Salvaging stem frosted cereal crops

Frank Mickan
Pasture and Fodder Conservation Specialist
DEDJTR, Ellinbank

Cereal crops in areas of Northern Victoria and Southern New South Wales are often affected by late frosts which can prevent cereal crops from reaching a grain harvest and is removed for hay. Temperatures can be measured as low as -5ºC near the base of the plants during some frost events. Whilst frost is a common feature at this time of year, it is unusual to see crops in the very early to late stages of head development affected. Many farmers and contractors ask whether frost affected crops can be salvaged.

Sometimes the earliest crops affected have been at the Zadoks 31 (Z31) growth stage. This is the onset of stem elongation, with Z31 referring to the detection of the first node or joint. This node may be anywhere from 10 to 50 mm from the ground. In the past crops have been reportedly affected in the range from Z31 to the booting stages of the head (Z45-Z47).

As a result, the developing or immature heads have been killed by the frost. Frost affected crops may turn white, stems will have weakened and the plants may be starting to decompose. Micro-organisms associated with decomposition then increase rapidly in number over time. The longer plants are left before any action is taken, the greater the likelihood of entire crops being unsalvageable.

The extent of damage to crops and areas affected will depend on many factors. This includes time of sowing, crop species and variety, stage of growth and frost severity. Another complicating factor in determine the impact of frost on crops is that plants may compensate by producing new tillers. It is not certain that these tillers will mature enough to produce grain heads. In moderately frosted crops, the remaining heads will compensate in part for the loss of their neighbours. However, yields may also be low and therefore there may be no financial benefit in having left the crop to mature.

Cutting crops for hay or silage are two options that could be considered for salvaging frost affected cereal crops. The success of these options in salvaging a crop will depend on the extent of the damage. Where crops are already dying, or are well advanced in decomposition, they may not be salvageable and the best option may be to graze as soon as possible.

Hay
Hay is only an option where there are enough days of heat to promote fast curing. Seriously consider mowing with a roller type mower conditioner that will split the stems. This may help expose the decomposing interior of the stem to the sunlight and heat, thereby setting back the decomposing micro-organisms. Even a flail or tyned type mower-conditioner can help increase curing rate.

If no mower-conditioner is available, consider following up mowing as soon as possible with a tedder to spread the material out to increase the rate of curing. Lift the tines to avoid picking up dust or soil.

Hay preservatives may need to be considered as the decomposing area in the plant stem may not completely dry down. The use of a preservative will also allow slightly earlier baling if rain is threatening and/or to prevent the material being on the ground for too many days. Hay quality may also be slightly higher due to less leaf loss. Hay preservatives include some bacterial inoculants, buffered organic acid salts and a sulphur plus amylase based product. Talk to reputable representatives about the effectiveness of their products for this job.

Ensure that forage is not baled too green and remember that different size bales require different moisture contents for baling. . For example, large squares should normally be baled below about 14 per cent moisture. Where hay preservatives are used this may increase by two to three percent.

Experienced hay operators and preservative representatives in the field can provide specific advice. Other information on hay preservatives is found here: http://www.depi.vic.gov.au/agriculture-and-food/dairy/pastures-management/hay-preservatives

Silage

The best option may be to ensile the crop as soon as possible. Rotting heads in the cereal sheath will in effect 'inoculate' the cereal silage crop with highly undesirable bacteria if left too long. Leafy cereals tend to have a higher buffering capacity than ryegrass plants so can be more difficult to ensile.

If plants are still green or slowly surviving and especially if near the booting stage, they will probably have good sugar levels which would have soon been converted into starch as the grain heads begin to form. Bacteria involved in the ensilation process (fermentation) of the vegetative cereals plants need and will use these sugars to produce a range of acids, preferably lactic acid, which will 'pickle' the forage. If silage is kept air (oxygen) and water-free the frosted crops could still potentially produce a feed of reasonable nutritive value.

As with hay production, the wilting rate needs to be increased as much as possible. If a tedder is used, a second tedding the second morning after the dew has lifted could be very beneficial. Aim for 30 – 35 per cent dry matter (% DM) for bulk (stack, bunker, bun stack) silage, 40 – 50 per cent DM for round bales and up to 60 per cent for large squares. If increasing the dry matter percentage slightly above60 per cent for the large squares, either individually wrap or tubeline these. Modules under plastic are risky if not done with experience.

Where crops are ensiled as bulk silage they can reach acidity levels of about pH 4.0 if the desirable fermentation occurs. This should inhibit many of the decomposing bacteria. Unfortunately, baled silage undergoes a more restricted fermentation and may only reach about a pH 5.0 or above which on its own may not affect the undesirable bacteria enough.

Consider using a fermentation enhancing silage additive on frosted crops because of increased numbers of 'bad' decomposing bacteria, the higher buffering capacity of vegetative cereals and also because weather at this time of year may not allow the desired DM level to be reached within two to three days. Crops wilting greater than about two days will begin to lose sugars and nutritive value at an increasing rate.

Silage additives are made up of mainly bacterial inoculants, but also buffered organic acid salts and the sulphur plus amylase based product mentioned above. Once again talk to the additive representatives for more specific advice.

Finally, remember that the longer any forage is on the ground curing for hay or wilting for silage, the greater are the losses of dry matter and quality.