B.S.C.E 15/W.P. 7

BSCE 15/WP 7

BSCE 15 AERODROME WORKING GROUP

EXPERIMENTS ON AND THE USE OF CHEMICAL AGENTS AS BIRD REPELLENTS ON AERODROMES

PRESENTED BY THE VICECHAIRMAN OF THE AERODROME WORKING GROUP

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1. Introduction

In accordance with the discussions at the 14th BSCE meeting in The Hague in October, 1979, the vicechairman asked by letter of 14th November, 1980, participants to the aerodrome working group meeting from 21 countries to give information on the following subject:

Experiments on and the use of chemical agents as bird repellents on aerodromes.

2. Answers have till 13th March, 1981, been received from the following countries: Austria, Belgium, Czechoslovakia, Denmark, Federal Republic of Germany, France, Israel, Italy, The Netherlands, Poland, Portugal, South Africa, Sweden, Switzerland, United Kingdom and USA.

The answers are as follows:

Austria:

No experiments on and use of chemical agents as bird repellents are made.

Belgium:

None.

Czechoslovakia:

Experiments with use of chemical agents as bird repellents on aerodromes have not been performed in Czechoslovakia.

Denmark:

We do not experiment with nor use chemical agents as bird repellents on aerodromes.

The Federal Republic of Germany

1. Chemical agents as bird repellents:

1.1. Name of chemical agent : [illegible]

Manufacturer : [illegible]

Period of tests : [illegible]

Tested at the following airbases : [illegible]

Results:

The substance ([illegible]) [illegible] sense of smell and taste of birds [illegible] of birds stay away from a sprayed [illegible] chemical agent. The birds do not [illegible] compounds anymore. ST-K-8 [illegible] by the Federal Biological [illegible].

Postscript:

The use of substances on ACH-basis, [illegible] of ST-K-8 has been prohibited by [illegible] No. [illegible] of 3 Dec 1971, for the entire Federal Armed Forces, because of oral toxicity.

1.2. Name of chemical agent : BAY 47500 = Mesurol = Mercaptodimethyl

Manufacturer : Bayer Leverkusen

Period of tests : [illegible] years before (?)

Tested at airbase : Jever + Rhein

Results:

Corn was treated with [illegible] Mesurol and mixed with untreated corn in a ratio of 1 : 4, 1 : 9 [illegible] 1 part treated and 4 parts untreated corn. [illegible] starlings were attracted to certain feeding grounds, where they usually stayed, by untreated corn. After four days of this [illegible] and at the same hours treated corn was given. The starlings left and did not return to the airfield for [illegible] months.

Mesurol was also used against crows, blackbirds, starlings and sparrows. The results can also be considered as good.

1.3. Name of chemical agent : [illegible]

[illegible] : [illegible] (F.R.G.)

Period of tests : [illegible]

Tested at airbase : [illegible] + Jever

Results:

[illegible] two areas with [illegible] and MH 30 [illegible]. The birds [illegible] on Foxglove [illegible] were sprayed with [illegible] and [illegible] drawings from [illegible] 2 [illegible].

...

1.4. Name of chemical agent: DRC 736 (Alpha-Chloralose)

Manufacturer : Unknown

Period of tests : 1970

Tested at several airbases of the Federal Armed Forces

Results:

DRC 736 is a plant protective, that has been tested since 1961 with several generations of animals. It does cause a temporary immobilisation. The lethal dose LD50 is around 8.4 milligrams per kilogram bodyweight with thrushes. The temporary immobilisation lasts about 20 to 60 minutes and showed no permanent defects at three generations. The preparation has been widely used on several airbases during 1970 with good results. The mortality was less than 2 %.

2. Growth inhibiting chemical agents and herbicides

2.1. Herbicides have been used to reduce the number of dicotyle plants (weeds) in greens. A reduction in bird population could not be verified.

2.2. Growth inhibiting substances, which lead to a retarded growing speed, have been tested under different climatic and soil conditions. The grass was thus kept at a length of 20 to 30 cm. This grass length led to a reduction of bird population. Only the number of small birds was slightly increased.

2.3. The following preparations were tested:

- Basinex (herbicide)
- CF 125 (Growth inhibiting agent)
- Hedonal MP-T (herbicide)
- MH 30 (Malein-acid-hydracid) (growth inhibiting agent)

Results:

A trial series was carried through at Nörvenich airbase from 1976 - 1979:

The best results in growth inhibiting was shown by a preparation of:

14 liters per hectar of MH 30 mixed with 12.5 liters per hectar of CF 125.

1. Initial [illegible] were [illegible] in the year [illegible] on a South-German airfield [illegible], [illegible] due to financial restraints.

The results of these [illegible] were encouraging, however. Lapwings have been [illegible] their nesting grounds in one instance and a flock of lapwings has been caused to change its flight path.

(The apparatus was [illegible] on tape)

2.1. All trials to scare birds away from airbases by means of light have been more or less unsuccessfull. Tests have been carried out on three airfields during 1968 through 1970 and all were negative.

2.2. Another aspect of bird scaring lights are airborne:

The efforts made to reduce the birdstrike hazard enroute by means of bird scaring lights have been largely inconsistent. A scaring effect could not be verified, but in haze or dawn it is not completely ruled out.

Other experiments did not leave the discussion stage.

France:

The following two chemical products (repellents) have been tested:

"Roost no more" contains mainly clue, was tested in liquid solution and also as paste against pigeons, sparrows and starlings. Results were non conslusive as this product stay active only a short time in urban area or in its immediate vicinity (dust is quickly covering that substance which is then losing its power). Furthermore, this method is very difficult to be used, dirty and costly.

"Bird repellent Reta" (Ammonium Aluminium Sulfate) was also tested at different period of times against Cormorants (phalacrocorax carbo) and Herring Gulls. Results were disappointing whatsoever the concentration used.

Israel:

We have experimented extensively with the use of a chemical repellent called Reta with negative results as indicated below. We are now making a small additional experiment at the request of Assia Maabarot who are marketing Reta in Israel and abroad (the repellent they have now prepared has a different concentration). The experiment is not yet concluded, though it already appears that its results will again be negative.

SUMMARY OF RESULTS OF SPRAYINGS WITH "RETA" REPELLENT AT BEN-GURION AIRPORT 1974-1979

by Shalom Ben-Aretz and Ilana Arad

1. Introduction

The chemical repellent "Reta", marketed by the Assia Maabarot Co. under reference, is an Aluminium-Ammonium-Sulphate (whose formula is $AlNH_4(SO_4)_2$) used for spraying in water solution. "Reta" causes irritation and its taste is bitter. We have yet to find out in what way birds are deterred by it, no harmful side-effects on birds having been detected even after spraying of their food with "Reta".

At the end of 1974, Mr Giora Bar, representative of Assia Maabarot, approached the airport management with the suggestion that "Reta" be tried as a repellent. Since it had already been used as a bird repellent in agriculture, and with some success, we recommended that it be tried also at the airport. We should point out here that until the end of 1977 we were acting as advisers to the airport management on matters connected with bird strikes, and repelling operations were carried out by them, during the winter season only, in accordance with our recommendations. As from 1.1.78. all operations pertaining to bird-strike problems were taken over by the Nature Reserves Authority, in accordance with a plan worked out by the authors of this paper.

2. Aim

Our aim in trying "Reta" at the airport was to find out in what way and to what extent birds would be driven off the runways and surroundings, and to check whether they would be kept away from the garbage dumps which are situated near the airport.

3. Data on Area (see sketch)

1. Due to permanent plant control, the fringes of the main Runway 30-12 are always free from vegetation to a width of some 50 m.

2. On the fringes of the "Quiet" Runway 26-08, and Runway 21-03 (also to the width of 50 m), there is aftergrowth of cereal plants used as fodder by the farmers during the first three months of the year (until its cutting in April).

3. Beyond these wide fringes, cotton fields are cultivated for some 5 months until picking in September. The fields remain bare from the end of September until the next sowing in May.

4. At the boundaries of the airfield, along the drainage channels, are tracts of fallow land. A very wide fallow tract of about 175 acres existed to the south of Runway 30-12. This and other fallow tracts were treated over the last two years with a view to controlling vegetation, and they are now most of them fit for cotton growing.

5. To complete the picture, the existence of two garbage dumps needs to be mentioned: a small dump adjoining the northern boundary of the airfield - the Yahoud dump, which was later removed (in 1977). The second dump - the biggest in the country - is the Kiriya dump, situated about 5 km west of the airport.

4. The Birds

We have [illegible] many species of birds, but first and foremost with bir[illegible] which gather here in large flocks, as winter visitors:-

a. Starlings - Sturnus vulgaris

Large flocks are wintering here from October until March. They usually sleep on the beach, but feed in agricultural areas, and principally on the garbage dumps of Kiriya and Yahoud. In the past they frequently used to roost in trees near the runways, and also in the puddles formed by the winter rains. These birds do not appear in Israel in their hundred thousands.

2. After

[illegible] with "Reta" *)

Winter [illegible]

a) The initial spraying by helicopter was carried out on [illegible].2.75. on the northern fringes of Runway 26-08. Two stretches about 1000 m. long and 45 m. wide (C and [illegible] in sketch) were sprayed, leaving between them an unsprayed stretch of similar dimensions for control.

b) On the same day, spraying was also carried out on a layer of fresh garbage at the Yanoud dump, and on the northern bank of the channel adjoining it (A and B in sketch) - an area of some 12 1/2 acres serving the birds as a roosting place.

Winter 1975-76

a) On 27 - [illegible], the first spraying was carried out by light plane alongside Runway 26-08, from the north (C, D, E and E_1 in sketch) to a total length of about 3000 m., and width of 45 m.

b) On 17.2.76, the same stretches were sprayed again.

c) On 15.2.76., Yanoud dump was sprayed (B in sketch) only in the garbage area (about 5 acres).

d) From 16.2.76. until 26.3.76., mainly the fresh garbage was sprayed daily at the dump - this time by manual pressure sprayer.

In the summer of 1977-78, sprayings with "Reta" were carried out without control or observations on our part, and are therefore not included in our report.

From winter 1976-77 onwards, spraying was carried out on a more or less fixed pattern, as shown below:-

Season	Spraying Date	Runway	Site (See sketch)	Remarks
Winter 1976-77	[illegible]-7.12.76.	30-12	F	by tractor 1st spray
	11.1.77	30-12	G (whole length)	by helicopter 1st spray
		26-08	C D E H I	" "
		21-03	J K (whole len.)	" "
	12.1.77.	30-12	F (" "	by helicopter 2nd spray
	14.2.77.	12-06	L M (on asphalt at the crossing)	by helicopter
Summer 1977	11.7.77.	30-12	G (whole length)	" "
		26-08	H I " "	" "
Winter 1977-78	[illegible]	[illegible]	[illegible]	" "
		[illegible]	[illegible]	" "
		[illegible]-03	J	
	[illegible]	[illegible]	M N (on asphalt at the crossing)	" "

*) [illegible] in accordance with professional directives of [illegible], with regard to [illegible]

Season	Spraying Date	Runway	Site (see sketch)	Remarks
Winter 1978-79	25.12.78.	12-30	F	by helicopter 1st spray
		26-08	H & E	" " "
		21-03	J	" " "
	14.1.79.	30-12	F	by helicopter 2nd spray
		26-08	H & E	" " "
		21-03	J	" " "
	24.1.79.	12-08	M N (on asphalt)	by helicopter
	5.2.79.	30-12	F	by helicopter 3rd spray
		26-08	H & E	" " "

Remarks: On 25.12.78., spraying was interrupted after a flaw in the quality of the material was detected. All the same, the observations made on the sprayed sites were taken into account.

The stretches that were treated in 1977-79 were all of similar size, as under:-

D E	north of runway	26-08	1500 x 50 m
F	south " "	30-12	2950 x 50
H	" " "	26-08	1500 x 50
J	west " "	21-03	1000 x 50
M N	intersection	12-08	650 x 45
			Total about 90 acres

3. Effects of Spraying

3.1 Winter 1974-75. Observations at the airport commenced on 2.1.75., about one month before initial spraying on 6.2.75. Field observations were made by the airport management under the supervision of Shalom Ab-Aretz.

a) Runway 26-08 Prior to spraying, and particularly on rainy days, many birds (mainly Black-headed Gulls) were observed on both sides of the runway.
Continuous observations on the 8 days following spraying showed:- on 7.2.75. (one day after spraying), several Lapwings and a flock of 600-700 gulls on sprayed site ! On 10.2.75. (four days after spraying), there were 150 gulls on the sprayed site again, and on 11.2.75, there were 200. On the following days (until 14.2.75.) about 10 partridges and several Lapwings were observed feeding. There was also considerable activity of song birds on the sprayed site. On 10.2.75., there again appeared a big flock of gulls on the sprayed site, but their behaviour was much more restless than usual.

b) Yarkon Park e.m. Prior to spraying, there were mainly Black-headed Gulls, usually many hundreds but on some days up to even 2000; furthermore many dozens of Starlings; about 50 Cattle Egrets, many Pale Doves; some Turtle-Doves, and many song birds.

On the day of spraying (6.2.75.), Black-headed Gulls were seen hovering over the garbage, though not coming down on it. Only a few hours later, however, 300-400 of them had already settled down on the garbage. On the same day, 30 Cattle Egrets were also seen in the sprayed area. The Starlings returned to their places on the following day after the helicopter had left.

Continuous observation during 6 days after spraying, showed the following situation at Yahoud dump:-

7.2.76.	about 40 Cattle Egrets and 30 Gulls
8.2.76.	several Cattle Egrets; numbers of Gulls
10.2.76.	50 Gulls
11.2.76.	Some Cattle Egrets, tens of Gulls, antennae full of Starlings.
13.2.76.	600-700 Gulls; a cloud of Starlings
14.2.76.	25 Cattle Egrets; tens of Gulls; very many Starlings, Bulbuls, Wagtails, Pipits, and many Palm Doves

Greater activity of Black-headed Gulls in unsprayed areas during several days after treatment was pointed out.

Summary While the number of Gulls appears to have decreased, the fact must be stressed that this is the time of year when spring migration brings about a considerable reduction in their number generally. All the same, certain effects were discernible during the first few days, when restlessness and excited behaviour of Gulls was clearly noticeable. As to the other birds, hardly any effects could be discerned.

2. Winter 1975-76. Observations at the airport during this season were continuous.

a) Runway 26-08 After the first spraying on the northern side of runway (27-28.1.76.) no changes were observed, but after the second spraying (17.2.76.) a noticeable decrease was seen in the number of Lapwings on both sides of the runway (also on the unsprayed side), though the fact must be taken into consideration that in the meantime there had been a considerable increase in the height of the vegetation - a factor which has a bearing on the disappearance of Lapwings. Partridge behaviour, however, remained unaffected.

b) Yahoud Garbage Dump Intensive efforts were made to remove the Gulls from this dump. After spraying on 15.2.76., the Gulls definitely disappeared, and the few that reappeared later did not come down on the dump to feed. On the other hand, a steady increase of Cattle Egrets was observed. During the last spraying with "Reta" (18.2.76.) additional methods were employed, such as distress calls broadcast over the loudspeaker; gas-cannons and shot-guns (all in accordance with movement of Gulls), resulting in their complete ousting from the dump to which the Gulls did not return for nearly one month following application of these methods.

To sum up: There is no doubt that the use of additional methods as described in para. (b) above, helped in dislodging the Gulls, and that the application of "Reta" definitely had a bearing on their disappearance; yet the additional factor of Gulls' migration period starting at that time, must be borne in mind.

3. Winter 1976-77

a) Runway 26-08 Prior to first and second spraying (6-7.12.76. and 20.12.76.) there had been considerable activity of Partridges and [illegible] on the southern edge of this runway. Activity extended over a wide area, from the bare stretches adjacent to the runway down to the cultivation patterns, and beyond these on to the fields in returns. [illegible] of the wind mostly and to the north of it. In addition, a flock of [illegible] were seen feeding at the edge of the runway. [illegible] after the first spraying

Partridges were [illegible] runway, and from them onwards they were [illegible] of additional occasions. [illegible] appeared only 5 days later. [illegible] 10 days after the first spraying, [illegible] after the second spraying. During the [illegible] number of doves increased to about 50 at the [illegible] runway where they had been at the beginning. [illegible] were seen north or south of the runway [illegible] spraying.

c) Runway 21-03. [illegible] were observed, whose behaviour [illegible] similar to [illegible]

d) Runway 08-12 [illegible] on the asphalt at the [illegible] prior to spraying. Some ten days after [illegible] on the same stretch.

Summing-up: [illegible] effect on birds, mainly Partridges [illegible] for relatively short periods only. [illegible] behaviour was noticeable, apparently as a [illegible] other. They were however not permanently [illegible] moved on the day after spraying, although [illegible] were not repelled at all as a result [illegible]

4. Winter 1977-78

a) Runway 30-12 [illegible] (see sketch). Observations [illegible] 78, showed the following: [illegible] the sprayed side of the runway [illegible] Collared Doves was very noticeable. [illegible] unsprayed side where they had not [illegible] moved after spraying, the doves crossed [illegible] was unfulfilling deviation. The [illegible] time 2 weeks after spraying. [illegible] distance of over 50 m north [illegible]

b) Runway 26-08 [illegible] F and H (see sketch). Observations [illegible] 78, showed that all Partridges [illegible] side of Runway 21, transferred [illegible] the starting point of Runway 26. [illegible] The Lapwings returned [illegible] about one week after spraying.

c) Runway 21-03 [illegible] (see sketch). Observations [illegible] 78, showed that here, [illegible] Lapwings reappeared [illegible]

d) Runway 12-30 [illegible] (see sketch). Observations [illegible] 78, showed no change in the behaviour [illegible] noticeable effect on Blackheaded [illegible]

<u>Summing up</u> : No change was discernible in Partridge behaviour as a result of spraying operations which were seen, however, to have a certain effect on Lapwings (though for only about one week). On the other hand, considerable change in behaviour was observed in <u>Collared Doves</u>, which returned to their usual place only two weeks after spraying.

3. <u>Winter 1978-79</u>

<u>General</u> We assume that the change in bird behaviour is due to the improved ecological quality of the environment, and especially to pest extermination in the uncultivated stretches of land adjacent to the runways. <u>Partridges</u> preferred hiding in uncultivated lands farther away from the runways. All the same, there was movement of Partridges crossing runways from one side to the other in search of food. <u>Collared Doves</u>, which had been present in previous years, did not reappear in their usual places at the airport. <u>Gulls</u> appeared on rainy days only, as in former years, and no activity was observed near runways (including unsprayed ones) either before or after spraying, but only in the ploughed fields farther away.

This year we were able to test spraying of the asphalt at the starting point of Runway 08 (24.1.79.). Two days before spraying several tens of gulls were seen roosting on the runway. Only about two weeks later, rain fell for the first time and on that day several gulls were seen roosting on the sprayed runway. No gulls whatsoever were seen at the airport between 24.1. and [illegible].

In our observations this year we took special note of the effects of spraying on <u>Lapwings</u>, as detailed hereunder:-

<u>Runway 26-08</u>

As far as behaviour of Lapwings was concerned, no change whatsoever was apparent as a result of the first spraying (29.11.78.)(D,E,H in sketch). During the second spraying ([illegible].1.79.), which was imperfect due to technical reasons, the Lapwings started to assemble in big flocks - as is their usual habit at this season - and to leave the area under review, particularly because the vegetation there had grown to a height of over 20 cm. Nevertheless, there were two instances when some did come down on the sprayed area (H) - first, [illegible] days after the second spraying, and again two days after the fourth spraying ([illegible].2.79.).

<u>Runway 30-12</u>

Lapwings appeared on sprayed [illegible] day after first spraying. Here, too, no Lapwings were seen after the second and third sprayings for the same principal reasons mentioned above: height of vegetation, the birds assembling in [illegible] away from runways.

<u>Runway 21-03</u>

Lapwings appeared on the [illegible] two days after spraying, while none [illegible] there during the two weeks prior to spraying.

<u>[illegible]</u>

Only one treatment [illegible] of this stretch ([illegible].1.79.) [illegible] before or after spraying, except [illegible] rainy [illegible] the first rainfall after spraying [illegible].79.).

It appears that Lapwings are not repelled by "Reta", seeing that there is no drastic change in their regular places after spraying. Alteration in behaviour was due to changes in weather or in surface conditions (formation of puddles after rains, height of vegetation, etc.). Moreover, we used additional deterrent methods such as gas cannons, distress calls, ultrasonic sounds, cane pistols, and nets. They were never observed to disappear after spraying from a place in which they had stayed regularly for a fortnight before. Furthermore, there was no change in their flights above the runways, so that the danger of Lapwings to air traffic was not diminished at all.

Final Summary

Our main aim in trying out the effects of "Reta" at Ben Gurion Airport has been the removal of the big birds from its runways and adjacent areas in view of the danger to air traffic. Spraying with "Reta" alone, as well as concurrent application of other deterrents, was carried out in accordance with the instructions of "Assia Maabarot", whose representative was present during spraying operations. In spite of the high cost of "Reta", spraying was carried out over large areas (about 90 acres) which were divided into several stretches, with equivalent stretches being left untreated for control and comparison.

A considerable part of their budget (at least 40%) for the prevention of bird strikes at Ben-Gurion Airport (including labour cost) was spent by the management for spraying only on the trial areas.

Spraying operations also entailed a considerable waste of time, as results very much depended on the weather, and spraying often had to be cancelled because of wind, rain, etc. Furthermore, co-ordination with the control tower to ensure the safety of the spraying planes, caused serious problems and difficulties.

Compared with "Reta" all other methods are cheap, can be activated at short notice, require hardly any coordination with the control tower, and can be applied quickly wherever needed. Even though these methods often have only a short-term effect their results are nearly always immediately noticeable. Moreover, methods based on distress calls, ultrasonic sounds, nets, "models" etc., will act on birds in any position, including flight (a very important factor from the danger point of view) whereas "Reta" only acts on birds landing to feed or roost.

Our observations and follow-up were continued for a considerable time, before and after sprayings, and almost without interruption (especially during the last two years). In analysing the results, we did no overlook the fact that certain birds, such as the Collared Dove (in small flocks), immediately after spraying left the place where they were usually feeding, returning to it only after a fortnight. The Black-headed Gulls, too, sometimes showed"restless behaviour" after spraying, but disappeared from the Yahoud dump only once (in winter 1975-76), and this only after intensive and efficient use of all the other deterrents (distress calls, gas cannons and shot guns)in addition to "Reta".

With regard to Partridges and Cattle Egrets, hardly any effect of "Reta" was registered. The Lapwings, for instance, formed flocks in their usual places, imperilling aviation also on the sprayed stretches. They actually only disappeared from places where vegetation had grown to a height of more than 20 cm, apparently without any connection whatsoever with spraying.

Reports from previous years (1973-77) showed several dozens of collisions of birds with aeroplanes during take-off or landing, and 5-6 serious ones every year when even jet engines were put out of action. As against this, there were only a few collisions in the last 2 years (1978-79) and none in which a jet engine was damaged.

There is no doubt in our minds that this success has been due to the continuous activity connected with the removal of food sources (garbage dump, vegetation control, coordination of agricultural activities, etc.) together with the efficient use of deterrents (distress calls, nets, "models", etc.) in addition to "Reta".

In spite of positive results obtained in certain cases, we are of opinion that the means invested in spraying with "Reta" are out of all proportion to the effects, and have therefore reached the definite decision to discontinue the use of "Reta" and to concentrate all our efforts on the development of alternative methods.

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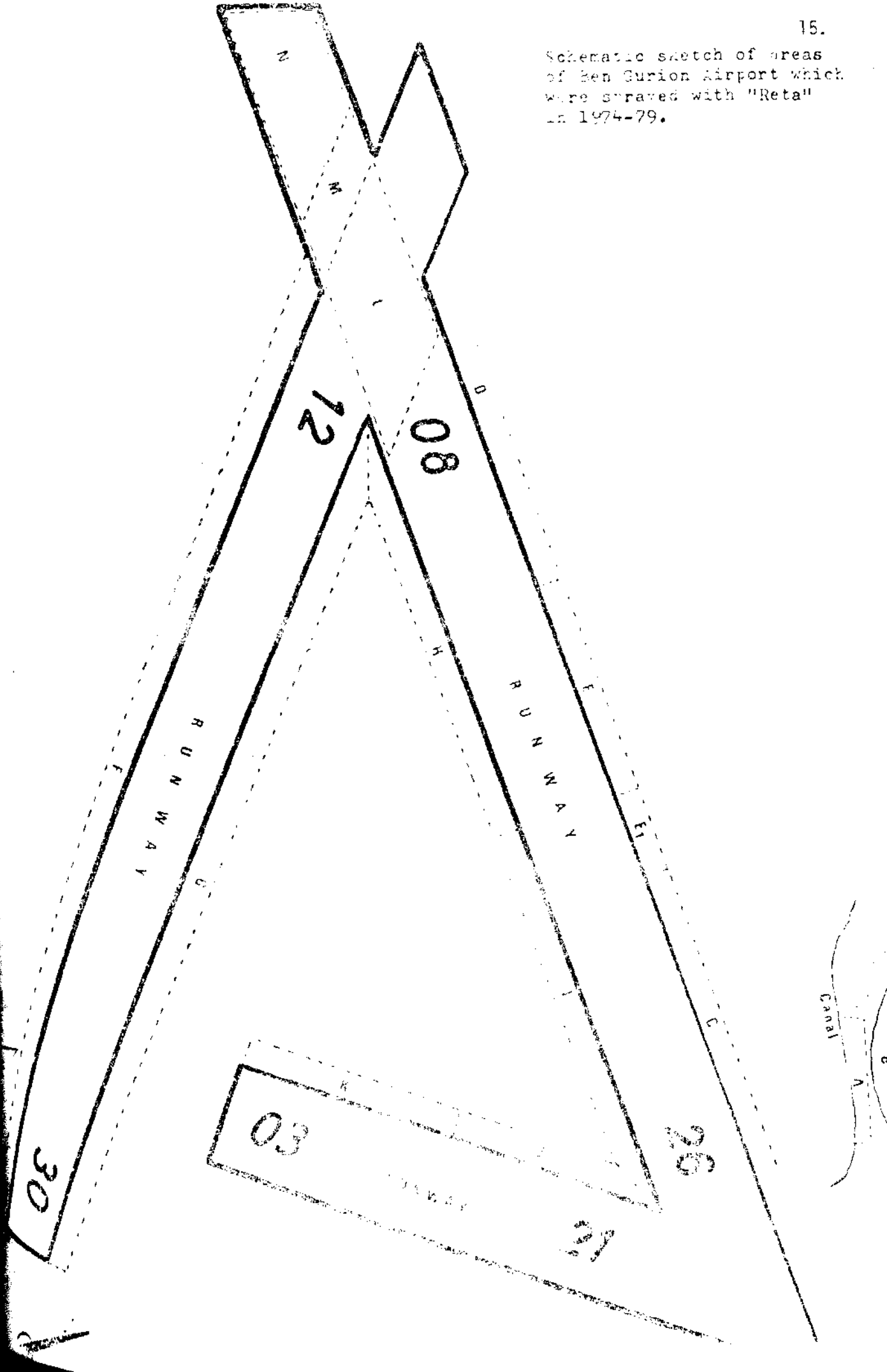
Schematic sketch of areas of Ben Gurion Airport which were sprayed with "Reta" in 1974-79.



Italy:

We do not use chemical agents as bird repellents.

The Netherlands:

No experiments have been carried out.

Poland:

No experiments with chemical agents are carried out on civil aerodromes in Poland.

Portugal:

No experiments on the use of chemical agents as bird repellents on aerodromes have been conducted.

South Africa:

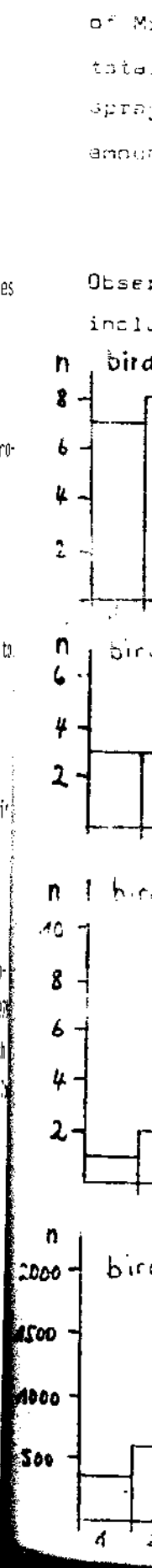
Experiments on the use of chemical agents as bird repellents on state airports have not proved satisfactory and have been found to be too expensive to warrant consideration.

Sweden:

Chemical agents as bird repellents on aerodromes have never been used in Sweden.

Switzerland:

Experiments on and use of chemical agents as bird repellents on aerodromes. Experiments with the bird repellent Reta were carried out in the autumn 19 on the civil aerodrome of Zurich and the military airfield of Dubendorf. On both airports were results were negative. A brief summary of the results is given be



Experiment with chem ... Kloten, Switzerland

12 plots along both sides ... were marked. 4 of them (no. 3, 5, 9, and 11) were sprayed with ... according to the prescriptions of Mr. Stone (who was present)

total of observed plots ... = 50'400 m^2

sprayed area within 4 plots ... = 16'800 m^2

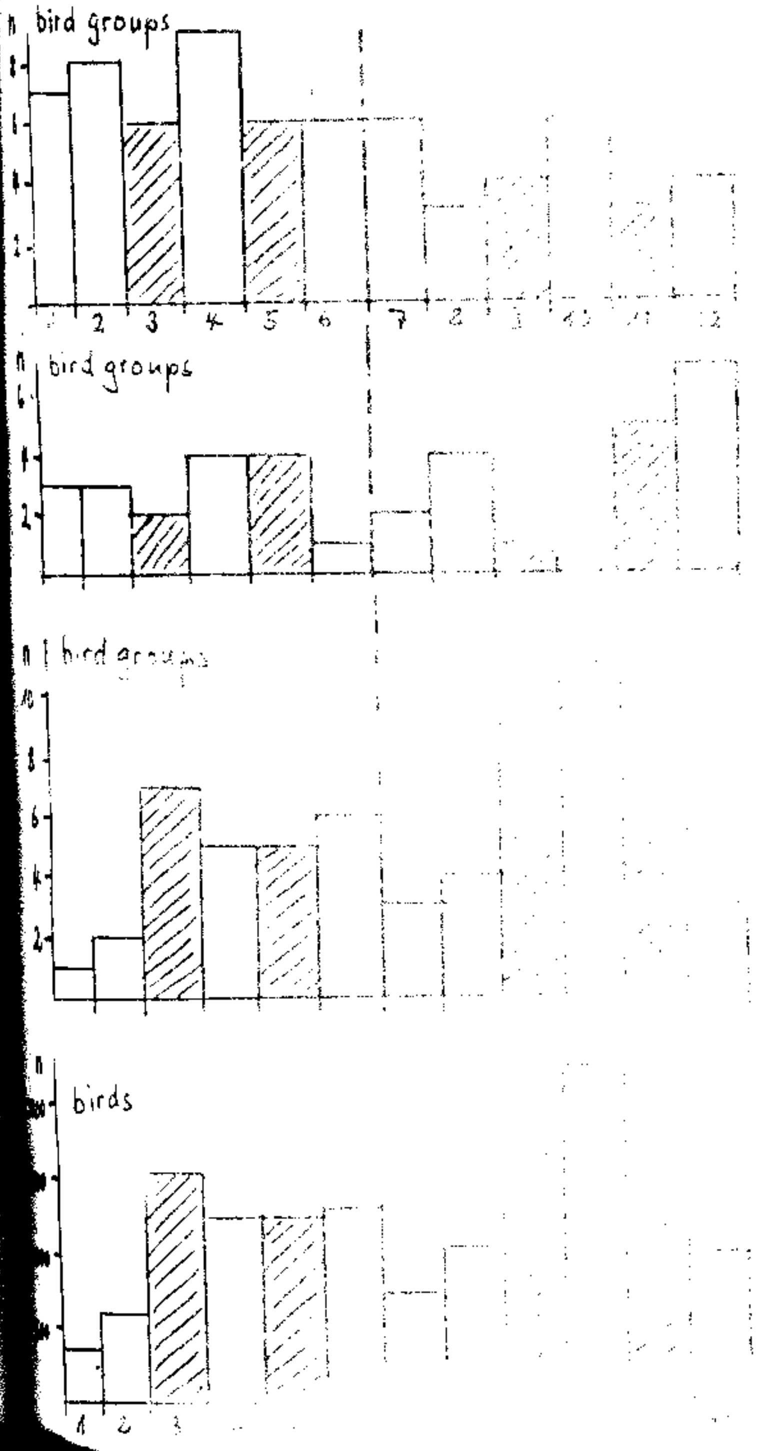
amount of sprayed repellent ... } double the concentration (indicated for normal use)

Observations: 15. Okt

included species: ...

A. ... = 16 birds per observation

B. ... = 140 birds per observation



... difference between ...

Experiment with chemical repellent at the civil airport Zurich-Kloten/Switzerland

12 plots in two rows at the end of the main runway were marked. 4 of them were later excluded from the analysis because of unsufficient coverage by observers (no. 7, 8, 9, 10). Two of the plots (no. 5 and 6) were treated with Master Guard (= Peta = Curb = S.A.A.S.) according to the prescriptions of Mr. Stone (who was present).

total of observed plots: 8 plots of 120 x 150 m = 144'000 m^2

sprayed area within 2 plots: 10 bands of 8 x 150 m = 12'000 m^2

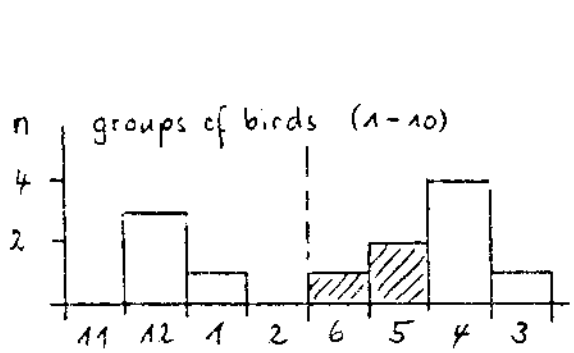
amount of sprayed repellent: 48 kg Master Guard
150 l warm water (50° C)
412 l cold water
600 l on 1,2 ha for the protection of 3,6 ha

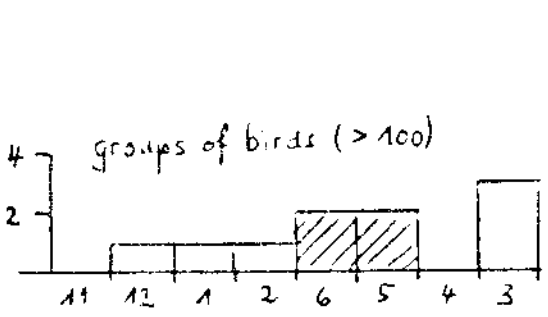
there was a gradient in the density of sprayed bands for plot no. 6 to 5. No. 5 got only 3/10 of the sprayed substance.

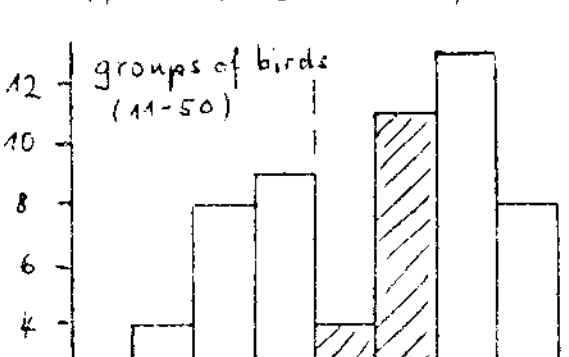
Observations: 26.10. - 17.12. 1979 Sprayed: 12.10. 1979 in nice dry weather

Included species: Black-headed Gull (Larus ridibundus), Carrion Crow (Corvus corone)

Because of the dry weather the number of gulls was very low.







Result: no diagram shows a difference between treated and untreated plots.

A slight difference between densely and less densely sprayed area seem possible.

United Kingdom:

To date in the [illegible] methods of repelling birds directly have not been successful. An attempt [illegible] by an application on grass of synergised aliphatic ammonium sulphate (Reta, CURB) proved unsuccessful.

USA:

The FAA is not [illegible] chemical agents for repelling birds.

The below list [illegible] registered, however, and used on some airports for controlling [illegible] birds.

Federally registered avian repellents separated into tactile, taste, and odor repellent categories.

Critical	Percent active	Product	[illegible]	Site	Method of Application
A. TACTILE REPELLENTS					
1. mineral oil 94.4% dialkyl dimethyl 5.2% and alkyl benzyl dimethyl ammonium bentonite	99.7	[illegible]	[illegible]	outdoors ledges	hand
2. polybutenes hydrogenated castor oil	40.5 1.5	Bird Repellent pressurized	birds	Outdoors buildings	"
3. polybutenes hydrogenated castor oil	97 3	Bird Repellent	birds	"	"
4. polybutenes polyethylene	95 5	Exclusive Bird Repellent	sparrows pigeons starlings	"	"
5. polybutenes hydrogenated castor oil	97 3	Bird Repellent [illegible]	birds	"	"
6. polybutenes paloja resins petroleum solvents petrolatum	10 23 35 29 3	[illegible]	[illegible] pigeons starlings	"	"
7. polybutenes mineral oil lithium stearate soap diphenylamine	100	[illegible]	pigeons [illegible]	"	"
8. polisobutylene	96.5	[illegible]	[illegible] starlings	outdoors buildings	hand
9. polisobutylene wax benzene	50.38 49.56 [illegible]	[illegible]	[illegible]	outdoors buildings [illegible] outdoors	
10. polybutenes and related olefins	96	[illegible]	pigeons [illegible] starlings	outdoors buildings	"
11. polybutenes and related olefins	90	Bird Repellent	pigeons starlings	"	"
12. mineral oil calcium soap polyisobutylene zinc oxide	73 12 5	[illegible]	pigeons [illegible] starlings	"	"
13. polybutene	97	[illegible]	pigeons starlings	"	"
14. polybutene mineral oil lithium stearate soap diphenylamine	[illegible]	[illegible]	[illegible]	"	"

B. TASTE REPELLENTS

	Lindane	75	Ortho Isotox Seed Treater (75)	pheasant	outside	seed treatment
	Lindane Captan	25 12.5	Ortho Isotox Seed Treater (F)	"	"	"
	Coal tar Creosote oil	62.67 31.33	Stanley's Crow Repellent	crow	"	"
	Copper oxate	4	Crow-Chex Repellent	crow	"	"
	Thiram	42	Arasan 42-S	birds	"	"
6.	endrin*	50	Red-top Endrin 50	birds	outside	seed treatment
7.	mesurol	50	Mesurol 50% Hopper-Box Treater	blackbirds	corn	"
8.	mesurol	75	Mesurol 75% Wettable Powder	robins, starlings, finches, grackles, sparrows, bluejays, cedar waxwings	cherries	sprayer
9.	mesurol*	50	Hopkins Mesrepel	blackbirds	outdoor (corn)	seed treatment
10.	mesurol*	50	Bonide Cro-x	"	"	"
11.	mesurol*	18.75	Borderland Black	"	"	"

C. ODOR REPELLENTS

1.	naphthalene	100	Wil-Kil	pigeons sparrows	indoors	hand

*restricted

Federally registered avian toxicants and chemosterilants.

Chemical	Percent Active	Product Name	Pest Species	Site	Method of Application
AVIAN TOXICANTS					
A-1 4-Aminopyridine (Avitrol)	0.5	Avitrol Bird Trip	house sparrows pigeons blackbirds cowbirds	inside/ outside structures	hand spot treatment
A-2 "	0.5	Avitrol Wheat	sparrows blackbirds cowbirds	outside feedlots	"
A-3 "	1.0	Avitrol Poultry Feed	starlings	inside/ outside structures	"
A-4 "	.5	Avitrol Sorghum	sparrows blackbirds cowbirds	"	"
A-5 "	0.5	Avitrol Mixed Grain	"	"	"
A-6 "	1.0	Avitrol Soluble Starch Corn Oil	blackbirds [illegible] starlings	"	"
A-7 "	2.5	Avitrol Corn Treat	sparrows blackbirds cowbirds	"	"

A-8 "	0.5	Avitrol Whole Corn	pigeons	inside/ outside structures	hand spot treatment
A-9 "	1.0	Double Strength Whole Corn	crows	outdoors feeding areas	"
A-10 "	0.8	Avitrol Corn Chops peanut butter	starlings	outdoors feedlots	"
A-11 "	25	Avitrol Concentrate	gulls	outdoors feeding	"
A-12 4-Aminopyridine (Avitrol)	50	Avitrol Powder Mix	starlings	outdoors cattle feed-lots	hand spot treatment
A-13 "	0.3	Avitrol Corn Chops-99	starlings blackbirds cowbirds	outdoors ripening sweet and feed corn	air or ground
A-14 "	0.3	Avitrol F C Corn Chops 1-10 Concentrate	reformulation repacking	n/a	n/a
A-15 "	.03	Avitrol F C Corn Chops -99$_5$	red-winged blackbird yellow-head blackbird common grackle starlings	sunflowers	broadcast air high clearance
B-1 Endrin*	91.4	Rid-A-Bird Control Liquid	starling english sparrow pigeon	outdoors/ indoors buildings pipeyards loading docks bridges	
C-1 Fenthion (entex)	"	Rid-A-Bird 1100	"	"	
D-1 Starlicide	1	Purina Starlicide	starlings blackbirds	outdoors (livestock and poultry operations)	
D-2 "	97	Purina Starlicide Technical	n/a	n/a	
D-3 "	0.1	Purina Starlicide Complete	starlings blackbirds	outdoors (livestock & poultry operations)	
D-4 "	98	Compound DRC-1339	starlings blackbirds	outdoors (livestock & poultry operations (concentrate for reformulating use only)**	
D-5 "	98	DRC-1339 Gull Toxicant Bait Concentrate	herring, great black-backed gulls	coastal area of northeastern U.S. near breeding area of colonial nesting birds**	
E-1 Strychnine*	0.6	Emerson's Ethicon Bait Poison Grain	pigeon	outdoors (buildings)	hand
E-2 "	0.6	Ehrichs English Sparrow Bait Poison Grain	house sparrows	"	"
E-3 "	0.6	Emerson's Grain	pigeons	"	"
E-4 "	0.	[illegible]	[illegible]	"	"
E-5 "	0.6	[illegible]	house sparrow	"	"
E-6 "	0.6	[illegible]	pigeon	"	"

Chemical	Percent Active	Product Name	Pest Species	Site	Method of Application
F-1 Compound PA-14**	99.5	Compound PA 14 Stressing Agent	blackbirds starlings cowbirds,	outdoor roost	by air
AVIAN CHEMOSTERILANTS					
A-1 20,25 diazacholestenol dihydrochloride	0.112	Ornitrol	pigeons	outdoor ground	hand

*restricted
**for use by U.S. Fish & Wildlife Service personnel trained in bird control or persons under their direct supervision

Source: Matheny, Raymond W., Federally Registered Pesticides for Vertebrate Pest Control, in Proceedings, Ninth Vertebrate Pest Conference, March 4-6, 1980, Fresno, California.

The Air Force Engineering and Services Center, Tyndall Air Force Base Florida has issued a report concerning evaluation of commercial bird repellents for air fields of July, 1979.

Conclusion of the report are the following:

Based on the data from this study, Bird Stop was judged the superior bird repellent in terms of effectiveness, durability and initial cost. Even though it showed some evidence of deterioration from adverse weather conditions, its repellent properties were maintained satisfactorily.

Initially, Roost No More was very effective in deterring pigeons from perching. The stringy consistency of this substance was distinctly disliked by the pigeons. Also, its repellent properties withstood the elements well. However, it has some definite disadvantages: Its messiness makes it unsuitable for interior use (such as inside a hanger), and it is easily removed by the trampling action of the birds.

Bird Tanglefoot was initially similar in effectiveness to the other two repellents tested but as it aged and weathered, it lost a great deal of its effectiveness. For this reason, it is deemed to be the least effective for any extended length of time.

Since the extremely sticky consistency of these products has a tendency to entrap [illegible] matter such as dust, lint, insects, pollen and seeds, their application could impede the function, operation and maintenance of certain equipment normally found in aircraft hangars. The scope of this study did not include the evaluation of specific circumstances which might preclude their use on Air Force bases. However, it is conceivable that the [illegible]

appearance and additional upkeep [illegible] for extensive use. Obviously, their use would not be appropriate in areas that are extremely dusty nor in areas where aesthetics are a primary consideration. Nevertheless, in certain selected [illegible] they would be very effective.

[illegible]

In our efforts to develop a successful testing method to evaluate the effectiveness of the commercial bird repellents, several obstacles were encountered. The foremost problem was the pigeon's tendency to remain on the ground during a large portion of the observed test period. A solution to this problem was eventually found by changing the entire test period from daytime to nighttime. In addition, too many variables made it difficult to evaluate the resultant data. The birds had too many choices (repellents) to established a definite perch preference. We recommed that an additional study be implemented to incorporate the following test plan.

SHORT-TERM EVALUATION

Based upon the findings of this study, short-term evaluations of commercial bird repellents should:

1. Monitor only two perches at a time (a test perch against a dry control perch).
2. Construct perches out of materials that are similarly encountered in real situations near aircrait and used in airfield structures, i.e., aluminum, steel, painted surfaces.
3. Use perch [illegible] long enough to accommodate all the test birds.
4. Conduct [illegible] during the early evenings and [illegible].
5. Make a [illegible] comparative the following [illegible].
6. Repeat the [illegible] and fecal drop counts for at least two additional [illegible].
7. If feasible, design [illegible] so the results can be statistically [illegible].

LONG-TERM EVALUATION

Instead of using birds in a closed aviary to test chemical bird repellents, we suggest using species of birds that naturally take up residence in the local vicinity. This can be done by using freestanding or tree-hung open air test platforms with feeders attached to a landing approach suitable for repellent application. Appropriate alterations would be necessary to make the feeders weather resistent and unavailable to tree climbing animals. Water would also be provided near the test perches. We believe this type of test would provide a more realistic approach to product evaluation and could be conducted separately or in conjunction with the shortterm evaluation. The test should:

1. Allow a pretest period for the birds to discover and begin using the test units before applying the test agents.
2. Monitor food consumption bimonthly or as required for a period of one year.
3. Determine the effectiveness and duration of effectiveness of each agent by evaluating monthly data results.

For further information contact POTOMAC RESEARCH, INC. 1607 Lisenby Avenue, Panama City, Florida 32401.

3. The Aerodrome Working Group may wish to authorize the vicechairman to prepare and issue a booklet describing the experiments gained according to the answers received and to distribute the booklet to interested airports and associations, civil aviation associations etc.