WP 32

[illegible] SPRAYING WITH "RETA" REPELLENT AT BEN-GURION AIRPORT 1974-1979

by Shalom Su-Aretz and Ilana Agat

A. Introduction

The chemical repellent "Reta", marketed by the Assia Maabarot Co. under licence, is an Aluminium-Ammonium-Sulphate Powder of the formula $Al.NH_4(SO_4)_2$ 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.

B. 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.

C. 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 Hiriya dump, situated about 5 km west of the airport.

D. The Birds

We have to deal with many species of birds, but first and foremost with big birds which usually occur here in large flocks, as winter visitors:-

The Black-Headed Gull - Larus ridibundus

These gulls 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 Hiriya and Yahoud. In the past they frequently used to roost on or near the runways, and also in the puddles formed by the winter rains. These birds usually appear in Israel in their hundred thousands.

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The Lapwing - Vanellus vanellus

These appear during the same period as the gulls, though in smaller numbers. Their numbers, however, have been increasing from year to year, and by now have reached several thousands. The main problem with lapwings is that they are present near the runways at all times, even at night, looking for food or roosting.

In addition to these two main species, there are many species of smaller birds, of which two at least are worth mentioning:-

The Collared Dove - Streptopelia decaocto
and
The Starling - Sturnus vulgaris

The repellent was also tried out by us on some of the big resident birds, mainly:-

The Partridge - Alectoris chukar, which live here in numerous flocks of several hundreds, hiding among shrubs in the uncultivated plots and in the agricultural regions beyond the fence, and coming out into the bare plots to find food (mainly cereals). They constitute a grave danger to aviation because of their low flights above the runways, especially in view of their comparatively heavy weight.

The Cattle Egret - Ardeola ibis , several thousands of which are to be found in the area, and although they are not in the habit of concentrating in great numbers near the runways, they descend in great flocks on the garbage dumps to feed, and constitute a particular danger when they leave the area in flocks, frequently crossing the runways, on the way to their permanent colony (some 6 km north of the airport).

In addition to these two species, there are many other resident birds appearing only occasionally, and in smaller numbers, such as the Spur-winged Plover - Hoplopterus spinosus; the Kestrel - Falco tinnunculus ; Pigeons (mostly hybrids) - Columbae; the Palm Dove - Streptopelia senegalensis, and the Hooded Crow - Corvus cornix.

E. Work Methods

1. Our first objective was the Black-Headed Gulls which, in winter, appear in huge numbers on the garbage dumps and also on the runways. Observations showed flocks of hundreds of gulls near Runway 26-08, and also at the Yahoud dump which, at the time, was situated some 500 m east of Runway 26. Partridges, too, constituted a danger on this runway, assembling on the edges of the runway in their dozens, and crossing from time to time to the other side.

   Consequently, it was decided to concentrate spraying operations during 1974-76 on the Yahoud garbage dump and on the fringes of Runway 26-08.

2. After the Yahoud garbage dump was moved about 15 km from the airport in 1977, and having tried out other deterrent methods, we considered it worth using "Reta" against the Lapwings, whose behaviour and reactions had become more dangerous in the meantime. The concentrations of Collared Doves near Runway 30-12, too, decided us to concentrate spraying on the fringes of all the runways.
   The Black-Headed Gulls also changed their behaviour in the course of the last few years, and took to roosting right at the beginning of Runway 08, as well as in the fields in the area. We therefore applied several trial sprayings on the asphalt at the starting point of Runway 08.

3. To check up on the differences in bird behaviour following sprayings with "Reta", it was decided to leave unsprayed certain parts (which were identical to the sprayed parts) for control purposes, basing our decision as to which parts to spray on bird behaviour and on surface conditions.

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F. Sprayings with "Reta" *)

1. Winter 1974-75

a) The initial spraying by helicopter was carried out on 5.2.75. on the northern fringes of Runway 26-08. Two stretches about 1000 m. long and 45 m. wide (C and . 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 Yahoud 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.

2. Winter 1975-76

a) On 27 - 28.1.76., 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., Yahoud dump was sprayed (B in sketch) only in the garbage area (about 5 acres).

d) From 18.2.76. 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	6-7.12.76.	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 leng.)	" "
	12.1.77.	30-12	F (" "	by helicopter 2nd spray
	14.2.77.	12-08	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	19.1.78	30-12	F	" "
		26-08	D E H	" "
		21-03	J	
	30.1.78.	12-08	M N (on asphalt at the crossing)	" "

*) All sprayings were carried out in accordance with professional directives of "Assia Maabarot", with regard to quantities, concentrations and spraying periods.

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Season	Spraying Date	Runway	Site (see sketch)	Remarks
Winter 1978-79	25.12.78.	30-12	F	by helicopter 1st spray
		26-08	D E H	" " "
		21-03	J	" " "
	14.1.79.	30-12	F	by helicopter 2nd spray
		26-08	D E H	" " "
		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	D E H	" " "

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

G. Effects of Spraying

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 Su-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) Yahoud Garbage Dump 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 Palm Doves; some Spur-winged Plovers, 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 antennae immediately after the helicopter had ceased working.

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Continuous observation during 8 days after spraying, showed the following situation at Yahoud dump:-

7.2.75.	about 40 Cattle Egrets and 60 Gulls
8.2.75.	several Cattle Egrets; hundreds of Gulls
10.2.75.	50 Gulls
11.2.75.	Some Cattle Egrets, tens of Gulls, antennae full of Starlings.
13.2.75.	600-700 Gulls; a cloud of Starlings
14.2.75.	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 30-12 Prior to first and second spraying (6-7.12.76. and 12.1.77.) there had been considerable activity of Partridges and Collared Doves alon the southern edge of this runway. Activity extended over a wide area, from the bare stretches adjacent to the asphalt down to the uncultivated patches, and beyond these on to the fields situated south-west of the wind hose and to the north of it. In addition, a flock of 50 Collared Doves were seen feeding at the edge of the runway. Already 5 days after the first spraying, Partridges were again observed south of the runway, and from then onwards they were seen in the sprayed area on a number of additional occasions. After the second spraying, Partridges appeared only 3 days later. Collared Doves were first seen 15 days after the first spraying, and some were observed 4 days after the second spraying. During the next fortnight the number of Doves increased to about 50 at the same place south of the runway where they had been at the beginning of the season. No Lapwings were seen north or south of the runway, either before or after spraying.

c) Runway 21-03. Here, too, flocks of Lapwings were observed, whose behaviour after spraying (11.1.77.) was found to be similar to that observed along Runway 26-08.

d) Runway 08-12 Lapwings and Magtails used to roost on the asphalt at the starting point of this runway prior to spraying. Some ten days after spraying they reappeared on the same stretch.

Summing-up: "Reta" was found to have a certain effect on birds, mainly Partridges and Collared Doves, though for relatively short periods only. Regarding Lapwing, restless behaviour was noticeable, apparently as a result of the "Reta" treatment. They were however not permanently repelled, but already reappeared on the day after spraying, although in smaller numbers. Song birds were not repelled at all as a result of spraying.

4. Winter 1977-78

a) Runway 30-12 Spraying was applied on Part F (see sketch). Observations during period 18.12.77. - 28.7.78. showed the following: The presence of Partridges on the sprayed side of the runway was not affected. Excitement of Collared Doves was very noticeable. Some crossed over to the unsprayed side where they had not been before. During 2 weeks after spraying, the Doves crossed the runway in a manner which was imperilling aviation. The Lapwings reappeared for the first time 3 weeks after spraying. There were no Lapwings to a distance of over 50 m north of the runway.

b) Runway 26-08 Spraying was applied on D, E and H (see sketch). Observations during period 11.12.77 - 26.2.78. showed that all Partridges which had previously been on the side of Runway 21, transferred jointly to an unsprayed place at the starting point of Runway 26 as a result of spraying operations. The Lapwings returned to their usual place in the sprayed area about one week after spraying.

c) Runway 21-03 Spraying was applied on J (see sketch). Observations during period 11.12.77. - 23.2.78. showed that here, too, the Partridges were hardly affected, and Lapwings reappeared one week after spraying.

d) Runway 08-12 Spraying was applied on M and N (see sketch). Observations during period 3.1.78. - 23.2.78. showed no change in the behaviour of Lapwings and no noticeable effect on Black-headed Gulls.

Summing up : 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 Collared Doves, which returned to their usual place only two weeks after spraying.

5. Winter 1978-79

General 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. Partridges 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. Collared Doves, which had been present in previous years, did not reappear in their usual places at the airport. Gulls 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 24.1.79 and 5.2.79.

In our observations this year we took special note of the effects of spraying on Lapwings, as detailed herebelow:-

Runway 26-08

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 (14.1.79.), 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 a sprayed area (H) - first, 9 days after the second spraying, and again two days after the fourth spraying (5.2.79.).

Runway 30-12

Lapwings appeared on sprayed site (F) on the 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, and birds assembling in big flocks and moving away from runways.

Runway 21-03

Lapwings appeared on the sprayed part of runway (J) two days after spraying, while none whatsoever had been seen there during the two weeks prior to spraying.

Crossing of Runways 12-08 (Asphalt)

Only one treatment was applied to the two parts (M,N) of this stretch (24.1.79.) Here, hardly any Lapwings were observed either before or after spraying, except in a few instances on rainy days (the first rainfall after spraying occurred on 8.2.79.).

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, bang 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.

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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.

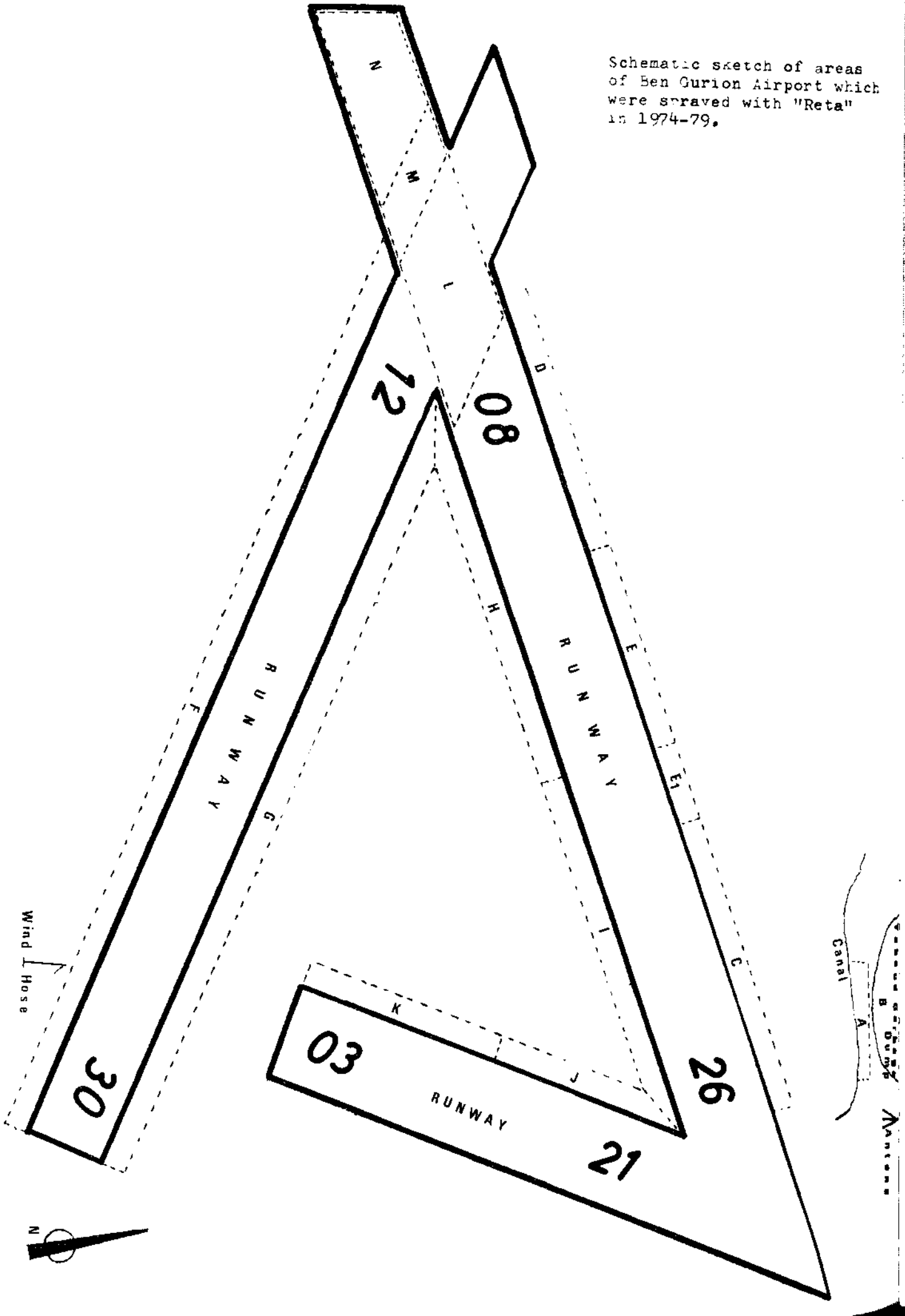
Our observations and follow-up were continued for a considerable time, before and after sprayings, and almost without interruption (especially during the last two years). In analysing the results, we did no overlook the fact that certain birds, such as the Collared Dove (in small flocks), immediately 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.


Schematic sketch of areas of Ben Gurion Airport which were sprayed with "Reta" in 1974-79.
N
M
L
D
12
08
H
RUNWAY
E
E1
C
F
RUNWAY
G
I
K
03
RUNWAY
J
26
21
30
Wind Hose
Canal
B
A
Antenna
N