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Agriculture is critically important for African societies and economies, but ensuring food security for Africa's growing population is a major challenge due to climate change, structural changes in land use and management, and intensification of agriculture, including the use of pesticides. Of particular concern is a group of insecticides called 'neonicotinoids'. These pesticides render all parts of a plant toxic to all insects and are highly water soluble, meaning they contaminate the soil and water bodies. Therefore they expose all insects and also other organisms to toxic substances. But not all insects are pests. Insects provide a broad range of important 'ecosystem services', such as pollination, soil development, and natural pest control (where some insect species keep others in check), and are an integral part of sustainable agriculture. Neonicotinoid insecticides have been shown to contribute to the loss of ecosystem services from pollinators and other insects in Europe and elsewhere, and several of them have been banned in the EU and other countries, due to their harmful effect on beneficial insects.

The InterAcademy Partnership (IAP) and the Network of African Science Academies (NASAC) collaborated in a study to examine the implications of neonicotinoid insecticide use for ecosystem services and sustainable agriculture in Africa. The study was conducted between October 2018 and October 2019 and involved two workshops with leading expert scientists from 17 African countries, as well as an extensive review of relevant African research. This activity was stimulated by a study on the impact of neonicotinoids on agriculture and ecosystem services in Europe by the association of the National Science Academies of Europe (European Academies' Science Advisory Council, EASAC), which contributed to subsequent legislation to ban neonicotinoids in Europe.

Maintaining the biodiversity that supports ecosystem services such as pollination and natural pest control is critical to the sustainability of African agriculture, to ensure food security and its contribution to African economies and supporting rural communities. In addition, biodiversity provides resilience against climate change and other environmental pressures.

This study concludes that it is urgent to act now to prevent further deterioration in the sustainability of African agriculture and in African biodiversity from indiscriminate and preventative use of neonicotinoids. While the focus here is on the neonicotinoid insecticides, alternative insecticides that deploy the same non-selective neurotoxic effects are already entering the market and should be subject to the same level of scrutiny for potential side effects on non-target organisms and the ecosystem services they provide.

"We need to address tensions between agricultural intensification and Africa's rich and abundant biodiversity and ecosystem services. Overall, this review concludes that stricter regulation of insecticides is required across Africa and that good agricultural practices in plant protection should be promoted to ensure sustainable

agriculture that protects the environment, human health and biodiversity" says Prof Baldwin Torto of ICIPE Kenya, a chemical ecologist and member of the expert group.

"Ensuring food security within a sustainable agricultural system requires farmers to be provided with the expertise to minimise pesticide use and ensure that, when used, they are applied in as safe a manner as possible: it's time for an ecological intensification" adds Prof Christian Pirk of the University of Pretoria leading expert on honeybee behaviour. "Such 'extension services' should provide expert advice independently of pesticide manufacturers and suppliers/traders."

Among the recommendations put forward in the report is that national governments and international funding agencies should substantially strengthen the provision of research, advice and training on sustainable agriculture in national agricultural research institutes and extension services. Better coordination of existing scientific resources, including development of regional centres of expertise, is needed to support development of policies protecting ecosystem services and the sustainability of African agriculture.

"Science has many solutions to offer to agricultural development and innovation. We need to strengthen and better use the existing potential and scientific resources in Africa, to coordinate and create synergies, so we can tackle common research priorities. Food security and agricultural sustainability are top priorities for Africa, and we need science-based policies to achieve this." emphasises Dr Enock Dankyi from the University of Ghana, an expert on environmental pollutants.

There are significant opportunities now to act on existing knowledge about the harmful effects of neonicotinoids, to protect ecosystem services and thus African biodiversity and agricultural sustainability. This review urges further scientific and political engagement with the issues raised, and for development of solutions at national, regional and continental levels.

From 12 November 2019, the report is available for download at <http://www.interacademies.org/57888/neonicotinoids>. Until then the report may be accessed via the following hidden link: www.interacademies.org/58107/EmbragoedNeonics.

More about the Network of African Science Academies

The Network of African Science Academies (NASAC) was established on 13 December 2001 in Nairobi, Kenya, under the auspices of the InterAcademy Panel (IAP), now known as the InterAcademy Partnership. NASAC is a consortium of merit-based science academies in Africa and aspires to make the "voice of science" heard by policymakers and decision-makers within Africa and worldwide. NASAC is dedicated to enhancing the capacity of existing national science academies and champions the cause for creation of new academies where none exist.

More about the Academy of Science of South Africa

The Academy of Science of South Africa (ASSAf) is one of the founding members of NASAC. ASSAf was inaugurated in May 1996 by the former President of South Africa and patron of the Academy, Nelson Mandela. The mandate of the Academy encompasses all fields of scientific enquiry and it includes the full diversity of South Africa's distinguished scientists. ASSAf is the official national Academy of Science of

South Africa and represents the country in the international community of science academies.

More about the InterAcademy Partnership

Under the umbrella of the InterAcademy Partnership (IAP), 140 national and regional member academies work together to support the vital role of science and its efforts to seek solutions to the world's most challenging problems. IAP's member academies are merit-based and typically independent of government, allowing them to provide authoritative evidence to inform policy and decision-making. IAP member academies represent more than 30,000 of the world's most respected scientific, medical and engineering leaders in over 100 countries across Africa, the Americas, Asia-Pacific and Europe.

For more information see www.interacademies.org and follow @IAPartnership on Twitter.

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