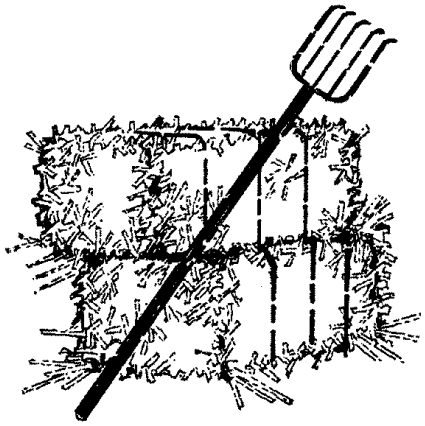
U.C. COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH AND PRODUCE

BERMUDAGRASS HAY



COMBINATION SEED/HAY

IMPERIAL COUNTY – 2004

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For an explanation of calculations used for the study refer to the attached General Assumptions or call the author, Herman Meister, at the Imperial County Cooperative Extension office, (760)352-9474 or e-mail at hmeister@ucdavis.edu.

FOREWORD

We wish to thank growers, pest control advisors, chemical applicators and chemical dealers, custom farm operators, fertilizer dealers, seed companies, contract harvesters, equipment companies, and the Imperial County Agricultural Commissioner's office for providing us with the data necessary to compile this circular. Without their cooperation we could not have achieved the accuracy needed for evaluating the cost of production for the field crop industry in Imperial County.

The information presented herein allows one to get a "ballpark" idea of field crop production costs and practices in the Imperial County. Most of the information was collected through verbal communications via office visits and personal phone calls. The information does not reflect the exact values or practices of any one grower, but are rather an average of countywide prevailing costs and practices. Exact costs incurred by individual growers depend upon many variables such as weather, land rent, seed, choice of agrichemicals, location, time of planting, etc. No exact comparison with individual grower practice is possible or intended. The budgets do reflect, however, the prevailing industry trends within the region.

Overhead usually includes secretarial and office expenses, general farm supplies, communications, utilities, farm shop, transportation, moving farm equipment, accountants, insurance, safety training, permits, etc. Eleven to 13% of the total of land preparation, growing costs and land rent was used to estimate overhead. Hourly rates vary with each crop depending on the workman's compensation percentages.

Since all of the inputs used to figure production costs are impossible to document in a single page, we have included extra expense in man-hours or overhead to account for such items as pipe setting, motor grader, water truck, shovel work, bird and rodent control, etc. Whenever possible we have given the costs of these operations per hour listed on the cultural operations page. Some custom operators have indicated that they are instituting a "fuel surcharge" to reflect "spikes" in fuel cost.

Not included in these production costs are expenses resulting from management fees, loans, providing supervision, or return on investments. The crop budgets also do not contain expenses encumbered for road and ditch maintenance, and perimeter weed control. If all the above items were taken into account, the budget may need to be increased by 7-15%.

Where applicable we have used terminology that is commonly used in the agricultural industry. These terms are compiled in a glossary at the end of the circular. We feel that an understanding of these terms will be useful to entry-level growers, bankers, students and visitors.

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2004-2005 Tillage & Harvest Rates
IMPERIAL COUNTY

HEAVY TRACTOR WORK & LAND PREPARATION

OPERATION	$/ACRE
Plow	32.00
Subsoil 2nd gear	45.00
Subsoil 3rd gear	38.00
Landplane	14.00
Triplane	12.00
Chisel 15”	26.00
Wil-Rich chisel	17.00
Big Ox	25.00
Slip plow	43.00
Mark/disc borders	10.50
Make cross checks (taps)	6.75
Break border	6.50
Stubble disc/with cultipack	22.50/24.50
Regular disc/with cultipack	13.00/15.00
List 30”-12 row/40” 8 row	16.50
Float	11.50
Dump (scraper) borders	18.25
Corrugate	14.00

LIGHT TRACTOR WORK

Power mulch dry	27.50
Power mulch with herbicide	31.00
Shape 30” 6-row / 40” 4-row	12.75/12.75
Plant sugar beets & cotton 30”/40”	17.00/15.00
Plant vegetables	20.00
Mulch plant wheat	20.25
Plant alfalfa (corrugated)	18.50
Plant alfalfa (beds)	19.00
Plant bermudagrass	13.75
Plant with drill (sudangrass, wheat)	14.75
Plant corn slope	17.00
Cultivate 30”/40” beds 4-row	16.00/14.00
Spike 30”/40” beds 4-row	13.00/11.00
Spike and furrow out 30”/40” 4-row	14.00/12.00
Furrow out 30”/40” beds 4-row	13.00/11.00
Lilliston 30” 6-row / 40” 4-row	14.00/14.00
Lilliston 30” 6 row/ 40” 4-row/ herb	15.50/15.50
Inj fert & fur out 30”/ 40” beds 4-row	16.50/14.50
Fertilize dry & fur out 30”/ 40” 4-row	17.00/15.00
Inject fertilizer flat	15.00
Broadcast dry fertilizer	8.00
Ground spray 30”/40” 8-row	12.00
Chop cotton stalks 30”/40”beds	16.00/14.00
List 80” melon beds	20.00
Plant 80” melon slope beds	22.00
Back fill furrow (melons)	9.5
Cultivate 80” melon slope beds	18.00
Center 80” melon beds	17.00
Re-run 80” melon beds	11.00
Inject fertilizer & furrow out 80” melon beds	18.00
Bust out 80” melon beds	12.00

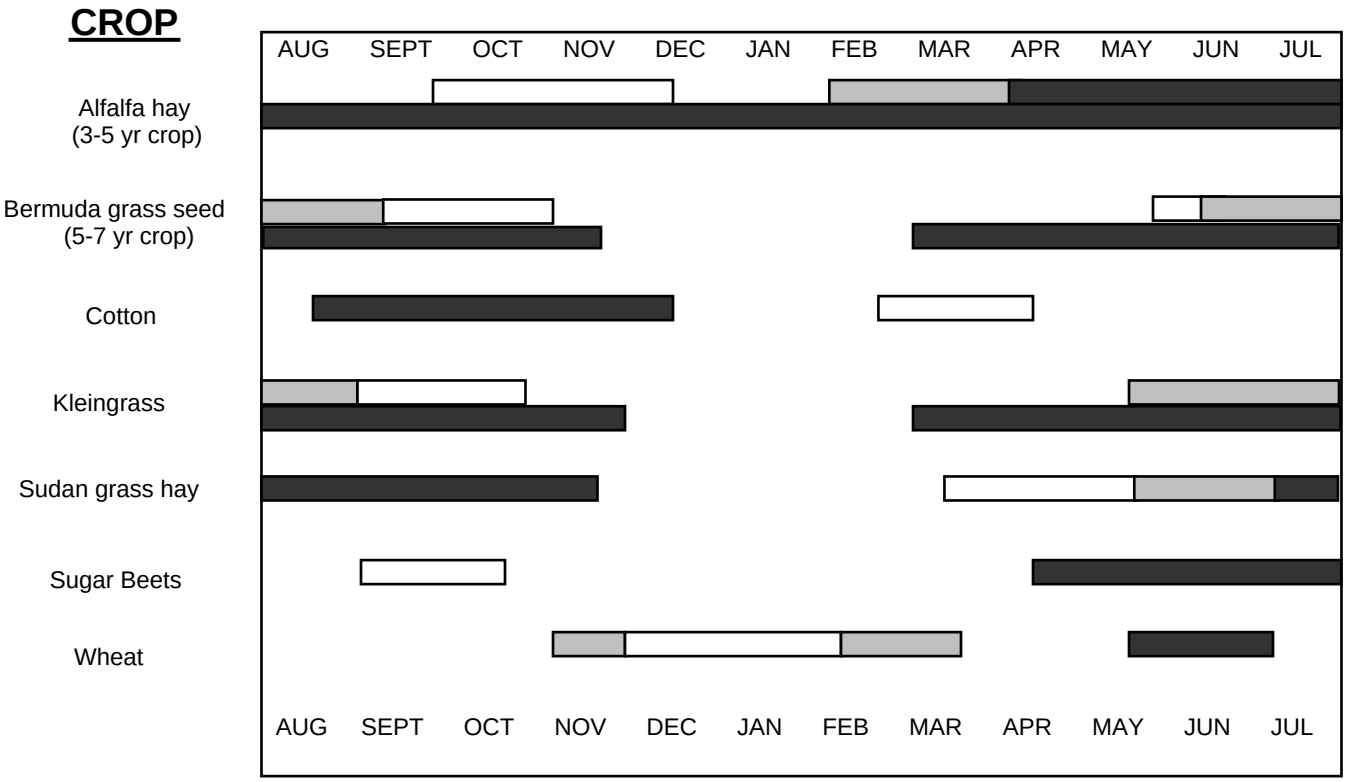
HARVEST COSTS-FIELD CROPS

	BY UNIT
Windrow alfalfa seed	17.50/acre
Combine alfalfa seed	41.00/acre
Swath bermudagrass	13.75/acre
Rake bermudagrass	5.50/acre
Swath sudangrass	11.25/acre
Rake sudangrass	6.00/acre
Swath alfalfa	8.75/acre
Rake alfalfa	5.00/acre
Bale (all types of hay- small bale)	0.70/bale
Haul & stack hay – small bale	0.27/bale
Bale (large bale 4X4)	7.50/bale
Haul & stack big bale	3.50/bale
Load with hay squeeze	62.50 / load
Dig sugar beets	2.65/clean ton
Haul sugar beets	2.50/clean ton
Combine wheat	16.00 per acre + 0.60 /cwt. over 1 ton
Haul wheat	5.00/ton
Combine bermudagrass seed 1st time	42.50/acre
Combine bermudagrass seed 2nd time	26.50/acre
Haul bermudagrass seed (local)	175/load
Pick Cotton 1st/2nd	03cts/lb/35.00/acre

MISCELLANEOUS RATES BY THE HOUR

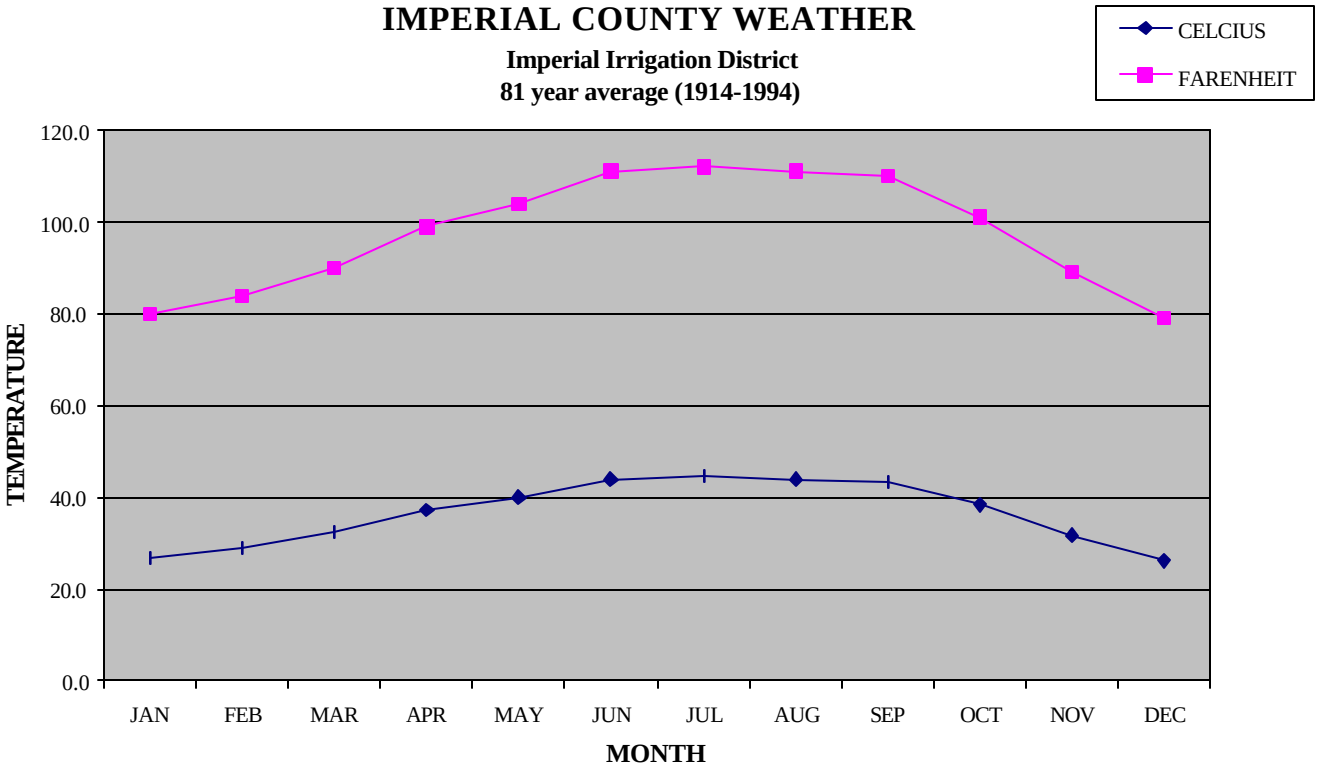
	$/HR
Motor grader	55.00
Backhoe	50.00
Water truck	40.00
Wheel tractor	35.00
Scraper	36.00
Versatile	60.00
D-6	56.00
D-8	73.00
Buck ends of field	35.00
Pipe setting (2 men)	38.00
Laser level	90.00
Work ends (disc out rotobucks)	40.00

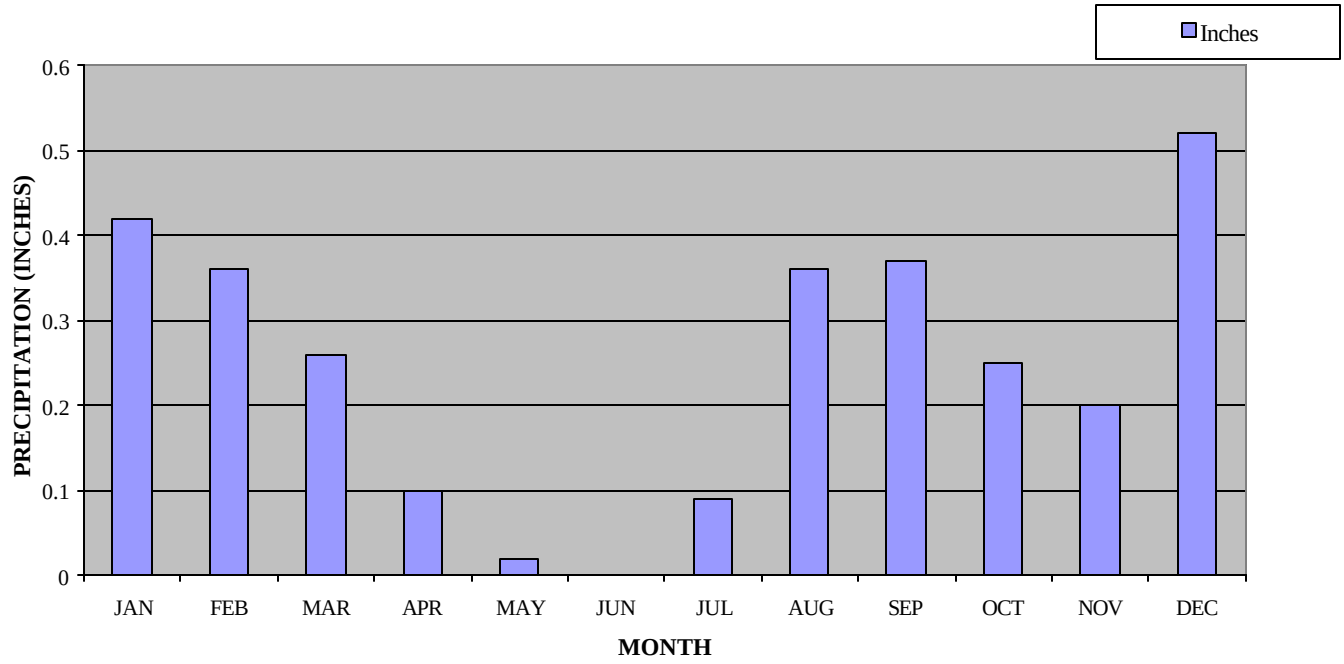
FIELD CROPS
PLANTING & HARVESTING CALENDAR
IMPERIAL VALLEY, CALIFORNIA



IMPERIAL COUNTY WEATHER

Imperial Irrigation District
81 year average (1914-1994)





IMPERIAL COUNTY COMBINATION BERMUDAGRASS SEED/HAY PRODUCTION COSTS 2004-2005

80 Acre Field

Mechanical operations at prevailing rates. Hand labor at $9.45 /hr. ($6.75 plus SS, unemployment, workman's compensation and fringe benefits)
Yield--800 pounds seed, thrasher run (TR), spring seed crop and summer hay crop*

	Prevailing	MATERIALS		HAND LABOR		COST
OPERATION	**Rate**	**Type/Amount**	**Cost**	**Hours**	**Dollars**	**Per Acre**
LAND PREPARATION						
Stubble disc	22.50					22.50
Big ox / ring roller	27.00					27.00
Regular disc / ring roller	15.00					15.00
Fertilize, broadcast	8.00	11-52-0 200lbs	30			38.00
Regular disc / ring roller	15.00					15.00
Laser level	50.00					50.00
Dump borders	18.25					18.25
Shape Borders	6.00					6.00
TOTAL LAND PREPARATION COSTS						**191.75**
COST OF ESTABLISHMENT						
Plant	13.75	Seed 15 lb @ $1.50/lb	22.50			36.25
Irrigate 5x		Water 1.5 ac-ft	24.00	1.5	14.18	38.18
Weed control 2x ground	12.50	Herbicide	20.00			45.00
COST OF ESTABLISHMENT						**119.43**
TOTAL COST OF STAND ESTABLISHMENT						**311.18**
ANNUAL COST OF SEED PRODUCTION (5-year life)						
Irrigate 14x		Water 5.5 ac-ft	88.00	4.25	40.16	128.16
Fertilize, broadcast	8.00	150 lb 11-52-0	22.50			30.50
Fertilizer, broadcast	8.00	100 lb N (urea)	22.00			30.00
Fertilizer (water-run)		150 lb N (UAN32)	33.00			33.00
Insect control 2x Air @ night	9.00	Insecticide	25.00			43.00
TOTAL ANNUAL COSTS						**264.66**
Land rent (net acres)						125.00
Amortization	20 % of total cost of stand establishment					62.24
Cost overhead	13 % of annual costs, land rent and amortization					58.75
TOTAL PREHARVEST COSTS						**510.64**
SUMMER HAY HARVEST COSTS (2 cuttings)						
Swather 2x	13.75					27.50
Rake 2x, heavy	7.50					15.00
Rake 2x cleanup	4.50					9.00
Bale 4 tons	0.7 /bale	18 bales/ton				50.40
Haul & Stack	0.27 /bale	18 bales/ton				19.44
TOTAL HARVEST COST						**121.34**
SEED HARVEST & POST HARVEST COSTS						
Cut rotary mower 1x spring	15.00 /acre					15.00
Combining 2x spring	42.50 /acre 1st +	25.00 2nd time				67.50
Hauling (thrasher run, TR)	0.65 cwt/TR					5.20
Cleaning seed						
thrasher run to unhulled	8.50 /cwt	@ 800 lbs. thrasher run				68.00
Bags	1.00 /cwt	450 pounds clean seed (estimate)				4.50
Baling straw 2 tons	0.70 /bale @	18 bales/ton				25.20
Haul & Stack	0.27 /bale @	18 bales/ton				9.72
Cleanup field	5.00					5.00
TOTAL SEED HARVEST & POST HARVEST COSTS						**200.12**
TOTAL ALL COSTS						**832.10**
Value of straw (estimated)	30.00 /ton @ 2 tons					60.00
Estimated value of hay	90.00 /ton @ 4 tons					360.00
TOTAL COSTS LESS STRAW & PASTURE VALUE						**412.10**

* Note: Some producers make a second seed crop in the fall. See culture section for additional information.

IMPERIAL COUNTY BERMUDAGRASS SEED/HAY CULTURE 2004-2005

Bermudagrass Seed

Annual acreage, yield, and value of bermudagrass seed in Imperial County, CA for five consecutive years

Year	Acres	Yield/Acre (lbs. hulled)	Value/Acre
2003	25,089	327	$517
2002	35,244	514	$754
2001	27,153	347	$520
2000	29,383	424	$628
1999	23,488	457	$591

(Source: I.C. Agricultural Commissioner's Reports)

Bermudagrass Hay

Annual acreage, yield, and value of bermudagrass seed in Imperial County, CA for five consecutive years

Year	Acres	Yield/Acre (Tons)	Value/Acre
2003	64,675	5.32	$423
2002	62,373	5.72	$408
2001	53,773	5.43	$411
2000	42,059	5.59	$417
1999	31,731	4.84	$364

(Source: I.C. Agricultural Commissioner's Reports)

GENERAL: Crop budgets are presented for "bermudagrass hay production" and "seed/hay production". The harvesting costs presented here could be adjusted for seed/seed, seed/hay/seed, seed/pasture, or other possible harvest regimes.

STAND ESTABLISHMENT: A uniform seedbed is prerequisite to obtaining a good stand. High spots in the field may cause uneven irrigation, resulting in poor stands. Laser leveling the field before planting will ensure more uniform irrigation and help prevent scalding. The cost of laser leveling varies from field to field based upon an hourly rate for equipment. The hourly rate normally translates to $45-50 per acre. If laser leveling is not used, then landplane and dump borders are often used to make a level seed bed.

PLANTING DATE: Late August and September is the preferred time for establishing new plantings. However, bermudagrass will germinate anytime during the summer.

SEEDING RATES: Plant 15-20 pounds of seed per acre on corrugations or on flat ground. Higher seed rates are needed on saline soils.

VARIETIES: The majority of the bermudagrass acreage is planted with the variety "Common." Many other varieties are becoming available such as Sahara, Sonestar, KF194, Sunstar, Savannah, Jackpot, Southern Star, and Sun Devil II.

IRRIGATION: Sprinkler irrigation is used by many growers for stand establishment (approximate cost per acre is $150-165). Other growers prefer flood irrigation. It may take 3 to 5 surface irrigations to establish a stand. During the season, 14 to16 irrigations may be needed to produce the crop. Three irrigations will generally produce a crop between cuttings; four irrigations will increase yield but decrease quality.

FERTILIZATION: The amount of fertilizer needed depends upon the intended use of the bermudagrass crop. Fields producing hay exclusively may receive as much as 500-600 pounds of nitrogen per acre for the growing season. Fields used for a seed/hay combination will require 150-200 lbs. less nitrogen for the season. Urea, UAN32, and anhydrous ammonia are the types of nitrogen fertilizer commonly applied. Some growers add phosphorus to their fertilizer program if soil tests show that levels of soluble phosphorus are lower than 10 parts per million.

PEST CONTROL: Bermudagrass grown for seed occasionally has pest problems. Cutworm, spider mites, mealy bugs, and fulgorids should be monitored as they may cause damage to spring and fall seed crops. Grass whiteflies and the fulgorid (*Toya propingua*) can cause extensive damage in the fall by contaminating seed heads with honeydew. The plant bug (*Trigenotylus tenuis*) can cause stunting, delayed flowering, and reduced yield.

Rust (*Puccinia cynodontis*) is common in fields with dense growth and is sometimes severe enough to merit control with fungicides. The needle nematode (*Longidorus africanus*) and the root knot nematode (*Meloidogyne* spp.) are occasional pests, but control is not economically feasible.

WEED CONTROL: Most weed control efforts are aimed at the stand establishment phase. Some herbicides are available for broadleaf weed control, but none are effective for selectively controlling other grasses from bermudagrass during this time. Pre-irrigating fields will reduce weed populations. Once the bermudagrass is established, weeds are seldom a problem due to the competitive nature of a healthy stand (except in the wintertime). Some broadleaf weeds and wild oats are problems in the wintertime. Consult your PCA or your local Weed Science Farm Advisor for suggestions.

HARVESTING: Bermudagrass seed is harvested once during the late spring or early summer. The field may be harvested again for seed as a late fall crop. However, some fields may be harvested for summer hay depending on market demand and prices.

The spring seed crop is cut with a rotary mower, combine-harvested once, and re-thrashed to maximize seed production. The soil should not be allowed to dry extensively while making the spring seed crop or it will be difficult to get the stand to grow out of a dormant condition caused by water stress.

The values presented in the crop budget are based upon thrasher run seed. This seed is then cleaned to produce unhulled seed or further processed to hulled seed to meet market demands. While there is a wide variation in clean out (high purity seed), a "ball park" average may be 50 percent clean, unhulled seed from thrasher run (field run).

If a fall seed crop is made, the crop is often thrashed only once while the seed crop is standing. Frost normally takes care of desiccation of the stand for harvest. Generally, there is no re-run thrashing of the field, as it is not economical.

BERMUDAGRASS HAY PRODUCTION ONLY: Most of the cultural practices for producing hay only are similar to those for seed/hay production. However, for hay production, the crop should be maintained in a lush, vegetative growing condition by applying ample nitrogen and maintaining regular irrigations. Five to six cuttings a year can be expected depending on age of the stand and cultural practices. Bermudagrass for export should not be allowed to grow too rank or the lower stems will have more bleach due to lack of sunlight.

GLOSSARY

10% Bloom stage of growth in alfalfa when 10% of the stems are flowering.

Bale or Baling Compacting dried alfalfa or grass into a compact package usually weighing 100-120 lbs.

Bed Mounded soil that is shaped and used for planting; beds are separated by furrows.

Berry see *kernel*

Big Ox® A chisel with 7 shanks used to rip soil 18-24 inches deep.

Blacken the beds To thoroughly wet/darken a bed with irrigation water applied in furrows.

Black point Darkened, sometimes shriveled embryo end of wheat seed; caused by several fungi including *Alternaria, Fusarium,* and *Helminthosporium*; also called kernel smudge.

Bleach Loss of green color in hay due to sun exposure.

Boot stage Stage of wheat development when the sheath surrounding the inflorescence expands.

Break borders To tear down flat flood borders or flat crop borders.

Broadcast To spread seed on the soil surface.

Buck ends of field The remaking of beds at the end of a field in order to channel when beds at the end of a field are destroyed due to insufficient turn around space for farm equipment.

Chisel A tractor-mounted, knifelike implement used to rip soil 15-20 inches deep.

Corrugation Ridges made in soil to control the flow of water down a field (mini-beds). Name stems from the resemblance to corrugated sheet metal.

Crimping Mechanical operation used to crush stems of hay for better curing.

Cross checks Small dikes at perpendicular angles to borders used for water diversion into a field; also called taps.

Cultipacker A farm implement used to break up clods of soil; consists of groups of knobbed metal rings stacked together; also called a ringroller.

Cultivate To work beds after planting in order to control weeds, loosen soil, and allow for application of fertilizer

Custom rate The value assigned to a cultural operation by farmers or contractors for cost accounting; normally includes the cost of the operator.

Cwt of CWT One hundred pounds

Damping-off A fungal disease of seedlings

Dough stage Stage of wheat kernel development, when kernels are mature, but not hardened.

Dormant varieties Alfalfa varieties which do not produce much growth in cold weather.

Drill Type of planter used for cereals.

Dump borders See *scraper borders*

Eagle beak Type of planter shoe shaped like an eagle's beak used in mulch planting crops such as wheat.

Float A large, wooden frame pulled with a tractor for rough leveling of the soil surface.

Flood irrigation A method of irrigation where water is applied a field by gravity; the water is channeled by earth borders that are usually 70-200 feet apart.

Full bloom Alfalfa blooming at maximum potential.

Furrow irrigation A method of irrigation where water is applied to fields by gravity flow, down furrows; the water enters the bed by capillary action.

Furrow out The movement of soil from furrows to beds by tractor-mounted shovels; removes impediments to irrigation water.

Grated pipe Large diameter pipes used to deliver low pressure water to each furrow; used to keep head end of field dry for cultivation or harvesting.

Green chop Alfalfa that is cut green and dehydrated for making alfalfa pellets.

Ground spray The application of an agrichemical by a tractor-mounted sprayer.

Inject fertilizer The application of liquid of liquid fertilizer in the top or sides of a bed.

Irrigate up To irrigate a crop to emergence.

Kernel smudge See *black point.*

Landplane A large, tractor-pulled land leveling machine.

Laser level A land surface leveler that uses a laser guiding device to maintain an accurate grade.

Layby To apply an herbicide or other agrichemical at the last opportunity to enter a field with a tractor prior to harvest.

Lilliston A rolling cultivator with curved tines which uses ground speed to assist in working up the soil surface in order to destroy weeds.

Listing Throwing soil into a mound to make beds.

Lodge Cereals falling over due to the weight of the seed and lack of stem strength.

Motor grader A large grader normally used to cut tail ditches for draining off excess surface water.

Mulch plant Planting seed into moist soil; no additional irrigation needed to germinate crop.

Noncruciferous Any crop other than members of the cabbage family (e.g., broccoli, brussell sprouts, cauliflower, etc.)

Nondeterminant Describes a plant's growth habit; plant size is not determined and may increase (within limits) as long as proper growth conditions exist.

Off types Plant types whose characteristics differ from those of the true variety.

Pipe setting Installing 2-inch plastic tubes through a soil berm with a hydraulic ram; the pipes are used to control the flow of irrigation water.

Pinch wheel Type of sugar beet harvester which grasps the beet leaves by pinching.

Planting to stand Planting the same number of seeds as the desired number of plants in a field.

Plow To mix soil by inversion.

Power mulch A tractor-mounted, power rototiller.

Pull borders To make flood berms used to channel the flow of surface applied water.

Punching pipe see *pipe setting.*

Raking Rolling hay to a windrow in order to dry, or combining windrows.

Random flow planter A non-precision planter; seed drop is regulated by agitating the seed in a hopper over a hole; planting rate depends upon hole size and tractor speed.

Rank growth Excessive growth.

Roll beds To roll a large, metal roller over the tops of beds in order to firm them prior to thinning.

Rototill To mechanically mix soil.

Row A line of plants or a bed with a single line of plants.

Scald Death of plants due to excessive soil moisture during period of high temperature causing lack of oxygen to the plant roots; e.g., alfalfa, bermuda grass, and sudan grass.

Scraper borders Method of making borders without leaving low spots in soil within the area to be planted; helps to prevent water puddling thus preventing scald and root diseases.

Seed line A line down a bed in which seeds are planted.

Semolina flour Flour made from Durum wheat and used to make pasta.

Shatter Loss of grain from the seed heads prior to harvest, often caused by wind or moisture.

Sidedress To place pesticides or fertilizers in a band next to a row of plants.

Slip plow An implement pulled by a caterpillar and used to make deep cuts into the soil whereby soil from below is carried upward into the cut; used to improve drainage.

Solitary bees Type of bee used for pollination which lives alone, not in colonies.

Spike The running of tractor-mounted shanks into the soil or beds to improve aeration and drainage.

Spike wheel Type of sugar beet harvester using long metal spikes to penetrate the beets and hold them while lifting them out of the ground.

Stand The density of plants in a field after emergence.

Stubble disc An implement used to chop crop residue and incorporate it into the soil; the blades are scalloped unlike a standard disc..

Subbing Irrigation method where water is applied to a field in furrows and allowed to travel across beds by capillary action.

Subsoil The pulling of large, hard-faced shanks through the soil up to 42 inches deep; used to shatter soil layers and improve drainage, and leach salts.

Top crop Cotton bolls set at the top of the plant; the late crop.

Triplane A smaller, three-wheeled version of a *landplane.*

Versatile A large 4-wheel drive tractor used to pull discs and other implements.

Water back Irrigate again, often after sprinkling.

Water fun An application of an agrichemical in irrigation water (i.e., furrow irrigation).

Wil-rich chisel plow An implement used to work wet or moist soils prior to making beds.

Windrow Forage cut from the plants and raked into a single line for curing and baling.

Work ends Miscellaneous field operations including use of a motor grader to cut a tail ditch for irrigation drain water; or bucking ends and pipe punching.

Yellowberry wheat kernels that are yellow rather than the normal opaque; usually the result of insufficient, nitrogen fertilization.