



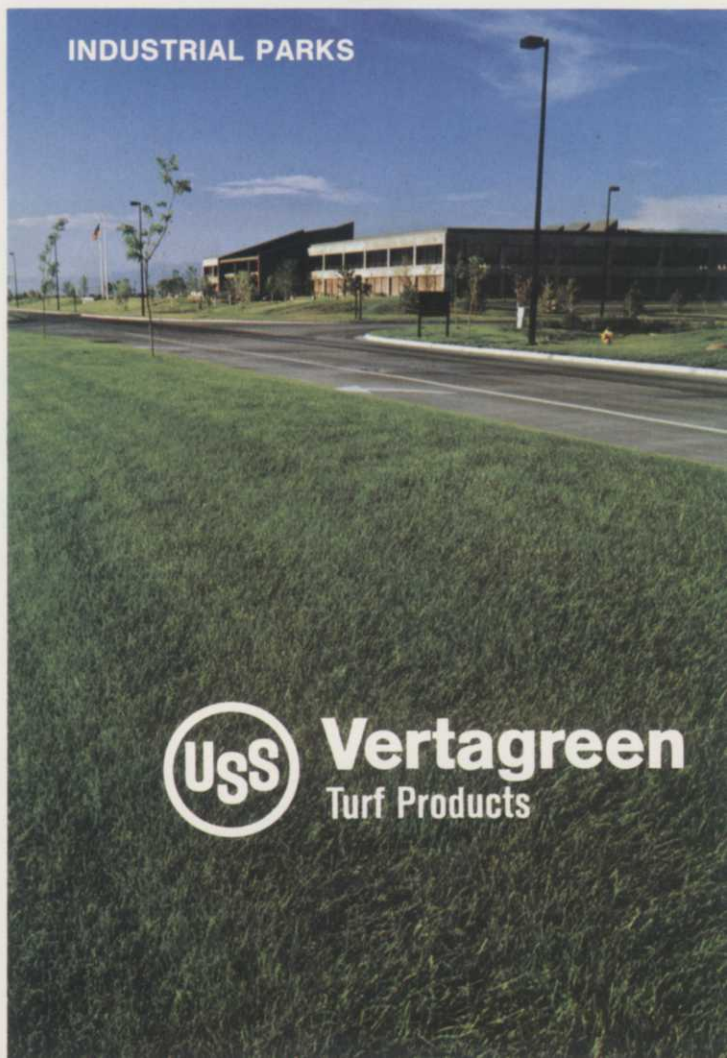
GREENS



FAIRWAYS



RECREATIONAL AREAS



INDUSTRIAL PARKS

USS Vertagreen
Turf Products



18-4-10
FOR TEES & GREENS



19-5-9
FOR FAIRWAYS



15-5-7
FOR FAIRWAYS

Tee Green NEW Technical Turf Food 18-4-10

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS	
Total Nitrogen (N)	18.00%
Synthetic Organic Nitrogen	
50% of total, equivalent to 9.00% N.	
Water Insoluble Nitrogen 5.5%	
Available Phosphoric Acid (P ₂ O ₅)	4.00%
Potash from Sulfate (K ₂ O)	10.00%

SECONDARY NUTRIENTS

Calcium (Ca)	2.00%
Magnesium (Mg)	1.20%
Sulfur (S)	10.00%

MICRO-NUTRIENTS

Copper (Cu)	0.05%
Total Iron (Fe)	0.28%
0.03% Chelated Iron (Fe)	
0.25% Fritted Iron (Fe)	
Manganese (Mn)	0.05%
Zinc (Zn)	0.05%

DENSITY: 60# per Cubic Foot

SCREEN SIZING: 90% Minus 10 Plus 20 Mesh U.S. Sieve

COLOR: Gray

REGULAR PACKAGE: 50# Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene

POLYETHYLENE PACKAGE: 50# 2 Ply Polyethylene, 9 Mil Thickness

Tournament Plus 19-5-9

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS:	
Total Nitrogen (N)	19.00%
5.5% Water Insoluble Nitrogen Derived from Urea-Formaldehyde	
Available Phosphoric Acid (P ₂ O ₅)	5.00%
Potash from Sulfate (K ₂ O)	9.00%

SECONDARY NUTRIENTS

Calcium	1.50%
Magnesium (Mg)	0.60%
Sulfur (S)	12.00%

MICRO-NUTRIENTS:

Copper (Cu)	0.05%
Total Iron (Fe)	0.28%
0.03% Chelated Iron (Fe)	
0.25% Fritted Iron (Fe)	
Manganese (Mn)	0.05%
Zinc (Zn)	0.05%

DENSITY: 50# per Cubic Foot

SCREEN SIZING: 90% Minus 8 Plus 20 Mesh U.S. Sieve

COLOR: Gray

REGULAR PACKAGE: 50# Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene

POLYETHYLENE PACKAGE: 50# 2 Ply Polyethylene, 9 Mil Thickness

Vertagreen for Professional Turf 15-5-7 with Balan® NEW

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS	
Total Nitrogen (N)	15.00%
Available Phosphoric Acid (P ₂ O ₅)	5.00%
Soluble Potash (K ₂ O)	7.00%

SECONDARY NUTRIENTS

Calcium (Ca)	1.00%
Sulfur (S)	10.00%

HERBICIDE: Benefin

	0.78%*
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DENSITY: 65# per Cubic Foot

SCREEN SIZING: 90% Minus 6 Plus 16 Mesh U.S. Sieve

COLOR: Yellow

REGULAR PACKAGE: 50# Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene

*0.78 pounds technical Benefin (Balan) per 100 pounds of 15-5-7. For 3 pounds technical Benefin apply 384 pounds of fertilizer per acre. For 2 pounds, apply 256 pounds per acre.

Balan is a registered trademark of Elianco Products Company, a division of Eli Lilly Company.



12-4-8
FOR FAIRWAYS



FOR FALL FAIRWAYS



15-5-5
FOR FAIRWAYS

Fertilizer for Professional Turf 12-4-8

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS:	
Total Nitrogen (N)	12.00%
2.10% Water Insoluble Nitrogen Derived from Urea-Formaldehyde	
Available Phosphoric Acid (P ₂ O ₅)	4.00%
Potash from Sulfate (K ₂ O)	8.00%
SECONDARY NUTRIENTS:	
Calcium (Ca)	6.00%
Magnesium (Mg)	1.20%
Sulfur (S)	14.00%
MICRO-NUTRIENTS:	
Copper (Cu)	0.05%
Total Iron (Fe)	0.28%
0.03% Chelated Iron (Fe)	
0.25% Fritted Iron (Fe)	
Manganese (Mn)	0.05%
Zinc (Zn)	0.05%

DENSITY: 65# per Cubic Foot

SCREEN SIZING: 90% Minus 8 Plus 20 Mesh Sieve

COLOR: Gray

REGULAR PACKAGE: 50# Multi-Wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene

POLYETHYLENE PACKAGE: 50# 2 Ply Polyethylene 9 Mil Thickness

Fall Fairway Fertilizer

This quality product is ideal for fall fairway fertilization because it has a high *potash* analysis...and that means less winter kill. Potash works to toughen the grass giving the turf healthy and hardy leaves that can better withstand the cold winter weather. Potash also helps fairways resist disease problems such as dollar spot and brown spot.

This fertilizer is formulated with primary nutrients specifically for your area. Consult your local distributor.

Vertagreen for Professional Use 15-5-5 with Dacthal®



GUARANTEED ANALYSIS

PRIMARY NUTRIENTS	
Total Nitrogen (N)	15.00%
Available Phosphoric Acid (P ₂ O ₅)	5.00%
Soluble Potash (K ₂ O)	5.00%
SECONDARY NUTRIENTS	
Calcium (Ca)	1.00%
Sulfur (S)	8.00%
HERBICIDE: Dacthal®	2.31%

DENSITY: 65# per Cubic Foot

SCREEN SIZING: 80% Minus 8 Plus 20 Mesh U.S. Sieve

COLOR: Gray

REGULAR PACKAGE: 50# Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene

*Use as a pre-emergence herbicide under U.S. Patent No. 2,923,634. Diamond Shamrock Corporation.

Dacthal is registered trademark of the Diamond Shamrock Corporation.



Nutrients and USS Vertagreen

The key to a successful turf program is the correct use of vital primary, secondary and micro-nutrients. The USS Vertagreen product line is designed by USS Agri-Chemicals agronomists to meet most needs with a correct formulation of these important nutrients which include:

- N** NITROGEN is a primary nutrient that gives plants a dark green color, vigorous blade and root systems and feeds soil microorganisms. All growing things must have nitrogen to survive.
- P** PHOSPHORUS, a primary nutrient, stimulates early root formation, gives a rapid start, hastens maturity, improves winter-hardiness and improves disease resistance.
- K** POTASSIUM, also a primary nutrient, is a "winterizer" that increases vigor and disease resistance, stiffens leaves and forms starches. Sulfate of Potash is used in USS Vertagreen turf grades because it has a lower salt index and is far less likely to burn.
- Mg** MAGNESIUM is a secondary nutrient that forms chlorophyll and sugar, carries phosphorus and corrects soil acidity.
- S** SULFUR, another secondary nutrient, maintains a plant's dark green color, encourages growth and corrects soil alkalinity.
- Fe** IRON is one of the most important micro-nutrients. It promotes chlorophyll production and is provided in two forms:

Fritted—glass-like materials giving slow but continuous release.

Chelated—chemically activated to prevent iron from binding with phosphate. Fritted iron is ideal for acid soil conditions, while chelated iron is more suitable for alkaline soils. A combination of these two sources in USS Vertagreen will supply the plant needs for iron over a wide pH range.

SPECIAL GRADES

There are many special regionally formulated N-P-K grades and direct application materials such as USS Ammonium Nitrate, USS Ammonium Sulfate, Sulfate of Potash and others available upon request. See your USS Vertagreen Turf Care distributor for special grades in your area.

USS Vertagreen products are formulated and packaged by USS Agri-Chemicals, a division of United States Steel. The USS Vertagreen line is designed by USS agronomists to meet every need and contingency. Use these products consistently in a carefully planned program and you avoid erratic feeding and spotty results. The USS Vertagreen turf team can help—with soil tests, advice and technical support every step of the way.

UREA-FORMALDEHYDE FOR LASTING GREEN

Half of the nitrogen in USS Vertagreen Tee Green formulations and a minimum of 25% of the nitrogen in our fairway fertilizers is in the form of urea-formaldehyde (UF). UF is an important element in a well planned turf program because it assures a sustained high-nitrogen level when used consistently.

BACTERIAL ACTION

The nitrogen in UF is released by bacterial action that increases as soil moisture and temperature increase. The changes which increase this bacterial action are also the changes which stimulate turf growth. Consequently, UF releases nitrogen to support the accelerated growth activity at the time the turf needs and can use it!

LESS WASTE

Since the nitrogen in UF is held in reserve until the turf can use it, nitrogen lost through leaching is kept to a minimum.

UF gives USS Vertagreen a stability not found in slow-release fertilizers that rely entirely on moisture to trigger nitrogen release. These fertilizers can be seriously depleted by a period of wet weather, regardless of soil temperature.

BUILDING NITROGEN LEVELS

The first year you apply USS Vertagreen, the UF releases 60% of its nitrogen; 25% the following growing season and 15% the third season (See chart). The result is a steadily growing nitrogen level in your soil and a consequent need for less chemical nitrogen each year until the maximum level from UF is reached in the third year.

COMPLETE IN SECONDARY AND MICRO-NUTRIENTS

Secondary and micro-nutrient deficiencies are most common in sandy soils or muck, but can occur in virtually any region and soil type. Shortage of any of these elements can have a marked effect on growth and color.

Most USS Vertagreen turf fertilizers, regardless of NPK content, deliver a uniform balance of secondary and micro-nutrients in a slow-release form.

CONTROLLED RELEASE OF IRON

Iron is one of the vital elements in the chlorophyll molecule. When iron is deficient or in an unavailable form, as is often the case in alkaline soils or where phosphate levels are high, the turf loses color and growth is stunted.

Direct application of a water soluble iron salt is not usually an effective remedy in the long run because iron in that form quickly links with phosphates in the soil and becomes unavailable to the turf.

USS Vertagreen provides usable iron over an extended period by including iron in chelated as well as fritted form.

Chelated Iron

Is chemically buffered to prevent the iron from linking itself to the phosphates in the soil.



Fritted Iron

Is a glass-like material which gives a slow, but continuous release of iron. The slow rate of release helps retard soil fixation of the iron, and at the same time furnishes iron for the turf over a longer period than is the case for readily soluble iron compounds. Fritted iron does a better job of furnishing iron under acid soil conditions, whereas chelated iron is more suitable for alkaline soils. A combination of the two sources will supply the plant needs for iron over a wide pH range.

DEVELOPMENT OF RESIDUAL NITROGEN IN THE SOIL			
YEAR			
1.	1st YR. U.F.	CHEM. N.	
2.	2nd YR. U.F.	1st YR. U.F.	CHEM. N.
3.	3rd YR. U.F.	2nd. YR. U.F.	1st YR. U.F.
4.	4th YR. U.F.	3rd. YR. U.F.	2nd YR. U.F.

Chart shows how identical applications of USS Vertagreen with UF build the level of slow-release nitrogen in the soil.

tegrated plan. The turfgrass breeder, engineer, chemist and practitioner must consolidate their knowledge into a program which can be considered low maintenance and yet impressive from a quality standpoint. Since these factions have operated independently for the most part, a new panel approach must be organized. One way to start would be to select one golf course, one park, one shopping center, one office plaza, one cemetery, and one highway right-of-way to implement all known labor and energy saving technology. Since associations are mainly concerned with specific fields, this coordinated program would most likely be taken on by a state university.

Of course, individual superintendents and turf managers could implement a combination of labor and energy saving methods at their facilities.

Some of these methods are included in the following description of progress in specific turf areas.

Aerifiers

The original aerifier was designed to be pulled by a tractor. It used a series of spoon-shaped rods attached to a central axle to pierce the soil. Soon afterward a gasoline powered aerifier was developed, both of these firsts came from West Point Products. Today, this technology is the property of Hahn. Other methods of coring were developed to reduce the unsightly appearance of cores remaining after aerifying. Hollow rods attached to a drum and dragging after aerifying are examples. Dedoes, Cushman/Ryan, Jacobsen, Toro and Turfco have all included aerifiers in their turf lines. Cushman makes one model that uses rows of upright rods to alternately punch the surface of greens.

Soil modification through topdressing is regaining strength as a turf practice. Aerification and sand topdressing offer potential for golf as well as other turf uses. The role of well-aerated soil in disease, compaction and irrigation efficiency is being rediscovered. Its role in *Poa annua* control is being restudied.

A drawback to the aerifier is its infrequent use. An aerifier attachment for a tractor may be more sensible on a cost basis. The multi-use turf tractor may be a key factor in equipment efficiency in the future.

Drainage

Proper site preparation makes



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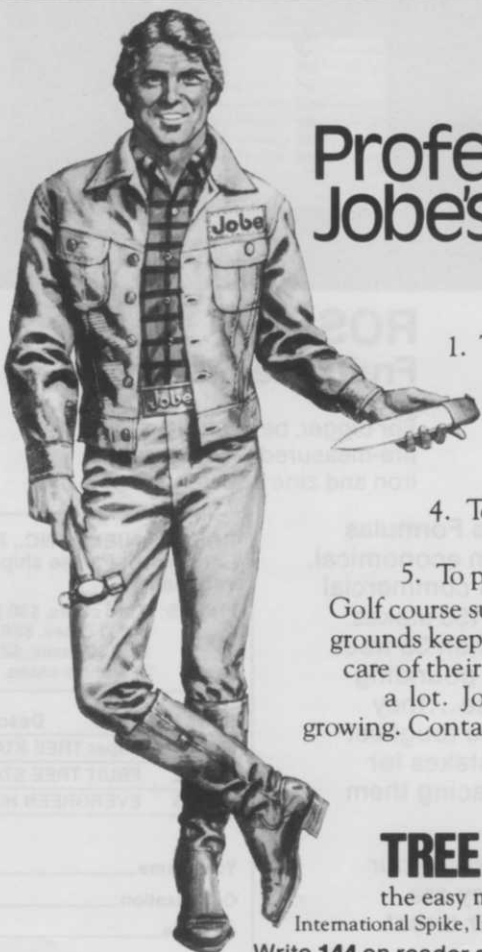
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correctional drainage unnecessary. On the other hand, improvements in trenchers and the development of flexible plastic drain tubing have greatly reduced site disturbance and installation cost. Very few good farmers have yet to tile their fields. Turf managers should follow suit realizing the installation cost can be recouped in better drained and playable turf. Drainage also provides the manager with better control over the environment of the turf. Excessive surface moisture encourages disease and *Poa annua*. A savings in fungicides and herbicides is a possible result.

Fertilizers

The most recent development in fertilizers has been liquid formulations of ureaformaldehyde. Sulfur-coated urea preceded liquid UF.

The latest intent of chemical manufacturers has been to provide convenient nitrogen sources for applicators of liquid materials for turf, primarily the lawn care market. Their developments could be applied to fertigation, an area of large potential for well-irrigated turf areas. Liquid lawn care to golf courses has not proven practical so far.

Granular fertilizers remain the dominant nitrogen source. Some dry materials are available in a form suitable for liquid application.

Slow-release fertilizer technology currently exists which enables managers to reduce the number of seasonal fertilizer applications.

Combining fertilizer with insecticides and herbicides to reduce the number of applications is desirable. Large users may economize by buying quantities of individual chemicals and mixing them. This is simpler in liquid form. Buying custom blended dry products is less economical. Distribution of dry materials from broadcast spreaders may not be even if particle sizes and weights vary considerably.

Guidelines to mixing various dry materials to consolidate applications would be well received.

Growth Regulators

If you remember that growth regulators were actually the materials used to develop herbicides from, you wonder why they haven't progressed more than they have. Scientists have worked decades to reduce the yellowing effect of most growth regulators on turf. Managers

of fine turf still hesitate to use them. Establishing low maintenance areas will encourage the use of growth retardants for roughs, roadsides, and parks.

Herbicides

The biggest headache in selective weed control remains grassy weeds such as yellow nutsedge and *Poa annua*. Basagran is registered for nutsedge but must be used with care to prevent burning desired turf.

Some specialists say we create our own weed problems with excessive fertilization and irrigation. Adjusting these maintenance practices should then help.

Properly timed use of preemergence herbicides certainly reduces postemergence treatments. Weed control is one of the areas that can benefit the most from integrating management practices. Keeping a good eye on the turf to identify problems early is advised, as is eliminating adjacent weed seed sources. Renovating a nearby field to tall fescue may be cheaper than endlessly fighting airborne weed seed. Hand removal of a few isolated weeds may eliminate the need for large area treatment later.

EQUIPMENT

National Mower Company

The historical flavor of the mower market can be sensed from the background of the National Mower Company of St. Paul, Minnesota, and its founder Robert Stanley Kincaid.

Kincaid received his degree in mechanical engineering from Purdue University in 1908. He grew up in Kentucky and appreciated the beauty and needs of turfgrasses. Kincaid's father became ill at the time of Stan's graduation and was hospitalized in Rochester, Minnesota. Since he hadn't yet taken a job, Kincaid decided to look for work in the Rochester area. He took a trolley to Minneapolis. When the conductor asked for additional fare he got off to look around. He noticed a manufacturing plant across the street and decided to check the company for job opportunities.

Although he was an engineer, he accepted an apprenticeship at the plant for \$1.25 per day. That company was Gas Traction Company, the first manufacturer of gasoline powered tractors in the world. Engineering developments there were applied to nearly all gasoline tractors to be built in the next 20 years.

Kincaid later worked in cooperation with John

Deere, the early founders of Toro, and Briggs & Stratton. The northern central states were a hotbed of gasoline powered tractors in the teens. In 1916, a demonstration of tractors from Ford, International Harvester and others was held in Nebraska. The conversion from steam to gasoline was now certain.

At this same time Kincaid began experimenting with gasoline-powered reel mowers. He developed a 40-inch mower for estates and helped solve early engine lubrication problems. All efforts were directed at war for the end of the decade.

In 1921, two years after he returned from the war, Kincaid began making small numbers of gasoline-powered mowers. He always resisted fancy and unnecessary cowling and concentrated instead on the engineering strength of his mowers. Gradually he built up production and his son John joined him.

Today, National makes some of the most rugged riding reel mowers in the business. These mowers had their origins with Toro's Bull Tractor and continue to play a growing role in mowing of fine turf. Kincaid strongly believes in doing a few things well rather than many things poorly.

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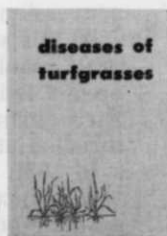
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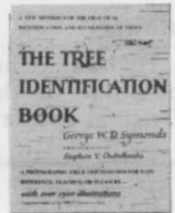


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Irrigation

Many turf specialists are suggesting irrigation has been misused, especially in the north and northeast. Battles with *Poa annua*, bentgrass in a stand of bluegrass, and turf disease are thought to be related to misuse of water. Much research on healthy irrigation levels for turf is needed. The practicality of using irrigation systems for chemical applications needs to be considered more seriously. This might well be a reason to install or upgrade an existing irrigation system since coverage would be critical for such use. Wetting agents may be one of those chemicals applied to improve the utilization of water by the turf.

Use of effluent or even city water may prove more economical than drilling a well or building a lake. In some areas, an extra meter can be installed on the system and sewerage treatment fees deducted from the water bill. If use is limited to necessary times water use can be curbed.

Mowers

Hydraulics have gained a strong position in the mower market. Original resistance caused by extra

maintenance for hoses and pumps is being overcome. Use of larger mowers is more practical due to hydraulics. Transporting large mowers no longer requires stopping the mower to pick up side units.

Hydraulics have helped the use of flail mowers for turf. Manufacturers offer fine edged blades for flail mowers. Benefits are said to be reduced blade sharpening and adjustment.

Hydraulic reel mowers offer an alternative to PTO driven versions or wheel driven versions. Gangs provide the extra flexibility of freeing the tractor for other jobs. Rotaries remain the modern workhorses due to high maneuverability and low maintenance. Hydraulics have eased some of the problems with belts on rotaries.

The sickle bar mower has slowly faded into almost strictly agricultural use.

Seeders/Spreaders

The technology of seeders and spreaders has not abandoned the drop spreader, although broadcast and hydraulic seeders are dominating commercial use.

Convenience of size and speed of ten outweigh the accuracy of the drop spreader. Broadcast spreaders throw a wide swath of material in a short time. Distribution is less uniform, however. Large broadcast spreaders have greatly increased the practicality of topdressing with sand.

The hydraulic seeder quickly solves large seeding jobs. The seed can be applied with the fertilizer and mulch at one time. Blowing straw becomes unnecessary. Seeding rates are higher but instant protection against weather is provided and the job is completed quickly. Mulch quality must be carefully watched. Always use the well-known brands to avoid problems.

Verticutter

More aggressive Kentucky bluegrasses have increased the need for vertical mowing. Increasing popularity of overseeding and topdressing also encourages the use of vertical mowers. Like the aerifier, the verticutter is used only occasionally. Combined with turf vacuums, verticutting can be a fairly quick form of turf improvement. Verticutting large areas remains a

EQUIPMENT

The Toro Company

Toro began as the Toro Motor Co. in 1914 when the Minnesota-based operation was commissioned to build engines for a manufacturer of farm machinery. It turned from its agricultural orientation in 1922 when the golf course superintendent of a local course suggested the company design a tractor-towed gang mower for fairway maintenance. By 1925 Toro turf maintenance machines were in service on nearly every major golf course in the country and on parks and large estates as well.

Toro produced its first power mower for residential use in 1939 but it was not until 1945 when it began to move into the home lawn market. Through a combination of acquisitions and research and development Toro began to expand operations around the country. Plants now exist in Bloomington, Windom, Shakopee, Fairmont, and Willmar, MN; Tomah and Hudson, WI; Riverside and San Marcus, CA; Columbus, OH; and Mason City, IA.

The company entered the rotary mower market with the purchase of Worldwind Inc. in 1948. Soon after Toro developed its wind tunnel housing, a major step in its technological growth. Toro was the first manufacturer to develop a mower with electric starting, the first to offer a rotary lawn mower with a bagging attachment, and led the way in establishing safety features for mowers.

Toro entered the snow thrower market in 1951, a major step in transforming the company from a seasonal business to a year-round supplier. It pioneered the development of compact, lightweight snow throwers and is now the leading manufacturer of snow throwers.

From snow equipment, Toro expanded into the irrigation field with the purchase of Moist O'Matic in 1961. Toro made extensive use of plastic in place of metal for irrigation equipment. Other innovations in irrigation include valve-in-head sprinklers, rotary gear driven sprinklers capable of sending a stream of water a diameter of 150 feet, pop-up pop-down sprinkler heads which virtually eliminate vandalism, and vibration-free easy-to-service sprinkler heads for all types of farm irrigation.

In 1979, Toro entered the lawn care service with the acquisition of Barefoot Grass, Columbus, OH. Its consumer yard care line which included both rider and walk-behind mowers has been broadened in recent years to encompass tillers, lawn debris pickups, flexible line trimmers, garden hoses, chain saws, and other outdoor appliances.

Toro's line of turf maintenance equipment ranges from a 21-inch walk-behind rotary mower to the giant HTM 175 that operates up to seven reels hydraulically and mows up to 80 acres a day. A total of 56 distributors in the United States and 56 in the rest of the world distribute Toro products.