field.

As well, do not use seed from a pulse crop that was treated with pre-harvest glyphosate as uneven and unusual seedling development may occur resulting in a poor plant stand.
TABLE 1. GUIDELINES FOR SAFE LEVELS OF INFECTED PULSE SEED FOR PLANTING:
Following are some suggested guidelines for infection levels of chickpea, lentil and field pea seed samples. Please note that these guidelines are subject to change and may vary with location and specific cropping practices.

<table>
<thead>
<tr>
<th>CROP</th>
<th>DISEASE (Pathogen)</th>
<th>SAFE LEVEL TO PLANT</th>
<th>SEED TREATMENTS AVAILABLE¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHICKPEA</td>
<td>ASCOCHYTA <em>(Ascochyta rabiei)</em></td>
<td>Use seed with less than 0.3% ascochyta infection². Even though a seed test may indicate 0% infection, the seed lot may still contain infected seed and seed treating is recommended. Seed-to-seedling transmission of ascochyta blight is high in chickpea. The disease is very aggressive and can spread quickly in a field once established and weather conditions are favourable. Guidelines for ascochyta blight control in chickpea are available at: <a href="http://www.agr.gov.sk.ca/docs/crops/integrated_Pest_management/disease/ascochytafungicides.asp?firstPick=Crops&amp;secondpick=Integrated%20Pest%20Management&amp;thirdpick=Disease">http://www.agr.gov.sk.ca/docs/crops/integrated_Pest_management/disease/ascochytafungicides.asp?firstPick=Crops&amp;secondpick=Integrated%20Pest%20Management&amp;thirdpick=Disease</a></td>
<td>Crown® (active ingredients: carthathin, thiabendazole)</td>
</tr>
<tr>
<td></td>
<td>SEED ROTS and DAMPING OFF <em>(Pythium and Phytophthora species)</em></td>
<td>These are soil-borne diseases and not tested for at seed testing labs. The use of seed treatment is strongly recommended for kabuli varieties since kabuli is very susceptible to these pathogens.</td>
<td>Allegiance FL®, Apron FL® (active ingredient: metalaxyl)</td>
</tr>
<tr>
<td></td>
<td>SEED ROTS and SEEDLING BLIGHTS <em>(Botrytis, Sclerotinia, Rhizoctonia, and Fusarium species)</em></td>
<td>These are primarily soil-borne diseases. Botrytis and sclerotinia are tested for at seed testing labs. Up to 10% infection (sclerotinia + botrytis) should be safe to plant, but will still result in significant seedling blight in the crop if a seed treatment is not used.</td>
<td>Apron Maxx RTA® (active ingredients: fludioxonil, metalaxyl-M)</td>
</tr>
</tbody>
</table>

¹Note: Seed treatments are subject to change and may vary with location and specific cropping practices. Applications may require a registered product. Always follow the label directions carefully for each product. 
²These guidelines are in accordance with current and published literature and are not intended to be inclusive of all possible infections. 
³Maxim 480FS is not available in all regions.
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</tr>
</thead>
<tbody>
<tr>
<td>LENTIL</td>
<td>ASCOCHYTA (Ascochyta lentis)</td>
<td>Up to 5% ascochyta infection may be safe to plant in the brown and dark brown soil climatic zones of Saskatchewan, if weather patterns are normal. A seed treatment should be used if infection levels are close to or exceed 5%. Seed should not be planted if infection levels exceed 10%. High infection levels are usually indicative of other quality issues. Use 0% ascochyta infection if planting in the black soil climatic zone of Saskatchewan.</td>
<td>Crown® (active ingredients: carthain, thiabendazole)</td>
</tr>
<tr>
<td></td>
<td>ANTHRACNOSE (Colletotrichum truncatum)</td>
<td>Even though anthracnose is not considered highly seed-borne, i.e. infection levels are rarely over 1%, it is still recommended to plant seed with as close to 0% anthracnose as possible.</td>
<td>None.</td>
</tr>
<tr>
<td></td>
<td>SEED ROTs and SEEDLING BLIGHTS (Botrytis, Sclerotinia, Rhizoctonia, and Fusarium species)</td>
<td>These are primarily soil-borne diseases. Botrytis and sclerotinia are tested for at seed testing labs. Up to 10% infection (sclerotinia + botrytis) should be safe to plant, but will still result in significant seedling blight in the crop if a seed treatment is not used.</td>
<td>Apron Maxx RTA® (active ingredients: fludioxonil, metalaxyl-M  Crone® (active ingredients: carthain, thiabendazole)  Maxim 480FS®³ (active ingredient: fludioxonil)  Vitaflo 280® (active ingredients: carthain, thiram)</td>
</tr>
<tr>
<td>CROP</td>
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</table>
| FIELD PEA  | **ASCOCHYTA** *(Mycosphaerella pinodes, Ascochyta pinodella, Ascochyta pisi)* | Up to 10% ascochyta infection should be safe to plant as long as the seed has other good quality characteristics such as germination.  
Seed-to-seedling transmission of ascochyta in pea under field conditions is low.  
In areas where pea production is common, air-borne spores from the over-wintering stage of the Mycosphaerella pathogen are the primary means of infection. | There are no seed treatments registered specifically for the control of ascochyta in pea although Thiram 75 WP® or Vitaflo 280® may assist in decreasing seed-to-seedling transmission to a certain extent. |
|            | **Pythium sp. and Phytophthora sp.**         | Not tested for at seed testing labs.  
Seed treatment in field pea may be beneficial when planting under cool, moist soil conditions or if using damaged or cracked seed. | Allegiance FL®, Apron FL® *(active ingredient: metalaxyl)*  
Apron Maxx RTA® *(active ingredient: fludioxonil, metalaxyl-M)* |
|            | **SEED ROTs and DAMPING OFF**                | These are primarily soil-borne diseases.  Botrytis and sclerotinia are tested for at seed testing labs.  
Up to 10% infection (sclerotinia + botrytis) should be safe to plant, but will still result in significant seedling blight in the crop if a seed treatment is not used. | Agrox CD®, Agrox B-2® *(active ingredient: captan, diazinon)*  
Captan Flowable® *(active ingredient: captan)*  
Maxim 480FS® *(active ingredient: fludioxonil)*  
Thiram 75WP® *(active ingredients: thiram)*  
Vitaflo 280® *(active ingredients: carbatin, thiram)* |

1 New seed treatments are continually being registered. Talk to your local agri-retailer, industry rep or provincial specialists for updated information on seed treatments registered in pulses.

2 SK Crop Insurance will not support claims that are made on fields that had over 0.3% seed infection and no seed treatment was used. Refer to the SCIC website at: [http://www.saskropinsurance.com/programs/2004/newcrops/chickpeas.shtml](http://www.saskropinsurance.com/programs/2004/newcrops/chickpeas.shtml)

3 Maxim 480FS® is only available to commercial seed treaters.