



Northern NY Agricultural Development Program 2014 Project Report

Testing Alfalfa Varieties & Germplasm for Winter Survival in Northern New York

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Background:

Winter survival is important for a perennial forage crop like alfalfa. Harsh winters typical of Northern New York (NNY) make winter survival as a trait in alfalfa varieties essential. Loss of a high quality perennial crop from winterkill is an economic blow to producers where both time and money are lost to crop rotation and reestablishment costs. Some alfalfa varieties have better winter hardiness than others and are better able to survive a truly harsh winter. However, alfalfa decline due to poor drainage and waterlogged soils will not be remedied by varieties with superior winter hardiness.

Fall dormancy, measured as the amount of forage produced in the fall, has been used as a winter survival indicator, such that varieties that are more fall dormant and produce a lower amount of forage in the fall, have better winter survival. The fall dormancy rating scale is from 1 (dormant) to 9 (non-dormant). The Cornell Integrated Field Crops Guide (<http://ipmguidelines.org/fieldcrops/>) generally states that alfalfa varieties with fall dormancy ratings from 2 to 4 are well adapted to NYS climate.

Fall dormancy is a useful indicator of winter survival in a broad sense. However, forage breeders have been developing varieties with more forage production in the fall that also claim to have improved winter survival. Genetic studies have shown that breeders should be able to develop alfalfa varieties with both fall forage production and excellent winter survival (Castonguay et al, 2006). Thus, varieties that have fall dormancy ratings of 5 or 6 and have been bred for superior winter survival rating should be tested for survival in NNY.

Forage yield trials for alfalfa and other forages are planted by the Cornell Forage Breeding Project each year in New York State. About one-half of the trials are in Ithaca and one-half are at other locations such as Western New York, Cobleskill (Eastern New York), and Chazy at the William H. Miner Agricultural Research Institute (NNY). Until 2003, all the varieties entered were of fall dormancy 2, 3, or 4. Over the past 10 years, there has been a steady increase in the number of fall dormancy 5 varieties entered in the trials (Figure 1).

Furthermore, in the ‘Winter Survival, Fall Dormancy, and Pest Resistance Ratings for Alfalfa Varieties, 2013 Edition’ (National Alfalfa and Forage Alliance, <http://www.alfalfa.org/varietyLeaflet.php>) there are even some fall dormancy 6 varieties listed that have winter survival ratings that range from very good to good.

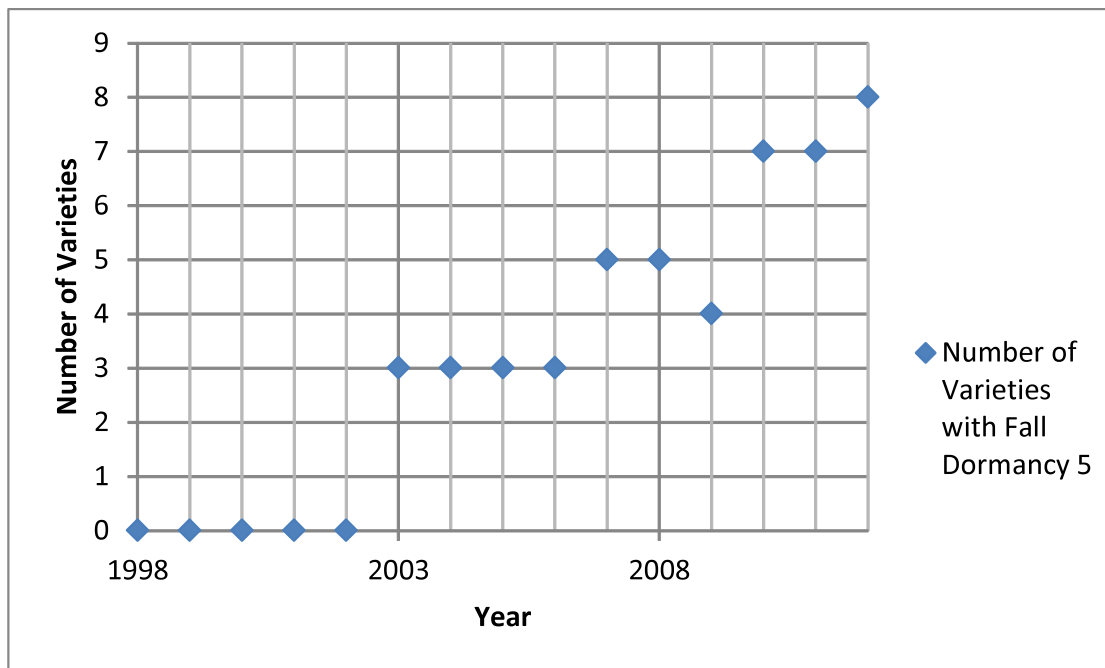


Figure 1: The number of alfalfa varieties entered in the Cornell Forage Yield Trial program that are fall dormancy 5 varieties for each year between 1998 and 2012.

The North American Alfalfa Improvement Conference has developed alfalfa standardized tests that range from disease and pest resistance tests to agronomic tests like yield and fall dormancy (<http://www.naaic.org/resource/stdtests.php>). A test for winter survival was

developed and has been used to describe alfalfa varieties. Some tests are required by the National Alfalfa and Miscellaneous Legume Variety Review Board, but winter survival is not a required test. Thus, many varieties are not rated for winter survival.

Methods:

A field at The William H. Miner Agricultural Research Institute in Chazy, NY was prepared for spring planting. At the Ithaca greenhouses, seed of the six check varieties, plus seed of twenty-one alfalfa populations / varieties were prepared and planted so that there were at least 100 seedlings of each of the 27 populations / varieties.

In early June, the seedlings were transported to Chazy and hand-planted into the field. The field was mowed on August 27th followed by spraying with grass herbicide to kill the weeds. Then again at the end of September, the nursery was cut off and sprayed with grass herbicide. Cutting in late September should have provided the pre-winter stress needed to assess winter survival. In the fall, the number of plants in each row was counted so that missing plants in the fall will not be counted as dead in the spring. In the spring of 2015, the rows in the winter survival test will be rated for winter survival. The plant ratings are a number score for each plant in a row and the scale is from 1 (no injury) to 5 (dead).

Results: In Table 1 (next page), the number of plants per entry established in the nursery is listed.

Conclusions/Outcomes/Impacts:

Once the plants in the Chazy winter survival nursery have been rated and the data analyzed, then the trial entries will have one winter survival rating. This winter survival rating will need to be confirmed by a second test planned for 2015-16. If the winter survival test is reproducible and consistently ranks alfalfa populations and varieties for winter survival, then this will be very useful information for producers to use in selecting alfalfa varieties for Northern NY.

Furthermore, selections from the brown root rot nursery will be compared for winter survival. In the future, winter hardy alfalfa plants may be selected from the rows for germplasm enhancement and variety development.

Outreach:

Outreach will be completed once the results of this research project are summarized.

Next steps:

As a continuation of this project, a second winter survival nursery will be established in spring 2015.

Acknowledgments: Cornell University Agricultural Experiment Station.

For More Information: Julie Hansen, Department of Plant Breeding and Genetics; 101 Love Lab; Cornell University, 607-255-5043, jlh17@cornell.edu.

Table 1: Winter Survival Nursery planted at Chazy on June 2 and 3, 2014. Plant counts were taken by M. Davis in November 2014. Plants will be rated for winter survival in spring 2015. Report date: May 1, 2015.

Trial Entry	Seed Lot Number	Plant Count over reps 11/4/14	Fall Dormancy	Winter Survival index	Winter Survival Category
ZG 9830	std check	100	2	1	Extremely winterhardy
5262	std check	100	2	2	Very winterhardy
WL325HQ	std check	100	3	3	Winterhardy
G-2852	std check	100	4	4	Moderately winterhardy
Archer	std check	98	5	5	Slightly winterhardy
Cuf 101	std check	100	9	6	Non-winterhardy
55Q27	NY13-55	97	5	unknown	
55V50	NY13-58	100	5	unknown	
FSG524	NY13-41	100	5	unknown	
WL363HQ	NY10-41	100	5	unknown	
Oneida Ultra	NY02-15	99	4	unknown	
Seedway 9558	NY08-20	100	3	unknown	
Vernal	NY09-45	100	2	2	
Ezra	NY09-41	96	3	unknown	
N-R-Gee	NY09-40	100	4	unknown	
Guardsman II	NY08-19	100	4	unknown	
ReGen	NY08-21	99	3	unknown	
Seedway 9558					
SBR	NY13-46	100	4	unknown	
SW315LH	NY14-17	100	unknown	unknown	
NY1318 bulk	NY14-1	100	unknown	unknown	BRR selection from Chazy
NY1319 bulk	NY14-2	100	unknown	unknown	BRR selection from Chazy
NY1320 bulk	NY14-3	100	unknown	unknown	BRR selection from Chazy
NY1321 bulk	NY14-4	100	unknown	unknown	BRR selection from Chazy
NY1322 bulk	NY14-5	98	unknown	unknown	BRR selection from Chazy
NY1323 Bulk	NY14-6	100	unknown	unknown	BRR selection from Chazy
NY1324 bulk	NY14-7	100	unknown	unknown	BRR selection from Chazy
NY1325 bulk	NY14-8	100	unknown	unknown	BRR selection from Chazy