Frost damage in alfalfa: What to do after it?

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Last weekend, air temperature descended to 23°F for as long as 5 hours in some locations in North Dakota (see NDAWN map from 2:00 to 4:00 AM, 14 May 2016). Alfalfa in areas in dark blue color were exposed to temperatures below 25°F for at least three hours. Literature indicates that frost damage in alfalfa will occur when alfalfa plants are exposed to temperatures below 25°F for at least two hours. Frost damage depends on many factors additionally to air temperature such as soil moisture, soil type, field location, residue on surface and more. The severity of the damage will vary in each location.

Average Hourly Air Temperature (°F) for hour ending at 0400 CST (2016–05–14)
Alfalfa stems can take much lower temperatures than leaves. A hard frost will cause the alfalfa stems bend over with a “shepherd’s hook” or act as a lazy stem (Fig. 1). If after a few days the stems straighten back up, the stem is uninjured and will resume growth with no yield penalty.

Figure 1. Alfalfa frost damage.

If the stem does not straighten up after a frost, it has been killed and will start to dry out. If most or all stem tops are damaged and stand is less than 10 inches tall, do nothing. The growing points have been killed but new alfalfa stems will develop from the crown and axillary buds and resume growth. This might delay the first cutting.

If less than 30% of stem tops show wilting/browning from frost, do nothing. Some yield reduction of first cutting may occur but it will recover completely on second cutting. If stand is over 12 inches tall and has more than 30% of stem tops with frost damage, harvest and allow to regrow. Be aware that frosted alfalfa hay might have high nitrate content and cause toxicity to animals.
In new seedings, some damage may have occurred, but usually alfalfa seedlings have excellent frost tolerance. Wait 3 to 5 days after the frost before assessing the damage. If plants do not recover from the initial wilting and die back to the ground, the plant is dead. At least one set of leaves must have escaped damage for the plant to recover. If more than 20 plants per square foot remain, stand will survive in good shape. If stands are lower consider reseeding.