UofA UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
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Agriculture and Natural Resources

Establishing Alfalfa

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Field Selection and Soil Preparation

The first step in establishing alfalfa is to select the proper soil and site. Soils for alfalfa must be relatively deep and well drained. Alfalfa will not persist in poorly drained soils. Soil depth should be at least three to four feet with no impermeable layers or hardpans that restrict root growth within that zone. Alfalfa will grow well in rocky soils as long as no shallow impermeable layers are present. More details on site/soil selection can be found in fact sheet FSA 2000, *Alfalfa Site Selection.*

After an acceptable site has been selected, soil fertility is the major key for maintaining productive and persistent alfalfa stands. Fields should be soil tested well in advance of planting so that fertilizer and lime can be applied to correct deficiencies. Poor establishment and survival will result if alfalfa is planted in soil that is too acid or too low in fertility.

Soil fertility levels should be medium or higher for rapid and vigorous establishment. Target soil fertility levels for good establishment include a soil pH of at least 6.5, a soil test phosphorus level of at least 60 pounds per acre, and a soil test potassium level of at least 200 pounds per acre. Fertilizer and limestone recommendations are based on the soil test values for pH, phosphorus and potassium. Follow soil test recommendations for the proper amount of lime, phosphorus, potash and boron fertilizer to apply before planting.

Limestone should be applied and, preferably, plowed in the soil at least six months in advance of planting. Incorporating limestone into the soil allows it to reduce soil acidity more rapidly in the top six inches of soil. This can be done during any previous crop rotations with annual forages or grain crops. Topdressed or surface-applied limestone takes longer to neutralize soil acidity because it is exposed to less soil surface area. After the stand is established, lime and fertilizer can only be topdressed or surface applied.

Variety Selection

Selecting the perfect alfalfa variety is seldom a clear-cut choice. Dozens of varieties are on the market, and the list of available varieties changes annually. Fortunately, several varieties may have similar performance for any given location. Consult your county Extension agent to narrow down the list to a few varieties that fit your growing conditions, then check on seed availability through your ag dealer. Yield potential is not the only factor to consider when selecting a variety. The following characteristics should also be considered when choosing an alfalfa variety.

Cost is often the main factor considered when choosing an alfalfa variety. However, cheap seed or seed of an unadapted variety can prove to be more expensive in the long run due to

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lower yield or poor persistence. Both of these traits are primary considerations for profitability. Establishment costs can be spread over the life of the stand. A well-managed stand of a good alfalfa variety should last at least five years, with some remaining productive up to ten years.

Intended use for the crop is important in variety selection. Some varieties are developed for hay production, some primarily for grazing, and some are classed as dual-purpose varieties. Grazing tolerance is a relatively new development in alfalfa varieties. Grazing tolerant varieties can be more versatile in a livestock program than traditional hay types.

Disease resistance is another important factor to consider when choosing a variety. Varieties with high ratings for root rot diseases such as phytophthora crown rot should be used for sites that are occasionally wet or have marginal drainage. These areas tend to have higher disease problems than soils that are very well drained.

Potato leafhopper resistance is perhaps the latest development in alfalfa varieties. Potato leafhoppers are small green insects which feed on alfalfa plants during summer. Leafhopper infestations cause the plants to turn yellow and become stunted in growth. Their damage can cause severe yield losses, especially in new stands. Leafhopper resistant varieties maintain green color better and still produce good yields when fields become infested with these insects.

Winter dormancy ratings are provided for most varieties. Dormancy ratings of 2 or 3 are very winter dormant and are grown in the northern U.S., while varieties with values of 8 or 9 do not go winter-dormant and are only grown in areas with warm winter growing seasons. In general, varieties for Arkansas should have a winter dormancy rating in the range of 2 to 7 with those in dormancy class 7 being adapted only to the southern part of the state.

Planting Date

Planting budgets in this fact sheet are based on a fall planting date, but alfalfa can be successfully established in spring or fall. When spring establishment is desired, simply insert March or April dates into the budgets in place of the fall dates for proper timing of the establishment practices.

The recommended planting dates for alfalfa in Arkansas are September 1 to October 15 or March 1 to April 15. In north Arkansas alfalfa should not be planted in fall later than October 1 or in spring earlier than March 15.

Fall plantings are preferred since weed problems are less likely than on spring plantings. However, winter annual weeds or annual ryegrass can be significant problems in some fall-planted fields. Heavy infestations of these weeds should be treated with herbicides to prevent stand thinning.

Occasionally, a seedling disease called Sclerotinia Crown Rot can be devastating to fall seedings. Alfalfa should be planted only in the spring in fields where this disease is known or suspected to be present. Alfalfa seeded in the fall should develop at least three to four trifoliates per seedling before the onset of cold weather to be winter hardy.

Seed Inoculation

Seed inoculant is a finely ground peat material containing the rhizobia bacteria needed to make the alfalfa fix nitrogen from the air. Well-inoculated alfalfa needs no nitrogen fertilizer. The inoculant should be thoroughly mixed with the seed according to the label directions. Usually no extra sticking material or liquid is recommended, but product directions should be followed to insure good seed contact. Inoculated seed should be stored in the shade or other cool place until it is planted. Seed inoculant packages are marked with an expiration date. Expired material may not be viable and should not be used. Hot storage conditions will reduce or destroy inoculant viability.

Seed of many new varieties is pre-inoculated and lime coated. In many cases the seed is also treated with fungicide to reduce the occurrence of seedling disease. Lime-coated seed is heavier than raw seed, resulting in fewer seed per pound and fewer seeds being planted per acre at a given seeding rate. But research has shown that the coatings improve seedling survival so stands are equal to or better than those planted with raw seed even though fewer seed are planted per acre.

Raw seed which has not been pre-inoculated, or pre-inoculated seed with an expired inoculant date, needs to be treated with fresh inoculant.

Herbicide Application at Planting Time

Weed control should always be planned as part of the establishment process for alfalfa. Existing fescue or bermudagrass should be controlled well in advance of planting alfalfa since these grasses can cause severe crowding of young plants. Seedling alfalfa does not tolerate heavy shading or competition from weeds. Fall-planted stands generally have less weed infestation than spring-planted stands. However, heavy infestations of winter annual weeds such as

chickweed, henbit or annual ryegrass can be present in some fields and can cause severe stand thinning. Spring plantings are more prone to have weed competition than spring seedings, especially from weedy grasses such as crabgrass and foxtail and certain broadleaf weeds.

Preemergence herbicides reduce early weed competition and improve stands. Post-emergence herbicides are available to control many grasses and broadleaves, but weeds must be sprayed when small for effective control. New stands should be scouted frequently for weed infestation. If weeds become large and obvious, much damage to the stand may have already occurred.

Recommended herbicides and the weeds controlled by each are listed in the Extension publication *Recommended Herbicides for Weed and Brush Control*, MP44, available through the county Extension office.

Planting Method and Seed Placement

Ideally alfalfa should be planted one-fourth inch deep. Very little seed will emerge if planted deeper than one inch. A fine, firm seedbed is required for uniform seed placement. A guideline for a good, firm seedbed is to have the soil firmed just enough so that you can walk over the field and leave a footprint only one-fourth inch deep.

Drill planting is preferred to broadcasting. Drill planters place the seed at a uniform depth which improves seedling emergence. Of course the planting depth of the drill must be adjusted according to soil conditions and checked periodically during planting to make sure proper depth is maintained.

Broadcast planting is often done when access to drill planters is limited. Seed is sown through a broadcast spreader and covered with a drag or roller. With this method seed may not be uniformly spread and it is difficult to maintain the proper depth when covering the seed. To compensate for these problems, broadcast seeding rates are usually 10 to 25 percent higher than for drill planting.

Establishment with no-till drills also can be accomplished successfully as long as existing vegetation and weeds are controlled and soil fertility is adequate. No-till drills are designed to cut through sod, place the seed in the soil, then firm the soil over the seed by means of a press wheel.

Planting depth should be checked frequently when no-till planting to prevent the drill from placing the seed too deep. A guideline for proper planting depth is that a small amount of seed should be visible on top of the soil.

Seeding Rate

In general, the recommended range for alfalfa seeding rates is 15 to 20 pounds per acre. Recent research has shown that higher yields are obtained from the higher seeding rates. For pure stands, 18 to 20 pounds per acre is sufficient and for mixed stands 15 to 16 pounds per acre should be planted. More seed is required for broadcast plantings than for drill plantings since seeding depth is less uniform.

Emergence and Stand Evaluation

Alfalfa seed planted at the proper time of year and depth and with adequate moisture will begin emerging in less than one week. Seed planted more than one-fourth inch deep will emerge more slowly, and seed placed deeper than one inch may never emerge.

If proper planting methods are used and weather conditions are optimum, 25 to 30 plants per square foot should be visible within 30 days. Alfalfa stands thin rapidly during the first year and more slowly in subsequent years. Remaining plants tend to increase in both crown size and number of stems as neighboring plants die. A stand of at least 6 to 8 plants per square foot is acceptable after the first year. For older stands a minimum of 3 to 4 plants per square foot is needed to maintain acceptable yields.

Pure or Mixed Stands

Whether to plant pure stands of alfalfa or an alfalfa-grass mixture depends on the intended use of the crop and on weed control options. Pure alfalfa hay generally has a higher market value than alfalfa-grass hay. However, mixed alfalfa-grass hay has more than enough quality for beef cattle. Alfalfa-grass mixtures may be more desirable if the field will be used for grazing.

More herbicide options are available for pure alfalfa stands than for alfalfa-grass mixtures. Some producers plant pure alfalfa to take advantage of a larger selection of herbicides for weed control at establishment, then drill in a companion grass after a few years as the stand begins to thin. Orchardgrass is most commonly grown with alfalfa. It is planted at a rate of 3 to 5 pounds per acre. Orchardgrass also helps increase drying rates after the crop is cut so the crop can be baled.

Costs Summary

The estimated costs for establishing fall-planted alfalfa are presented in Table 1. Estimated costs are divided into direct expenses and fixed expenses. Direct expenses include seed, custom work, fertilizer and lime, herbicide, labor, diesel fuel, repairs and maintenance, and interest. Seed cost was the single most expensive item at $55.00 per acre. A custom application of two tons of lime was estimated to be $40.00 per acre. The total fertilizer cost was $32.77 per acre which included a boron application plus a $3.50 per acre custom application cost. An application of 1.5 pints of Treflan cost $5.51 per acre plus $3.50 per acre for custom spraying. The remaining direct expenses totaled $14.98 per acre. The total direct expense was estimated to be $155.25 per acre.

Fixed expenses include depreciation on equipment, interest on the investment, and taxes and insurance. Total fixed expenses were estimated to be $9.63 per acre. Total specified expenses, which include direct and fixed expenses, were $164.88 per acre.

Table 2 presents a sequential listing of all operations used in developing these establishment costs. After applying two tons of lime, the field was chisel plowed, disked, custom sprayed with 1.5 pints of Treflan and disked again. The 31-80-80 bulk blend fertilizer and boron was then applied using a custom applicator. The field was then rolled and planted with 20 pounds of alfalfa seed per acre. Refer to the Planting Date and Herbicide Application at Planting Time sections of this publication for spring-planted recommendations.

Notice that charges for land, farm overhead and management are not included in the $164.88 per acre estimate. Fertilizer, insecticides and herbicides needed to maintain the crop in future years were also not included. Therefore, the costs shown should be used as guides for planning purposes only. Use the "Your Farm" column to change your estimates by adding, deleting or changing costs to reflect your specific situation.

Table 1. Estimated costs per acre, Alfalfa Establishment – Fall Planting.

ITEM	UNIT	PRICE	QUANTITY	AMOUNT	YOUR FARM
		dollars		dollars	
DIRECT EXPENSES					
CROP SEED					
Alfalfa seed	lbs	2.75	20.0000	55.00	_____
CUSTOM WORK					
Custom apply lime	ton	20.00	2.0000	40.00	_____
Cstm ap grd herbicid	acre	3.50	1.0000	3.50	_____
Cstm ap grd fert dry	acre	3.50	1.0000	3.50	_____
FERTILIZER & LIME					
31-80-80 bulk blend	acre	30.74	1.0000	30.74	_____
Boron – actual	unit	2.03	1.0000	2.03	_____
HERBICIDES					
Treflan 4EC	pint	3.67	1.5000	5.51	_____
OPERATOR LABOR					
Implements	hour	6.23	0.7538	4.70	_____
DIESEL FUEL					
Tractors	gal	0.60	2.9172	1.75	_____
REPAIR & MAINTENANCE					
Implements	acre	1.94	1.0000	1.94	_____
Tractors	acre	2.75	1.0000	2.75	_____
INTEREST ON OP. CAP.	acre	3.84	1.0000	3.84	_____
TOTAL DIRECT EXPENSES				155.25	_____
FIXED EXPENSES					
Implements	acre	5.01	1.0000	5.01	_____
Tractors	acre	4.62	1.0000	4.62	_____
TOTAL FIXED EXPENSES				9.63	_____
TOTAL SPECIFIED EXPENSES				164.88	_____

Table 2. Estimated resource use and costs for field operations, per acre, Alfalfa Establishment – Fall Planting.

OPERATION/ OPERATING INPUT	SIZE/ UNIT	TRACTOR SIZE	PERF RATE	TIMES OVER	MTH	TRACTOR COST DIRECT	TRACTOR COST FIXED	EQUIP COST DIRECT	EQUIP COST FIXED	ALLOC LABOR HOURS	ALLOC LABOR COST	OPERATING INPUT AMOUNT	OPERATING INPUT PRICE	OPERATING INPUT COST	TOTAL COST
						- - - - - - - - - - - - - - dollars			- - - - - - - - - - - - -		dollars		- - - - - - - - - dollars		- - - - - - - -
Custom apply lime	Ton			1.00	Mar							2.0000	20.00	40.00	40.00
Chisel plow	17'	85	0.114	1.00	Sep	0.99	1.01	0.18	0.40	0.137	0.85				3.43
Disk, light cut	21.75'	85	0.099	1.00	Sep	0.86	0.88	0.44	1.16	0.119	0.74				4.08
Cstm ap grd herbicid	acre			1.00	Sep							1.0000	3.50	3.50	3.50
Treflan 4EC	pint											1.5000	3.67	5.51	5.51
Disk, light cut	21.75'	85	0.099	1.00	Sep.	0.86	0.88	0.44	1.16	0.119	0.74				4.08
Cstm ap grd fert dry	acre			1.00	Sep							1.0000	3.50	3.50	3.50
31-80-80 bulk blend	acre											1.0000	30.74	30.74	30.74
Boron – actual	unit											1.0000	2.03	2.03	2.03
Roller	18'	85	0.090	1.00	Sep	0.78	0.80	0.06	0.31	0.108	0.67				2.62
Grain drill	20'	85	0.118	1.00	Sep	1.02	1.05	0.82	1.98	0.271	1.69				6.56
Alfalfa seed	lbs											20.0000	2.75	55.00	55.00
TOTALS						4.50	4.62	1.94	5.01	0.754	4.70			140.27	161.04
INTEREST ON OPERATING CAPITAL															3.84
UNALLOCATED LABOR															0.00
TOTAL SPECIFIED COST															164.88

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