

**U.C. COOPERATIVE EXTENSION**  
**SAMPLE COST TO ESTABLISH AND PRODUCE**

***SUGAR BEETS***

**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](mailto:hmeister@ucdavis.edu).

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## 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**

<u>OPERATION</u>	<u>\$/ACRE</u>
Plow.....	32.00
Subsoil 2 <sup>nd</sup> gear.....	45.00
Subsoil 3 <sup>rd</sup> 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 1 <sup>st</sup> /2 <sup>nd</sup> .....	.03cts/lb/35.00/acre

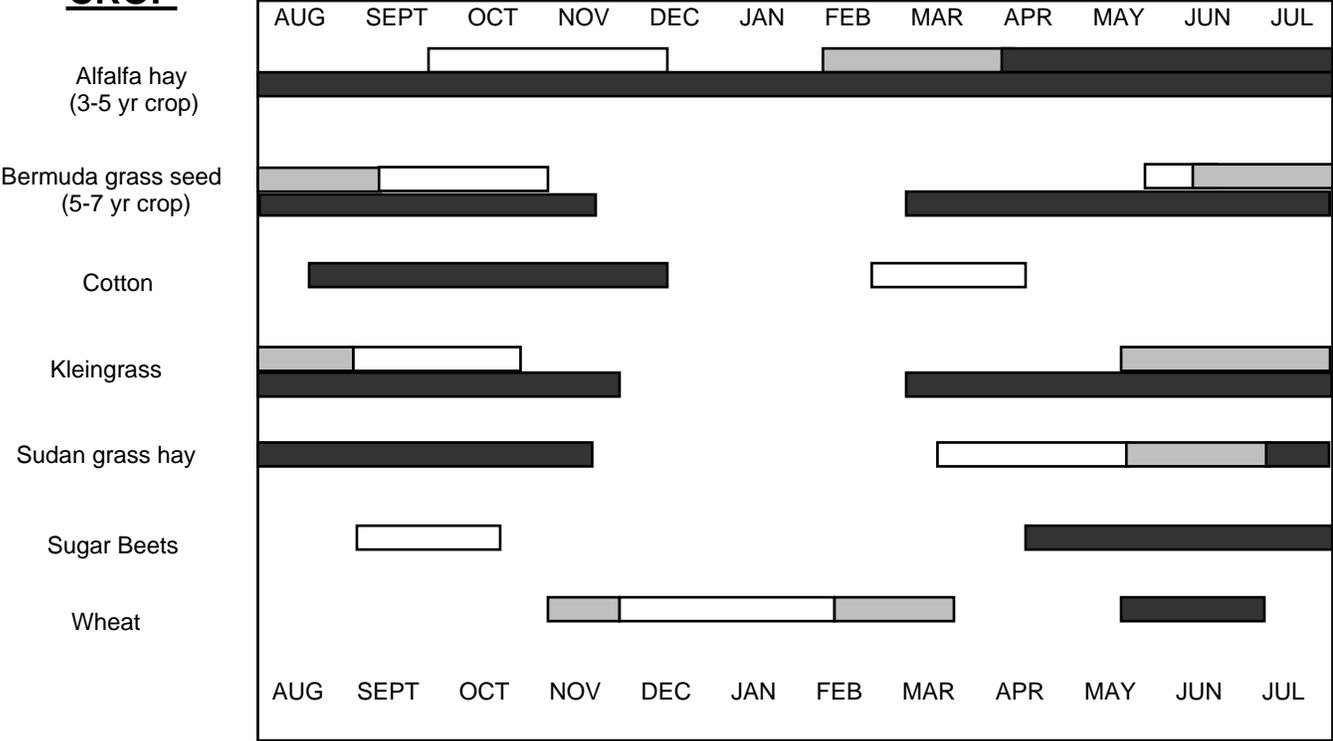
**MISCELLANEOUS RATES BY THE HOUR**

**\$/HR**

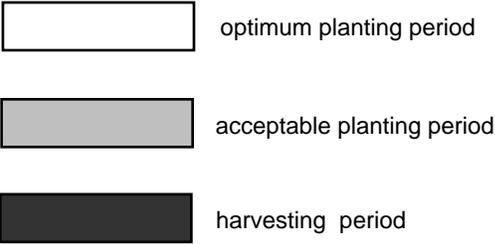
Motor grader.....	55.00
Backhoe.....	50.00
Water truck.....	40.00
Wheel tractor.....	35.00
Scraper.....	36.00
Versatile.....	60.00
D-6.....	56.00
D-8.....	73.00
Buck ends of field.....	35.00
Pipe setting (2 men).....	38.00
Laser level.....	90.00
Work ends (disc out rotobucks).....	40.00

# FIELD CROPS PLANTING & HARVESTING CALENDAR IMPERIAL VALLEY, CALIFORNIA

**CROP**

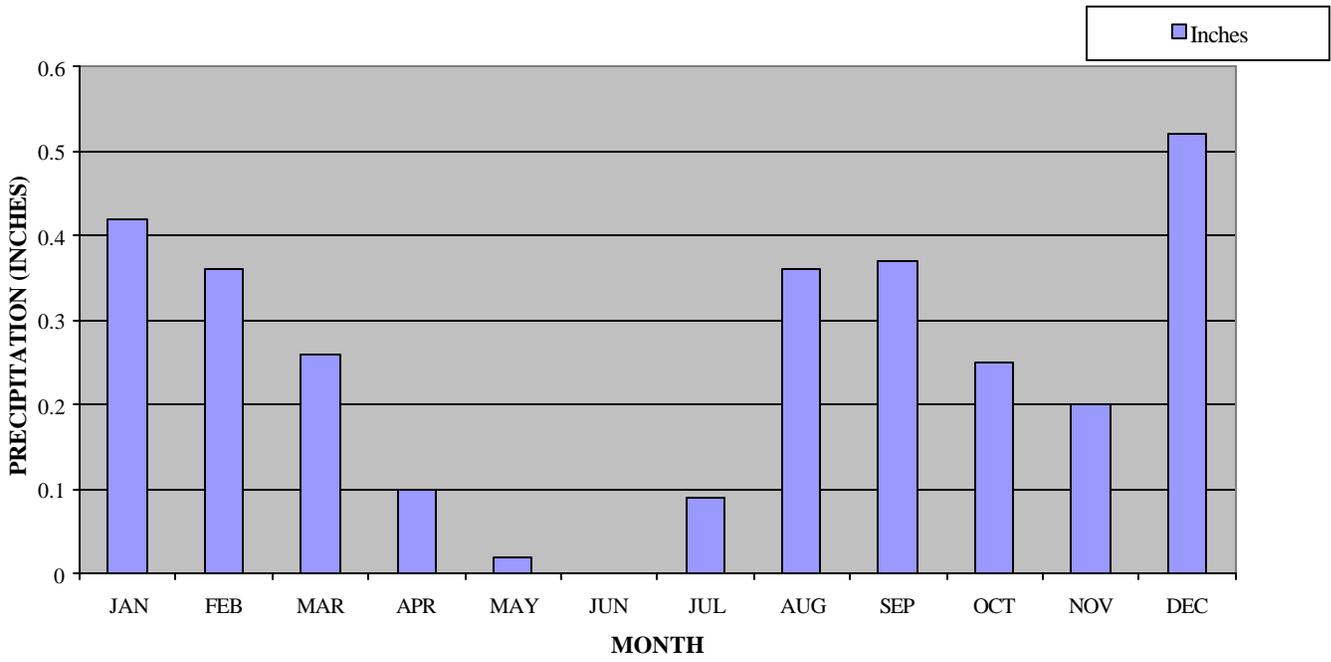
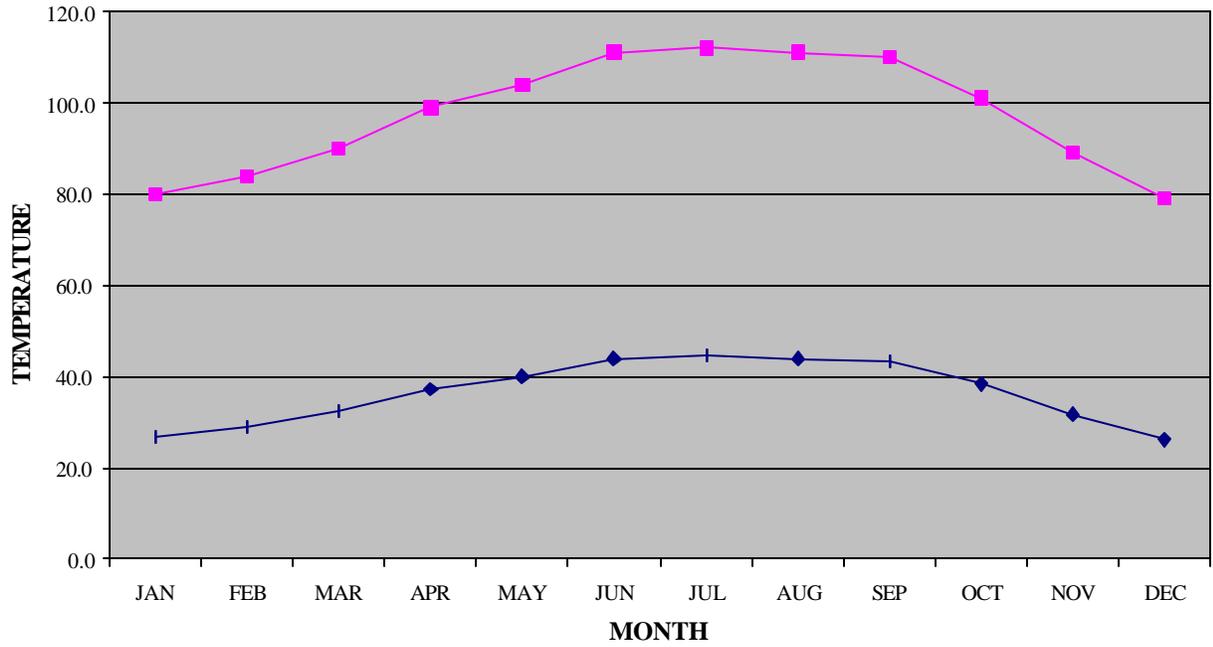
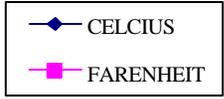


**MONTH**



# IMPERIAL COUNTY WEATHER

Imperial Irrigation District  
81 year average (1914-1994)



**IMPERIAL COUNTY SUGAR BEET PRODUCTION COSTS 2004-2005**

Mechanical operations at prevailing rates. Labor at \$8.60 /hr (\$6.75 plus SS, unemployment, workman's compensation and fringe benefits)  
Yield--42.0 tons per acre. 30-inch beds

OPERATION	Prevailing Rate	80 Acre Field		COST Per Acre
		MATERIALS Type/Amount	HAND LABOR Cost Hours Dollars	
<b>LAND PREPARATION</b>				
Stubble disc	22.50			22.50
Subsoil 2nd gear	45.00			45.00
Disc 2x / ring roller corrugate	15.00			30.00
Flood	14.00	Water 1.0 ac-ft	16.00 1 8.60	14.00
Disc 2x	13.00			26.00
Fertilize	8.00	250 lb 11-52-0	37.50	45.50
Triplane	12.00			12.00
List	16.50			16.50
Pre-irrigate beds		Water .5 ac-ft	8.00 1 8.60	16.60
Lilliston beds	14.00			14.00
<b>TOTAL LAND PREPARATION COSTS</b>				<b>266.70</b>
<b>GROWING PERIOD</b>				
Plant and	17.00	Seed 3.0" spacing	52.00	69.00
inject insecticide	2.00	Admire/Lorsban	22.00	24.00
Herbicide 3x ground	12.50	Herbicide	75.00	112.50
Cultivate 2x	16.00			32.00
Fertilize(dry) 2X	17.00	160 lb N(am-nitrate)	68.80	102.80
Insecticide 6x(4air,2 grd)	8.50	Insecticide	80.00	114.00
Disease control 2x grd	12.50	Fungicide(sulfur)	8.00	33.00
Irrigate 17X		Water 5.5 ac-ft	88.00 5 43.00	131.00
Work ends 2x	6.50			13.00
<b>TOTAL GROWING PERIOD COSTS</b>				<b>631.30</b>
<b>GROWING PERIOD &amp; LAND PREPARATION COSTS</b>				<b>898.00</b>
Land rent (net acres)				175.00
Cash overhead	13 % of growing period, land prep & land rent			139.49
<b>TOTAL PREHARVEST COSTS</b>				<b>1,212.49</b>
<b>HARVEST COSTS</b>				
Digging	2.65 per clean ton	Yield -	42 tons/acre	111.30
Hauling	2.50 per clean ton			105.00
<b>TOTAL HARVEST COSTS</b>				<b>216.30</b>
<b>TOTAL ALL COSTS</b>				<b>1,428.79</b>

In order to determine the value of a ton of sugar beets, several variables must be known:

- 1) percent sugar
- 2) sugar price to grower (varies with % sugar)
- 3) contracted harvest date (premium price for early dig; price reduction for late dig),
- 4) variable trucking charges due to distance, and
- 5) grower agreements on digging pools



## IMPERIAL COUNTY SUGAR BEET CULTURE 2004-2005

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

Year	Acres	Yield/Acre (tons)	Value/Acre
2003	25,617	42.4	\$1,816
2002	24,714	40.8	\$1,659
2001	26,300	41.6	\$1,443
2000	31,475	38.6	\$1,432
1999	33,386	40.7	\$1,774

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

**YIELD:** Sugar beet yields and sugar levels are increasing due to better varieties and management practices. Craig Elmore of Desert Sky Farms holds the current sugar beet yield record in the Imperial Valley with 21,095 lbs. sugar per acre on 69.85 tons of beets per acre at 15.10 % sugar.

**BED PREPARATION:** Fields are generally pre-irrigated twice; once flat and once after the beds are listed. This process aids in leaching salts and removing weed populations. Lillisting the bed before planting assures a crumbly seed bed necessary for adequate seed germination. A concerted effort to assure a healthy, uniform stand is imperative to obtain maximum yields.

**SEEDING RATE:** Sugar beets are grown single line on 30-inch rows. Some early season fields are planted at a 2-3-inch spacing; later fields are precision planted with seed spaced 4-5 inches apart. Seed is now sold in units of 100,000 seed. Seed prices depend upon fungicide and insecticide treatments, seed size, seed quality, variety and quick prime treatment. Precision planting improves the overall stand by reducing the need for thinning and increases overall plant uniformity and population. Field observations indicate that yield is reduced more by too few plants than too many plants per acre. Planting depth is normally  $\frac{1}{4}$  to  $\frac{1}{2}$  inch. Many kinds of planters are used including vacuum planters.

Early plantings during extremely hot weather will require a higher seeding rate to achieve the proper stand. Planting when soil temperatures are high greatly increases the incidence of seed rot, damping-off and insect injury. However, new seed treatments have reduced the problem significantly.

**PLANTING / HARVEST DATE:** The planting season begins in September and continues until mid-October. Harvest starts roughly April 15 and ideally ends by the 1<sup>st</sup> of August. Late-planted fields tend to be more expensive due to additional costs for irrigation, additional pest control, and for losses due to root rots and sugar beet cyst nematode. However, sometimes the greater expenses on late fields are often offset by higher beet yields.



**VARIETIES:** There are several sugar beet varieties approved by a seed evaluation committee for use in Imperial Valley. “Phoenix” performs well for early plantings and “Beta 4430” is commonly planted for the remainder of the season. Varieties should be tolerant to *rhizomania*, a destructive viral disease. The California Sugar Beet Association will soon release sugar beet cyst nematode tolerant varieties upon approval.

**FERTILIZATION:** All phosphate fertilizer should be applied before listing the beds. Apply 1/3 of the required nitrogen fertilizer with phosphate in a pre-plant application, 1/3 at thinning and the final 1/3 before December 1st. Some growers split the nitrogen into two applications on the early-planted fields. Late applications of nitrogen will reduce sugar percentage and purity. Many types of nitrogen fertilizer are used for sugar beet production.

With vegetable rotations, sugar content and purity are generally lower. Land formerly in vegetable crops tends to have high residual nitrogen. This needs to be accounted for in planning the fertilization program.

**IRRIGATION:** The crop is normally furrow irrigated up initially and may require watering back within 4 to 5 days to get a stand. Never allow the crop to wilt or suffer from shortage of water. Fifteen to 17 irrigations may be required during the season depending on soil type. Beets should not be irrigated so frequently that prolonged periods of soil saturation occur, as this practice will encourage root rot organisms. The last irrigation should be applied at least 30 days prior to harvest in April, 25 days in May, 20 days in June, and 15 days in July. In late June and July on quarter-mile irrigation runs, early evening irrigations on a 7-9 day schedule is suggested.

**PEST CONTROL:** Pest populations vary from year to year and pest control costs varies accordingly. A number of insects and diseases may be a problem during the growing season. Growers planting early should exercise all caution against insect damage by inspecting fields frequently and carefully. Crickets, flea beetles, cutworms and armyworms occur as seedling pests and are especially damaging in early plantings. From January to March the green peach aphid is a primary pest. Spider mites and leafhoppers occur as late-season pests. Armyworms can increase the incidence of *Rhizopus* root rot (*Rhizopus stolonifer*) by creating points of entry for the fungus.

Sugar beet cyst nematode (SBCN) (*Heterodera schachtii*) is a serious pest that threatens the Imperial Valley sugar beet industry. Until recently, a crop rotation program consisting of growing sugar beets 4 out of 10 years has been successful in reducing the SBCN. The industry is now encouraging growers not to plant beets “back to back” due to a higher incidence of fields showing SBCN infestations. Nematode-infested fields must be rotated to non-host crops. Host crops such as broccoli, cabbage or cauliflower should not be rotated with sugarbeets for a minimum of 3 years. Other potential weed host such as wild beets should be controlled in other crops. Growers should carefully clean all nematode-infested machinery when moving between beet fields.

*Rhizomania* is a viral disease caused by Beet Necrotic Yellow Vein Virus (BNYVV) and vectored by a soilborne fungus (*Polymyxa betae*). The disease reduces sugar production significantly. The only control is to use partially resistant varieties and to meticulously clean all equipment coming into fields.



Rhizomania-resistant varieties are available, but plant resistant breaking strains of BVYVV have been detected in the Imperial Valley.

Various types of fungal root rots (*Phytophthora drechsleri*, *Pythium aphanidermatum* and *P. ultimum*) are prevalent on sugar beets. Bacterial vascular necrosis and rot (*Erwinia carotovora*) is also very common. Root rots are extremely prevalent in late season beets and as much as 10 percent of the beet roots may be affected. Varieties with higher rot tolerance should be planted for late July harvest. Proper water management is extremely important in combating root rots. *Rhizoctonia solani* causes damping-off, as well as root and crown rot. Powdery mildew (*Erysiphe polygoni*) is a common foliar disease that can be effectively controlled with fungicides.

**WEED CONTROL:** UpBeet is used by ground for the first weed control operation. UpBeet in combinations with other herbicides like Betamix or Stinger are used depending on the weed problem for the second application. The expense of hand weeding is almost prohibitive. Pre-irrigation, cultivation and herbicides are relied on for weed control.

**HARVEST:** Pinch-wheel beet harvesting machines recover 1-2 tons of beets more per acre than spike-wheel harvesters due to the method of root extraction. Also, pinch-wheel harvesters can be used to harvest fields a few days earlier after the last irrigation than spike wheel harvesters can.

Pasturing sugar beet tops with cattle was once common practice, however, with new harvesting techniques only the leaves remain. The sugar beet crowns are taken with the sugar crop. As a result, pasturing is no longer profitable.



## 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 or 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, brussels 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.