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Good Stands for Top Alfalfa Production in Michigan
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Good Stands for Top Alfalfa Production

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Alfalfa stands in Michigan are frequently so poor that high yields can't possibly be obtained. The steps given here should help insure the kind of stands necessary (at right) for 5- to 6-ton yields on many sandy loams and loam soils and 6 to 8 tons on the most fertile, well-drained soils. Table 1 shows soil management groups suited for good alfalfa production. If naturally well-drained or tilled, all textures 1 to 5 are suitable for good alfalfa production.

Table 1. Interrelationship among soil management groups.

Dominant Soil Profile Texture	Symbol	NATURAL DRAINAGE		
		Well Drained (a)	Poorly Drained (b)	Poorly Drained (c)
Fine clay	0	0a	0b	0c
Coarse clay	1	1a	1b	1c
Clay loams	1.5	1.5a	1.5b	1.5c
Loam and silt loam	2.5	2.5a	2.5b	2.5c
Sandy loam	3	3a	3b	3c
Loamy sand	4	4a	4c	4c
Sand	5	5a	5b	5c
Muck or peat				Mc

Test soil — Test the soil prior to seeding and follow soil test recommendations (See "Fertilizer Recommendations for Vegetables & Field Crops," Extension



Figure 1. Adequate lime should be added, preferably 3 to 6 months before seeding, and incorporated to bring the pH to 6.8 or above.



Bulletin E-550, 1976). Apply lime, preferably 3 to 6 months before seeding, and incorporate into the soil to bring the pH to 6.8 or above, Figure 1. If time is limited, apply lime just before seeding rather than not using lime. Low pH is still a primary reason for low alfalfa yields in Michigan. Corn will grow well on a soil of pH 5.5, but alfalfa will not. In rotations, soil should be sweetened for alfalfa. This will also improve the yield of the subsequent corn crop.

Good seedbed — Minimum tillage in the spring (usually plowing and one tillage operation before seeding) is adequate (Figures 5 and 6). In summer, a firmer seedbed is required to prevent drying so cultipacking before seeding is advised, especially on loose seedbeds or loamy sand soils.

Fertilize according to soil test — High yields of 5 to 8 tons of alfalfa generally require about 400 to 600 pounds of 6-24-24 or equivalent when seeded with oats in the spring or 0-25-25 or 0-14-42 when seeded without oats in the summer. Phosphorus is important for rapid root growth and strong seedling development. Even if the soil test indicates phosphorus is not necessary, the use of a starter fertilizer containing 25 pounds of phosphate is advised to get strong seedling development. Potassium is necessary for high yields and winter hardiness.

Adapted seed—Use recommended, wilt-resistant varieties to insure genetic quality, high germination, and purity. Plant varieties which have performed well in MSU tests: for short to medium term stands (2 to 4 years), Saranac, Honeoye, Saranac AR, Promor, 520, Iroquois, WL305, Thor, Anchor and Weevlchek are among the best; for long-lived alfalfa for 5 years or more or for pasture, use the hardiest, highest yielding varieties—520, Vernal, Iroquois, Weevlchek, Titan, or WL202. Use Apollo, Agate or MSU-recommended root rot-resistant varieties on wetter soils where root rot is likely.

Seeding rates—Twelve pounds of alfalfa and 3 to 4 pounds of brome grass or orchardgrass per acre (when used) are adequate for 2- to 4-year stands. For long-term stands, 12 to 16 pounds are recommended. MSU tests have shown better stands and greater yields after 5 years at acre seed rates of 12 to 16 pounds rather than 8 pounds.

Inoculation—Inoculate seed by hand before planting (Figure 2) or buy pre-inoculated seed to be sure the plant acts as a nitrogen factory, taking free nitrogen from the air and putting it in the nodules in the root and then into the soil. Cost is nominal—about 10 cents per acre. If pre-inoculated seed is carried over from spring, it should be re-inoculated by hand if used for summer seeding.

Band seed above fertilizer—Band seeding is first choice for good stand establishment. It insures shallow planting— $\frac{1}{4}$ to $\frac{3}{4}$ inch. The alfalfa seed placed on top of the ground in a band above a band of fertilizer (and small grain such as oats) placed 1 to $1\frac{1}{2}$ inches deep (Figures 3 and 5). Band seeding gives 20% better stands, more vigorous seedlings, and much more uniform stands than broadcast seedings since all seedlings are adequately fertilized with phosphorus which



Figure 2. Inoculate seed just before seeding with specific alfalfa Rhizobia inoculant or use pre-inoculated seed.

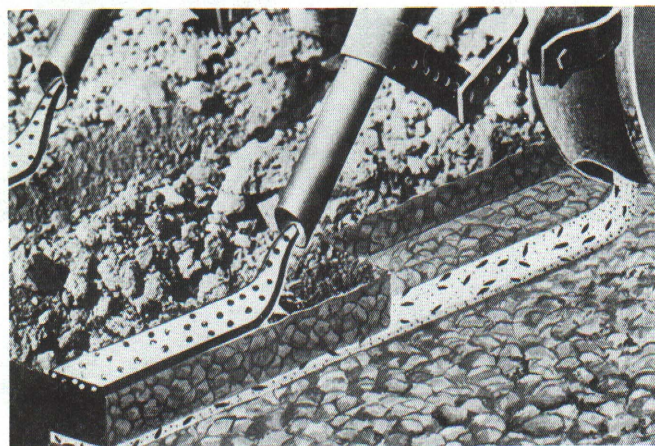


Figure 3. In band seeding, legume seed is placed in a band on or near the surface (0 to $\frac{1}{2}$ inch) directly over a band of fertilizer (and small grain) placed 1 to $1\frac{1}{2}$ inches deep. The phosphorus in the fertilizer stimulates rapid root and seedling growth.

stimulates root development and top growth (Figure 4). Rapid seedling growth enables the plant to compete more favorably against weeds, drouth, or the companion crop.

A cultipacker seeder, Figure 6, is second choice for seedling establishment. The seeder places the seed shallowly and covers the seed with firmed soil after broadcast fertilization. MSU research shows the cultipacker broadcast seeder is almost as effective (84%) as a band seeder followed by a cultipacker in spring, but it is less effective (74%) in getting a good stand in summer, Table 2 and Figure 7. The considerably greater vigor of the band-seeded alfalfa shown in Table 2 and Figures 4 and 7 is due to greater stimulation from phosphorus and better seed coverage when band seeded and cultipacked.

Use press wheels or a cultipacker—Press wheels or a cultipacker (Figure 5) towed behind the band-seeder drill improve stands in the spring but considerably more so in the summer, Table 2. With no cultipacker, spring seedings were 75% as good as when a cultipacker followed the band seeder. In summer, seedings without the cultipacker were only 54% as good, indicating the great need for covering the seed and compacting the soil over it during the drier part of the season (Table 2, Figure 7).

Press wheels are slightly more effective than a cultipacker in spring (6%) and more effective in summer (12%) (Table 2, Figure 7). Both achieve shallow seed coverage and soil compaction around the seed. If press wheels are not available, a cultipacker is an excellent method of covering the seed shallowly and firming the soil around the seed.

Table 2. Percentage stands of alfalfa seeded at 9 to 11 lb. acre on two soil types and dry weights of seedlings/sq ft (3-year average). Average Conover Silt Loam and Hillsdale Sandy Loam Soils, East Lansing, MI.

Seeding Machine	Compaction (a) Method	% Stands Seeded in (b)		Seeded Aug. 26,
		Spring	Summer	% Weight Nov. 1
Band seeder drill	None	75	54	45
Band seeder drill (Fig. 5)	Press Wheels	106	112	167
Band seeder drill (Fig. 5)	Cultipacker	100	100	100
Cultipacker seeder (Fig. 6)	Cultipacker seeder	84	74	59

(a) Seed banded over fertilizer except treatment 4, broadcast over fertilizer.
 (b) 6 trials in spring, subsequent rains; 5 in summer, 3 without rain.

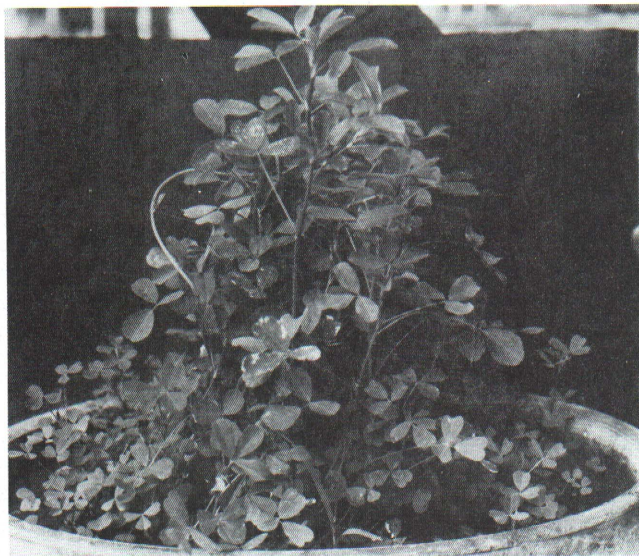
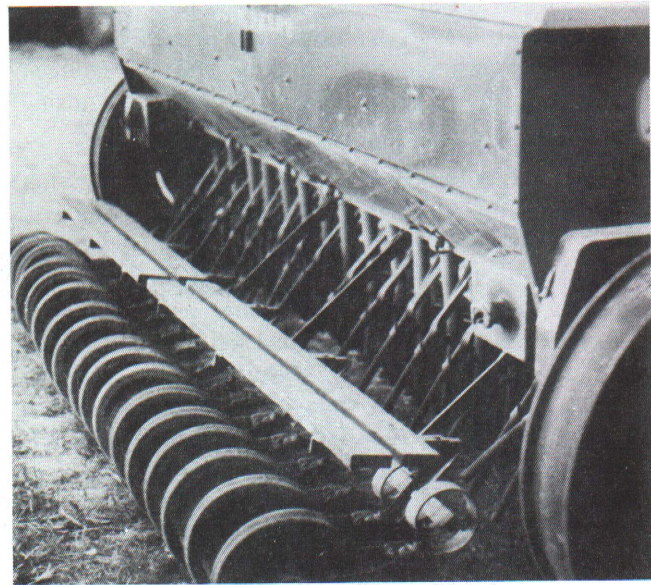
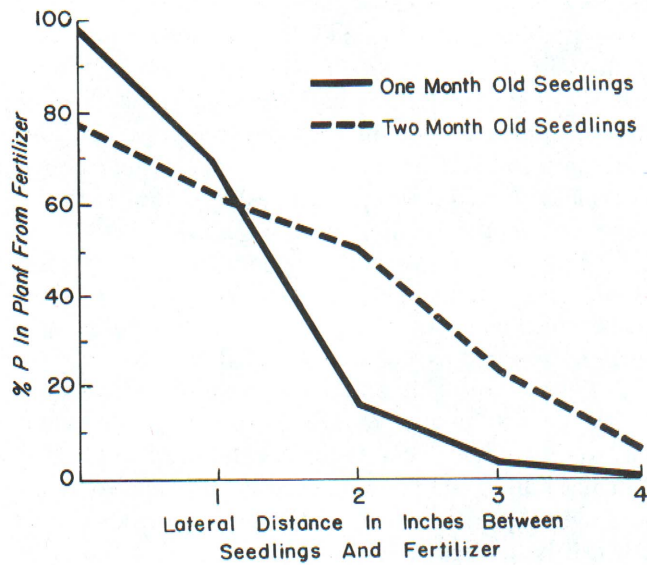


Figure 4. Alfalfa banded directly over phosphorus fertilizer is stimulated by the phosphorus, but alfalfa 3 to 4 inches away (as in broadcast seeding over banded fertilizer) gets very little benefit from the fertilizer in the first two months' growth.

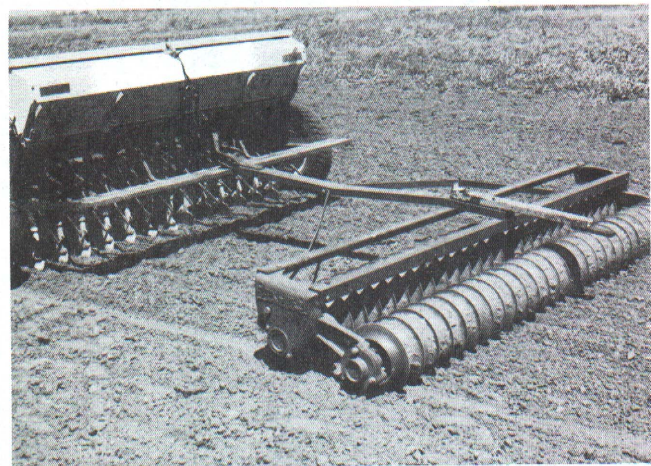


Figure 5. The fertilizer-grain drill with band seeder attachment places the seed shallowly over a band of fertilizer (Figure 3) to get maximum stimulation for the seedling from the phosphorus (Figure 4). Press wheels (top photo) cover the seed shallowly with soil and firm the soil around the seed for good germination. If press wheels are not available, a cultipacker (lower photo) gives almost as good a stand as press wheels.

Table 3. Effect of seeding dates in summer on Vernal alfalfa yields in the first and second years after seeding.

Method of seeding alfalfa	DATE OF SEEDING			
	July 27	August 13	August 27	September 11
EAST LANSING — CONOVER LOAM (2-YEAR AVERAGE)				
First year after seeding				
Alone	5.03	4.80	3.74	2.25
plus oats, not removed	2.70	2.53	2.22	1.72
plus oats, removed Oct. 3	3.06	3.30	2.60	2.13
Average	3.59	3.54	2.85	2.04
Second year after seeding				
Alone	—	4.55	4.07	3.99
plus oats, not removed	—	4.24	3.61	3.78
plus oats, removed Oct. 3	—	4.03	3.89	4.34
Average	—	4.27	3.86	4.03
LAKE CITY — NESTOR SILT LOAM (ONE-YEAR AVERAGE)				
First year after seeding				
Alone	2.57	2.16	1.70	1.25
Second year after seeding				
Alone	4.46	4.79	3.64	3.41

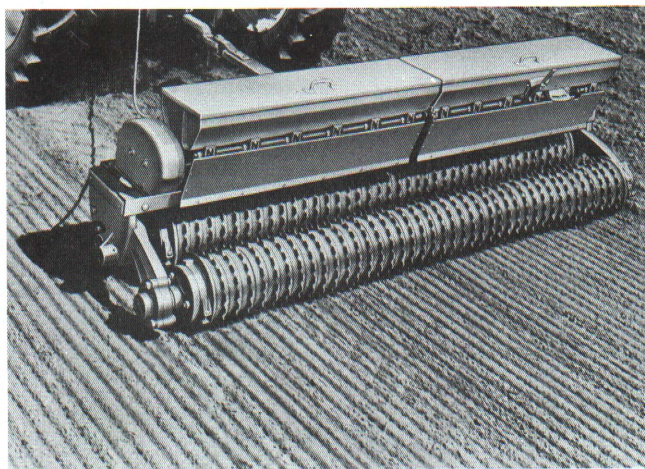


Figure 6. A cultipacker seeder is second choice as a method of establishing alfalfa but is still an excellent seeding machine. The seed is placed between the front and rear rollers and covered shallowly by the rear roller. Fertilization with other equipment prior to seeding is required.

MAKE SEEDINGS IN SPRING OR SUMMER

MSU results have shown that successful stands of alfalfa can be established in spring or summer. About three-fourths of Michigan's million-plus acres of alfalfa are made with oats as a companion crop in spring seedings made in April or early May.

Summer seedings are an alternative for farmers who do not seed with oats in spring, may want to

eradicate perennial weeds and quackgrass from a field (see Ext. Bul. 527), or who may want to seed after winter wheat is harvested. About one-fifth of Michigan's alfalfa is seeded in summer after wheat.

Both spring and summer seedings are successful under Michigan conditions. MSU results show that spring seedings were about 10% higher yielding than summer seedings in the year after seeding, equal in the second harvest year, and then generally less productive than summer seedings in the third and successive years because of better initial stands. Excellent stands can be obtained with either spring or summer seedings; timely seeding is important.

Spring Seedings

Seed on time. Plant as early as possible in April as a good seedbed can be prepared without injuring soil structure. Alfalfa grows well at low temperatures and gets a head start on weeds which generally need warmer temperatures to germinate. Seedings with oats can generally be made as late as early May in southern Michigan and up to two weeks later in the Upper Peninsula.

Companion Crops — Oats provide good income during the seeding year, and reduce weed competition and erosion. They are not necessary to help the seeding as was once believed. Companion crops take water, light, and nutrients but are generally used because of the

income provided. Oats is considered a good companion crop since it is not too competitive (as, for example, wheat), is removed early, has good feed value, and may be cut or grazed if it lodges and threatens the seeding.

Oats may be removed by grazing without hurting the seeding, by ensiling in the early boot stage (early July in southern Michigan), or by harvesting for grain. If harvested for grain, oat straw must be removed or serious seedling injury will result under the windrows.

Select an early maturing oat variety to reduce competition. Mariner and early maturing varieties have performed well throughout the state. Oat rates should be reduced to one bushel per acre on sandy, coarse-textured soils to reduce competition. [On droughty, sandy soils in soil management groups 4 and especially 5, it is advisable to use the regular seeding rate of oats with no alfalfa, harvest the oats, plow, and make a summer seeding of alfalfa — or clear seed in spring with herbicide and no oats (see last section on clear seeding.)] Reduce the oat rate to 1½ to 2 bushels of oats in spring seedings on heavy, fine-textured, well-fertilized soils in soil management groups 0 to 1.5 to reduce oat competition and lodging.

Oat and weed competition — Competition from the oat crop can be reduced in spring seedings by removing oats early for silage, particularly on sandy, droughty soils or by grazing twice — once when about a foot tall and about a month later. Taken for silage

in the early boot stage, the feeding value of oats per acre is increased 50 percent over the harvested grain.

MCPA (¾ pound active ingredient AE) or DNBP (¾ pound AE) sprayed when the oats are 6 to 8 inches tall and fully tilled will reduce competition from broad-leaved weeds. The oat canopy will prevent appreciable injury to the alfalfa. 2,4-DB (1 pound AE), used when alfalfa is in the second or third trifoliolate-leaf stage (1 to 2 inches tall), gives good broad-leaved weed control and no alfalfa injury.

Oat stubble should be clipped and removed after combining to reduce danger of disease or killing of the alfalfa under windrows. Mowing as low as possible will generally do an effective job in broad-leaved weed control and will not harm the alfalfa.

Summer Seedings

Seed on time. Timely summer seeding is even more important than seeding on time in the spring since the plant must be large enough to survive Michigan's winters.

The best seedings are made in late July or early August in southern Michigan and mid-July in the Upper Peninsula. In MSU tests at East Lansing and Lake City, the next year's yield was reduced by ⅓ ton for each week's delay of alfalfa seeded between July 27 and September 11 (Table 3). The greatest decrease in yield was in the latest 2-week period, between August 27 and September 11. The weaker seed-

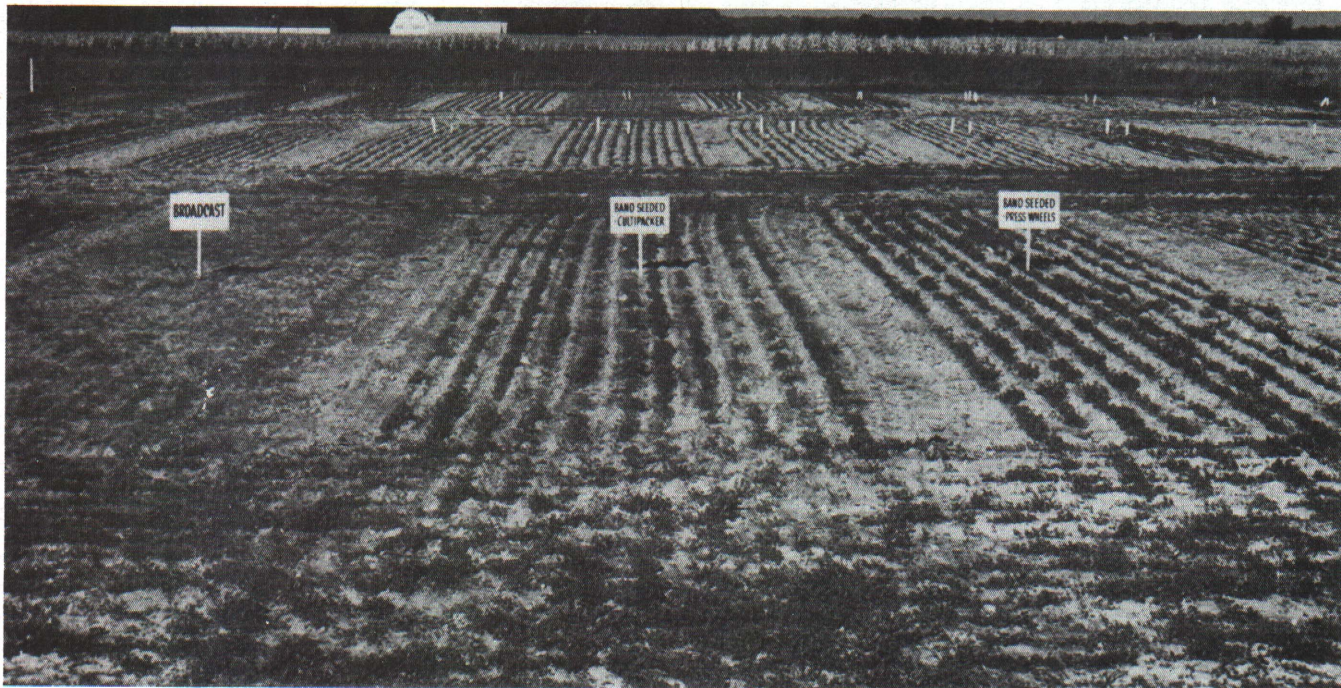


Figure 7. Summer seeded alfalfa generally has the best stands if seeded with a band seeder drill with press wheels (right). A cultipacker instead of the press wheels gives almost as good a stand (center). Broadcast seeding with the cultipacker seeder produced a poorer but satisfactory stand (left).

lings from late seeding carry over into the second harvest year with resulting lower yields, although there is less difference due to late seeding than in the first harvest year.

Seedings should not be made later than August 5 in northern Michigan or August 25 in southern Michigan. Seedings in late August are apt to be failures, especially in northern Michigan. *September seedings of alfalfa are too likely to be failures and are not recommended anywhere in Michigan.*

Seed alone in summer. Oats should *not* be used in summer seedings because of strong competition for water on any soil management group, especially groups 4 and 5. Oats have reduced stands and next year's yields in summer seedings in MSU research at Lake City in northern Michigan and at East Lansing (Table 3).

Don't seed in wheat. Generally, alfalfa should not be seeded with wheat in the fall because of the danger of winter injury (Sept. 11 seedings, Table 3). Spring seeding in wheat in MSU tests has resulted in erratic stands lacking uniformity necessary for high yields. Plowing the wheat stubble under and making a summer seeding in early August gives as good as or better stands than when spring seeded in oats, and a much better stand than when alfalfa is seeded with wheat in the fall or on top of wheat in spring.

FALL MANAGEMENT

If spring-seeded alfalfa is a foot tall by October 15 after the oat crop has been removed for silage or grain, the growth can be grazed or green chopped *after October 15* to utilize the top growth. Growth of alfalfa has stopped by this date and no injury will result.

Spring seedings should generally be rested during September to October 15 for maximum food storage in the roots.

Summer seedings must not be grazed, clipped, or disturbed in September or early October of the seeding year. They need adequate time for root or top growth and food storage.

Cutting or grazing spring or summer seedings *after October 15* when growth stops will not hurt the seedlings and will provide from ½ to 1 ton of good silage or pasture per acre.

Clear Seeding — Making Spring Seedings with Herbicides and No Oats. Two and one-half to three tons of alfalfa seeded alone on productive soils can be harvested in the year of seeding if no companion crop is used (see Ext. Bul. E-961, "Clear Seeding of Alfalfa", for more detail on clear seedings). Follow suggested seeding practices for spring seeding above but make the following changes for alfalfa to be harvested in the seeding year.

1. Be especially careful of good drainage, a good seedbed, recommended phosphorus and potassium starter fertilizer, bandseeding and cultipacking, and seeding as early as possible in April.

2. Spray pre-plant and incorporate 3 pounds AE EPTC or one pound 2,4-DB post emergence when the seedlings have two or three trifoliolate leaves (1 to 2 inches tall). 2,4-DB can be used if broadleaved problems develop after using EPTC pre-plant. Only 2,4-DB can be used if grasses are seeded with alfalfa.

3. Cut twice in central Michigan (mid-July, second cutting any time if flowering) or three times for greater yield in southern Michigan (early July, August 15-25, after October 15).

4. Top dress with potassium (and phosphorus if needed) in the fall or the next year.