Minimizing your time for diesel engine maintenance

by Tom Kane

■ Although a tractor is build for year-round performance, mid-season maintenance checks are needed to ensure minimal downtime repairs.

Maintenance checks are particularly important in the hot weather, which taxes an engine. Checks are also important during the peak season, when engines are running 8 to 12 hours a day.

Air system—Diesel engines use 8,000 gallons of air to every gallon of fuel. In contrast to a gas engine, no throttle plate or choke plate restricts air flow into the combustion chamber of a diesel engine. The three most basic and important steps to maintain the air system are:

1) Check the air cleaner element every 100 hours.

2) Periodically check for leaks and cracks.

3) Examine the hoses for hardness, cracking and loose connections.

It is also important to use care when replacing a filter. Improper replacement can cause an engine to ingest dirt and dust which can lead to wearing out pistons and rings, and cause valves and rings to stick.

Be certain the caked dirt that builds up on the filter does not fall into the hose as the filter is removed. When replacing the filter, the sealing gaskets on both ends must be in proper position to direct the air through the filter. Check that it is securely fastened and free from any cuts, nicks or distortions.

Before your filter is in place, look in the downstream host to be certain no appreciable accumulation of dust or dirt can be found. If so, check for defective clamps or hoses.

In determining when to clean and/or replace a filter, keep in mind that a somewhat dirty filter actually operates more efficiently than a brand new one, as the dirt already trapped in the filter prevents the smaller particles from entering the system. Therefore, establish cleaning and replacement schedules according to your equipment's operating manual.

And remember, cleaning the engine itself with a high-pressure washer or hose must be done carefully. If water enters the intake system, it can cause hydraulic lock by filling the space between the piston and the head. This in turn can cause a connecting rod to bend or result in piston damage. To assure the engine remains water-free while cleaning, fasten a plastic bag around the entire filter assembly and do not clean with water while the engine is running.

Fuel system—Cleanliness and quality are the two most important fuel factors. Dirt and water are the chief contaminants of diesel fuel. Diesel fuel actually lubricates the injection pump and nozzles, which is one reason a diesel engine will outlive a gas engine. Water, even the slightest amount, can cause bacterial growth on the fuel filter element. Rusting problems are also created by water, beginning with corrosion of valves and plungers. Operation of injection nozzles and injection pumps can be disturbed—again by only the smallest amount

of water.

To prevent condensation from forming in the fuel tank, keep it full at all times when not in use. In addition, condensation and other types of contamination can enter the system from the fuel storage tank.

Quality is another key for diesel fuel users as fuel contamination is a major concern. The following fuel factors must be considered to keep on top of this potential problem:

- Cetane number: reduces lag time. A longer lag time means a harder start engine, especially in cold weather. It is also more likely to smoke and knock.
- Flash point: the temperature at which fuel ignites. If too low, white smoke will appear.
- Cloud point: approximately 10-15° F. when wax fuel appears. As long as fuel system components do not plug, the fuel is usable.
- Sulfur content: should not exceed 0.5 percent. Levels above that may contribute to acid build-up on the lubrication system.

Proper storage of diesel fuel is imperative. The following guidelines should be followed:

1) Be certain fuel is stored with as little moisture as possible.

2) Be certain fuel is stored where there are no dramatic temperature changes.

3) Only store what can be used in a reasonable amount of time. Storage tanks should be kept full, too.

Diesel fuel engines will smoke at the initial start-up. However, smoke that continues after a complete warm-up may be an indicator of potential problems. A diesel engine's condition can often be read by the color of its smoke, as such:

White smoke, Type 1: water vapor or steam that appears but doesn't linger. This indicates a cooling system leak.

White smoke, Type 2: caused by low temperature. If it is a low ambient temperature, the smoke will disappear. If it is a low combustion camber temperature, the puffs of white smoke will continue and may indicate low pressure, ring or piston problems, or leaky valves.

Black smoke: caused by unburned fuel. This may indicate nozzle problems of injecting more fuel than can be properly burned with the given horsepower and time.

Gray smoke: caused by excessive amount of oil in the combustion chamber. It indicates worn rings or valve guide wear.

Refer to your operator manual for specific tractor or equipment models. In general, the fuel filter should be checked and cleaned every 100 hours, and changed every 400 hours.

—The author is national training manager for Kubota Tractor Corp.

Treating oak leaf spot

■ During the past two years, leaf spot (*Tubakia dryina*) has increased in container-grown oaks, according to Dr. Jim Strandberg, plant pathologist at the Central Florida Research and Extension Center.

The fungus produces small lesions and a blight that deforms the plant's leaves. It affects many species of oak, including the popular laurel oak.

Tubakia spores reproduce best in humid, damp weather. At one time, this devastating disease was common only in Eastern states. Severe oak leaf spot losses, however, recently have been recorded in several Southeastern nurseries.

Strandberg has studied the fungus since 1989. In addition to investigating its biology, he has so done a comparison of control products.

"Traditional control methods include copper fungicides," says Strandberg. "But these aren't always effective because they're non-systemic. Oaks may produce several growth flushes a season, so there's a constant chance that young, susceptible foliage may need protectant sprays.

"Ornamental nurseries are at particular risk because sprinkler irrigation spreads tubakia spores," he adds.

Strandberg tested seven fungicides in three classes: systemic, copper and non-systemic. Efficacy was determined by measuring the percentage of leaf area damage (indicated by "LAD") on new foliage of infected one-year-old laurel oaks. Overhead irrigation was performed nightly for two months, and fungicide applications were made bi-weekly.

"All the fungicides reduced leaf damage," Strandberg notes. "Only the systemic fungicides reduced the damage enough to satisfy the strict requirements of nursery production."

For his test results, see accompanying chart below.

FUNGICIDE EFFICACY ON OAK LEAF SPOT

Percentage of lead area damaged (LAD) on new growth of one-year-old Tubakia-infected trees.

	June 14		July 25	
Fungicide	Rating	%LAD	Rating	%LAD
Banner	1.8	6.4	1.6	5.1
Bayleton	2.3	9.3	3.3	33.2
Copper hydroxide	1.6	14.7	2.7	24.4
Daconil	2.5	20.3	3.4	31.8
Control	3.5	17.6	4.3	51.4

Source: Standberg, 1991