

Bunker C Fuel Oil Reduces Mallard Egg Hatchability

Robert C. Szaro¹

U. S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Md. 20811

Recent studies have shown that microliter amounts of petroleum applied externally to the egg surface are extremely toxic to developing embryos of a variety of bird species (AIBERS 1977, COON *et al.* in press, SZARO and AIBERS 1977, WHITE *et al.* in press). Five microliters of No. 2 fuel oil, South Louisiana crude oil, or Kuwait crude oil reduced hatchability of mallard (*Anas platyrhynchos*) eggs under laboratory conditions by at least 68 percent (SZARO *et al.* 1978). The present study was designed to test the effect of Bunker C fuel oil on mallard egg hatchability.

METHODS

Mallard eggs were placed in a commercial incubator and candled on the seventh day of incubation. Infertile or dead eggs were discarded at that time. The viable eggs were randomly divided into 5 sets of 50 eggs each and returned to the incubator. On the eighth day of incubation, Bunker C fuel oil was applied to four sets of eggs in amounts of 5, 10, 20, and 50 μ l. One set served as an untreated control.

The oil was applied externally to the air cell end of the eggs with a microliter syringe and allowed to spread freely. The 5 μ l application was made at a single location; the 10, 20, and 50 μ l applications were made in two 5 μ l, two 10 μ l, and five 10 μ l applications (AIBERS 1977). Eggs were again candled 6 days after treatment. Eggs with surviving embryos were incubated until hatching or 4 days beyond the normal 26-day incubation period.

RESULTS AND DISCUSSION

Six-day survival and hatchability were significantly ($P < 0.05$) reduced in all oil treatment groups (Table 1). In fact, as little as 5 μ l of Bunker C fuel oil was sufficient to reduce hatching success to 36 percent. This compares to hatching successes of 2, 18, and 24 percent for mallard eggs treated with 5 μ l of South Louisiana crude oil, No. 2 fuel oil, and Kuwait crude oil (SZARO *et al.* 1978). Thus Bunker C fuel oil was only slightly less toxic than the oils previously tested and may pose a threat to nesting marine bird populations by increasing embryo mortality.

¹Present address: U. S. Forest Service, Forestry Science Laboratory, Arizona State University Campus, Tempe, Arizona 85281.

TABLE 1

Survival of mallard embryos from eggs treated on the 8th day of incubation with Bunker C fuel oil (N = 50)

Treatment	6-day survival (%)	30-day hatching success (%)
Control	100	98
5 μ l	52*	36*
10 μ l	44*	18*
20 μ l	14*	6*
50 μ l	2*	0*

*Significantly different ($P < 0.05$) from the control, Binomial test.

REFERENCES

- ALBERS, P.H.: *In* Fate and Effects of Petroleum Hydrocarbons in Marine Ecosystems and Organisms, D. A. Wolfe, ed. New York: Pergamon Press, pp. 158-163. 1977.
- COON, N. C., P. H. ALBERS, and R. C. SZARO: Bull. Environ. Contam. Toxicol. (In press).
- SZARO, R. C., and P. H. ALBERS: *In* Fate and Effects of Petroleum Hydrocarbons in Marine Ecosystems and Organisms, D. A. Wolfe, ed. New York: Pergamon Press, pp. 164-167. 1977.
- SZARO, R. C., P. H. ALBERS, and N. C. COON: J. Wildl. Manage. 42, 404 (1978).
- WHITE, D. H., K. A. KING, and N. C. COON: Bull. Environ. Contam. Toxicol. (In press).