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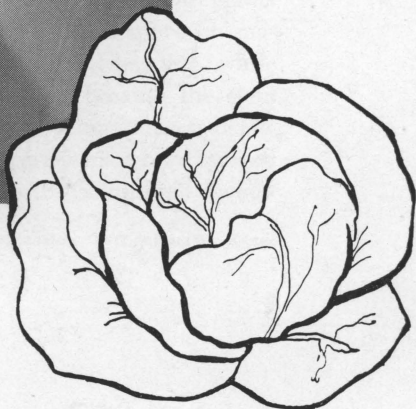
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GROWING

# Lettuce

IN THE LOWER  
RIO GRANDE VALLEY



TEXAS AGRICULTURAL EXTENSION SERVICE  
G. G. Gibson, Director, College Station, Texas

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# *Growing Lettuce . . .*

## IN THE LOWER RIO GRANDE VALLEY

*W. H. Friend and George R. Williams\**

**L**ETTUCE AND TOMATOES share top honors as America's favorite fresh vegetable. The increasing popularity of lettuce is due to a fuller appreciation of the dietetic value of leafy vegetables, and to general fondness for crisp salads. The 1953-54 winter lettuce crop in the Southwest was valued at 32 million dollars. Texas produced about 1,953,000 crates of lettuce in 1953-54.

Texas farmers like to grow lettuce because of its income potential. In the Lower Rio Grande Valley growers try to have crisp lettuce of desirable sizes and quality for markets in the Midwest and East during December. This is the season of least competition from other production areas. Planting usually extends over an 8-week period so that head lettuce will be available from Valley shipping points from December 1 through March.

The creation of the Great Lakes variety, the use of dry field-packing, half-crate cardboard cartons and vacuum cooling have opened up new possibilities. The retailer and consumer acceptance of dry-packed, vacuum-cooled lettuce in cardboard containers has changed the handling of this highly perishable vegetable. This new method of preparation is expected to lower costs.

### *Climatic Requirements*

Lettuce is a cool-weather crop and thrives best when temperatures range around 60 degrees, 70 maximum and 50 minimum. The plants are more susceptible to both heat and cold as the heads approach maturity. Relatively low air temperatures encourage solid heading, while high temperatures favor bolting and loose heading because the stem grows larger. Young lettuce plants will endure temperatures below freezing without injury, but heads nearing maturity may be damaged to the extent that they will not hold up in transit. Conditions accom-

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panying the freeze and the rate of thawing materially affect losses caused by low temperatures.

## *Soil Requirements*

Lettuce is grown successfully on soils ranging from clays to sandy loams. Soils with appreciable quantities of clay are preferred for the fall crop which begins while the weather is hot. These heavier soils retain more moisture than the coarser textured soils. Surface soil temperatures favorable to lettuce seed germination are maintained more easily in soils which contain some clay. However, clay ground is not workable soon after rain, and land preparation should be completed while the soil is dry. The lighter, well-drained soils of the Valley are used for the production of main crop winter lettuce planted during October. Soil which crusts over or "puddles" following a rain may interfere with the emergence of the seedlings. Lettuce attains its highest quality on fertile loamy soil that is well drained and supplied with organic matter. It can be grown on soil having an alkaline reaction, where the phosphorus needs of the crop are supplied by superphosphate. Lettuce is not as tolerant of salt and alkali as other vegetable crops. Since soil moisture control is so important, lettuce should be grown only on land which is graded properly for irrigation.

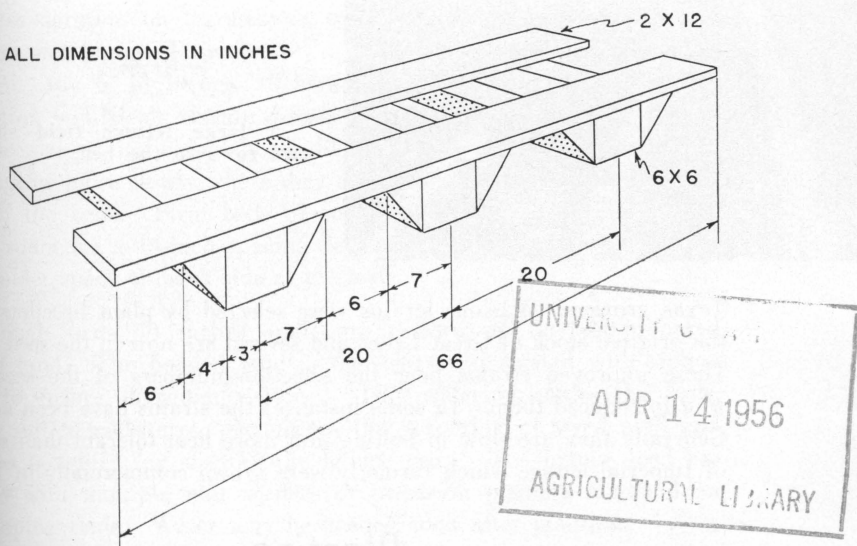
## *Place in the Rotation*

Lettuce is relatively shallow-rooted and should follow some deep-rooted crop in the rotation. It should not follow other members of the lettuce family, such as endive and dandelion. Sweet corn, field corn, cantaloups, tomatoes, field peas and even cotton are cash crops which can rotate with lettuce.

## *Land Preparation*

Aside from the composting of residue from a previous crop, land preparation should include grading or floating the land to a slight, uniform slope. Level land is easy to irrigate provided the layout is engineered to fit the amount of available water and the infiltration rate of the soil. Poor stands, uneven development of the crop, light yields, undersized heads and a high incidence of "slime" disease may result from faulty land preparation. Where leveling involves the moving of appreciable quantities of soil, it should take place fully a year before starting the lettuce project. A crop less costly should be grown on recently leveled land while it is in the "swelling" and "settling" stage.

NOTE: ALL DIMENSIONS IN INCHES



Floats made of 2' x 12's, spiked onto 6" x 14" runners that are 3 feet long, are used to shape up rough beds for single-rowed planting.

Lettuce is always planted on raised beds so that irrigation water will not wet the undersides of the plants. The beds may vary in height from 4 inches on light sandy soils to 6 inches on clay soils which sub-irrigate well. The beds measure 18 to 20 inches shoulder to shoulder. The water furrows are 18 to 20 inches across at the top. A limited amount of single-rowed planting is practiced where the seed are planted on the tops of beds 4 to 6 inches high and spaced 19, 20 or 30 inches apart.

The rough beds are made with multiple listers that make two or three furrows (one or two beds) at a time. The rough beds or ridges are shaped with sleds just before planting, or with the planter sleds at seeding time. On soil which is inclined to form hard clods, a special trip over the beds with a pulverizer or clod crusher should precede the planting.

Phosphate fertilizer should be applied deep in the beds before the lettuce crop is planted.

## Varieties

Great Lakes has become the most important variety in many of the lettuce growing areas because of its ability to produce good yields of marketable heads under adverse conditions. It is preferred by



A large lettuce field showing two rows to the bed.

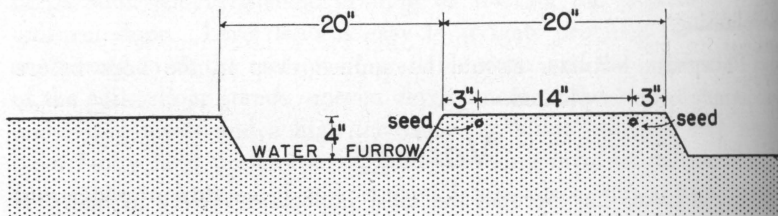
Texas growers. Various strains were selected by plant breeders from the original stock of Great Lakes and several are now in the seed trade. These improved strains bear the selection numbers of the seedsmen who introduced them. In some instances the strains have been named. Generally they are slow in bolting and more heat tolerant than strains of Imperial lettuce which formerly were grown commercially in Texas.

## Planting

Lettuce should be planted on pre-irrigated land, as water causes the soil to settle and encourages germination and emergence of numerous weeds which can be easily destroyed at planting time. On moist clay loam soil, lettuce seed should be planted  $\frac{1}{4}$  to  $\frac{1}{2}$  inch deep. Deeper planting up to 1 inch is preferred on light or cloddy soils where the crop is planted dry and watered up.

The amount of seed required to plant an acre of land to double-rowed lettuce ranges from  $1\frac{1}{2}$  to 2 pounds. Stand is so important for maximum production that generous amounts of viable seed are used, even though this may call for costly "blocking out" and hand thinning of the seedlings.

Lettuce seed for the fall crop do not germinate at high temperatures unless the soil is well aerated. Leaving the seedbed slightly cloddy



Pair-rowed planting on flat beds 40 inches from center to center with rows of lettuce plants 14 inches apart.

promotes aeration on the heavier types of soil. Planting should be done on well-prepared, settled beds. The preferred distance between pairs of rows is 14 inches. Where the rows are too close together, cultivation is difficult, certain diseases are more likely to cause trouble, and the size of individual heads likely will be small. However, the plants grow more slowly where they are too close to the edges (shoulders) of the beds. Firm beds of sufficient width (20 inches) allow ample room for a 14-inch spacing between pairs of rows and 3 inches of shoulder space on each side of the beds.

Rough beds 40 inches apart are thrown up on well-prepared graded land. The bedded land is then furrow irrigated with siphon tubes to insure thorough soaking. This watering settles the beds, lowers soil temperatures, encourages the sprouting of weed seed and supplies moisture for starting the lettuce crop. The lettuce seed are planted with multiple unit seeders or precision planters mounted on bed-shaping sleds. Water may be needed soon after planting.

Another common method is to plant the seed on loose dry beds and water up the crop. The beds should be compacted prior to planting by dragging them off with a float made of 2" × 12" timbers with 6" × 6" runners, spaced 40 inches apart.

The time required from seed to harvest is 85 to 120 days, depending on weather conditions. The early fall and late winter crops develop within the shortest periods.

## *Irrigation*

Since lettuce is grown during a season of inadequate rainfall, the commercial crop is grown under irrigation. However, overwatering should be avoided, especially when the plants are small and as the heads near maturity. Too much water increases losses from disease. Generally water should be applied when rainfall does not supply the equivalent of 1 inch every 7 to 10 days. The highest yields of quality lettuce are produced with soil of uniformly high moisture content throughout most of the head-forming period. Irrigation or rain as the crop nears maturity and following a period of moisture deficiency may cause the heads to be too leafy and loose.

Siphon irrigation gives some control over the flow of water and makes it possible to subirrigate the beds without wetting the lower portion of the plants.



Water is very important in the production of lettuce, but it should be kept under control. Here, siphon tubes regulate the volume of water that flows down each furrow.

## *Cultivation*

Lettuce is cultivated primarily to control weeds, but some stirring of the soil may be needed to break surface crusts and to fill cracks. A tractor-drawn cultivator can open up the water furrows, and pile soil on the shoulders of the beds following final thinning. Deep tillage may seriously affect plant growth. Cultivation late in the season must be done carefully to avoid injury to the plants.

For economy in hand labor, precision cultivation near the plants may be done with cultivators equipped with half sweeps. The cultivators must be set up to work the same number of beds as were seeded at one time. Duck-foot sweeps or small disks may be used for the first two cultivations.

## *Weed Control*

Weeds along the rows of seedlings may be quite a problem, especially when early fall lettuce emerges during the careless weed season. Pre-emergence applications of selective herbicides, such as Chloro IPC, have been tried in the Valley. Under ideal conditions, the results were satisfactory.

## *Thinning*

Precision thinning of seedlings is essential in successful head lettuce production. The job should be completed before the plants begin to crowd. The time between seeding and thinning may vary



from 3 weeks during warm weather to as much as 8 weeks for the portion of the crop that is planted after the air and soil have cooled considerably. The usual practice is to block the plants out at 12 to 14-inch intervals in the rows. Special short-handled hoes are used for blocking, and the clumps are thinned to one plant. If two or more plants are left, it is equal to a skip, since crowded plants do not produce marketable heads. As a general rule, close spacing (12 to 14 inches) is used for the plants that mature during March and April; while wider spacing is used for lettuce to be harvested from October through February. Hand weeding usually is performed at the time of thinning, but some growers prefer to weed before the plants attain thinning size (about 1½ to 2 inches high.) Thinning is the most laborious and costly job in growing lettuce and should be supervised closely.

The crop should be cultivated, the middles “swept” out to facilitate irrigation and water applied to firm the soil about the plants immediately following thinning.

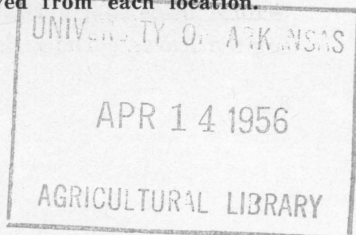
## Fertilizers

All fertilizer programs should be based on soil analysis. Contrary to the general concept about lettuce fertilization, phosphate is important. Generally 60 to 80 pounds of  $P_2O_5$  per acre should be applied in the beds prior to planting. This can be done with ordinary cotton planters using wingless middlebreakers to split the beds and place the phosphate several inches below the general ground level. Watering and sledding firms the beds over the phosphate before the seed are planted.

Nitrogen also is important for high yields of size 4 heads. Previous use of the land and the nitrogen content of the soil largely determine the amount of this element to be applied. Sixty pounds of nitrogen per acre applied on old crop residue before it is turned under may supply the nitrogen needs of the lettuce crop. However, an additional 20 or 30 pounds of nitrogen per acre as a sidedressing sometimes will be needed just prior to irrigation following thinning. Ex-



**Precision thinning is one of the essentials in successful lettuce production. All but one plant must be removed from each location.**





Dry-field packing in cardboard containers and vacuum cooling are some of the recent improvements in growing and marketing lettuce.

cessive applications of nitrogen, especially where it is not "balanced" with phosphate, may cause the heads to be "puffy" and "leafy." Late applications are more likely to cause loose heading than similar amounts applied about thinning time. Most Valley soils contain adequate amounts of potash. For detailed information refer to Leaflet 222, available from county agents.

## *Insects and Diseases*

Leaf-eating caterpillars and red aphids are the most common pests in Texas lettuce fields. White grubs, wireworms, root aphids, cucumber beetles and false chinch bugs occasionally damage lettuce. The virus that causes aster yellows in lettuce and carrots is carried by a species of leaf hopper.

Information on the control of most insect pests that attack lettuce appears in L-255 "Guide for Controlling Insects on Vegetable Crops" which may be obtained from county agricultural agents.

Downy mildew is probably the most common disease in Texas lettuce fields. Yellowish or light-green spots appear on the upper sides of the leaves. The lesions usually are bounded by the veins, and a

dense, white, fluffy patch of fungus appears on the undersides of the discolored areas. The spores are spread rapidly to all parts of the field by wind during foggy or showery weather. Spraying or dusting with maneb or zineb should begin before the infection becomes widespread.

Slime caused by slimy soft rot may affect leaves which have been damaged from any cause such as tipburn. High, well-drained beds and good water control aid in the control of slime.

Other diseases that sometimes affect lettuce are damping off, drop, bottom rot, big vein and mosaic.

Tipburn of lettuce is caused by unfavorable growth conditions such as hot, dry weather; but the Great Lakes strains are very resistant.

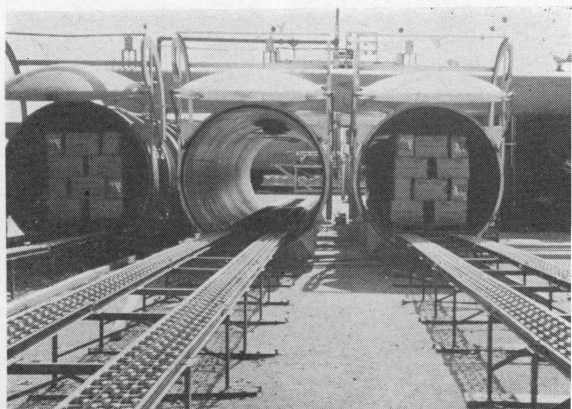
Bolting (premature seed stalk formation) may occur when lettuce plants have been subjected to high temperatures over a long period.

## *Harvesting and Marketing*

Harvesting usually is done by crews employed by the shipper who buys the lettuce. Much of the crop is dry-packed in half-crate cardboard cartons by expert lettuce trimmers and packers who cut, trim and pack the heads in the field. The crates are stapled shut and are stacked on pallets for hauling to a vacuum-cooling plant. The cartons are unloaded with fork lift trucks and placed on "trains" which run into the vacuum-cooling chambers. The heads can be cooled throughout to near the freezing point in less than 30 minutes. This rapid cooling helps to delay deterioration. However, it does not restore quality lost during the cutting, packing and hauling procedures.

Much of the crop is hauled to the sheds in field crates for trimming, grading and packing. Where shed packing is done, the heads are placed in paper-lined wooden crates with ice.

Vacuum cooling plants reduce lettuce temperatures to 32 — 34 degrees Fahrenheit in about 30 minutes.



Cutting should begin when a high percentage of heads has reached the firm stage. It is best to harvest when the plants are slightly wilted as water-gorged plants are brittle and easily bruised or broken. The plants should be cut just below the groundline with special "knives" that resemble large asparagus cutters. Assistants to the packers trim off unwanted leaves.

Harvesting should be done at night during hot weather if quality is to be maintained. High-quality production and strict adherence to grade standards are essential to the development and maintenance of a steady demand for head lettuce.

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