Appendix 1

Reference ID no	Reference short	Reference complete	Year of publication	Article scope	Journal type	Number of cases	The article represents a study explicitly designed to evaluate the causal link between bird biodiversity and pest control?								
1	Barbaro et al. 2017	Barbaro, L., Rusch, A., Muiruri, E. W., Gravellier, B., Thiery, D., & Castagneyrol, B. (2017). Avian pest control in vineyards is driven by interactions between bird functional diversity and landscape heterogeneity. Journal of applied ecology, 54(2), 500-508.	2017	Agroecology	Applied Ecology	4	Yes								
2	Heath & Long, 2019	Heath, S. K., & Long, R. F. (2019). Multiscale habitat mediates pest reduction by birds in an intensive agricultural region. Ecosphere, 10(10), e02884.	2019	Agroecology	Generic	1	No								
3	Kolkert et al. 2021	Kolkert, H. L., Smith, R., Rader, R., & Reid, N. (2021). Prey removal in cotton crops next to woodland reveals periodic diurnal and nocturnal invertebrate predation gradients from the crop edge by birds and bats. *Scientific Reports*, *11*(1), 5256. https://doi.org/10.1038/s41598-021-84633-8	2021	Agroecology	Generic	2	No								
4	Koranyi et al. 2025	Korányi, D., Zsebők, S., Báldi, A., Brambilla, M., Varga, M., & Batáry, P. (2025). Forest cover enhances pest control by birds and bats independently of vineyard management intensity. *Journal of Applied Ecology*.	2025	Agroecology	Applied Ecology	1	No								
5	Kross et al. 2016	Kross, S. M., Kelsey, T. R., McColl, C. J., & Townsend, J. M. (2016). Field-scale habitat complexity enhances avian conservation and avian-mediated pest-control services in an intensive agricultural crop. *Agriculture, Ecosystems & Environment*, *225*, 140–149. https://doi.org/10.1016/j.agee.2016.03.043	2016	Agroecology	Specialized	2	No								
6	Maas et al. 2015	Maas, B., Tscharntke, T., Saleh, S., Dwi Putra, D., & Clough, Y. (2015). Avian species identity drives predation success in tropical cacao agroforestry. *Journal of Applied Ecology*, *52*(3), 735-743.	2015	Agroecology	Applied Ecology	2	No								
7	Martinez-Nuñez et al. 2020	Martínez-Núñez, C., Rey, P. J., Manzaneda, A. J., Tarifa, R., Salido, T., Isla, J., Pérez, A. J., Camacho, F. M., & Molina, J. L. (2020). Direct and indirect effects of agricultural practices, landscape complexity and climate on insectivorous birds, pest abundance and damage in olive groves. *Agriculture, Ecosystems & Environment*, *304*, 107145. https://doi.org/10.1016/j.agee.2020.107145	2020	Agroecology	Specialized	2	No								
8	Martínez-Salinas et al. 2016	Martínez-Salinas, A., DeClerck, F., Vierling, K., Vierling, L., Legal, L., Vílchez-Mendoza, S., & Avelino, J. (2016). Bird functional diversity supports pest control services in a Costa Rican coffee farm. Agriculture, Ecosystems & Environment, 235, 277-288.	2016	Agroecology	Specialized	3	Yes								
9	Martínez-Sastre et al. 2020	Martínez-Sastre, R., Miñarro, M., & García, D. (2020). Animal biodiversity in cider apple orchards: Simultaneous environmental drivers and effects on insectivory and pollination. Agriculture, Ecosystems & Environment, 295, 106918.	2020	Agroecology	Specialized	4	Yes								
10	Milligan et al. 2016	Milligan, M. C., Johnson, M. D., Garfinkel, M., Smith, C. J., & Njoroge, P. (2016). Quantifying pest control services by birds and ants in Kenyan coffee farms. *Biological Conservation*, *194*, 58–65. https://doi.org/10.1016/J.BIOCON.2015.11.028	2016	Biodiversity and Conservation	Specialized	2	No								
11	Otieno et al. 2019	Otieno, N. E., Jacobs, S. M., & Pryke, J. S. (2019). Maize field complexity and farming system influence insectivorous birds' contribution to arthropod herbivore regulation. Biotropica, 51(6), 851–861. https://doi.org/10.1111/btp.12701	2019	Biodiversity and Conservation	Specialized	1	No								
12	Peisley et al. 2016	Peisley, R. K., Saunders, M. E., & Luck, G. W. (2016). Cost-benefit trade-offs of bird activity in apple orchards. *PeerJ*, *4*, e2179. https://doi.org/10.7717/peerj.2179	2016	Agroecology	Generic	1	No								
13	Peña et al. 2023	Peña, R., Schleuning, M., Miñarro, M., & García, D. (2023). Variable relationships between trait diversity and avian ecological functions in agroecosystems. Functional Ecology, 37(1), 87-98.	2023	Biodiversity and Conservation	Generic	2	Yes								
14	Philpott et al. 2009	Philpott, S. M., Soong, O., Lowenstein, J. H., Pulido, A. L., Lopez, D. T., Flynn, D. F., & DeClerck, F. (2009). Functional richness and ecosystem services: bird predation on arthropods in tropical agroecosystems. Ecological applications, 19(7), 1858-1867.	2009	Agroecology	Applied Ecology	3	Yes								

15	Razak et al. 2019	Razak, S. A., Saadun, N., Azhar, B., & Lindenmayer, D. B. (2020). Smallholdings with high oil palm yield also support high bird species richness and diverse feeding guilds. *Environmental Research Letters*, *15*(9), 094031.	2019	Biodiversity and Conservation	Generic	3	No								
16	Tela et al. 2021	Tela, M., Cresswell, W., & Chapman, H. (2021). Assessment of Pest Control Services by Vertebrates in Nigerian Subsistence Maize Farms. Conservation and Society, 19(4), 218–224. https://doi.org/10.4103/CS.CS_213_20	2021	Biodiversity and Conservation	Specialized	3	No								
17	Van Bael et al. 2008	Bael, S. A. V., Philpott, S. M., Greenberg, R., Bichier, P., Barber, N. A., Mooney, K. A., & Gruner, D. S. (2008). Birds as predators in tropical agroforestry systems. *Ecology*, *89*(4), 928-934.	2008	Biodiversity and Conservation	Generic	2	No								
18	Yahya et al. 2024	Yahya, M. S., Ibrahim, N. L., Kamarudin, N., Ahmad, S. N., Atikah, S. N., Sanusi, R., ... & Azhar, B. (2024). Higher avian biodiversity, increased shrub cover and proximity to continuous forest may reduce pest insect crop loss in small scale oil palm farming. *Journal of Applied Ecology*, *61*(6), 1255-1268.	2024	Agroecology	Applied Ecology	2	Yes								

Appendix 2

Reference ID no	Reference short	Reference complete	Year	Article scope	Journal type	Number of cases	The article represents a study explicitly designed to evaluate the net effects of trade-offs bewteen avain ecosystem services and
1	Borkhataria et al. 2012	Borkhataria, R. R., Nuessly, G. S., Pearlstine, E., & Cherry, R. H. (2012). Effects of Blackbirds (Agelaius phoenicius) on Stink Bug (Hemiptera: Pentatomidae) Populations, Damage, and Yield in Florida Rice. Florida Entomologist, 95(1), 143-149. https://doi.org/10.1653/024.095.0122	2012	Agroecology	Generic	3	No
2	Bouarakia et al. 2023	Bouarakia, O., Linden, V. M. G., Joubert, E., Weier, S. M., Grass, I., Tscharntke, T., Foord, S. H., & Taylor, P. J. (2023). Bats and birds control tortricid pest moths in South African macadamia orchards. Agriculture, Ecosystems & Environment, 352, 108527. https://doi.org/10.1016/j.agee.2023.108527	2023	Agroecology	Specialized	1	No
3	García et al. 2018	García, D., Miñarro, M., & Martínez-Sastre, R. (2018). Birds as suppliers of pest control in cider apple orchards: Avian biodiversity drivers and insectivory effect. Agriculture, Ecosystems & Environment, 254, 233-243. https://doi.org/10.1016/j.agee.2017.11.034	2018	Agroecology	Specialized	2	No
4	García et al. 2021	García, D., Miñarro, M., & Martínez-Sastre, R. (2021). Enhancing ecosystem services in apple orchards: Nest boxes increase pest control by insectivorous birds. Journal of Applied Ecology, 58(3), 465-475. https://doi.org/10.1111/1365-2664.13825	2021	Agroecology	Applied Ecology	1	No
5	Garfinkel and Johson 2015	Garfinkel, M., & Johnson, M. (2015). Pest-removal services provided by birds on small organic farms in northern California. Agriculture, Ecosystems & Environment, 211, 24-31. https://doi.org/10.1016/j.agee.2015.04.023	2015	Agroecology	Specialized	3	No
6	Garfinkel et al. 2020	Garfinkel, M., Minor, E. S., & Whelan, C. J. (2020). Birds suppress pests in corn but release them in soybean crops within a mixed prairie/agriculture system. The Condor, 122(2), duaa009. https://doi.org/10.1093/condor/duaa009	2020	Agroecology	Generic	2	Yes
7	Garfinkel et al. 2022a	Garfinkel, M. B., Fuka, M. E., Minor, E., & Whelan, C. J. (2022). When a pest is not a pest: Birds indirectly increase defoliation but have no effect on yield of soybean crops. Ecological Applications, 32(4), e2527. https://doi.org/10.1002/eap.2527	2022	Agroecology	Applied Ecology	2	Yes
8	Garfinkel et al. 2022b	Garfinkel, M., Minor, E., & Whelan, C. J. (2022). Using faecal metabarcoding to examine consumption of crop pests and beneficial arthropods in communities of generalist avian insectivores. Ibis, 164(1), 27-43. https://doi.org/10.1111/ibi.12994	2022	Agroecology	Generic	1	No
9	Gonthier et al. 2019	Gonthier, D. J., Sciligo, A. R., Karp, D. S., Lu, A., Garcia, K., Juarez, G., Chiba, T., Gennet, S., & Kremen, C. (2019). Bird services and disservices to strawberry farming in Californian agricultural landscapes. Journal of Applied Ecology, 56(8), 1948-1959. https://doi.org/10.1111/1365-2664.13422	2019	Agroecology	Applied Ecology	2	No
10	Gras et al. 2016	Gras, P., Tscharntke, T., Maas, B., Tjoa, A., Hafsah, A., & Clough, Y. (2016). How ants, birds and bats affect crop yield along shade gradients in tropical cacao agroforestry. Journal of Applied Ecology, 53(3), 953-963. https://doi.org/10.1111/1365-2664.12625	2016	Agroecology	Applied Ecology	2	No
11	Guenat et al. 2019	Guenat, S., Kaartinen, R., & Jonsson, M. (2019). Shade trees decrease pest abundances on brassica crops in Kenya. Agroforestry Systems, 93(2), 641-652. https://doi.org/10.1007/s10457-017-0159-5	2019	Agroecology	Specialized	2	No
12	Heath & Long. 2019	Heath, S. K., & Long, R. F. (2019). Multiscale habitat mediates pest reduction by birds in an intensive agricultural region. Ecosphere, 10(10), e02884. https://doi.org/10.1002/ecs2.2884	2019	Agroecology	Generic	1	No
13	Hohlenwerger et al. 2024	Hohlenwerger, C., Spake, R., Tambosi, L. R., Aristizábal, N., González-Chaves, A., Librán-Embid, F., Saturni, F., Eigenbrod, F., & Metzger, J.-P. (2024). Coffee pollination and pest control are affected by edge diversity at local scales but multiscalar approaches and disservices can not be ignored. Landscape Ecology, 39(4), 75. https://doi.org/10.1007/s10980-024-01869-1	2024	Agroecology	Generic	2	Yes
14	Iverson et al. 2019	Iverson, A. L., Gonthier, D. J., Pak, D., Ennis, K. K., Burnham, R. J., Perfecto, I., Ramos Rodriguez, M., & Vandermeer, J. H. (2019). A multifunctional approach for achieving simultaneous biodiversity conservation and farmer livelihood in coffee agroecosystems. Biological Conservation, 238, 108179. https://doi.org/10.1016/j.biocon.2019.07.024	2019	Biodiversity and Conservation	Specialized	1	No

15	Johnson et al. 2009	Johnson, M. D., Levy, N. J., Kellermann, J. L., & Robinson, D. E. (2009). Effects of shade and bird exclusion on arthropods and leaf damage on coffee farms in Jamaica's Blue Mountains. Agroforestry Systems, 76(1), 139-148. https://doi.org/10.1007/s10457-008-9198-2	2009	Agroecology	Specialized	2	No
16	Johnson et al. 2010	Johnson, M. D., Kellermann, J. L., & Stercho, A. M. (2010). Pest reduction services by birds in shade and sun coffee in Jamaica. Animal Conservation, 13(2), 140-147. https://doi.org/10.1111/j.1469-1795.2009.00310.x	2010	Biodiversity and Conservation	Specialized	1	No
17	Karp and Daily 2014	Karp, D. S., & Daily, G. C. (2014). Cascading effects of insectivorous birds and bats in tropical coffee plantations. Ecology, 95(4), 1065-1074. https://doi.org/10.1890/13-1012.1	2014	Agroecology	Applied Ecology	2	No
18	Karp et al. 2013	Karp, D. S., Mendenhall, C. D., Sandí, R. F., Chaumont, N., Ehrlich, P. R., Hadly, E. A., & Daily, G. C. (2013). Forest bolsters bird abundance, pest control and coffee yield. Ecology Letters, 16(11), 1339-1347. https://doi.org/10.1111/ele.12173	2013	Agroecology	Generic	1	No
19	Koh 2008	Koh, L. P. (2008). Birds Defend Oil Palms from Herbivorous Insects. Ecological Applications, 18(4), 821-825. https://doi.org/10.1890/07-1650.1	2008	Agroecology	Applied Ecology	1	No
20	Kross et al. 2012	Kross, S. M., Tylianakis, J. M., & Nelson, X. J. (2012). Effects of Introducing Threatened Falcons into Vineyards on Abundance of Passeriformes and Bird Damage to Grapes. Conservation Biology, 26(1), 142-149. https://doi.org/10.1111/j.1523-1739.2011.01756.x	2012	Biodiversity and Conservation	Specialized	1	Yes
21	Kross et al. 2016	Kross, S. M., Kelsey, T. R., McColl, C. J., & Townsend, J. M. (2016). Field-scale habitat complexity enhances avian conservation and avian-mediated pest-control services in an intensive agricultural crop. Agriculture, Ecosystems & Environment, 225, 140-149. https://doi.org/10.1016/j.agee.2016.03.043	2016	Agroecology	Specialized	1	No
22	Kross et al. 2020	Kross, S. M., Martinico, B. L., Bourbour, R. P., Townsend, J. M., McColl, C., & Kelsey, T. R. (2020). Effects of Field and Landscape Scale Habitat on Insect and Bird Damage to Sunflowers. Frontiers in Sustainable Food Systems, 4. https://doi.org/10.3389/fsufs.2020.00040	2020	Agroecology	Specialized	2	No
23	Librán-Embid et al. 2017	Librán-Embid, F., De Coster, G., & Metzger, J. P. (2017). Effects of bird and bat exclusion on coffee pest control at multiple spatial scales. Landscape Ecology, 32(9), 1907-1920. https://doi.org/10.1007/s10980-017-0555-2	2017	Agroecology	Generic	2	No
24	Linden et al. 2019	Linden, V. M. G., Grass, I., Joubert, E., Tscharntke, T., Weier, S. M., & Taylor, P. J. (2019). Ecosystem services and disservices by birds, bats and monkeys change with macadamia landscape heterogeneity. Journal of Applied Ecology, 56(8), 2069-2078. https://doi.org/10.1111/1365-2664.13424	2019	Agroecology	Applied Ecology	1	Yes
25	Maas et al. 2013	Maas, B., Clough, Y., & Tscharntke, T. (2013). Bats and birds increase crop yield in tropical agroforestry landscapes. Ecology Letters, 16(12), 1480-1487. https://doi.org/10.1111/ele.12194	2013	Agroecology	Generic	3	No
26	Martin et al. 2013	Martin, E. A., Reineking, B., Seo, B., & Steffan-Dewenter, I. (2013). Natural enemy interactions constrain pest control in complex agricultural landscapes. Proceedings of the National Academy of Sciences, 110(14), 5534-5539. https://doi.org/10.1073/pnas.1215725110	2013	Agroecology	Generic	3	Yes
27	Martin et al. 2015	Martin, E. A., Reineking, B., Seo, B., & Steffan-Dewenter, I. (2015). Pest control of aphids depends on landscape complexity and natural enemy interactions. PeerJ, 3, e1095. https://doi.org/10.7717/peerj.1095	2015	Agroecology	Generic	1	Yes
28	Martínez-Salinas et al. 2016	Martínez-Salinas, A., DeClerck, F., Vierling, K., Vierling, L., Legal, L., Vílchez-Mendoza, S., & Avelino, J. (2016). Bird functional diversity supports pest control services in a Costa Rican coffee farm. Agriculture, Ecosystems & Environment, 235, 277-288. https://doi.org/10.1016/j.agee.2016.10.029	2016	Agroecology	Specialized	1	No
29	Martínez-Salinas et al. 2022	Martínez-Salinas, A., Chain-Guadarrama, A., Aristizábal, N., Vilchez-Mendoza, S., Cerda, R., & Ricketts, T. H. (2022). Interacting pest control and pollination services in coffee systems. Proceedings of the National Academy of Sciences, 119(15), e2119959119. https://doi.org/10.1073/pnas.2119959119	2022	Agroecology	Generic	1	No
30	Martínez-Sastre et al. 2020	Martínez-Sastre, R., Miñarro, M., & García, D. (2020). Animal biodiversity in cider apple orchards: Simultaneous environmental drivers and effects on insectivory and pollination. Agriculture, Ecosystems & Environment, 295, 106918. https://doi.org/10.1016/j.agee.2020.106918	2020	Agroecology	Applied Ecology	1	No
31	Mayne et al. 2023a	Mayne, S. J., King, D. I., Andersen, J. C., & Elkinton, J. S. (2023). Crop-specific effectiveness of birds as agents of pest control. Agriculture, Ecosystems & Environment, 348, 108395. https://doi.org/10.1016/j.agee.2023.108395	2023	Agroecology	Specialized	6	No
32	Mayne et al. 2023b	Mayne, S. J., King, D. I., Andersen, J. C., & Elkinton, J. S. (2023). Pest control services on farms vary among bird species on diversified, low-intensity farms. Global Ecology and Conservation, 43, e02447. https://doi.org/10.1016/j.gecco.2023.e02447	2023	Biodiversity and Conservation	Specialized	1	No

33	Monteagudo et al. 2023	Monteagudo, N., Rey Benayas, J. M., Meltzer, J., & Rebollo, S. (2023). Assessing the influence of raptors on grape-eating birds in a Mediterranean vineyard. Crop Protection, 174, 106395. https://doi.org/10.1016/j.cropro.2023.106395	2023	Agroecology	Specialized	1	No
34	Ndang'ang'a et al. 2013	Ndang'ang'a, P. K., Njoroge, J. B. M., & Vickery, J. (2013). Quantifying the contribution of birds to the control of arthropod pests on kale, Brassica oleracea acephala, a key crop in East African highland farmland. International Journal of Pest Management, 59(3), 211-216. https://doi.org/10.1080/09670874.2013.820005	2013	Agroecology	Specialized	2	No
35	Olimpi et al. 2020	Olimpi, E. M., Garcia, K., Gonthier, D. J., De Master, K. T., Echeverri, A., Kremen, C., ... & Karp, D. S. (2020). Shifts in species interactions and farming contexts mediate net effects of birds in agroecosystems. Ecological Applications, 30(5), e02115.	2020	Agroecology	Applied Ecology	3	Yes
36	Olimpi et al. 2022	Olimpi, E. M., Garcia, K., Gonthier, D. J., Kremen, C., Snyder, W. E., Wilson-Rankin, E. E., & Karp, D. S. (2022). Semi-natural habitat surrounding farms promotes multifunctionality in avian ecosystem services. Journal of Applied Ecology, 59(4), 898-908. https://doi.org/10.1111/1365-2664.14124	2022	Agroecology	Applied Ecology	3	No
37	Orłowski et al. 2014	Orłowski, G., Karg, J., & Karg, G. (2014). Functional Invertebrate Prey Groups Reflect Dietary Responses to Phenology and Farming Activity and Pest Control Services in Three Sympatric Species of Aerially Foraging Insectivorous Birds. PLOS ONE, 9(12), e114906. https://doi.org/10.1371/journal.pone.0114906	2014	Agroecology	Generic	1	No
38	Peisley et al. 2016	Peisley, R. K., Saunders, M. E., & Luck, G. W. (2016). Cost-benefit trade-offs of bird activity in apple orchards. PeerJ, 4, e2179. https://doi.org/10.7717/peerj.2179	2016	Agroecology	Generic	1	Yes
39	Peisley et al. 2017	Peisley, R. K., Saunders, M. E., & Luck, G. W. (2017). Providing perches for predatory and aggressive birds appears to reduce the negative impact of frugivorous birds in vineyards. Wildlife Research, 44(4), 334-342. https://doi.org/10.1071/WR17028	2017	Agroecology	Applied Ecology	1	No
40	Serée et al. 2021	Serée, L., Gardarin, A., Crouzet, O., Barbottin, A., Valantin-Morison, M., & Chiron, F. (2021). Exploring multitrophic interactions in oilseed rape fields reveals the prevailing role of Carabidae. Ecology and Evolution, 11(21), 15377-15388. https://doi.org/10.1002/ece3.8229	2021	Agroecology	Generic	1	No
41	Shave et al. 2018	Shave, M. E., Shwiff, S. A., Elser, J. L., & Lindell, C. A. (2018). Falcons using orchard nest boxes reduce fruit-eating bird abundances and provide economic benefits for a fruit-growing region. Journal of Applied Ecology, 55(5), 2451-2460. https://doi.org/10.1111/1365-2664.13172	2018	Agroecology	Applied Ecology	1	No
42	Sottomayor et al. 2024	Sottomayor, M., Palmeirim, A. F., Meyer, C. F. J., De Lima, R. F., Rocha, R., & Rainho, A. (2024). Nature-based solutions to increase rice yield: An experimental assessment of the role of birds and bats as agricultural pest suppressors in West Africa. Agriculture, Ecosystems & Environment, 370, 109067. https://doi.org/10.1016/j.agee.2024.109067	2024	Agroecology	Specialized	3	No
43	Sow et al. 2020a	Sow, A., Seye, D., Faye, E., Benoit, L., Galan, M., Haran, J., & Brévault, T. (2020). Birds and bats contribute to natural regulation of the millet head miner in tree-crop agroforestry systems. Crop Protection, 132, 105127. https://doi.org/10.1016/j.cropro.2020.105127	2020	Agroecology	Generic	1	No
44	Sow et al. 2020b	Sow, A., Haran, J., Benoit, L., Galan, M., & Brévault, T. (2020). DNA Metabarcoding as a Tool for Disentangling Food Webs in Agroecosystems. Insects, 11(5), Article 5. https://doi.org/10.3390/insects11050294	2020	Agroecology	Generic	1	No
45	Tela et al. 2021	Tela, M., Cresswell, W., & Chapman, H. (2021). Assessment of Pest Control Services by Vertebrates in Nigerian Subsistence Maize Farms. Conservation & Society, 19(4), 218-224.	2021	Biodiversity and Conservation	Specialized	2	No
46	Tschumi et al. 2018	Tschumi, M., Ekroos, J., Hjort, C., Smith, H. G., & Birkhofer, K. (2018). Predation-mediated ecosystem services and disservices in agricultural landscapes. Ecological Applications, 28(8), 2109-2118. https://doi.org/10.1002/eap.1799	2018	Agroecology	Applied Ecology	1	Yes
47	Vasynghel et al. 2022	Vansynghel, J., Ocampo-Ariza, C., Maas, B., Martin, E. A., Thomas, E., Hanf-Dressler, T., Schumacher, N.-C., Ulloque-Samatelo, C., Yovera, F. F., Tscharntke, T., & Steffan-Dewenter, I. (2022). Quantifying services and disservices provided by insects and vertebrates in cacao agroforestry landscapes. Proceedings of the Royal Society B: Biological Sciences, 289(1982), 20221309. https://doi.org/10.1098/rspb.2022.1309	2022	Agroecology	Generic	1	Yes
48	Williams-Guillén et al. 2008	Williams-Guillén, K., Perfecto, I., & Vandermeer, J. (2008). Bats Limit Insects in a Neotropical Agroforestry System. Science, 320(5872), 70-70. https://doi.org/10.1126/science.1152944	2008	Agroecology	Generic	1	No