

Soil Temperature and Seed Germination

With the cool spring we are experiencing this year, more attention should be given to soil temperature when planning seeding operations. Cool soil temperatures may adversely affect crop emergence. Cold soils can cause delayed germination, which may lead to seed damage and sparse or uneven seed emergence¹.

Some crop types are better adapted to germinating in cooler soils. In general, larger seeded crops have a greater tolerance to cool soils while smaller seeded crops are more sensitive. Below are some seeding considerations by crop type.

Canola

Seeding canola early can be an important tool for mitigating the risk of fall frost damage. Early seeding also helps avoid heat damage as pods develop, resulting in increased yield potential. However, seeding too early into cold soils may increase the risk of emergence problems. Monitoring the soil temperature in your fields will help you make an informed decision when to seed.

Soil temperatures below 10° C generally result in reduced germination and emergence. Studies have shown that canola (*B. napus*) will absorb water and germinate at temperatures as low as 2° C. If this low temperature is sustained it will damage the seed embryo and reduce germination and growth. If the time for seed germination and emergence is extended due to lower soil temperatures, there is a greater chance of seedling disease which may result in reduced plant populations, uneven germination, poor stands and varying maturity².

Since the first 50% of germinated seeds produce the majority of the yield, the number of days required to reach 50% germination is important. Studies have shown that soil temperatures at 4° C had little effect on the total percent germination. However, the number of days to reach 50% germination increased substantially when soil temperatures were below 6° C. For example, 50% germination was reached in three days at an 8° C soil temperature compared to thirteen days at a 2° C soil temperature².

Flax

Flax can germinate at temperatures in the 3 to 4° C range. However plants at the cotyledon stage are very sensitive to frost. Flax plants that have been exposed to colder temperatures at the 2 to 4 leaf stage will tolerate short periods of sub-zero temperatures³.

Cereal Crops

Cereal crops such as wheat, barley and oats are well adapted to cool soils and can be seeded at soil temperatures of 4 to 5° C. The growing point of cereals is located below the soil surface until the three-leaf stage and therefore can handle frost damage in the early part of the season³.

Pulses

Cool season crops like field pea, lentil and desi chickpea are able to withstand spring frosts as low as -4 to -6° C. To ensure the best yield potential and quality, seeding at a soil temperature of 5° C is recommended⁴.

Kabuli type chickpeas should be seeded when soil temperatures reach 10° C in an effort to minimize potential seed rot damage by promoting rapid seed germination and emergence⁴.

Dry Beans have no tolerance to spring frosts; therefore seeding should be delayed until mid to late May when soil temperatures are at 12° C to minimize the risk of potential spring frost events⁴.

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References

¹ Alberta Agriculture, Food and Rural Development.1980. Soil Temperature for Germination. Agri-Facts [Internet]. [cited 2009 May 5]. Available from: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex1203](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex1203)

² Canola Council of Canada. 2003. Chapter 5: Temperature, Frost and Hail. In: Canola Growers Manual. 2003 Edition. pp. 504-505

³ Saskatchewan Agriculture. 2009. Soil Temperatures & Seeding. Frequently Asked Questions [Internet]. [cited 2009 May 5]. Available from: <http://www.agriculture.gov.sk.ca/Default.aspx?DN=401b8c2c-ef18-4450-b80c-3b5e63144b52>

⁴ Saskatchewan Pulse Growers. 2000. Section 2: Production. In: Saskatchewan Pulse Growers. Pulse Production Manual. 2nd edition. p. 9