NINE-POINT-ACTION PLAN AGAINST INSECT DECLINE – THE SCIENTIFIC PERSPECTIVE*

Insects are the most speciose group of animals on Earth and they play an essential role in ecosystem functioning. The dramatic decline of insects in Central Europe has now reached alarming proportions. It is an indication of a global biodiversity crisis that has been looming for decades, and will have unpredictable economic and ecological consequences. During the first International Symposium on Insect Conservation at the Stuttgart State Museum of Natural History (19th October 2018), the causes for the current insect decline were discussed based on latest research results. The aim of the symposium was to suggest tangible solutions and to develop recommendations for decision-makers in politics.

We, the speakers of the International Symposium on Insect Conservation, support the recent discussion proposals concerning an "action programme against insect decline" for the Federal Government made by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. We consider the following measures particularly important, as they could in our view effectively counteract the causes of insect decline. The implementation of these measures requires close cooperation between all key actors from politics, industry, agriculture, nature conservation, science and society if we are to overcome one of the greatest social challenges of the 21st century.

1. Limiting the agricultural use of pesticides

a) The authorisation procedure for pesticides requires modification. Evaluation of pesticide toxicity needs to be complemented by an analysis of indirect lethal impairment and long-term effects on the ecosystem. Criteria currently used (e.g. LD50) are inadequate and deceptive. Ecological "collateral damage" has to be included in the evaluation of the damaging effects of insecticides, whereby the precautionary principle must be applied not only to humans and livestock but also to the biotic and abiotic components of the natural environment. A better research and risk assessment of the possible combined effects of pesticides is urgently needed.

b) The Plant Protection Act should be altered, prohibiting any preventive plant protection, in particular seed coating and precautionary spraying without previous detection of pest or insect infestations.

c) Neonicotinoids and pesticides with similar modes of action should be prohibited entirely in the field. The use of all other chemical pesticides should be reduced to a maximum of 20% of their current usage.

d) Non-selective broad-spectrum herbicides such as glyphosate should be banned entirely and with immediate effect in protected areas, buffer zones, biotope connective corridors as well as in public and private green spaces, since they eliminate the basis for species-rich food webs. In all other areas, the use of glyphosate should be terminated gradually within the next five years.

2. Extensification of farming

a) EU agricultural subsidies should be altered so that direct support schemes are linked to ecological services.
b) The proportion of fallow areas should be increased urgently. In order to tackle the decline of insects, especially on a larger scale, it would be beneficial to strategically select and acquire areas in regions of particularly intensive farming and to return them to nature.
c) The proportion of agricultural land that is farmed organically should be increased as quickly as possible to at least 20%. The conversion to organic farming should be promoted as a priority in protected areas, in buffer zones and in biotope connective corridors.
d) Criteria for ecological priority areas need to be reviewed instantly and adapted regarding their relevance for nature conservation. The proportion of ecological priority areas should be increased from 5% to 10-20%.
e) Nutrient surpluses in landscapes must be limited effectively. To this end, compliance with needs-based fertilisation must be insisted on. Violations of the amended Fertilisers Regulation should be sanctioned.
f) Smaller fields with structurally diverse field edges and hedges should be subsidised to a greater extent. In addition, improved landscape planning is needed to design biotope connective corridors with appropriate connecting elements. Ecological measures should be implemented primarily in landscapes that are already without diverse structure or cleared out.

3. Increasing grassland biodiversity

a) The further decline in grassland areas, which currently account for around 30% of agricultural land, must be stopped immediately.
b) The introduction of insect-friendly mowing practices and techniques is a basic premise for the development of diverse insect and plant communities in grassland. This includes adhering to a "10-10 rule", i.e. leaving 10% of the meadow unmowed (even during wintertime) and a mowing height of at least 10 cm. Resulting economic losses are to be compensated financially.
c) The use of mulching equipment and hay conditioners must be reduced to an absolute minimum.

4. Maintenance of conservation areas

a) Habitat requirements of insects and other invertebrates should be taken into account for the maintenance of nature conservation areas. This also includes more insect-friendly mowing (see point 3) and the involvement of scientists.
b) The budget of nature conservation authorities needs to be increased immediately. This ought to enable maintenance and management schemes in protected areas, which are perfectly adjusted to the conservation of local biodiversity and consider the special characteristics of local diversity.
c) All forms of land use (e.g. farmland) must be adequately integrated into the maintenance and management schemes of the conservation areas. Target concepts as seen from the perspective of biodiversity conservation should be clearly defined for various types of use.
d) The use of pesticides should be prohibited in conservation areas. In order to minimize pesticide contamination, appropriate buffer zones should be established between nature reserves and adjacent farmland.
e) The number of conservation areas and thus the proportion of total area for nature conservation should be increased through targeted purchasing of suitable land.

5. More nature in public space

a) Insect-friendly management concepts should be implemented on public green areas immediately. These should also be extended to commercial and private areas.

b) When planting, particularly in cities and towns, native plants, ideally those rich in nectar, should be used consistently instead of exotic plants (e.g. forsythia, thuja and cherry laurel). The additional costs should be paid for by new biodiversity programmes. Instead of "greener cities" the motto should be "more native flowering plants in the cities".

c) Large-scale conversion of mowing practices in public green spaces in urban and rural areas should move away from short-lawn management and towards extensive meadow management with a maximum of two mowing events per year, including the removal of the mowed material only after a few days. Meadows in public areas should be replanted using native seeds indigenous to the region.

d) In road construction, insect-friendly roadsides should be planted using autochthonous seeds and adhering to an extensive mowing practice.

6. Light pollution

Illumination with a high proportion of blue light attracts numerous insects from the natural environment, with a negative "vacuum cleaner" effect on the ecosystem. Therefore, from an ecological and economic point of view, the use of LED street lights should be promoted. Instead of the decision frequently made by local authorities in favour of a colour temperature of 4000 Kelvin (white light), LED street lamps with a maximum colour temperature of 3000 Kelvin should be deployed. This colour temperature has been shown to attract fewer nocturnal insects. The sufficient brightness to meet the duty to maintain road safety is given at 2800 - 3000 Kelvin.

7. Research and education strategy

a) Knowledge of insect biodiversity in Germany is alarmingly low and needs to be expanded urgently. Risk assessments exist only for approximately one third of insect species, while for the majority of species basic data on their biology, distribution and role in local species communities are missing.

b) Germany needs a ‘taxonomy offensive’ to explore and document species diversity with new positions at natural history museums and universities. The taxonomic and faunistic expertise of freelance field biologists, as well as amateur entomologists, should be better valued and expanded. This would prevent both the further loss of basic biological knowledge and the decline in numbers of well-trained species experts.

c) Instead of further restricting biology lessons in schools, profound knowledge of species, an understanding of ecological relationships and the importance of biodiversity should once again be conveyed.

d) Comprehensive long-term insect monitoring must become a sovereign task of the respective states and serve as a basis for future nature conservation measures. Studies should not be limited to individual indicator groups but should take into account preferably as many species as possible with diverse ecological functions.

e) As archives of life, natural history collections will become increasingly important for modern biodiversity research and for monitoring projects. Sufficient financial and human resources should be made available for their further expansion and maintenance.

8. Promotion of wild pollinators

a) Critically endangered wild bees should be given a higher protection status in the Federal Species Protection Regulations according to the categories RL0, 1, 2, G and R. As a consequence, consideration of endangered wild bees would be mandatory in intervention and landscape planning.

b) Despite their ecological key function, wild bees are still not listed in the fauna and flora directive (Council Directive 92/43/EEC). At least the wild bee species that are considered vulnerable throughout Europe should be included in this directive, granting them conservation status in the EU.

c) The commercial breeding and releasing of honey bees, bumble bees, and other bees for pollination purposes needs to be better regulated. Stricter hygiene measures would prevent the spreading of diseases to wild pollinators. Initiatives to promote honey bees as measures for nature conservation are suitable only to a limited extent, as they can lead to food competition with wild pollinators, in particular when flower supply is low. Specific measures for wild bees and other wild pollinators are compulsory. An ecologically acceptable maximum number of honey bee colonies should be set, depending on the habitat. Within nature reserves and adjacent buffer zones, a ban on beekeeping should be taken into consideration whenever necessary.

9. Public relations

a) Everyone can and should contribute towards the prevention of further insect decline. This requires a new awareness, which considers the diversity of plants and animals in residential areas and public green spaces as a value in itself.

b) Monotonous lawns or gravel-sealed gardens and green spaces should not be viewed as "tidy" but as a contributor to further ecological impoverishment of our cities and communities. Unmanaged areas in parks and private gardens will turn into attractive natural spaces for citizens, especially for people with reduced mobility.

c) In order to initiate long-term rethinking among the general population, we must start with the youngest. Specific advanced training for teachers and educators would raise awareness of the issue in schools and draw children's attention away from their smartphones and towards what is crawling on the side of the road.

***Second, slightly revised version**

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Stuttgart, 19.10.2018