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Tracking DDT Levels in a New Zealand Starling Population, 1970-2013

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Abstract

An ecological study of an isolated population of European starlings living in 500 nest-boxes, ran from 1970 to 2020. DDT was widely used to control insect pests from about 1946 until it was banned on pastures in 1970. Most was applied from small aircraft. Many birds died after eating poisoned insects and earthworms, so samples of dead starlings were collected at five year intervals. These were analysed by Ministry of Agriculture scientists for DDT, DDE, and many other chemicals. At first residues declined as expected. Then a world-wide sampling of starling eggs from 30 countries in 2012 revealed some New Zealand DDE at near lethal levels, far higher than elsewhere. Complex food chains may be responsible.

Keywords: Ecological Study; Ministry of Agriculture scientists; Eggs

Introduction

In the 1930s, ryegrass / white clover became the basis of New Zealand pastures [1] and native insects, especially grass grub (Costelytra zealandica) and porina (Wiseana spp.), were major pests. When DDT became available sheep and cattle farmers spread it from tractors, but soon turned to specially designed aircraft.

Environmental problems, as DDT levels increased in food chains killing top predators like hawks and falcons, and water birds, led to much research. Six adult New Zealand falcons (Falco novaeseelandiae) averaged 11.7ppm, and Swamp harriers (Circus approximans), often preying on roadkill, ranged from 2.0 - 64.9 ppm [2]. The food eaten also affects mortality levels; earth worms carry high DDT levels in orchards, killing starlings but not mynas which avoid worms [3].

In Britain Moore and Walker record peaks of 36.0 ppm in a peregrine falcon (Falco peregrinus), 28.0 in a heron (Ardea cinerea), and 22.7 in a great crested grebe (Podiceps cristatus). Such findings world-wide led to its ban in 1970 [4].

Ecology Division, NZ Department of Scientific and Industrial Research, began studies of starlings in Hawke's Bay; and Belmont, 16km north-east of Wellington. The aim was to see if insect pasture pests could be kept down by these birds, a cheap form of biological control. Also in Hawke's Bay, Peter Wilson compared DDT levels in birds from orchards, which were still allowed to use DDT in 1980.

Methods

At Belmont, 41 10S, 147 54E, on the 1500 ha Waitangirua Farm Settlement block, 500 nest-boxes were set up in groups of 10 or 15 in old army munition bunkers. For a photograph of this area, and details of the study methods, see Flux, et al [5].

Starlings found dead were sent to NZ Ministry of Agriculture and Fisheries, who examined them to determine

the cause. Many died in the nest-boxes with very low DDT levels, which remained a mystery until two were found locked together with claws in each other's eye sockets [6].

This aggressive behaviour to obtain a nest-box increased as starling numbers rose from about 300 to level off at 3000.

Results

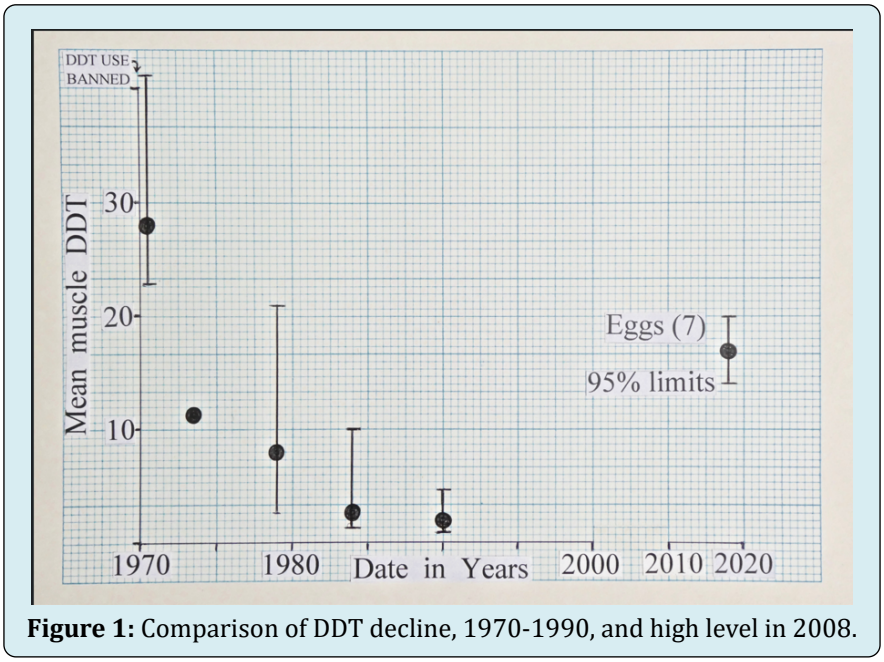

Figure 1: Comparison of DDT decline, 1970-1990, and high level in 2008.

The DDT averages and extremes for each five yearly sample are shown in Figure 1. from 1970, the year DDT use was banned. There was a rapid decline from 28ppm to 8ppm over nine years, followed by about 2ppm in 1984-1990.

By coincidence, Soren Svensson [7] reviewed a 1982 journal's record of heavy metals and organic pesticides, giving yearly DDE levels in dead starlings in South Sweden, 1967-75: 18 3.9 6.3 1.6 1.2 3.1 1.6 1.6 0.8ppm. These show a similar pattern to Figure 1, but declining earlier, and at lower levels See also Antarctica [8].

Discussion

The highest DDT levels were found in Hawke's Bay orchards which were still applying DDT every two weeks; mynas were not affected, but 5 starlings, 5 blackbirds, and 3 song thrushes, which eat earthworms, were found dying in tremors.

The critical level of DDT to kill starlings is in the 20-30ppm range, but the background level in soils is not uniform. Earthworms accumulate under rotting corpses, and if these were of mammals or birds high in the food-chain, starlings eating them would die. Thus adult New Zealand falcons averaged 11.7ppm, and Swamp harriers ranged from 2.0-64.9ppm [9-12].

Many food-chains are complex: DDT washed out to sea can affect small invertebrates, and work up an increasing size chain of fish to tuna, sharks, or dolphins. When these wash up on beaches, scavenging gulls can return the DDT to farmland.

Acknowledgements

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References

1. McLintock AH (1966) An Encyclopaedia of New Zealand. NZ Government publication v: 3.

2. Fox N, Lock J (1978) Organochlorine residues in New Zealand birds of prey. New Zealand Journal of Ecology 1: 118-125.

3. Wilson PR (1980) Effects on birds of spraying DDT and DDD in orchards. New Zealand Journal of Ecology 3: 117-124.

4. Carson R (1962) Silent Spring. Houghton Mifflin, USA, pp: 368.

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5. Flux J, Flux M (1981) Population dynamics and age structure of starlings (*Sturnus vulgaris*) in New Zealand. New Zealand Journal of Ecology 4: 65-72.

6. Flux J, Flux M (1992) Nature red in claw: how and why starlings kill each other. Notornis 39: 293-300.

7. Svensson S (1983) DDE in starlings in S Sweden. Var Fagelvarld 42: 131.

8. Brewerton H (1969) DDT in fats of Antarctic animals. New Zealand Journal of Science 12: 194-199.

9. Collett N, Harrison DL (1968) Some observations on the effects of using organochlorine sprays in an orchard. New Zealand Journal of Science 11(2): 371-379.

10. Eems M et al. (2013) Can starling eggs be useful as a biomonitoring tool to study organohalogenated contaminants on a worldwide scale?. Environment International 51: 141-149.

11. Moore N, Walker C (1964) Organic chlorine insecticide residues in wild birds. Nature 201: 1072-1073.

12. Risebrough R (1967) DDT residues in Pacific sea birds: a persistent insecticide in marine food chains. Nature 216: 589-591.

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