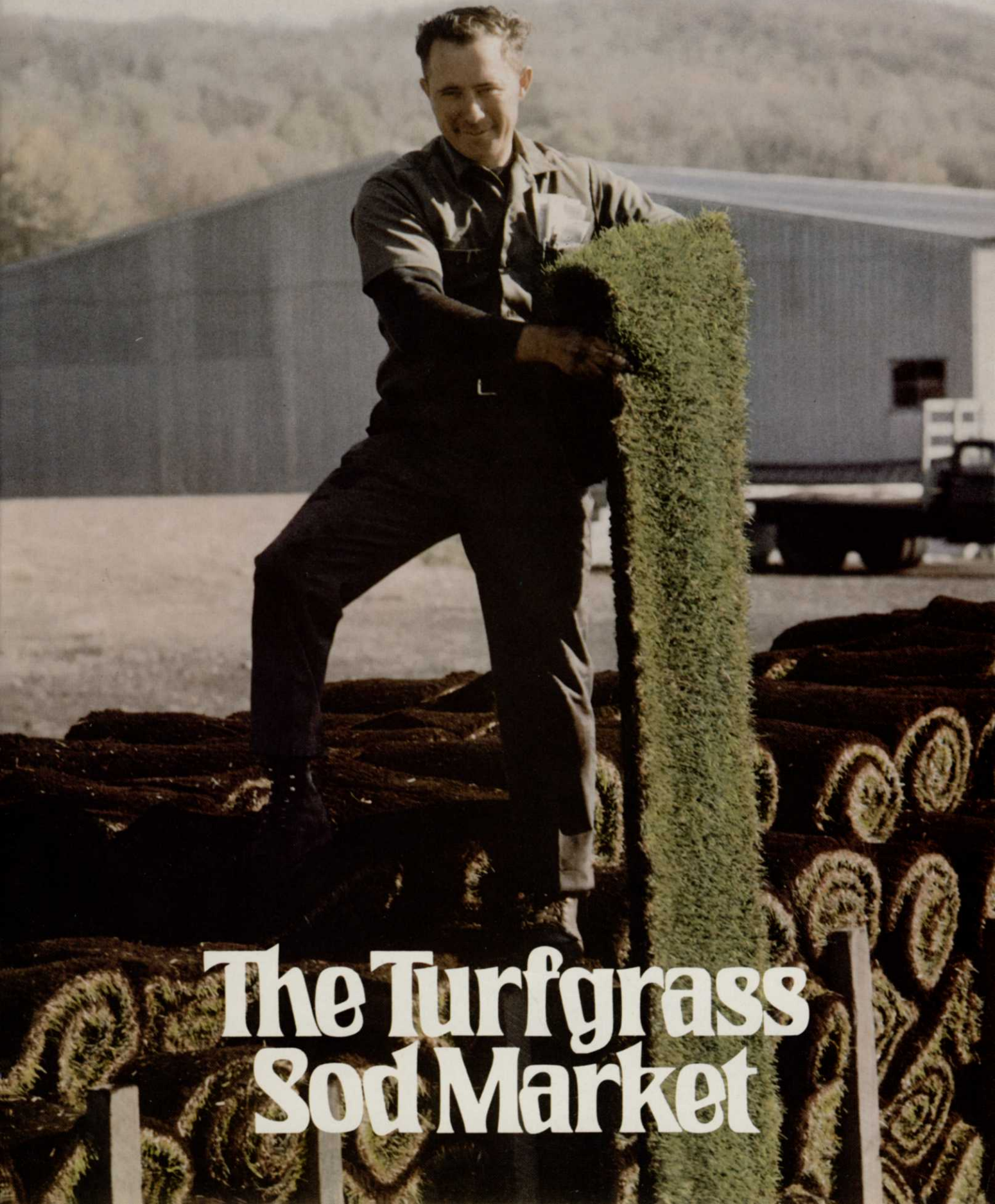
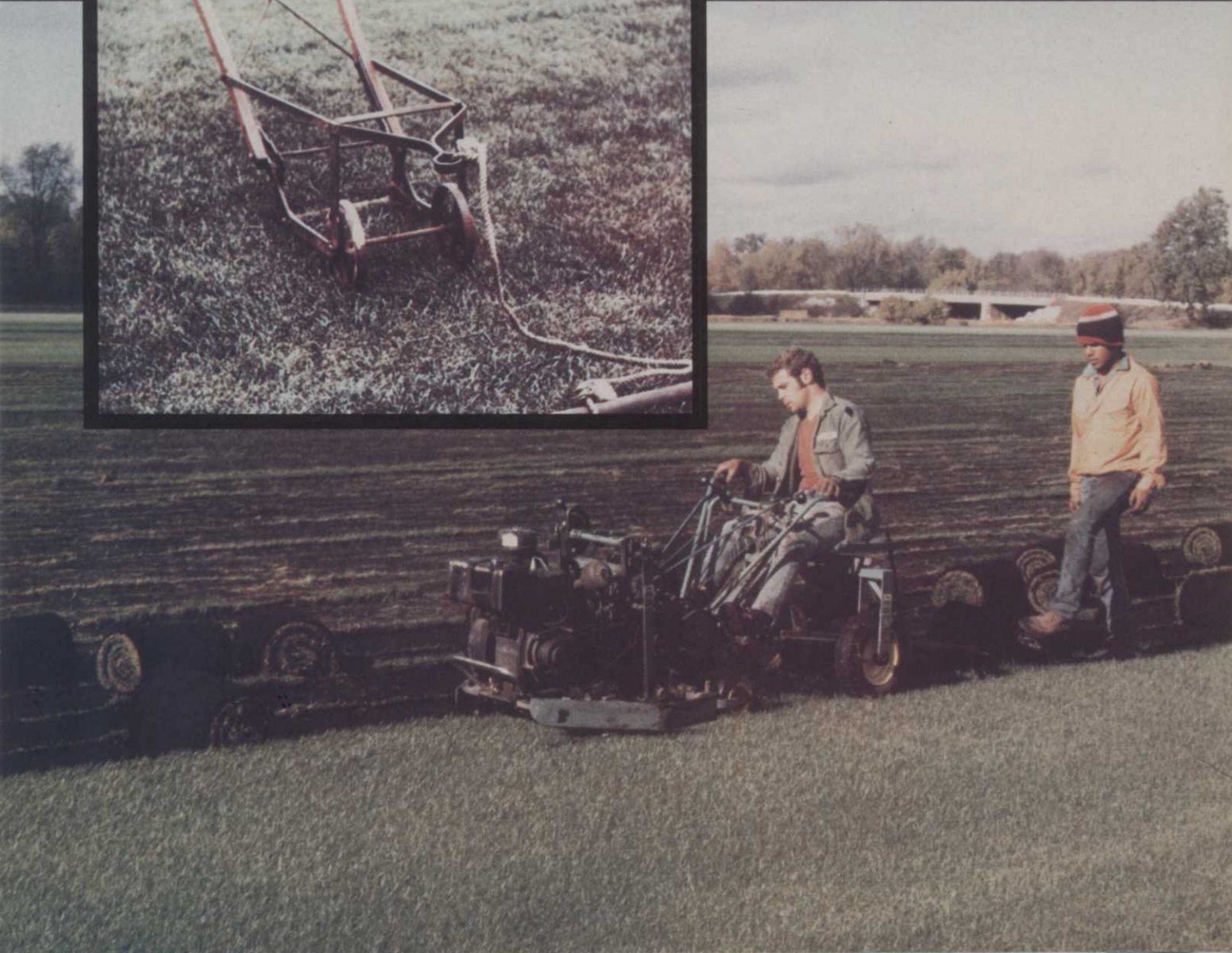


# WEEDS TREES & TURF

TURF MANAGEMENT SERIES / PART 2



## The Turfgrass Sod Market



## THE FORMATIVE YEARS

The cultivated sod industry, like the seed industry, began as a mechanism to transplant natural stands of common bluegrass from their rural location to the urban environment. Tied closely to the construction industry, both industries grew as man left the farm to take part in the American industrial revolution.

The original sod producer was really a landscape contractor who would pay farmers in the neighborhood of \$100 per acre to cut and remove the pasture sod from their fields. If a job called for instant grass, the contractor would go looking for the fields and the men required. Equipment was primitive and the work required many men to accomplish.

By the 20's, a few cities could support a firm devoted mainly to obtaining and delivering sod to contractors. Unfortunately, few of these companies still exist today. The Depression delayed the progress of the sod industry during the early 30's. By the end of the 30's the market had begun to recover. The concept of planting fields specifically for sod use had taken hold, although pasture sod production still takes place today, mainly for specific jobs requiring native grasses or very low quality sod.

According to Ben Warren of Warren Turf Nurseries in Palos Park, IL, the sod business was one of few healthy and promising businesses in the late 30's when he started. Warren had worked for his uncle as a landscape contractor for nearly ten years and wanted to step out on his own. He surveyed various markets for potential and noticed that two sod companies in the Chicago area were doing very well. In 1938, Warren founded his business, and has since led the way for other sod growers in the U.S., at least in cool season turfgrass sod production.



**Ben Warren**

*Organizer of both Midwest Sod Growers Association and the American Sod Producers Association. Warren is a pioneer in improved turfgrasses for sod and owner of sod nurseries in five states totalling 4,500 acres.*

Warren later used vegetative production techniques for much of his bluegrass sod. Vegetative production's history parallels cool season sod production. Early production of bentgrass and bermudagrass stolons dates back to the 20's. Large nurseries of bermudagrass began in Florida at that time and that state developed the first certification program for vegetative parent material, not sod. Southern Turf Nurseries in Tifton, Georgia and Cal Turf in Ventura, California were leaders in mechanization and development of vegetative sod production. See sidebar for more information.

The transition from pasture sod to cultivated sod is still taking place in Europe. A small amount of pasture sod is still used in the U.S. Eastern sod specialists have four categories

for sod. The first is cultivated sod which is produced from seed or stolons, carefully managed for weed control, harvested and sold as high quality turf. The second is semi-cultivated sod which is obtained from pastures seeded for the purpose of sod harvesting. Improved pasture sod is third. This sod comes from natural stands which are fertilized and harvested. Finally, there is unimproved pasture sod. The only management of this sod is mowing prior to harvesting.

The quality improved with each type of sod. The sod producer gained control over his product through improved turfgrasses, mechanization, chemicals, irrigation, and advances in the science of management.

In the mid-40's, Ryan developed the sod cutter. This engine powered oscillating knife enabled sod producers to harvest faster and improved the consistency of their product. Considerable labor was still required to roll and load the sod. In 1954, Ryan added a devise to cut the sod into sections and in the 60's an implement to roll the sod as it was cut. Despite this early progress, ways to cut manpower did not develop until the mid 60's.

Merion Kentucky bluegrass made a tremendous impact on the sod industry as it did on the seed industry. Pasture sod harvested and planted one fall on a job site, would be nearly all crabgrass the next fall. Disease just wiped out the common bluegrass during the summer, Fred Grau, former turf specialist at Pennsylvania State University and director of the USA Green Section, said. Merion provided the disease resistance to withstand summer stress, quick establishment in sod fields, and a more attractive sodded lawn.

Slow release fertilizers were first developed in the late 40's. The

ability to reduce burn potential, supply a steady stream of nutrients to the sod, and speed up grass growth gave sod producers new control over their product. Combined with the release of Merion in 1950, the sod cutter, slow-release fertilizer gave new substance to the business of growing sod. Many of the large sod producers today got started in the 50's. However, they started with comparatively small acreages and took advantage of Merion and eventual equipment improvement to break the 1,000 acre mark. Those who did not respond to improved turfgrass are not around to tell about it.

Those who did take advantage of Merion, like William Ruthven of Canada, were able to ship hundreds of miles into markets where Merion was not available. He shipped sod as far away as Chicago and Washington, D.C. Canada still figures well in sod today with the largest single farm in North America, Gem Sod Farms in Edmonton, Alberta, and Brouwer, the largest supplier of sod harvesters and also a large sod grower in Keswick, Ontario. Today, transportation costs and inspections make export of Canadian sod less attractive on a competitive basis with U.S. sod.

During the late 40's and early 50's, sod producers gained the assistance of selective herbicides and irrigation in producing a good crop in a reasonable period of time, usually 12 to 18 months.



**Wiley Miner**

*Leader of sod industry in New Jersey and developer of one of the first effective sod harvesters.*

After Merion was introduced, it was often grown as a monstand. The blend and mixture of turfgrass varieties did not come until the late 60's.

The 60's showed the sod industry as a viable and creative group. The sod grower began the decade as an independent using his ingenuity to solve equipment and marketing problems. He ended the decade organized, with improved equipment, and responsive to changes in turfgrass technology.

Many sod growers tried to solve the material handling problems of sod. They include: Wiley Miner of Princeton Turf Nursery of Hightstown, NJ, and Woodrow Wilson of Eastside Nursery of Canal Winchester, OH, who developed the Princeton harvester; Gerry Brouwer of Keswick, Ontario, Canada who developed the Brouwer harvester; John Nunes of Nunes Manufacturing of Patterson, CA who developed the Nunes harvester; Martin Beck Sr. of Beck Turf Nurseries in Auburn, AL, who developed Beck's Big Roll harvester; and others who put time, energy and money into solving the equipment problem, such as Ben Warren; William Daymon of Michigan with his sod roller; Ray Jensen of Southern Turf Nurseries of Tifton, GA, with his zoysia plugger and stolonizer; and Toby Grether of Cal Turf Nurseries in California with his fork lift and net layer. In fact, today out of the five major makers of sod cutting and harvesting equipment, four are sod producers as well as equipment manufacturers.

From the standpoint of sod organizations, the Midwest Sod Growers Association was the earliest in the mid-50's. Consisting of sod producers from Illinois, Wisconsin, Michigan and Indiana, the Illinois group organized to correct through lobbying highway sod standards in 1957. The group was fighting specifications for 3-inch thick sod for highways. They knew that thinner sod actually took root more quickly than thick sod.



Common bluegrass pasture sod near Washington D.C. in the 40's. Photo courtesy F.V. Grau.

They also knew the weight problem of thick sod and the likelihood of sliding down embankments. They won their case and continued to serve as a force in sod production until the formation of the American Sod Producers Association.

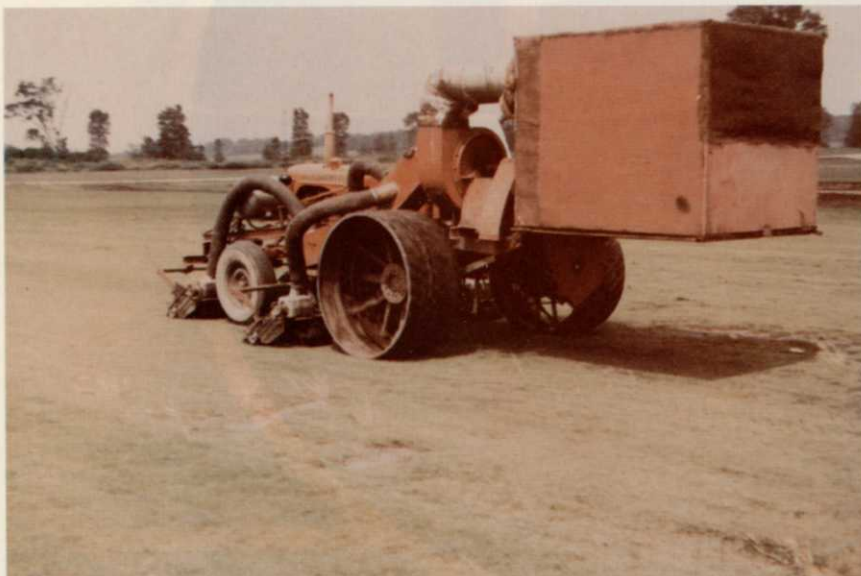
Another early organization was the New Jersey Cultivated Sod Growers Association, formed in 1964 with the leadership of Wiley Miner and Dr. Henry Indyk of Rutgers. This group supported the development of a sod certification program for New Jersey. The mid-60's were very exciting years for New Jersey sod

growers with the creation of an organization, the development of certification and the first demonstrations of a sod harvester prototype designed by Miner at the New Jersey summer field days in 1966.

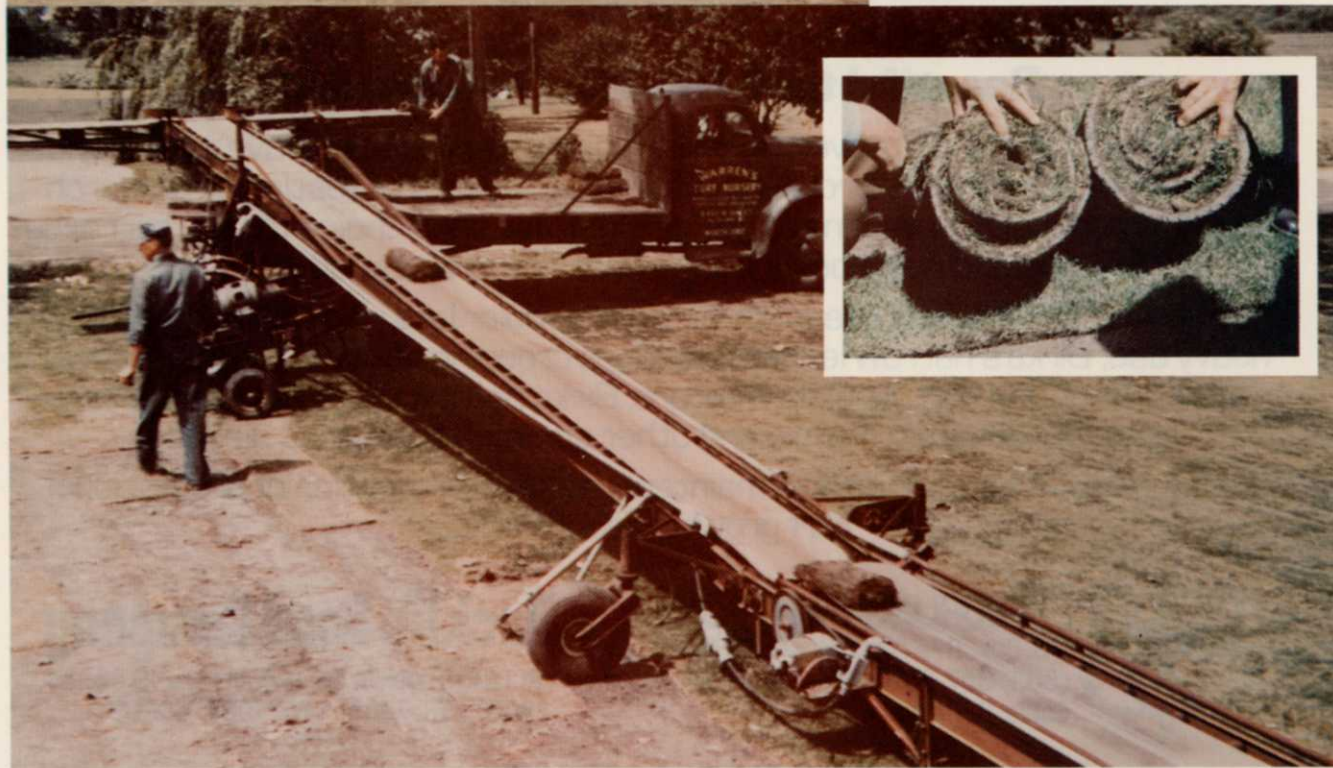
During the 60's a group of five sod producers and a number of turf specialists began meeting at the Golf Course Superintendents Association of America Show. They included Ben Warren, Tobey Grether, Wiley Miner, Gene Johanningsmeir of Michigan, and Jim Ousley of Florida. Meeting with them were turf specialists Dr. Henry Indyk of Rutgers, Dr.

William Daniel of Purdue, Don Juchartz of Michigan State University, and Dr. Elwyn Deal of the University of Maryland. Finally in 1967, at the GCSAA Show in Washington, D.C., Warren made the motion to create a national association and Miner seconded it. The industry finally had its own voice. Growing slowly at first, the organization has had three executive directors in its history. First was George Hammond of Paint Valley Bluegrass in Columbus, OH; second was Indyk from 1969 to 1973; and third Bob Garey from 1973. In 1973 American Sod Producers Association began holding a winter meeting as well as a summer field day. Today, ASPA has nearly half of the sod producers of the U.S. as members and supports research at various universities across the country.

Those states that have sod certification started it in the 60's. New Jersey established the first certification program which was followed by Maryland and Virginia. Basically, certification consists of inspection of fields prior to planting, approval of the seed blend or mixture, and periodic inspections during pro-



**Early vacuum** at Warren's Turf Nursery in 1956. (left) Sod cut at 1/2 and 1 inch (below). Loading truck from field showing manpower requirements of sod cutting below). Photos by F. V. Grau.



duction. The state publishes a list of approved certified seed lots for sod growers seeking certification. Pre-plant inspections are meant to find grassy weed problems such as yellow nutsedge. A serious problem with such weeds will exclude the field from certification unless it is fumigated for total weed control.

Seed inspection is intended to find those lots of seed which have no bentgrass of *Poa annua*. It is possible to purchase certified seed with the minimum allowable percentage of *Poa annua* or bentgrass. Some lots harvested from exceptionally clean fields may have virtually no bent or *Poa annua*. It is lots from these fields that inspectors are looking for to recommend to sod growers. Indyk believes that if certification accomplishes nothing else, it gets seed growers to direct their best seed to sod producers in states with certification programs.

Of course, not all sod produced in these states is certified. As little as 10 percent of the acreage may be certified sod. But when landscape architects who support certification specify certified sod, only that ten percent of the acreage is eligible.

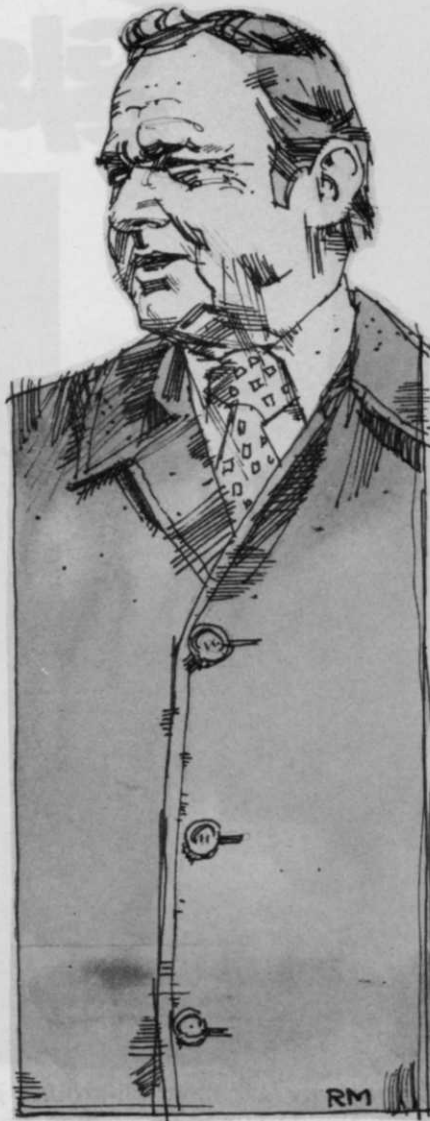
One unique and pressing problem today with certification is that suppliers of sod to New Jersey whose farms are in New York want to grow and meet certified sod requirements. New Jersey says these growers are out of jurisdiction and therefore cannot meet New Jersey certified sod requirements.

Florida had a certification program for vegetative parent material before New Jersey's sod certification program, according to Indyk. Other states considering programs are California and Nebraska. Pennsylvania has a program underway.

Some midwestern sod producers feel certification is unnecessary and slows down progress with new turfgrass varieties. According to these growers competition keeps everyone on their toes. Dr. Jack Butler of Colorado State University in Colorado Springs feels this way. He helped sod producers in Illinois as director of that state's turf program during the 60's. Ben Warren and Dr. William Daniel of Purdue also feel this way.

Certification is also a marketing tool. It is intended to eliminate doubts of those afraid of sod quality. Confidence in sod varies across the country. Architects and contractors strongly recommend sod in some areas, such as Illinois, California, Colorado, and many eastern states.

Sod producers continue to work for other ways to strengthen the position of sod compared to seeding. One way is to gain legislation which requires grass cover prior to release of bonding and issuance of occupancy permits. Contractors may not be willing to wait 60 days for seed to germinate and establish an acceptably thick turf. They are liable often for six months or more. The extra cost of sod must be sold to the customer. In the Midwest, seeding costs approximately 6 - 8 cents per square foot as compared to sod at that figure wholesale plus the cost of installation. Retail sod is priced in the area of 15 cents per square foot in Ohio.



**Henry Indyk**

Rutgers University turf expert who helped organize New Jersey and American Sod Producer Associations.

The instant lawn concept has been pushed for years. Although there are many questions and doubts about improved perennial ryegrasses and tall fescues, they may provide some challenge in certain areas. Establishment time is cut to about four weeks with these turfgrasses when seeded. Basically, it is a question of what is acceptable turf cover for job completion.

The 70's saw the sod harvester take over the sod industry. The Brouwer, Nunes and Princeton harvesters are now found on nearly every sod farm. The harvester drastically cut manpower requirements in harvesting sod. Whereas harvesting with a sod cutter may require up to ten men to accomplish, harvesters cut this number to three in many cases.

The harvester cuts and lifts the sod onto a conveyer. Depending upon the model, harvesters can cut rolls, slabs or folds of sod. After the harvester has rolled or folded the sod, a person on the back of the machine places the sod onto a pallet. When the pallet is filled, the harvester puts it down for pick up by a forklift, and continues cutting. The need to pick up individual rolls of sod from the field is eliminated. The cutting speed of harvesters is faster than sod cutters as well.

The harvester allowed sod producers to handle more acreage with fewer employees. Other improvements to harvesters will further speed up production and reduce waste. These changes however, come at a price. Harvester manufacturers have to prove the cost/benefit of more expensive machinery.

The sod cutter is by no means extinct. Ryan and Turfco of Minneapolis manufacture sod cutters for smaller acreages and for situations where portability is important, such as the remaining pasture sod market. Many cemeteries, golf courses, and parks have sod nurseries for replacement of damaged turf areas. A number of firms making sod cutters and harvesters have stopped doing so. Ryan manufactured the Brouwer harvester in the late 60's. Names like Daymon, Big Brute, Sod Winder, Big J, Gieringer, and Hadfield are now history.

Other progress has helped the sod producer. The improved turfgrasses reduce losses to disease, netting reduces the dependency on sod knitting and shortens production time when needed, and better field drainage gives the sod farmer better



**William Daniel**

Purdue University turf professor who provided early support to the Midwestern, Michigan and American Sod Producer Association.

control over weather. Sod production is now a fairly precise operation with considerable control by the grower. If needed, he can push a crop of sod to be harvested six to eight months after seeding. For this purpose some sod producers keep a portion of their acreage netted and well irrigated. They can also utilize more aggressive Kentucky bluegrass cultivars to speed up the sod, or increase fertilization.

Eastside Turf Nursery grows blends of bluegrass to give the sod the potential to adjust to varying levels of maintenance following installation. Certification officials in New Jersey, Maryland and Virginia encourage such thinking. Shade tolerant bluegrasses and creeping red fescues are often added to provide a hedge against installation in shady areas. Some sod growers provide customers with educational pamphlets on sod care to assure proper maintenance of the sod. ASPA provides such pamphlets to members.

The future holds further developments for sod, especially in the areas of harvesting and installation. Installation remains the labor intensive portion of sod use. "The amount of sod sold could double if a method to lay the sod by machinery could be found," says Dr. Daniel. The device would have to be easily portable, reliable, and maneuverable on site. It should lay the sod faster than it was harvested.

Princeton and Beck's Turf Nurseries have experimented with the width and length of the roll for speeding up harvesting and laying. Princeton offers a 20-inch width on some of its harvesters and Woodrow Wilson claims a 48-inch length is the longest that one man can lay in one motion. As for width, Wilson claims the 20-inch width reduces trimming since it fits standard dimensions of tree lawns and other turf areas better than 16- or 18-inch widths.

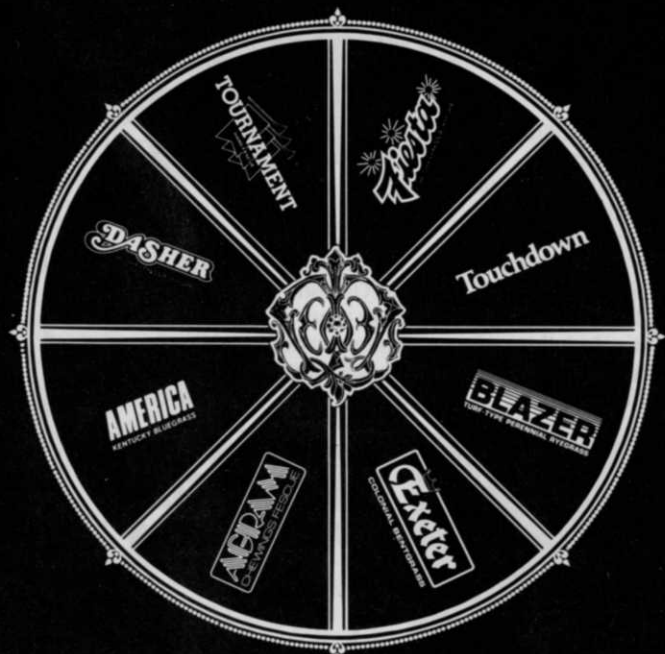
Beck's offers a sod handling system which includes a harvester that cuts three 18-inch wide rolls simultaneously and a forklift, modified, like those that move rolls of carpet, to transport the sod from the harvester to the truck and from the truck onto the job site. The lengths of the rolls can be set according to the measurements of the job. The system is only available on a franchise basis.

Advanced models of current harvesters further reduce manpower and material handling needs. The

new Brouwer harvester has automatic steering which either eliminates strips between rows or standardizes them for vegetative regrowth. The large Princeton, costing more than \$100,000 is a combine-like harvester which reloads pallets as one is filled and lowered, has a closed cab, and the additional horsepower of machines that size.

Equipment for net setting, leveling the seedbed, moving pallets, and unloading at the job site have all added to the mechanization of the sod industry.

Warm season operation has had its share of inventors too. Stolonizers, pluggers, planters and other means of handling vegetatively grown sod and stolons were invented simultaneously with cool season machinery by major southern sod producers such as Southern Turf Nurseries and Cal Turf. Ray Jensen and Toby Grether developed various pieces of equipment for southern sod production.



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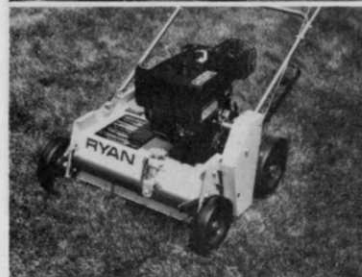
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# EQUIPMENT

## Ryan Turf Equipment

Ryan Turf Equipment, a division of OMC/Lincoln, has devoted effort to meeting the needs of sod producers longer than any other company. Since the late 40's, Ryan has manufactured and continuously improved its sod cutter, which dominated the industry into the 70's. During the late 60's it manufactured and marketed the Brouwer harvester until Brouwer assumed production and marketing responsibility in 1972.

Art Ryan designed the sod cutter produced originally by K & N Machine Works of St. Paul, MN. In 1950, K & N offered an 18-inch version, a step up from the original 12-inch model. The Ryan Junior sod cutter was designed in 1956. In 1963, K & N changed its corporate name to Ryan Turf Equipment Co.. Within the next five years, Ryan introduced the sod roller (1965) and the sulky roller (1968).

The Ryan corporate policy is "whenever improvements are made on any product, the improvement is designed so that it can also be adapted to the present machines in the field."



Heavy duty sod cutter (top) is an improved version of a 1947 model. Sod cutter with sulky roller (bottom) still meets the needs of many sod producers.



## COOL SEASON PRODUCTION

From two nuclei, Illinois and New Jersey, cultivation of cool season sod production spread in the 60's. Michigan, Indiana, Minnesota, Wisconsin, and Ohio sod industries grew in number of firms and competitiveness. The midwestern boom spread westward to Missouri, Kansas, Colorado, Nebraska and California in the late 60's.

From New Jersey, growth spread quickly to Maryland, Virginia and Pennsylvania and northward to New York and Connecticut. By the early 70's, cool season cultivated sod production was clearly established and busy providing the needs of a boom in housing and industrial building. Competitiveness kept prices down forcing growers to work toward

volume for profit. Mechanization clearly separated the men from the boys and later helped stabilize the market to its current position.

Like the stripping crews in seed production, the pasture sod business faded as newer technology took over. Sod nurseries grew in size and began offering a variety of turfgrasses. Seed companies and extension turf specialists saw the potential of the market and began providing special attention to sod production. Michigan, under pressure from the Sod Growers of Michigan and the Michigan Turfgrass Foundation, legislated a special turf fund for research. Turf specialists now had at least part of their work time designated for sod production service. Sod was a

separate power from golf but served to supplement the turf cause in turf research from a public funding standpoint. Older research programs such as Pennsylvania, Ohio, New Jersey, Virginia, Maryland, Michigan, Illinois, and Nebraska found new support and grew as a result. The second generation turf researcher was studying during a boom period for turf. Some of them moved from older institutions to newer programs such as California, Colorado, Oklahoma and Texas and broadened turf research there.

It was the sod producer that really spread the word about improved turfgrasses. The obvious difference of a lawn sodded with an improved turfgrass next to one sodded or



Ben Warren and assistant in turf greenhouse evaluating turfgrass selections.

# PROFILE

## Pine Island Turf Nursery

The sod industry grew rapidly in the 60's. An example of a firm who entered the business in the mid-60's is Charles Lain, owner of Pine Island Turf Nursery in New York.

Lain left his job with Weyerhaeuser in 1964 and started a sod nursery in 1964. In 1966, he stepped out on his own. He served as president of the American Sod Producers Association in 1979 and today manages a 435 acre business with sales of more than \$500,000.

Lain's nursery is located in New York's largest sod growing region. The area has more than 3,000 acres of sod production on its black, mucky soil. Lain competes with Warren's Turf Nursery in the same area and other growers serving the New York City area including DeLalio and McGovern sod farms in Long Island.

The Pine Island area is among the richest in terms of soil fertility in the country, with vast onion, lettuce and celery production. The soil is acidic and contains a fair amount of aluminum and iron. "Chemicals that work on upland soil don't always work on muck soils," says Lain. In the fall, he applies 600 lbs./acre of 10-30-20 and three tons of lime per acre. He feeds again in late October with 300 lbs. of 20-5-5 and finally the next spring with 350 lbs./acre of 45 percent urea. Based on soil tests, he adds copper and adjusts the phosphate. He supplements the area's 25 inches of rainfall with irrigation.

Lain used Ryan sod cutters until 1974 when he bought his first Brouwer harvester. "The harvester has allowed us to get more production per acre by reducing loss between five and ten percent," says Lain. "It also allows us to harvest more tender, younger sod."

"It used to take 12 workers six hours to harvest one acre of sod using the sod cutter. Today, we harvest an acre in less than four hours with three to four workers," Lain boasts. The harvester enabled Lain to reduce peak season labor by eight persons.

Lain grows a blend of Adelphi, and two of three other improved Kentucky bluegrasses, Touchdown, Majestic and Glade. For shady areas, Lain sells a mixture of Warren's A-34, Glade, and Fortress and Jamestown fescues.

"Sod is plagued much more by weeds than disease," says Lain. After harvesting he applies Roundup to eliminate weeds such as Quackgrass, Crabgrass, foxtail, barnyardgrass, and other weeds are controlled by spring and fall applications of Banvel-D and 2-4,D and two applications of D.S.M.A.

In 1977, Lain lost nearly a third of his mature sod to leaf spot after a very wet spring. Lain indicated fungicide treatments are not required as often in his area as in others.

Marketing is a firm commitment to Lain. He spends nearly ten percent of his sales on billboards, newspaper advertising, brochures and radio messages. Sales have increased by nearly 20 percent per year since 1976. Eighty percent of his sales are to landscape contractors, 15 percent to garden centers, and five percent retail. He often provides retail customers with maintenance information to help assure the sod of proper care and Lain of a satisfied customer. *Story and interview by Carol Rose.*

seeded with common Kentucky bluegrass made the public take notice of improved turfgrasses. The demand upon garden centers and landscape contractors for improved turfgrasses grew. Landscape architects starting specifying the improved Kentucky bluegrasses.

Today, the number of new turfgrass cultivars is clouding the issue of what type of sod to produce. Sod producers must anticipate demand 18 months ahead of time. They know they have good demand for certain solid performers. Their willingness to devote much acreage to a steady stream of improved grasses is limited to the sales advantage of switching from one to another. So, their acceptance is slow



**Gerry Brouwer**

*Ontario sod producer and equipment maker who helped spur the industry on with his side tracking sod harvester.*

and cautious. Each time they add a new turfgrass they also accept the need to educate customers of the advantage of it. The fact that landscape contractors and architects are better voiced on improved turfgrasses does speed up the educational process. Therefore, seed growers have a larger educational job to do.

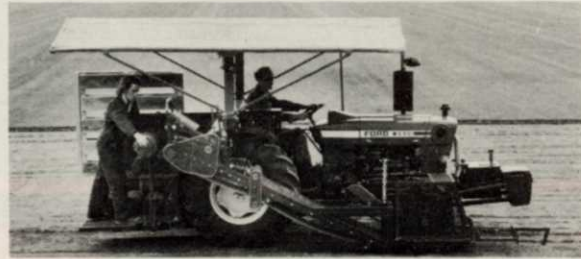
The number of sod producers has stabilized in the last five years. Acreages increase to meet rising demand. The market appears just as solid as Ben Warren found it in the late 30's, and some conglomerates are acquiring sod nurseries. Two examples are Cal Turf's acquisition by American Garden Products and its takeover by Amfac of Honolulu, a large agribusiness corporation, and the purchase of Southern Turf Nur-

# EQUIPMENT

## Brouwer Turf Equipment Ltd.

The largest manufacturer of sod harvesters is the Canadian company Brouwer Turf Equipment Limited. A sod producer himself since the mid-60's, Gerry Brouwer began production of the Model A harvester in 1972. Brouwer still farms 1,500 acres of sod in addition to his rapidly expanding equipment business. The unit is designed to either roll, slab or fold and operates off the uncut turf which prevents tracks and turf damage. Brouwer recently announced production of a new line of harvesters, the Model 2000. This unit offers innovative features such as automatic steering, automatic empty pallet loading and four-wall stacking area. It can harvest 2,000 sq. yds. per hour with minimal waste.

Brouwer also makes the light weight Hitch-Hiker fork lift, a side-unloading grass collector, a turf roller, and PTO gang mowers. The company recently established a sales office in Europe to meet sales and service demands of overseas sod producers.



**Model 2000** is the newest Brouwer harvester featuring automatic steering and empty pallet loading (top). Model A harvester is used by more sod producers than any other harvester.

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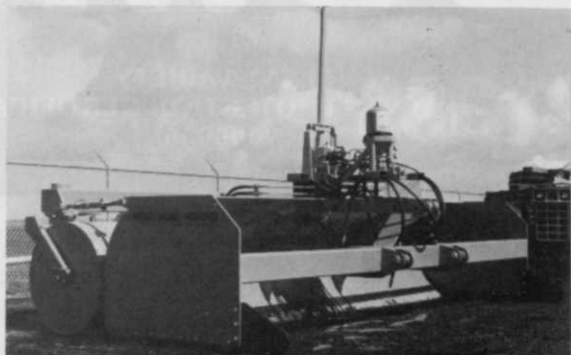


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# EQUIPMENT

## Nunes



Laser scraper

The two largest forces in sod in California are Nunes and Cal Turf, now part of American Garden Products, recently acquired by Amfac. The two people behind the firms are Tobey Grether of Cal Turf and John Nunes of Nunes Turfgrass Nurseries. Grether sold his interest in the 70's. But John Nunes and his son Greg manage 1,500 acres of sod, orchards, and diversified row crops, as well as Nunes equipment line.

Nunes manufactures a line of sod equipment including a harvester, vacuum sweeper, rotary mower, sod netter and a laser land leveler.



Rotary mower

Although distribution of its Kentucky bluegrass and bermudagrass sod is regional, its distribution of equipment is international. The company is headquartered in Patterson, 90 miles east of San Francisco.

Nunes also has "Instant Grass Centers" in nine California cities to market its sod and other landscape materials. This marketing effort certainly gets the idea of sod across to potential customers. It may be one of the reasons sod is so well accepted in California.

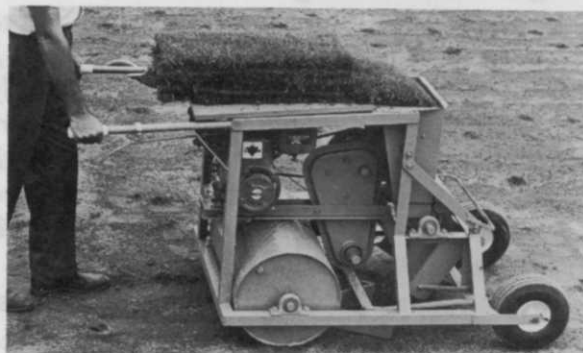
## Beck's Manufacturing Company



Big Roll Harvester

A unique answer to the sod harvesting and handling situation is Beck's Big Roll. This system harvests three 16-inch rolls of sod simultaneously and can lay them the same way. The sod is rolled onto cores which are handled by a carpet pole like device. This core permits handling by cranes and adapted forklifts. It also permits laying with a tractor three rolls at a time.

Beck Manufacturing Company is a division of Beck's Turf Nursery, one of the earliest producers



Sprig Planter

of zoysiagrass in the country. Another product of Beck's is Lawn-O-Matic sprigger which sprigs or plugs three 8-inch rows at once.

The Big Roll system is available on a franchise basis only. This guarantees a territory for the franchisee. The Beck Manufacturing Company and Turf Nursery is located in Auburn, Alabama.

series of Tifton, Georgia, by Atlanta-based Tech Industries.

As of July, no drastic fall-off had occurred in the demand for sod this fall, despite gloomy building start figures. Sod will again show its relative remoteness to economic conditions. Commercial lawn care has heightened the interest in lawns by homeowners. As homeowners are forced to restrict travel plans, their homes and their lawns become their prize possessions. Unfortunately, sod producers, irritated by an Illinois law which essentially permits a lawn care firm to apply just water during a job, have formed a poor attitude about all lawn applicators. When sod producers could be working with lawn care firms to resod old lawns, they instead are reluctant to recommend a lawn care service to their customers. The care provided by the lawn applicator or the landscape contractor is the best insurance against failure of the sod after installation. Furthermore, these firms could recommend sodding for lawns they see as beyond hope or not up to current turfgrass standards. If a person pays \$2,000 to sod his property, he will be willing to pay the

\$200 per year to take care of it.

Lawn renovation becomes an important factor when building declines. The sod industry should deal with this marketing alternative.

#### Market Size

Value of sod produced in the U.S. approximates \$200 million annually. Seventy percent of this total is cool season sod production. Sod producers harvest between a third to a half of their acreage each year. Total acreage in sod production is estimated at more than 100,000 acres.

By far the most common time for seeding is late August. Some growers may harvest the sod the following summer if they have used netting or pushed the sod through fertilization. This is done only in special cases and usually less than ten percent of the acreage is devoted to accelerated production. If a grower chooses, he will plant a portion of his acreage in the spring, again usually for specific orders. The normal growing cycle remains 12 to 18 months, fall to fall or fall to spring a year later. Whereas monostands of Merion or other Kentucky bluegrass were common in the

early 60's, a blend of improved Kentucky bluegrasses is common today. In some cases, creeping red fescues are added for shade and less fertile sites. Research by Dr. Richard Hurley under Dr. Richard Skogley at Rhode Island found ten percent as the optimum percentage of red fescue in a sod mixture.

Although netting could conceivably allow production of perennial ryegrass sods, growers have avoided such production so far. They are sold on the superior sod strength of bluegrass sod and question the winter hardiness of improved perennial ryegrasses for sod. NK-200 has proven cold tolerant in Minnesota, but more research is needed.

In the transition zone, tall fescue is included in many sod mixtures. New fine-bladed tall fescues show promise for this area and perhaps northern areas once winter hardiness is established.

Zoysiagrass and bermudagrass are available as plugs or sod in the transition zone. Some Virginia sod nurseries produce bermuda and zoysia sod. Much of the original work with zoysia took place at the USDA Research Center in Beltsville, MD.



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## WARM SEASON PRODUCTION

Warm season sod production benefits from a longer growing season, turfgrasses that remain aggressive during the summer, and various uses for the product, i.e. plugs, stolons, and sprigs. It is hampered only slightly in that most production is vegetative, requiring planting methods more complicated than seeding.

Warm season turfgrass sod production required different mechanization from cool season turfgrass sod production. Most of this inventiveness came from the Southeast from men such as Ray Jensen of Southern Turf Nurseries, John Beck of Beck Turf Nurseries, and many others who contributed to the organizational effort, like Jim Ousley of Ousley Sod Co. in Pompano Beach, Florida. In California, Toby Grether of Cal Turf provided the West with the drive and technology to develop.

In some respects, turf nurseries in the South preceded sod farms in the North. While pasture sod was still dominant up North in the 30's and 40's, the turf nursery for production of plugs, sprigs and stolons already existed in southern states. However, sod cutting and harvesting technology really caused both northern and southern sod industries the same delay in transition from older, less efficient methods to those which permitted volume production. Furthermore, modern cutting and harvesting equipment is utilized today in sprig and stolon production.

Extremely high germination temperatures for warm season turfgrasses and their ability to spread rapidly strongly favored vegetative production. The only significant use of seed in tropical and semitropical zones is for winter overseeding with rvegrass and more recently rough bluegrass, *Poa trivialis*. There is some use of centipedegrass, bahiagrass, and kikuyugrass seed. It is



**Ray Jensen**

*Founder of Southern Turf Nurseries, one of the largest warm season turfgrass nurseries.*

generally considered that vegetative production maintains genetic purity better than seeding.

Bermudagrass, St. Augustine, and zoysiagrass are the dominant sod grasses. They form dense, tight sod which performs well under low mowing heights. St. Augustine and zoysia are favored for shaded areas and exhibit good insect resistance. St. Augustine does not withstand traffic as well as zoysia, and not nearly as well as bermudagrass. Bermuda requires higher maintenance however.

Whereas sod competes with seeding in the cool season turfgrass zones, sod competes with plugs, stolons and sprigs in warm season turfgrass zones. Again, time is the big factor. Warmer climates allow year round use of athletic fields. Some repair can be made by spot sodding and plugs, but major damage must be

repaired by sodding. To have a field out of play for renovation is considered impractical.

Irrigation is a way of life in the semitropical and tropical zones where fine turf is concerned. If one commits to the expense of permanent irrigation, as many do, the cost of sod is less an issue. Large areas and lower maintenance areas may opt for stolons, sprigs or plugs. Stolons are often applied by hydraulic mulching equipment. Stolons can also be broadcast and crimped into the soil. Sprigs are inserted in slits cut every eight to 18 inches and tamped. Plugs can be planted at the density desired by the customer or planted in one area and used for future plugs after regrowth.

The equipment required for planting plugs and stolons is not generally available. It is provided by the contractor who installs the lawn. The number of manufacturers is very limited.

So, in some respects, sod has a competitive advantage over other methods in the South, advantages which go beyond the instant lawn. A look at the 1974 Agricultural Census indicates turf nurseries in the South average twice the acreage of northern nurseries but average the same as northern growers in sales. Therefore, it takes twice the acreage in the South to receive the same sales as in the North.

Texas followed Florida in sod production of warm season turfgrass, in the late 60's and early 70's. Texturf bermudagrasses are developments of the Texas Agricultural Experiment Station. Growers in Alabama and Georgia appeared to help push southern sod producers into significance. In California, Tobias Grether and John Nunes pushed that state's industry into sod production in the late 60's.

# PROFILE

## Southern Turf Nurseries

One of the success stories of warm season sod production is Southern Turf Nurseries of Tifton, Georgia.

Started in 1950 by Ray Jensen, a soil scientist with the USDA, Southern Turf Nurseries has an amazing record. Located near the USDA Research Center in Tifton where Glenn Burton bred his "Tif" series of bermudagrass, Southern Turf responded quickly to advances in turfgrass breeding. Jensen was the first to produce seed of centipedegrass and is one of three suppliers of the seed today. He and his staff developed the equipment necessary to plant and harvest sprigs of bermudagrass, centipede, and St. Augustine and plugs of zoysiagrass. In 1960, Southern Turf started production of warm season sod.

Jensen's creative and aggressive business sense was continued by the purchase of the company in 1976 by Charles Nash and E.G. Pope of Atlanta, partners of Tech Industries. In 1978, Southern Turf Nurseries entered into an agreement with Anheuser Busch to utilize brewery effluent to irrigate sod fields adjacent to breweries. The first project in Jacksonville, and another to begin soon near the Williamsburg, VA, brewery solve two problems for the makers Budweiser, Busch, and Michelob; that of effluent treatment and fertilizer needs of the farm. The effluent is rich in nitrogen and is naturally percolated through the sod field soil to the water table. The Jacksonville project produces 300 acres of sod.

Another major step for the company is the recent joint project with Lofts Pedigreed Seed Co., the creation of Sunbelt Seeds. Based in Tucker, Georgia, Sunbelt will market a complete line of overseeding mixtures and warm season turfgrass seed. The company plans to provide considerable technical assistance to southern turf managers.

An existing specialty of Southern Turf is its experience with planting southern athletic fields. In 25 years it has planted more than 2,000 sports fields, including the Orange Bowl in Miami, the Atlanta stadium, and part of Augusta National Golf Course. It has exported and planted fields in 15 foreign countries, including Saudi Arabia, Japan and Israel. It provided much of the stolons for many of Hawaii's famous golf courses.

Today, Southern Turf Nurseries is the largest producer of warm season turfgrasses in the world.

Grether, a tomato and sugar beet farmer in Ventura, CA, planted bermudagrass in part of his acreage in 1958. By 1965, he had 150 acres of sod and 1,100 acres by 1971. Grether is credited with the first net laying devise and the use of fork lifts for sod handling. Today, nearly all of the 1,100 acres is netted. Grether retired in the mid 70's and was followed by Ralph Daily, who improved the net layer and has helped its rise in use today.

According to Daily, the netting permitted planting sod fields that otherwise could not have been planted. Grether's net layer buried the edges of the netting. Daily improved this by a glue applicator for the joining edges of netting.

Warm season sod production faces a greater challenge with offtypes in fields. For example, if bermudagrass gets established in a field of St. Augustine, or visa versa, it must be dug out by hand to remove all viable stolons. Broadleaf weeds are kept under control by herbicides, but grassy weeds require extra effort. Often, mowing crews will spot for offtypes and flag them for control.

Fumigation is very common in warm season sod production and necessary for certified sod. Fields are first fumigated and inspected. Usually, the certified stolons are planted in one foundation block, or field. Other fields are planted by expanding out of that block. The fields are continuously rogued for offtypes. Inspectors make unannounced visits to check the fields prior to harvest.

Irrigation has been essential in the south and west. Large mobile systems are common fed either by wells or lakes. Early proponents and problem solvers in irrigation include Toro's Jim Watson and Weathermatic's Jim Watkins. Fumigation and irrigation are significant in terms of cost to the grower. Without them, however, the job would be nearly impossible.

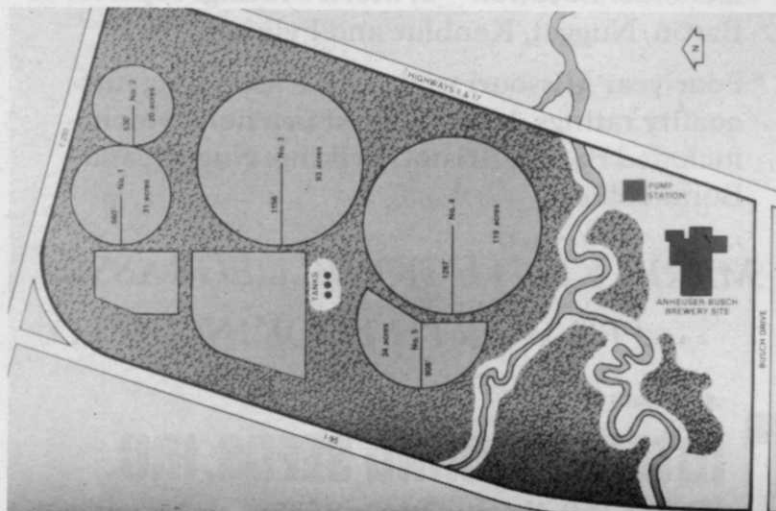


Diagram of effluent project with Anheuser Busch in Jacksonville, Florida.

## RESEARCH AND THE FUTURE

The inventiveness of the sod producer and support entities, i.e. university extension personnel and suppliers, has not diminished. Although the market has matured, demand continues to increase. Lack of appropriate hand labor strongly encourages further mechanization. The cost of water is rising rapidly in some regions encouraging the use of effluent water, efficient irrigation,

drainage recovery, water conditioners, more water efficient turfgrasses, and perhaps antitranspirants. Closely associated to water use is disease resistance. The American Sod Producers and the Golf Course Superintendents Association of America support turfgrass pathologists and breeders work toward more disease resistant cultivars. Rising petroleum prices

encourage the development of turfgrasses with lower maintenance requirements. This includes lower nitrogen needs, improved disease resistance, and improved insect resistance.

To accomplish all this, support must come from the sod producer made possible by less destructive competitive pricing, cooperation



**Examples of inventiveness.** Power splitter for sods invented by Bill Lyons of Canal Fulton, Ohio (left). Two-man spiker circa 1939 (top right). Sprig planter from John Deere circa 1950 (bottom right). Photos by F. V. Grau.



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# EQUIPMENT

## Princeton Turf Equipment

Princeton Turf Equipment originated under the cooperative efforts of Woodrow Wilson of Eastside Nursery in Canal Winchester, Ohio, and Wiley Miner of Princeton Turf Nurseries in New Jersey. Miner displayed the harvester during a turf field day at Rutgers in 1966. An improved version of that harvester became the first Princeton harvester. Today, Princeton has a number of models of harvesters, including an extremely sophisticated large harvester with enclosed cab and minimal sod handling needed. In addition to harvesters, Princeton manufactures a fork lift called the Piggyback and a harvester that is attached to the tractor in an easily detachable hitch arrangement freeing the tractor for other duties. It also makes a turf vacuum and a stolon planter. Princeton designs to serve both cool and warm season sod production.

Wilson says that every harvester he has ever sold is still in use today, attesting to the reliability of his product.



Princeton harvester can harvest up to 2,500 square yards per hour and has a floating cutterhead for cutting in mineral or peat soils and in rolling conditions.

The advantage of the Princeton harvester is that the weight of the machine is over the blade, not to the side, according to Wilson. He attributes this and other design advantages to the success of the Princeton harvester. Wilson continues to work on improvements to his harvesters and to develop and manufacture other pieces of sod equipment, such as the fork lift, grass vacuum, and sprigger.

## METRIC SOD

The U.S. conversion to metric, although slow, is occurring. At the same time, sod production technology developed in the U.S. and Canada is going worldwide.

Gerry Brouwer of Brouwer Turf Equipment Ltd. estimates that the demand for improved sod technology will grow in areas still strongly based in pasture sod. Areas such as South Africa, Australia, Holland, Germany and the United Kingdom are buying harvesters.

Canadian sod producers currently sell sod in .8 square meter rolls, which is the same as a square yard. The Nursery Sod Growers Association of Ontario pushed for the conversion to metric in 1978. So golf course superintendents, landscape contractors, and homeowners now must think in terms of meters instead of yards.

Although it would make sense to go to the square meter over the .8 square meter roll, sod producers say the full meter roll is too heavy to handle. Since nearly two-thirds of Ontario's bentgrass sod is sold to U.S. users, the acceptance of metric conversion will spread to northern states quickly.

No talk of converting machinery to the metric units has been proposed. But conversion is eminent and a little lesson in metric is appropriate.

### CONVERSIONS:

area in square yards x 1.0451 = the number of 0.8 square meter rolls

area in square feet x 0.11612 = the number of 0.8 square meter rolls

area in square meters x 1.25 = the number of 0.8 square meter rolls

with other turf organizations, and a willingness to try new methods. Marketing techniques can be improved to increase demand, increase price, and solidify the image of sod as the surest way to have a quality lawn. Support to university research is critical, either by individual contributions by estates of those who lived comfortably from the sod industry or by organizational grants. Purchasing new machinery that has been improved, chemicals that make savings possible, and seed that exhibits improved characteristics will provide the commercial sector with the will to experiment and develop new products.

Future sod production will be an agronomically complex skill. It has come a long way from the pasture to the highly mechanized, irrigated, blend and mixture, and chemically complex profession. It has also become a sophisticated business with marketing and planning critical to growth. It will take study in addition to inventiveness to succeed in sod production in the future.

The continuously growing strength of the American Sod Producers Association will play a major role in accomplishing needed research and maintaining commercial interest in the market by suppliers. By making industry statistics available to potential suppliers and showing that its membership is receptive to new ideas ASPA can generate a tremendous commercial interest in sod production. This will encourage private research as well as public research on sod methodology.

ASPA is increasing its service to warm season sod producers in an effort to represent all U.S. growers. Recalling that two of the original five producers behind ASPA were growers of warm season grasses, southern growers should not categorize ASPA as for northern growers only.

Perhaps the most present challenge is marketing of sod. Full participation in the Landscape Industry Association Council (LIAC) could facilitate support from landscape architects and contractors, and to benefit from basic marketing problems of the Green Industry. Sophisticated promotional campaigns and record keeping could extract further market potential for sod. That potential, if realized and funnelled back into research and the supplier will assure continuous growth.

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