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PRODUCING HIGH CORN YIELDS.
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RESOURCE MATERIAL ON CORN PRODUCTION FOR HIGH SCHOOL VOCATIONAL AGRICULTURE AND ADULT FARMER CLASSES WAS DESIGNED BY A STATE LEVEL GROUP OF SUBJECT MATTER SPECIALISTS, TEACHER EDUCATORS, SUPERVISORS, AND TEACHERS TO HELP SOLVE PROBLEMS THAT CONFRONT CORN PRODUCERS AT PLANTING TIME. THE SUBJECT MATTER CONCERNS PLANTING TIME, DEPTH, ROW WIDTH, METHOD, FERTILIZATION, INSECTICIDE APPLICATION, AND HERBICIDE APPLICATION. SECTION TITLES ARE STATED IN THE FORM OF PROBLEMS. THE MATERIAL IS USEFUL AS EITHER TEXT OR REFERENCE ASSIGNMENT FOR A PERIOD OF ONE TO FOUR HOURS. TEACHERS SHOULD HAVE GENERAL COMPETENCY IN AGRICULTURE, AND STUDENTS SHOULD HAVE AVERAGE ABILITY, AGRICULTURAL INTEREST, AND AN OCCUPATIONAL OBJECTIVE. THE DOCUMENT IS ILLUSTRATED WITH PHOTOGRAPHS, GRAPHS, AND TABLES. THIS DOCUMENT IS AVAILABLE FOR 15 CENTS FROM VOCATIONAL AGRICULTURE SERVICE, 434 MUMFORD HALL, UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS 61801. (JM)

PRODUCING HIGH CORN YIELDS

1. When Should I Plant Corn?
2. How Thick Should Corn Be Planted?
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5. Should Corn Be Drilled or Hill Dropped?
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Corn is the leading crop in Illinois, accounting for about one-half of the value of all harvested crops. Illinois ranks second in corn acreage, being surpassed only by Iowa. About one-half of the corn produced is sold as grain off the farm. Less than 5 percent of the corn acreage is harvested for silage.

In early times, corn yields were rather low and remained fairly constant, except for yearly changes due to weather. However, as farmers applied the knowledge gained from agricultural research, corn yields have steadily increased. From 1940 to 1950, hybrid seed corn probably caused the greatest increase in yield (Fig. 1). Since then, more fertilizer; better weed, insect and disease control; thicker planting; and more timely operations (made possible by more and better machinery) have accelerated the rate of increase.

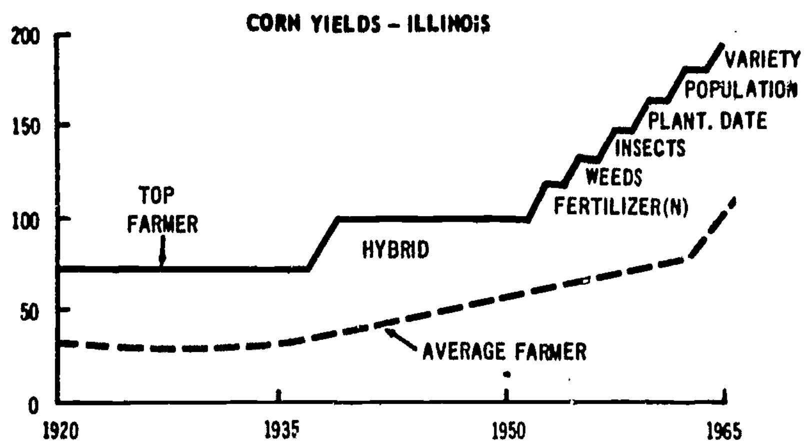

Fig. 1. Trend of corn yields in Illinois

1. WHEN SHOULD I PLANT CORN?

Planting corn early has paid off in higher yields in recent tests in Illinois and many other states. The question of when to plant corn is not new by any means. Earlier tests conducted at Urbana for nine years indicated that the yields were about the same for all plantings made before the third week in May. In these tests the top yields were approximately 110 bushels. If you are producing at a medium level for your soil, the results of these tests are probably still valid. However, if you are pushing for higher corn yields, early planting can mean more bushels in the bin at harvest. This, however, may not mean extra corn unless you are using other good growing practices. Remember that any one poorly planned or poorly executed practice can hold down your yield.

If you are following this new practice of early planting, plant corn when the soil temperature reaches 50° to 55° F. This is usually about the first of May in the northern half of the state and 10 days to 2 weeks earlier in the southern part of the state. Current research indicates a loss of 1 bushel per day for each day you delay planting after the optimum planting date. The rate of planting should also be increased about 20 percent because of the higher "mortality rate" in cool soils.

Planting corn early is one way you can increase the odds of getting more favorable weather at tasseling, the most critical time in the life of the corn plant. The nearer to June 22 you can get ear filling, pollination, and the corn to tassel, the more daylight you will have and thus usually the most favorable light conditions. Studies of long-time weather conditions indicate that the probability of receiving an inch or more of rainfall is 30 to 35 percent during any week prior to July 10. Between July 10 and August 10, the probability drops to 20 to 25 percent. If we can get corn to tassel in early July, you will have a better chance of getting rain and also a shorter period of hot weather to accelerate surface evaporation of water. Early planting also means early shading and a reduction of soil water evaporation. Sunlight provides the energy to keep the corn plant factory going, and the peak demand is at tasseling and immediately thereafter. Hence, early planted corn has a better chance for favorable moisture at tasseling. When you add all the weather factors, you find that early planted corn has a better chance for favorable weather at tasseling and thus a greater chance of achieving maximum yields.

There are other advantages for early plantings. The plants will be shorter, will have lower ears, and therefore will stand better. The grain will be drier, and harvest can begin earlier.

Table 1 shows the results of one experiment conducted to determine the effect of time of planting and moisture content. Note that the later-planted corn contained more moisture and had fewer erect plants at harvest.

Another hidden bonus for early corn plantings will come from the earlier planted soybeans on the same farms. Although soybeans are not as responsive as corn to planting date, yields of full-season adapted varieties generally trend downward.

A grower's requirements for early planting of corn are a brave heart, optimism, and a great deal of planning. You must partly accept the concept of minimum tillage and gear up accordingly. Although the seedbed in the row is important, there is no need for a "lettuce bed" between the rows. A great amount of research in Illinois and other states shows that yields from minimum tillage plots are equal and sometimes superior to those from traditional finely pulverized seedbeds. Fall plowing of level land will allow you to plant early in the spring. This is especially important on heavy, high clay content soils. Sandy soils usually dry out earlier and warm up sooner than finer-textured clay soils; therefore, planting can usually be started earlier on the sandy soils than on the finer-textured soils.

Early hybrids will seldom if ever outyield adapted full-season hybrids when both are planted early. Although they will permit harvest to begin earlier in the fall, only in unusual seasons or very late plantings are early hybrids likely to yield as well as medium or late hybrids. Fig. 2 shows the response of an early and late hybrid to planting date at DeKalb, Illinois, at a population of 18,000 plants per acre. Table 2 presents yield data collected in an extremely good growing season (1965) at Urbana, Illinois, at a plant population of 24,000.

Because of cold soils often encountered in early plantings, the following cultural practices are necessary for a maximum yield bonus: (1) Overplanting the desired final plant population by 15-20 percent, (2) planting

Table 1. Effect of Date of Planting on Corn at Harvesting Time (Av. for 5 different years) Urbana

Average date of planting	Yield of grain	Moisture in grain at harvest	Plants erect when harvested
	bu./A	perct.	perct.
May 4	112	18.3	80.4
May 12	108	19.5	79.5
May 19	111	20.7	78.4
May 27	110	21.5	69.6
June 3	101	23.5	66.6
June 12	89	25.5	54.0

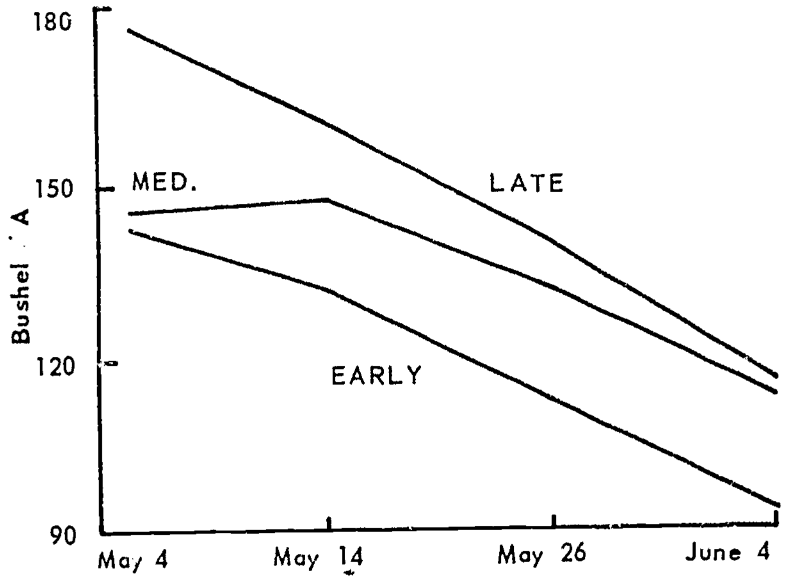

Fig. 2. Effect of planting date on grain yields of three hybrids at DeKalb, Illinois, 1964-65.

shallow, (3) using small amounts of row fertilizer, and (4) controlling weed and soil insect pests by using pre-emergence herbicides and soil insecticides.

New, modern hybrids with proper seed care and seed treatment have a lot of "get up and grow." However, as the trend toward earlier planting continues, corn breeders will need to screen germ plasm more closely for uniform germination and growth under cold, unfavorable growing conditions and for frost tolerance. Plant physiologists will also need to meet this challenge by initiating basic studies toward understanding these phenomena. This two-front attack might permit corn to be planted much earlier than we now assume possible.

Table 2. Effect of planting date on grain yields of two hybrids (30-inch rows, 24,000 plant population, Urbana, Ill.).

Planted	Early Variety	Late Variety	Average
April 19	184	217	201
April 30	192	213	202
May 14	160	195	177
May 31	141	162	151

2. HOW THICK SHOULD CORN BE PLANTED?

A high yield cannot be attained without a high corn-plant population, but a large number of plants per acre is no guarantee of a high yield. As the number of plants increases, the amount of grain produced per plant is decreased, but up to a certain limit the total yield will be greater due to more plants. The proper rate of planting will depend largely on soil productivity and weather conditions. Planting rates aiming at 12,000 to 16,000 plants per acre were commonly recommended a few years ago for the average farmer. Today planting rates are being increased on farms capable of producing 125 or more bushels of corn per acre.

The practice of recommending a plant population on the conservative side of the yield plateau was influenced by (1) drought, (2) standability, and (3) harvestability. The latter two do not carry the importance they once did because of the advent of earlier harvest and better standing hybrids. Drought, however, still remains a real threat to heavy plant populations. Yet, early plantings, coupled with improved hybrids and fertility practices, have not shown the drastic yield reductions for droughty periods that previously occurred.

Although it is true that increasing plant population will do little to increase yields at the 75- to 125-bushel yield level, this statement does not hold for soils capable of producing really high yield levels. In fact, this production practice of low planting rates may be one of the limiting factors insofar as future high corn yields are concerned. Improved hybrids have changed our concepts of stands. There is some trend toward higher plant population already. According to a 1965 survey by the Illinois Cooperative Crop Reporting Service, the average spacing of drilled corn in the row was 9.1 inches, as compared to 10.6 inches in a similar survey three years earlier (1962), and 11.3 inches apart in 1959.

Numerous studies are underway to correlate plant populations with yields. However, to obtain the maximum yield of corn for a specific fertility level and soil type, it is important to plant the proper number of kernels per acre. Plant at a rate, which, in normal years, will produce ears averaging about one-half pound (Fig. 3). The population at harvest is often less than the number of kernels planted (or assumed to have been planted). Therefore, planting rates should be adjusted accordingly. Table 3 may be used as a guide to determine the number of kernels to plant from the desired number of stalks per acre at harvest.

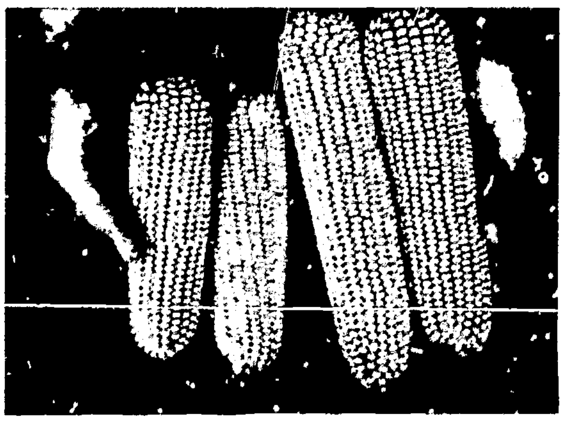

Fig. 3. The half-pound ears of corn on the left indicate good balance of stand with soil productivity. The ears on the right, with average weights of 0.8 pound, indicate that the stand could have been increased profitably by 5,000 to 6,000 plants per acre.

Table 3. Select the Proper Population for the Fertility Level

Expected yield per acre	Kernels planted per acre	Stalks at harvest per acre
75 bushels	13,300	12,000
100 bushels	16,500	14,000
125 bushels	20,000	17,000
150 bushels	25,000	20,000

When striving for high yields, a planting rate of 18,000 to 20,000 kernels per acre is commonly recommended for soils with good water holding capacity. Rates of 20,000 or more are recommended on good soils when the row width is reduced to 30-inches or less.

Since the proper planting rate is essential for high yields, be sure to select planter plates recommended for the grade of corn used and adjust the planter to drop at the desired rate (Fig. 4). During the planting operation, be sure to dig out several kernels along the row and make an estimate of the average kernel spacing as a final field check (See Appendix). By checking this spacing with the desired rate, you can determine the accuracy of your calibration and make whatever adjustments are necessary on your planter.

Fig. 4. Select planter plates recommended for the grade of corn you plan to use.

3. HOW DEEP SHOULD I PLANT?

When planting corn, place the seed deep enough in the soil so that it is in close contact with warm, moist soil and has enough covering for reasonable protection against birds, rodents, and surface drying. Quick germination and seedling emergence mean less trouble from soil insects and disease pests or from crusted soil.

A good general rule to follow is to put the corn deep enough to be in moist soil and no deeper. For wet, heavy soils, shallow planting is usually best, especially early in the season. In the lighter, sandy soils where low moisture rather than low temperature slows germination, it may be necessary to plant the seed 3 inches deep or more to reach moisture (Fig. 5). Remember that the seed [illegible] d, so don't bury it--plant it.

If the soil is moist from the surface on down, one inch is deep enough to plant. The depth of the permanent root system is not increased by planting deeper than one inch.

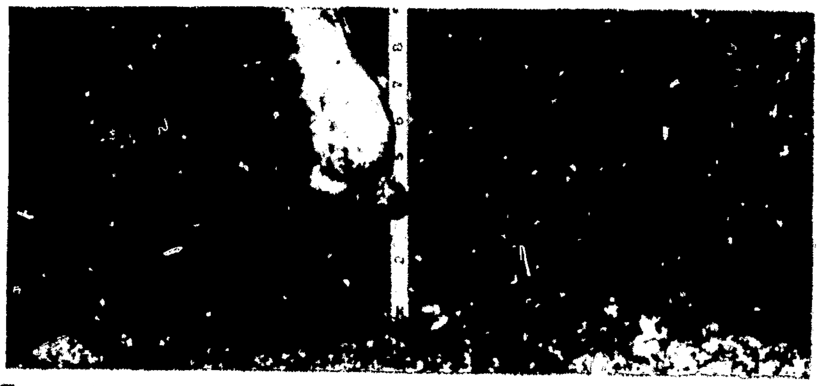

Fig. 5. Plant corn deep enough to be in moist soil.

4. WHAT WIDTH OF ROW SHOULD I USE?

Prior to 1960, corn row spacing had become standardized at about 40-inches, along with the standardization of row-crop equipment. However, since that time many farmers have been considering narrower rows. According to a survey by the Illinois Cooperative Crop Reporting Service, almost half of the 9.7 million acres of corn in 1965 were planted in rows less than 40 inches. Approximately two percent was planted in 30-inch rows. While the latter figure is not very great, this was the first year that commercial machinery could be purchased in these dimensions (narrow row widths).

Agronomists at Illinois and surrounding states have been evaluating various corn row spacings. Their reports show yields for narrow rows that vary from little or no increase up to 25 percent.

Experimental results at Illinois indicated at high yield levels, corn yields increase about 5 percent by narrowing rows from 40-inch to 30-inch widths. This difference is small and it is sometimes difficult to measure on the farm or in experimental plots. Sometimes the tests showed yield increases of 15 bushels and occasionally they showed no difference. However, so far, no experiments have been reported where 30-inch corn rows yielded lower than 40-inch rows.

Narrow rows simply permit a more even plant distribution and a reduction in interplant competition for moisture, nutrients, and light. This lessening of competition permits greater economic use of increased planting rates. Such plantings also shade the ground sooner and thereby reduce weed growth and soil moisture evaporation.

You are most likely to benefit from narrow rows when the following situations occur:

1. Your total acreage of corn and soybeans is large.

2. Your yields in recent years have surpassed 125 bushels.

3. Your plant population exceeds 20,000. You have a high fertility program, good weed control, and practice early harvests.

4. Your present corn growing and harvest equipment is worn and needs replacement.

With most midwest farmers at present, the big question is "Can I afford to convert to narrow rows?" As your present equipment wears out and if your farming operation already includes the first three situations listed above, then your next question may be, "Can I afford not to convert to narrow rows?"

A change to narrow rows will benefit soybeans more than corn in the North Central States. Research results with this crop show yield increases of 10 to 20 percent by narrowing rows. Grain sorghums also respond similarly. The same equipment used for narrow row corn can also be used for soybeans. Therefore, you should consider the benefits from both corn and soybeans when deciding if narrow rows can be justified.

If you decide to go to narrow rows, you may ask, "Why not go to 20-inch rows?" In corn the greatest yield increase seems to come in narrowing from 40-inches down to 30-inch row spacings. It is extremely doubtful if the same increment of difference will be recovered between 30- and 20-inch rows. A preliminary 2-year study at Illinois (Table 4) questions the desirability of going "all the way" to 20-inch rows at the present time. In addition, several machinery companies now have equipment on the market that will allow a farmer to standardize all row crops at about 30-inch spacings.

Table 4. Grain yields from three row spacings at three plant populations (Urbana, Ill., 2-year average).

Plant Population at Harvest	Row Spacing		
	40-inch	30-inch	20-inch
	Bu./A.	15.5% moisture	
16,000	136	135	135
24,000	146	157	151
32,000	146	154	150

If you do change to a narrow row system, remember that high population and narrow rows will increase the tendency for lodging or stalk breakage. Thus, you should choose hybrids adapted to high planting rates with excellent stalk quality. Research results indicate that the shorter, earlier hybrids will do better in narrow rows than tall late varieties. Early planting also seems to favor narrow rows.

Like most management decisions on the farm, the decision to convert to narrow rows is primarily an economic one and thus, varies with the individual operator.

5. SHOULD CORN BE DRILLED OR HILL DROPPED?

Development of herbicides and improved tillage equipment for weed control has largely ruled out any advantage of check-row planting. Today less than one percent of the corn is planted by this method. The 1965 Crop Reporting Service survey indicates that 48 percent of the corn is drilled, 51 percent is hill-dropped, and 1 percent other; however, the trend seems to be toward drilling in recent years. When drilling, the planter drops one seed at a time and the plants grow singly spaced. Hill-dropping consists of dropping two or more kernels in one spot at regular intervals in the row in hills.

Plant population shows a greater effect on yield than the planting pattern within rows. However, many experiments have been conducted to compare drilled and hill-dropped corn. Most of these show a small difference favoring the drilled pattern. Yield differences have ranged from 0 to 13 percent.

Early studies at Illinois indicate that under favorable weather conditions, drilled corn gave a greater yield than hill-dropped. The greatest advantage of drilled was obtained at relatively high plant populations. When dry weather occurred during July and August, hill-dropped corn produced just as high yields as drilled corn. On the other hand, in seasons with ample rainfall, drilled corn produced a larger yield than hill planted corn.

Even though drilling is apparently best for producing grain under ideal moisture conditions, this method has some disadvantages. Lodging (broken stalks) is worse than in hill-dropped plantings even though the diameter of the stalks is larger. Early studies showed lodging averaged 36.1 percent for drilled and 31.9 percent for hill-drop planting in Illinois. Although this percent of lodging was only slightly different, it was statistically significant. Drilled corn will also sucker or tiller more than those hill-dropped. However, these two factors will not be so important in the future as they have been in the past. Corn breeders have systematically improved hybrids, eliminated heavy-suckering varieties, and the trend toward faster and earlier harvesting may reduce lodging.

You may wonder how narrow-row corn will effect plant distribution in the row. Table 5 presents the information on this subject obtained at Urbana, Illinois, in 1965 with three single cross commercial hybrids in 30-inch rows at a final stand of 24,000 plants per acre.

All three hybrids performed best when distributed in the row. An average yield difference of 11, 12, and 23 bushels was noted for single plants versus 2, 3, and 4 plants per hill respectively.

Table 5. Effect of plant distribution in 30-inch rows at high productivity level on grain yield—Bu./A.

Spacings	Hybrid A	Hybrid B	Hybrid C	Average
1 plant every 8.7 inches	194.7	204.8	209.2	202.9
2 plants every 17.4 inches	181.2	191.6	204.0	192.3
3 plants every 26.1 inches	185.0	187.1	201.9	191.0
4 plants every 34.8 inches	169.4	178.7	190.0	179.7

6. SHOULD I USE FERTILIZER AT PLANTING TIME?

Whether or not you use fertilizer at planting time will depend upon the fertility program on your farm. If your basic build-up requirements have been met, soil-improving legumes and manures have been added, and maintenance amounts of fertilizer applied at other times during the rotation, you may receive very little, if any, benefit from adding fertilizer at planting time. On most soils, however, the corn crop will benefit from at least a small amount of fertilizer applied at planting time.

Applying 80 to 150 pounds per acre of a fertilizer containing a small amount of nitrogen, a larger percentage of P_2O_5, and an intermediate amount of K_2O at planting time will usually help corn get a vigorous start (Fig. 6). Apply the fertilizer in one or two bands about 2 inches to the side and 2 inches deeper than the seed (Fig. 7). When drilling corn, make the bands continuous. When checking or hill dropping, drop the fertilizer about 6 to 8 inches along the side of the hills.

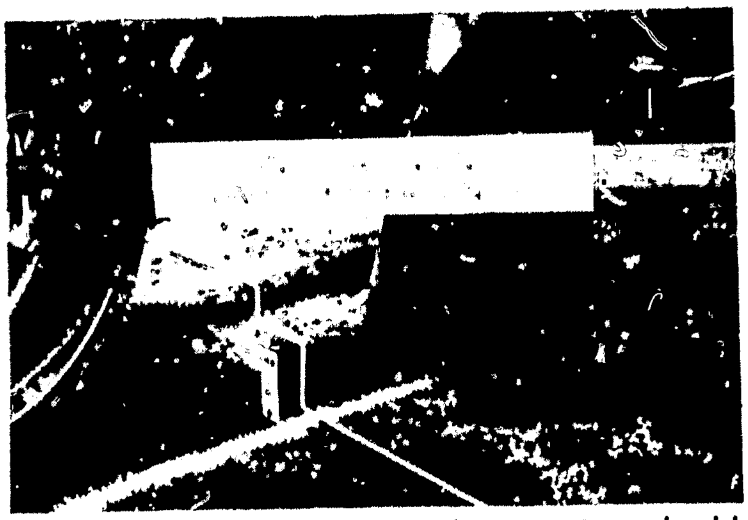

Fig. 7. Fertilizer applied at planting time should be placed to the side of and below the seed (courtesy Velsicol Chemical Corp.).

Some planters are equipped to apply liquid fertilizer (Fig. 8). Liquid fertilizer may be easier to handle and is just as good as dry fertilizer providing equivalent amounts of actual fertilizer are used.

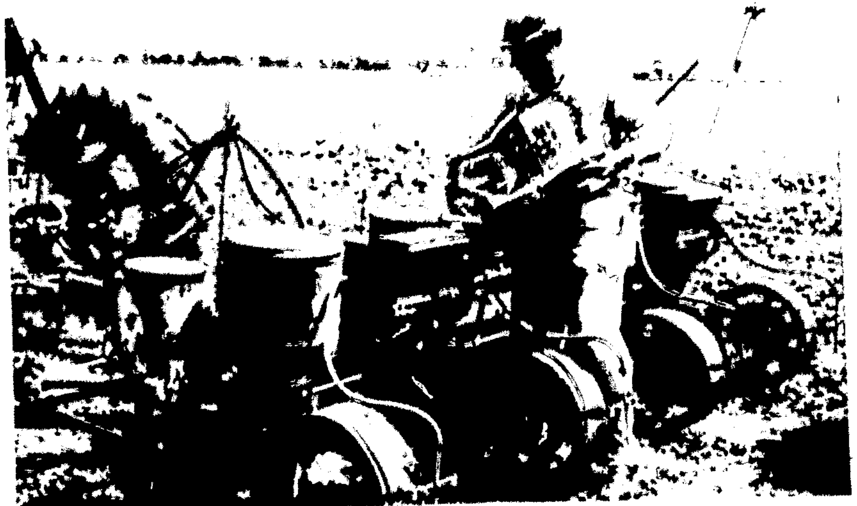

Fig. 6. Fertilizer applied at planting time can help give young plants a vigorous start.

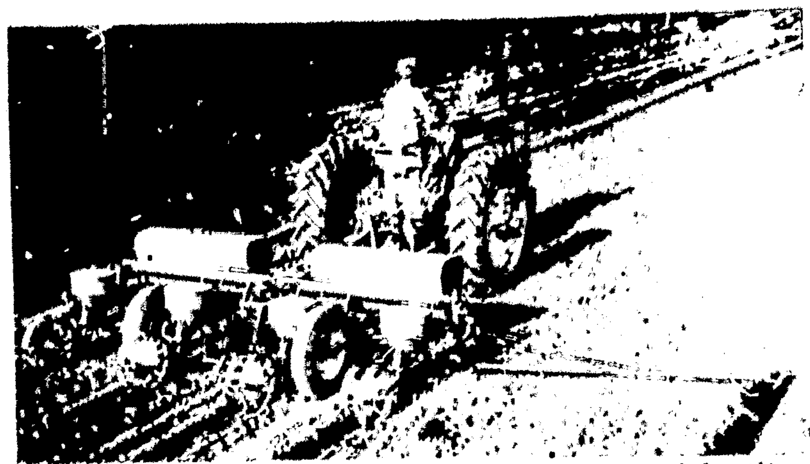

Fig. 8. This planter is equipped to apply liquid fertilizer at planting time (courtesy Deere and Co.).

7. SHOULD I APPLY INSECTICIDES AT PLANTING TIME?

Wireworms, grape colaspis, root worms of various kinds, grubs, seed-corn beetles, and seed-corn maggots are some of the more common stand-destroying and root-pruning insects which can damage corn yields if not controlled. Reports indicate that farmers lose 5 to 6 bushels of corn per acre to these hidden pests.

Many of these insects may be controlled and yields increased by applying such insecticides as aldrin or heptachlor to the soil. They may be worked into the soil before planting, applied with fertilizer, or applied with a special planter attachment (Fig. 9). To get maximum benefits, use 1 1/2 pounds of actual aldrin or heptachlor per acre when broadcast and 1 pound of either per acre when used as a row treatment.

Aldrin, heptachlor, or dieldrin applied to the seed at planting time can also help to give protection against some insects.

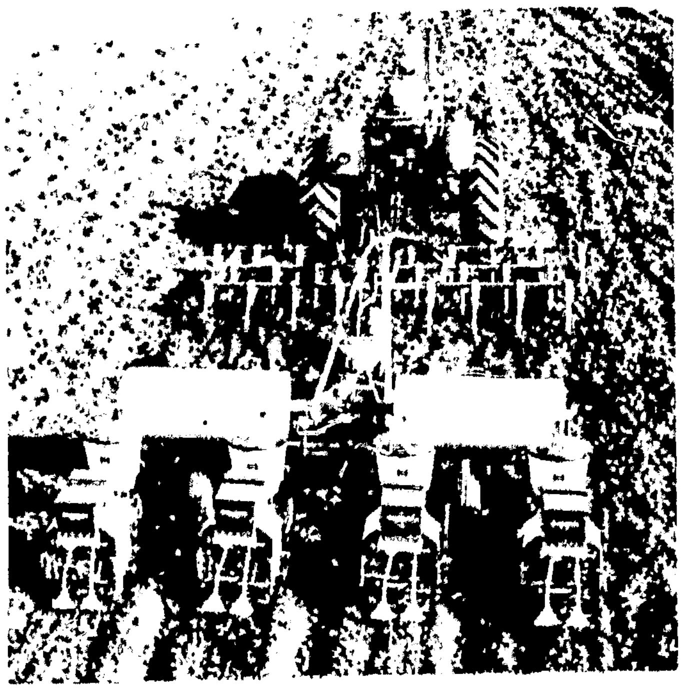

Fig. 9. Insecticides may be applied at planting time by using a special attachment on the planter.

You have probably noticed that most seed corn is treated before it is sold to the farmer. This treatment is usually a fungicide for controlling plant diseases rather than insects.

8. SHOULD I APPLY HERBICIDES AT PLANTING TIME?

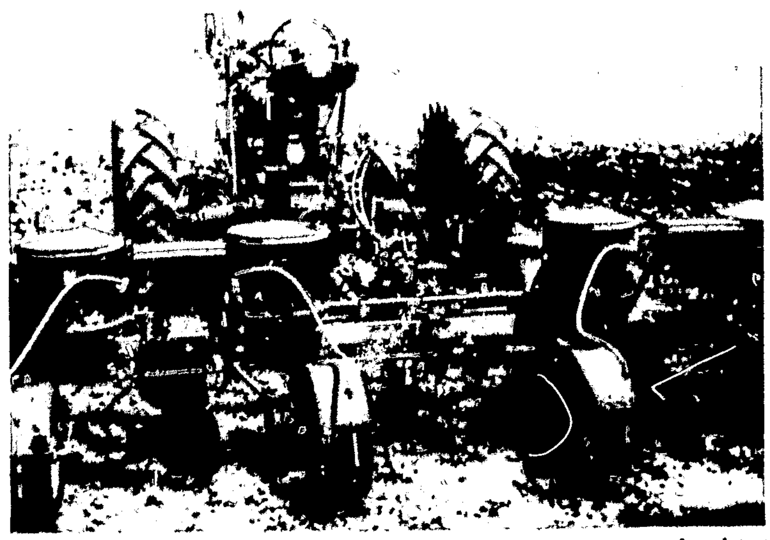

Fig. 10. This farmer is applying a pre-emergence herbicide over the row behind his planter to help control weeds.

A herbicide is a chemical used to kill or prevent the growth of some plants but not others. A pre-emergence herbicide is one which is applied before the crop has emerged or come through the ground.

A pre-emergence herbicide may be applied at planting time or shortly after to help control weeds as they germinate. The material may be applied by mounting equipment on the planter so that the spray or dry granules fall in a band over the row behind the planter press wheels (Fig. 10) or broadcast application may be made within a few days after planting. Some herbicides are available which help control both grass-type and broadleaf weeds.

The use of herbicides to control a serious weed infestation can be a good investment. For example, research shows that 50 giant foxtail plants per foot in the corn or soybean row can reduce yields by 25 to 30 percent. Most people are willing to invest $5.00 per acre if more than the amount invested is returned in increased yields.

Most pre-emergence herbicides cost $2.00 to $5.00 per acre for band application. If you can achieve economical and satisfactory weed control without pre-emergence herbicides, you probably would be wise to invest the money for other needs, such as fertilizer. In some years, however, a pre-emergence herbicide does not give satisfactory weed control and you may not have a suitable return on your investment.

Using pre-emergence herbicides is an economical practice about three years out of four. One of the main reasons for failure is lack of adequate rain to activate the herbicide. However, on the other hand, pre-emergence herbicides are sometimes called "wet weather insurance." It is during the wet years when weeds grow best and cultivation may be delayed that you really need help and that is when pre-emergence herbicides often work best. When it is dry for a few weeks after planting, the herbicide may not be very effective, but weeds are usually not very serious then either and cultivation can be timely. If you could predict the weather, there would be no need to buy "pre-emergence insurance" in the dry years.

For those of you who have changed to narrow rows, it is a common belief that narrow rows give more shade between the rows and thus improve weed control. If, however, you still do use a pre-emergence herbicide, the change from 40- to 30-inch rows means a band application of herbicide on nearly half rather than only a third of the actual area. Band application still costs less than broadcasting in terms of herbicide, but with narrow rows the difference between banding and broadcasting decreases. With narrow rows the cost of two cultivations may still be less than the cost of applying the herbicide between the rows. However, you must consider the price you are willing to put on weed control during a wet period, when labor is short, or on being able to eliminate a cultivation when time is at a premium.

CHEMICAL WEED CONTROL FOR CORN

CROP	*CHEMICAL**	*REMARKS*
CORN, pre-emergence	**ATRAZINE (2 to 3 lb.)**	Controls annual grass weeds and broad-leaved weeds. Adjust rate for soil type. Performs best on low organic matter soils. Injury to spring oats and soybeans has sometimes occurred the following year.
	RAMROD (4 lb.)	Controls annual grass weeds, pigweed, and lambsquarter. Best adapted to dark soils, but better than Randox on light-colored soils. Control lasts a little longer than with Randox. Less irritating than Randox, but use care to avoid irritation. Do not feed forage to livestock.
	RANDOX (4 lb.)	Controls annual grass weeds and pigweed. Do not use on sandy soils. Performs best on soils moderate to high in organic matter. Use appropriate precautions to avoid irritation to skin and eyes.
	RAMROD plus ATRAZINE (3 lb. Ramrod plus 1 to 1½ lb. Atrazine)	Trial use. For spray application. This combination appears promising for obtaining a broader spectrum of weed control under a wide variety of soil and climatic conditions. The reduced rate of atrazine reduces the possibility of residue problems. Federal registration has been applied for. Handle with care to avoid irritation.
	ATRAZINE plus LOROX (Adjust rate for soil type)	Performs better on light, low organic matter soils than on the moderately dark to dark soils. Crabgrass and panicum control may be better than with atrazine alone. Reduced rate of atrazine reduces possibility of residue problem.
The following pre-emergence herbicides have label clearance for corn but, because of lower crop tolerance or less weed control, are not considered as satisfactory as the above.		
	RANDOX-T (see label)	Controls annual grass weeds and broad-leaved weeds. Use precautions to avoid irritation to skin and eyes. Do not use on sandy soils. Corn tolerance not as good as with Randox. Soybeans and some vegetable crops planted the year following application have sometimes been injured.
	ROUNDUP (3 lb. Ramrod plus 1 lb. 2,4-D)	Trial use. The addition of 2,4-D to Ramrod improves control of broad-leaved weeds. However, a preferred alternative would be a pre-emergence application of Ramrod followed by an early post-emergence application of 2,4-D. Available in granular form. Handle with care to avoid irritation.
	KNOXWEED (2 lb. Eptam plus 1 lb. 2,4-D)	Controls annual grass weeds and broad-leaved weeds. Corn injury possible, but less likely than with Eptam alone.
	2,4-D ESTER (1½ lb. liquid or 2 lb. gran.)	For control of broad-leaved weeds. May give some control of annual grass weeds. Some hazard to corn if heavy rains occur soon after treatment. Do not use on sandy soils. Do not use amine form for pre-emergence.

* Rates indicate active ingredient or acid equivalent per acre broadcast unless otherwise indicated. Rates for Dowpon refer to pounds of commercial product per acre broadcast.

APPENDIX

Table 1. Kernel spacing to obtain various plant populations in different row widths in a Drilled Planting Pattern. A 10% stand loss is calculated into each rate.

	Kernel spacing					
Plants/acre	40" rows	38" rows	36" rows	32" rows	30" rows	28" rows
12,000	11.8	12.4	13.1	14.7	15.7	16.8
13,000	10.9	11.4	12.1	13.6	14.5	15.5
14,000	10.1	10.6	11.2	12.6	13.4	14.4
15,000	9.4	9.9	10.5	11.8	12.5	13.4
16,000	8.8	9.3	9.8	11.0	11.8	12.6
17,000	8.3	8.7	9.2	10.4	11.1	11.9
18,000	7.8	8.3	8.7	9.8	10.5	11.2
19,000	7.4	7.8	8.3	9.3	9.9	10.6
20,000	7.0	7.4	7.8	8.8	9.4	10.1
21,000	6.7	7.0	7.5	8.4	9.0	9.6
22,000	6.4	6.8	7.1	8.0	8.6	9.2
23,000	6.1	6.5	6.8	7.6	8.2	8.8
24,000	5.8	6.2	6.5	7.3	7.8	8.4
25,000	5.6	5.9	6.3	7.0	7.5	8.1
26,000	5.4	5.7	6.0	6.8	7.2	7.8
27,000	5.2	5.5	5.8	6.5	7.0	7.5
28,000	5.0	5.3	5.5	6.3	6.7	7.2
29,000	4.8	5.1	5.4	6.1	6.5	7.0
30,000	4.7	5.0	5.2	5.9	6.3	6.7
31,000	4.6	4.8	5.1	5.7	6.1	6.5
32,000	4.4	4.6	4.9	5.5	5.9	6.3

Table 2. Spacing to obtain various plant populations in different row spacings when hill dropped, 2 kernels per hill. A 10% stand loss is calculated into each rate.

	Kernel spacing					
Plants/acre	40" rows	38" rows	36" rows	32" rows	30" rows	28" rows
12,000	23.6	24.8	26.1	29.4	31.4	33.6
13,000	21.8	22.8	24.1	27.1	29.0	31.0
14,000	20.2	21.2	22.4	25.2	26.9	28.8
15,000	18.8	19.8	20.9	23.5	25.1	26.9
16,000	17.6	18.6	19.6	22.0	23.5	25.2
17,000	16.6	17.5	18.4	20.8	22.1	23.7
18,000	15.6	16.5	17.4	19.6	20.9	22.4
19,000	14.8	15.6	16.5	18.6	19.8	21.2
20,000	14.0	14.8	15.7	17.6	18.8	20.2
21,000	13.4	14.2	14.9	16.8	18.0	19.2
22,000	12.8	13.5	14.2	16.0	17.1	18.3
23,000	12.2	12.9	13.6	15.3	16.4	17.5
24,000	11.6	12.4	13.0	14.6	15.7	16.8
25,000	11.2	11.9	12.5	14.1	15.1	16.1
26,000	10.8	11.4	12.0	13.6	14.5	15.5
27,000	10.4	10.9	11.6	13.0	14.0	15.0
28,000	10.1	10.6	11.2	12.6	13.4	14.4
29,000	9.6	10.2	10.8	12.2	13.0	13.9
30,000	9.4	9.9	10.4	11.8	12.5	13.4
31,000	9.1	9.6	10.1	11.4	12.1	13.0
32,000	8.8	9.3	9.8	11.0	11.8	12.6

Table 3. Spacing to obtain various plant populations in different row spacings when hill dropped, 3 kernels per hill. A 10% stand loss is calculated into each rate.

	Kernel spacing					
Plants/acre	40" rows	38" rows	36" rows	32" rows	30" rows	28" rows
12,000	35.4	37.1	39.2	44.1	47.1	50.4
13,000	32.7	33.6	36.2	40.7	43.5	46.5
14,000	30.3	31.8	33.6	37.8	40.3	43.2
15,000	28.2	29.7	31.4	35.3	37.6	40.3
16,000	26.4	27.9	29.4	33.0	35.3	37.8
17,000	24.9	26.2	27.7	31.1	33.2	35.6
18,000	23.4	24.8	26.1	29.4	31.5	33.6
19,000	22.2	23.4	24.8	27.9	29.7	31.8
20,000	21.0	22.3	23.5	26.4	28.2	30.2
21,000	20.1	21.1	22.4	25.2	27.0	28.8
22,000	19.2	20.3	21.4	24.0	25.7	27.7
23,000	18.3	19.4	20.5	22.9	24.5	26.3
24,000	17.5	18.6	19.5	22.0	23.5	25.2
25,000	16.8	17.8	18.8	21.2	22.6	24.2
26,000	16.2	17.1	18.0	20.4	21.7	23.3
27,000	15.6	16.4	17.4	19.5	20.9	22.4
28,000	15.1	15.9	16.7	18.9	20.1	21.6
29,000	14.4	15.3	16.2	18.2	19.5	20.9
30,000	13.8	14.9	15.7	17.6	18.8	20.2
31,000	13.7	14.4	15.2	17.1	18.2	19.5
32,000	13.2	13.9	14.7	16.5	17.6	18.9