BUILDING THE EVIDENCE BASE: POLLINATOR RESEARCH PUBLICATIONS

The following are pollinator publications by Irish researchers in 2023. These scientists are part of the Irish Pollinator Research Network. Their work helps underpin the All-Ireland Pollinator Plan.

1. Alejandre E. M., Scherer L., Guinée J. B., Aizen M. A., Albrecht M., Balzan M. V.... Stout J. C., et al. (2023) **Characterization Factors to Assess Land Use Impacts on Pollinator Abundance in Life Cycle Assessment**. Environmental Science & Technology Vol. 57 Issue 8 Pages 3445-3454. DOI: 10.1021/acs.est.2c05311

2. Bottero I., Dominik C., Schweiger O., Albrecht M., Attridge E., Brown M. J. F., et al., Stout J. C. (2023) **Impact of landscape configuration and composition on pollinator communities across different European biogeographic regions**. Frontiers in Ecology and Evolution 11. https://doi.org/10.3389/fevo.2023.1128228

3. Burns K. L. W., Stanley D. A. (2023) **Irish faba beans (Fabales: Fabaceae) depend on wild bumblebee pollination for marketable yields**. Agricultural and Forest Entomology 25 (2): 312-322. DOI: https://doi.org/10.1111/afe.12553

4. Cullen M. G., Bliss L., Stanley D. A., Carolan J. C. (2023) **Investigating the effects of glyphosate on the bumblebee proteome and microbiota**. Science of The Total Environment 864: 161074. DOI: https://doi.org/10.1016/j.scitotenv.2022.161074

5. Díaz M. A., O'Connell D. P., Jordan S., O'Connor C., Martin P., Jones J. C., Garvey J. (2023) **Analysis of Pesticide Levels in Honey and Pollen from Irish Honey Bee Colonies Using a Modified Dutch Mini-Luke Method with Gas and Liquid Chromatography–Tandem Mass Spectrometry Detection**. Journal of Agricultural and Food Chemistry 71 (34) 12657-12667. DOI: 10.1021/acs.jafc.3c02250

6. Dirilgen T., Herbertsson L., O'Reilly A. D., Mahon N., Stanley D. A. (2023) **Moving past neonicotinoids and honeybees: A systematic review of existing research on other insecticides and bees.** Environmental Research 235: 116612. DOI: https://doi.org/10.1016/j.envres.2023.116612

7. Dozier E., Straw E. A., Stanley D. A. (2023) **Systematic review of cuckoo bumblebee research reveals data gaps and understudied species.** Ecological Entomology 48 (6): 636-649. DOI: https://doi.org/10.1111/een.13260

8. Eakins J., Lynch M., Carolan J. C., Rowan N. J. (2023) **Studies on the novel effects of electron beam treated pollen on colony reproductive output in commercially-reared bumblebees (Bombus terrestris) for mass pollination applications**. Science of The Total Environment 899: 165614. DOI: https://doi.org/10.1016/j.scitotenv.2023.165614

9. Franchini P., Fruciano C., Wood T. J., Shastry V., Goulson D., Hughes W. O. H., Jones J. C. (2023) **Limited introgression from non-native commercial strains and signatures of**

adaptation in the key pollinator Bombus terrestris. Molecular Ecology 32 (21) 5709-5723. https://doi.org/10.1111/mec.17151

10. Henty Williams J… Knapp J. L., et al. (2023). **Roadmap for action on the environmental risk assessment of chemicals for insect pollinators** (IPol-ERA). *EFSA Journal*. 10.2903/sp.efsa.2023.EN-8431

11. Karbassioon A., Stanley D. A. (2023) **Exploring relationships between time of day and pollinator activity in the context of pesticide use.** Basic and Applied Ecology 72: 74-81. DOI: https://doi.org/10.1016/j.baae.2023.06.001

12. Karbassioon A., Yearlsey J., Dirilgen T., Hodge S., Stout J.C., Stanley D. A. (2023) **Responses in honeybee and bumblebee activity to changes in weather conditions.** Oecologia 201 (3): 689-701. https://link.springer.com/article/10.1007/s00442-023-05332-x

13. Kavanagh, S., Phelan, N. Rodriguez-Gasol, N. O'Brien, S., Stout, J., Fitzpatrick, Ú. (2023) **Protecting Farmland Pollinators: Whole Farm Scorecard - Experiences and Recommendations.** Journal of Pollination Ecology, Accepted

14. Knapp J., Nicholson C. C., Jonsson O., de Miranda J. R., Rundlöf M. (2023) **Ecological traits interact with landscape context to determine bees' pesticide risk.** Nature Ecology & Evolution 7 (4): 547-556. DOI: 10.1038/s41559-023-01990-5

15. Knapp J., Sciarretta A. (2023) **Agroecology: protecting, restoring, and promoting biodiversity.** BMC Ecology and Evolution 23 (1): 29. DOI: 10.1186/s12862-023-02140-y

16. Larkin M., Stanley D. A. (2023) **Impacts of local and landscape grassland management on the structure of plant-pollinator networks**. Basic and Applied Ecology 70: 50-59. DOI: https://doi.org/10.1016/j.baae.2023.04.003

17. Larragy S. J., Möllmann J. S., Stout J. C., Carolan J. C., Colgan T. J. (2023) **Signatures of Adaptation, Constraints, and Potential Redundancy in the Canonical Immune Genes of a Key Pollinator.** Genome Biology and Evolution 15 (4) https://doi.org/10.1093/gbe/evad039

18. Leclercq N… Dirilgen T., Stanley D.A., et al. (2023) **Global taxonomic, functional, and phylogenetic diversity of bees in apple orchards**. Science of the Total Environment, 901: 165933.

19. McCann M., McCormack G. P. (2023) **Increased levels of introgression evident in Irish honey bees.** Journal of Apicultural Research https://doi.org/10.1080/00218839.2023.2262872

20. Nicholson C. and Knapp J. L., Hodge S., Stout J.C., et al. (2023). **Agricultural pesticide use negatively affects bumble bee colonies across Europe**. Nature, Accepted.

21. O'Reilly A. D., Stanley D. A. (2023) **Non-neonicotinoid pesticides impact bumblebee activity and pollen provisioning**. Journal of Applied Ecology 60 (8): 1673-1683. DOI: https://doi.org/10.1111/1365-2664.14444

22. O'Reilly A. D., Stanley D. A. (2023) **Solitary bee behaviour and pollination service delivery is differentially impacted by neonicotinoid and pyrethroid insecticides**. Science of The Total Environment 894: 164399. DOI: https://doi.org/10.1016/j.scitotenv.2023.164399

23. Russo L., Ruedenauer F., Gronert A., Van de Vreken I., Vanderplanck M., Michez D., Klein A., Leonhardt S., Stout J.C. (2023) **Fertilizer and herbicide alter nectar and pollen quality with consequences for pollinator floral choices**. PeerJ 11: e15452. DOI: 10.7717/peerj.15452 https://peerj.com/articles/15452/

24. Smith S., Moro A., McCormack G. P. (2023). **Exploring a Potential Avenue for Beekeeping in Ireland: Safeguarding Locally Adapted Honeybees for Breeding Varroa-Resistant Lines**. Insects 14: 827. https://doi.org/10.3390/insects14100827

25. Straw, E.A., Stanley, D.A. (2023) **Weak evidence base for bee protective pesticide mitigation measures**. Journal of Economic Entomology, 116: 1604-1612.

26. Thompson L. J., Stout J. C., Stanley D. A. (2023) **Contrasting effects of fungicide and herbicide active ingredients and their formulations on bumblebee learning and behaviour**. Journal of Experimental Biology 226 (6) https://doi.org/10.1242/jeb.245180

27. Vickneswaran M., Carolan J. C., Saunders M., White B. (2023) **Establishing the extent of pesticide contamination in Irish agricultural soils**. Heliyon 9 (9) https://www.cell.com/heliyon/pdf/S2405-8440(23)06624-0.pdf

28. Willcox B., Potts S. G., Brown M. J. F., Alix A., Al Naggar Y., Chauzat M.-P. … Knapp J. L., et al. (2023) **Emerging threats and opportunities to managed bee species in European agricultural systems: a horizon scan**. Scientific Reports 13 (1): 18099. DOI: 10.1038/s41598-023-45279-w

29. Zioga E., White B., Stout J. C. (2023) **Honey bees and bumble bees may be exposed to pesticides differently when foraging on agricultural areas**. Science of The Total Environment 896: 166214. DOI: https://doi.org/10.1016/j.scitotenv.2023.166214

30. Zioga E., White B., Stout J. C. (2023) **Pesticide mixtures detected in crop and non-target wild plant pollen and nectar**. Science of The Total Environment 879: 162971. DOI: https://doi.org/10.1016/j.scitotenv.2023.162971