



## Peanut Digger and Combine Efficiency

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Consumers demand wholesome, good-tasting peanuts and peanut products. Meeting this demand starts on the farm with growing and harvesting the cleanest and least-damaged peanuts. This publication explains how peanut diggers and combines work and how to adjust them for peak efficiency to produce the highest quality peanuts.

### Harvest Management

When to dig peanuts is one of the most important decisions growers make each year. The hull-scrape method of determining peanut maturity is an accurate way of judging when to harvest. For more information on the hull-scrape method, check with your county Extension agent.

An effective weed control program makes harvesting easier, reduces weed pressure and lessens soil compaction. Use periodic harrowings or herbicide treatments to suppress grass and other weeds along field borders and at the ends of peanut rows. When vegetation is present where the digger blades engage the soil, it has a tendency to wrap around the blades, covering the cutting edge. The presence of tough, dead plants at harvest time hampers digging even more than the presence of live plants.

### Digging:

#### The First Step for Harvesting Peanuts

The modern peanut digger-inverter (Figure 1) lifts peanuts from the soil, separates pods from the soil, elevates the vine mass, and inverts and windrows the vines, exposing pods to the air for curing.

Peanut inverters can be classified into two types. One type uses a conventional rattler bar system for moving the peanuts upward from the digger blades until the vines are inverted. The second type uses a tangent chain or chain rod combination to move the peanuts up to the inverter attachment. The first type of machine is the most common and will be discussed in detail.

With a conventional rattler bar system, the peanut plant passes through three stages: digging, shaking or dirt removal, and inversion. Digging is accomplished by cutting the peanut taproot with a horizontal blade just below the pods. This blade has a slight forward pitch to lift the plant onto a shaking conveyer just after the taproot is severed. The shaking conveyer is made up of horizontal bars that ride over small rubber wheels. These wheels cause the bars to vibrate, which helps re-move soil from the plants and pods. As vines exit the shaking conveyer, they engage the inversion wheels and rods that flip and windrow the plants.

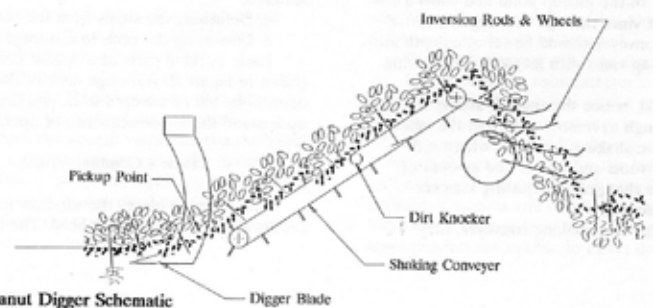


Figure 1. Peanut Digger Schematic

### Digger Operation and Adjustments

Operate digger-inverters **from 3.5 to 5 mph at PTO speeds of 70 to 90 percent of rated PTO speed**, depending on the type of machine.

**Inspect the digger-inverter for broken, bent or missing parts** before making adjustments. Many adjustments can be performed before actual field work starts. First, **make sure the front tool bar is level** with the tractor. Stand at the rear of the

machine with the implement raised and sight the top of the tool bar with the top of the rear axle (For accuracy, first be sure the rear tractor tires are inflated to the same pressure.) If the tool bar is not parallel to the tractor axle, level the digger by adjusting the lift arm.

Next, **inspect the blades**. A well-adjusted digger will have sharp, flat-running blades set to clip tap-roots just below the pod zone where the taproot starts branching. Blades should run level, with a slight forward pitch to lift plants into the shaker. This adjustment can be accomplished best on a flat surface. Excessive pitch of the digger blades may result in soil and pods being carried forward by the blade before being freed by the cutting edge. Such pods are usually lost. Dull blades cause most digging losses because they fail to cleanly cut the tap-root and may drag roots or pods, dislodging the pods from the plant.

After plants pass over the digger blades, they are transferred onto the shaking conveyor. **Check the conveyor chain speed and depth**. The chain speed should be slightly faster than the forward speed of the digger-inverter to avoid pod loss as the plant moves from the digger blade to the shaking mechanism. This speed will avoid a pileup of vines ahead of the pickup point and allow a smooth flow of vines through the digger-inverter. The shaking conveyor should be set at a depth at which it picks up vines with its teeth just clearing the soil.

In the field, **notice the shaking action**. It should be enough to remove soil from the vines. More aggressive shaking is needed where soil clings to pods, roots and stems. The amount of shaking can be changed by adjusting knocker wheels up or down.

As vines exit the shaking conveyor, they engage the inversion wheels and rods. These rods are factory set; however, they will change position with use. **Adjust the inversion rods before going to the field** by placing the digger on a level surface and setting them according to the operator's manual. Properly inverted peanut plants will form a uniform, fluffy, well-aerated windrow with very few peanut pods touching the soil.

### Combining or Threshing Peanuts

All peanuts produced commercially in Georgia are harvested directly from the windrow with a combine. The peanut combine removes peanut pods from the

vines, separates pods from vines and other material, and delivers pods to an overhead basket.

When the windrowed peanuts have reached a moisture content of 18 to 24 percent, which usually occurs two or three days after digging, they can be combined with minimum mechanical damage. There is less combine damage when the plant has partially dried than when it is very green or very dry. Most peanut growers prefer this time for combining when all quality and cost factors are considered.

An improperly set combine can result in reduced peanut yield and a product with excessive pod damage, loose-shelled kernels (LSKs) and foreign material.

### What a Combine Does

Basic combine operations include:

1. Picking up vines from the windrow by a header and conveying them to the threshing mechanism,
2. Threshing (removing peanut pods from the vines),
3. Separating pods from vines and other material,
4. Detaching the stems from the pods, and
5. Conveying the pods to a storage basket.

Basic working parts of a peanut combine are shown in Figure 2. Although each of the basic operations will be covered in detail later, you first need to understand the entire sequence of operations.

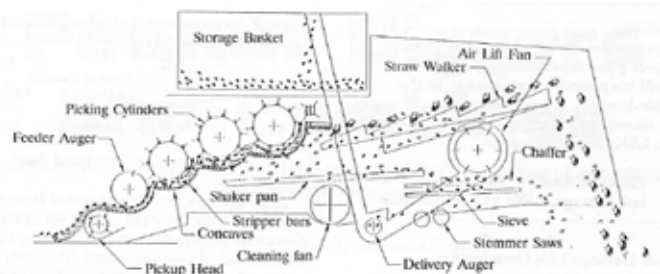


Figure 2. Peanut Combine Schematic

### How a Combine Works

The combine places the windrow into the feeder auger using a pickup head. The feeder auger delivers the material into the threshing mechanism. The threshing mechanism consists of picking cylinders that operate over concaves. Stripper bars slow the movement of vines.

Most of the peanut pods and small vine material fall through the concaves onto the shaker pan. The material that doesn't fall through is transferred rearward, either by straw walkers or some type of

agitation device, where further separation takes place. The material that has fallen on the shaker pan is conveyed rearward onto an oscillating chaffer and sieve or other type of separation device. Openings in the chaffer or other mechanism allow the peanuts to fall through but retain the trash. As the material moves rearward, an air blast directed upward through the sieves helps separate pods from small vine material and other foreign material.

The peanut pods fall onto stemmer saws that remove the stems. Finally, the air delivery system conveys the pods to a storage basket.

## Windrow Pickup, Conveying and Feeding

### Checkpoints

The pickup head consists of a cylinder-type unit with spring teeth on cam-controlled bars. Combine makers use many different arrangements to move the windrow from the pickup teeth to the threshing mechanism. Most combines have some type of auger, which uniformly feeds the peanut vines into the threshing mechanism. Larger combines move the material laterally before it enters the threshing mechanism. The header height is controlled either by suspension from the tractor or with a hydraulic cylinder.

Check these points in the operation:

1. The pickup head should run from 1 to 3 inches above the ground to avoid excessive wear on the springs and prevent more dirt from entering the combine.
2. The pickup head speed should match the forward speed. This allows the windrow to be lifted into the combine without separating or overrunning the vines, which pulls pods from plants before they enter the combine.

### Threshing:

#### How it Works, Adjustments to Make

Threshing is done by moving the peanut vines through a cylinder or a series of cylinders operated over concaves. Stripper bars can be engaged to different degrees to slow the movement of the vines through the combine.

Once the vines and pods are inside the combine, they should be separated using the slowest possible threshing cylinder speed and stripper bar engagement. The idea is to have the least aggressive threshing that gives good separation of the peanut

Pods and vines. This will help prevent LSKs and pod damage. As windrow conditions change during the day, the threshing aggressiveness should be adjusted.

These adjustments will help eliminate LSKs:

1. Start with the manufacturer's recommended cylinder speeds. Depending on the make of the combine, the cylinder speed may be changed by adjusting a variable speed pulley or changing the cylinder drive sprocket.
2. Adjust the stripper bars for the least aggressive action that gives separation without excessive kernel bruising and hull breaking. Mechanical damage from fast-moving parts may leave peanuts susceptible to insect damage and undesirable molds.
3. Always use the lowest combine cylinder speed that gives good separation of pods from vines. This will keep mechanical damage to the lowest possible level.

**Table 1.** Effect of combine cylinder speed on hull damage, LSKs and germination.

Cylinder Speed	% Hull Damage	% LSK	% Germination
Slow	17.1	2.6	80
Medium	24.6	3.3	7
Fast	33.4	5.4	68

### Separation:

#### Keeping the Peanuts, Discarding the Trash

Most of the peanut pods and some small vine material fall through the concaves onto an oscillating shaker pan. The pan conveys the pods and other material to the rear of the machine for further cleaning. The remaining pods are transferred rearward, either by straw walkers or by some type of agitation device, where further separation takes place. The heavier peanuts fall through grates onto the shaker pan.

The material on the shaker pan is conveyed onto an oscillating chaffer and sieve or some other type of separation device (for example, a group of revolving disks). Air is blown upward through the separation device, which causes fine foreign material to be airborne until it is discharged from the rear of the combine.

The amount of cleaning air is adjustable, which allows for good separation as the moisture content of pods and other materials varies. Too much air will cause good peanuts to be discharged. Too little air will result in excess foreign material deposited in the bin. Slippage of the fan drive belt also influences the volume of air. This occurs when belts are loose or in poor condition.

Chaffer and sieve openings also influence the amount of separation, and should be adjusted according to the size and variety of peanuts. Although vine and field conditions influence final settings, Table 2 provides recommendations for initial start-up.

**Table 2.** Recommended chaffer and sieve openings for initial combine start-up.

	Type of Peanuts		
	Spanish	Runner	Virginia
Chaffer	5/8"	3/4 - 7/8"	1 - 1 1/8"
Sieve	1/2"	5/8 - 3/4"	3/4 - 7/8"

### Conveying: The Final Step

After the peanuts are separated from vines and other materials, they fall onto a set of stemmer saws. The saws remove the stems from the pods and dispose of vine fragments. The pods are conveyed to one side of the combine and enter an air stream that moves them into the overhead storage basket.

The amount of air required to carry the pods upward varies with peanut yields. Adjust the amount to get the smallest airflow possible without the airlift duct clogging. Too much air damages the pods, which may crack and result in LSKs.

Make sure the drying wagon is clean before depositing peanuts from the combine storage basket. Dirt and other crop residues in wagons are one source of foreign material that can be eliminated easily before harvest.



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