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THE STORY OF BIOPESTICIDE RESEARCH-FOR-DEVELOPMENT AT *ICIPE*

Arthropod pests and vectors constrain the livelihood opportunities of people in Africa by debilitating production of crops and livestock and through transmission of vector-borne diseases. In the absence of effective alternative management options to tackle these pests and vectors, there is extensive dependence on synthetic pesticides for their management on crop and livestock systems, with significant negative impacts on animal and human health, and the environment.

Biopesticides are effective and environmentally sustainable alternatives to synthetic pesticides. The International Centre of Insect Physiology and Ecology (*icipe*) has engaged in biopesticide research-for-development since the 1970s. In September 2020, scientists at *icipe* published an open-access article in *Frontiers in Sustainable Food Systems* that provides the story of the Centre's research-for-development efforts in developing biopesticides. The article, 'Biopesticide research and product development in Africa for sustainable agriculture and food security – experiences from the International Centre of Insect Physiology and Ecology (*icipe*)', by Akutse et al., is available at <https://www.frontiersin.org/articles/10.3389/fsufs.2020.563016/full>

Underpinned by a large repository of arthropod pathogens, protocols for lab bioassays and field efficacy testing, and effective public-private partnerships to generate new biopesticide products, three biopesticides based on *Metarhizium anisopliae* strains have been commercialized for Africa by Real IPM (Thika, Kenya) and are used on 132,994 ha. Registration of additional products against animal ticks and the fall armyworm *Spodoptera frugiperda* are pending. *icipe*'s R4D activities on arthropod pathogens increasingly include bacteria, microsporidia, entomopathogenic nematodes and viruses.

Recently, the Centre is expanding research-for-development toward plant endophytes and rhizosphere inhabitants, and increasing its understanding of the diversity, roles and possible exploitation of insect symbionts in key plant pest and disease vectors. In addition, key entomopathogens of reared insects for human food and animal feed are a new focus of interest, together with integrating biopesticides with other integrated pest management (IPM) technologies as well as pollination services.

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THE WILD COCHINEAL OF CACTUS SPREADING FAST IN MENA REGION AND EAST AFRICA

Cactus pear (*Opuntia ficus indica* L.) is an important food and feed crop for small farmers in the Middle East, North Africa (MENA) and East Africa. The cactus fruit is used for human consumption, as a dye, and in cosmetic products, while the pads are used as animal feed. Cactus has an important role in soil and biodiversity conservation, and as an alternative source of flowers for bee keeping during droughts. Unfortunately, this crop is now threatened by an invasive cochineal species, *Dactylopius opuntiae*, that was reported for the first time in Morocco in September 2014. This pest has now spread to several regions of Morocco, central, southern



and eastern part of the country. In Ethiopia the cochineal, *Dactylopius coccus*, which invaded the country in 2004, has infested 16,000 ha of cactus in Tigray region, with devastating damage (picture on the left) and threatening the livelihood of over 200,000 households who depend on this crop as their livelihood from their food, income and animal feed. In Lebanon the wild cochineal,

D. opuntiae, was introduced accidentally in 2012 in the South of the country in the region of Nabatieh. The survey conducted in 2014 showed that this newly introduced species is widespread and new infestations were observed in the region of Jezzine and Chouf. The wild cochineal has also been recently discovered in northern part of Jordan in 2018, and since then has been spreading to other regions of the country. Even though the females of the cochineal do not move once they land on the cactus cladodes, their nymphs, however, are very mobile and could disperse through different means: wind, animals and straw movement among regions etc...

With the actual rate of spread, and if no control and quarantine measures are implemented, the cochineal infestations could wipe out cactus in MENA region and East Africa; this would have severe negative impact on the livelihood of rural populations and the environment. Thus, national and international efforts are needed to strengthen quarantine measures within and across countries to limit the spread of this invasive pest. In collaboration with the National Institute of Agronomic Research (INRA) and the International Center for Agricultural Research in the Dry Areas (ICARDA), good progress has been made in Morocco to develop integrated pest management options for the control of the cochineal. Eight resistant genotypes have been identified and are being multiplied in different regions of the country for distribution to farmers. In addition, several indigenous plant extracts and other biodegradable products have shown high level of control on the different stages of the pest.

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NEW WEBINARS ON THE SAFE USE OF PESTICIDES

The Feed the Future Innovation Lab for Integrated Pest Management (IPM IL) at Virginia Tech is collaborating with Cultivating New Frontiers in Agriculture (CNFA) on facilitating webinars on the safe use of pesticides in the developing world. While the CNFA Farmer-to-Farmer program typically sends U.S.-based volunteers to deliver training in-person in its focus countries, the rise of COVID-19 prompted the program to disseminate information virtually. Participants in the webinars include extension professionals, the private sector, research organizations, farmer associations, government officials, and more across both Africa and Asia, combining both programs' stakeholders.

In developing countries, synthetic chemical pesticides are a common method for combatting crop pests and disease; however, the sale of banned and expired products, limited access to personal protective equipment, and lack of knowledge about exposure can put human and plant health at risk. The IPM IL-CNFA webinars emphasize an Integrated Pest Management (IPM) approach and increased awareness about pesticide safety as a pathway to resilience.

The webinars include information on:

- Risks and benefits of pesticide use
- Consequences of pesticide exposure, including routes of exposure, acute and chronic consequences on human health, and first aid response, and environmental effects of pesticides
- Ways to reduce the risk of pesticide exposure to humans and the environment through IPM and use of correct types, amounts, and preparations
- Ways to reduce the risk of pesticide exposure through safe application, respect of Re-entry Intervals (REIs), cleanup of equipment and spills, and correct storage and disposal
- Understanding pesticide residues, Post-Harvest Intervals (PHIs), and post-harvest washing

The webinars are delivered by Tim McCoy, an Extension Associate in the Virginia Tech Pesticide Programs, where he develops pesticide safety educational materials focused on protecting non-target species. McCoy has been a member of the Virginia Tech Entomology department for 17 years.

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FIRST ANNOUNCEMENT: 24TH MEETING AND SCIENTIFIC CONFERENCE OF AAIS



The African Association of Insect Scientists (AAIS) serves persons and institutions interested in the promotion of insect science and its application in the African Region. AAIS is happy to announce its 24th Scientific Conference in collaboration with Addis Ababa University, Ethiopia,

to be held 22 - 26 November 2021 in Addis. The theme of the conference: “*Migratory and Invasive Pests: Early Warning System, Monitoring, Control and their Impact on Food Security and Livelihoods after the COVID-19 pandemic*”.

The scientific program will include an inaugural conference, seven plenary sessions and scientific presentations in relation to the respective sub themes. Members are encouraged to organize round-tables/symposia, provided thematic focus.

More details on sub-themes and side events, and registration form available on:
https://drive.google.com/file/d/1AkjUilVi_KiPm8sf2gFg5plQPxIlgED8/view

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IAPPS Mission: to provide a global forum for the purpose of identifying, evaluating, integrating, and promoting plant protection concepts, technologies, and policies that are economically, environmentally, and socially acceptable.

It seeks to provide a global umbrella for the plant protection sciences to facilitate and promote the application of the Integrated Pest Management (IPM) approach to the world's crop and forest ecosystems.

Membership Information: IAPPS has four classes of membership (individual, affiliate, associate, and corporate) which are described in the IAPPS Web Site www.plantprotection.org.

The *IAPPS Newsletter* welcomes news, letters, and other items of interest from individuals and organizations. Address correspondence and information to:

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