



# Timothy

Timothy (*Phleum pratense* L.) is a perennial, bunch-type, shallow-rooted, cool-season grass that is well adapted to the Northeast and Upper Midwest. Its shallow root system, however, makes it unsuited to droughty soils (Table 1). Timothy is popular in the northern half of Pennsylvania and most of New York State because of its natural adaptation to moist, cool environments.

Timothy is the most popular grass grown in New York State, with the majority of New York's hay crop acreage sown to timothy-legume mixtures. Its sensitivity to high temperatures has limited its productivity in southern Pennsylvania. Timothy stores energy reserves for regrowth and tillering in its haplocorm or corm (enlarged bulbous structure) at the stem base. Its energy storage pattern makes it a better hay crop than a pasture species.

Timothy is grown primarily as hay for horses but is frequently included in pasture mixtures. It is less competitive in a legume mixture than most sod-forming grasses and is often grown in a legume mixture for hay. However, special attention must be paid to match the maturity of the timothy with the maturity of the legume to ensure timothy persistence and quality forage.

## ADAPTED VARIETIES

Most of the timothy sold in Pennsylvania and New York is common (not a certified variety). However, several improved varieties are available and have been evaluated in research trials under both hay and grazing research studies. These results appear in the *Forage Variety Trials Report*, an annual publication available at local offices of Penn State Cooperative Extension.

## ESTABLISHMENT

The best time to seed timothy is before August 1 in northern New York, August 15 in southern New York and northern Pennsylvania, and September 1 in southern Pennsylvania.

Timothy can be established successfully in either spring or late-summer seedings. However, fall seedings are more successful because the cool fall weather is more suitable for timothy growth, and weeds are less of a problem. Timothy can be slow to establish and may fail when weed competition is severe during establishment. Grass weeds are especially harmful. Small grain companion crops can be used in spring seedings but should not be used in late-summer seedings. Oats are the most common companion crop, but early removal for silage or by grazing is necessary to reduce competition for light and moisture. A small grain and field pea companion crop may provide too much competition when establishing an alfalfa-timothy mixture.

If a late-summer seeding is planned, prepare the seedbed 2 to 4 weeks ahead of seeding, if possible. This will allow the soil to become firm and provide an opportunity to accumulate seedbed moisture.

The best stands of timothy are obtained when seeds are sown not deeper than ½ inch in a well-prepared, firm seedbed. A firm seedbed is essential to the successful establishment of small-seeded grasses such as timothy. A firm seedbed allows greater regulation in seeding depth, holds moisture better, and increases seed-to-soil contact. Proper seeding depth can be accomplished with band seeders equipped with press wheels. Other seeding methods can be used, but chances of obtaining

Table 1. Characteristics of perennial cool-season grasses in the Northeast.

Grass	Seedling vigor	Tolerance to soil limitations			Winter survival	Tolerance to frequent harvest	Relative maturity <sup>b</sup>
		Drought	Wet	Low pH <sup>a</sup>			
Kentucky bluegrass	M <sup>c</sup>	L	M	M	H	H	Early
Orchardgrass	H	M	M	M	M	H	Early-medium
Perennial ryegrass	H	L	M	M	L	H	Early-medium
Reed canarygrass	L	H	H	H	H	H	Medium-late
Smooth bromegrass	H	H	M	M	H	L	Medium-late
Tall fescue	H	M	M	H	M	H	Medium-late
Timothy	M	L	L	M	H	L	Late

a. pH below 6.0.

b. Maturity characteristic refers to relative time of seed head appearance in the spring. This will depend not only on species but also variety.

c. L = low, M = moderate, H = high.

thick stands and vigorous growth in the seeding year are reduced. Cultipacker seeders and grain drills work well if the seedbed is firm and the seed is covered to a depth not exceeding 1/2 inch. Roll or cultipack after seeding with grain drills not equipped with press wheels or after broadcast seeding. Caution must be used not to bury the seed after broadcast seeding.

Timothy should be seeded at 8 to 10 pounds per acre when seeded alone. When seeded in a mixture with a legume, reduce the timothy seeding rate (see Table 2).

*Table 2. Seeding rates for timothy and a single legume in mixture.*

Species	lb/A
Timothy	2-6
	with any one of these legumes
Alfalfa	8-10
Birdsfoot trefoil	6-8
Red clover	6-8
White clover	2-4

Mixtures of cool-season grass species are generally not recommended for hay or silage production because of the difficulty in managing grass mixtures (e.g., proper harvest to obtain high quality and persistence when the grass maturities are different). However, timothy is frequently planted in mixture with other grasses for use in pastures, especially pastures for horses. A pasture mixture that has performed well in Pennsylvania is 8 pounds of Kentucky bluegrass plus 4 pounds each of smooth brome grass and timothy and 1 pound of white clover. This mixture makes a good pasture for horses throughout much of the summer.

## HARVEST MANAGEMENT

Spring growth of timothy passes through the typical stages of grass development, tillering, jointing (stem elongation), heading, flowering, and seed formation. Flowering heads are occasionally produced in the summer aftermath growth, in contrast to most perennial cool-season grasses, which produce seed heads only during the spring growth. Initial flowering in the spring does not usually occur until late May in southern Pennsylvania and June in northern Pennsylvania and New York, depending on the variety and location in the state.

Timothy is a hay-type forage grass with relatively few basal leaves below the cutting height. It is easily weakened by frequent cutting or grazing. This is because of timothy's limited storage of energy reserves in the culms, its production of few basal leaves to support regrowth after harvest, and its upright growth habit, which is generally dominated by a single stem.

Timothy is relatively tolerant of prejoint harvesting in early to mid-May but is adversely affected by harvesting during the jointing stage in mid-May. In addition, harvesting at early heading reduces yields and persistence, compared with harvesting at either early or late bloom (Table 3). Harvesting the spring growth of timothy at early heading reduces first harvest yields, and there is generally no increase in yield of subsequent harvests to compensate for this loss. In Pennsylvania, timothy makes relatively little yield after the first harvest because of its intolerance to the hot and dry conditions that prevail during summers. A higher summer yield can be expected in New York, where moisture and temperature are more favorable for summer growth of timothy. Quality is among the highest of cool-

*Table 3. Yield and persistence of perennial cool-season grasses when the first harvest was taken at different stages of grass development and fertilized at two rates of N, averaged over three production years.*

Stage at first harvest	N <sup>a</sup>	Yield				Persistence after 3rd year			
		OG <sup>b</sup>	RC <sup>b</sup>	SB <sup>b</sup>	Tim <sup>b</sup>	OG	RC	SB	Tim
		T/A				% Groundcover			
Prejoint	High	3.2	3.3	3.0	3.3	54	100	22	32
	Low	2.2	2.1	2.3	2.5	58	100	30	47
Early-head	High	3.5	3.5	3.9	3.4	49	100	23	32
	Low	2.0	1.9	2.9	2.4	57	100	30	32
Early-bloom	High	3.6	3.7	4.9	3.9	51	100	25	14
	Low	2.4	2.0	3.7	2.8	55	100	35	35
Late-bloom	High	3.6	3.8	5.1	4.0	42	100	30	13
	Low	2.5	2.0	4.0	3.6	53	100	38	40
<b>Means of harvest schedules</b>									
Prejoint		2.7	2.6	2.7	2.9	56	100	26	39
Early-head		2.8	2.7	3.4	2.8	57	100	27	32
Early-bloom		3.0	2.9	4.3	3.3	52	100	30	24
Late-bloom		3.0	2.9	4.6	3.4	48	100	34	26
<b>Means of N rates</b>									
	High	3.5	3.6	4.3	3.6	48	100	25	22
	Low	2.3	2.0	3.2	2.7	56	100	33	38

a. High N treatments received 200-250 lb N per acre per year, low N treatments received 100-125 lbs N per acre per year.

b. OG = 'Pennlate' orchardgrass, RC = common reed canarygrass, SB = 'Saratoga' smooth brome grass, Tim = 'Climax' timothy.

Adapted from Northeast Regional Publications 550, 554, 557, and 570. *Management and Productivity of Perennial Grasses in the Northeast*. West Virginia Agric. Exp. Stn.

season grasses when the plant is vegetative but decreases very rapidly as reproductive growth is initiated (Table 4).

Under grazing management, timothy should not be allowed to progress very far into jointing before grazing. Delaying grazing will reduce timothy's stored energy reserves and ultimately reduce its persistence. Grazing in the spring can begin when timothy is 3 to 4 inches tall. Timothy will tolerate moderately continuous grazing, but rotational grazing with a minimum recovery period of 3 weeks will improve production and persistence.

#### FERTILITY

Fertility needs at seeding should be determined by a soil test. A soil pH between 6.0 and 7.0 is best for timothy. In the absence of a soil test, assuming a medium-fertility soil, plow down 0-45-135 pounds per acre and apply 20-20-20 pounds per acre at seeding (banded if possible). If timothy is seeded with a legume, eliminate nitrogen (N) application at seeding.

Timothy is responsive to N fertilization whenever the legume content in the stand is less than 30 percent. Split applications of 100 to 150 pounds N per acre annually will generally produce yield increases of 1 to 1.5 tons per acre. Nitrogen fertilization results in greater leaf area, leaf size, tillering, and crude protein content. However, high N applications, over 200 pounds per acre per year, can reduce storage of energy reserves and lower persistence. Apply 50 to 60 pounds of N per acre in the spring when the timothy starts to become green and an additional 50 pounds per acre after each cut.

Application of other fertilizers should follow soil test recommendations. Timothy requires a high level of fertility

for maximum production. Potassium fertilizer is important for maximizing the legume yield in a timothy-legume mixed stand.

#### PESTS

The cereal rust mite (*Abacarus hystrix*, Nalepa) is a major pest of timothy throughout much of Pennsylvania, but especially in the south and east. This pest begins reproducing in mid-February so that populations are high when the timothy begins to grow in the spring. Symptoms begin to appear in April or early May and include leaf rolling (plants appear drought-stressed even though there is plenty of soil moisture), stunted growth, and discoloration of the foliage. Severe infestations can cause complete loss of yield, while lesser infestations result in reduced yields and discolored hay. There are no resistant varieties. Carbaryl (Sevin) can be used to control the cereal rust mite (emergency Section 18 label), but effectiveness has been variable.

#### SUMMARY

Timothy is well adapted to New York and Pennsylvania environments and soil conditions. It is winter hardy and offers little competition to a legume in the mixture. However, timothy is intolerant of cutting during jointing or early heading. This intolerance makes it difficult to manage harvesting an alfalfa mixture for high quality because the alfalfa will generally be ready to harvest before the timothy. Management systems that include harvesting at early heading, in combination with high N fertilization rates, consistently reduce timothy stands. Timothy is the hay of choice for horse owners and can also serve as a horse pasture.

Table 4. Nutritional value of perennial cool-season grasses at first harvest.

Stage at first harvest	OG <sup>b</sup>	Crude protein <sup>a</sup>			Digestible dry matter				
		RC	SB	Tim	OG	RC	SB	Tim	
%									
Prejoint	28.3	24.5	31.9	32.3	82	79	84	76	
Early head	16.8	17.0	18.0	16.1	66	72	72	62	
Early bloom	14.7	15.4	14.1	11.3	63	71	67	59	
Late bloom	12.5	11.1	8.6	8.8	57	60	54	55	

a. Grasses were fertilized with 200–250 lbs of N the previous year.

b. OG = orchardgrass, RC = reed canarygrass, SB = smooth brome grass, Tim = timothy.

Adapted from Northeast Regional Publications 550, 554, 557, and 570. *Management and Productivity of Perennial Grasses in the Northeast*. West Virginia Agric. Exp. Stn.

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