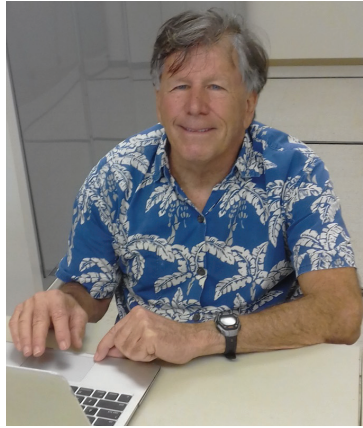


In Memoriam Roger Irvin Vargas (1947–2018)



On July 10, 2018, Roger Vargas passed away suddenly, and the entomology world lost one of its greatest and most beloved scientists. Roger spent the majority of his career working on Tephritid fruit flies, many of which are the most economically damaging pests in the world. His areas of expertise were integrated pest management, insect ecology, biological control, crop protection, insect mass rearing, demography, trapping, and toxicology. Roger was widely regarded as the world's greatest fruit fly ecologist. His over-40-year record of research on fruit flies was truly outstanding: He published over 240 scientific papers, won many awards, and was awarded patents for his work on fruit fly rearing. His research productivity was considerable, as demonstrated in a 2018 IAEA/APHIS survey ranking him number four worldwide for number of fruit fly publications. A complete list of Roger's publications is available online at <http://hdl.handle.net/10125/59374>.

Roger was born in Long Beach, California, and grew up nearby in Riverside. He attended the University of California Riverside, where he played football as a running back, and received a bachelor's de-

gree in oceanography in 1969. He received a master's degree in zoology from San Diego State University in 1974, moved to Honolulu, and enrolled in a Ph.D. program at the University of Hawaii's Department of Entomology. Under the guidance of Dr. Toshiyuki Nishida he received his doctorate in 1979 and was hired by the USDA's Agricultural Research Service in Manoa, on Oahu. Roger initially worked on fruit fly mass rearing, developing new fruit fly mass rearing procedures. He received patents for his work on rearing, producing flies used in sterile release programs. Roger became the Research Leader of the Rearing, Radiation, and Genetics Unit from 1986 to 1990, after which he moved to Hawaii island and worked at the USDA-ARS Hilo laboratory for the rest of his career. Roger was in great demand for his expertise and was constantly traveling around the world to work with governments on developing and improving fruit fly control, particularly in the tropical and semitropical regions where fruit flies are economically important.

Throughout his career, Roger demonstrated a high degree of insight and originality, as evidenced by his numerous achievements and awards (Table 1).

Table 1. Significant awards and recognition given to Roger Vargas since 2000.

2000	Fellowship Award: Agriculture Western Australia's visiting Specialist.
May 2004	Team recipient of the Federal Laboratories Consortium Award for Technology Transfer for the impacts made by the Hawaii AWPM Program
June 2004	USDA Award for Superior Service. Hawaii Fruit Fly AWPM Core Team. "For creating an effective area-wide suppression program for fruit flies in Hawaii which provides the basis for a sustainable rural economy."
June 2004	Entomological Society of America, Pacific Branch Award for Team IPM Accomplishments
Nov. 2004	Entomological Society of America Entomological Foundation Integrated Pest Management Team Award
Feb. 2005	USDA-ARS Technology Transfer Award. Hawaii Fruit Fly AWPM Core Team
2005	Hawaii House of Representatives Recognition Award for Hawaii Fruit Fly AWPM Program
April 2006	Fifth National IPM Symposium. IPM Achievement Award Winner
March 2009	Elected 2010 President of the Pacific Branch of the Entomological Society of America (2010–2011)
March 2011	Recognition for Outstanding Service (e.g., planning and organization of the most heavily attended Pacific Branch annual meeting—396 registrations—in history) as President of the Pacific Branch of the Entomological Society of America
Feb. 2012	Hawaiian Entomological Society Entomologist of the Year (2011)
June 2018	Fiftieth recipient of the C. W Woodworth Award as "Outstanding Economic Entomologist," Pacific Branch of the Entomological Society of America

He developed new and alternative fruit fly mass-rearing procedures (egging, larval recovery, and pupation), including a patented cage and egg harvest system capable of providing 1 billion eggs per week, which could be applied to the Mediterranean fruit fly (*Ceratitidis capitata*) and three *Bactrocera* species. This novel approach was implemented in the APHIS Hawaii Sterile Fruit Fly Rearing Facility that produced 300–500 million fruit flies per week for the U.S. mainland eradication programs for over 10 years. He also led research in the development of improved low-cost diets for mass-rearing facilities in Mexico, Guatemala, and Hawaii, including specialized diets and rearing methods for mass production of Malaysian fruit fly (*Bactrocera latifrons*) in Hawaii.

Using mass rearing data, Roger developed comparative models to characterize life history, survival, and demographics of wild and laboratory lines of four species of fruit flies and their parasitoids. His work on Tephritid demography was essential for the development of area-wide suppression of fruit flies and early detection and effective eradication of invasive populations.

Roger also provided invaluable contributions to the development and improvement of field suppression and eradication for invasive fruit flies, starting with an area-wide SIT demonstration test on Kauai island as part of a pilot eradication program in the 1980s. From 2002 to 2009 he coordinated the highly successful national program known as the Area-Wide Integrated Pest Management of Fruit

Flies in Hawaiian Fruits and Vegetables, integrating field sanitation, bait sprays, and male annihilation with sterile insect and augmentative parasitoid releases. In partnership with the industry, his contribution was instrumental in developing and registering the spinosad-based GF-120 Fruit Fly Bait. Roger also developed or tested a number of male annihilation bait stations as replacements of the traditional organophosphate cover sprays resulting in reductions of sprays by 75–90%. The area-wide program was nationally recognized with seven major awards and received acclaimed international attention, with technology transfer to numerous countries in Oceania, Asia, and Africa.

In the area of classical biological control, Roger developed a cost-effective and sustainable biological control program by introducing and establishing natural enemies of oriental fruit fly into French Polynesia and evaluating their impact. Establishment of *Fopius arisanus* reduced oriental fruit fly populations by as much as 85% and levels of fruit infestations by as much as 90% with average parasitism rates of 70%. Establishment of *F. arisanus* in French Polynesia became the most successful example of classical biological control of fruit flies in the Pacific area outside of Hawaii and served as a model for the subsequent introduction into South America and Africa where species in the *B. dorsalis* complex have recently become established. Roger was actively engaged in the effort to transfer some of these biological control agents to other nations, recently including Brazil, Senegal, and Cameroon. He also led some of the rare research on parasitoid wasp spatial dynamics in the field, as well as detailed measurements of parasitoid effects after introduction.

As mentioned above, Roger was the recipient of many awards. In 2018, he

won the C.W. Woodworth Award, the highest honor of the Pacific Branch of the Entomological Society of America. Furthermore, he served as President of the Pacific Branch of the ESA in 2011 and ran its meeting that year in Hawaii.

Roger was a remarkably congenial, kind, and generous person. He was dedicated to his family and is survived by his wife Kathy and daughters Noelani and Kela. Roger was unfailingly optimistic, resilient, and an invaluable source of information on fruit flies, ecology, and many other topics. He was especially generous with his time; despite being very busy with research and travel, he was always willing to help others and did a lot to promote the careers of young entomologists. He was laid-back and pleasant and nearly all who met him became instant friends. Roger was an avid surfer, swimmer, biker, marathoner, and tri-athlete. He even ran the Boston and Honolulu marathons, and in 2005 notched an impressive 1hr 37 min time in a 10-mile race in Volcano, Hawaii. He is fondly remembered by those who knew him, leaves a legacy of research to future fruit fly researchers, and will be greatly missed.

—John D. Stark¹, Luc Leblanc², Ronald F.L. Mau³, and Nicholas C. Manoukis⁴

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