FERTILIZING BLUEJOINT HAY MEADOWS ON THE LOWER KENAI PENINSULA

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PREFACE

This circular provides guidance on fertilizing native hay meadows of bluejoint reedgrass (*Calamagrostis canadensis*) on the lower Kenai Peninsula. It is based on a number of experimental trials conducted by the authors on Kachemak silt loam soil at various sites near Homer.

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Fertilized bluejoint reedgrass meadow (right) is producing 3 to almost 4 times as much forage as the unfertilized portion to the left. The unfertilized portion is yielding about 0.6 ton of hay per acre.

Why Fertilize?

Native, undisturbed stands of bluejoint reedgrass on the Kenai Peninsula can produce the equivalent of 1.5 to more than 2 tons of hay per acre by early to mid-July. However, hay meadows subjected to annual harvests without fertilizer application experience a serious decline from this potential. Experimental trials conducted at three different sites have indicated that, without fertilization, annual harvests conducted in early to mid-July will soon decline to only 0.4 to 0.6 tons per acre. Operators must ask themselves if such yields are sufficient to overwinter stock or to merit harvesting for a cash crop.

How Much Should Be Applied?

Yields of bluejoint in response to different fertilizer rates supplying nitrogen (N), phosphorus (P), and potassium (K) have varied a great deal, probably depending upon specific site conditions and seasonal growing conditions. Single-harvest yields generally have ranged from about 0.6 ton/acre or less, without the use of fertilizer, to 1.5 tons with 90-120 lbs N/acre applied (Table 1 and Figure 1). Almost 2 tons/acre have been obtained in some trials in good growing years. Little increase has been obtained in single-harvest yields from applications of nitrogen exceeding 90-120 lbs/acre. Application of 60 lbs N/acre will usually double production on lands with no N applied. Phosphorus and potassium should be applied with the nitrogen.

Table 1. Yields of bluejoint reedgrass obtained with July harvests under different spring-applied N treatments, with P and K, on Kachemak silt loam soil.

Yield (t/a)	Pounds N applied per acre			
	0	40-60	90-100	120-150
Range:	.39-.71	.82-1.67	.95-1.92	1.08-1.79
Median:	.55	1.25	1.44	1.44

Thus, if a field is to be managed for a single harvest, optimum applications of N appear to be 90-120 lb/acre. If a second harvest or grazing use is contemplated after a first harvest, at least 150-180 lbs N/acre are recommended. Responses have been obtained in second harvests to N rates greater than 180 lb/acre (Figure 1).

Generally, over 50 lbs N or more are removed in each ton of forage harvested. Continual mining without replenishment of the native N supply depletes the soil and renders it less favorable for the organisms that would normally convert organic matter to available nutrients. Addition of fertilizer not only raises yields, but also enhances the quality of the herbage. Table 2

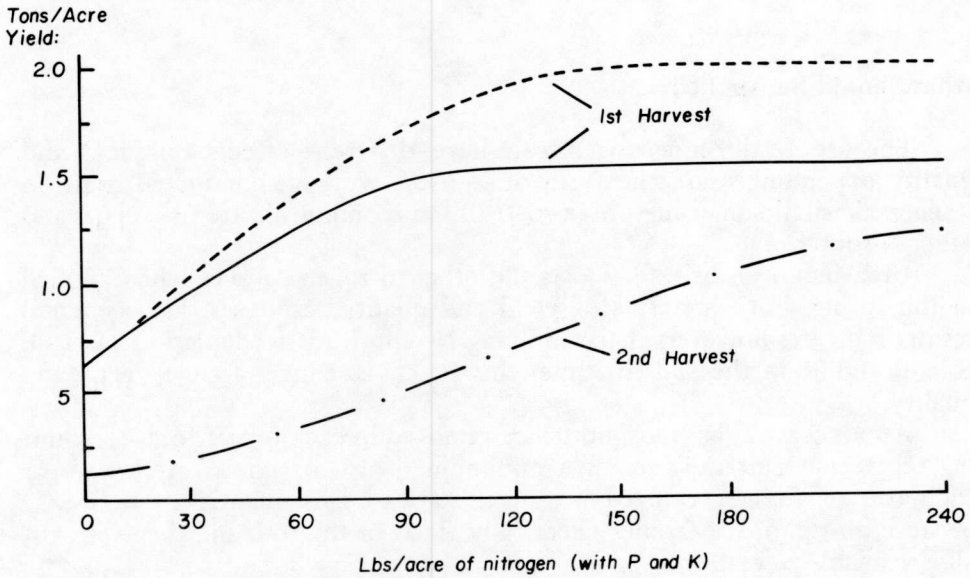

Figure 1. A generalized representation of bluejoint production in response to a range of N treatments with P and K. The dashed line represents higher-level, first-harvest yields achievable under proper growing conditions.

summarizes the effects of nitrogen applications on forage protein content, as gleaned from a number of trials. The range in values for a given treatment may reflect differences in maturity at time of harvest, since protein content declines as grass ages. It may also reflect differences in growing conditions.

Table 2. Protein concentrations obtained on July harvests of bluejoint reedgrass under different spring-applied N treatments, with P and K, on Kachemak silt loam soil.

Crude Protein (%)	Pounds N applied per acre			
	0	40-60	90-100	120-150
Range:	10.9-14.6	10.6-20.5	17.2-21.7	16.8-23.1
Median:	12.8	15.6	19.5	20.0

What Should Be Applied?

Because fertilizer nitrogen can have different effects on yield and quality depending upon the form of N used, we have conducted trials on Kachemak silt loam using urea (46-0-0), ammonium nitrate (34-0-0), and other N sources.

Urea has been as effective as the other nitrogen sources when applied in the spring, both in terms of yield and quality responses. Experimental results indicate, however, that supplying N only leads to depletion of available P and K in the soil. In time, this practice reduces forage yields and quality.

About 5 to 7 lbs phosphorus are removed in each ton of forage, requiring replacement at the rate of a minimum of 15 lbs phosphate (P_2O_5) for each ton of forage removed per acre. At least this quantity is necessary because phosphorus becomes chemically fixed in the soil, and therefore not all is available to plants.

Much more potassium than phosphorus is removed in grass harvests. Generally, from 30 to 55 lbs K are removed in each ton of forage. On plots that received no potassium fertilizer, soil and herbage K contents have declined to levels believed to be deficient for good growth. Forage tissue containing less than 1% K content is considered low to deficient in that element. If only nitrogen is applied to a field annually, it will soon produce forage with this low level of K content. About 36 to 60 lbs of potash (K_2O) are required to replace the 30 to 50 lbs of K removed in each ton of forage. Some potassium may be lost through leaching as well as through herbage removal.

When Should Fertilizer Be Applied?

Trials comparing fall vs. spring fertilizer applications have produced mixed results. Autumn treatments have equalled or exceeded spring treatment in first-harvest yield responses in some years, but have been up to 39% less effective in other years. Autumn and spring conditions undoubtedly influence the effectiveness of the respective treatments, but not all of the factors involved have been determined and are probably not predictable. However, it is advisable to expect fall applications to produce at least 15% less growth than spring applications for a June to July harvest.

Fall fertilizer treatments have been consistently inefficient in promoting additional regrowth following the July harvest in the subsequent year, producing at least 30% less growth than spring treatment. Urea, used alone as a fall treatment, is particularly inefficient for producing late-season regrowth, providing 45 to 50% less regrowth than when applied in the spring. Also, fall applications generally produce lower protein content than spring applications, particularly in the post-harvest regrowth when urea alone is applied.

In one trial, refertilization with 200 lbs/acre urea after the July harvest greatly enhanced forage quality (protein content and digestibility) and increased yields of the regrowth.

Summary of Recommendations

The following recommendations are made for fertilizing and harvesting bluejoint hay meadows based on the results of a number of trials conducted on Kachemak silt loam in the Homer area of the Kenai Peninsula. Results will vary because of specific field conditions and seasonal growing conditions.

Fertilizer:

To about double the yields of unfertilized areas, and thus obtain at least 1 ton hay per acre, apply :

Lbs per Acre				
N		P_2O_5		K_2O
60	–	20	–	50

To promote nearly maximum growth for a late-June to early-July harvest equalling about 1.5 to 1.8 tons/acre, apply:

Lbs per Acre				
N		P_2O_5		K_2O
90-120	–	50	–	70-90

To provide for a good first harvest as above, plus sufficient, good quality regrowth for grazing purposes or a second harvest equalling about 1.0 to 1.5 tons/acre, apply:

Lbs per Acre				
N		P_2O_5		K_2O
150-180	–	50	–	100-120

Time to Fertilize:

Good regrowth of bluejoint after first harvest can be promoted by applying the nitrogen as a split application: half in spring and half after the first harvest. Higher applications of N and K than those recommended above produce higher yields in the second harvest.

In general, fertilizer appears to be more effective when applied in the spring than in the fall. Results are unpredictable, however, with fall applications. Such applications produce yields equal to or as much as 30% less than spring applications in our trials. Fall treatments with urea, particularly when used alone, are 35 to almost 50% less efficient than spring treatments in promoting regrowth after the first harvest.

Time to Harvest:

To obtain good-quality forage, the harvest should not be delayed beyond the first to second week in July. This is generally when the seed heads are just commencing to appear, that is, emerging from the boot (enclosing leaf sheath). Forage quality steadily declines as the grass ages, so the earlier the harvest the higher the quality, given proper handling and storage methods.

Since frequency of precipitation normally increases as the summer progresses, the chances of curing grass swathed in the field are usually better in late June to early July than later in the season. By harvesting later, an operator cuts poorer quality forage and increases the chance of having it ruined, after being mowed, by sustained periods of wet weather.

If forage cannot be dried in the field, consideration should be given to means of conserving it as silage. Bluejoint can provide a high-protein feed with fair to good digestibility when harvested sufficiently early and handled properly.