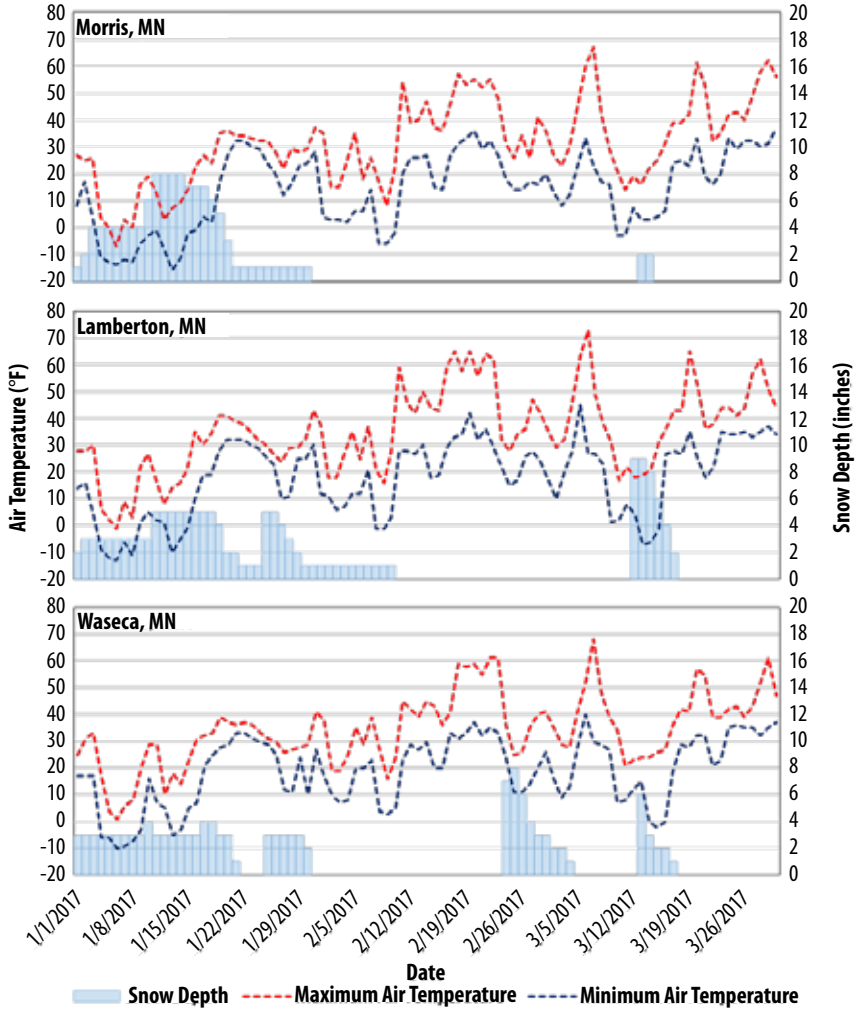
Forage Crop Alternatives After Winterkilled Alfalfa

Reagan Noland, M. Scott Wells, Craig Sheaffer, University of Minnesota

Alfalfa winterkill and winter injury can result from a range of environmental conditions in the Midwest. In many areas this year, periods of abnormally high temperatures occurred in January and again in February, followed by extremely cold temperatures (Figure 1). These thawing and re-freezing cycles can reduce snow cover and cause ice sheeting and soil heaving, which can all contribute to winter injury. Warm temperatures early in the year can also cause alfalfa to break dormancy too early, leaving it susceptible to subsequent cold damage.

Figure 1. Environmental conditions in Morris, Lamberton, and Waseca, MN (January – March 2017). Data retrieved from the Midwest Regional Climate Center (mrcc.isws.illinois.edu/CLIMATE).



Management responses for winterkilled alfalfa generally involve planting an alternative forage crop to reduce losses. Replanting alfalfa is usually not recommended due to residual autotoxicity. Depending on production goals and field conditions, suitable crops may include silage corn, sorghum, sudangrass, small grains, or cool-season forage grasses. Winter injury is not always obvious with initial regrowth, and cold wet spring conditions may delay planting of an alternative crop. Therefore, fast-growing, short-season crops are often most suitable for timely and adequate forage production. Silage corn can be planted following alfalfa if field conditions allow; however, this will not provide immediate forage if farmers are expecting a yield distribution similar to alfalfa. Annual forage grasses have potential for quick production and can regrow for multiple harvests.

Nitrogen (N) fertility is another important consideration, as residual N from alfalfa is often adequate to support a following crop. In alfalfa winterkill situations, annual forage grasses could make use of this N to optimize production while reducing inputs. University of Minnesota researchers conducted field trials in 2014 and 2015 at Rosemount and Waseca, MN, to determine the viability of no-till planting annual forage grasses into winterkilled alfalfa, and to assess the production and economic implications of added N fertilizer. The overall project goal was to identify management practices that provide a forage yield distribution meeting the needs of farmers otherwise expecting a typical production year of alfalfa.

Field trials were established in existing stands of alfalfa terminated with glyphosate upon spring green-up to simulate winterkill. The project investigated eight forages (i.e., brown midrib sorghum, sudangrass, sorghum-sudangrass, Japanese millet, teff, 'Jumbo' annual ryegrass, 'GreenSpirit' Italian ryegrass, and a ryegrass-red clover mix) with three rates of N fertilizer (0, 50, and 100 lbs N/ac). Forages were no-till planted into terminated

alfalfa in late May. The Waseca site received over 13″ of rainfall in June 2014, and the soil remained too saturated for successful forage establishment. Forages were harvested three times each year to maximize forage yield and nutritive value, and simulate a harvest frequency similar to alfalfa. In each trial, the first harvest occurred in early July, the second harvest was in mid-August, and the final harvest was in mid-September.

Forage crop establishment was generally successful; except, sorghum-sudan type forages and teff each established poorly in at least one-site year, and Japanese millet generally did not persist well under multiple harvests. The distribution of forage yield was generally balanced across harvests, indicating these grasses can provide forage on a similar time-scale as alfalfa. General findings indicate annual and Italian ryegrasses are most reliable to establish and produce consistent yields with greater forage nutritive value. Warm-season grasses, sudangrass, and teff showed the greatest yield potential with an average 3.4 tons/ac;
although, these species did not always establish well and generally had lower forage quality than ryegrasses. Added N usually did not improve forage yield, but did frequently increase weed biomass. Forage nutritive value was improved with added N; however, these improvements generally did not justify the economic inputs of purchasing and applying fertilizer. Across locations and years, annual ryegrass averaged 2.6 tons/ac with an relative forage quality (RFQ) of 163, and Italian ryegrass averaged 2.5 tons/ac with 182 RFQ.

Overall findings indicate annual forage grasses can be no-till planted into dead alfalfa to produce supplemental forage in alfalfa winterkill situations. However, the findings also highlight risks involved through variable establishment and weed pressure. Weed management strategies need to be considered, particularly in older stands of alfalfa. If the primary goal is total season tonnage (and not the timing of forage availability), then silage corn or brown-midrib sorghum will usually result in the greatest yields. Although this project did not investigate silage corn establishment and production, no-till planting corn has variable success in northern climates, and tillage should be applied pre-planting when field conditions allow. If timing of forage availability is a priority, then annual forage grasses such as ryegrass can provide forage more quickly and yield multiple harvests throughout the season. When no-till planted into dead alfalfa, annual ryegrass and Italian ryegrass consistently established well and resulted in the highest forage quality, competitive yields, and lower weed biomass. Please visit extension.umn.edu/agriculture/forages/growth-and-development/winter-injury-of-alfalfa/ for additional information and recommendations regarding management options in response to alfalfa winterkill.

Italian ryegrass (left), teff (center), and brown-midrib sorghum (right), no-till planted into spring-terminated alfalfa at Rosemount, MN in 2014.