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CC172 Grow Better Corn

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Grow Better Corn

by Clinton A. Hoover

M. D. Weldon

FOLLOW THESE PRACTICES:

- control insects
- plant suitable stand
- provide soil fertility
- select adapted hybrid
- prepare good seed bed
- use best planting methods

EXTENSION SERVICE
UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE
AND U. S. DEPARTMENT OF AGRICULTURE
COOPERATING
W. V. LAMBERT, DIRECTOR
BETTER CORN - MORE PROFITS

1. Preparing the Seedbed for Corn

A good seedbed is essential in getting a good stand and maximum yield of corn. The method and timing of each tillage operation are important in preparing a good seedbed. Unnecessary tillage operations only add to the cost of producing the crop. The main objectives to be accomplished in good seedbed preparation are:

(1) Weed and insect control*  
(2) Uniform and rapid seed germination and seedling emergence.  
(3) Improvement of soil structure for better absorption of water, development of roots and aeration.  
(4) Incorporation of crop residues and manure for more rapid formation of nitrate.

*For information on insect control, see section on Corn Rootworm Control.

Double disking and listing on nonirrigated land in Nebraska has yielded about the same as the best plowing practices. But replanting is more often necessary on listed ground because heavy rains may wash in the ridges and cover the seed too deep. This often results in poor stands, particularly if a hard crust is formed in the furrows. On sloping land where the furrows run down the hill, corn stands are often reduced by washing during heavy rains. Poor germination often occurs in cold, wet soil during a long wet period after planting. These disadvantages are less serious if listing is shallow rather than deep.

Plowing is necessary if corn is to be surface planted. Deep plowing is rarely advantageous in most soils in Nebraska. Eleven years of experimental work at the University Agronomy Farm at Lincoln have shown that 7 inch plowing early in the spring was more profitable than deeper plowing.

Plowing is recommended for irrigated corn or bottomland in eastern Nebraska where the moisture supply is better than on well-drained uplands.

The stubble mulch method of seedbed preparation, planting, and tillage is especially valuable on sandy land and sloping land subject to erosion. By maintaining a cover of crop residues (straw, stalks, etc.) on the surface, soil losses from wind and water erosion can be greatly reduced. This protective covering also conserves soil moisture by reducing evaporation. See Nebraska Station Bulletin 420 on implements for stubble mulch farming.
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2. Corn Rootworm Control

Insecticides and amounts per acre are as follows:

<table>
<thead>
<tr>
<th>Insecticides</th>
<th>Broadcast</th>
<th>Row application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldrin</td>
<td>1 lb. per acre</td>
<td>1/2 lb. per acre</td>
</tr>
<tr>
<td>Heptachlor</td>
<td>3/4 lb. per acre</td>
<td>1/2 lb. per acre</td>
</tr>
<tr>
<td>BHC</td>
<td>3/4 lb. per acre</td>
<td>not recommended</td>
</tr>
</tbody>
</table>

In listed corn, row sprays are about as effective as broadcast applications. Row sprays cost less and save time. Ordinary weed sprayers can be modified for row treatment at moderate cost. Your county extension agent has diagrams showing how to make this conversion. Aldrin or heptachlor in granular form also can be used for row treatment. Apply at the rate of 2 1/2 lbs. of 20% aldrin or granular heptachlor per acre. Commercial applicators are available that may be attached to most listsers or planters. If starter fertilizer is recommended, a fertilizer-insecticide mixture may be used to supply the recommended rate of insecticide in the row. On the other hand, where soil tests show that starter fertilizer is not needed, the use of a starter fertilizer-insecticide mixture is usually an expensive way to control corn rootworm. See paragraph on phosphorus under Soil Fertility section.

For starter fertilizer to be most effective, it should be placed in a band to the side and slightly deeper than the seed. But the insecticide placed in this manner usually gives control only on one side of the row.

Broadcast treatment may be made by aircraft, weed sprayers, or as dry granular materials. There should be no wind during application. The insecticide must be worked into the soil immediately after broadcasting. A disk, springtooth or spiketooth harrow or similar implement is suitable. If allowed to remain uncovered, the insecticide evaporates and is lost. Broadcast application of the insecticide may be made any time within 4-6 weeks of corn planting time, provided it is worked into the soil immediately. Plowing the insecticide under is not recommended.

Row treatments are effective only for one season. Broadcast treatments with one pound of aldrin or heptachlor per acre, in Iowa experiments, have given second year control. But we have no data on residual effects on irrigated corn in Nebraska.

There is no practical way of determining whether or not rootworm control is needed from year to year. Treatment for every corn crop is therefore recommended, especially for irrigated corn or wherever the prospective value of the crop makes it unwise to take a chance.

Where row treatment is applied for rootworm control, seed treatment with insecticide is not needed.
3. **Planting the Corn**

**Method.** Surface planting is recommended on all irrigated land and on heavier soils where the moisture supply is good. Listing is best adapted to regions of low rainfall and light soils. Listing is especially good on sloping land if done on the contour or parallel to terraces. On irrigated sandy soils, double disking and shallow loose-ground listing gives good results. Shallow listing and surface planting places the seed in warm soil. This results in faster germination and better stands. List only deep enough to place the seed in moist soil.

On nonirrigated land, it is desirable to keep as much crop residue on the surface of the land as possible. This is especially true on the lighter soils in central and western Nebraska. Shallow listing through the residues will do a good job of planting and leave a cover of crop residues between the rows.

The soil in the row should be clean and free of weeds and germinating weed seeds at planting time. Listing accomplishes this purpose. Furrow openers on the planter are also effective. If a planter without furrow openers is used, planting should be done immediately after plowing or disking.

When the corn is planted, it is essential that moist soil be firmly packed around the seed to insure prompt germination. The soil between the rows should be kept as loose as possible to slow down the germination and growth of weeds. This will also increase the water intake during rains.

**Depth.** Corn should be planted just deep enough to get it into moist soil. This is usually 1-3 inches depending on soil moisture and condition of the seedbed. On medium to heavy soils with well prepared seedbed and good surface moisture, plant 1 to 1 1/2 inches deep. Plant deeper if the surface soil is dry and loose.

It is a mistaken idea that planting corn deep will result in a deeper root system. Permanent roots of the plant will be at about the same depth no matter if the kernel is planted 1 inch or 5 inches deep. Very deep planting can hurt the field stand and consequently reduce yields.

Complete covering of the seed and packing are usually more important than exact depth, so long as this is within reason.

**Using the planter or lister.** Poor corn stands are often the result of driving too fast and not properly adjusting the planter or lister. Most planters and listers operate the best at speeds of 3 1/2 miles per hour or less. Make sure the machine is in proper adjustment. Choose plates carefully. Not all the seed of the same grade will plant the same. Check each lot of seed through the machine before starting to plant to make sure it is dropping uniformly and at the desired rate.

**Time.** The European corn borer has brought with it the need for greater alertness as to a suitable time for planting corn. Midseason planting, about May 10-25 seems to be the best in most years. This will vary somewhat with the season and region of the state. But corn should not be planted until the daily minimum soil temperature at the depth of planting remains above 55°F for several days.
**4. Planting Rates**

A full stand of corn is necessary for high yields. A uniform stand is highly desirable but the total number of plants per acre is more important. Stands should be planned for each field to balance the fertility and moisture level, including subsoil moisture at planting time.

Nonirrigated land. The rate of planting on nonirrigated land should be regulated by the amount of subsoil moisture at planting time. Too high a planting rate on dry land may result in plant burning if rainfall is not timely. Find out how much moisture is in the soil and how deep the moist soil extends, by using a soil probe or auger.

The following kernel spacings are suggested for planting corn in rows 40-42 inches apart at different soil moisture conditions in eastern, central and western Nebraska.

<table>
<thead>
<tr>
<th>If soil is moist at planting time to a depth of:</th>
<th>Eastern</th>
<th>Central</th>
<th>Western</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 foot</td>
<td>*20-24</td>
<td>*24-30</td>
<td>*30-36</td>
</tr>
<tr>
<td>2 feet</td>
<td>17-20</td>
<td>20-24</td>
<td>20-24</td>
</tr>
<tr>
<td>3-4 feet</td>
<td>12-17</td>
<td>17-20</td>
<td>17-20</td>
</tr>
<tr>
<td>5-6 feet</td>
<td>12-17</td>
<td>17-20</td>
<td>17-20</td>
</tr>
</tbody>
</table>

*It is questionable whether corn should be planted under these conditions. It would be wise to fallow the land or plant milo rather than corn.*

On the average, 70% of the kernels planted produce ears. If ears average 0.5 pound in weight, the yields to be expected from the various rates of planting are as follows.

<table>
<thead>
<tr>
<th>Kernel drop size</th>
<th>Kernels per 100 feet</th>
<th>Ears per 100 feet</th>
<th>Ears per acre</th>
<th>Possible Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>20&quot;</td>
<td>60</td>
<td>42</td>
<td>5500</td>
<td>39 bu.</td>
</tr>
<tr>
<td>17&quot;</td>
<td>71</td>
<td>50</td>
<td>6500</td>
<td>46 &quot;</td>
</tr>
<tr>
<td>14&quot;</td>
<td>86</td>
<td>60</td>
<td>7800</td>
<td>56 &quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>100</td>
<td>70</td>
<td>9100</td>
<td>65 &quot;</td>
</tr>
</tbody>
</table>

In fields where there is little soil moisture at planting time, thin planting may usually be depended upon to produce better yields than heavier planting.

Irrigated and bottomland. On irrigated land and on bottomland where the moisture supply is better than average, a heavy stand is essential for high yields. If yields are to exceed 100 bushels per acre, the final stand of corn must, in most cases, produce at least 100 ears per 100 feet of row, in rows 38 to 42 inches apart. Usually, only 70-80 per cent of the planted kernels will produce ears. If the yield goal is 100 bushels or more, the planting rate should be 150-180 kernels per 100 feet of row, or a kernel every 6½ to 8 inches in the row. This may be expected to produce 115 to 150 stalks carrying 110 to 135 ears per 100 feet of row. The closer spacing will be necessary for yields above 150 bushels per acre.

Some corn growers have used the power hill drop type of planting and prefer it over even drilling. There is much difference of opinion. Many growers prefer to drop 2 or 3 kernels in hills spaced to give the desired stand.

Hybrid selection. Select hybrids which respond well to heavy planting and fertility and make use of the entire growing season. For early planting, choose full season hybrids which use a longer period of time to manufacture food and store it in the grain. For late planting, earlier maturing hybrids usually do better than late maturing kinds. CC 163 entitled "Recommended Crop Varieties for Nebraska", which can be obtained at your county agent's office, shows the recommended Experiment Station hybrids adapted to your area.
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5. Soil Fertility

Greater efficiency in corn production can be attained by using fertilizer in accordance with soil tests. Soil fertility recommendations based on soil tests are intended to provide all the lime, nitrogen, phosphorus and potassium needed for most profitable yields.

Nitrogen. Outstate Testing experiments with fertilizers on corn show that all the nitrogen carriers (ammonium nitrate, ammonium sulfate, urea, anhydrous ammonia and various solutions of these materials) are equally effective if applied in a suitable manner and at equal rates of available nitrogen.

Preplant application of nitrogen is in most cases practically equal to sidedressing when the corn is 6 to 24 inches high, provided enough nitrogen is used for most profitable yield.

Where anhydrous ammonia is applied before listing, some of the seed may be placed in the concentrated band of ammonia. Slow, uneven growth of the seedling corn plants may result, especially if the rate of application is more than 50 pounds of nitrogen per acre. This injury can usually be avoided by placing the ammonia in bands 20 inches apart. This reduces the concentration of ammonia 50%. Good results can also be obtained by blank listing and injecting the ammonia in the furrows, then splitting the ridges when planting. No injury has been reported where ammonia was applied before plowing, followed by surface planting, planting with furrow openers or planting with loose ground lister.

Best results with sidedressing anhydrous ammonia are obtained where the ammonia is injected into the soil to a depth of 6 to 10 inches, when the corn is no more than 10 or 12 inches high. In a 40 inch row spacing, the ammonia should be placed in a single band between the rows. This places the ammonia 20 inches from each row where it will be readily available but not close enough to the plant to cause root cutting or burning.

Sidedressing with dry fertilizers or fertilizer solutions need not be close to the row. If nitrogen fertilizer is placed in moist soil at a distance of 20 inches from the corn plant, it is within reach of the roots when needed.

Phosphate. Outstate Testing experiments show that (1) phosphate is needed for good corn yields on soil of low and very low phosphorus supply, (2) on soils of high and very high phosphorus supply, starter fertilizer in the row tends to depress corn yields, (3) this depression of yield is especially serious if a complete fertilizer is used as a starter, (4) little or no depression in yield is likely to occur if the phosphate or mixed fertilizer is plowed down or disked in before planting, and (5) on medium phosphorus soils, starter usually has little effect on grain yield but sometimes gives profitable increases in yield on sandy soils. Starter usually hastens early growth and produces earlier and more uniform maturity. On medium phosphorus soils, starter should be tried in strips and yield and maturity compared with corn receiving no starter in an adjacent strip.

If starter fertilizer is used, it should be applied with care to avoid injury to germination and early growth. This is especially true if the soil is moderately dry and the weather remains dry after planting. It is especially true if mixed or complete fertilizer is used as a starter. Starter fertilizer should not be placed in contact with the seed nor in the row directly above the seed. It is most effective and least likely to cause injury if placed 2 inches from the row and 1 to 2 inches deeper than the seed.
Soil fertility-continued

If a complete fertilizer is recommended as a starter, it is safest to use no more than 10 to 20 pounds of nitrogen plus potash.

Potash. Most Nebraska soils are well supplied with potassium for corn. Potassium fertilizer should be (1) used where soil tests show a need for it, and (2) tried on sandy soils, even though soil tests show medium to high in exchangeable potassium.

Fertilizers in relation to moisture, stands, and weed and pest control. In non-irrigated land where there is ample moisture to a depth of 4 to 6 feet, a heavy stand should be planted as indicated in Section 4 on planting rates, and enough fertilizer used to produce the expected yield. Wisely used, fertilizer ensures efficient use of moisture by the crop. But fertilizer is not a substitute for moisture. Where subsoil moisture is short, planting too thick and fertilizing may reduce rather than increase yield.

On irrigated land, a thick stand is essential as explained in Section 4. If the stand is so thin as to limit the prospective yield to 80 bushels, applying enough fertilizer for a 150 bushel yield is wasteful.

Similarly, if the crop is seriously injured by rootworms, borers, or weed competition, heavy fertilization is inefficient and wasteful. All factors must work together if efficient, high-level production at low cost per bushel is to be attained.