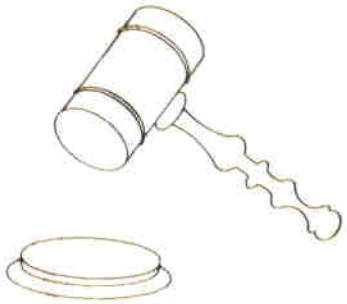

President's Message

ASSOCIATION DEFINED

By Bill Roberts

Every once in a great while it becomes necessary for me to go back to the source when attempting to define a challenge or an opportunity, a situation or a setting. With the assumption of a new role as President of the Wisconsin Golf Course Superintendents Association (and with a very persistent newsletter Editor with deadlines to meet), one takes on certain duties and may begin to view things from a different perspective. A re-definition may be called for relative to our Association, at least for me.

To digress for a moment, one of those new duties I have been entrusted with is the contribution of a "President's Message" in each issue of our outstanding publication, "THE GRASS ROOTS." This responsibility does not equate to nor imply any sort of monopoly on wisdom or insight but, rather, is a result of the office. The column space allows a certain "free forum" for the discussion of what may be the priorities of thoughts and ideas of the incumbent. In short, an inherent opportunity to say what one feels, believes or is being convinced of, in writing, and with virtually no limitations.

With a re-definition and my new role in mind (and with that newsletter Editor on the phone again), I have decided to wax philosophically on the age-old questions of "What is the Wisconsin Golf Course Superintendents Association doing for me?"

I could give you all the standard answers. Excellent educational opportunities at monthly meetings. An outstanding golf turf management event at our annual WGCSA symposium. An informative and timely publication in "THE GRASS ROOTS." Support of two outstanding turf research organizations, the Wisconsin Turfgrass Association and the O.J. Noer Foundation, which produce direct, tangible and applicable results for turf. Access to some of Wisconsin's great golf courses. A membership directory which can provide contact with fellow Golf Course Superintendents, industry people and research people. Standard answers.

However, I believe the real answer to this question may lie in the definition of an "association" itself. Going back to the source, in this case Webster's New Collegiate Dictionary, I found that, in part, "an association is an **organization of persons** having a common **interest**." I judged that to be sufficiently vague and pursued explanation of what I believe to be the operative (and **underlined**) words. In no particular order, I would offer the following as a set of parameters in order to define our "association" and what it "does for me."

1. **Organization** — defined as "an administrative and functional structure." WGCSA has such a structure. Officers, Directors and committee members all contribute to the planning and implementation of procedures and policies which are necessary to insure a smooth operation.

   For example, meeting notices go out, registrations are taken, golf is played, prizes are awarded, dinner is served, guest speakers expound, questions are asked and answered, raffle prizes are awarded and everyone goes home having gained. That process did not just occur. It was planned and implemented.

   Likewise, other areas such as Publicity, Scholarship and Research, our History and Membership are covered through such organization. A structure is present, direction is set and pursued and the chaos is held to a minimum.
2. **Interest** — "a feeling that accompanies or causes special attention to an object or class of objects" according to Webster. Our professional attention is focused on our common goal (object). We desire to contribute to the management of the finest golf turf possible, be recognized for that effort and to be rewarded appropriately. Whether Golf Course Superintendent, Turf Supplier or researcher we all concentrate on that encompassing goal. This mutual objective is enhanced through interaction at meetings, over the telephone, through our newsletter, et cetera as we strive for excellence in our respective positions.
3. **Persons** — "individuals" quite simply. The tie that breeds the interest into the organization. Without the efforts of "individuals" such as Paul Brockhausen, John Bone, Lester Verhaalen, Frank Musbach, Ray Mertens, Bill Sell, Bob Musbach, Al Vrana, Wayne Otto, and Woody Voight we may have had the interest but not the organization to put the interest into action. Jim Belfield has enough interest to serve the organization for eleven years. Danny Quast, who began a proud tradition with our newsletter and Monroe Miller, who has enriched that tradition while leading this organization at the same time have the interest. Past and current Board members, committee members, host superintendents, and individuals all have the interest. All share the same interest.

The individuals I have mentioned, and many I have missed, all had and have the foresight to see our "common interest" enhanced through an organization. Their reward was, and is, their contribution and, I suspect, that chance to contribute was, and is, what the Association really did for them.

The Wisconsin Golf Course Superintendents Association offers many benefits. However, "what it really does for me" is that it provides me the opportunity to participate, to share, to question, to answer, to pursue and to grow with any number of individuals, who choosing to do likewise, help me, in an orderly, directed fashion, to achieve my, and our, goals.

In short, WGCSA does exactly what you do for it. Get involved, stay involved and enjoy the rewards.

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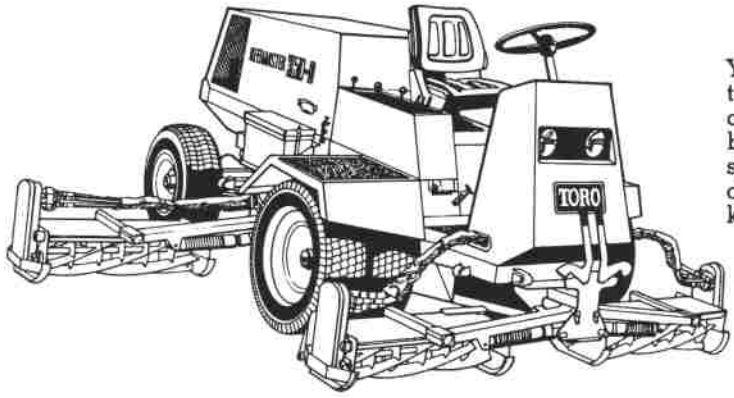

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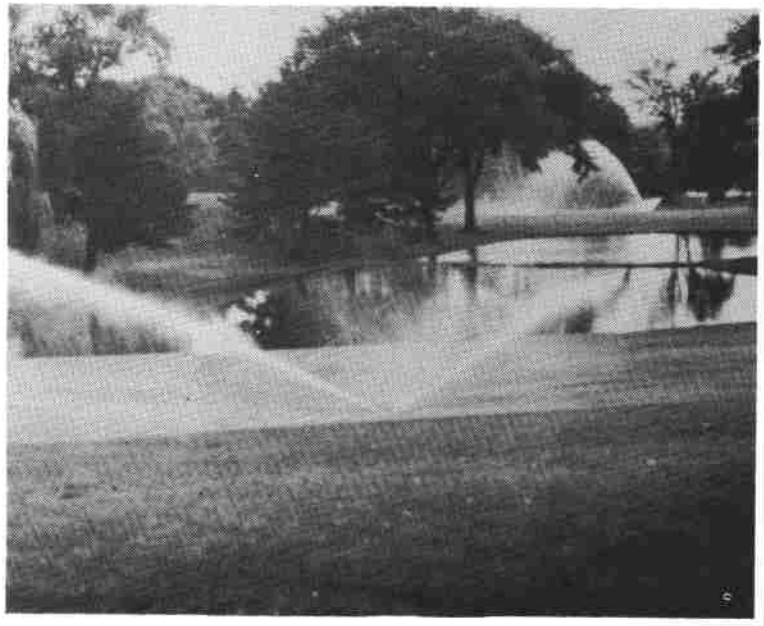

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Editorial

A SLOW BURN

By Bill Roberts

The 1985 golf season was an unqualified success, not only for members of the Wisconsin Golf Course Superintendents Association, but also for Golf Course Superintendents throughout the country. Deserving of special note are those who hosted golf championships on state, regional and national levels. The intense demands placed on one in our profession, not to mention the extraordinary demands placed on tournament hosts are constantly and consistently met despite budgetary restrains, weather conditions and the myriad of "glitches" that can tax one's patience, talents and experience. These events continue to be successful, in fact golf continues to be successful because we are "the best prepared, the best educated and most dedicated professional managers in the industry."

How utterly inappropriate, and perhaps a bit tragic, therefore, that the Professional Golfers Association chose to produce a network television advertisement that many WGCSA members viewed during this past summer's telecast of the PGA championship held at Cherry Hills Country Club in Denver, Colorado.

The advertisement in question implied, by showing a "Golf Professional with a soil probe," that someone other than the Golf Course Superintendent is responsible for the superb playing conditions enjoyed by the American golfer day in and day out. The impression given by this particular piece of advertising seemed to be that the "Golf Professional was the one making the decisions, taking the responsibilities and generally contributing to the game through golf course management."

Of course, such an assertion is ludicrous and insulting. It is, in fact, the professional Golf Course Superintendent, through his experience, education and intensity, who has raised playing conditions and overall golf course management to a standard not conceivable even 10 years ago. The Golf Course Superintendents Association knows this. Individual Golf Course Superintendents have achieved this. Knowledgeable individuals in the world of golf recognize this. Even, we suspect, the Professional Golfer's Association knows this (albeit they appear reluctant to accept this fact). However, we do not believe that the confusion, perpetuated by ads such as the one in question, should be left unchallenged. GCSAA, the Wisconsin GCSA and the game of golf have too much at stake.

The Wisconsin Golf Course Superintendents Association Board of Directors does believe that the Executive Committee of the Golf Course Superintendents Association of America has made great strides in promoting the public perception of individual Golf Course Superintendents. Our new "public relations package" promises to be a major step. The ESPN ads have potential to be a "breakthrough." This past summer, GCSAA's appearance at several major tournament appears to have been worthwhile and valuable experience. Generally, membership in GCSAA and the Wisconsin GCSA can be the most valuable positions one can take in upgrading and maintaining one's professional image.

The Wisconsin GCSA Board of Directors also believes that GCSAA, in its essential role as focal point for our profession, must take a specific line of action in a situation where its members' contribution and commitment is downplayed or ignored. While conceding that some of these and/or other actions may have already been discussed or undertaken, we respectfully submit that the following options are available:

a. communication with the PGA, the PGA Tour and PGA Commissioner Deane Beman, expressing concern over this disturbing attitude apparently adopted by these organizations,
b. continuing commitment, by GCSAA, to advertising over limited access television such as ESPN,
c. continued open communication with allied golf interests and associations such as USGA, CMAA, NGF and even, yes, the PGA,
d. budgetary support by GCSAA for its Communications/Awards Committee including appropriate monies for development of "network type" television advertising in the short term and long range budgetary commitments to insure this advertising reaches the American golfing public on a major network within a two year period,
e. continued review of all ongoing programs in order to appraise effectiveness and upgrade or delete as needed, and,
f. timely response by GCSAA, as to the appropriate status and action taken whenever concerns such as these are voiced by the membership.

The Wisconsin GCSA trusts that our concerns and suggestions have been taken in the spirit that they are offered. That is; to ultimately benefit our profession and our Association. We, again, applaud those actions already taken but intensely encourage the implementation of even more. Our future demands it.

William R. Roberts

1986 WGCSA Dues must be paid — NO more separate notices will be sent!

Memories of Photosynthesis

By Michael Semler

The snow has finally returned to Wisconsin, and we can sit back, relax and enjoy some type of normality in our work schedules. If I might be so rude as to try and bring back memories of warm days and green vegetation, I would like to try and refresh our memories with one of the essential processes occurring in all plants. That process — photosynthesis — is the route by which virtually all energy enters our biosphere, and is no doubt the reason I will dwell on the systems and pathways involved.

Historically, plants were assumed to derive all their food from the soil. It was not until the 1600's that the Belgian physician Jan van Helmont conducted his famous experiment by planting a 5 pound willow tree in 200 pounds of soil. At the end of the 5 year experiment, during which only water was added, the willow weighed 169 pounds and the soil decreased in weight by 2 ounces. Van Helmont logically concluded, though incorrectly, that all the substance of the plant came from the water and none from the soil.

During 1771, Joseph Priestely, discovered a means of restoring air destroyed by burning a candle. Priestely put a living sprig of mint into air which a candle had burned out, another candle could be burned 10 days later in the same air. Dutch physicist Jan Ingenhaus confirmed Priestely's work and showed air was restored only in the presence of light and only by green plant parts. In 1796, Ingenhaus suggested that carbon dioxide was split in photosynthesis to yield oxygen. In the overall reaction for photosynthesis, it was assumed that the carbohydrates came from carbon and water and the released oxygen came from the carbon dioxide. This reasonable assumption was widely accepted, but quite wrong.

Ingenhaus' theory was accepted until 1930 when Stanfords' C.B. van Neil proposed that water, not carbon dioxide, was split in photosynthesis. Thus, the complete, balanced equation was determined to be:

$$6CO_2 + 12H_2O + \text{LIGHT} \longrightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$$

For about 200 years, light has been known to be essential for photosynthesis. In 1905, English plant physiologist, F. F. Blackman presented evidence of photosynthesis being a 2 stage process. The first stage being light dependent and known as the "Light Reactions" and the second stage being light independent and known as the "Dark Reactions." It is important to note that the dark reactions normally occur in the light because they require the products of the light reactions. The expression "dark reactions" merely indicates light is not directly involved.

In the first stage of photosynthesis, light energy is used to form adenosine tri phosphate (ATP) from adenosine di phosphate (ADP) and reduce the electron carrier molecule NADP to $NADPH_2$. In the second stage, the energy products from the first stage are used to reduce carbon, from carbon dioxide, to a simple sugar. This process converts chemical energy from carrier molecules to forms suitable for transport and storage in the plant.

Photosynthesis, in a basic reference, is the conversion of light energy to chemical energy. In order to start this process, light must first be absorbed. This energy absorption is done by compounds known as pigments, mainly found in the chloroplasts of cells. The relative importance of the pigments is based on the range of the light spectrum being absorbed. This range is known as its' absorption spectrum. Each pigment has a different absorption spectrum and thus, has a different action spectrum. The action spectrum defines the relative effectiveness of different wavelengths on the light requiring processes.

Of all the pigments in the plant, chlorophyll is the principle one involved in photosynthesis. There are several types of chlorophyll, which differ slighly in chemical structure. Chlorophyll A, the primary type of chlorophyll, occurs in all photosynthetic eukaryotes and prokaryotic cyanobacteria.

Chlorophyll B is present in vascular plants, bryophytes and certain other algae types. The absorption spectrum of chlorophyll B, an accessory pigment, is different from chlorophyll A and like all other pigments, serves to extend the usable light spectrum for photosynthesis. When a chlorophyll B molecule absorbs energy, it must transfer it to a chlorophyll A molecule, where it will then be converted to chemical energy.

Chlorophyll C, another accessory pigment, is present in the brown algae and the diatoms.

Two other classes of pigments are involved in light capture; the carotenoids and the phycobilins. These pigments must also transfer their energy to chlorophyll A and may not substitute for it. The carotenoids are red, orange and yellow, fat soluble pigments whose colors are normally masked by the more abundant chlorophyll. They are divided into 2 groups: the carotenes and xanthophylls, and like chlorophyll, are present in the thylakoid membranes of the chlorplasts.

The phycobilins, the third class of pigments, are water soluble and found in the cyanobacteria and the red algae.

These pigments are imbedded in the thylakoids in discrete units called photosystems. All pigments in the photosystem are capable of absorbing photons, but only one chlorophyll molecule in the system can use the energy. This special chlorophyll A molecule is called the reaction center. When the reaction center receives the absorbed energy, one of its' electrons is boosted to a higher energy level and transferred to an acceptor molecule to initiate energy flow.

In currently accepted models of the Light Reactions, two system exist. In Photosystem I, the reaction center has a wavelength absorption peak of 700 nanometers and is called P700. Photosystem II has a reaction center with an absorption peak of 680 nanometers and is called P680.

In the Light Reaction system, light energy trapped in the reaction center, P680, of Photosystem II boosts electron pairs to a higher energy level to a primary electron acceptor. The electrons are then passed along an electron transport chain to a somewhat lower energy level, the P700 reaction center. As they pass along this chain, some of the energy is stored in the form

of ATP. The "excited" electrons removed from the P680 reaction center are replaced by electrons from the splitting of water, releasing protons and oxygen.

Light energy absorbed by Photosystem I boosts the electrons accepted from Photosystem II to another primary electron acceptor. From this acceptor, they are passed via other electron carriers to the coenzyme NADP, resulting in the reduction of NADP to $NADPH_2$. The energy yield from the light ractions is stored in the form of $NADPH_2$ and ATP. Thus, in the presence of light, there is a continuous flow of electrons from water to Photosystem II to Photosystem I to NADP. The NADP is converted to $NADPH_2$, and along with the ATP, provides energy directly to the biosynthetic processes of the plant. The net harvest from the excitement of 12 electron pairs in the light reactions is 12 ATP molecules and 12 $NADPH_2$ molecules.

In the second stage of photosynthesis, the Dark Reactions, the energy from the first stage, $NADPH_2$ and ATP, are used to reduce carbon to sugars. This carbon, available from carbon dioxide, reaches the photosynthetic cells through the stomata of the leaf.

The reduction of carbon dioxide occurs in the stroma of the chloroplasts by means of the Calvin Cycle, also known as the three carbon pathway (C3) because of a three carbon intermediate molecule. The Calvin Cycle begins with the introduction of a single carbon dioxide molecule. It is then attached to the 5 carbon enzyme Ribulose 1,5 Bisphosphate (RuBP). The carbon dioxide is reduced in a series of reactions to give a single carbon atom. The RuBP is regenerated at the end of each cycle to start again and reduce another carbon dioxide molecule. Six turns of the cycle and 6 carbon dioxide molecules are required to produce a single six-carbon sugar.

The Calvin Cycle is not the only carbon fixing system. A second system, the 4-Carbon Pathway, or C4, has a 4-carbon compound oxaloacetate as the first detectable molecule. The C4 fixation system begins in the mesophyll cells. Here the oxaloacetate is formed when carbon dioxide is fixed to phosphoenylpyruvate (PEP), an enzyme which catalyzes the system. The oxaloacetate is quickly converted to malate, which then moves to the bundle sheath cells surrounding the vascular bundles of the leaf. It is then decarboxylated to carbon dioxide and pyruvate. The carbon dioxide enters the Calvin Cycle and is reduced as in the C3 system. The pyruvate returns to the mesophyll cells for regeneration to PEP to reenter the system and fix another carbon dioxide molecule.

One might ask why the C4 pathway evolved such a clumsy and energenically expensive method of providing carbon dioxide to the Calvin Cycle. The C4 pathway is better understood when we learn that the Calvin Cycle is always accompanied by photorespiration, a sequence which consumes oxygen and releases carbon dioxide. Photorespiration yields no energy and may consume up to 50% of the photosynthetically fixed carbon, under normal atmospheric conditions, converting it to carbon dioxide.

However, high carbon dioxide and low oxygen concentrations limit photorespiration. C4 plants have an advantage over C3 plants because of their ability to force carbon dioxide from the mesophyll to the bundle sheath cells, keeping a high carbon dioxide and a low oxygen concentration in the presence of the Calvin Cycle.

C4 plants also are superior utilizers of carbon dioxide because the PEP has a greater affinity for carbon dioxide at lower concentrations than the RuBP of the Calvin Cycle.

The C4 plants evolved in the tropics and are especially well adapted to high light intensities, high temperatures and dryness. The optimal temperature range for C4 plants is higher than for C3, and often C4 plants flourish at temperatures lethal for C3. Because of their more efficient use of carbon dioxide, C4 plants can obtain the same photosynthetic rate as C3, but with smaller stomatal openings and thus, with less water loss.

The difference between C3 and C4 plants can be found on golf courses. C3 grasses, such as Kentucky Bluegrass and Creeping Bentgrass, are often overwhelmed by the C4 plant, Crabgrass, which grows more rapidly in the heat of summer.

A third, and final carbon fixing pathway is the Crassulacean Acid Metabolism (CAM) system found in the succulents. In CAM plants, the carbon dioxide fixation by PEP into C4 compounds occurs at night and then stored. During the following day, the fixed carbon dioxide is transferred to the Calvin Cycle. Like the C3 plants, CAM photosynthesis occurs in the same cell.

CAM plants are largely dependent on carbon dioxide accumulation for photosynthesis at night because the stomata are closed during the day to retard water loss. Obviously, this is advantageous because of the high light intensities and high temperatures that succulents exist in.

No article could ever encompass an indepth look at photosynthesis, however, I hope I have brought back some of the important aspects involved. Our livelihood depends greatly on this process, and an understanding of it is far too important for us to ignore.

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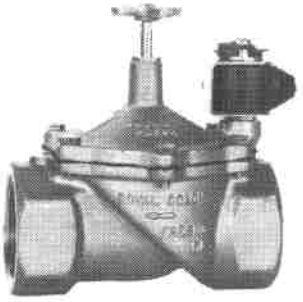

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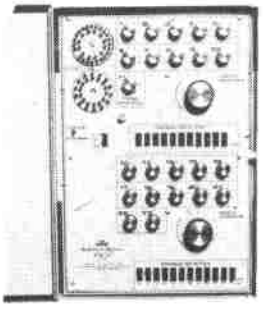

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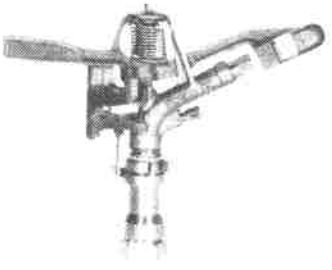

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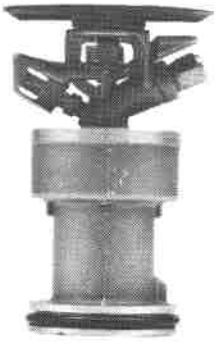

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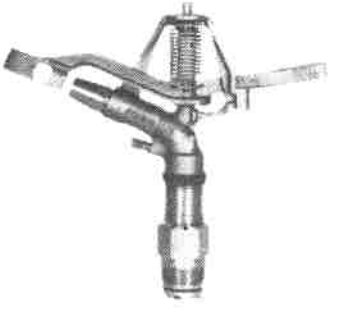

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1956 — 1986

WISCONSIN TURF — FROM HUMBLE BEGINNINGS. . .

By Ralph Christopherson
Founder and President

It was the spring of 1956 when Wisconsin Turf Equipment Corp. of Janesville, Wisconsin was born but the roots of the company stem back to Racine, Wisconsin long before that time. In 1938, I took a job in a small shop in Racine known as Solper Saw Works sharpening saws and sharpening and repairing lawnmowers. I always knew some day I would have my own business but my goal was to become a tool and die maker and someday own a small tool shop. Within one year I really got to enjoy the work in this small shop in which we sharpened saws for most of the contractors, schools, and factories in Racine. The lawnmower sharpening was primarily all hand-mowers with very few power mowers. Racine was a very industrial city and had an excellent, well-equipped vocational school machine shop. During my high school days and a few years after I attended night school. I talked the instructor into letting me rebuild our lawnmower grinder and a few other antiquated grinders. The quality of the work in our shop greatly improved which was immediately reflected in more work.

On May 3, 1941 I took the biggest step of my life. I not only got married, but I purchased the shop and the home which was adjacent to the shop. Frank Solper, owner of the shop, certainly must have had a lot of confidence because all the money we had after buying furniture was $500.00 for a down payment and the balance of the $8,000.00 purchase price he put on a land contract. In those days $7,500.00 was like the national debt. I was very interested in sports and since I had a twin brother the fellows didn't know if it was Ralph or Ray. So I became known as Christy. After purchasing the business I renamed my business "Christy's Saw & Lawnmower Service." In the fall of 1941 our country got involved in World War II. Racine became a real hot bed in attracting war contracts and most of the companies used saws of some sort and I was flooded with work. On top of all the saw work new lawnmowers were impossible to buy so the old ones had to be repaired and sharpened. Help was practically impossible to hire so both my brothers, Ray and Les, helped out on a part-time basis along with a couple other part-time mechanics. The hours were long but it really helped to live next door to your work.

In the spring of 1944 I was called into the service and was lucky enough to get into the Navy. I wound up on the U.S.S. Patuxent, a tanker refueling the Seventh Fleet in the Pacific. Looking back the duty was a memorable one but certainly not a career which I wanted to pursue.

After the war Christy's was reopened in a new location with larger facilities and I took my brothers, Ray and Les, into business as full time partners. The war years stimulated people into raising victory gardens which continued as a hobby after the war. Garden tractors and tillers became very popular, helping to take a lot of the manual labor out of this hobby. Suburban living with large lawns also was a trend which created a demand for power mowers. If Christy's could fix them, Christy's could sell them and sell them we did. After five years of hard work Ray and Les wanted to try some other venture, so Christy's was sold.

I went to work for the Toro distributor in the state as a field serviceman. It didn't take long for the boss to figure out the fella he sent out in the field with a tool box was selling a lot of merchandise and my title was changed from Field Service to Sales Representative. The work was challenging and exciting and I enjoyed it. The turf industry was growing and many business men recognized the power mower and allied products was the beginning of a new industry and wanted to get on the band wagon. Among calling on prospective dealers, establishing a dealer organization and calling on the turf market, I was one busy Dane. With the new products being introduced into the turf market I enjoyed that segment of the

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business the most. Demonstrating many new products such as sod cutters to the landscapers, aerators and then verti-cuts to the golf courses, along with power trimmers to the cemetaries and other new products certainly beat sharpening saws and mowers all day long, and I was satisfied in making the move and selling Christy's. I did this for five years from 1950-1955 and looking back they were certainly enjoyable, educational, satisfying years. But then the old urge that I got when I was only 12 years old, working on a farm, reappeared and I knew I had to get back into my own business. Brother Ray went farming and wasn't making a howling success and wanted to get back into business again, so I picked Janesville as a city to start for many different reasons. Rock County was rated as number five market in the state and was only 30 miles from Dane County which was rated as number two market in the state, and only 20 miles to the south was Winnebago County in Illinois which was also a very good market. Another factor the Worthington Company, a subsidiary of Jacobsen, was building gang mowers and tractors and needed representation in that part of the state. We both sold our homes in Racine, pooled our limited resources, bought our present lot and built a 35' x 50' building.

My wife got the worst end of the deal because after investing practically all our money in the business we had very little left to buy a home. We finally found a small house with a small down payment and moved our family consisting of four children. Thank goodness I spent all of my time working because that house was so small I would have developed claustrophobia. From past experience we knew that service work was a good bread and butter business and eventually led to sales, so we stressed service work. When we embarked on our venture into the turf business, Worthington only had six pieces of equipment in their line consisting of gang mowers, rough mowers (named blitzers), their model F tractor, a model G tractor, a triplex mower and a 3 pt. mounted rotary mower. The Jacobsen Co. only offered a walking greens mower, a park 30", a 24" tee mower and a 26" lawn king besides their homeowner line. These weren't enough products to sell to try to make a living and most of the other turf maintenance tools were represented, so we had to turn to chemicals and fertilizers. There weren't too many companies that had products for the turf market at that time but we acquired those that were available. To sell these products you had to have a knowledge of grass so I attended every educational meeting available to learn more about turf. Companies such as Northrup King, I.M.C. Fertilizer, Nitro-form and their agronomist—Fred Grau, Mallinckrodt and Milorganite were all very helpful and had excellent educational meetings. Most of the superintendents during the 50's and early 60's were self-educated men and any knowledge I could offer was as welcome as water to a thirsty man in the desert.

Beside our service department and limited turf products to sell we also had a retail department selling mowers, tillers, garden supplies, etc. to the local homeowner trade. A year ago we phased that department out to make more room for our growing turf market.

The first two years of business were **very** tough and it was the service department that was responsible for putting bread on the table. I believe that is one of the reasons our service department today is regarded as a very important phase of our business. The first few years our company consisted of only five people—my brother, Ray; myself; my father-in-law, Bill Hansen; Preacher Thornton, who was an excellent mechanic; and Leone Lowe. I was making calls in our $85.00, ¾ ton Dodge truck which left me stranded on the road many times while Brother Ray took

Curt Larson, General Manager, Corporate Treasurer.

Jerry Jensen

Field day at Blackhawk Park.