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NEWS RELEASE

Understanding bug behaviour to tackle Africa's food challenges – UP's Prof Chris Weldon delivers inaugural lecture

From left to right: UP Vice-Principal Prof Loretta Feris, Prof Christopher Weldon, and Prof Barend Erasmus, Dean of UP's Faculty of Natural and Agricultural Sciences.

PRETORIA - A thorough understanding of insect physiology and ecology can influence sustainable farming practices throughout Africa in the future. This idea formed the basis of the recent inaugural lecture delivered by Professor Christopher Weldon, an entomologist in the Department of Zoology and Entomology at the University of Pretoria (UP).

Titled "Using Insect Behaviour and Temperature Responses for Precision Pest Management and African Food Security", Prof Weldon's impactful address focused on how better knowledge about the biology of tiny pests could solve some of Africa's most significant agricultural challenges.

"Africa's population is surging toward 3.8 billion by the century's end, and the demand for nutritious food will increase too," he said. "But this doesn't have to come at the expense of ecosystems. If we can manage insect pests

with greater precision, we can simultaneously protect food systems, biodiversity and livelihoods."

The primary focus of his research is on developing better, more sustainable pest management approaches, taking into account insect behaviour, temperature sensitivity, water requirements and nutrition. Using this information, Prof Weldon and his research team create biologically-based control plans, surveillance systems and forecasting models to reduce the harm that pest species like thrips, fruit flies and citrus psyllids cause. Consider the Mediterranean fruit fly (*Ceratitis capitata*), one of the world's most widely distributed and damaging agricultural pests. According to Prof Weldon, these insects rot fruit from the inside out using their gut microbiota, making it unmarketable before it leaves the farm. They spread quickly; under the right conditions, they can produce up to 12 generations in a year, he explained.

"We must comprehend the biology of pests to effectively control them," Prof Weldon said. "To effectively control pests, we need to understand their biology in detail – everything from their mating behaviours and thermal tolerance to how they respond to lures and environmental cues."

Temperature is critical. It has an impact on every aspect of insect life, including metabolism, reproduction and flight activity. According to his team's research, insect populations exhibit varying behaviours based on their local environments, necessitating customised solutions. To reduce pesticide use and its adverse effects on the environment, Prof Weldon's laboratory can now identify pest hotspots and vulnerable periods through machine-learning and spatial mapping.

His academic accomplishments outside the lab are equally remarkable: he's had more than 80 peer-reviewed journal articles published and has an H-index of 24. Prof Weldon has also supervised 18 master's students (six with distinction) and seven PhD candidates, mentoring them in his core areas of expertise and across diverse research interests. He attributes much of his success to his collaborators, students and the farming communities that allow him access to their land for research trials.

The lecture concluded with reflections on future goals, including advancing the sterile insect technique and exploring how climate change could affect pest physiology and food production systems.

"We're just scratching the surface," Prof Weldon said. "But if we keep asking the right questions – and listening to the insects – we might find smarter, more sustainable answers."

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ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on its Hatfield Campus in Pretoria. This 115-year-old institution is also one of the largest producers of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business

Science (GIBS). It is the only university in the country with a Faculty of Veterinary Science, which is ranked the best in Africa. UP has 120 academic departments and 92 centres and institutes, accommodating more than 56 000 students and offering about 1 100 study programmes. It has the most academic staff with PhDs (70%), NRF-rated researchers (613).

The 2025 Times Higher Education subject rankings placed UP first in South Africa in the fields of Accounting and Finance; Architecture; Electrical and Electronic Engineering; Law; Sport Science; and Veterinary Science. UP's Faculty of Law has been ranked as the top law school in Africa for a remarkable eighth consecutive year.

Quacquarelli Symonds (QS) ranked the University among the top five in Africa, as part of their 2024 World University Rankings (WUR). UP was the only South African university featured in the 2023 World University Rankings for Innovation (WURI), falling within in the 101-200 range of innovative universities.

For more information, please go to www.up.ac.za