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College of Agriculture

Cooperative Extension Service
Agricultural Experiment Station

Current Information Series No. 835

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APR 27 1989

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Potato Harvesting and Handling Operations For Quality, Efficiency and Safety

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Potato production is an important part of Idaho's agricultural economy. A proper harvesting operation helps ensure a quality product, a smooth harvest and no accidents. Whenever more than one person is involved in the operation of a complex machine, such as a potato harvester, a coordinated effort on the part of each individual is required for safe operation.

Each individual must know his or her role in the potato harvest operation. Proper training of personnel and review of such things as the operator's manual for equipment can improve potato quality and reduce operator safety problems. Knowing the machine, knowing what is expected and keeping equipment in good condition can assure a smooth, safe and efficient harvest.

The Machine Operator

The tractor operator is the key individual in the harvest operation. The operator must be well acquainted with each adjustment and component on the potato harvester or windrower, because no one combination of adjustments and optional parts will do the optimum job for all soil and weather conditions. Study your operator's manual, especially the safety instructions and machine adjustment procedures, before the potato harvest begins. Even if you are already familiar with the machine's operation, you will find that information in the manual becomes more meaningful as you gain experience. Being able to efficiently diagnose and correct problems is the best way to eliminate haste that can lead to mistakes and safety hazards.

Several common adjustments affect the harvester's performance. They are ground speed, digger blade depth, agitation, primary chain speed, secondary chain speed, conveyor tilt and coulter position. These adjustments are also necessary to reduce tuber bruising.

The operator must understand these adjustments in order to make safe and efficient use of the harvester. Most of these adjustments should be made only after proper tractor shutdown procedures have been per-

formed. Check the operator's manual to find out which components are designed for adjustment during operation and which are not.

Ground speed is usually adjusted by shifting gears in the tractor while maintaining the same throttle setting for proper PTO speed. This can be accomplished with little interruption to the harvesting operation. Change gears and clutch smoothly when altering speed to keep workers who may be standing on the harvester from losing their balance.

If the machine has sorters on it, **keep the sorters in mind. Jerky or erratic driving could make them lose their balance on the harvester and contact moving parts or fall from the machine.**

NOTE: If sorters are required on the machine, it is necessary to shield all moving parts with which they come in contact.

Always shut down the machine and tractor when making adjustments or unclogging. The hazards of making machine adjustments while the machine is running may not be obvious. They are:

- The elevator chains could catch your clothing or limbs.
- The PTO shaft could catch on clothing.
- Tools could fall into and be thrown by the machine or carried into the machine.
- The tractor could slip into gear, causing an injury or equipment damage.

The **primary chain** on a potato harvester sometimes comes equipped with eccentrics or vibrators that gives the right amount of AGITATION (chain shake) to separate the soil from the potatoes under most conditions. But conditions vary greatly with the type of soil and weather, and you may have to manually adjust three-point shaker sprockets to get differing separation. If this adjustment becomes necessary, make sure all power is

disengaged and **engines are shut off** before servicing these parts. Some hydraulically driven vibrators can be adjusted on-the-go.

Another variable that affects the proper separation of soil and potatoes is the speed of the primary chain. The primary chain speed should be set initially to approximately 1.1 times travel speed, then fine-tuned to carry the right amount of dirt. To change primary chain speed, disengage the power and turn off all power units. Then change the size of the drive or driven sprocket. To assure proper chain tension, adjust idler sprockets or remove any extra links and store them for future use. If the chain fits properly without excessive slack, the harvester will perform more reliably, the chances of a breakdown will be reduced and there will be less opportunity for injury.

The **secondary chain speed and picking table conveyor speed** can be adjusted by ratchet or hand controls or may require tools. Some ratchet and hand controls can be adjusted without interrupting the harvesting operation. Others, however, should not be adjusted while the machine is running. In general:

1. Sorters must not leave the platform while the harvester is in motion.
2. Never reach around or near moving parts or shields.
3. **Disengage all power and shut off the engine before servicing or adjusting the machine.** Never make adjustments while the harvester is running, unless this is recommended in the operator's manual. The secondary chain speed should be adjusted initially to approximately 0.7 times the ground travel speed as a rough adjustment, then fine-tuned to keep the chain as full as possible to minimize tuber bruise.

The main function of the COULTERS is to cut vines so they will not cause plugging or hair-pinning at the sides of the harvester blade. If clogging occurs, stop and back up a bit to clear vines. If this doesn't remove vines, disengage the power and shut off the engine before attempting to untangle the vines. If clogging occurs inside the machine, make sure the tractor is turned off. Never reach into the harvester with hands or other objects unless all power is disengaged and the engine is turned off.

Make Pre-Operational Checks

Breakdowns and hurried operations are the greatest enemies of safe and efficient operation of harvesting and handling equipment. Patience and good judgment are often forgotten or valuable time lost when a machine is not working properly. Make seasonal and daily inspections as outlined in your operator's manual, and inspect your machine and correct these problem areas before each use:

- Loose bolts and connections.
- Poor tire condition, or improper inflation.
- Leaky hydraulic hoses or connections.
- Greasy or cluttered picker's platform.

- Loose, broken or missing handrails on the sorter's platform.
- Loose or missing safety shields.
- Improper tension of chains and belts.

Remember that a safer operation is also a more efficient operation. The extra attention you pay to safety and servicing will be well rewarded by the improved performance of your equipment, higher quality tubers and the health and well-being of everyone involved.

Transport Harvester Correctly

Potato harvesters, like many other farm machines, are designed for field work, not high-speed transport. To reduce hazards, follow these five steps before attempting to transport your harvester on a public road:

1. Use lights, reflectors and an SMV (slow moving vehicle) emblem that is properly displayed.
2. Raise the coulters and digger blade for ample ground clearance.
3. Lower the boom conveyor extension and secure to harvester frame.
4. Use braces as provided during shipping to support the digger and coulters if the hydraulic system is not connected.
5. Provide another means of transportation for passengers. Don't transport them on the harvester.

Handling

Handling and storing potatoes involves many people in concentrated areas. To help avoid injuries in this operation, provide adequate lighting in work areas. As much as possible, increase ventilation to prevent dust inside handling areas from affecting visibility and inhalation. If dust is a consistent problem, workers should then wear dust masks and possibly goggles to prevent eye irritation. When using conveyors, make sure that:

- Conveyors are in good working condition.
- All shields are attached.
- Electrical cords are grounded, are not frayed and are located out of traffic paths to avoid tripping hazards.
- Conveyors are operated in a stable position to prevent tipping.

Truck drivers need to be aware of workers and should sound horn to warn workers before backing into handling areas. In addition, truck drivers need to:

- Stay within the limits of their experience when driving heavy loads and allow extra space between vehicles on the road.
- Obey rules of road and right of way.
- Check lights and turn signal operations.
- Check tires for proper inflation.
- Check brakes.
- Take periodic breaks to maintain alertness on the road.
- Watch for obstacles and changing conditions in the fields.

Train Workers

Everyone connected with the harvesting and handling operation should be properly trained. Before going into the field, review safety precautions with the people who will be operating the harvester, tractors and trucks, and tell them exactly what their duties will be. Here are some safety guidelines for operators and workers:

1. Wear close-fitting clothing that is less likely to get caught in moving parts. Secure long hair to prevent it from being tangled in machinery.
2. Wear shoes or boots with slip-resistant soles. Avoid smooth neoprene, leather or other materials that tend to become slippery and may lead to falls. Wear shoes with a safety toe.
3. Get on and off the harvester only when it's stopped. Use prearranged hand signals to communicate among tractor operator, sorter and truck drivers.
4. Wear personal protection to protect yourself from dust and noise.
5. Never allow adjustment to be made unless proper shutdown procedures have been followed.
6. Tractor operators need to keep the tractor at a smooth steady pace so that sorters can have secure footing. Change speeds smoothly because jerky starts and cornering too fast can cause sorters to get tangled with moving parts if they lose their balance. Make

turns cautiously and remember to raise and lower coulters, boom conveyor and digger of the harvester.

7. The sorters should be shown how to recognize malfunctions in the harvester such as broken conveyor flights, lodged rocks or clogging. They should also know how to signal the operator when a problem occurs. A loud buzzer can provide adequate warning.
8. Make sure all shields are replaced, after working on machines, to protect workers.

Worker Comfort and Safety

Worker comfort is also a major concern during the harvest operation. Proper protection from the weather (sun, rain, etc.) and proper restroom facilities need to be taken into account. While these may be difficult to provide in the field, they are easier to provide at the potato storage area. Moving the sorting operations to the storage area improves efficiency and reduces risk in the potato harvest operation.

Efficiency and safety can also be achieved by making sure that workers work reasonable hours and take frequent rest breaks daily (especially during mid-morning and mid-afternoon) during the harvest operation. Workers will be more alert and less apt to make mistakes if they have adequate rest than if they are tired and fatigued.

Material adapted with permission from "Agricultural Machinery Safety," part of the "Fundamentals of Machine Operation" series published by John Deere Company.

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