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James B Beard: The Father of Contemporary Turfgrass Science

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ABSTRACT

James B Beard (24 Sept 1935 to 8 May 2018) can rightly be considered the “Father” of contemporary turfgrass science. During his career, he was known for setting a standard that provided the foundation for turfgrass science through his thorough approach to research, teaching, mentoring and communications. The books he published outlined a vision for an evolving scientific discipline. He trained and mentored >45 domestic and international doctoral and master students and numerous post-doctoral trainees, who in turn continued to raise the quality of contemporary turfgrass science in the USA and internationally. He led the effort to change the name of Division C-5 of the Crop Science Society of America (CSSA) from Turfgrass to Turfgrass Science, making C-5 an important and a vital part of the society. His subsequent rigorous education and mentoring of others continued to strengthen the division. He recognized the importance of quality, peer-reviewed science and the need for C-5 to be represented on the Crop Science Journal (CSJ) Editorial Board to expedite this goal. His leadership and encouragement led to the creation of a C-5 Technical Editor

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position on the CSJ Editorial Board in 2002. Beard provided the vision and worked with other leaders worldwide to develop the International Turfgrass Society (ITS) and the ITS Research Journal. The ITS and its leaders and members have been instrumental in enhancing turfgrass science internationally. Beard's leadership, along with others in turfgrass academia and industry, resulted in the USGA Turfgrass and Environmental Research Program that provides a competitive grant-fund source for turfgrass research. Beard appreciated and vigorously studied history and contributions to turfgrass science by those who went before us. He leaves behind a legacy in science that deserves recognition and respect. It is our hope that this synopsis of Beard's career accomplishments will inspire present and future turfgrass scientists to follow in his footsteps.

INTRODUCTION

James B Beard was born 24 September 1935 in Bradford, Ohio and grew up on a crop and livestock production farm. In his youth he developed a strong work ethic, an appreciation for growing plants, and an interest in the discipline of Agronomy. Beard set high standards for himself as a student. He received his Bachelor of Science degree in Agronomy from Ohio State University in 1957, graduating *Summa Cum Laude*. He earned his Master of Science degree in 1959 majoring in Crop Ecology and Doctor of Philosophy degree in 1961 majoring in Turfgrass Physiology at Purdue University. He received a National Science Foundation (NSF) Fellowship for graduate students, a highly competitive award for individuals interested in science, and at the time, one rarely awarded to agricultural science students (Shearman, 2000). Jim married Harriet in 1955. Their marriage was the beginning of a strong family bond and a partnership in which Harriet played many important roles behind the scene, including typing every manuscript he ever wrote (Trusty, 2017).

From the beginning of Beard's career at Michigan State University (MSU) in 1961, it was evident that he possessed a strong drive to ensure his research, teaching, outreach and mentoring efforts were conducted at a high level of efficacy and productivity. He progressed rapidly through

the academic ranks at MSU, achieving the rank of Professor in 10 years (Shearman, 2000). In 1969, Beard received a Post-Doctoral Fellowship from the National Science Foundation (One of only 200 individuals among all sciences nationwide to receive this honor) (Beard, 2015). During a year-long study, he sharpened his basic science knowledge of plant biochemistry and physiology at the University of California-Riverside. This experience provided much of the impetus for his research and outreach contributions in water use and conservation, drought resistance, wear tolerance mechanisms, temperature stress relationships, shade tolerance and adaptation, root growth and development, and other environmental stress studies that he conducted during the remainder of his career (Shearman, 2000).

In 1975, Beard made a major career shift, when he accepted a position in the Soil and Crop Sciences Department at Texas A & M University (TAMU). This shift further intensified his drive to raise the bar for turfgrass science. He viewed his new position as an opportunity to expand his understanding and knowledge of warm season turfgrasses, and gain practical experience managing these species. Beard remained at TAMU until he retired from academia in 1992. Upon his retirement, he maintained Professor Emeritus status at TAMU in the Soil and Crop Sciences Department, and he also began a new career as President and Chief Scientist of the International Sports Turf Institute (ISTI). At ISTI, he guided international research and education programs, conducted seminars and workshops, and provided technical support for turfgrass environmental, management and construction issues (Shearman, 2000).

Throughout his career, Beard demonstrated a propensity for written and oral communication skills, writing nine books and >1300 refereed, technical and popular manuscripts; and conducted frequent workshops, seminars and oral presentations (Beard, 1973; Beard et al., 1977; Beard, 2015; Shearman, 2000; Turfgrass Information Center, 2020). He trained >45 graduate students and numerous undergraduate students, many of whom went on to contribute as leaders in national and international turfgrass academic and industry positions (Fig. 2). Beard encouraged and

mentored his colleagues and students to take on leadership responsibilities in their professional societies, industry organizations, and communities, in a continuing effort to raise the bar of turfgrass science as a discipline (Shearman, 2006).

In 1965, Beard recognized a need for improved awareness and communications regarding turfgrass science on an international basis. He made contacts with several international societies proposing a turfgrass science section in their societies. These inquiries met with little or no interest. At the Crop Science Society of America (CSSA) meeting in 1966, Beard made a proposal to the CSSA Division C-5 members to develop a non-affiliated international turfgrass conference. His proposal was approved and Beard was charged with leading a committee (Other members: J.R. Escritt, B. Langvad, and J.R. Watson) in forming an international turfgrass organization (Beard and Gibbs, 2017). The first International Turfgrass Research Conference (ITRC) was held in 1969 at Harrogate, England, UK, and at that meeting the International Turfgrass Society (ITS) was formed and it was decided that an ITRC would be held at 4-year intervals. Thanks to Beard's foresight, ITS has been very successful in encouraging turfgrass science research and teaching and promoting communication and exchange of ideas among international turfgrass researchers. The first ITRC had 78 participants with subsequent meetings ranging from 155 in Chile (2009) to 814 in Japan (1989) (Beard and Gibbs, 2017). The next conference is scheduled for July 2021 in Copenhagen, Denmark (<http://turf society.com/>)

From the early 1960s to 1983, funds for turfgrass research were limited and placed restrictions on researchers' abilities to address more fundamental issues of turfgrass science (Huffine and Grau, 1969; Roberts et al., 1992), but in 1983 that changed. Beard recognized the need for sustained grant funding and led efforts, working with a number of academic and industry colleagues, to develop a research initiative supported by the United States Golf Association (USGA) (Shearman, 2006). Since its inception in 1983, the USGA Turfgrass and Environment Research Initiative has funded 772 research projects with about \$41 million invested in developing new

turfgrasses, improved management approaches and enhanced understanding of environmental issues since its inception in 1983 (USGA, 2020). This funding has played a major role in strengthening turfgrass science as a discipline.

Beard recognized that one way to elevate turfgrass science as a discipline was to improve its prestige among peers within the Crop Science Society of America (CSSA). He worked diligently to increase the contributions of turfgrass science to CSSA. Firstly, he provided leadership to change Division C-5's name from Turfgrass Management to Turfgrass Science (Shearman, 2006). He also encouraged colleagues and trained students to be involved in the leadership of the society and to strengthen the science in their presentation at national meetings. Early in this process, turfgrass research manuscripts were often directed to the Agronomy Journal rather than Crop Science, the flagship journal for CSSA. Beard identified this situation and the impact it had on Division C-5's recognition and esteem among its peers within CSSA. He promoted Division C-5 to enhance its image by publishing quality, peer-reviewed science and by encouraging the CSSA editors to publish turfgrass manuscripts in Crop Science Journal (CSJ). Through his leadership, a C-5 Technical Editor was added to the Crop Science Editorial Board in 2002 (Shearman, 2006). In 2020, Turfgrass Science (Division C-5) is recognized as a leader within the Tri-Societies (Agronomy Society of America, Crop Science Society of America, and Soil Science Society of America) and among the divisions of CSSA.

Beard's career has been well documented in the turfgrass literature (Mascaro, 1994; Shearman, 2000; Widder, 2003; Trusty, 2017; McMaugh, 2018). For his hard work and dedication, Beard received many honors and awards from prestigious institutions, professional societies, and organizations, recognizing his many accomplishments and contributions during his career (Beard, 2015; Shearman, 2000; Shearman, 2006). In addition, he received many awards from turfgrass industry organizations, and state turfgrass associations, that recognized his practical contributions and distinguished service to the turfgrass industry (Beard, 2015; Shearman, 2000; Trusty, 2017). In 2003, the dedication of the James B Beard Turfgrass Collection and Room at the Michigan State

University Library provided opportunity for further scholarly study of this extraordinary person as an innovator, leader, mentor and scholar.

A VISION OF AN EVOLVING DISCIPLINE

Throughout his career, Beard pursued a book publication process that reflected his systematic and carefully-considered view of the nature and, perhaps more importantly, perceived needs of a young, but rapidly evolving discipline. Each work that he published was a cumulative component of the foundation for turfgrass science as he saw it. Across nine categories, and six decades, those publications range from the treatise on the front end (Beard, 1973) to most recently a full-scale, site-specific case study (Beard et al., In Press). The sequence of his publications chronologically is relatively easy to map in retrospect (Fig. 3), but it had to have been difficult to execute from the outset as a writing strategy. Seemingly, Beard was developing scholarly content that was both marketable and functional in laying the ground work for an evolving turfgrass science discipline. There had been a limited number of textbook-like works written in the 20th century, relating to scientific turfgrass culture. *Turf for Golf Courses* (Piper and Oakley, 1917) was one of the more notable of these works. The publication of *Turfgrass: Science and Culture* (Beard, 1973) defined the discipline at that point in time. Beard's treatise objective was to inventory, review, synthesize, and summarize the history of turfgrass science written to that date and to publish a book for persons involved in turfgrass science to use as a reference guide. Compiling the turfgrass literature up to that point in time was challenging because the literature was scattered among disciplines, including crop and soil sciences, horticulture, landscape architecture, plant biology, sports, and agriculture more broadly, and because most library holdings of turfgrass literature were very limited. Beard spend long hours in the MSU Library working late into the night and early morning hours gathering, sorting and assessing the available literature. The subsequent publication, *Turfgrass: Science and Culture* (Beard, 1973) has never been replicated under a single authorship within the science, and probably is the single most cited work within the turfgrass literature. The

literature assessment required to produce *Turfgrass: Science and Culture* resulted in thousands of sources beyond those ultimately cited in the treatise. These sources that were not included in *Turfgrass: Science and Culture* were subsequently published in the *Turfgrass Bibliography* (Beard et al., 1977) which received the Oberly Award from the American Library Association, being recognized as the finest produced bibliography in Agriculture. The bibliography included a subject index that provided access to over 16,000 scientific, professional, and trade publications published between 1672 and 1972. Given the limitations of the tools, technology, and resources available at the time, the bibliography is an extraordinary piece of work for a practicing academic scientist to have compiled and published.

Eager to provide sound science-based advice to the non-professional turf manager, Beard published *How to Have a Beautiful Lawn: Easy Steps in Turfgrass Establishment and Care for Aesthetic and Recreational Purposes* (Beard, 1975). This publication was subsequently revised and updated through five editions, the last in 1993 (Beard, 1979; 1983; 1988; 1993). In 1979, *Introduction to Turfgrass Science and Culture: Laboratory Exercises* was published, filling the need for another component of a functional science literature (Beard et al., 1979). This laboratory handbook has been used in turfgrass curricula on a world-wide basis.

Beard published *Turf Management for Golf Courses* with the support of the USGA (Beard, 1982), a professional handbook that converted science into the practicum. This publication continued the USGA's book publication commitment, starting with *Turf for Golf Courses* (Piper and Oakley, 1917), and *Turf Management* (Musser, 1950 and 1962). *Turf Management for Golf Courses* received extensive editorial review and input by the agronomic staff of the USGA Green Section. This publication detailed construction and management guidance aimed at golf course superintendents, and quickly became the standard handbook in the field. A second, fully-revised edition was published with even more extensive review than the first edition. It also received input from USGA

agronomic staff members and several turfgrass scientists prior to its release (Beard, 2002). When Beard published the *Turfgrass Encyclopedia for Golf Courses, Grounds, Lawns, Sports Fields* (Beard and Beard, 2005), he described it as an A-Z updating and reformatting of *Turfgrass: Science and Culture*. In the Encyclopedia, he made extensive use of list-tables, one of his favorite presentation formats. Utilizing the alphabetic format permitted easier cumulative expansion of the work, which ranges across all aspects of the discipline and quickly became a standard reference for the discipline.

In the mid-1990s, Beard guided the translation from Japanese to English of a book about turfgrass diseases authored by Toshikazu Tani. He felt the book had excellent potential as a reference on turfgrass disease characteristics, and after modification and refinement the book was published as the *Color Atlas of Turfgrass Diseases: Disease Characteristics and Control* (Tani et al., 1997).

Turfgrass History and Literature: Lawns, Sports, and Golf was published in 2014 (Beard et al., 2014). This publication included a narrative format reviews of components of the discipline and industry, as well as an extensive, annotated bibliography of the turfgrass science literature, and biographical profiles of nearly every author publishing in the turfgrass literature from the 1800s to 2014. This volume also received the Oberly Award, and the Beards became the only two-time recipients of that honor (i.e. first award was in 1977 for *Turfgrass Bibliography*). *Turfgrass History and Literature: Lawns, Sports, and Golf* is a staggering piece of scholarly work that might have appeared even more inclusive and extensive had it not been repeatedly edited and reorganized to fit in a single printed volume. This publication does nothing less than define, evaluate, highlight, and create a timeline of the turfgrass science literature as it developed and evolved within the broader historical context of turfgrass research, education, management, industry and organizations. It is a defining work, almost beyond the ability of the discipline to absorb. Work on this book, as with many of Beard's other books, was continuous and cumulative over the entirety of his career. Early

partial manuscript copies of the content were extremely useful in turfgrass collection development efforts at the Michigan State University Libraries thirty years prior to the book's release.

Beard's final large-scale monographic effort likewise was a long-term project and one which has not yet appeared in print. The text of *The Green at St. Andrews Links: An Annotated and Pictorial History* was completed by the time of Beard's passing, but the work is not yet available. It provides a case study of the Old Course at St. Andrews' evolution and of turfgrass management practices. Interestingly, Beard finishes his chronology of the turfgrass science discipline with St. Andrews, where it all began!

From 1973 to present day, these aforementioned books in composite have been cited more than 3000 times.

OTHER WORKS

There were a number of unpublished and unrealized works started at various points during Beard's career. They included a corporate history of the Scotts Company that was intended for a broader audience than turfgrass scientist. In addition, a collected work of case studies for the sports turf sector and a weed atlas were considered. Particularly of note by its absence from his sequence of writing contributions was an undergraduate textbook. *Turfgrass: Science and Culture* was used by many educators to fill this void, but as previously described, it was intended as a reference volume and not as a textbook. A second edition of *Turfgrass: Science and Culture* was among his unfinished work. Revisions for a second edition began in the 1970s, and were sporadically restarted through the 2010s. Beard often stated that he felt the *Turfgrass Encyclopedia* (2005) was in many ways a restructured update of *Turfgrass: Science and Culture*, but his hopes for the extended narrative format of a second edition was never completed. Arguably, the discipline of turfgrass science had likely evolved in complexity and diversity by the early 1980s beyond the capability of a single author

to realistically distill and compile an exhaustive treatise as the one done with the first edition of *Turfgrass: Science and Culture*.

OVERALL PUBLICATION RECORD

Over the course of his career, James B Beard was a prodigious writer, reporting in a wide range of outlets and writing for an equally wide range of audiences. As of 2019, Beard's publications totaled 1,341 for authored and co-authored articles (Turfgrass Information Center, 2020). This total likely approaches his total publication activity, including peer-reviewed research, other reports (preliminary or final) of original research, conference proceedings, technical, trade and professional outlets, extension materials, and books and book chapters. He was a diligent task master particularly when it came to developing the writing skills of his graduate students, and he encouraged them throughout their careers to share their research findings in peer-reviewed journals, proceedings, and trade publications.

As may or may not be evident, Harriet Beard worked alongside her husband throughout his career and played an essential role in the ongoing production of written and other professional materials (Fig. 4) She was formally listed as a co-author or co-editor on the Bibliography (1977), the Disease Atlas (1997), the Encyclopedia (2005), the History (2014), and the Case Study (202x). Her role was often under-recognized (though certainly not by Jim), but was so essential to the continued productivity of 'the team' (Miller, 2011; Shearman, 2000; Trusty, 2017). In a broader sense, Beard always framed his works as, "the Books of James B Beard and Colleagues" (Fig. 5).

THE COLLECTIONS

Early in his career, Beard recognized that libraries, even those at land-grant institutions, had minimized turfgrass literature in their collections. The turfgrass resource scarcity found in most

libraries was likely due to those resources being viewed as niche items not seen to be of broad interest (Cookingham, 2001). Knowing he intended to survey the turfgrass literature, Beard first began to aggressively build a collection of his own for personal use, and later on to develop an active working relationship with the MSU Libraries. The former would eventually become the world's strongest private collection of turfgrass literature and the latter the world's most extensive public collection. Both are now fortunately together at the MSU Libraries as the O. J. Noer Memorial Turfgrass Collection and the James B Beard Turfgrass Library Collection (Widder, 2003). In 1966, following discussions with the leadership of the O. J. Noer Research Foundation, Beard advocated for MSU to receive the personal library of O. J. Noer, who had passed away that same year. Noer, who was a turfgrass industry leader from the 1920s until his death in 1966, had compiled many of the early turf-related research reports conference proceedings, and periodicals from across the industry. Beard enlisted the support of Dr. Richard E. Chapin, then Director of the MSU Libraries, who agreed to house and process those materials at MSU, and to continue to build the collection going forward. Following 1968, when the original Noer Collection arrived at MSU, all previously acquired turf-related materials, as well as subsequent acquisitions, whether by purchase or donation, were designated as being a part of the O. J. Noer Collection. The Noer Collection led directly to the development of the online work of the MSU Libraries' Turfgrass Information Center in 1984, and continues to serve the worldwide turfgrass audience via the Turfgrass Information File (TGIF) database (Kenna, 2020). The TGIF is now the primary international documentation resource within the discipline. Continuing donations by the Beards, as well as others, resulted in the growth and strengthening of the Beard Collection between 2003 and Beard's death in 2018. Subsequently, the remaining portion of Beard's personal collection was received at MSU, and are just now being processed. They include substantial archival and image content from Beard's career. Both the Noer and Beard Collections represent a living memorial to the discipline itself. It is highly unlikely that subsequent events would have culminated as they did without Beard's fundamental interest and

driving force, as well as, his ongoing support and advocacy to the turfgrass bibliographic work at MSU.

THE IMPACT OF BEARD'S SCHOLARLY WORK

Beard's scholarly activities, accomplishments, and contributions have markedly influenced the discipline of turfgrass science as we know it today. In addition, many of his research findings and scholarly works have become basic and commonly accepted cultural practices in today's turfgrass industry. Given the evolving discipline and the need to address numerous aspects of turfgrass physiology and management, Beard published papers on essentially every turfgrass species and management system known.

To numerically quantify the impact within the scientific community and outreach to the public at large of Beard's writings, select publications are listed in Table 1 and are referenced in the Literature Cited section of this manuscript. Citation analysis involves counting the number of times a scientific article is cited by other works to measure the impact of a publication or author. This approach has limitations due to the fact that there is no single citation analysis tools that collects all publications and their cited references. Scientific disciplines like chemistry, biology, physics, and social sciences like philosophy and sociology have a long history of academic publication venues. To a lesser extent, this is true of agronomy and horticultural disciplines. Web of Science (<http://webofknowledge.com>) provides citation counts for articles indexed within it. It indexes over 10,000 journals in the arts, humanities, sciences, and social sciences. While Web of Science includes journals like Crop Science, Agronomy Journal, Weed Science etc., its database does not include The International Turfgrass Society Research Journal, Crop Forage and Turfgrass Management (CFTM), or trade/organization journals common to turfgrass science. Scopus (<https://www.scopus.com/home.uri>) provides citation counts for articles indexed within it. Scopus

does include traditional agronomy and horticulture journals, including CFTM but not The International Turfgrass Society Research Journal nor less academic publications. Google Scholar (<https://scholar.google.com/>) may find more cited references than Web of Science or Scopus because overall, Google Scholar indexes more journals and more publication types than other databases. Google Scholar is much more inclusive of turfgrass specific periodicals than Scopus and Web of Science. For our purposes, Web of Science and Scopus were not viable options for assessing the impact of Beard's publications. To measure the impact of a select group of Beard's publications (Table 1), we started with Google Scholar to measure initial citations and then quantified, with Google Scholar, next generation citations, defined as citations generated from the papers citing the original Beard publication. Given the applied nature of much of the Beard scientific portfolio and the subsequent end-user adoption of science-based management practices, we used key word searches in Google (<https://google.com/>) to further elucidate the impact and reach of Beard publications (Table 1). The foundational impact of Beard's scientific publications is evident in the number of direct citations of this short list of scientific publications coupled with the citations described as second generation. The Google data base search, with a few key phrases accentuates the capacity of his work to be relevant and adopted to the primary consumers of the turfgrass science discipline.

It is difficult to highlight an individual component of Beard's extensive research and outreach outcomes as more significant than others. As an example, Beard devoted about one third of his academic career to the study of turfgrass water use and management, water conservation and drought resistance mechanisms (Beard, 1989). Much of this work was orchestrated from his investigations of individual plant and turfgrass systems assessments under different environmental and soil conditions. His initial studies determined turfgrass water use rates through evapotranspiration (ET) measurements of turfgrasses growing in gravimetric lysimeters when soil moisture was not limited. These values thus were referenced in the literature as the water use rate (ET_{grass}) of various turfgrass species in mm/day (Beard, 1985). When the ET_{grass} values were summed

by time, these values were then referenced as the Consumptive Water Use (CWU), provided in terms of mm per week, month or season. Such field experiments demonstrated that ET_{grass} differed among and between C_3 and C_4 turfgrass species, within cultivars of species, by cultural practices, within environments, and by geographic regions (Beard, 1985; Johns et al., 1983; Kim and Beard, 1988). These studies benefitted turfgrass managers, water providers and water regulating agencies to better estimate the volume of water required to maintain turfgrass systems. These initial results also provided additional insight into further study of germplasm that demonstrated variation in ET_{grass} , CWU, and other desirable reduced water use characteristics. For the applied irrigation manager, Beard would also compare the water use of turfs with the immediate and corresponding atmospheric demand for reference evapotranspiration (ET_o). The ratio of ET_{grass}/ET_o is referred to as the crop coefficient or Kc value. Turfgrasses that have lower ET_{grass} for a given reference ET_o have a lower Kc value compared to turfgrasses that have higher ET_{grass} values under the same atmospheric conditions. The determination of turfgrass Kc values for multiple turfgrass species simplified “ET based irrigation” for the end user. Thus, $ET_o \times Kc$ = the estimated water use and can be applied effectively to control daily irrigation run times automatically in order to apply the targeted amount of irrigation water, resulting in water conservation through ET_o - Kc based irrigation. Before this research, irrigation scheduling was often simply based on turfgrass appearance, with irrigation run times adjusted monthly at best.

Beard’s turfgrass water use and conservation studies also evaluated plant physiological responses and management considerations for turfgrasses receiving irrigation at less than optimal Kc values for well-watered turfs. He used research protocols as applying irrigation at incremental ET_o values less than optimum Kc values using a fixed-time schedule or applying irrigation at measurable plant or soil moisture stress increments. He also studied irrigation effects based on regularly scheduled applications made at less than CWU, when the turfgrasses exhibited measurable stress or a critical soil water content was reached (Beard, 1989). Beard stressed the need for clarity in

terminology when reporting results from such studies. He published terminology pertaining to turfgrass water use, physiological mechanisms, and drought resistance that were adopted by the American Society of Agronomy (ASA). They serve as a template for reporting, interpreting and discussing results relative to turfgrass water use and drought stress. These mechanisms laid forth by Beard led to new discoveries and techniques used in defining physiological pathways and elucidation techniques for modern genetic identification and quantification methods. For example, aquaporins have been found in tall fescue and dehydrins have been linked to stress responses in bermudagrass species. More recent studies developed in the last 20 years allow for the identification and quantification of plant genes, gene sequences and phylogenetic relationships within and between turfgrass species and cultivars relative to drought resistance in C₃ and C₄ turfgrass species. These findings can be linked to specific drought resistance mechanisms as defined by Beard and were adopted by the ASA as accepted terminology.

OUR DISCIPLINE'S ROOTS

No pun intended! Sometimes it's important to remember our roots. Beard not only studied turfgrass roots, he established our discipline in a firm rooting media of science. A discipline that all future generations of turfgrass scholars will have an opportunity to enhance. It is our hope that this synopsis of Beard's contributions and accomplishments will inspire present and future turfgrass scientists to follow in his footsteps. We believe James B Beard is truly worthy of recognition as the "Father of Contemporary Turfgrass Science".

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Figure 1. James B Beard (24 Sept 1935 to 8 May 2018) can rightly be considered the “Father” of contemporary turfgrass science.

Figure 1.



Figure 2. Beard advised, mentored, and trained >45 graduate and numerous undergraduate students during his academic career. Many of these students became leaders in national and international turfgrass academic and industry positions. (Front row L-R: J.E. Kaufmann, A.J. Turgeon, J.W. King, J.B. Beard, unknown, R.N. Carrow; Back row L-R: R.C. Shearman, unknown, D.P. Martin, J.V. Krans)

Figure 2.



Figure 3. Chronology of James B Beard's publication record during an academic and professional career spanning 1961-2018. A-Major Works. B-Composite List of all publication types, excluding major works, by year.

Figure 3.

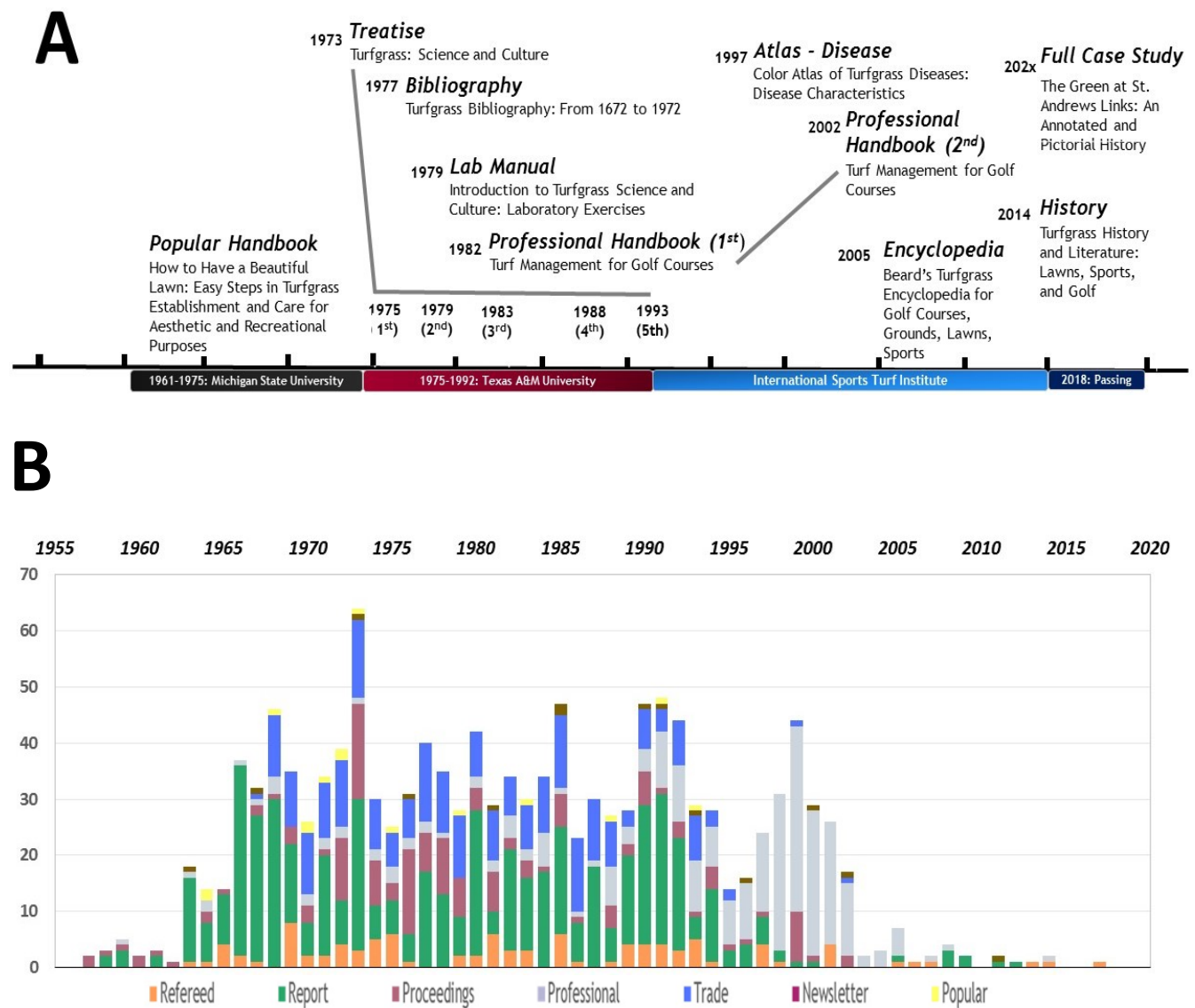


Figure 4. Harriet Beard worked alongside Jim, her husband of more than 60 years, throughout his career and played an essential role in the production of his written materials and other professional activities.

Figure 4.



Figure 5. Beard believed in a team approach for research, teaching and outreach efforts. Pictured are members of an early Michigan State University Turfgrass team (Front row L-R: P.E. Rieke, J.M. Vargas, J. B Beard, and K.T. Payne; Back row L-R: R.C. Shearman, D.P. Martin, J.F. Wilkinson, J.E. Bogart, and J.E. Kaufmann).

Figure 5.

