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White Clover

White clover (*Trifolium repens* L.) is a short-lived perennial that can reseed itself under favorable conditions. It grows rapidly and spreads via stolons. White clover has a shallow root system, which makes it intolerant of droughty soils. It grows best during cool, moist weather on well-drained, fertile soils with a pH between 6 and 7 (Table 1). Pure stands of white clover are not usually planted because of their low growth habit and associated low yield. However, they make high-quality pastures in mixture with a grass and fix nitrogen for use by the grass.

ADAPTED VARIETIES

The various types and varieties of white clover are indistinguishable from one another except for their size. Ladino and Regal are varieties whose leaf stems (petioles) grow taller than those of other white clover varieties. Because of their taller growth habit, these varieties are often referred to as large white clover types. Dutch or common white clovers have slightly shorter petioles than the large white clover types. White clovers with the shortest petioles are classified as small clovers, and their names frequently contain the words "wild white." These small white clovers yield less than the large types but persist better under heavy continuous grazing.

ESTABLISHMENT

White clover can be "frost seeded" (in early spring when the soil is still honeycombed with frost) into existing grass pastures to improve pasture production and quality. This technique requires that seeding be done while the soil contains frost. Delaying seeding until mid-morning when the soil surface has become slippery will result in poor stand establishment. White clover can also be no-till seeded into existing grass pastures.

Seeding white clover–grass mixtures into a conventionally prepared seedbed is also an excellent method of establishment. Do not plant deeper than ¼ inch when seeding. Press wheels or cultipacking used in conjunction with or after band seeding will improve the seed-to-soil contact and the chances of obtaining a good stand. To obtain a proper seeding depth, the seedbed should be firm. This can be accomplished by cultipacking before seeding.

Fluid seeding (planting in a fertilizer solution) of white clover onto a well-prepared, firm, fine seedbed can also be successful. Cultipacking before fluid seeding to make a firm seedbed and after fluid seeding to ensure good seed-soil contact will improve stand establishment. Fluid seeding requires special equipment, and a custom applicator is recommended.

Seeding rates of white clover into an existing grass pasture should be 2–4 pounds per acre. White clover seeds are relatively small and 1 pound of seed contains about 800,000 seeds. Therefore, the seeding rates for white clover appear low relative to other forages. Hay or silage mixtures containing white clover should also contain red clover to increase the potential yield. White clover and red clover with one of the grasses listed in Table 2 should provide an excellent hay or pasture stand.

Table 1. Characteristics of perennial forage legumes in Pennsylvania.

		TOLERANCE TO SOIL LIMITATIONS					TOLERANCE TO FREQUENT:		
LEGUME	SEEDLING VIGOR	DROUGHTY	WET	LOW pH[a]	HEAVING POTENTIAL	PERSISTENCE	GRAZING	HARVEST	RELATIVE MATURITY[b]
Alfalfa	M[c]	H	L	L	H	H	L	M	Early
Birdsfoot trefoil	L	M	H	H	L	M	H	H	Late
Red clover	H	L	M	M	M	L	M	M	Medium-late
White clover	M	L	H	M	L	H	H	H	Early-medium

[a] pH below 6.0.
[b] Maturity characteristic refers to relative time of flower appearance in the spring. This will depend not only on species but also variety.
[c] L = low, M = moderate, H = high.

HARVEST MANAGEMENT

Harvesting white clover for hay or silage is generally based on the grass in mixture with the clover since white clover constitutes a small proportion of the total forage and is of relatively high quality at maturity. Harvest should be dictated by the harvest schedule that maximizes grass performance.

Pasture mixtures that contain a legume offer many advantages but also require more careful management than pure grass pastures. Advantages of having white clover or any legume in a pasture mixture is that forage quality is improved over a pure grass pasture and the stand requires less nitrogen (N) application because of the legume's N contribution (Table 3).

White clover can be grazed continuously or rotationally. It can be grazed to a height of about 1 inch without seriously damaging the stand. However, closely grazed plants must be allowed to recover. If grown with a tall-growing grass and grazed rotationally, the pastures should be grazed at intervals that do not allow the grass to shade the white clover excessively. In predominantly white clover pastures, bloat can be a problem.

FERTILITY

Lime and fertilizer needs of white clover should be determined by soil testing before planting. For best results the soil pH should be between 6 and 7. Starter fertilizer application of up to 20-60-20 pounds per acre will often assist in white clover establishment. If the soil test calls for nutrients in excess of this amount, they should be applied prior to seeding and incorporated into the seedbed. If white clover is to be seeded into an established winter grain, topdress applications of N to the small grain should not be made.

Clover stands should be fertilized annually according to soil test recommendations. In the absence of a soil test and assuming a medium-fertility soil, apply 0-60-145 pounds per acre. When white clover makes up less than 30 percent of a white clover–grass mixture, apply 30 to 50 pounds of N per acre to enhance grass production.

SUMMARY

White clover is a low-growing forage legume used predominantly in pasture mixtures with grasses. It improves forage quality above a pure grass stand and supplies nitrogen for grass growth. White clover can tolerate close grazing but persists best if allowed a period to recover. Its contribution to the total forage yield in a mixed stand is generally relatively small, but its overall contribution to forage quality and nitrogen for the grass makes it an excellent legume for pasture mixtures.

Table 2. Seeding rates for mixtures containing white clover.

	HAY OR SILAGE	PASTURE
SPECIES	LB/A	
White clover	2	2
Red clover	3	5
	with any one of these grasses	
Orchardgrass	3	3
Perennial ryegrass	5	6
Reed canarygrass	8	8
Smooth bromegrass	8	8
Tall fescue	8	10
Timothy	4	5

Table 3. Effect of percent legume in mixture on quality of pasture in Pennsylvania.

MIXTURE			PASTURE QUALITY[a]		
LEGUME	GRASS	WEEDS	CP	ADF	NDF
%					
83	6	11	23	24	37
74	12	13	24	27	46
54	42	4	16	31	53
26	73	1	12	32	56

[a] CP = crude protein, ADF = acid detergent fiber, NDF = neutral detergent fiber.

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