Alfalfa Integrated Pest Management Project 1984

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This progress report is presented with the cooperation of Drs. John Baker, Prasanta Bhowmik, William Manning and Michael Peters, faculty from Plant and Soil Sciences, Plant Pathology and Entomology who participated in the project in 1984.

Field Demonstrations

Field demonstrations were conducted both on area farms and at the University Farm facility. A summary of alfalfa production at a growers field and at the University Farm is given in Tables 1 and 2. A goal on these situations was to demonstrate that we could more than double the state average alfalfa production level of 2.8 tons per acre. The best treatment combination at the University farm produced approximately 7.2 tons per acre of hay equivalent or 2.6 times the state average. Similarly, on the grower's field we estimate he would have produced close to 7 tons per acre by following recommended management practices.

Table 1. Total Accumulated Yields From Alfalfa IPM Demonstration University of Massachusetts Farm, South Deerfield

Treatment	Hay Equivalent Yield* (ton/acre 12.5% moisture)	
Potash Fertilizer (lb/acre)		
180 (applied in split	5.34	no
400 applications after	5.10	significant
625 first and third cuts)	5.43	difference
Cutting Management		
3 cuts (All at 10% bloom)	4.23	all
3 cuts (First at full bud,	5.32	significantly
4 cuts remainder at 10% bloom)	6.32	different
Weed Control		
None	5.42	significantly
Velpar applied after first cut	4.85	different

* Maximum Yield Treatment (medium-high fertility, 4 cuts, zero weed control) 7.2 tons per acre hay equivalent.

Table 2. Accumulated Yields From Alfalfa IPM Demonstration
Franklin County Farm

Treatment	Hay Equivalent Yield* (tons/acre 12.5% moisture)	
Potash Fertilizer (lb/acre)		
Basal	4.92	no
Basal + 150	5.03	significant
Basal + 300	4.94	difference
Insect Control		
None	4.90	no
Insecticide between first and second cuts	5.02	significant difference
Weed Control		
None	5.42	
Velpar after first cut	4.51	

* Yield only from first, second and fourth cuts; third cut data missing because of farmer miscommunication.

Fertility Management The choosing of sites with high levels of soil fertility, which is the recommended practice, resulted in no response to added potash fertilizer. This is to be expected in the first cutting season with high soil fertility and also since the potash was applied in split applications. The continuation of such treatments would demonstrate the long term effects of minimum and adequate fertilizer practices.

Cutting Management Varying the number and timing of harvests produced differences in production as was expected. This clearly demonstrates that timely management is important for maximizing production. Delaying the first cut until 10% bloom resulted in a one ton/acre reduction in yield compared to taking the first cut at full bud with the second and third at first flower to 10% bloom. Taking a fourth harvest added one ton/acre over taking three cuts.

Diseases The 1984 season sought to answer two questions concerning diseases: how much of the Fusarium isolated from alfalfa is pathogenic, and can potassium levels, insecticides and/or herbicides affect the level of disease incidence in field plots.

To do this, eight growers' fields were sampled in central and western Massachusetts. Foliar, stem, crown and root organisms were isolated. Over 2500 isolates were made, and of these approximately 85% were Fusarium spp. These are being screened for pathogenicity.

Table 3. Pathogenicity of Fusarium
(Samples tested to date: 310)
In Vitro test, Saranac AR host.

Non-Pathogenic	25%
Moderately Pathogenic	33%
Highly Pathogenic	42%

Field observations in 1984 indicated the same trends as were apparent the previous season. Phoma mediocaginis causing spring black stem was the most common foliar pathogen through June. Sclerotinia causing white mold was also a problem in the spring. In late summer, Stemphyllium and Alternaria were important foliar pathogens. As mentioned, Fusarium spp. were the most common organism isolated from roots and crowns.

We feel confident in our assessment of which pathogens are commonly found in Massachusetts alfalfa fields. It is still necessary to establish economic thresholds, disease prediction models and pest management practices which can be used to remedy these disease problems.

Insects Four pest insects were monitored in the Franklin County Farm demonstration during the 1984 season. They were the Alfalfa Weevil, Potato Leafhopper, Alfalfa Blotch Leafminer and Pea Aphid. Stem samples were taken in plots that did not receive the insecticide (carbofuran) treatment. Samples were also taken from alfalfa in the same field adjacent to the plots.

According to Pennsylvania State predictive models, none of the pest species reached economic levels, and only the potato leafhopper came anywhere close to approaching its threshold at any time. With the Purdue model potato leafhopper did reach an economic level, but yield data indicated that Purdue thresholds are below those that adversely affect yields under 1984 conditions in Massachusetts.

Analysis of yield data shows that the total insect pest complex did not adversely affect alfalfa. Yields from plots treated with carbofuran and those without treatment were not significantly different.

Weeds Effects of annual grass and broadleaf weeds on alfalfa yield in the first year of establishment were not observed under the experimental conditions. This can be attributed to the fact that Eptam at 3 lb/acre was used as a pre-plant incorporated treatment twice, once on April 29, 1983 during seedling establishment and the other on August 23, 1983 for the replanting of alfalfa in the same field. This was due to a poor stand from the April 29 planting. Subsequently, plots were clean and reinfestation of annual weeds in the spring of 1984 was minimal.

In order to evaluate the effect of a herbicide program on

established alfalfa, Velpar L at 0.75 lb/acre was applied in post-emergence after the first cut when the regrowth of alfalfa was less than 2-3" tall. A slight to moderate alfalfa injury from Velpar application was noted. Second cut yield of alfalfa was significantly reduced. However, Velpar treated plants recovered later in the season, and yields from third and fourth cuts were similar to that of untreated plots. Therefore, differences in alfalfa yields can be attributed to Velpar injury and are not due to weed competition.

Yields much greater than the apparent State average can be achieved from alfalfa if sound management practices are followed. These include choosing a well-drained productive soil and a superior disease-resistant variety, establishing a vigorous stand with good nodulation and adequate weed control and maintaining good fertility and insect control with timely cutting management thus promoting plant vigor.