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Biography of Edward Yataro Hosaka (1906–1961), Botanist and Agronomist in Hawai'i

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Biography of Edward Yataro Hosaka (1906–1961), Botanist and Agronomist in Hawai‘i

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Abstract: Edward Yataro Hosaka (1906–1961) was a botanist and agronomist who made significant contributions in Hawai‘i and beyond during the first half of the Twentieth Century. A biographical account of Hosaka’s life was compiled using a combination of primary and secondary sources including but not limited to Hosaka’s publications, herbarium specimens, and interviews with his surviving family members. Born on O‘ahu and raised in Kīpapa Gulch, Edward Hosaka pursued undergraduate and graduate degrees from the University of Hawai‘i before splitting his professional career between the Bishop Museum and the Hawaii Agricultural Experiment Station. At these institutions he made significant impacts on plant taxonomy and pasture development in Hawai‘i. He was engaged in a large amount of public outreach and was recognized as an expert on tropical agriculture worldwide. Hosaka was also an avid fisherman and published the classic *Sport Fishing in Hawaii* in 1944. His contributions to plant taxonomy and tropical agronomy continue to impact these fields.

INTRODUCTION

The Hawaiian Islands are home to an incredibly diverse biota that has been shaped and studied by an incredibly diverse group of people. The son of Japanese immigrants to Hawai‘i, Edward Yataro Hosaka was part of the Hawaiian Nisei generation. This second-generation of Japanese immigrants would help to chart the future of culture, politics, and science in Hawai‘i. Edward Hosaka would develop a career that expanded the knowledge of the Hawaiian flora, reflected on Pacific cultural practices, provided food security for Hawai‘i residents, and served as the voice of Hawaiian agronomy on the world stage.

METHODOLOGY

A biographical account of Edward Yataro Hosaka’s life was compiled using a variety of primary and secondary sources. Primary sources included Edward Hosaka’s scientific publications, books, bulletins, and circulars. Hosaka’s unpublished work, including his 1935 master’s thesis, undergraduate papers, field notes, letters, and natural history collections were also reviewed. Interviews with Edward Hosaka’s family (Donald Hosaka, Melvin Hosaka, Helen Hosaka, Jeri Hosaka, Donna Hosaka Leong, Scott Hosaka, and Yukari Hosaka) were conducted on 26 June 2023, to both discuss Edward Hosaka’s personal and professional life and to inform his family on the scope of research being conducted. Employment records, oral histories, and census data from the Territory and State of Hawai‘i were also reviewed. Primary sources were obtained through online databases and through the archives of the Bishop Museum, the University of Florida, the University of Hawai‘i, and the Smithsonian Institution.

A variety of secondary sources were consulted. Newspaper articles and books highighting Hosaka’s personal and professional life were reviewed. Harold St. John’s un-

published *History of Hawaiian Botany* (St. John n.d.) also provided invaluable information about Hosaka's life. The author also held discussions with Barbara Kennedy, Clyde Imada, Arnold Suzumoto, and Jaynee Kim, collection staff at the Bishop Museum, to gain a greater perspective on the impact of Edward Hosaka on their natural history collections. Additional conversations about Hosaka were held with Dr. Billy Bergin of the Paniolo Preservation Society.

The scope of Edward Hosaka's natural history collections and taxonomic research were evaluated on several online herbaria. Hosaka's natural history collections were attributed to him on the biodiversity website Bionomia.com. The author attributed specimens to Hosaka if he was listed as any level of collector (first, second, third, etc.) on the Bionomia website. Specimens were not attributed to Edward Hosaka if they had collection information that was incorrectly attributed to a date before Hosaka's birth year (1906), after his year of death (1961) or if they appeared to be in a year when he was not making plant collections professionally (pre-1928). Specimens without a year associated with them were attributed to Hosaka. Counts of currently accepted taxa that were named by or for Hosaka were made on the Bishop Museum's *Plants of Hawai'i* (2023) website by using the search word "Hosaka" for those taxa that Hosaka authored and the search words "hosakae", "hosakai", "hosakanum", and "hosakana" for those taxa named in honor of Hosaka.. Taxonomic names were updated to their currently accepted names as indexed on the Bishop Museum's *Plants of Hawai'i* (2023) website or The Royal Botanic Garden Kew's Plants of the World Online (2024).

BIOGRAPHY

Early Life and Education

Edward Yataro Hosaka was born on 25 March 1906, in Waipi'o, O'ahu (Employment Record, n.d.). Hosaka's father Yahei Hosaka and mother Shimano Tanaka (St. John, n.d.) immigrated separately from Japan to Hawai'i, both from the Fukuoka region of Japan (Helen Hosaka, pers. comm.). Harold St. John described Hosaka's father as an independent pineapple farmer "who settled in 1908 in Kīpapa Gulch, Waipi'o on the valley floor 3.5 miles upstream from the bridge on the old paved territorial highway" (1947). Kīpapa Gulch is one of the largest gulches on O'ahu (Hosaka 1937) and extends from the Ko'olau mountains southwest towards Pearl Harbor. In his master's thesis Hosaka (1935, 1937a) provides a history of recent human occupation of Kīpapa Gulch that was likely informed from his own experiences. He commented that the region of Kīpapa Gulch closest to Pearl Harbor contains level alluvial land, "the larger portion of this is utilized for rice growing. There are several fishponds … and small patches of taro fields and vegetable gardens along the fringe of the rice fields" (Hosaka 1937a). Humans moved into the gulch in waves, starting with pineapple growers in 1908 and migrants from sugar plantations who came to the gulch to make charcoal (Hosaka 1935). The northeastern portions of the gulch were planted in sugar cane, pineapple, and truck crops (Hosaka 1937a). Hosaka grew up on and worked on a pineapple farm in Kīpapa Gulch (St. John & Hosaka 1932). In his spare time he would hunt pheasants and wild pigs (Dunn-Rankin 1987).

Hosaka's primary education took place at several institutions. St. John (n.d.) mentions that Edward Hosaka went to school in Ka'a'awa. He may have been referring to the Ka'a'awa Nipponjin Shōgakkō, one of many Japanese-Language schools on O'ahu at that time (Ethnic Studies Program 1977). Families from across O'ahu would send their

children to the school to learn Japanese, as many were predominantly speaking English in Hawai‘i (Ethnic Studies Program 1977). Employment records at the Bishop Museum also indicate that Edward Hosaka attended the Ka‘iulani School (Employment Record n.d.). One of Hosaka’s friends at Ka‘iulani was Herb Leong (Dunn-Rankin 1987). The two of them would develop a friendship, involving fishing whenever they could, that lasted into their adulthood.

Hosaka attended President William McKinley High School in Honolulu (Employment Record n.d.). While there he was part of a group of students who helped to organize a Japanese Orchestra that played strictly classical music (Anonymous 1927a). This orchestra was conducted by a former member of the Honolulu Symphony Orchestra and was organized to counteract youth’s interest in jazz music (Anonymous 1927a). Hosaka would also play in the band as part of McKinley’s R.O.T.C. program (Anonymous 1927b). He graduated from High School in 1927 (Anonymous 1927c).

Undergraduate Career

Hosaka enrolled at the University of Hawai‘i (UH) in 1927 where he studied agriculture (UH 1930) and botany (St. John n.d.). Hosaka enrolled in Harold St. John’s plant taxonomy course the first year that he had joined the faculty at UH (St. John n.d.). St. John (n.d.) mentioned that Hosaka was a plant lover upon his enrollment and was an eager student. While an undergrad, Hosaka wrote a paper entitled *The Problems of Forestry and the Work in Progress Toward Reforestation in the Territory of Hawaii* (Hosaka 1930). This unpublished undergraduate work acknowledged the impact of humans on forests in Hawai‘i, with special emphasis on the role of forests in helping to protect watersheds. He put Hawai‘i’s forests in context of global forest management practices and discussed the role of the Agricultural Extension Service in helping reforestation (Hosaka 1930). This work was comprehensive enough to be cited in *Public Land Policy in Hawaii: The Multiple-Use Approach*, a Legislative Reference Bureau publication from the University of Hawai‘i (Frame & Horwitz 1965). An additional undergraduate paper from 1931, *History of the Hawaiian Forest*, provides a comprehensive review of early accounts of Hawaiian forests by explorers and residents (Hosaka 1931). Outside of his academic work Hosaka was a member of the Aggie Club, Band, the Swim Team, Track Team, and the fraternity Alpha Beta (UH 1931).

In 1930, Hosaka participated in a trip to Kaua‘i with Harold St. John over the winter break. Hosaka and ten other students sailed from O‘ahu to Nawiliwili Harbor on 25 December with St. John and his mother (Anonymous 1930). The path of their trip can be reconstructed from herbarium specimens on deposit in global herbaria which carry the title “University of Hawaii and Bishop Museum Expedition”, although labels with this title were also used for subsequent field trips conducted by St. John. From 26 through 29 December 1930, the group stayed at a cabin in Koke‘e (St. John 1987) and collected in the Nā Pali-Kona Forest reserve, the Alaka‘i Swamp, and the surrounding area. The group then traveled to Hā‘ena from 31 December through 4 January, where they camped at a Boy Scout Camp (St. John 1987) and continued to collect at Hanakāpī‘ai Valley, Wainiha Valley, and Lumaha‘i. This field trip was likely Hosaka’s first interisland excursion, and certainly his first botanical expedition.

Soon after Hosaka’s Kaua‘i field trip he approached St. John with an idea of making drawings of weeds (St. John n.d.). St. John encouraged him in this effort, and Hosaka began botanical studies of pineapple fields of O‘ahu during the summer of 1930 (St. John &

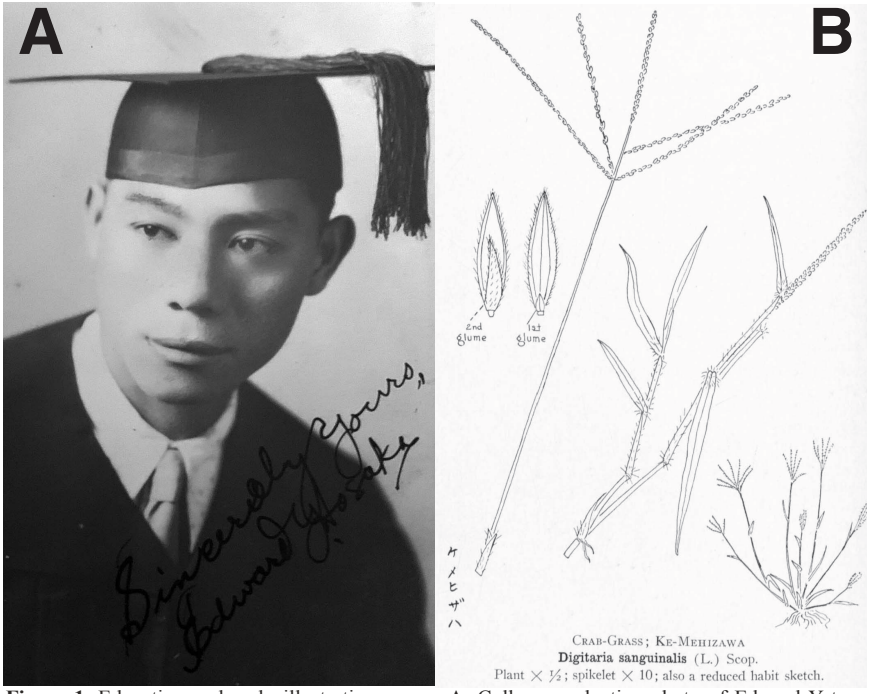

Figure 1. Education and early illustration career. **A**. College graduation photo of Edward Yataro Hosaka from *Ka Palapala* 1931 yearbook (Image by: Waipahuneitibu, CC BY-SA 4.0 via Wikimedia Commons); **B**. Illustration of *Digitaria sanguinalis* (L.) Scop modified from *Weeds of the Pineapple Fields of the Hawaiian Islands* (St. John & Hosaka 1932), Public Domain.

Hosaka 1932). He continued this study of weeds of pineapple fields in his spare time, and in the summer of 1931 Hosaka traveled to all the main Hawaiian Islands to expand his survey (St. John & Hosaka 1932). Hosaka would collect plants, provide illustrations, and describe the biology of the weeds while St. John would confirm identification and provide descriptions of each taxon (St. John n.d.). Their work was compiled in the book *Weeds of the Pineapple Fields of Hawaii* (St. John & Hosaka 1932) and contains a dichotomous key to common weeds in pineapple fields, how the weeds are disseminated, and notes on how to eradicate them. This work contains illustrations by Hosaka for almost all the described taxa. His illustrations consist of line drawings of whole plants accompanied by magnified floral organs. Many of the plants included are grasses, and he takes care to carefully illustrate unique features of grass flowers (Figure 1). His botanical illustrations are accompanied by Japanese text.

One thousand copies of *Weeds of the Pineapple Fields of Hawaii* were printed and sold at seventy-five cents each (Anonymous 1932, Bryan 1932). Reviewers praised the illustrations in the work and the non-technical terms used to describe the plants (Anonymous 1932, Bryan 1932). One review included the following quote from Dr. Maurice Lanford on behalf of the Association of Hawaiian Pineapple Canners: “from the standpoint of the local

pineapple industry, the work is the most complete and most useful yet written" (Anonymous 1932). Edward Hosaka graduated from UH in 1931 with a degree in Biological Science (UH 1931) (Figure 1).

Weeds of the Pineapple Fields of Hawaii was the first of many publications that included Hosaka's own illustrations of plants or animals. His sons Donald and Melvin Hosaka (pers. comm.) are not aware if their father had any professional training as an artist. Barbara Kennedy, current Collections Manager of the Bishop Museum Herbarium, recalled hearing that Hosaka must have been quite an artist. The illustrations in *Weeds of the Pineapple Fields of Hawaii* are representative of the many subsequent illustrations that Hosaka would provide for his future publications (Figure 1). His illustrations are always clear, concise, and represent well the pertinent characters of the taxa he is describing. In later works he would incorporate his initials EYH running alongside the stems or leaves in his illustrated plants.

Career at the Bishop Museum

Several months after his college graduation, Hosaka was hired by the Bishop Museum. He was initially hired as a Laboratory Assistant in 1931 (Gregory 1932), a rank he kept for the first two years of his employment (Gregory 1933) before transitioning to an Assistant Curator of Collections (Gregory 1934). In 1935 he would transition to Assistant Curator of Collections (Botany) (Gregory 1936), a position that allowed him to focus more on the herbarium curation and dispersal of duplicate specimens. Hosaka would maintain the role of Assistant Curator of Collections until 1941 (Buck 1942), when he was hired by the Hawai'i Agricultural Experiment Station (HAES). Even then, he would still be listed as an Associate of the Bishop Museum through 1949 (Buck 1950). While employed at the Bishop Museum he made sizeable contributions to Hawaiian Botany through his master's research and extensive field and taxonomic work.

Master's Thesis

In 1932, Harold St. John initiated "exploratory excursions" into Kīpapa Gulch (Gregory 1933). These excursions were likely used to initiate Edward Hosaka's master's thesis, which included a thorough ecological and floristic study of Kīpapa Gulch. Hosaka (1930, 1931) had thoroughly studied the history of Hawaiian forests and forestry as an undergrad and argued in his thesis that few detailed ecological studies have been conducted in Hawai'i (Hosaka 1937a). Hosaka commenced floristic and ecological studies in 1931 and gathered climate and soil data in 1933 (Hosaka 1935). Figure 2 displays Hosaka's 1937 illustration of Kīpapa Gulch, depicting study areas and distribution of important taxa. Hosaka designated six plant zones along the gulch based on their existing cover. In each of these zones Hosaka measured soil temperature, atmospheric temperature, rainfall, evaporation, and relative humidity. He also profiled the canopy structure of each plant zone. Hosaka made collections to support a comprehensive flora of the entire gulch which included a description of life forms, abundance, and distribution of 449 species of bryophytes (n = 34), ferns (n = 75), and angiosperms (n = 340) (Hosaka 1935). His submitted thesis also included description of four new taxa: *Sanicula purpurea* St. John & Hosaka, *Panicum koolauense* St. John & Hosaka (*Dichanthelium koolauense* (H.St.John & Hosaka) C.A. Clark & Gould), *Rollandia st-johnii* Hosaka (*Cyanea st-johnii* (Hosaka) Lammers, Givnish & Sytsma), and *Rollandia lanceolata* Gaudich. var. *kipapaensis* Hosaka ex Fosberg (*Cyanea lanceolata* (Gaudich.) Lammers, Givnish & Sytsma).

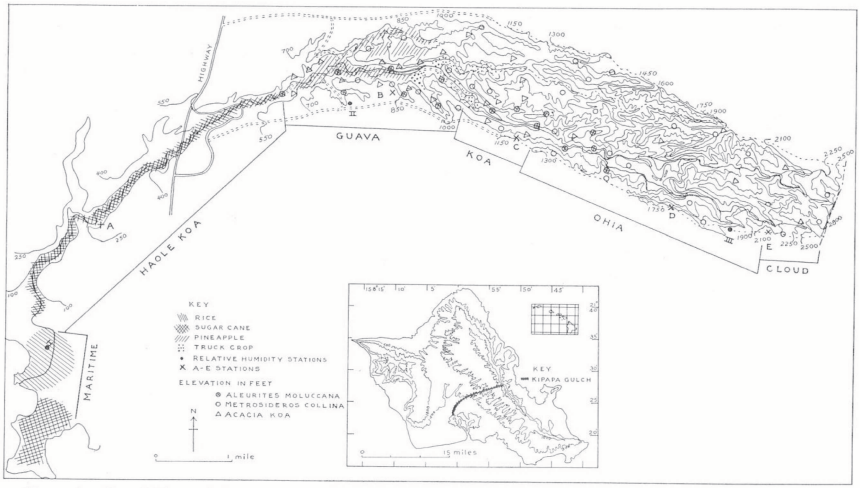

Figure 2. Kīpapa Gulch, as illustrated by Hosaka in the 1937 publication of his master's thesis (Hosaka 1937a). His original figure legend read: "Map of Kipapa Gulch showing topography, stations where data were collected, and distribution of important trees". Public domain, available at: http://hbs.bishopmuseum.org/pubs-online/pdf/op13-17.pdf (Accessed 1 February 2024).

His two-volume thesis was submitted to UH in 1935 and was published in the *Occasional Papers of the Bernice Pauahi Bishop Museum* in 1937. The 1935 thesis contains 92 photographic plates of industry, agriculture, and ecology in Kīpapa Gulch. Additional photos are used to document his survey techniques, plant communities, and unique plant collections. Hosaka included large hand-colored maps of different communities in the gulch as part of his 1935 thesis. Approximately 212 hand-marked plant distribution maps are also provided. Vouchers from his collections were deposited in the herbarium of the Bishop Museum. E.H. Bryan (1937) wrote of Hosaka's work in the *Honolulu Advertiser*: "This little paper…is recommended to all who are interested in the plant life of Hawaii, or in the relationship between organisms and their environment". In reference to the Kīpapa Gulch work, Harold St. John (n.d.) said that Hosaka "made it known in a detail that has not been equaled for any other valley in the Hawaiian Islands" and called it a "classic in Hawaiian botanical literature" (St. John 1979).

Taxonomic and Field Work at the Bishop Museum

The new taxa that Hosaka named in his master's thesis (1935) were published with St. John in 1935 (St. John & Hosaka) and would be the first of many taxa named by Hosaka and his colleagues during his tenure at the Bishop Museum. Hosaka would help describe new taxa across the Hawaiian flora, including genera as diverse as *Schiedea* Cham. & Schltdl. (Caum & Hosaka 1936), *Panicum* L. (Whitney & Hosaka 1936, Hosaka 1942), *Lobelia* Plum. ex L. (Fosberg & Hosaka 1938, St. John & Hosaka 1938), *Styphelia* Sm. (currently recognized in *Leptecophylla* C.M. Weiller; Fosberg & Hosaka 1938), *Phyllostegia* Benth. (Hosaka & Degener 1938), *Cyanea* Gaudich. (Hosaka & Degener

1938, Degener & Hosaka 1940), and *Straussia* A.Gray (now a synonym of *Psychotria* L.; Degener & Hosaka 1940).

Hosaka would conduct extensive fieldwork with numerous field biologists and institutions during his graduate research and his employment at the Bishop Museum. He would be accompanied in the field by a variety of professional and amateur botanists. Raymond Fosberg, Otto Degener, and Harold St. John were frequent field companions (Edward Yataro Hosaka 2023). Michio Yamaguchi, an agriculture teacher, was also a frequent collaborator in the field (Hosaka 1937a). Hosaka would name a new species of *Phyllostegia* for him (Hosaka & Degener 1938). Even Melvin Hosaka accompanied his father into the field. Melvin remembered his father instructing him to scramble down and up a ravine to collect a specimen on the opposite side (Melvin Hosaka, pers. comm.). Some of Hosaka's fieldwork was conducted through the HAES or Parker Ranch (Buck 1939). Even when sponsored for rangeland surveys, Hosaka would also make collections of plants, insects, and mollusks to be deposited at the Bishop Museum (Buck 1938).

Despite his considerable work across the Hawaiian flora, perhaps Hosaka's most significant taxonomic achievement is his revision of the Hawaiian species in the genus *Myrsine* L. (Hosaka 1940). In attempting to resolve the variation in Myrsinaceae, Hosaka worked with Otto Degener to evaluate the latter's collections from this family. According to Degener & Hosaka (1939), the two could not see "eye to eye" on how to address the family and each proceeded with their own respective treatments. Hosaka examined hundreds of Hawaiian and south Pacific herbarium specimens across the genera *Myrsine*, *Suttonia* A. Rich., and *Rapanea* Aubl. and ultimately consolidated *Suttonia* and *Rapanea* into *Myrsine*. His revision recognized 25 taxa (21 species and four varieties) of Hawaiian *Myrsine* illustrated in nineteen figures. Robert Wilbur (1965) revisited Hosaka's treatment of *Myrsine* to address minor taxonomic issues and in the process, he called Hosaka's paper a "significant milestone in elucidating a difficult group of Hawaiian trees and shrubs". In the *Manual of the Flowering Plants of Hawai'i*, Wagner *et al.* (1999) largely followed Hosaka's treatment in recognizing 20 species of Hawaiian *Myrsine*. Regarding *M. lessertiana* A.DC., an incredibly variable taxon, Hosaka said: "At present I am not able to state whether this variation is due to hybridization or to the effect of environment…". Appelhans *et al*. (2020) would provide evidence for hybridization within *M. lesssertiana* using radSEQ data, confirming Hosaka's speculation using techniques unavailable in his time.

In addition to documenting new species, Hosaka would also help discover new ecosystems in Hawai'i. On one survey in the Ko'olau Mountains in 1937, Raymond Fosberg and Hosaka recorded what appeared to be an open-bog type environment. They compared the site to open bogs on Kaua'i, Moloka'i, and Maui, and remarked that an environment with those floristic and physiological characters had never been documented before on O'ahu (Fosberg & Hosaka 1938). This bog environment is one of two now known on O'ahu, the other is Mt. Ka'ala in the Waianae Range (Wagner *et al*. 1999).

After transitioning full time to the HAES in 1941, Hosaka would remain on staff at the Bishop Museum in the capacity as an Associate in Botany until 1949 (Buck 1950), and then as an Honorary Associate in Botany (Buck 1951). In these roles Hosaka would continue to assist with exhibits and collections at the museum (Buck 1946). During interisland trips Hosaka would also advocate for the Bishop Museum (Edmundson 1952). During his work with the HAES Hosaka made many plant collections, especially of new or naturalized taxa (Buck 1951), that were deposited at the Bishop Museum Herbarium and other global herbaria.

Marriage and Personal Interests

On 17 November 1934, Edward Hosaka married Beatrice Midori Ichijo at the Izumo Shrine in Honolulu (Anonymous 1934). The Society column of *The Nippu Jiji* newspaper described the couple as "two popular members of the young Japanese set" (Anonymous 1934). They would soon have two sons: Donald and Melvin.

Hosaka lived with his family at Mahi Place (Teho 1952), near what is now the intersection of University Avenue and the Lunalilo Freeway (Interstate H-1) in Mānoa. During his free time Hosaka would continue his childhood recreations of hunting and fishing. He would also engage in taxidermy, stuffing animals that he and his friends hunted (Hosaka Family, pers. comm.). Donald Hosaka would observe his father stuffing animals and sewing their pelts in the family garage (Donald Hosaka, pers. comm.). Hosaka still fished whenever possible with his childhood friend Herb Leong (Dunn-Rankin 1987).

Edward and Beatrice would work together to support each other's careers and community service. In the acknowledgements of his thesis, Edward thanks Beatrice for typing his paper (Hosaka 1937a). Beatrice Hosaka was associated with Shinyu Kai, an "international Institute Club for young business girls of Japanese ancestry" (Anonymous 1939). This social organization would host events for the community. At one of these events in 1939 Edward Hosaka gave a presentation on kapa Cloth (Anonymous 1939).

Agronomic work at the Hawai'i Agricultural Experiment Station (HAES) (1936–1937, 1941–1961)

Institutions involved in Hawai'i's agriculture in the early 1900s, including the HAES, UH, the Bishop Museum, and the Bureau of Agricultural and Forestry, were positioned near each other in Honolulu and it was not uncommon for personnel to be shared and subcontracted back and forth among these institutions (Brennan & Hollyer 2008). During portions of 1936 and 1937 Hosaka took a leave of absence from the Bishop Museum to work for HAES to conduct range surveys of the island of Hawai'i (UH 1937). One of the ranges that Hosaka surveyed was at Parker Ranch. While there he trekked across all of Parker Ranch's vast holdings, identifying over 300 species of grasses and legumes (Bergin 2004). In addition to range surveys, Hosaka would also spend this trip providing lectures to local youth on topics as diverse as marine life (Anonymous 1936a), geology, and taxidermy (Anonymous 1936b).

Though Hosaka had worked closely with the HAES during his education and postgraduate work, he officially became an employee with them as a Junior Agronomist in 1941 (UH 1941). He was employed with the HAES for the rest of his life, transitioning from Junior Agronomist to Assistant Agronomist (UH 1943), Assistant Specialist in Animal Husbandry (UH 1949), Associate Specialist in Agronomy (UH 1952), and finally Specialist in Agronomy (UH 1955). Food security in Hawai'i was a concern in the early 1900s as it is today. In 1951 Hawai'i produced about half of the beef that it consumed (Sinclair 1952). Hosaka would dedicate much of his professional career helping to increase beef production in Hawai'i by expanding and enriching pasturelands (Figure 3).

Early in his employment with the HAES Hosaka coauthored *Vegetation Zones of Hawaii* (Ripperton & Hosaka 1942). The zones were delineated based on data accumulated during Hosaka's 1936–1937 fieldwork (Ripperton & Hosaka 1942). During these surveys Hosaka would hike up and down slopes primarily in pasture areas to determine species composition and elevational boundaries between vegetation types. Abiotic factors were then mapped to establish preliminary boundaries of 10 different

Figure 3. Edward Hosaka with a stand of Buffel grass at the University of Hawaii Experimental Farm in Mānoa (Anonymous 1953a). (Edward Yuichiro [sic] Hosaka: Pasture Management Specialist at U.H. Experimental Farm, Japanese Diaspora Initiative, Nippu Jiji Photo Archives; Copyright holder: Hawaii Times Photo Archives Foundation; digitization: Densho; and bilingual metadata: Hoover Institution Library & Archives and National Museum of Japanese History; https://hojishinbun.hoover.org/en/newspapers/A-JA723-001.1.1.)

vegetation zones across Hawai‘i (Ripperton & Hosaka 1942). *Vegetation Zones of Hawaii* was one step in the evolution of the understanding of the structure of Hawai‘i’s diverse ecosystems (Buck & Paysen 1984) and would be the foundation for Hosaka’s future work in improving Hawai‘i’s forage crops.

In 1936 Hosaka discovered a patch of *Desmodium canum* (J.F.Gmel.) Schinz & Thell. (now recognized as *D. incanum* (Sw.) DC.) growing in a pasture at Kaimi Dairy Farm in Kailua, O‘ahu (Anonymous 1942, Hosaka 1945) (Figure 4). Range managers had been looking for a legume that could grow in moist lowlands and this clover had potential as a forage crop in these areas (Anonymous 1942). Seeds of Kaimi Spanish clover, as the cultivar was named, were explicitly sent to different vegetation zones described by Ripperton & Hosaka (1942) to assess and report on how well they would grow at different elevations (Hosaka 1945). This scenario illustrates Hosaka as a factor in the initial identification of a useful species, its testing at different vegetation zones that he helped to define, and then reporting on its progress in agricultural bulletins.

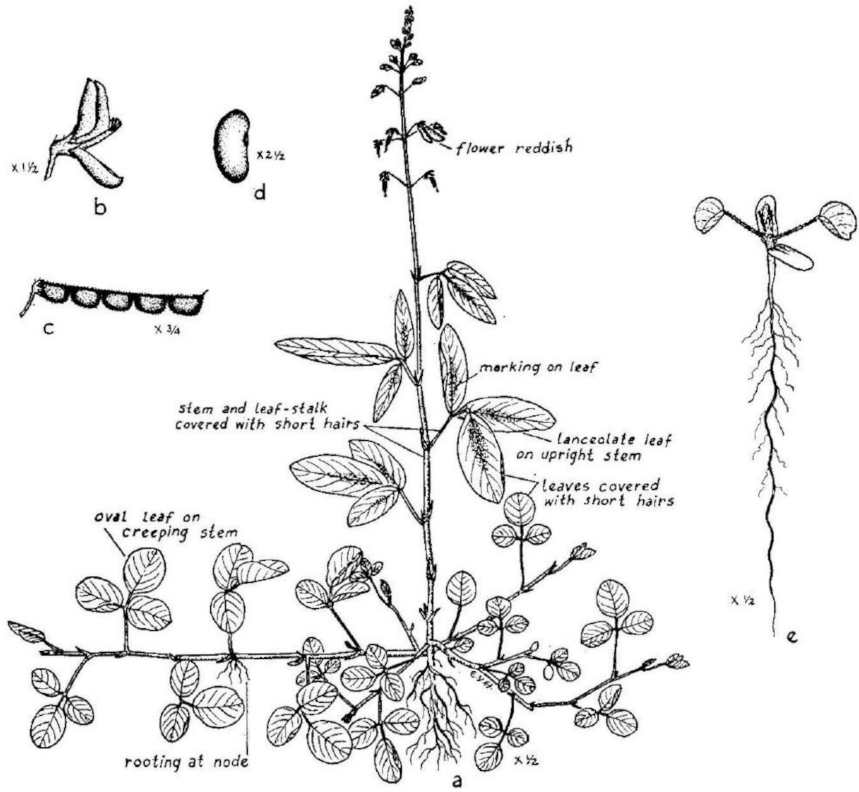

Figure 4. Edward Hosaka's illustration of Kaimi Spanish clover (*Desmodium incanum*) (Hosaka 1945). A. habit; b. flower; c. pod; d, seed; e, seedling [labels follow Hosaka 1945]. Image obtained from the University of Hawai'i at Mānoa Digital Collections. Public Domain; available at: https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/26c929bb-b510-40f8-a836-15fbfee17936/content (Accessed 1 February 2024).

Hosaka would repeat this Kaimi Spanish clover study, at least in part, with a litany of legumes and grasses. Over the next ten years he would study and report on feather fingergrass (*Chloris virgata* Sw.; Hosaka 1953a), pangola grass (*Digitaria eriantha* Steud.; Hosaka & Goodell 1954, Hosaka 1956), molasses grass (*Melinis minutiflora* P.Beauv., Hosaka & Ripperton 1953), Guinea grass (*Megathyrsus maximus* (Jacq.) B.K.Simon & S.W.L.Jacobs; Hosaka 1956), buffelgrass (*Cenchrus ciliaris* L.; Anonymous 1953a, Hosaka & Carlson 1957) (Figure 3), trefoils (*Lotus* L.; Hosaka 1957a), Kenya white clover (*Trifolium burchellianum* Ser. subsp. *johnstonii* (Oliv.) Cufod. Ex J.B. Gillett; Hosaka & Matsuura 1958), and kikuyu grass (*Cenchrus clandestinus* (Hochst. ex Chiov.) Morrone; Hosaka 1958a). Hosaka's agricultural reports would typically provide historical context for the origin of the species in Hawai'i, its use in other regions of the world, and summaries on the success of the species in experimental trials and in

agricultural use. Hosaka would also co-author taxonomic keys (Whitney *et al.* 1939, Hosaka & Ripperton 1944) and publish reports on cattle grazing (Hosaka 1957b, 1958b), pasture irrigation (Hosaka & Carlson 1952), and rangeland weeds (Hosaka 1953b, Hosaka & Thistle 1954).

Several of Hosaka's HAES publications are indexed on the University of Hawai'i at Mānoa's College of Tropical Agriculture and Human Resources` (CTAHR) Publications and Information Central website (CTAHR 2024). This site cautions that while the historic Hawaiian publications by researchers and extension agents provide valuable information, some of the practices and recommendations are not in line with current techniques (CTAHR 2024). For example, some of the historic HAES publications promote the use of plant taxa now considered invasive (CTAHR 2024). Hosaka's observations about the activity of now-invasive grasses would have profound ecological implications long after his time. Hosaka & Carlson (1957) had documented the advancement of buffelgrass from small a planting on Moloka'i. First introduced to Hawai'i in 1935 by the HAES (Hosaka & Carlson 1957), buffelgrass has become naturalized on all Hawaiian Islands and listed by the Hawai'i Invasive Species Council (2024) as a High Risk Weed.

Hosaka's agricultural reports would be read over the radio by broadcasters (e.g. Anonymous 1937) and were reported on in newspaper articles (e.g. Hosaka 1937b). This high level of interaction with the public at multiple levels solidified Hosaka as an expert on both taxonomy and rangeland management in the tropics. He would continue to leverage this expertise as he engaged with the public in personal pursuits and in leaves of absence from the HAES.

Sport Fishing in Hawaii (1944)

Inspired by the encouragement of his fishing friends (Hosaka 1944), Hosaka published *Sport Fishing in Hawaii* in 1944 (Figure 5). The work chronicles fishing techniques and equipment of native Hawaiians, fishing practices of Asian immigrants, techniques used in professional competition-level sport fishing, and a dichotomous key to sport fish encountered in Hawai'i. As the book was intended for the layperson, Hosaka also provided a clear description of how to use the dichotomous key and an illustrated guide to fish morphology.

Hosaka provided illustrations of fish and fishing practices throughout *Sport Fishing in Hawaii* (Figure 6). According to Arnold Suzumoto (pers. comm.), Ichthyology Collections Manager at Bishop Museum (1985–2023), many of his illustrations were based on those in earlier works such as Jordan & Evermann (1905) and Fowler (1928). Suzumoto's perspective on Hosaka's illustrations is: "It takes an artist's hand and eye to reproduce features on paper that represent a fish species in a way recognizable to a lay or experienced audience and Mr. Hosaka was highly skilled with pen and ink, possessed of a very good understanding of each particular kind of fish. His line drawings depicting actions (casting, playing the fish, spear fishing, squidding, crabbing, etc.) are clearly original, sharing consistency of clarity and form, understandable and informative. Taken together with his fish images, these, and the entirety of his book, stand as a testament to his observational, artistic, and interpretive skill".

Sport Fishing in Hawaii contains a great amount of cultural and technical detail that may have never been available to a mass audience before 1944. Suzumoto (pers. comm) suggested that if Hosaka was talking to a lot of Hawaiian fishermen, he may have been recording some Hawaiian fishing practices for the first time. In an unpublished review,

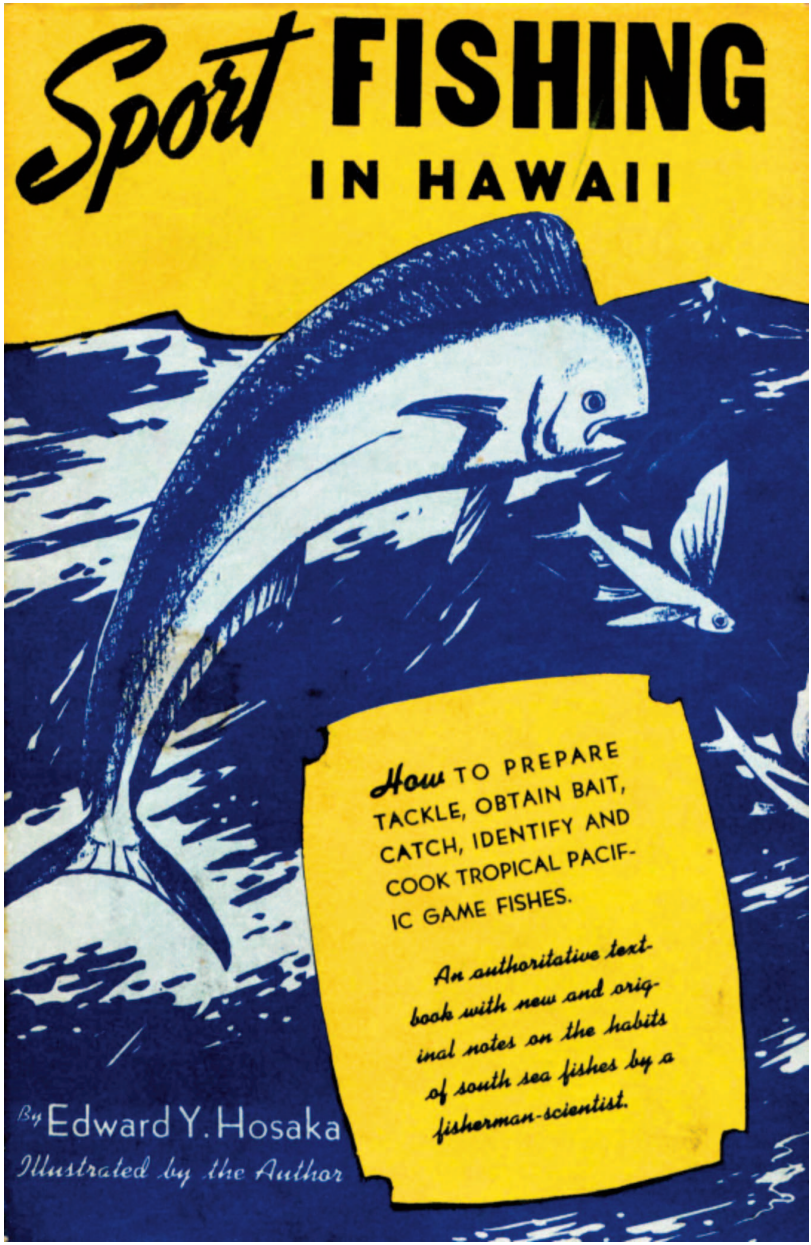

Figure 5. Cover of *Sport Fishing in Hawaii* (Hosaka, 1944). Public Domain.

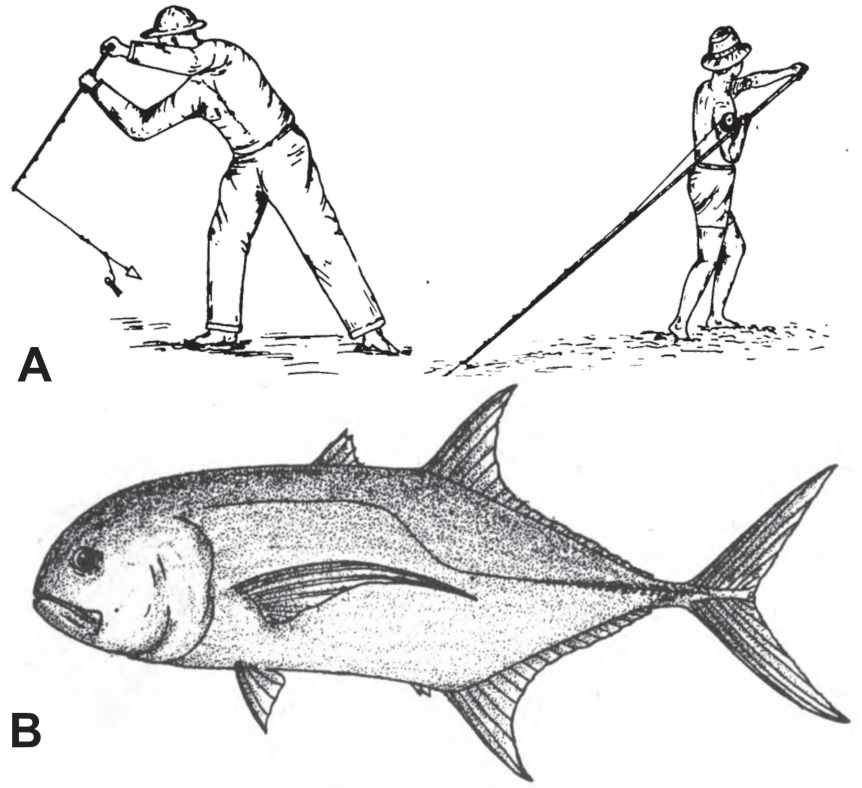

Figure 6. Representative illustrations from Sport Fishing in Hawaii (Hosaka 1944). **A**. Two methods of casting; a, pendulum cast, b, running cast; **B**. Black *ulua*. [Figure legends follow Hosaka (1944)]. Public Domain.

E.H Bryan (n.d.) remarked that Hosaka, "unlike most fisherman…has been willing to share his knowledge with others". Hosaka may have also been one of the first fisherman to document the practice of slide-bait fishing, a practice that likely originated in Hawai'i (Funai 2003).

Hosaka's text goes beyond technical descriptions of fishing to explore his own emotions behind the rod and reel. In one thrilling passage Hosaka (1944) described his personal experience in catching and reeling in his largest black 'ulua. On a warm night, again fishing with his friend Herb Leong, Hosaka's alarm sounded to indicate he had hooked a fish. Following is a portion of his recount of the fight: "… my arms and back were beginning to feel the strain. The fish, too, showed some signs of exhaustion, for the tension on the pole was not as great as it had been during the first twenty minutes of the struggle. When I thought that the turning point in the fight had come, I started to "pump" the fish in. Little by little I gained line, and in about fifteen minutes I took in nearly 50

yards of line. Then in a flash the fish tore out nearly 30 yards of line again. I wondered who was the master of the situation - was I playing the fish or was the fish playing me?"

Sport Fishing in Hawaii has had a long and broad impact in Hawai‘i. A contemporary review touted the wealth of information in the work but provided caution about the number of Hawaiian words used throughout the text (Seibert 1946). Bruce Carter (1961), who wrote a fishing column for the *Honolulu Advertiser*, mentioned that the text was for many years considered the "bible of island sport fisherman". E.H. Bryan (n.d.) heaped praise on the publication and said that "Hosaka is to be congratulated on having produced an 'omnibus' of tropical Pacific fishing which should be of interest to a great number of persons in the great Pacific area". In 1973 the work was reprinted by Petroglyph Press as *Shore Fishing in Hawaii*. The 1973 edition omits sections of the original work that were in 1973 considered obsolete, updates the fishing laws, adds extra illustrations, and provides updated taxonomy (Hosaka 1973).

United States Commercial Company Expedition (1946)

In the spring and summer of 1946, the United States Commercial Company (USCC) conducted a survey of the economics and natural resources of the Marshall, Carolina, and Mariana Islands, which had been under Japanese occupation during World War II (Oliver 1951). Numerous specialists including botanists, geologists, anthropologists, and sociologists traveled across these Micronesian Islands or were stationed in one area (Oliver 1951). They conducted thorough assessments of the islands in their areas of expertise to provide information for future administration of these islands. Edward Hosaka was one of two botanists who participated in this survey (Oliver 1951). Accompanying him was botanist Raymond Fosberg and the agronomists Richard Lyman and J.C. Ripperton. In Douglas Oliver's 1951 report on this survey, Edward Hosaka is described as a botanist for the University of Hawai‘i. The surveyors traveled among the islands on a repurposed LCI (Landing Craft Infantry) ship (Hosaka 1946a). Reports on Micronesia would be provided by each participant in the expedition. Hosaka reported on Agricultural Botanical Economics (Hosaka 1946b).

A self-professed "poor sailor" (Hosaka 1946a), Hosaka would visit 12 islands across Micronesia (Hosaka 1946b), sometimes flying instead of taking the Company's ship. While he was conducting his botanical surveys Hosaka found that he was called upon to serve as an interpreter and help other experts in Animal Husbandry and Agriculture with plant identification (Hosaka 1946b). He appreciated the ability to participate in these additional tasks, but as a result he was not able to collect as many specimens as he anticipated (Hosaka 1946b). Regardless, Hosaka still collected 886 specimens during the trip (Hosaka 1946b). Fosberg collected 2,800 specimens (Fosberg 1946). Collections were primarily deposited at the herbaria of the Smithsonian Institution and duplicates were sent to other herbaria featuring the flora of the Pacific (Fosberg 1946). On this trip Hosaka also collected land snails for Charles Montague Cooke, Jr. (Hosaka 1946a), who was at the time the Curator of Pulmonata at the Bishop Museum (Jaynee Kim pers. comm.).

The collections from the USCC Expedition would be used in a myriad of studies. Hosaka brought back several sets of seeds from grasses and legumes that would enter testing regiments at the HAES (Jessen 1947). Fosberg would eventually publish *The*

Vegetation of Micronesia in 1960, which would be based on this initial survey and follow-up excursions across Micronesia. Collections by Fosberg and Hosaka would be used in a subsequent study (St. John 1960) to further describe the flora of Micronesia.

Parker Ranch (1948–1949)

Edward Hosaka's work made a significant impact on ranches across Hawai'i, but his work was especially lauded at Parker Ranch on the Big Island. A.W. Carter, trustee of the Parker Ranch, was especially interested in Hosaka's work (Kimura 1993). Hosaka had already spent time surveying Parker Ranch during his 1936–1937 field surveys. Carter later encouraged Hosaka to leave the HAES to work for Parker Ranch for an entire year (Kimura 1993). Hosaka and his family relocated to Kamuela in 1948 so that he could devote himself full-time to rangeland management at Parker Ranch. Dr. Billy Bergin, who wrote the three-volume history of Parker Ranch, remembered that when he was a young stableboy his elders spoke highly of Hosaka (Bergin, pers. comm.). In addition to consulting on pasture development he would also teach other employees of Parker Ranch how to make vouchers of plants on the range (Kimura 1993).

Hosaka's surveys in and around Parker Ranch in 1948 not only improved the pastureland, but he also discovered species new to science. In November of 1948 Hosaka was surveying Pu'u Papapa, a cinder cone in Waikoloa, where he collected a previously unknown species of *Isodendrion* A. Gray (Violaceae). The plant would be named *Isodendrion hosakae* by St. John (1952).

While in Kamuela, the Hosaka family would occupy a house associated with Parker Ranch. Melvin Hosaka (pers. comm.) remembered riding his bicycle around in the living room, thinking the house was huge. In 1949, Hosaka and his family were celebrated with a beach party, including a chicken hekka dinner, upon their departure from Parker Ranch to return to Honolulu (Anonymous 1949).

International Agronomy Outreach

In 1952 Hosaka attended the Sixth International Grassland Conference at the Pennsylvania State College (now Pennsylvania State University; Teho 1952). Though newspaper articles mentioned that Hosaka was the first person from Hawai'i to attend the conference (Teho 1952, Anonymous 1952a), there were at least two other representatives from Hawai'i whose abstracts were printed in the conference proceedings: M. Takahashi of the College of Agriculture at UH and Richard Penhallow of Parker Ranch (Takahashi 1952, Penhallow 1952). Hosaka's presentation was entitled "Grass in the conservation program of Hawaii" (Hosaka 1952). He provided a review of the ecology of Hawai'i, the destruction of native habitats, the role of native grasses in Hawaiian ecology, and how introduced grasses were used for forage, landscape design, and erosion control (Hosaka 1952). Following this conference, Hosaka visited the Smithsonian Institution, the American Museum of Natural History in New York, and numerous states to consult on botanical and agronomy issues (Teho 1952). Upon return from this trip, Hosaka commented to *The Hawaii Times* that he felt that pastures in the Territory of Hawai'i were more advanced than those in some states (Anonymous 1952b).

The next year, in 1953, Hosaka accepted an invitation to tour rangelands of Australia (Anonymous 1953b), funded by a grant from the Royal Credits Development Fund of the

Commonwealth Bank of Australia (CSIRO 1954). Many areas of northern Australia are similar in ecology to Hawai‘i, and Hosaka's collaboration was sought to share experiences of rangeland management across similar ecosystems. He embarked on a planned eight-month tour of Australia in December 1953 and visited New South Wales, Victoria, and Queensland (Anonymous 1953b). He collaborated with Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO) to visit local pasturelands to share information on subtropical and tropical agronomy (Anonymous 1954a). Upon his return from Australia Hosaka imported several grasses, legumes, and a wild grape as potential new forage crops to Hawai‘i (Anonymous 1954b). After his trip, Hosaka would educate the community about Australia through lectures and travelog films (Anonymous 1961a).

In 1957, Robert Kleberg, the president of King Ranch in Texas, wrote a letter to Michael J.P. Malone in the New York offices of the Compañía Ganadera Becerra to explore the possibility of brining Hosaka to their Cuba ranch holdings to assess pasture conditions and possibly advise them on sugar cane (Kleberg 1957). Kleberg, who indicated that he was responsible for Hosaka's visit to Australia (Kleberg 1957), also said: "I believe that Hosaka is one of the most practical grass and legume men on tropical conditions that I know" (Kleberg 1957). After several months of planning, Edward and Beatrice embarked on a trip to the Caribbean at the expense of the King Ranch and the Reynolds Company (Malone 1958). Hosaka toured properties owned by the Reynolds Company in Jamaica (Hosaka n.d.) and the King Ranch and Czarnikow-Rionda Company in Cuba (Hosaka 1958c). He generated two reports (Hosaka n.d., 1958c) from this trip, each providing an assessment of current management practices and potential development of these ranch holdings in the Caribbean. Hosaka was also offered the role of superintendent of a Cuban Ranch (St. John n.d.).

Correspondence with Mary Agnes Chase

For over 20 years Hosaka maintained correspondence with Agnes Chase, eminent botanist and grass expert at the Smithsonian Institution. Agnes Chase corresponded with Hosaka regularly in 1938 while Hosaka was writing *Grasses of Hawaiian Ranges* (Whitney *et al.* 1939). Chase provided critical edits (Chase 1938a) of the document's structure and taxonomy following the death Leo D. Whitney, the first author on that work (Whitney *et al*. 1939). Hosaka accepted every editorial suggestion made by Chase for the publication (Hosaka 1938).

Chase and Hosaka maintained a courteous professional relationship after the publication of *Grasses of the Hawaiian Ranges*. Chase complimented Hosaka on the way he received criticism about his work (Chase 1938b). In addition to exchanging duplicate grass specimens (Chase 1961), the two would also exchange books about grass identification (Chase 1939a,b).

Hosaka respected Chase's perspectives on grass identification and looked to her for advice. In a 1961 letter to Jason Swallen, Head Curator in the Department of Botany at the Smithsonian, Hosaka reminisced that "Once Mrs. Chase told me in writing that Hawaii is the crossroad where all the grasses of the world congregate. It is well said because I find new records of grasses often" (Hosaka 1961a). In a letter dated 7 March 1961, Hosaka informed Agnes Chase that he was working on a revised edition of the *Grasses of Hawaiian Ranges* and that he was planning to write a popular grass handbook for tropical ranchers (Hosaka 1961b). He asked Agnes Chase for advice on the format of these new volumes, and she responded on 12 March 1961. Unfortunately, Edward Hosaka would not be able to complete these works.

Death and Remembrances

In July 1961 Hosaka traveled to Hilo for a business trip (Anonymous 1961a). While there, he traveled to Kahuku Ranch and revisited one of his frequent fishing spots, Puʻu Kī, a popular site for ʻulua on Pohue Bay (Clark 2002). He had hooked a fish and while reeling it in began to feel unwell (Clark 2002, Anonymous 1999). After collapsing, he was taken to a hospital in Hilo. The journey to transport Hosaka to a hospital was a long one, hindered by multiple locked fences along a long unpaved ranchland road (Melvin Hosaka pers. comm.). Hosaka was in a coma for several hours before being pronounced dead from cerebral hemorrhaging on 23 July 1961 (Clark 2002, Anonymous 1961a, Anonymous 1999). He was only 55 years old.

There were multiple tributes following Hosaka's death that highlighted his work in botany, sport fishing, and agronomy. The Bishop Museum Annual Report for 1961 printed: "Edward Hosaka was a modest, thoughtful, and always cheerful colleague … As agriculturalist, naturalist, and a sport-fishing expert he gave both knowledge and a sense of enjoyment to the life of the islands" (Spoehr 1961). A remembrance by Bruce Carter (1961), in his regular "Fishing" section of the *Honolulu Advertiser* mentions Hosaka's sport fishing book: "This book will continue to serve not only me … but all Hawaii's fisherman … for many years to come". An additional remembrance quoted Dean Morten Rosenberg of the College of Tropical Agriculture: "hardly a ranch in the State has pastureland that was not improved through Hosaka's work. His contribution to the cattle industry cannot be measured" (Anonymous 1961b). His son Melvin remarked that, while shore fishing for ʻulua, he had died doing what he loved to do (Melvin Hosaka pers. comm.).

Legacy

Taxonomic names established by Edward Hosaka continue to be employed by the botanical community (Table 1). While many of the taxa that Hosaka named in his own research or in collaboration with others have been put in synonymy, the Bishop Museum's *Plants of Hawai'i* webpage (2023) lists twenty-three taxa named by Edward Hosaka that are currently accepted by plant taxonomists. Among the taxa named after Hosaka, five taxa and a cultivar of Kikuyugrass (Fukumoto & Lee 2003) are currently accepted.

Hosaka's collections continue to be curated at global institutions where they have served as references for numerous studies on Hawaiian and Pacific taxonomy and systematics. In *The Manual of the Flowering Plants of Hawai'i*, Wagner *et al.* (1999) mentioned that Hosaka collected 4,055 plant specimens from October 1929–June 1960. A summary of Edward Hosaka's collections and co-collections of over 6,300 specimens from Bionomia (Edward Yataro Hosaka 2023) is summarized in his Bionomia profile at: https://bionomia.net/Q15999581. The majority of Hosaka's collections listed on this site are flowering plants and the largest families are Poaceae (1,123 collections), Rubiaceae (368 collections), Fabaceae (315 collections), and Asteraceae (239 collections). These specimen numbers reflect both the size of these families and their importance in rangelands across Hawaiʻi. Bionomia also lists 269 collections of mollusks distributed over 15 families, the largest of these is the Amastridae (87 collections). This number of mollusks from Bionomia is an underestimate, as records provided from the Bishop Museum Malacology collection indicate Hosaka's mollusk collections are closer to 900 specimens. Hosaka's collections are found in at least 51 world-wide natural history collections. The largest concentrations of his specimens are at the Bishop Museum and the

Table 1. Currently accepted taxa named for or after Edward Hosaka.
[Scientific names were obtained from the Bishop Museum's Plants of Hawaii (2023) webpage]

Accepted Taxa named by Edward Hosaka	Accepted Taxa named after Edward Hosaka
Cyanea horrida (Rock) O. Deg & Hosaka	*Cyrtandra* x *hosakae* H. St. John & Storey
Cyanea munroi (Hosaka) Lammers	*Isodendrion hosakae* H. St. John
Cyanea st-johnii (Hosaka) Lammers, Givnish & Sytsma	*Genistoma hosakanum* (Sherff) Byng & Christenh.
Dichanthelium koolauense (H. St. John & Hosaka) C.A. Clark & Gould	*Melicope hosakae* (H. St. John) W.L. Wagner & R.K. Shannon
Lobelia koolauensis (Hosaka & Fosberg) Lammers	*Viola kauaensis* A. Gray var. *hosakae* (H. St. John) Havran & Ching Harbin
Lobelia villosa (Rock) H. St. John and Hosaka	
Myrsine alyxifolia Hosaka	**Cultivars named after Edward Hosaka**
Myrsine degeneri Hosaka	Kikuyugrass cv. hosaka
Myrsine denticulata (Wawra) Hosaka	
Myrsine fernseei (Mez) Hosaka	
Myrsine fosbergii Hosaka	
Myrsine juddii Hosaka	
Myrsine knudsenii (Rock) Hosaka	
Myrsine linearifolia Hosaka	
Myrsine mezii Hosaka	
Myrsine petiolata Hosaka	
Myrsine pukooensis (H. Lèv.) Hosaka	
Myrsine wawraea (Mez) Hosaka	
Panicum faurieri Hitchc. var. *carteri* (Hosaka) Davidse	
Panicum konaense Whitney & Hosaka	
Phyllostegia x *yamaguchii* Hosaka & O. Deg.	
Sanicula purpurea H. St. John & Hosaka	
Schiedea kealiae Caum & Hosaka	

Smithsonian Institution. During the current work, it has become evident that some Hosaka collections of rangeland plants are distributed in smaller collections around Hawai‘i that are awaiting curation.

Hosaka communicated with and inspired a wide diversity of people in Hawai‘i and beyond. Clyde Imada, Research Specialist in Botany at the Bishop Museum, never met Edward Hosaka; however, when he was young, Clyde had a copy of *Sport Fishing in Hawaii* and, as he pursued his dreams of working in the field of botany, became more aware of Hosaka's first-rate scholarly botanical publications, such as his classic Kīpapa Gulch study and his revision of the Hawaiian species of *Myrsine*. Imada recalled that Hosaka, this "local boy", gave him the inspiration and confidence that he could work locally in natural history fields, too (Clyde Imada, pers. comm.).

Scott Hosaka, Edward Hosaka's grandson, shared that: "My grandfather's knowledge and leadership in forage for pasture management made him in high demand by the largest to smallest cattle ranchers throughout the Hawaiian Islands (Sinclair 1951). Edward had a significant and lasting impact and in 2008 was recognized by the University of Hawai‘i's College of Tropical Agriculture and Human Resources (CTAHR) as one of the 52 individuals honored as an outstanding achiever for his important contributions in their 100 year history (Brennan & Hollyer 2008)."

Figure 7. Edward Hosaka's family visiting places important to his career. **A**. Bishop Museum, O'ahu. Left to right: Helen Hosaka, author, Jeri Hosaka, Melvin Hosaka, Donald Hosaka, Clyde Imada (Research Specialist, Bishop Museum Herbarium), Donna Hosaka Leong, Yukari Hosaka, and Scott Hosaka. **B**. Pu'u Papapa, Hawai'i. Left to right: Keith Leong, Donna Hosaka Leong, Donald Hosaka, Dylan Leong, Helen Hosaka, Lori Hosaka Goya, Yukari Hosaka, and Scott Hosaka. Photos used with permission from Scott Hosaka.

In July 2023 Edward Hosaka's son Donald and his family visited the island of Hawai'i to tour sites associated with Edward Hosaka for the first time since his passing in 1961 (Philips 2023, Hosaka Family, pers. comm.) (Figure 7). They travelled to Pu`u Papapa and the Pōhakuloa Training Area Natural Resources Program to learn about the

discovery and conservation of the endangered ʻAupaka, *Isodendrion hosakae*. They were also hosted by the administration of the Hawaiʻi Volcanoes National Park to visit Puʻu Kī, where Hosaka collapsed while fishing. It is now called Hosaka Point or Hosaka Flats in his honor (Clark 2002, Hosaka Family pers. comm.). Hosaka's family remember him as quiet, modest, always cheerful, and with a good laugh. Helen Hosaka (pers. comm.) remembers that he would be resting in the living room watching TV in his worn corduroy blazer. When he would be invited to lecture, he would wear the same worn blazer. He was an unassuming "Kīpapa boy to the end".

In the 80 years since Edward Hosaka's death his work continues to impact biological inquiry in Hawaiʻi and beyond. The Hawaiian specimens he collected and the taxa he named are an integral part of a diverse and dynamic flora that is studied around the world. The work that he did to improve global rangelands continues to support worldwide agriculture and ensures food security for people living in the tropics. Edward Hosaka has left behind a legacy that illustrates the biological and cultural diversity of Hawaiʻi.

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