

Potassium Needs for Alfalfa in New York

2010 Yield Results



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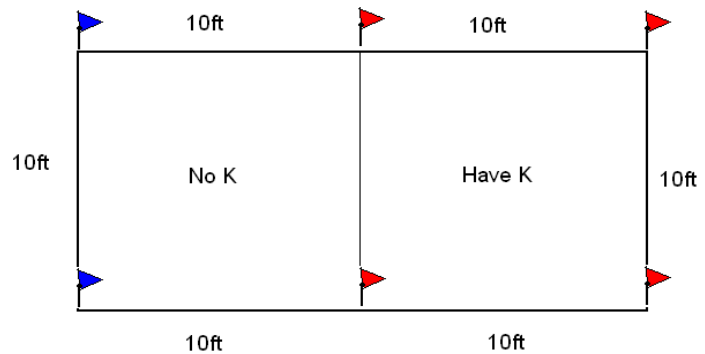
Project Setup

In 2010, we conducted K responsiveness trials on 30 fields, located in Northern, Western and Central New York. The objective of this study is to evaluate two soil testing approaches to K management (Cornell guidelines based on Morgan extractable K and the K saturation ratio approach) for alfalfa in corn-alfalfa rotations, taking into account yield, quality and stand survival. At on-farm locations in northern, western and southern NY, we conducted four time replicated comparisons replications to determine K yield and quality response (0 or 350 lbs/acre of 0-0-60) on a total of 30 fields. Fields were selected for the largest possible range of soil test K and percent K saturation within each farm ensuring at least 1/3 of the fields were expected to be responsive. Plots received K when the trial was set up right after first cutting, and were harvested in 4-cut (18 fields) or 5-cut systems (12 fields), depending on growing conditions and location. Soil samples were taken twice a year, at initial set up of trial plots following 1st cutting (prior to applying K fertilizer) and after the final harvest, and will be analyzed for Morgan K and percent K saturation. Forage samples (for DM and quality) were taken for all cuttings and tissue samples (0-6 inch samples) were taken at 3rd cutting as well.

There were two treatments in side by side 10 ft by 10 ft plots (forming a 10 ft x 20 ft rectangle) in each of the 30 fields:

1. No K
2. +K (350 lb/acre 0-0-60)

Fertilizer was provided in pre-measured amounts for each plot: The +K plot received 350 lb/acre 0-0-60 (210 lb K₂O/acre) and both plots received 110 lb/acre 0-45-0 (50 lb P₂O₅/acre) to be sure P was not a limiting factor.



Due to funding challenges for our main funding source for the project (NYFVI), we have, to date, not been able to submit the soil and tissue samples, nor were we able to conduct forage analyses. We do have the yields and calculated yield responses and that is what is presented in this report. Two locations were harvested 4 times (2nd through 5th cutting). The other locations were harvested as 4-cut systems (so the results reflect the total of the 2nd through 4th cuttings).

2010 Yield Results

Fields with a P value <0.05 are highlighted with a brown background (fields for which we are 95% sure the yield response is due to K addition). For those fields the average yield response is a 15% increase in yield with K application (ranging from a 10 to a 27% response for individual fields). For fields with a blue background, the P values are between 0.10 and 0.20 (so an 80 to 90% certainty that the yield response is due to the K addition). For those fields, the average yield response was 6%. For the fields that are not highlighted, the P value is larger than 0.20 and the average yield response is -1% which basically means that there was no yield response to K addition for those fields.

Table 1: Yields obtained with and without K addition for 30 fields sampled (2nd through 4th or 5th cutting) in the 2009 growing season. A P value <0.05 indicates a significant yield response. The relative yield is the ratio between yield without K and yield with K.

Farm	Field	Farm field ID	Yield no K	Yield plus K	P-value	Relative yield
(Collaborator)	(Trial ID)		(tons DM/acre)			(no K/plus K)
NMSP (Aurora)	1	Z	1.33	1.33	1.0000	1.00
Kingston/Daly*	1	72D	3.60	3.57	0.8974	1.01
Kingston/Daly*	2	72B	3.68	3.97	0.3750	0.93
Kingston/Daly*	3	15A	4.73	4.54	0.6273	1.04
Kingston/Daly*	4	15C	4.82	4.56	0.1761	1.06
Kingston/Daly*	5	15D	4.18	4.56	0.1167	0.92
Kingston/Daly*	6	41C	4.00	4.22	0.4856	0.95
Young	1	T8	2.03	2.17	0.1561	0.94
Young	2	T23	2.22	2.36	0.1034	0.94
Young	3	S23	2.71	2.77	0.6820	0.98
Young	4	R20W	3.12	3.31	0.1735	0.94
Young	5	RS11S	2.73	3.07	0.0295	0.89
Young	6	RS15	3.34	3.31	0.8505	1.01
Boerman*	1	32C	3.01	3.52	0.0474	0.86
Boerman*	2	33	3.69	4.14	0.0300	0.89
Boerman*	3	53C	3.98	3.98	1.0000	1.00
Boerman*	4	87B	3.36	3.70	0.1692	0.91
Boerman*	5	87A	3.54	3.84	0.1021	0.92
Boerman*	6	202	3.59	3.79	0.5153	0.95
Degni	1	205C	2.40	2.71	0.0336	0.89
Degni	2	189A	0.97	1.18	0.2592	0.82
Degni	3	193	1.87	2.14	0.0229	0.87
Degni	4	742	1.41	1.69	0.1559	0.83
Degni	5	721	1.37	1.74	0.0133	0.79
Canner/Barney	1	H1A-1	3.88	4.04	0.2842	0.96
Canner/Barney	2	H1A-2	3.06	3.56	0.0324	0.86
Canner/Barney	3	90	4.08	4.93	0.0220	0.83
Canner/Barney	4	E1	2.77	3.05	0.0164	0.91
Canner/Barney	5	HF12	4.15	4.28	0.5646	0.97
Canner/Barney	6	B1	3.58	4.02	0.0336	0.89

*Harvested as a 5-cut system (so 2nd through 5th cut combined).

Yet to be completed for 2010

Our goal is to evaluate if the various soil and tissue testing approaches can be used to predict where we could expect a yield response. It is great to see we do have a dataset that shows a third of the fields showed a yield response to additional K (at 95% certainty levels). This will be a good dataset to evaluate our soil and tissue testing tools with. We hope to get the go-ahead from NYFVI soon so we can proceed with the soil analyses and tissue testing and complete year 1 of this study.

Plans for 2011/2012

The plan for year 2 of the NYFVI study is to harvest 1st cutting for all 30 fields, reapply the P and K as we did this year, and harvest all cuttings in 2011 so we have, for each field, two field seasons. For those fields where we are able to do so (and if the NESARE proposal gets funded), the plan for 2012 is to harvest the 1st cutting in 2012 so we have 2 full seasons that include 1st cuttings and then do a stand composition assessment.

Additional Findings

We conducted a K response trial at Aurora for the past 4 years. This trial showed no yield response to K this year (that makes it 4 years without a K response). The tissue K in 3rd cutting goes up with K application from 1.5% without K to 2.0% with K application at 1 1/3rd of estimated crop removal. We did not measure a species composition change either (after 5 years of alfalfa) as is shown in Figure 1.

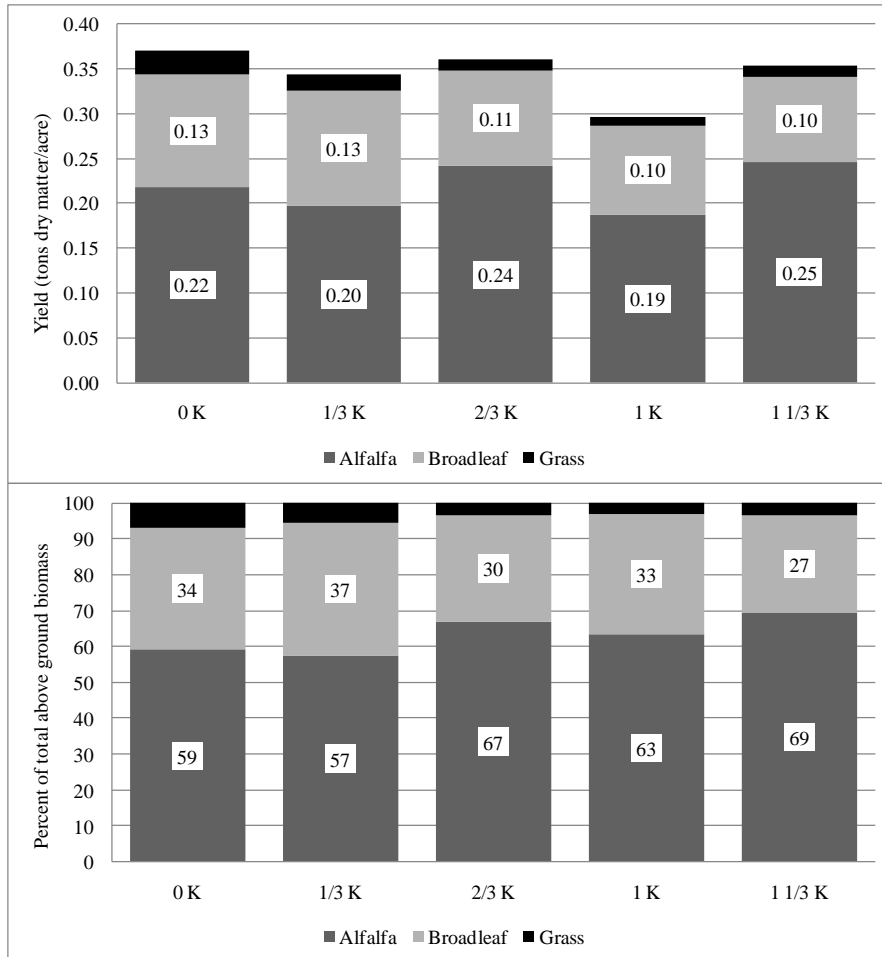


Figure 1: stand composition after five years of alfalfa, four of which at varying K rates. Broadleaf weeds were mostly dandelions. The assessment was done just before termination of the stand in the late fall of this year. We propose a similar assessment for the on-farm trials after our two years of K studies.