

Alfalfa Breeding Project— Resistance to Brown Root Rot

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Brown Root Rot (BRR) was first detected in the eastern United States in 2003 in Clinton County, NY, on alfalfa. The results of subsequent surveys of alfalfa production fields in New York, Vermont, and New Hampshire suggest that BRR may be a serious factor impacting the health and persistence of alfalfa in the region. The BRR incidence observed in northeastern United States is similar to that observed in Saskatchewan, Canada, where the disease has long been recognized as a serious problem for alfalfa production.

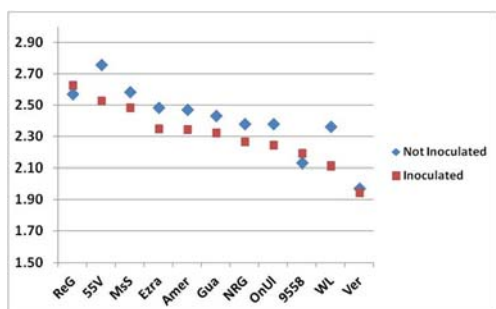


Figure 1: Yield in tons per acre by variety of the plots inoculated with brown root rot (red) and plots not inoculated (blue). Second production year at Chazy, NY.

2009 - 2012: Breeding Program Start-Up

Research on BRR began by testing currently available alfalfa varieties in research plots that either had been inoculated or not inoculated with BRR. By the second production year, a clear trend was observed where the inoculated plots (red squares) yielded less than the not inoculated plots (blue diamonds). Between the second and third production year, the trial winterkilled, turning researcher’s disappointment into a plant breeder’s opportunity. The surviving plants were propagated and a breeding program for BRR resistance in alfalfa began.

Alfalfa Type	% Plant Stand	Avg. Yield/Yr.	Winter Survival
Survivor Populations	48%	2.6 tons/acre	1.6
Varieties	35%	2.3 tons/acre	2.2

Table 1: Plant stand, yield, and winter survival rating (1=extremely winterhardy, 2=very winterhardy, 3= winterhardy) of alfalfa populations developed from surviving plants (survived winterkill and brown root rot). Trial planted at Chazy in 2014, and winter survival nursery planted in 2016.

2013 - 2017: Successive Populations Improving

Seed was produced on surviving plants and planted in a trial in 2014. Six of the eight alfalfa populations developed from the BRR trial were improved for plant stand, yield, and winter survival. Furthermore, these plants survived BRR.



Photos, left to right: Brown root rot symptoms (M. Wunsch), close-up of brown root rot lesion with dark margin (J. Hansen), plant stant density in 2017 of plot trial planted in 2014 at William H. Miner Agricultural Research Institute at Chazy, NY (J. Hansen). Survivors in spring 2018 will be dug and propagated.

2018: New Survivors for Program

Survivors from the trial planted in 2014 will be dug in spring, and incorporated in the Cornell Alfalfa Breeding Program. This will be the second cycle of advancement through plant breeding for alfalfa varieties adapted to Northern New York and more highly resistant to BRR.

Conclusion: Alfalfa has resistance genes. The resistance mechanism is not known at this time. Alfalfa resistance to Brown Root Rot needs to be increased to a high resistance level.

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