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Weather damaged cereal seed

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Wet harvests often result in significant deterioration of seed quality, particularly cereals, which have limited ability to withstand such conditions. Symptoms of weather damage may vary from mild staining of the grain to sprung and shot seed. It is important to be able to identify weather damaged seed and understand the limitations when using this seed.

Some aspects are:

- Weather damaged seed may have a reduced germination capacity.
- Weather damaged seed may have reduced vigour.
- Weather damaged seed will deteriorate more rapidly in storage.
- Seed stored at a high moisture level may heat up killing or injuring the seed.
- Seed stored at high moisture is susceptible to insect and fungal attack which may also kill or injure seed.
- Weather damaged seed is more susceptible to physical seed damage as a result of excessive handling.

Seed biology

Seed is a living entity. The overall quality of the seed is determined at physiological maturity and often reflects the growing conditions experienced by the crop. Once a seed is mature it will begin to deteriorate. The rate at which this occurs will depend upon the species, the initial quality of the seed, harvest and handling of the seed, and the storage conditions.

Once sown into moisture, the seed will imbibe (take up moisture). This starts off a complex series of chemical reactions which result in the germination of the seed. Put simply, starch stored in the seed is converted by enzymes into sugars which are then sent to the growing points of the seed to produce new cells forming the radicle (root) and plumule (shoot).

Germination and seed vigour

Germination is ability of the seed to successfully mobilise the food reserves and produce a radical and plumule. Excessively deteriorated seed or damaged seed may be unable to perform this function and are considered unviable. Some seed may germinate but will not go on to produce normal plants due to seed damage, these are referred to as abnormal seedlings. The germination ability of a seed lot may be readily tested at home. However, a test by an accredited seed testing laboratory will give more accurate results, particularly in the identification of abnormal seedlings.

Ideally, seed of winter cereals should have a germination capacity greater than 90%. Seed lots with a germination capacity below 70% are likely to have poor seed vigour and should be rejected where possible. It should be noted that seed lots with a high germination capacity might not necessarily have high seed vigour.

Seed Vigour can be defined as the sum of all the properties of the seed which determine the performance of the seed during germination and seedling emergence. Seed vigour is difficult to test for but some laboratory tests such as cold stress or accelerated ageing are useful in determining seed vigour. A slow rate of germination and slow root and shoot development are also useful guides to seed vigour.

Weather damage

Weather damage of seed occurs when the seed is subject to premature wetting at harvest. In most cases the seed will partially imbibe and commence the chemical processes, this may be indicated by staining. The process will cease when there is insufficient moisture to continue. Unfortunately, a significant amount of energy is lost in this situation and such seed will exhibit reduced vigour when re-imbibed to continue the process.

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It the moisture level is sufficient the seed will swell significantly. This often results in the splitting of the skin covering the growing point and the seed is referred to as being sprung. Once this occurs the chemical reactions in the seed have greater access to oxygen and proceed at a faster rate. If the process is again interrupted due to lack of moisture some of the starch stored in the seed may be oxidised and lost to the seed, greatly reducing the seeds ability to complete the germination process. Seedling vigour is often markedly affected. Additionally, the seed is now more susceptible to fungal attack and seed damage due to excessive handling. As the starch reserves have been severely depleted, shot seed usually has a very low germination capacity and exhibits very poor vigour.

A falling numbers test measures the extent of starch conversion to sugar but does not measure the capacity of a seed to germinate nor assess its vigour. **A falling numbers test should NOT be used to assess the suitability of seed for sowing purposes**.

Sowing weather damaged seed

If weather damaged seed must be used a laboratory seed test is prerequisite. The sowing rate needs to be adjusted for any reduced germination capacity or vigour problem.

The coleoptile is a protective sheath surrounding the first leaf, it protects and guides the shoot as it grows through the soil. If the seed is sown deeper than the length of the coleoptile the plant can fail to emerge. Coleoptile lengths vary from one variety to another. Early sown seed under warm soil conditions may also have shorter coleoptiles in northern NSW.

The reduced vigour of most weather damaged seed makes the job difficult for the coleoptile. As a leaf is unlikely to be able to reach the soil surface without the protection of the coleoptile it is important not to sow the seed deep.

Soils that crust present additional problems to the emergence of the seedling. Weather damaged seed should not be sown into paddocks where surface sealing occurs.

Seed dressings/trifluralin

Coleoptile lengths are shortened by some seed dressings (e.g. Armour ® and Baytan ®) and also by the herbicide Trifluralin. These seed dressings should be avoided on weather damaged seed, particularly when used in conjunction with Trifluralin. Care must be taken to sow the seed just below the Trifluralin layer. Check with the supplier or manufacturer of your particular seed dressing or chemical treatment to determine if it will reduce the coleoptile length or impair emergence.

Storage of weather damaged seed

Weather damaged seed deteriorates at a much faster rate than sound seed. It is recommended that it not be stored for more than one season. The germination capacity of the seed should be determined after harvest to assess the value in storing such seed. Stored seed needs to be dried to below 12% moisture to avoid fungal attack. Insects are active above 7% moisture, and as it is unlikely that most farmers will achieve moisture levels below this long term, insect activity need to be monitored and control measures applied when appropriate. An excessive number of fumigations with phosphine may have a deleterious effect on seed viability so attention should be paid to farm hygiene.

The seed lot should be tested again prior to sowing to ensure the quality is suitable and allow sufficient time for additional seed purchases if required.

Summary

- Test seed for germination capacity after harvest.
- Select seed lots with a germination above 90%.
- Reject seed lots with a germination capacity below 70%.
- Handle all seed carefully, particularly weather damaged seed.
- Reject sprung and shot seed.
- Do not use seed dressings that significantly reduce coleoptile length on weather damaged seed. Ensure that all seed dressings and chemicals are suitable.
- Do not sow the seed too deep.
- Sow seed just below the Trifluralin layer.
- Do not sow weather damaged seed into paddocks that surface seal.
- Do not store weather damaged seed longer than 12 months.
- Store seed in cool dry conditions and ensure adequate pest control.
- Retest seed early in the season to check its germination capacity prior to sowing.

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