

### Select Alfalfa Varieties by Winter Survival & Fall Dormancy

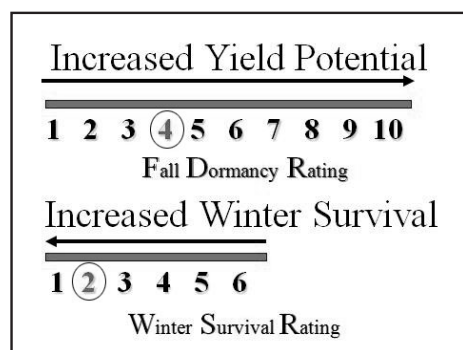
by Donald Miller - Nampa, ID

Alfalfa farmers in the North Central Region of the U.S. are aware that selecting the optimal variety for their region is critical to their economic success. Historically, the first criterion in selecting a variety for this region has been its winter survival. For many years that decision was based on a variety's Fall Dormancy Rating (FDR). However that rating system in many cases was arguably better suited for predicting yield than winter survival. The limitation in predicting winter survival centered on the fact that it was not a direct measurement of winter survival. Winter survival estimates, using FDR, were based on a variety's dormancy reaction to shortening day length as a survival mechanism to minimize frost damage and conserve food reserves. The degree of a variety's dormancy reaction in the absence of any other measurement gave a fairly good indication of winter survival. However, the FDR had difficulty in predicting the actual winter survival differences between varieties with similar fall dormancy ratings or even within a dormancy class. Varieties of the same FDR could vary greatly for actual winter survival following a harsh winter. Therefore, conservative variety choices were often made based on lower FDR to insure winter survival. As a result, high yielding less dormant varieties were overlooked due to the uncertainty of their actual ability to survive a harsh winter. To overcome this limitation, alfalfa breeders in recent years developed a second rating system that measured actual winter survival following harsh winter conditions –the Winter Survival Rating (WSR) or in some cases the Winter Survival Index. In recent years, the combined use of both ratings (FDR & WSR) in variety selection has dramatically improved the process and optimized the selection of individual varieties having both optimal winter survival and high yield for a given region. The following is a brief description of how the rating systems evolved and how farmers can use them to optimize variety selection in the North Central Region.

#### Variety Selection

In the 2011 National Alfalfa & Forage Alliance (NAFA) variety leaflet, there are 199 alfalfa varieties (237 including the RRA addendum). Each has its own list of agronomic traits, which may include increased pest & disease resistance, improved yield & quality or a wide array of many other desirable traits. However, regardless of how desirable a specific trait(s) is, not every variety is adapted to grow in every region of the United States. The first criteria that should be used in selecting a variety is whether or not the variety is adapted to the region's climate and/or elevation. For example, if a Wisconsin farmer's variety choice did not survive the first winter, then it was a poor choice for his farm despite other desirable traits. Farmers often ask "how do I narrow the NAFA variety leaflet down to those best suited for my farm?"

There are two basic alfalfa variety rating systems all farmers should take advantage of to initially narrow the NAFA list of 237 varieties to a workable number. These systems rate varieties on adaptation and ability to grow in various climates, ranging from very cold winter conditions to very mild winters with little or no frost. The first is the FDR and second the WSR.



#### Fall Dormancy Rating

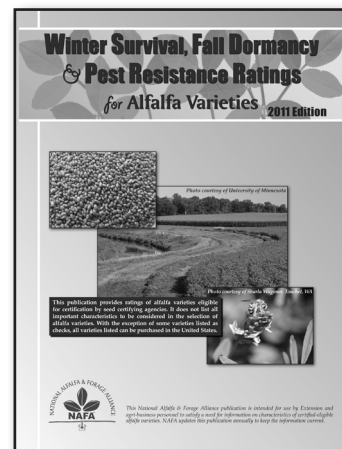
After alfalfa was first introduced into North America, farmers growing alfalfa in the northern United States noticed that some alfalfa was prone to winterkill and some was not. It was also noted that if seed was used of varieties that evolved in cold climates, the resulting plants responded to the fall's shortening daylength and cooling temperatures by reducing their fall growth. In contrast, the varieties that evolved in warmer climates continued to grow in the fall since they were not genetically programmed to respond to short days and/or cold temperatures that occurred in more northern latitudes. As a result, they experienced repeated frost damage and often winterkilled as a result of added plant stress. Eventually, this "Fall Dormancy" observation resulted in the development of the FDR system to estimate winter survival using the amount of fall growth as an indicator.

Using the FDR system, alfalfa varieties are currently subdivided into ten dormancy groups based on their Fall Growth Response to the shortening fall daylength and/or cooling temperatures. Varietal differences are based on average plant heights in comparison to 10 standard check varieties. Varieties displaying the most fall dormancy (shortest height) are given a rating of 1, and those with the least fall dormancy (tallest) a rating of 10.

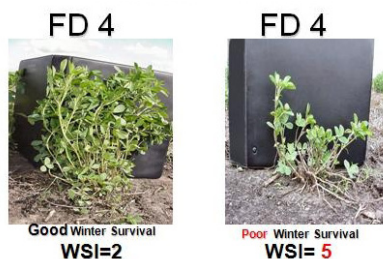
For many years, this "Fall Dormancy Rating" was a useful tool for estimating the survival and/or adaptation of varieties to cold or hot climates. However, this system did have its limitations and drawbacks. Winter survival was estimated solely on varieties' survival mechanism of conserving food reserves by reducing fall growth and not on actual winter survival performance data.

#### Winter Survival Rating

The 2011 alfalfa variety list currently has 76 varieties classified as FD 4 and although all their fall growth habits are statistically the same, some of the varieties demonstrate actual winter survival as good as or better than varieties rated with a FD 2. This discrepancy prompted the development of the more accurate rating now called the Winter Survival Rating.



Variations between varieties for winter survival.



In contrast to the FDR system, the WSR system directly rates a variety's level of survival following harsh winter conditions in regions of the U.S. that are known to have severe winters such as Minnesota or Wisconsin. Varieties are compared to standard check varieties and rated on a scale of 1-6 depending on their degree of winter damage. Varieties with a score of 1, display little or no winter damage and those with severe damage are given a WSR= 6 and are considered very susceptible to winterkill.

### Using Fall Dormancy & Winter Survival Ratings as a Means of Selecting a Variety

Researchers have known for years that factors associated with higher yields (vigor, fast regrowth, extended fall and spring growth) increased as one moved up the fall dormancy rating scale from 1-10. Farmers and researchers often saw the extra yield potential of a FD 5 (or even a FD 6) over a FD 4, but were at a loss of how to capture that yield without

risking winter kill. As a result farmers were often conservative in their selection of a variety based on FDR. Now armed with a direct measurement of winter survival, they can be more confident in selecting a variety with a higher FDR number for increased yield. If the chosen variety also has a low WSR score, they can take advantage of increased yield potential of a high FDR but feel confident that the low WSR number will insure that they will not sacrifice winter survival.

### Summary

Numerous alfalfa varieties are currently available to the farmer to help maximize profits; however, narrowing the list of two hundred plus potential varieties to a handful is often difficult. Farmers can now initially reduce the list of potential varieties significantly by using two alfalfa rating systems – the FDR and the WSR. For years the FDR system was used to predict winter survival of alfalfa varieties, but it had some limitations. The FDR utilized the amount of fall growth of a variety as an indirect means of predicting winter survival. In contrast, the relatively new WSR directly measures a variety's survival following severe winter conditions and is a more accurate winter survival estimate. Despite its limitations of predicting winter survival, the FDR's fall growth estimate can be a very good indicator of yield potential, and when used in conjunction with the WSR, they are a powerful tool for the farmer. The tandem use of the two ratings in variety selection allows the farmer to pick a variety that maximizes yield without sacrificing winter survival.

During variety selection, farmers should initially make a list of all the varieties with the recommended optimal winter survival rating for their location using the WSR system. Farms in the North Central Region generally require a minimum recommended value of WSR 1-2. The farmer can then narrow the list by selecting the varieties with the HIGHEST available FDR (i.e., WSR 2 & FDR 5 or in more severe winter areas a variety with WSR 1.5 & FDR 4). The remaining list of varieties with the optimal WSR and FDR ratings can then be evaluated for any other desirable agronomic trait such as pest resistance, quality and yield before the final variety selection is made.



To view the 2011 NAFA Variety Leaflet, visit: [www.alfalfa.org](http://www.alfalfa.org)