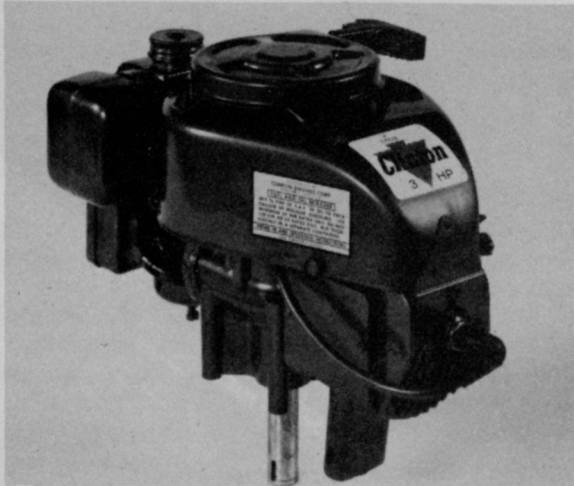


The Onan CCK Series engines operate best in open air applications, where speed variations are short and wide (1800 to 4000 rpm). Each model has an air cleaner with replaceable dry element, a lube oil pump, an oil level indicator, a mechanical fuel pump, a manual choke, and twin mufflers with exhaust connectors.

Model T260G, with its 24 bhp (flywheel or brake horsepower), is recommended for both variable speed and continuous duty. It includes an electric starter, a mechanical flyball governor, a replaceable dry-element, two-stage air cleaner, and a spin-on, full-flow lube oil filter.

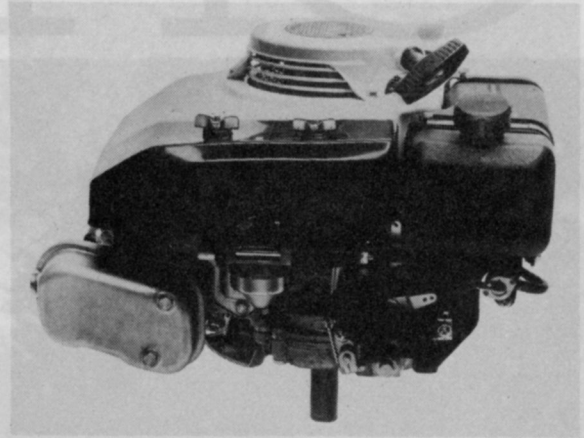
Clinton Engines Corporation (306) produces 16 basic engines, used principally on power lawnmowers with 2½ to 10.3 horsepower. These engines are available in two- and four-cycle designs, with horizontal and vertical crankshaft.



Clinton's vertical shaft, three-horsepower, two-cycle Series 501 engine.

The 500 and 501 series comprise several single-cylinder, two-cycled models with 3 horsepower. The 500 model has a bore of 2½ inches and a stroke of 1½ inches. The 501 has a bore of 2½ inches and a stroke of 1½ inches. Both are air-cooled and their piston displacement is 5.76 cubic inches. The 4.5-horsepower, four-cycle Series 498 engines are suitable for tillers and made of cast-iron alloy. They have a bore of 2-15/32 inches, a stroke of 2½ inches, and a piston displacement of 10.2 cubic inches.

American Honda Company (307) offers a new 5-horsepower vertical engine (GV200) for lawn and garden equipment which includes several features for durability. The top ring is hard-chrome-plated, the cylinder sleeve and valve guides are cast iron, and a trochoid oil pump provides positive lubrication. This model also has a dual-element air cleaner for higher efficiency, and a one-piece crankshaft which is hot-forged and heat-treated with ball bearings at both ends.



Honda GV200 five-horsepower, four-cycle engine.

The oil ring of the GV200 is a three-piece combination type, a design which has proved to reduce oil consumption. And the mechanical governor and fixed jet carburetor insure a consistently even fuel/air mixture and a stable output at both high and low speeds.

A single-cylinder, four-stroke engine from American Honda, the G-100, is currently being used to power its edgers. This two-horsepower, forced-air-cooled engine has a .36 gallon fuel tank that supplies power for approximately two hours. Piston displacement is 76 cc (4.6 cubic inches); bore and stroke are 46 mm x 46 mm (1.8 inches x 1.8 inches).

Teledyne Wisconsin Motor (308) offers air-cooled Robin gasoline engines in the 3 to 16.8 horsepower range. Two new single-cylinder, four-cycle models, W1-1340 and W1-1390, are equipped with heavy cast-iron cylinder liners and cast-iron camshafts with induction-hardened lobes.

Model W1-1340 is rated at 9 horsepower at 3600 rpm. It has a displacement of 20.4 cubic inches (334 cc), a bore of 3.07 inches (78 mm), and a stroke of 2.76 inches (70 mm).

Model W1-1390 is rated at 11 horsepower, also at 3600 rpm. Its displacement is 23.7 cubic inches (38 cc), with a bore of 3.307 inches (84 mm) and a stroke of 2.76 inches (70 mm).

A group of V-type, air-cooled engines from Teledyne Wisconsin is suitable for use with natural gas, gasohol, and even alcohol on special order. The two-cylinder, 25 horsepower model W2-1230 has a displacement of 75 cubic inches (1230 cc), and the four-cylinder 50 horsepower model W4-2460 has a 150-cubic-inch displacement. Both models have a 3.75-inch bore x 3.4-inch stroke, with a 6.8:1 compression ratio. They are available with an optional flywheel alternator rated 30 amperes at 12 volts.

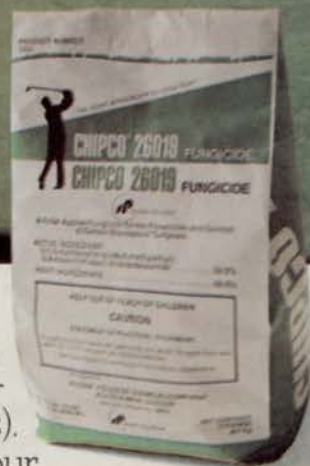
*Continues on page 44*


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### Engines from page 41

Distributor ignition and 12-volt electric start are standard on these V-type models. Inlet valves are made of Austenitic steel, and exhaust valves are of long-life, heat-resistant alloy. Positive-type valve rotators on the exhaust valves reduce the possibility of valve burning and contribute to longer valve life. Other standard features are a dry-type replaceable element air cleaner, mechanical diaphragm-type fuel pump, exhaust mufflers, and conveniently located fuel panel.

Teledyne Wisconsin has also introduced a new family of diesel engines. Model WD2-860 was selected by FMC Corporation to power its Bolens HT20D Diesel hydrostatic tractor, which it rates at 19.9 horsepower. This air-cooled engine is a twin-cylinder, four-cycle unit with cast-iron cylinders and forged crankshaft. It features full pressure lubrication and direct, open chamber combustion. The governor automatically presets the fuel injection pump to assure easy starting after shutdown. Automatic bleed valves eliminate air in the injection system.

Onan expects to have an L Series of diesel engines in production by the middle of this year. A two-cylinder model with 27.5 horsepower and a three-cylinder model with 41 horsepower will be ready some time in 1982.

Allis Chalmers (309) manufactures diesel engines which have cylinder heads designed with a cross flow. Because the intake and exhaust ports are located on opposite sides of the combustion chamber, both chamber and valves are cooled better. And with the combustion chamber actually in the piston head, there is a highly turbulent, swirling air mass at the time of injection, resulting in a more complete burning of fuel.

Model 213 delivers 27 horsepower at 3000 rpm for continuous-duty operation and is suitable for irrigating a lawn. Model 320 runs on 40 horsepower at the same rate.

How do gasoline and diesel engines compare in an actual performance test? Guido Gallioli, marketing manager for the Teledyne Wisconsin diesel, says, "We ran a comparison test between the 18.2-horsepower gasoline and 19 horsepower diesel. The initial additional cost of the diesel is offset in about 650 hours. After that, the use of a diesel becomes more economical in cost of fuel. Maintenance and tune-ups are fewer because diesel does not have electrical components. The injection pump is more precision-built than the carburetor and doesn't have to be adjusted — it stays tuned longer. The average life is at least double with the heavy-duty gasoline model. With the light-duty type, it's ten times longer. As a rule of thumb, the diesel makes sense economically for somebody who runs the equipment commercially or industrially."

Once the proper engine has been selected, it is

*Continues on page 54*



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# MAGNOLIA CULTIVARS FLOWER FROM APRIL THROUGH SUMMER

By Douglas J. Chapman, Horticulturist, Dow Gardens, Midland, Michigan

If one large shrub or small tree represents a herald of spring, it certainly is magnolia. Magnolias commence blooming in mid-April and continue through June. They are useful as specimens, foundation planting, or for large area landscapes. The outstanding magnolias include Lily, Saucer, Star, 'Dr. Merrill,' and Sweetbay.

Lily Magnolia (*Magnolia quinquepeta* — formerly *M. liliflora*) is a multiple-stemmed, large shrub or small tree, with a round habit, reaching 10 to 14 feet in height. The 3- to 4-inch leaves are dark green on the upper surface with a light green beneath, giving a shimmering effect on a windy day. Fall color is non-existent. This native of China is perfectly hardy as far north as Detroit. It flowers during mid-May, just after *X M. soulangiana*. The delicate flowers are the prominent characteristic. The fine texture, pointed petals are unique, having dark purple exterior and white interior. It grows best in semi-sun and integrates well as a specimen, in beds, or with ground cover. The soil should have a pH of 5.5 to 6.5, be moist yet well-drained, and high in organic matter, since magnolia is rather shallow rooted.

**Dr. Merrill Magnolia** flowers in late April and grows rapidly to 30 feet high. It makes an excellent specimen in single or multi-stem forms.

**Sweetbay Magnolia** flowers in mid-June through much of the summer and is native from Florida to Massachusetts.



Saucer Magnolia (*X Magnolia soulangiana*) can be a single stem or multiple stem tree, 20 to 30 feet in height, with a round habit, holding branches clear to the ground. The coarse leaves are 4 to 6 inches in length, being a flat green during summer and a shiny brown late in the fall. This fall color is extremely effective. The smooth gray bark, almost beech-like, is an outstanding winter characteristic. Saucer Magnolia flowers in central Michigan during early May. The purple buds are outstanding, but when the plant comes into full flower, the petals fall rapidly. The most effective time for the flowers is during bud — not when fully open. Saucer Magnolia prefers soil which is well drained, fertile, and high in organic matter with a pH ranging from 5.5 to 7. It should be moved early spring, before flowering, for most successful transplanting. Saucer Magnolia is an outstanding specimen tree for use in the home landscape or on commercial grounds. It should be noted that if planted in a lawn, the branches should be left clear to the ground as grass can be too competitive for this fleshy root system. Further, the grass will not thrive well in

Continues on page 48





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the dense shade produced by the magnolia. The cultivars of Saucer Magnolia are most spectacular as they flower one to two weeks later and usually have fruit which, as it turns red, can be quite effective during the fall months. *X M. soulangiana* 'Alba' ('Superba') is a compact tree form with white flowers. These white flowers have a light purplish tinge in bud but are almost pure white in full flower. *X M. soulangiana* 'Lennei' is the outstanding purple variety. It not only holds its petals over a long period of time but has purple to magenta flowers on the interior and exterior of the petal, making it unique among the magnolias.

'Dr. Merrill' Magnolia (*X Magnolia loebneri* 'Dr. Merrill'), a hybrid between *M. stellata* x *M. kobus*, is intermediate in flowering between Star and Saucer Magnolia. In Central Michigan, it is usually in full flower during the last week of April. It is a rapid growing small tree that can reach 30 to 35 feet in height. It is an outstanding specimen plant in large area landscapes or for the home grounds. Although it can be in multiple-stem forms, it is most spectacular as a single stem tree since it holds a good central leader. The fragrant white flowers are truly spectacular with white petals (pink outer surface).

The semi-upright habit gives one an opportunity of planting ground cover beneath or simply mulching heavily.

Star Magnolia (*Magnolia stellata*) is the earliest herald of spring. Michigan can dependably expect Star Magnolia to be in full flower during the second or third weeks of April. It is a small shrub, usually multiple-stemmed, reaching 10 to 15 feet in height with a similar spread. It is a slow growing, dense plant, making it outstanding as a specimen, shrub, or in mass plantings. The foliage is dark green in summer, becoming yellowish to bronze in the fall. This fall color is not nearly as effective though as is *X M. soulangiana*. Flowers are a double white, 3 inches in diameter, with at least 12 to 15 petals. The species flowers are a good clear white, being equally effective in full flower and bud. The most outstanding cultivar is the 'Rosea' form of Star Magnolia which is quite pink in bud, fading to a light pink at full flower. Star Magnolia, as with many magnolias, transplants best before flowering. This shrub is perfectly hardy as far north as central Michigan.

Sweetbay Magnolia (*Magnolia virginiana*) is a 10- to 20-foot tree in the north and can reach in excess of 60 feet in the south. Although often found as a multiple-stemmed tree or shrub in the north, its upright spreading habit is quite tree-like in the south. The upper side of the foliage is a lustrous dark green throughout the summer and a grayish glaucous on the under surface. This gives a shimmering aspen-like effect on a windy day. The 3- to 5-inch long, somewhat pointed, oval leaves give this magnolia a rather fine texture. It is outstanding as a specimen tree in small area or commercial landscapes. Its gracefully spreading habit is outstanding during the winter. The bark of the twig is green. Sweetbay Magnolia flowers during the summer. It usually starts flowering during mid-June. It is not uncommon to see flower buds, partially opened, in full bloom, and fruit formed on the same plant at the same time. This not only extends the period of bloom, it makes this plant truly a unique addition to the summer landscape. The flowers are creamy-white, lemon-scented, 2 to 3 inches in diameter, with 9 to 12 petals. It is native from Massachusetts to Florida and is perfectly hardy in protected sites as far north as central Michigan.

Magnolia, a herald of spring, is susceptible to many insects and diseases but rarely is damaged by any. It can be pruned early spring. It is effective as a flowering shrub (Star Magnolia) or tree (Saucer or Sweetbay Magnolia). The flowering periods are as follows: Star Magnolia — mid-April; 'Dr. Merrill' Magnolia — third week of April; Saucer Magnolia — mid-May; Lily Magnolia — third week of May; and Sweetbay Magnolia — throughout June. **WTT**

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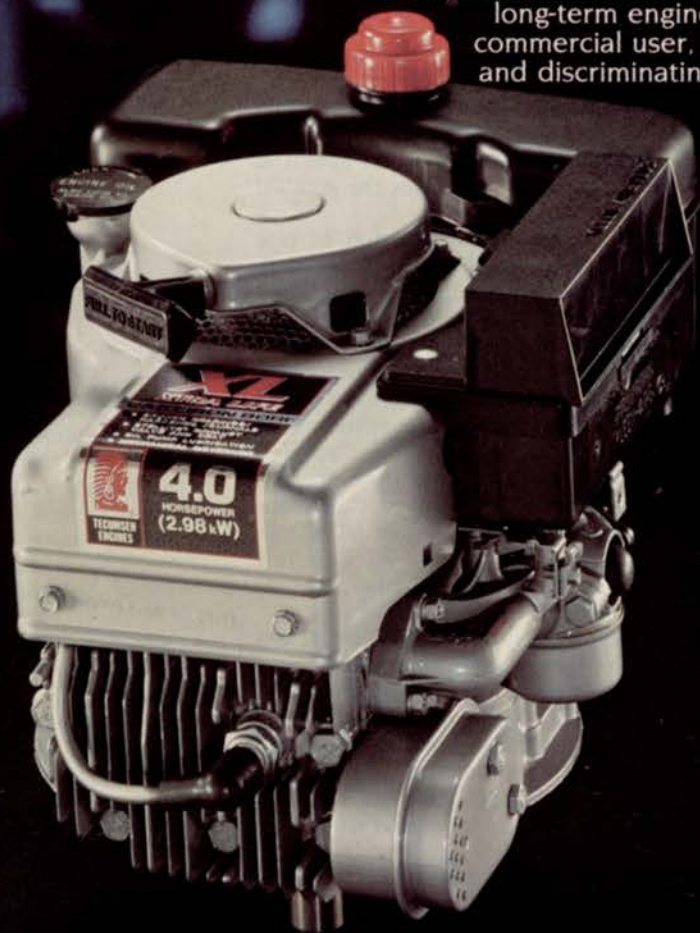
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# VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

**Q:** Much is being reported lately on the advantages of late fall fertilization. I have read that as much as two-thirds of the year's nitrogen should be applied during this period. At the same time, there are warnings to the effect that nitrogen late in the season may be undesirable by forcing top growth when the grass plants should be storing carbohydrates and developing root systems.

Please explain this seeming conflict. What is considered late fall timing here, and what fertilizer analysis do you recommend for this application? (Ohio)

**A:** The apparent contradictions are due, in part, to a failure in the literature to distinguish between fall and late fall fertilization, and between late fall and winter fertilization. The time period for each is not always clear since it can vary from one area of the country to another and even from one year to the next. The distinction is important, however, in predicting turfgrass response to fertilization since cool-season turfgrasses have a distinct seasonal cycle of growth, primarily the result of seasonal changes in temperature, day length, and light intensity.

**SPRING** — Maximum root growth of cool-season turfgrasses occurs in early spring before top growth (spring greenup) is evident. Later in the spring, top growth increases while root growth declines.

**SUMMER** — Both top and root growth slow during summer, and surface roots may be killed. Although the emergence of rhizomes is less seasonal-specific, Kentucky bluegrass reportedly produces the greatest number during the summer.

**FALL** — Top growth is again stimulated in late summer-early fall. As top growth slows in late fall, roots begin actively growing and continue growth at a decreasing rate until the soil temperature approaches freezing.

An extensive root system and vigorous but not excessive top growth are important objectives in maintaining good quality turfgrass. Because of the cyclic growth of cool-season turfgrasses, fertilizer applied before top growth is initiated in the spring or after top growth slows in the fall will stimulate root development without a correspondingly large gain in foliage. Top growth that occurs as a result of late fall fertilization is mainly in the form of new tillers that remain compact until spring.

Late fall fertilization roughly coincides with the last regular mowing of the season as the turfgrasses begin their hardening-off process to cold temperatures. In Ohio, this usually occurs in late October-early November. Excess nitrogen during this period has reportedly reduced cold resistance and enhanced turfgrass susceptibility to snow molds although I am not aware of any field data that demonstrates increased winter injury.

Concerning the appropriate analysis and application rate, many researchers suggest nitrogen alone at a rate of one to two pounds per 1000 square feet in a soluble form such as urea. The advisability of including potassium or phosphorus can be determined only through future testing. We are currently conducting re-

search to compare the results of late fertilization with other fertilization schedules and to determine the feasibility of including late fall fertilization in our program.

**Q:** Recommendations for insecticides are usually given for 100 gallons of solution. We do some of our spraying with a backpack and spend a lot of time trying to determine the right amount of material to use. Is there a chart available or some easier way to reduce the recommendations to a gallon of solution?

**A:** The measurements given below are approximate and should be used as a guideline only if the directions for mixing small quantities are not given on the label.

## LIQUID MEASURE:

Amount per 100 gallons	Amount per gallon
1/4 pint	1/4 teaspoon
1 pint	1 teaspoon
1 quart	2 teaspoons
1 gallon	2-1/2 tablespoons
2 gallons	5 tablespoons
4 gallons	1/3 pint
11 gallons	7/8 pint

## DRY WEIGHT

Amount per 100 gallons	Amount per gallon
1/2 pound	1/12 ounce
1 pound	1/6 ounce
2 pounds	1/3 ounce
3 pounds	1/2 ounce
4 pounds	2/3 ounce
6 pounds	4/5 ounce
16 pounds	2-3/5 ounces
20 pounds	3-1/5 ounces

**Q:** What is the name of the material which can be used to prevent wood from checking?

**A:** The product is polyethylene glycol (PEG). The latest information we have is that it is available through Dow Chemical Company, P. O. Box 1592, Midland, Michigan 48640; and Union Carbide Company, Park Avenue, New York, New York 10017.

Additional information may be available from Forest Products Laboratory, P. O. Box 5130, Madison, Wisconsin 53705.

**Note:** In response to the question on the availability of Krilium published in Vegetation Management, December 1980, I received the following information:

Mitchell Seed and Grain Company, located in Roswell, New Mexico, has several drums of Krilium purchased at the time that Monsanto phased out the product. If you are interested, contact that company direct for further information.

**Send your questions or comments to: Vegetation Management c/o WEEDS TREES & TURF, 757 Third Avenue, New York, NY 10017. Leave at least two months for Roger Funk's response in this column.**