U.C. COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH AND PRODUCE

SUDANGRASS

IMPERIAL COUNTY – 2004

Prepared by:
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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

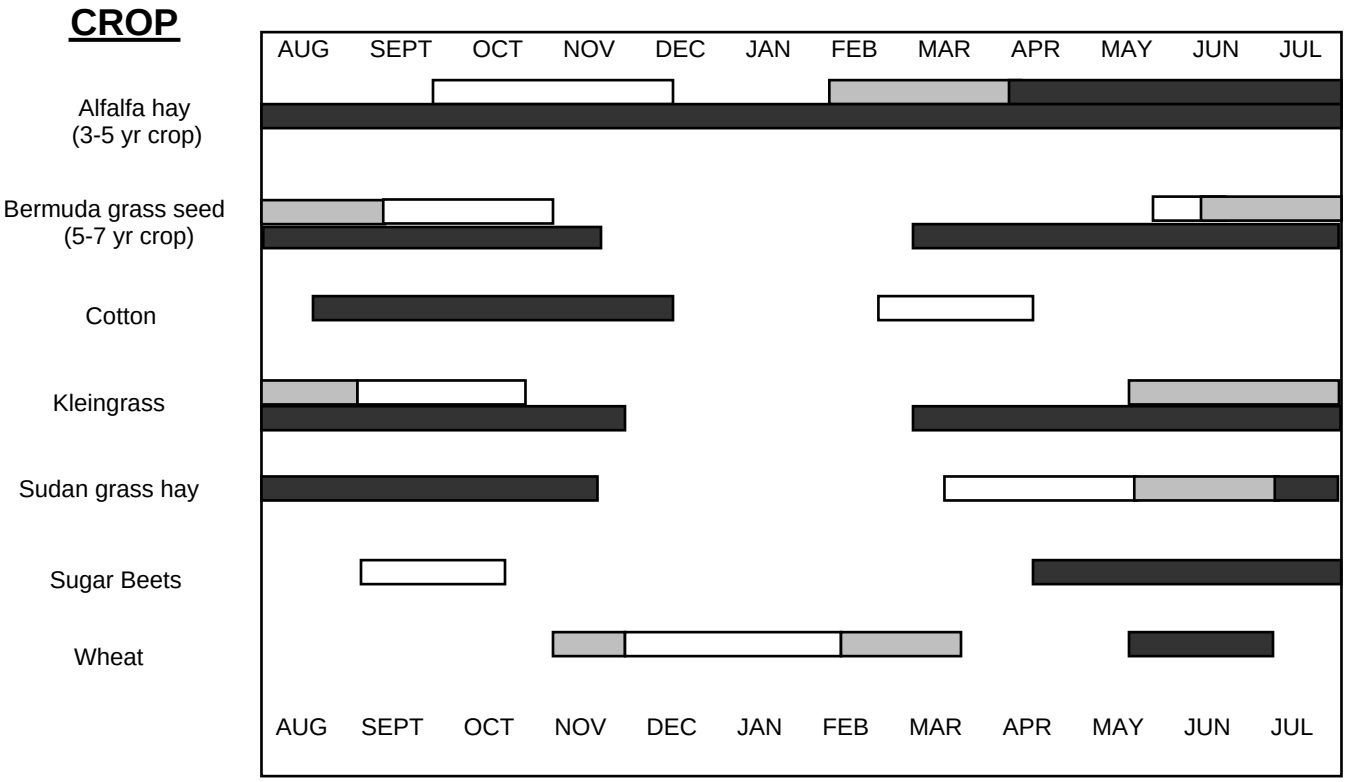
HARVEST COSTS-FIELD CROPS

	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

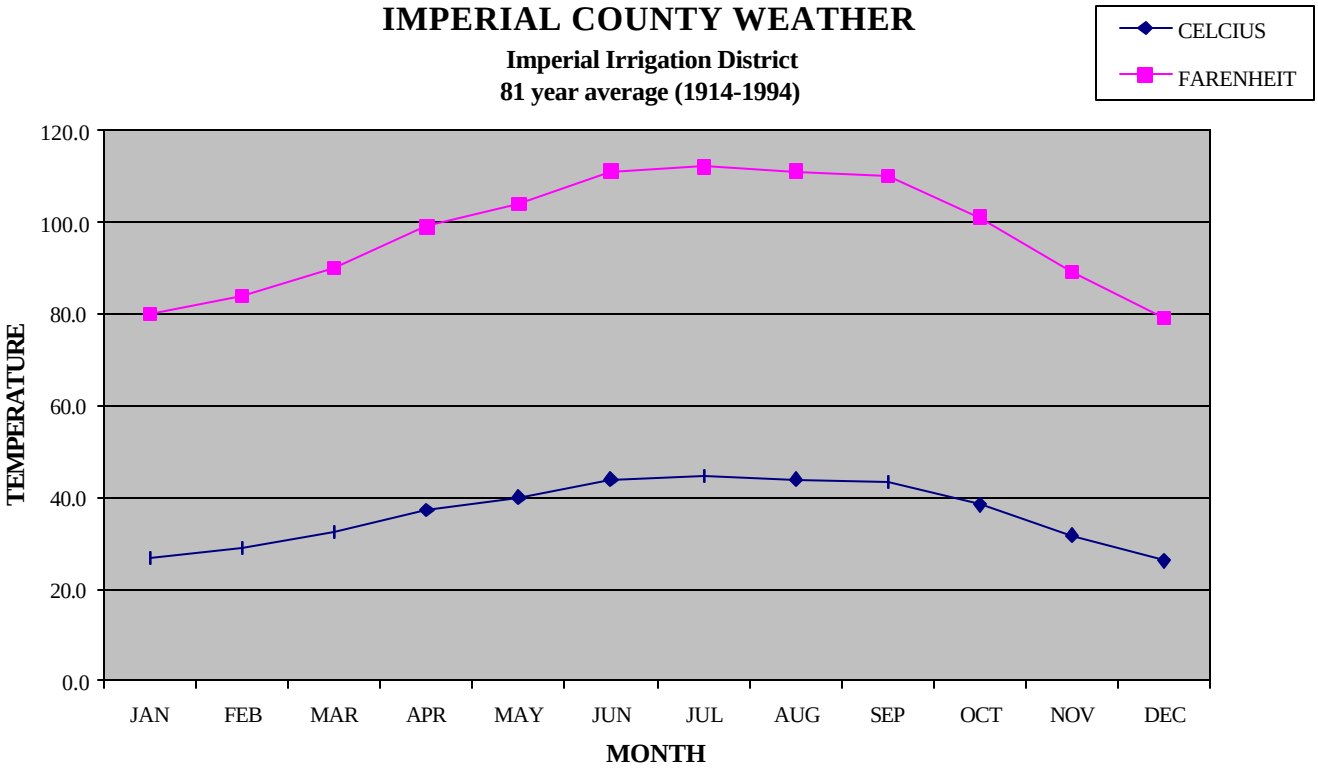
	$/HR
Motor grader	55.00
Backhoe	50.00
Water truck	40.00
Wheel tractor	35.00
Scraper	36.00
Versatile	60.00
D-6	56.00
D-8	73.00
Buck ends of field	35.00
Pipe setting (2 men)	38.00
Laser level	90.00
Work ends (disc out rotobucks)	40.00

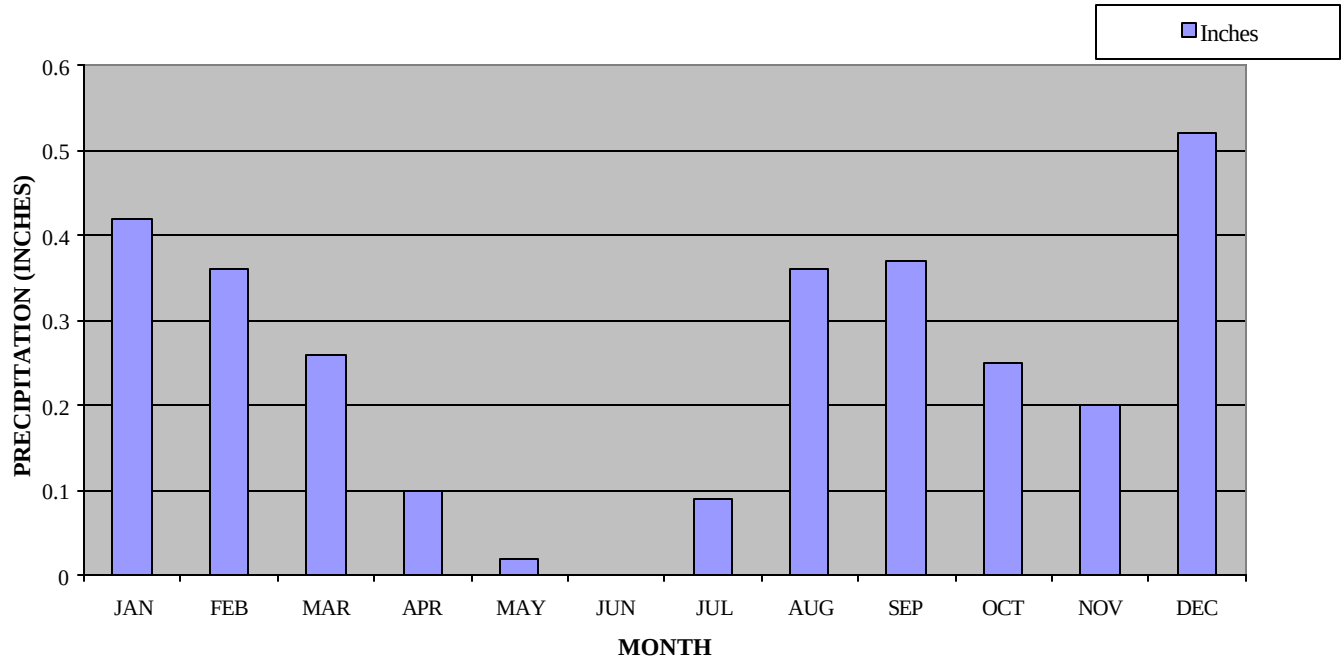
FIELD CROPS
PLANTING & HARVESTING CALENDAR
IMPERIAL VALLEY, CALIFORNIA



IMPERIAL COUNTY WEATHER

Imperial Irrigation District
81 year average (1914-1994)





IMPERIAL COUNTY SUDANGRASS HAY PRODUCTION COSTS 2004-2005

Mechanical operations at prevailing rates. Labor at $9.45 /hr. ($6.75 plus SS, unemployment, workman's compensation and fringe benefits)

Yield--6.0 tons per acre cured hay **80 Acre Field**

OPERATION	Prevailing Rate	MATERIALS Type/Amount	Cost	HAND LABOR Hours	Dollars	COST Per Acre
LAND PREPARATION						
Stubble disc/ring roller	24.50					24.50
Regular disc/ring roller	15.00					15.00
Fertilize (Injected)*	15.00	100 lb N (anhydrous)	22.00			37.00
Triplane	12.00					12.00
Mark/disc borders	10.50					10.50
Border checks	6.75					6.75
TOTAL LAND PREPARATION COSTS						**105.75**
GROWING PERIOD						
Plant	14.75	140 lb seed @ 0.60/lb	84.00			98.75
Irrigate 8x		4.00 ac-ft	64.00	2.5	23.63	87.63
Fertilize (water-run) 2x		60 lb N per cutting(UAN32)	45.60			45.60
TOTAL GROWING PERIOD COSTS						**231.98**
GROWING PERIOD & LAND PREPARATION COSTS						**337.73**
Land rent (net acres)						110.00
Cash overhead--		12 % of preharvest costs & land rent				53.73
TOTAL PREHARVEST COSTS						**501.45**
HARVEST COSTS (calculated at 5.5 tons/acre and 2 cuttings)						
Swather 2x	11.25					22.50
Rake 4x	6.00					24.00
Bale (6.0 tons)	0.70 /bale	20 bales/ton				84.00
Haul & Stack	0.27 /bale	20 bales/ton				32.40
TOTAL HARVEST COSTS						**162.90**
TOTAL ALL COSTS						**664.35**

*Injection of fertilizer not advisable following a produce crop with ample residual nitrogen

PROJECTED NET GAIN (PER ACRE)

Yield (tons/ac)	Price/ton ($) 70	80	90	100	110	120	Break-even ($/ton)
4.5	-320	-275	-230	-185	-140	-95	141
5.0	-268	-218	-168	-118	-68	-18	124
5.5	-270	-215	-160	-105	-50	5	114
6.0	-236	-176	-116	-56	4	64	105
6.5	-219	-154	-89	-24	41	106	98

IMPERIAL COUNTY SUDANGRASS CULTURE 2004-2005

Annual acreage, yields, and value of sudangrass in Imperial County, CA for five consecutive years

Year	Acres	Yield/Acre (tons)	Value/Acre
2003	30,234	4.56	$444
2002	46,211	4.43	$405
2001	51,319	5.30	$486
2000	55,045	4.90	$451
1999	65,786	4.87	$393

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

YIELD: Sudangrass yield on two cuttings is usually 5 to 6 tons per acre. Three sudangrass cuttings should yield between 7-8 tons per acre.

SOIL PREPARATION: A uniform seedbed is necessary to obtain a good stand of sudangrass. High spots in the field cause uneven irrigation and the stand will not be uniform. Low spots in the field will scald; decreasing the stand and reducing yield.

PLANTING RATES: Sudangrass should be planted at a rate of 120 to 150 pounds of seed per acre. This high seeding rate produces finer-stemmed hay that is desirable for export to Japan.

PLANTING DATES: Sudangrass may be planted from March to June with a drill or broadcaster. Planting should begin after soils have started to warm. A temperature of 65°F or above is desirable. Temperatures above 104°F reduce seed germination. Research has shown that Sudangrass (var. Piper) had 95 percent germination in 6 days at 68°F constant temperature.

VARIETIES: Certified "Piper" is the most common variety. It is high yielding and has the quality characteristics desired for the export market.

FERTILIZATION: The fertilizer requirements of sudangrass depend upon the residual soil nitrogen. Many growers take soil samples and determine the quantity of nitrogen fertilizer to use based upon laboratory results. If the soil is deficient, then 100 pounds of actual nitrogen as NH_3 is a normal rate applied pre-plant. Fifty to sixty pounds of nitrogen are usually applied to the crop after each cutting.

IRRIGATION: Sudangrass requires ample soil moisture. However, care must be taken not to over-irrigate or the sudangrass will scald if standing water is left on a field several hours during period of high heat. The first crop will require 4-5 irrigations to harvest. Subsequent crops will require 3-4 depending on regrowth potential.

WEED CONTROL: Weeds do not generally cause serious problems in sudangrass if it is planted at the appropriate time of year and the crop emerges and grows vigorously. Very few herbicides are registered for this crop. Low rates of atrazine have been used for watergrass and purslane control when heavy weeds are present. Consult your pest control advisor or Weed Science Farm Advisor for current recommendations.

PEST CONTROL: Occasionally the armyworm (*Pseudaltcia unipuncta*) will cause damage to leaves and may require insecticidal control.

DISEASES: Brown Leaf is a general symptom that has several causes. Low nitrogen, excessive flea beetle feeding and bacterial disease symptoms alone or in combination have been referred to as "brown leaf" of sudangrass.

The export market is demanding a product low in nitrates. Farmers are growing sudangrass on a low nitrogen budget. In the process, the plants move nitrogen from the lower leaves to the terminal to continue growth. The lower leaves turn a pale yellow to tan/brown in the absence of nitrogen and in the shady environment. This is a physiological condition and not a disease.

Bacterial leaf blotch is caused by bacteria (*Pantoea ananas* and *Pantoea stewartii*) and is spread by the desert flea beetle and possibly other means of transmission as well. The disease is commonly found in Imperial County, especially during July and August. Currently there is no economic control.

HARVESTING: Sudangrass may be harvested 2-5 times between May and October. Cuttings should be made when the field has 10 percent bloom or earlier depending on market demand. While waiting longer to cut increases yield, overall quality of the sudangrass is decreased. Nitrate nitrogen accumulates at a higher level in the lower portion of the stalk. To avoid nitrate poisoning in the hay crop, cut sudangrass 6-8 inches above the ground. Another method of reducing high nitrate in the hay is to swath in the afternoon and early evening hours. Nitrate begins to store from 10 p.m. and peaks in the early morning hours.

PASTURING: Feeder lambs or cattle may be pastured in the early fall. Hay quality of sudangrass at this time diminishes rapidly. If sudangrass is to be used for pasturing, do not fertilize after the last hay cutting. Delay pasturing until the sudangrass is 3 feet tall or higher to avoid the chance of prussic acid poisoning. **DO NOT** graze animals on sudangrass that has been frosted, as the risk of prussic acid poisoning is very high.

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.