Weld County 4-H

Crops Project Manual

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CONTENTS

Practical Crop Production

Introduction to Unit III

Leading farmers leave as little as they can to chance. They know that crop protection is at best, risky. Realizing that while they cannot control the weather, for example, they can reduce, even eliminate some of the other risks. They rely on soil tests for guidance to the best fertilizer treatment for a particular crop grown or a given field. They also insist on testes seed of a proved variety.

"Top" farmers know that good practices, used in combination, tend to support and to magnify the benefits. On the other hand, poor practices magnify each others shortcomings.

Scientists call this behavior "inter-action." Remember that word and its meaning. It's a good one to bear in mind always.

Back in 1910, when the 4-H Club idea was just starting, Jerry Moore, a 16 year old 4-H'er in South Carolina, amazed the public by producing 228 bushels of corn per acre. The next year membership in 4-H Corn Clubs in the South increased four times.

In 1955, Lamar Ratcliff, a 16 year-old high school senior in Prentiss County, Mississippi, received national attention with a corn yield of 304 bushels. And the next year, according to the county agent's records, Lamar's younger brother, Lindon, grew 257 bushels and, in 1960, 295 bushels, demonstrating that these achievements were solidly based.

In a recent Alabama-Georgia Peanut Yield Contest, a yield of 4,644 pounds per acre established a new Alabama record for the Adult division as did 5,299 pound yield in Georgia. But Randall Sellers, a 14 year-old 4-H boy in Henry County, Alabama, harvested 5,648 pounds per acre from his 6-acre crop.

You, too, can be a pace setter. Remember, to reduce production costs can be as meaningful as producing record yields. Whether the pace you set serves only your community or your state is secondary – the real reward is breaking through barriers to reach new levels.

If we asked these young men how they accomplished what they did, they probably would say: "Provide your crop every advantage you can. Don't depend on heavy fertilization alone, good seed, or any other *single* practice. Do everything right."

They knew and followed the principal of *interaction*.

PURPOSE

A. To use all the known scientific principles and practices and your own management decisions in growing a profitable crop, or
B. To choose a problem that affects plant growth. Use scientific principles and practical methods to meet that problem. This project can be done in

the field, in small plots, (garden or lawn) or in pots. *Use known facts to grow the plants or to identify the problem.*

HOW TO PROCEED

1. Determine which crops grow well under your local conditions and their potentials for market or home use.

2. Then learn as much as you can about a crop or other useful plants such as lawn grass, flowers, shrubbery, forest trees, or ornamental plants for your project.

3. Obtain all available manuals, bulletins and other information that pertain to your selection. Your leader or county extension agent can help you obtain the information materials.

4. Review all important factors that may reduce yields or profit, result in failure, or produce abnormal growth. Use outline on pages 12-14 to organize your procedure.

5. Outline all practical and scientific steps to be taken which produce optimum growth, quality, and/or yield (all-practice approach). Use the outline on pages 8 to 10 to develop your plan.

6. Proceed with your project. Produce and harvest your crop (pot, plot, or field)* according to your plan above, step 5. (Harvesting may not be necessary when yield is not a basis of evaluation).

   If you choose a problem area, go through a check list of the above outline. If one or more practices were left out, list those with any abnormal soil condition, disease situation, insect infestation, etc. which you find.

7. If your crop is to be stored for later home use or for a more favorable market price ask your county extension agent for advice on suitable storage methods. He also can advise you on proper preparation and packing of your procedure to be sold at market.

8. Keep a record of your activities and the crop's responses. (See page 19). Include pictures where possible.

9. Report what you have learned to clubs, groups, and the public by TV, radio, and other media.

10. Exhibit and evaluate your project and similar projects.

11. Review your plan on pages 12-14 and record any changes you would make in growing this crop again.

* Complex problems may be best solved by using several treatments in pots or small plots.

FACTORS TO CONSIDER IN SELECTING YOUR PROJECT CROP

The following must be considered carefully in the selection and production of any crop.

I. Climate

Look about you to identify the crops that are suited to your climate.

Weather makes a great difference and there is little you can do about it beyond irrigating to make up water shortages, and

draining to remove excess water. But climate means more than water – important as it is.

Climate means heat and cold, length of growing season, light intensity, length of day and other conditions that affect plants. And, in time, climate affects the soil itself.

So important are the plant-climate relationships that it is climate that accounts for the concentration of cotton across the southern part of our country and hard spring wheat in the northern prairie states. Climate accounts for the location of the cornbelt and the citrus areas.

In general, we must select crops that climate permits us to grow. Using the greenhouse to grow other plants illustrates this fact, because its purpose is to modify climate.

II. Soils

Prevalence of certain crops in your area also tells you the soils that are more or less suitable for them. However, unlike climate, there is much you can do to improve soil. And that is extremely important, for good soil management often makes the difference between success and failure.

Take the position that any soil can be made to produce more than it is presently producing. You may be surprised how true this is.

III. Management

A. Choosing your planting site – Field, plot, or pot. Unit II-E Growing and Using Plants gives detailed attention to selection of sites for vegetables, ornamentals, and potted plants. Now, let's examine the successful farmer's view. It's broader. For him productivity, economy, convenience, and appearance are major, if not equal considerations.

He chooses his most fertile an preferably, most level lands for cropping. He leaves the swampy, extremely sandy, rocky and steep areas in forests. And he uses the lands falling between these for such purposes as orchards and vineyards, but most widely for hay and pasture.

Productivity and economy of operation are important factors in the selection of cropland. For the higher yield and the lower production costs the greater the profit. Characteristics to look for include: deep fertile soils that are free of stones, gullies and serious weed problems. Fields should be relatively level or else adaptable to terracing and to contour farming; and well-drained yet not too dry. The field should be easy to reach for working convenience.

Experienced planters know that few sites offer all of these advantages but they seek sites with as many as possible.

B. Improve and guard the soil, manage moisture by:

a. fitting crops to the land, field by field.
b. returning plant and animal residues to the soil.
c. terracing, contour farming, draining, and irrigating.
d. utilizing cover crops, windbreaks, and fallow.
e. investigating and testing promising ideas such as minimum tillage.

C. Match crops to soils with a view to yield.

a. With heavy soils we associate soybeans, sugar beets, wheat, rice, sorghum, cotton and others because the generally perform better that corn or vegetables. Sandy, porous soils are favored for such crops as potatoes, peanuts and melons. Between these extremes are the loam soils. Neither too heavy nor too light, they are

suited to a range of crops. (See Unit II-B Soils, for details.)

D. Boost soil productivity with fertilizer, lime for acid soils and with other minerals – all guided by soil tests. **Soil testing is so *reliable*, easy, and inexpensive; there is no reason to treat by guess.**

E. Where nematodes are suspected soil testing offers similar guidance.

F. Disrupt hard pans and plow-soles by chiseling or sub soiling, to deepen the soil, improve its structure and drainage.

G. Prepare seedbeds that are weed-free, mellow yet firm, and ready for the seed at the proper planting time.

H. *Seed*

From the standpoint of yield and crop value, selection of seed is a *key* decision. Though superior seed costs are a small part of the total production expenses, the advantages are often sacrificed. Planter-box surveys prove it.

Desired seed qualities include:

a. Adapted varieties as demonstrated by variety tests and local experience.

b. Genetic purity. This means purity of "blood lines." It implies that seed of generations close to the foundation stock is preferable to seed from later generations. Open-pollinated seed declines in performance from the level of its original parent stock. Hybrid seed loses its added vigor (its major advantage) in a single generation.

The successful plant breeder knows he must continually protect, test, and re-select his breeding stocks.

c. Physical purity means freedom from:

1. Mixtures with other varieties, weed seeds, trash or foreign matter.
2. Damage caused by improper harvesting, processing, or storage, and by insects and disease.

I. *Seed Treatment*

When planting a legume, remember that the bacteria which cause nodules to form on the plant roots must be present or the crop must depend upon the soil for nitrogen instead of drawing its important nutrient from the air. If you are not sure the soil is inoculated for the particular legume, inoculate the seed.

For low-cost insurance against certain soil and seed-borne diseases, treat the seed with the proper *fungicide*. See your county agent for local recommendations.

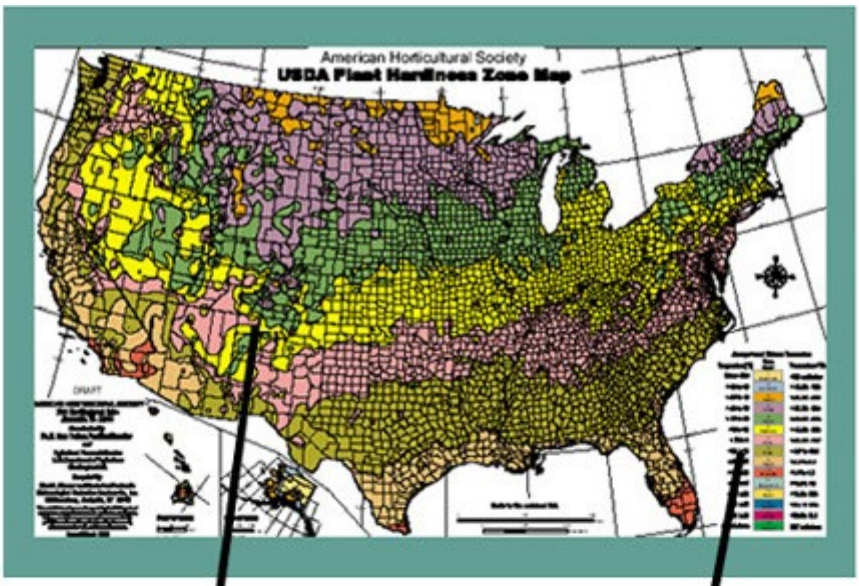
J. *Seeding Rates*

State research provides local information on the relation of yields to stands (plants per acre). It may vary with climate, soils, and other factors. Follow your state's recommendations.

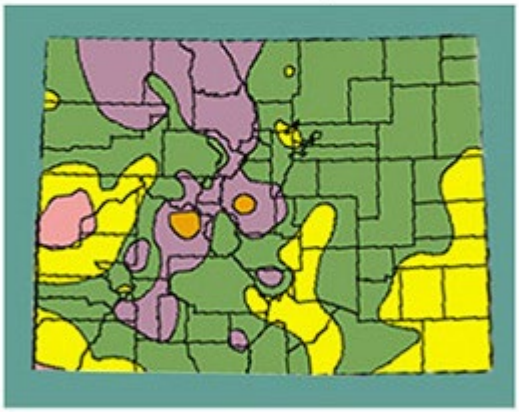
Growers who already enjoy high yields from usual spacing often can increase yields by closer spacing, either between rows and/or between plants. But if yields are below average, improvements in other practices (fertilization, seed selection, etc.) are likely to be more productive.

K. *Seeding Time*

Experiments tend to show that soil temperature, as well as the calendar, indicate the earliest safe spring planting dates. For example, in the northern half of Illinois, agronomists have found that planting as soon as possible after April



USA



COLORADO

Average Annual Minimum Temperature

Temperature (°F)	Zone Color	Temperature (°C)
Below -50.0	1 Goldenrod	-45.6 and below
< -40 to -50	2 Cornflower	< -40.0 to -45.5
< -30 to -40	3 Carrot	< -34.5 to -40.0
< -20 to -30	4 Violet	< -28.9 to -34.4
< -10 to -20	5 Apple	< -23.4 to -28.8
< 0 to -10	6 Buttercup	< -17.8 to -23.3
< 10 to 0	7 Rose	< -12.3 to -17.7
< 20 to 10	8 Moss	< -6.7 to -12.2
< 30 to 20	9 Peach	< -1.2 to -6.6
< 40 to 30	10 Poinsettia	< 4.4 to -1.1
< 50 to 40	11 Peppermint	< 10.0 to 4.5
< 60 to 50	12 Melon	< 15.5 to 10.0
< 70 to 60	13 Bluebell	< 21.1 to 15.8
< 80 to 70	14 Orchid	< 26.6 to 21.2
80 and above	15 Papaya	26.7 and above

10 favors highest corn yields, although there is still some risk. They advise planting as soon after this date as the soil temperature at a 4 inch depth reaches 55°F at 1:00 p.m.

Some agronomists would delay planting until soil temperatures continue at safe levels for two or three days, For example, in California, it is recommended that cotton planting be delayed until the soil temperature reaches 60° to 65°F at an 8 inch depth at 8:00 a.m. for two or three successive days.

Take temperature readings daily at several points in the field, especially if the soils are different.

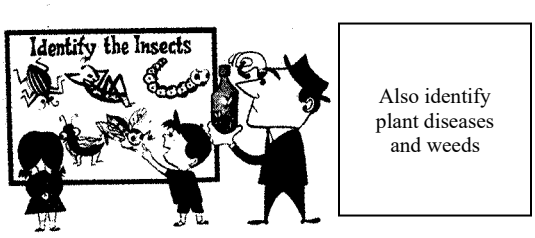
L. *Weed Control*

The main reason to cultivate is to reduce the crop's competition from weeds. Experience has shown that plots can be kept weed-free by merely scraping the soil surface with sharp hoes. And the yields are equal or better than from those plots subjected to mechanical cultivation.

Today, increasing numbers of growers rely on recommended chemical herbicides to control weeds. This avoids damage to crops by mechanical cultivation and lessens problems of erosion.

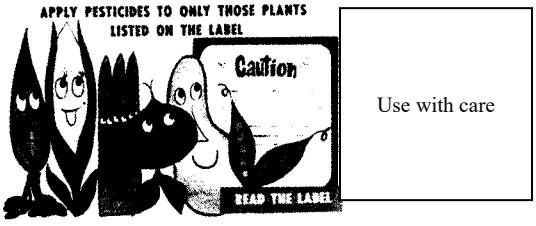
The use of mulches for small plots is effective in controlling weed growth and conserving moisture. Straw, shredded bark, black plastic and even paper are some materials used as mulches.

PLAY SAFE – DON'T GAMBLE WITH PESTICIDES

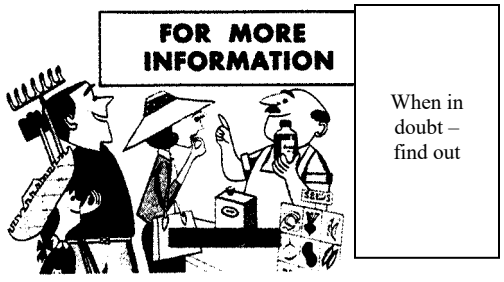


The key to using the right pesticide is to identify properly the particular pest.

Follow instructions on the label. It tells you the right rate to use, how to use it and when.



Apply pesticides only to those plants listed on the label. Keep spray from drifting to other plants. It may kill or injure them.



Ask your county agent, your local nursery-man or other well-informed person.

M. *Controlling Insects and Diseases*

Familiarize yourself with insect and disease problems of your area including: a. symptoms b. preventives and c. control measures recommended by your College of Agriculture.

Make it habit to use preventive measures: a. use resistant varieties; b. seed treatment; c. clean-up fields and storage bins.

Where treatment (spraying) is indicated, act promptly.

N. *Know Irrigation Principles*

Irrigation is a man's ability to supply land with water by artificial means. Think about the close relationships of crop-soil-climate-water. Realize there are plants which are adapted to extreme climatic variations such as heat-cold, light intensity, length of day, and length of season. Why then are there highly productive regions, barren regions, and all gradations between these extremes?

Frequently, the explanation rests on the water-soil-plant food relationship – another case of interaction. This means, if either the climate fails to provide water when plants require it, or if the soil is unable to retain sufficient water, crop production suffers. The problem narrows down to water.

The irrigation engineer takes this point of view. And the soil specialist tells us that without water, nutrients cannot go into solution, so plants cannot use them. Also, harmful minerals may collect in the soil if there is not enough water to remove them. Some desert soils are overloaded with such minerals (salts). So water is required to *utilize* the desirable minerals and to *remove* the undesirable ones. The millions of acres of lush crops now grown *by irrigation* on formerly desert lands prove that water is the key.

Additional water needs vary by regions. In the driest areas, farmers depend entirely upon irrigation. Where the climate provides rain and the soils retain some but not enough water, supplemental irrigation is practiced. Where water is deficient only to the point that it restricts yields, farmers boost their yields by skillful choice of crops and soil management to conserve water. Anytime a crop lacks water, yields suffer. Thus, the practice of irrigation continues to expand.

Irrigation, like the greenhouse, can modify climate. Here, briefly, are the principles of irrigation:

1. *Consumptive use* is the amount of water drawn from the soil through transpiration of the plant. This determines how much water the crop needs. (See Fig. 4) Daily water requirements vary by plant species, stage of growth, temperature, humidity, and wind, factors that affect evaporation. Consumptive use determines how much water must be applied. Peak use is the highest rate of water used by a crop. Both are expressed in tenths of an inch per day.
2. *Frequency of water application* is determined by the soil type, stage of root development and consumptive use. Soil acts as a water reservoir with clay type soils holding more water per foot of depth than sandy soils. (See Fig. 1) Clay holds the water tightly and doesn't give it up to plants as readily as do loam soils.

   Soil-water below plant roots is of little value to the crop. (See Fig. 3) Therefore, frequent irrigation insures soil moisture within the root zone when needed.
3. *Soil-intake rate* determines the length of time water must be applied to refill the soil reservoir. (See Fig. 2) It is

measured in inches of water taken into the soil in one hour. Intake rates differ with soil type. Clays take water slowly – ¼ inch per hour – while sandy loams will take 2 inches and more per hour. The object is to fill the soil reservoir by applying the water at the rate the soil will take it.

The principle of irrigation is simply – give the crop the proper quantity of water when it needs it. This is determined by the competitive use and the ability of the soil to absorb and hold water for plant use.

THINGS YOU MUST KNOW BEFORE DESIGNING AN IRRIGATION SYSTEM

1. The soil.
2. The crops you'll grow.
3. The **Peak Use** of water by the crop.
4. The lay of the land (topography).
5. The supply of water.

Soils, root depth, and the crop's peak daily use of water will determine the quantity and frequency of application

SPRINKLER SYSTEM

From acreage, quantity of water, frequency of application and the number of sprinkler heads, the size of the system can be determined.

From the quantity of water and frequency of application the nozzle size can be determined.

The power, the pump and the pipe sizes can be determined from the quantity, frequency of use, system size and the total head.

Fig. 1

3 INCHES OF WATER WILL WET EACH SOIL TO THE DEPTH SHOWN.

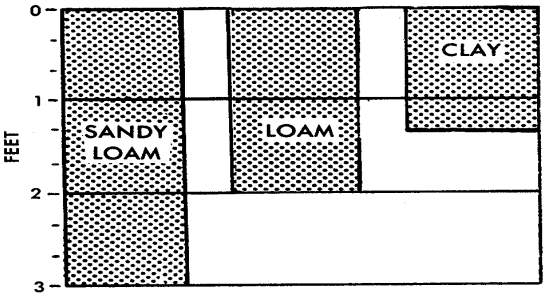
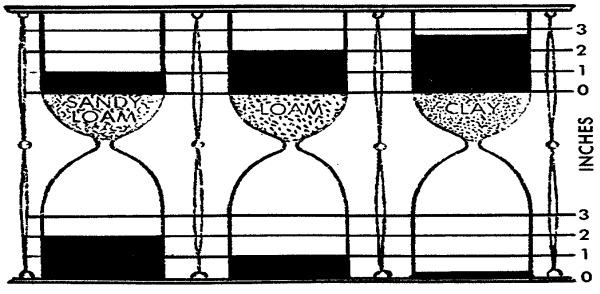


Fig. 2

WATER INTAKE RATE IN SOILS

in inches per hour



SANDY LOAM — 2" per hour
LOAM — 1" per hour
CLAY — ¼" per hour

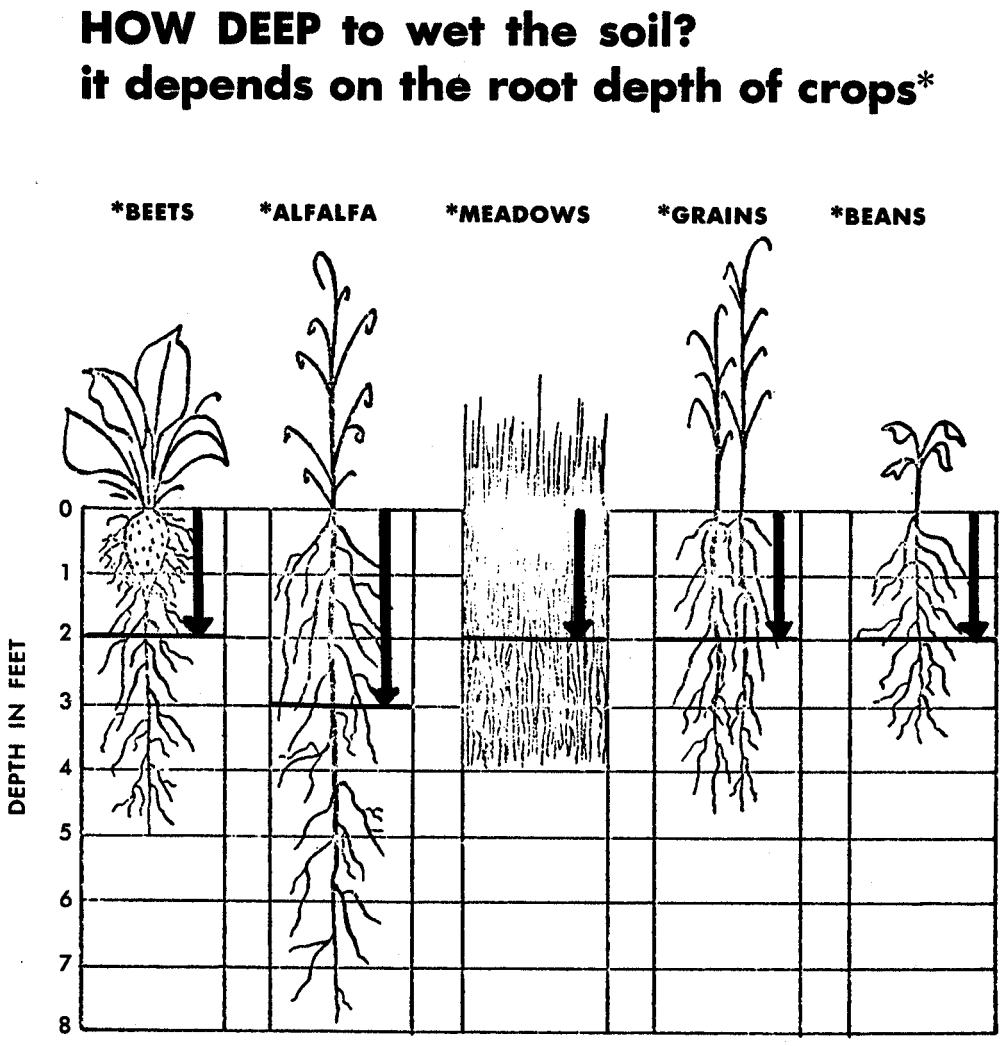

HOW DEEP to wet the soil?
it depends on the root depth of crops*
*BEETS
*ALFALFA
*MEADOWS
*GRAINS
*BEANS
DEPTH IN FEET
0
1
2
3
4
5
6
7
8

Fig. 3

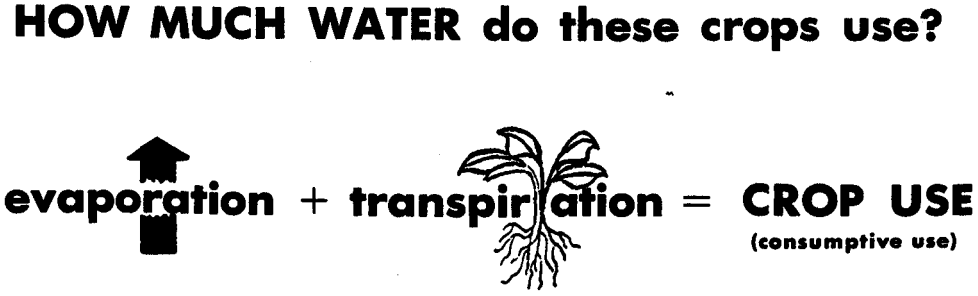

HOW MUCH WATER do these crops use?
evaporation + transpiration = CROP USE
(consumptive use)

Fig. 4

Peak use is the highest rate of water used by the crop during the season. The system should be so planned as to meet these needs.

O. *Harvesting*

Key harvesting considerations include:

1. Maturity stage of the crop (timing)
2. Weather conditions.
3. Condition and adjustments of harvesting equipment.
4. Operation of equipment at proper speed to restrict waste and damage.
5. Careful handling and storage of crop. Storage area should be adequately ventilated but with protection against moisture and pests.
6. Prompt drying of harvested crop when required.

Harvest losses, if measured, often are startling. Thought they may not be eliminated, usually, they can be reduced by proper adjustment and operation of harvesting equipment.

The tables below show how deceiving field losses may appear. After calculating losses of shelled corn and ear corn add these to find *total* loss.

To check losses of *shelled* corn:

with 40 inch rows, square off 40 inches between the rows

with 30 inch rows, measure off 30 inches between the rows

Count kernels found within the square and check table below for losses per acre. If your row width differs from the examples below, proportion the area of your square, and your loss to one of the examples given. For *total loss* add the losses of grain and ear corn.

CORN

Shelled			Ear	
Row Width Inches	Area Gleaned Inches	Number of Kernels to Equal One bu./ac.	Row Distance Gleaned (feet)	Number 0.6 lb. (9-10 oz.) Ears to Equal One bu./ac.
40	40x40	20	112	1
30	30x30	11	160	1

SOYBEANS (medium size)

Beans per sq. foot	2	4	8	12	16	20
Loss in bu. per acre	½	1	2	3	4	5

To minimize harvest losses of any crop, follow manufacturer's directions to keep harvest equipment in proper adjustment for peak operating efficiency.

P. Marketing and Utilization By following the principles listed, you should have quality products, whether for home use or market. If it is a feed crop you produce, your livestock will reflect the difference quality makes. If it is a market crop, have your product graded if possible and seek a market where prices are based on grade.

YOUR PROJECT PLAN

A well-developed plan helps guide you through those practical and scientific steps you expect to take in your all-out effort to produce optimum growth, quality and/or yield in you crop production project.

CROP SELECTION

What crops are grown in your area? _____
What crop (s) have you selected? _____
Why? _____

SOIL FACTORS (See Unit IIB)

1. *Erosion*. Is the soil likely to erode? _____ By Rain? _____ By wind? ____
At what time during land preparation, crop growing period, following harvest?
_____

2. *Drainage*. Circle the degree of drainage (surface: Poor _____ Good _____ subsurface: Poor _____ Good _____). List improvements needed_____
_____

3. *Soil Characteristics**. Soil type_____
Structure_____Depth of surface soil_____
Type of subsoil_____Percent organic matter_____
And relative water holding capacity (See Unit IIB-Soils)_____
List plans for modifying these factors.
Short term_____
Long term_____

4. *Soil Fertility*. Give the pH, Organic matter, Calcium, Phosphorous, Potash, Magnesium level as shown by a soil test. pH_____; Om_____; Ca_____; P_2O_5_____; K_____; Mg_____; Others_____
Outline your lime and fertility program on the basis of soil test and the characteristics of your chosen crop; Before planting_____;
At planting_____; As topdressing or sidedressing____
_____.

5. *Salt Content, Disease and other factors*. Determine *if there is* a likelihood of a build-up of a salt or other harmful material, diseases, nematodes or other problems. Indicate action you plan to take. _____
_____

*(See your county agent or soil conservationist)

CROPPING HISTORY (What crops have been grown on the soil in the past three years and what cultural practices have been used that will help you in outlining your cropping plan)

Year	Crop	Fertilization	Insect Problems & Chemicals used

Disease Problems & Chemicals used	Weed Problems & Chemicals used	Moisture Level Low Adeq. High	Other Problems or Comments

Which of these factors require special consideration for your project _____

_____

How do you plan to correct the foregoing factors or use them to an advantage? _____

_____

SEED OR PLANTS

	Used Last Year	Your Selection
1. Variety		
2. Standards met (certified, Registered, etc.)		
3. Germination (seed only)		
4. Treatment		
5. Additional treatments by you		

Indicate why you chose these particular seeds or plants_____

_____

RECORDS TO KEEP

SEEDING

1. Seed bed preparation: List number of times: Plowed_____ Disked_____ Harrowed_____ Tilled_____ Other_____
Describe Firmness of soil bed: _____
Size of soil particles in relation to seed size (range of size in one representative cup of soil) _____
2. Plant spacing: Between rows_____; In row_____ Plants per acre _____
3. Date planted_____ Did you use soil temperature as a guide? _____
4. Depth of planting_____
5. Soil moisture at planting: Dry____; Medium_____; Fairly wet_____; Wet____
6. Weather at planting: Cloudy_____ Partly cloudy_____ Sunny_____
7. Air temperature (high and low) for 4 days after planting. 1st_____ 2nd_____ 3rd_____ 4th_____
8. Record rainfall after planting: Total 1st week_____ Total 2nd week_____

WEED CONTROL

1. If possible, describe the weed control program used on this area last year:
Mechanical_____
Chemical (types, rates, timing etc.)_____

2. Did it satisfactorily control weeds? _____

_____

If not, which weeds caused a problem? (Include important life cycle information)

_____

3. Describe your planned weed control program. (Indicate whether mechanical or chemical methods will be used and what chemical)

A. Before planting (Pre-planting)_____

_____

B. After planting but before seeds emerge (Pre-emergence) _____

_____

C. After plants are set or seeds have emerged (Post-emergence) _____

_____

D. Tillage (list number of times and procedure below).

Stage of Growth	Tillage tool to be used	Depth of tillage	Time required per acre or per 100 ft. row

_____

_____

_____

E. List herbicide(s) to be used_____

_____

INSECTICIDES

List the insecticide(s) you will probably use and the purpose(s). _____

_____

_____

At what growth stage(s) will they need to be applied?_____

FUNGICIDES

List the fungicide(s) you expect to use if any, and the purpose(s) _____

_____

_____

At what growth stage(s) will they be applied? _____

IRRIGATION

Has irrigation been used on this field? _____

Do you plan to use irrigation?_____; sprinkler type _____or_____

If so, briefly outline your plan on time and rate. _____

_____

HARVESTING (if applicable)

Describe your proposed method(s) of harvesting. Include measures to be used in preserving quality and preventing yield losses _____

_____

OTHER CONSIDERATIONS

Indicate other problem(s) or precaution(s) considered in your plan. Include proposed steps to be taken to overcome the problem(s). _____

_____

_____

SUGGESTIONS FOR KEEPING YOUR CROP RECORDS

In addition to keeping a list of cash expenses, time and labor charges and others, it is a good idea to record any of the following that apply:

1. Make notes of any abnormal plant behavior when it occurs.
2. Record any symptoms of disease or insects. Also, any nutrient deficiency, damage by rodents, birds, wind, water or other causes. Record any other pertinent observations such as lodging, abnormal growth, weak spots in the field, etc.
3. List problems encountered. Describe corrective measures taken. Include your sources of information for identifying and correcting each problem.
4. Record final yield and quality of the crop produced.
5. Compare your yield with previous yields produced on the field. If possible, give your reasons (including controllable and uncontrollable factors) for the increased or decreased yield.
6. Explain any variation between your planning sheet and actual practices. Give your reasons for making these changes. _____
   _____
7. Outline any changes you would make in your production practices if you were to continue the project for another year*.
8. Briefly state what you have learned from this project. Tell how important you feel this experience may be to your future plans.
9. Record any suggestions you have to make this project more helpful to other 4-H'ers.

*Where the project has been carried out for mare than one year, include the record sheets for each year of the project.

RATE YOUR OWN PROGRAM

Basis for selecting crop and area	5	_____
Completeness of outlining program	15	_____
Consistency of carrying out plan	15	_____
Completeness of weekly reports	15	_____
Explanation of yield vs previous yield	25	_____
Value of learning experience	25	_____
	Total – 100%	_____

Special consideration for carrying out a meaningful challenging program on a problem situation Plus 25% _____

CROP CASH RECORD

Enter all cash receipts and cash expenses, including any cash outlay for hired labor. Put down as expenses the value of any seed received free. Estimate if you do not have exact figures.

Date	Items	Receipts		Expenses	
Total receipts (transfer to line 2 page 15)					
Total expenses (transfer to line 5 page 15)					

FIELD OPERATION RECORD

Date	Kind of Work Done	Custom rate 1/		Acres or Hours		Total Cost
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
			X		=	
Total Field Operation Cost (transfer to line 4 page 15)						

1/ As taken from your state extension circular on “Farm Custom Rates” or local custom rates as indicated by your county extension agent.

CROP BUSINESS SUMMARY

Complete the following summary before submitting your record book to your 4-H leader at the close of the 4-H year.

RECIEPTS

1. Inventory value of any unsold crop on hand at close of this year's project …… $ _____

2. Receipts from page 14…….. _____

TOTAL RECIEPTS $ _____

EXPENSES

3. Inventory value of seed on hand at beginning of this year……..$ _____

4. Cost of field operations from page 15……. _____

5. Total cash expenses from page 15……... _____

TOTAL EXPENSES $ _____

RECIEPTS minus EXPENSES $ _____

Deduct land rental value if not already accounted for _____

PROFIT or LOSS to your management and labor input $ _____

DEFINITION OF TERMS

Annuals – Plants that normally live only one year.
Anther – The part of a stamen where pollen is produced – usually at the tip.
Bark – Tough, woody outside covering of a woody root or stem.
Cambium – A thin formative layer that gives rise to new cells and is responsible for secondary growth.
Carbon Dioxide – (CO_2) – A gas in the atmosphere used by plants to produce sugars and starch (photosynthesis).
Characteristics – Traits that distinguish or identify.
Concentrated – A strong solution, as when much salt is dissolved in water.
Dicotyledon – Plant having two cotyledons or seed leaves.
Dormant – A state of reduced activity in which no growth takes place.
Embryo – The underdeveloped plant within a seed (the germ).
Evaporation – To pass off as a vapor.
Fertilizer – Plant food used to enable plants to grow better.
Fibrous Root – A fine, many branched root like that of corn or grass.
Filament – Stalk or stem of a stamen.
Flower – Reproductive structure of a plant.
Germination – The process by which a seed takes up water, swells and the embryo starts to grow.
Growth Regulators – Substances, other than nutrients, that influence growth.
Inoculum – Bacteria supplied to legumes to "fix" nitrogen from the air.
Legume – A family of plants capable of drawing nitrogen from the air, with the aid of proper inoculum, for their own use: i.e., alfalfa, clover, beans, peas.
Life Cycle – Series of stages through which a plant passes before arriving again at the starting point (seed germination, seedling, plant, flower, seed).
Lodging – The beating down of a crop by hail, wind, rain, or the falling over through plant weakness.
Membrane – A thin, soft sheet or layer. (See Plant Characteristics Ex. IID-3).
Mold – A superficial, often wooly, growth produced on damp and decaying organic matter.
Monocotyledon – Plant having a single cotyledon or seed leaf.
Ovary – Base of a pistil, where the seed develops.
Oxygen – A gas given off by plant leaves in the process of making starches and sugars by photosynthesis.
Perennials – Plants that grow from the same root system three or more years.
Pesticides – Chemicals used to control pests (for: insects-insecticides; diseases-fungicides; weeds-herbicides).
Phloem – "Plumbing" system that conducts food manufactured in the leaves to all parts of the plant.
Photosynthesis – Process by which leaves, with the aid of the energy of the sun, convert carbon dioxide and water to sugars and starches.
Plant Nutrient – A chemical element taken into a plant that is essential to its growth, development, and reproduction.
Prune – To trim or cut back a plant or plant part.
Root – The belowground part of the plant.
Seed – A dormant embryo enclosed in a seed coat with the endosperm.
Sod – The grass and root-mat covering the ground.
Stem – Stalk, trunk, branch of a plant. Can be vertical or horizontal.

Stigma – Part of a flower that receives the pollen.
Style – Tube connecting the stigma of a flower with the ovary.
Tap Root – Main root growing straight down as found on legumes, carrots, radishes, and certain trees.
Vascular Bundle – A unit containing both the phloem and xylem.
Vegetation – Plant life or total plant cover (as of an area).
Xylem – "Plumbing" system that conducts water and dissolved minerals up the stems.

See your leader for local requirements

4-H PLANT AND SOIL SCIENCE RECORD

Practical Crop Production Unit III **Year _____**

_____

(Name of Member) (Age) (County)

Address_____ Zip Code _____

Name of Parents _____

Name of 4-H Club _____ Years in 4-H Work _____

Name of Adult 4-H Leader _____

Address of Adult 4-H Leader _____

REQUIREMENTS FOR COMPLETING A 4-H PLANT AND SOIL SCIENCE PROJECT*

1. Select a major crop project (field crops, garden, lawn, landscaping, or potted plants).

2. Use the principles of good crop production and management.

3. Use the outline on the next page to tell about your project.

4. Give your completed record to your leader by the date requested. (Send to your county extension agent when you are not in an organized club.)

*This record can also be used for a 4-H Science Record.

RESUME OF 4-H PLANT, SOIL, AND CROPS SCIENCE PROJECT _____
(Crop Selected)

(Check the following)	Yes	No
1. Selected s crop suited to local conditions	_____	_____
2. Checked all soil factors and treated conditions needing improvement.	_____	_____
3. Recorded the most recent crops previously grown on the field, fertilization, moisture, weed and insect controls.	_____	_____
4. Used seeds or plants of high quality.	_____	_____
5. Used recommended practices and recorded date of planting, soil preparation, weather conditions, number and spacing of plants frequency of cultivation.	_____	_____
6. Kept a complete record of weed control practices.	_____	_____
7. Conducted an irrigation program. (Answer only if one was needed.)	_____	_____
8. Applied an insecticide and/or fungicide when necessary.	_____	_____
9. Used recommended harvesting method(s) recorded production and checked field for losses. (Answer only if applicable to your project.)	_____	_____
10. Asked and obtained help and information when needed for guidance in producing a crop.	_____	_____

I have checked the activities on this project and found it to be satisfactorily completed.

_____
(Signature of Leader or Parent)

_____
(Signature of Extension Agent)