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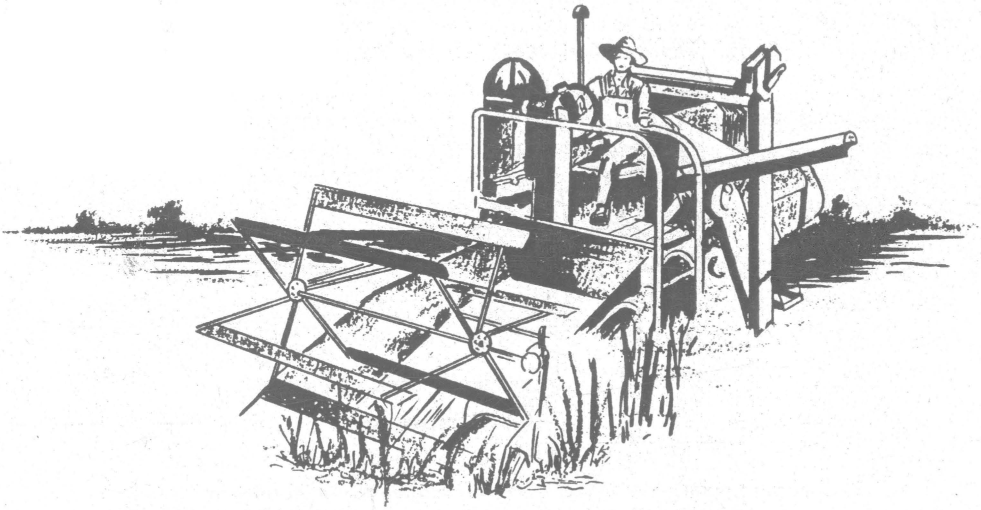
Harvesting with Combines



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Soil Testing

To determine the current status of available plant nutrients in your soil, have the soil tested. When combined with soil type information, soil tests tell the system of fertilization you need to use on each field of your farm.

Which Fertilizer to Use?

Corn benefits most from hill or row applications of fertilizers under all conditions. Use 300 to 400 pounds per acre on drilled corn or as a row aplication on checked corn. Limit hill applications to 150 pounds per acre.

Use grades—3-12-12, 4-12-8, 4-16-8, 5-10-10, or 8-8-8
  On very productive soils—0-12-12 or 0-20-10
  On sandy, muck and peat soils—3-9-18 or 0-10-20

On productive soils plant at least 15,000 seeds per acre. Often you can also increase corn yields by applying nitrogen in addition to the row application. This is especially true on less productive soils and where crop residues, grass sods, and strawy manure have been plowed under.

Use 50 to 100 pounds of nitrogen per acre. Broadcast before plowing or apply as a side-dressing after the corn starts growing. Side-dress 3 to 6 inches deep. Plow under all applications of 80 or more pounds per acre. The heavier applications are good where rate of planting is adequate, soil tilth is favorable for corn, and nitrogen supply is short.

Fifty pounds of nitrogen per acre may be supplied by using 250 pounds of sulfate of ammonia or cyanamid, 150 pounds of ammonium nitrate, or 325 pounds of nitrate of soda.

Anhydrous ammonia is a good source of nitrogen and may be used when facilities for handling it are available.

Small Grains need 400 to 500 pounds of fertilizer per acre.

Apply grades without nitrogen on productive land where there is danger of lodging and where wheat is planted on the fly-safe date. Use fertilizer high in nitrogen where there is no danger of lodging and where wheat follows soybeans or corn.

Use grades 4-16-8, 4-12-8, 3-12-12 or 5-10-10
  On productive soils—0-20-10 or 0-12-12
  On sandy, muck and peat soils—3-9-18 or 0-10-20

Wheat fertilized at seeding time but with poor growth needs 20 to 30 pounds of nitrogen per acre in the spring. Use particularly on poorer soils and for late seeded wheat following corn and soybeans. Broadcast fertilizer in March in southern Ohio and from March 1 to April 15 in northern Ohio.

If oats make poor growth and the variety is not apt to lodge, use the same nitrogen application as for wheat . . . above. Plow under or apply at seeding time in 8-8-8 or other grades high in nitrogen.

Established Alfalfa and Ladino Clover Hay or Pasture needs fertilizer high in potash. Use 200 to 300 pounds per acre yearly of 0-10-20, 0-9-27 or 0-12-12 when meadow is to be kept another year. This will maintain high yielding meadows and pastures when other management practices are good. Apply in early fall, spring, or after any harvest.

For New Seedings, 200 pounds of 0-20-0 may be run down the tube with the legume seed when seeding in wheat with a disk drill. Two hundred pounds of 0-12-12 or 0-20-10 also may be used, but the potash should not exceed 25 pounds per acre. You can broadcast the legume seed if the wheat is growing fast and wet soils keep the drill out of the field.

When seeding with oats or without a companion grain crop, arrange the hose or tubes from the clover seed box to drop the legume seed 8 inches back of the discs and directly over the fertilizer and oats band (band seeding). You gain nothing if the seeds are dropped one-half inch or more to one side of the band of fertilizer.

Permanent Pastures require 400 to 600 pounds per acre of 0-20-10 or 0-20-0 as an initial treatment. Every second or third year later, apply the same amount of 0-20-10 or 0-12-12. Use 0-20-0 if the field is completely manured.

To advance the date for early spring grazing and increase spring growth, apply 40 to 60 pounds of nitrogen per acre on fair to good sods. Do this either in the fall, winter or early spring. Treat a third or a half acre for each cow to be grazed. If the land needs all nutrients the same year, use 600 pounds per acre of 8-8-8 or 12-6-6.

Timothy or Other Grass Meadows need phosphorus and potash as do permanent pastures. To increase yields, apply 40 to 60 pounds of nitrogen per acre in fall, winter, or early spring. Seed production of grasses is often noticeably increased by the use of nitrogen fertilizers.

Soybeans respond least of all crops to direct applications of fertilizer. They will benefit, however, if the rate of fertilization is increased on other responsive crops (corn, sugar, beets, truck crops or small grains) in the rotation. For direct application, apply 200 to 300 pounds of 0-12-12 per acre but avoid contact of seed and fertilizers.

Tobacco plants, also, should not contact fertilizer. For cigar filler, use 600 to 800 pounds of 3-12-12 in the row. If you cannot apply in the row, broadcast 500 to 1000 pounds of 4-12-8 per acre. Other good grades are 5-10-10 and 8-8-8.

Plow under or work the fertilizer into the soil immediately after plowing to get the best results from white burley tobacco. Use 1000 pounds of 8-8-8 with half the potash in the sulfate form. Apply in the row 300 to 600 pounds of 4-12-8 or 3-12-12, preferably with half the potash in the sulfate form. An alternate treatment is the use of 600 pounds of 3-12-12 or 4-12-8 on rye or ryegrass cover crop in the fall and the plowing under of 60 pounds of nitrogen in the spring with the row application recommended above.

Sugar Beets require a soil with a high capacity for holding usable water before profit can be attained. Good tilth is necessary and the soil's pH needs to be 6.5 to 7.0. Best place for a beet crop in a rotation is following a 2-year-old legume-grass sod.

Fertilize each acre in the row with 300 to 400 pounds of 3-12-12, 5-10-10 or 4-16-8. Use 3-9-18 on muck soils. If needed, apply more nitrogen at the rate of 60 to 80 pounds per acre. This may be broadcast and plowed under or placed on the furrow bottom. Another way of adding nitrogen is to broadcast 600 to 800 pounds of 10-10-10 per acre and cover in the same manner.

Remember . . . for best results

Fertilize According to Need
Handle Manure Carefully
Keep Nutrients at Home

2/52-25M

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HARVESTING WITH COMBINES

Losses in harvesting any crop with a combine may be much greater than necessary because of improper operation. But the moisture problem in combining, particularly when combining wheat, is of equal seriousness. Once the combine is in proper adjustment, wait until the wheat moisture has dropped to at least 14.5 percent before starting to combine. To determine the moisture content, take a sample of grain to your local elevator or grain dealer for test.

Remember Hand-threshed samples generally have 2 to 4 percent less moisture than combined samples. For safe storage on the farm or for sale to the elevator, the moisture content of wheat must not exceed 14.5 percent.

THE JOB OF EACH PART OF THE COMBINE

Functions of a combine may be divided into four distinct zones, each of which has a separate job to perform. These zones are· (1) Cutting and conveying, (2) threshing, (3) separating, and (4) cleaning. (See Fig. 1)

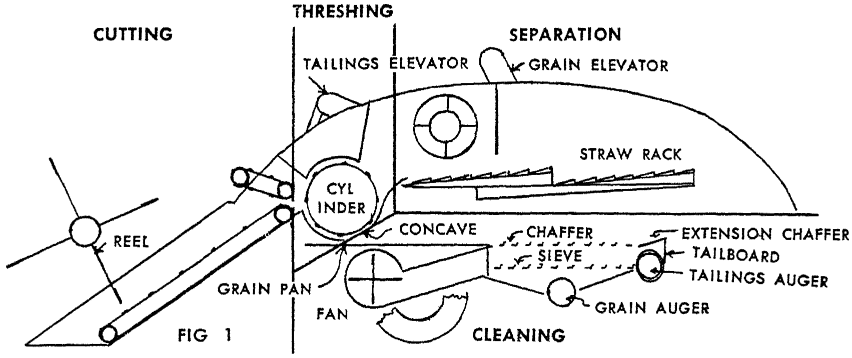


FIG 1

CROSS-SECTION OF A COMBINE

The cutting and conveying zone is made up of cutterbar, dividers, reel, platform canvas and feeding devices just ahead of the cylinder. The outer divider should separate the standing grain before it is cut. Following this, the reel prevents the material falling forward while it is being cut and then lays it back on the platform canvas which carries it to the threshing cylinder. The feeder device, canvas or down beater, immediately ahead of the cylinder serves two purposes· (1) It changes the direction of the material from its upward direction to a downward direction through the cylinder, and (2) assists in feeding the material evenly into the cylinder.

As the material passes between the cylinder and concave, the grain is removed from the head by either a flailing or rubbing action, or a combination of the two. The material travels through the cylinder at approximately 60 miles per hour at the higher cylinder speeds.

A beater, a stripper, or combination of both, placed just behind the cylinder to strip the straw from the cylinder, slow it down, and place it on the front end of the straw rack. Canvas or metal drops are placed above the straw rack to stop flying kernels of grain.

A large percentage of the separation of the grain from the straw takes place through the concave grates. The grain remaining in the straw is shaken out as it progresses over the straw rack. A metal pan or conveyor beneath the rack carries the separated grain forward and drops it onto the grain pan just ahead of the chaffer. The straw passes out at the rear of the machine (onto the ground.)

The grain, chaff and short straws then move off the grain pan and into the cleaning shoe. This is made up of two and sometimes three sieves with a blast of air coming up through them. As the material passes over the sieves, the grain drops down through, while the air carries the dirt and chaff out at the rear of the combine. The clean grain is then moved by auger and elevator to the grain bin.

If any part of the combine fails to do its job properly, grain losses will take place.

CHECKING GRAIN LOSSES

Cutterbar loss can be found by looking for loose kernels and heads of grain on the ground underneath the combine. Look in the standing grain and observe how many kernels are on the ground per square foot. Don't count this as a cutterbar loss. This is shattered grain. Count the number of kernels found on one square foot underneath the machine. The approximate loss in bushels per acre can be determined from table at right.

When a machine is in proper adjustment, the cutterbar loss is usually the greatest.

Cylinder loss can be determined by looking for unthreshed kernels in the heads. It is usually the smallest of the four losses *regardless* of the condition of the crop or correctness of machine adjustments.

KERNELS PER SQUARE FOOT TO EQUAL ONE BUSHEL LOSS PER ACRE

CROP	KERNELS PER SQ. FT.
WHEAT	18-20
OATS	14-16
SOYBEANS	4-5

Rack loss can be measured by catching the straw in a box or on a canvas. The loose grain is then shaken out of the straw. By measuring the area over which the sample was taken and then finding the number of kernels per square foot, the bushel per acre loss may be obtained. This loss may be excessive if the rack is overloaded. Improper rack speed also may cause excessive losses.

Shoe loss can be measured on some combines by catching only the material coming over the rear of the cleaning shoe. The bushel per acre loss is then determined as described for rack loss. With other combines, it is impossible to catch the chaff without catching the straw at the same time. Shoe loss can then be measured by subtracting the rack loss from rack and shoe losses as measured by catching all of the material leaving the rack and shoe. High shoe losses may be caused by overloading, overthreshing, incorrect speed of the shoe, improper direction or amount of wind blast, or incorrect sieve opening.

ADJUSTING THE COMBINE

A definite order must be followed in making adjustments if losses are to be reduced to a minimum. Assuming that the machine is in good mechanical condition, the first thing to check is:

Machine speed (proper r.p.m.)

Refer to the *combine instruction manual* to find the recommended r.p.m. of the power-take-off or the engine on engine mounted combines. A wide open throttle setting on the engine or tractor usually does not give correct power-take-off speeds. Adjust the engine throttle so that the power-take-off speed is 15 to 20 r.p.m. above the correct speed when the combine is running empty.

After the power-take-off or engine speed is set correctly, take the speed (r.p.m.) of the straw rack, cylinder, fan and beaters and adjust them to the speeds given in the *instruction manual.* A *speed counter* should be used to measure all power-take-off and rack speeds. Most tachometers are not accurate enough for low speeds.

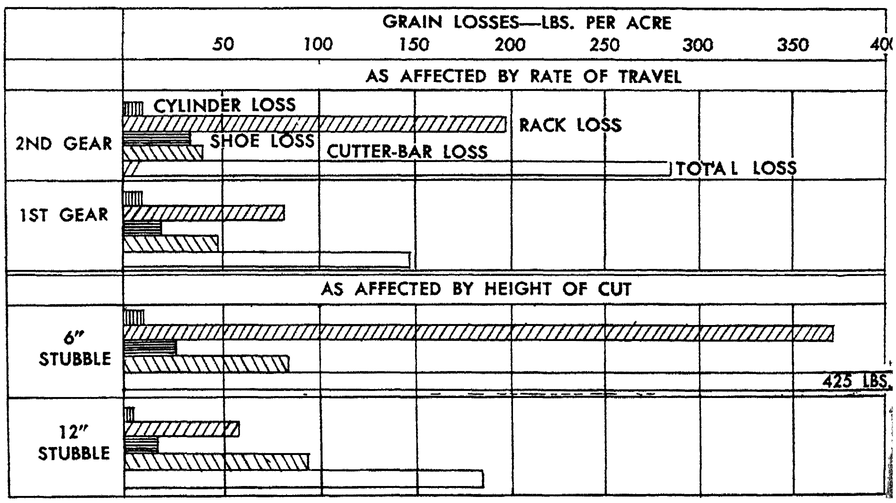
Overloading is to be avoided.

Don't overload the machine by driving too fast or by setting the cutter-bar too low. Overloading is one of the most common causes of high rack and shoe losses. If the rack r.p.m. is correct, overloading is the most likely cause of high rack loss. (See Fig. 2)

The same effect as overloading is obtained when the straw is badly broken up by too close a cylinder-concave setting or by too high a cylinder speed.

OVERLOADING GRAIN LOSSES AS AFFECTED BY HEIGHT OF CUT AND RATE OF TRAVEL

FIG. 2



Cylinder Adjustments

Cylinder adjustments are important because of its effect on rack and shoe losses. Most grain threshes easily and a wide setting of the cylinder and concave is desirable. *Don't try to get every kernel out of the head.* To do so will usually result in overthreshing and cause high rack and shoe losses. If too much grain is left in the head, increase the threshing action by raising the cylinder speed. If still greater threshing action is needed, decrease cylinder-concave spacing. Raising cylinder speeds has less tendency to break up the straw than decreasing the clearance.

Cleaning Shoe Adjustments

Loss at the rear of the sieves may be caused, as in rack loss, to overloading and overthreshing. It may also be caused by amount or improper direction of wind blast. Material should be lifted from the sieves at the front end of the shoe. If the chaff is allowed to settle solidly in a mat on the sieves, poor separation results. The blast should not be heavy enough to blow the grain out, but it should cause the chaff to "float" over the sieve. After this adjustment has been made, open the sieves to a point where proper cleaning of the grain is no longer maintained. Then close the sieves one notch.

Make adjustments in the order discussed. It is impossible to reduce rack and shoe losses if the various parts of the combine are running at an incorrect speed or if the combine is overloaded.

Harvesting characteristics of grain will change from hour to hour. Adjustments must be made frequently to meet changing crop conditions. Adjustments must be changed when starting to harvest a different variety.

EFFECT OF WEEDS ON COMBINE LOSSES

Weeds increase grain losses in combining. (See Fig. 3) Much can be done to reduce these losses by proper machine adjustments.

The losses increase because of the heavy mat of green material which forms on the rack and shoe. Quick separation of the grain is difficult. *Increase the cylinder-concave clearance as much as possible. Raise the cutterbar* to take as little of the green material as possible. Do not raise it so high that too heavy cutterbar loss results. Direction and amount of wind blast should be such that the material is broken up at the forward end of the screens. *Reduce the rate of travel* or take a narrower cut.

EFFECT OF WEEDS ON EFFICIENCY OF COMBINING

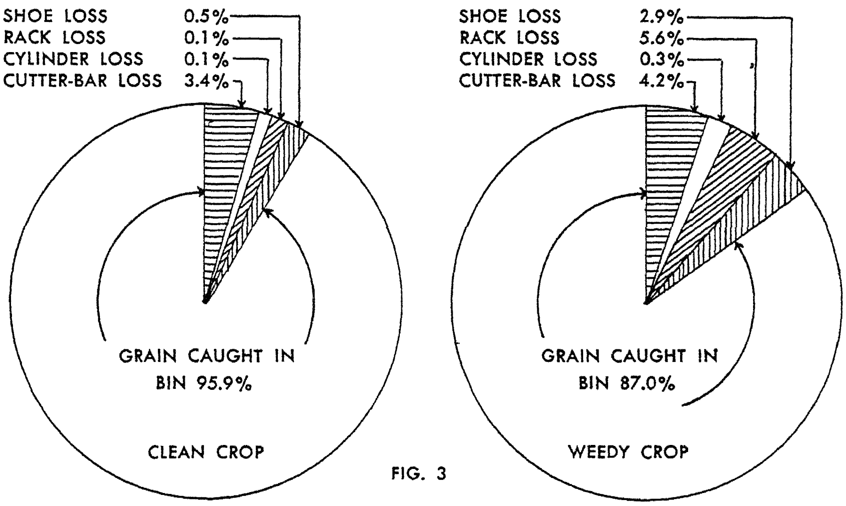


FIG. 3

Weeds will add considerable moisture to the grain while it is being combined. (See Fig. 4)

MOISTURE CONTENT OF GRAIN—UNCUT AND AFTER COMBINING

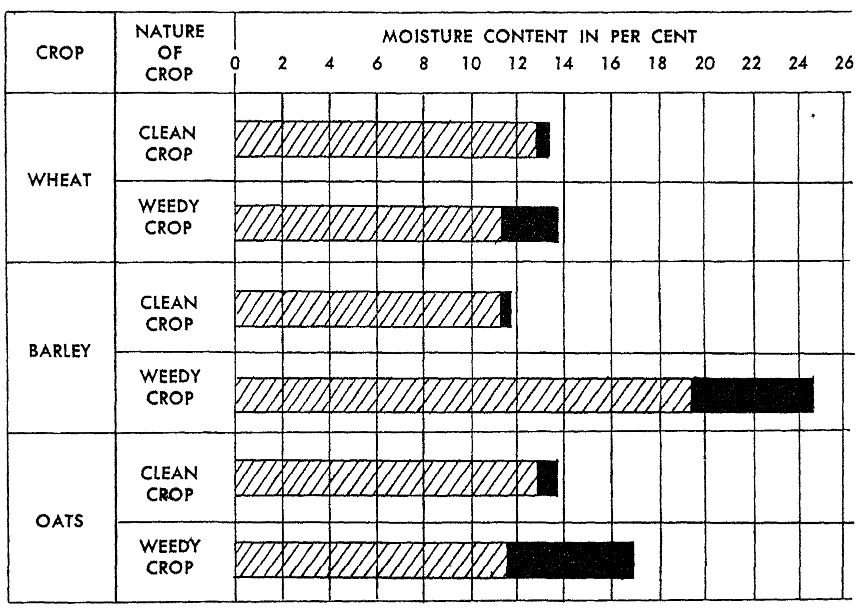


FIG. 4

UNCUT

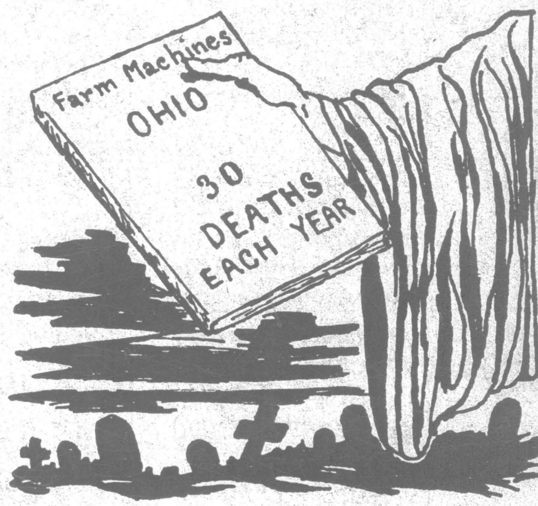
ADDED BY COMBINING

COMBINING TROUBLES, CAUSES AND REMEDIES

TROUBLE	PROBABLE CAUSE	REMEDY
High Cutterbar Loss	Cutterbar too high	Lower cutterbar to cut low growing or down crops
	Reel shattering grain	Decrease reel speed by changing sprockets
	Grain not being laid back on platform canvas	Move reel back and down. Add pieces of belt to reel slat to brush cutterbar
	Reel throwing cut grain	Raise reel. Fill in from reel slat toward center of reel with 1/4" mesh hardware cloth
High rack loss	Rack speed too high or too low	Check power-take-off speed
	Breaking up material too much with cylinder	Increase cylinder-concave clearance. Decrease cylinder speed
	Rack openings plugged	Clean the rack openings
High shoe loss	Overloading the shoe (overthreshing)	Increase cylinder-concave clearance. Decrease cylinder speed. Reduce rate of travel. Raise cutterbar.
	Shoe speed too high or too low	Check power-take-off speed
	Improperly directed wind blast.	Change direction of wind blast.
	Too much wind blast	Reduce wind blast
	Sieve openings closed too much	Open the chaffer or upper sieve
	Sieve openings plugged	Clean the sieves
High cylinder loss	Low cylinder speed	Increase cylinder speed
	Too much clearance between cylinder concaves	Decrease cylinder-concave clearance.
Poorly cleaned grain	Overthreshing	Increase cylinder-concave clearance
	Overloading	Reduce rate of travel
	Sieve open too much	Close lower sieve slightly
	Insufficient wind blast	Increase the wind blast and direct it toward the forward end of the sieves
Cracked grain	Too little cylinder-concave clearance	Increase cylinder-concave clearance
	High cylinder speed	Reduce cylinder speed
	Too much grain being returned to cylinder in the tailings	
Cylinder wrapping	Grain tough, damp, or heavy growth of weeds	Increase cylinder speed slightly. Increase beater speed slightly. Reduce rate of travel. Raise cutterbar slightly

Don't Let the
GRIM REAPER
Do the Harvesting!

THE FACTS OF LIFE LOST



In addition to the 30 lives lost in Ohio each year while operating farm machinery, there are about 9,000 non-fatal accidents. Practically all farm machinery accidents result from improper operation.

You can reduce your chances of having a serious accident if you can honestly say "yes" to the following questions.

DO YOU....

...always keep all guards and shields in place?

...stop the tractor and shut off the power before dismounting, oiling, and/or adjusting machine?

...have the tractor in neutral when starting the engine?

...ride on the seat or stand on the platform and prohibit extra riders?

...wear close-fitting clothing?

...thoroughly train new operators?

...take special precautions when working long hours?

...refuel after the engine is stopped and allowed to cool?

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