# CORN for GRAIN

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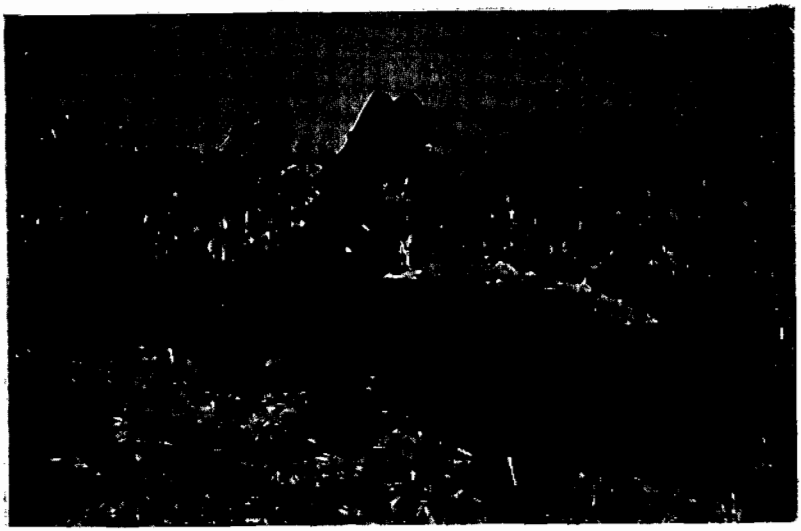

in

# Stanislaus County

UNIVERSITY OF CALIFORNIA
Agricultural Extension Service
Stanislaus County

# CORN AS A GRAIN CROP

## ADVANTAGES

Fits well into rotation program.

Not subject to nematode or soil diseases.

No pest control needed.

Good local market.

## REQUIREMENTS FOR A GOOD CROP

Fertile soil.

Nitrogen fertilizer.

Careful farming.

## REQUIREMENTS FOR A GOOD PROFIT

Better-than-average yields.

Lower-than-average costs.

Special equipment and storage facilities.

Careful marketing.

# CORN FOR GRAIN IN STANISLAUS COUNTY

by
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Hybrid field corn is a crop that grows well in Stanislaus County. It is not subject to the wilt diseases of melons, blackeye beans or alfalfa, and is resistant to nematodes. Many tons of this popular feed crop are shipped into this area each year from the Midwest for feeding poultry, dairy cattle and other livestock at a shipping cost of about $15 a ton.

Locally grown corn should find a ready market as ear corn for cattle (corn and cob meal have approximately the same feed value as rolled barley); shelled corn for poultry, and probably most important of all, as a silage crop where it produces more cattle feed per acre than any crop except alfalfa. The feed value of an acre of corn silage is roughly twice that of the grain that would be produced from the same field.

Corn is not a high income crop. Good management is necessary to obtain "the better-than-average yields at lower-than-average costs" required to make the crop profitable. Proper storage facilities appear to be necessary in order to keep from selling during the harvest season when prices are at their lowest point.

## SOIL REQUIREMENTS

Corn will grow well on any productive soil, but top yields require a deep, well-drained soil. Yields on less fertile soil can be increased by heavy nitrogen fertilization, but satisfactory crops cannot be grown on land which is quite sandy, too heavy or too alkaline in nature.

## SEEDBED PREPARATION

Plowing seems to pay off in higher yields. (Disking is a second choice). A light harrowing is needed to complete seedbed preparation. Rolling is often helpful to insure a firm moist seedbed. On compacted soils, chiseling or subsoiling when the land is dry will result in better crops.

## VARIETIES

Most seed companies have hybrid varieties which will produce well in this area. It has not been possible to test all of these nor is it our aim to do so. The varieties listed can be recommended to do well on the basis of test plots conducted by the Agricultural Extension Service and observations of commercial plantings throughout the county. There are probably others which are equally good.

The varieties of corn that will produce the highest yields of silage or grain are those which will use the entire growing season that is available. The maturity date should be early enough so the corn can be harvested before the rainy season. Ear corn will store safely at 20% moisture and shelled corn below 15% moisture.

### Selection of Varieties According to Maturity Range

The early-maturing or short-season varieties are desirable where late plantings are to be made or where early harvest is desired. A farmer also might plant several varieties of different maturity ranges in order to spread out his harvest and minimize harvest loss caused by grain being too dry at time of harvest.

The late-maturing varieties can be used best for early plantings. These usually will yield more than the shorter season varieties. In general, most of the grain production in the state is from the varieties from the medium-early or the medium-late classes.

## Selection of Variety for Silage

In general, varieties which are good grain producers are good producers of forage for ensiling. Considering that silage is harvested at about 67% moisture for the total plant, you can use a longer maturing variety for silage production than you would have to use for grain production under the same conditions.

## Days to Maturity

In the following list, varieties are classified according to the number of days that the plant would normally take to produce mature grain at 15% moisture. In order to get the approximate number of days to produce silage at 67% moisture for the total plant, you would subtract about 35 to 40 days from this figure.

## MATURITY CLASSIFICATION AND CERTAIN CHARACTERISTICS OF COMMERCIALLY GROWN VARIETIES

**Very Early** — Approximately 120-130 days to mature grain at 17-20% moisture.

| | |
|---|---|
| Kingscrost KS6<br>Kingscrost KR2 | These varieties are recommended when planting is late or when planting is early and early harvest is desired. As might be expected, yields are generally lower than those of longer season varieties. |

Medium-Early 135-140 days to mature grain at 15-20% moisture.

| | |
|---|---|
| Pioneer 352 | Good grain variety, generally adapted. Low ear placement. |
| Pfister 347 | Good grain variety, generally adapted. |
| Kingscrost K3A | About average in performance. |
| Kingscrost KY4 | Slightly earlier than K3A |
| DeKalb 459 | Slightly below average Fusarium tolerance. Stalks tend to be brittle when mature. |
| DeKalb 450 | Still relatively new in the state. Has good stalk quality. |

Medium-Late 140-145 days from planting to produce grain at 17-20% moisture.

| | |
|---|---|
| Pfister 383 | Good Fusarium tolerance. |
| Kingscrost KY7 | For grain or silage. Good Fusarium tolerance. Tends to be relatively tall. |
| Pioneer 300 | May be below average in Fusarium tolerance. For grain or silage. |
| Pfister 403 | Relatively new, but looks fairly good. |

| | |
|---|---|
| Late | Approximately 150-160 days from planting to mature grain at 17-20% moisture. |
| DeKalb 1002 | Good silage variety but may lodge. For grain, it has disadvantage of stalk breakage if harvested very dry. |
| Pioneer 302 | Good grain and silage variety. |
| Pioneer 505 | (White-seeded) Good silage variety. |
| Pfister 485 | Primarily a silage variety but may do all right as a late grain variety. |
| Texas 30 | Generally later than other varieties in this group. Main use in this area appears to be for "single-crop silage." Very tall plants with high ear placement. |

The planting dates listed above are based on "normal seasons." If average temperatures are low during the growing season, corn planted near the deadline date may not mature properly. This means a smaller crop and immediate usage of the corn or some type of drying to prevent spoilage.

Plant "late" and "medium-late" varieties May 7 to May 20. Even so, the "late" varieties sometimes cannot be harvested before the rainy season. "Medium-late" varieties are usually a little safer. "Medium-early" varieties should be planted by June 20 for satisfactory harvest. Yields from double-cropping are not usually high enough to make the crop profitable.

On the west side of the county, corn matures 2 to 3 weeks later than in the Modesto-Turlock area and this must be considered in selecting a variety.

PLANTING

Make certain the soil has warmed up after rains or preirrigation. Plant the seed an inch or two into the moisture, depending on soil type. Rows should be 36 to 40 inches apart. (Most mechanical pickers are set for 40 inches and rows which are too close often result in excessive harvester losses.)

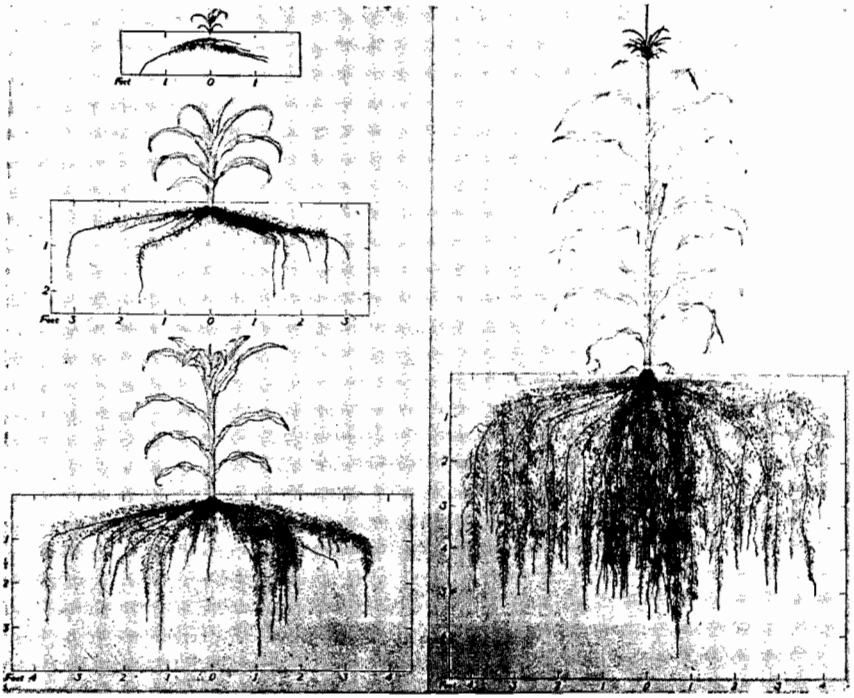
A good corn planter is recommended in order to get a proper stand. Spacing tests at Davis have demonstrated that plant spacings of 9 to 12 inches give highest yields where rows are 40 inches apart. Normally, about 15 pounds of seed are required per acre. Adjust the planter on hard ground to insure proper spacings. Seed spacings of 7 to 8 inches will usually give you the desired stand with allowance for losses from poor germination, insects, etc.

Seed is the cheapest part of growing the crop. Make certain that you buy the best seed available.

IRRIGATION

Preirrigation is usually necessary. Corn is a shallow-rooted crop during its early growth and frequent, light irrigations are needed. The first irrigation should be delayed until the plants are about knee-high. (If small plants are flood-irrigated, it often stunts their growth).

Plenty of moisture should be available during tasseling and silking. Three irrigations, 10-14 days apart, are usually needed at this stage. Good soil moisture should be maintained until the corn is in the hard dough stage.



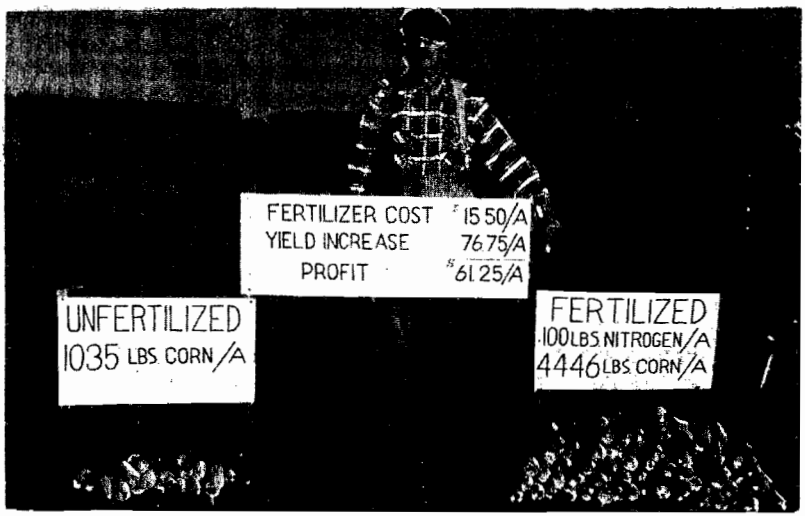
Development of the corn root system at two weeks after planting (upper left); four weeks (center left); six weeks (lower left); and maturity (right). Taken from Nebraska Agricultural Experiment Station Research Bulletin 161.

A knowledge of the growth of the corn root system shows the reasons for shallow cultivations and frequent irrigations. The rooting habits also show why there are advantages of side-dressing or drilling fertilizers to have them readily available when the plants are small and growing rapidly.

## WEED CONTROL

Weeds should be controlled by cultivation when they are small. From one to three timely, shallow cultivations are usually needed, depending on the weeds present. Small weeds in the row can be effectively controlled by "throwing soil" toward the rows with the cultivator knives. However, no more cultivation should be done than is necessary for weed control. Cultivation, itself, does not conserve moisture unless it kills weeds. 2,4-D can be used to kill broad-leaved plants in the row but is not recommended unless cultivation will not do the job.

## FERTILIZATION




Corn is a heavy nitrogen feeder. From 75 to 100 pounds of actual nitrogen per acre is recommended from any of the simple nitrogen fertilizers such as sulfate of ammonia, nitrate of ammonia or ammonia gas. When land has just come out of alfalfa or if fertilized with manure, these amounts may be cut in half.

Fertilizers can be applied before planting and worked in, side-dressed at planting time or side-dressed when the seedlings are several inches tall. In general, earlier applications are better.

Nitrogen is needed to decompose corn stalks or other non-nitrogenous crop residues. From 40 to 50 pounds of actual nitrogen per acre is needed and should be applied in late fall. Most of this will be available for the next crop.

Nitrogen not only increases yields but also makes plants in the corn family mature earlier. The unfertilized milo plants on the left have not headed out yet, while the fertilized rows on the right are well-headed.

## INSECT AND DISEASE CONTROL

Most seed comes treated with a fungicide, such as Arasan or Semesan, Jr. for help in controlling damping-off and seedling blight.

Lindane can be added to the fungicide as a seed treatment to protect against wireworms and seed-corn maggots. The cost of the lindane treatment is only a few cents an acre.

SMUT

Smut damage depends on the season but generally is not too serious. There is little difference in susceptibility between varieties. The smut spores are carried by the wind, so seed treatment is of no help. Crop rotation does not help much either. Healthy, well-fertilized plants growing on good land usually show little damage.

FUSARIUM EAR ROT OR PINK ROT

Damage from ear rot also depends on the season and spores are carried by the wind as in smut. Varieties differ in their susceptibility to the disease. Select one that has shown resistance to the disease during past years. On fertilizer tests, plants receiving plenty of nitrogen usually have less ear rot than plants that are nitrogen-deficient.

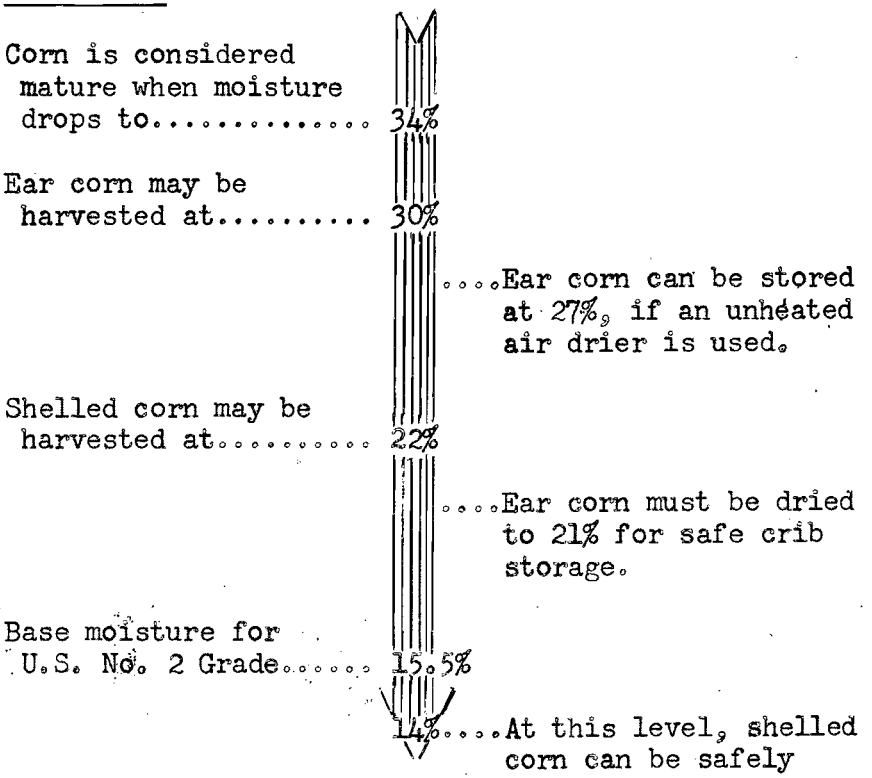
INSECTS

Although aphids, corn earworms and spider mites may become numerous in the field, no practical chemical controls are known. Occasionally, various caterpillars may also cause some damage, but aside from controlling migrating yellow-striped armyworms with an insecticide barrier on the outside of the field, application of insecticides is impractical in these cases also. Recommended varieties under good management usually will produce a good crop in spite of the insects.

YIELDS

On good soils, yields will run from two to four tons of ear corn per acre (3200 to 5600 lbs. of shelled corn) and occasionally higher, depending upon the variety grown, date of planting, and amount of fertilizer used. There is no profit in an average yield at present prices. High yields are essential.

## HARVESTING




Mechanical pickers, trailer-wagons, and some type of elevating equipment are needed for efficient handling of the corn. Pickers will harvest from 5 to 15 acres per day. Before buying a corn picker, check carefully with farmers who have them. Some commercial models will not satisfactorily handle the tall corn grown in this area. Both one and two-row pickers are available for custom harvesting, which runs about $10 to $12 per acre.

Picker-shellers and grain combines with adapted snappers or headers can be used when the crop is handled on a shelled corn basis. Normally, corn will shell out about 80 per cent.

BE SURE TO FOLLOW ALL RECOMMENDED SAFETY PRECAUTIONS WHEN OPERATING OR WORKING AROUND A CORN PICKER. EACH YEAR THESE MACHINES TAKE A TERRIFIC TOLL OF LIVES, ARMS AND LEGS IN THE MIDWEST.

Corn can be harvested satisfactorily with a mechanical picker when the moisture per cent is 30 per cent or under (20 to 25 per cent is better). For safe storage without drying, ear corn should be down to 20 per cent and shelled corn below 15 per cent moisture.

As the table on page 11 shows, 22 per cent is nearly the upper limit for shelling without excessive kernel damage occurring. Shelling performance improves as the kernel-moisture content decreases. However, below 15 per cent moisture content, the higher losses at the header may more than offset the improved shelling.

## DRYING

When moisture is much above 20 per cent, ear corn should be fed within a short time or artificially dried. To be custom-dried, the corn must first be shelled (the cost of custom-shelling is about $2.50 a ton). Custom-drying costs vary with the moisture content and will run from $6 to $7 a ton, including handling and transportation.

Moisture percentages may be obtained from commercial driers. Samples should be taken of 6 to 8 representative ears. These should be sealed in a tight container or several thicknesses of paper bags, kept in a cool place, and tested within a few hours. Even so, the samples may vary several percentage points because of differences between individual ears or various parts of the field. A safety factor of one or two percentage points is desirable to make certain that the corn will not spoil.

# SAMPLE COSTS TO PRODUCE CORN ON THE EASTSIDE OF STANISLAUS COUNTY (4000 lb. yield)

## PREHARVEST

| | Costs/Acre |
|---|---|
| Land preparation | $ 7.50 |
| Fertilizer (100 lbs. nitrogen) | 12.50 |
| Fertilizing | 2.00 |
| Seed (13 lbs. @ 25¢) | 4.25 |
| Planting | 2.00 |
| Irrigation water | 1.50 |
| Irrigation labor | 3.50 |
| Miscellaneous labor | 1.00 |
| | $ 34.25 |

## HARVEST

| | |
|---|---|
| Picker-sheller (contract) | 15.00 |
| Hauling | 3.00 |
| Commercial drying (wet basis) | 10.00 |
| | $ 28.00 |

## RENT

| | |
|---|---|
| Cash | 40.00 |
| TOTAL COST PER ACRE | $ 102.25 |

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| CHANCE FOR PROFIT | 4000 lb. yield | 5000 lb. yield |
|---|---|---|
| If price is $55/ton | $110.00 | $137.50 |
| Cost of production | 102.25 | 102.25 |
| Net profit per acre | $ 7.75 | $ 35.25 |

| CHANCE FOR PROFIT (with storage) | 4000 lb. yield | 5000 lb. yield |
|---|---|---|
| If price is $62/ton | $124.00 | $155.00 |
| Estimated cost of production | 102.25 | 102.25 |
| Net profit per acre | $ 21.75 | $ 52.75 |

Ear corn can be dried using a forced-air drier, without supplemental heat. Ducts are placed in the bin as the corn is put into storage. Corn with a moisture content under 27 per cent can usually be dried without heat. For higher moisture corn, heat must be used. The fan and motor assembly from a hay-drier can be easily adapted to dry ear corn.

Drying can be profitable, especially for handling crops which are a little wet. Varieties may be planted which are later maturing and higher yielding than would be possible if no drying equipment were available. Also, the grower is not forced to sell at harvest time, usually at a low price.

## STORAGE

Any well-ventilated storage facility with a roof will do for ear corn. (Shelled corn has to be kept completely dry). Cribs may be made inside a barn or other farm structures or an outside crib may be made of snow fence, hog wire or lumber. VENTILATION IS IMPORTANT. The floor may be either cement or wood. It should be dry and thoroughly clean before storing the corn.

Sanitation is important if storage facilities are used for more than one year. Bins should be cleaned thoroughly and a residual spray of DDT made before putting the corn in to assure "clean corn." Information on corn drying and insect control is available at the Farm Advisor's office.

## PROFIT OR LOSS?

The present "price-cost squeeze" makes it difficult to produce corn at a profit. Custom harvesting, shelling and drying may run $30-$40 an acre on a 2½-ton crop of shelled corn. Selling at harvest time has been "costing the grower" as much as $8 a ton or $20 an acre for a 2½-ton crop. This can easily mean the profit or possibly even "red ink." Only good farmers on good land should attempt this crop.