

BIRD STRIKE COMMITTEE EUROPE

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SYNERGISED ALUMINIUM AMMONIUM SULPHATE IN THE
CONTROL OF BIRDS AT AIRPORTS

R.J. Stone

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Synergised ammonium aluminium sulphate (ammonium alum for short) includes micro additives and is prepared in such a way that it has synergistic properties as a repellent, that is to say, the repellency of the whole is greater than the sum of the repellent properties of each of the ingredients.

Chemical repellents as you will all know, have always been very suspect as a method for bird control because the range of avian chemoreception has been too wide for any chemical previously to have had the breadth of effectiveness to ensure full control. This has not been the fault of the chemical manufacturers, for no scientist yet understands much of the sensory perception in birds apart from the structure of the sensory organs. For example, no one can explain why a chicken with only 24 taste buds can perceive chemical solutions which are imperceptible to a cow with a thousand times as many.⁽¹⁾

It is accepted that birds, like mammals, have the six senses. Of these, sight, hearing and touch have been found generally of little value in achieving a high degree of control over birds at a reasonable level of cost. So, there then remain the chemical senses.

These are commonly divided into three classes: (1) olfaction, or smell, (2) gustation, or taste, and (3) the common chemical sense. Olfaction is characterised by a sensitivity to volatile substances in extreme dilution which accounts for it being described as a distance receptor: the gustatory receptors need a more gross contact with the chemical stimulant: while the common chemical sense which Moncrieff (1951) suggested was the primitive sense with olfaction and gustation later differentiations, is reserved for non-specific stimulants, often an irritant.⁽²⁾ The divisions between smell, taste and the common chemical sense are arbitrary and they can overlap with a single chemical being able to affect all three categories.

Scientists have found that all mammals and birds that have been studied have gustatory organs commonly referred to as taste buds, and that the morphology of olfactory organs is basically similar in all vertebrates, while the fine membranes of the eyes, nostrils and mouth barely cover the free nerve endings in those organs which are, therefore, generally susceptible to irritants, though this is not always the case for pigeons and gray partridge (*Perdix perdix*) have been reported (Soudek, 1929) to be relatively insensitive to strong ammonia solutions.⁽³⁾

It is, however, difficult to consider the sensory systems of birds collectively because there is so substantial a variation not only in development between species, but also, apparently, in sensory perception and the reaction to it among individuals within each species.

From my own studies of birds and their reactions to repellent chemicals I have come to the conclusion that the answers to the problems of bird control lie in a chemical or chemicals which will effectively repel over the whole of the sensory thresholds, i.e. degrees of perception, of birds of all species.

In this search, I discovered that by varying my methods of preparation of the synergised ammonium alum and by varying in micro amounts the synergistic ingredients, the potency and range of effectiveness could be varied at will from a mild preparation suitable for general garden use to one which has been found to date capable of repelling every bird and mammal against which it has been tested. If we do find one able to resist then we shall increase the potency accordingly.

This wide range of effectiveness, covering as it does all species of birds and mammals, has been derided and the product condemned as an *amnibus nostrum* - something of a quack remedy: but I have found that mammals and birds do have the same basic sensory perception, and, as the material is made more potent and of wider range of effectiveness, what repels the normally insensitive members of any one species will also repel members of other species of similar insensitivity irrespective of whether they are birds or mammals. This is not just my own opinion: in Japan, Professor Udagawa, a

highly experienced worker in this field for over thirty years, goes even further. Following successful laboratory and field trials on the control of birds, he is so convinced of the overall efficacy of the material at a high level of potency, that he is using it in an attempt to rid the populated and tourist areas of Hokkaido, the Northern island, of the vast numbers of snakes - particularly the poisonous vipers.⁽⁴⁾

In trials with this material it is important to keep in mind that different 'strengths' of the material are available: that, where necessary, the potency and the range of activity can be increased over any one or two or all of the chemical senses until, so far as I can determine, full control is achieved. The importance of this cannot be overstressed for in past years workers in this field have tended to test only one strength - often the mildest - and if that was not immediately effective to damn the whole product out of hand.

Synergised ammonium alum is a fine or micronised powder varying from white through various colours. In so far as safety is concerned it has been cleared for use under the U.K. Ministry of Agriculture's Safety Precautions Schemes not only for veterinary use on all animals and in homes, but, also, on plants and trees of all species, including vegetables, cereal and other crops and fruit for human consumption, both growing and in store. Normally, with the milder preparations, no recommendations are necessary, but with the stronger, more potent material it is advisable that operators use masks, not for safety, but because its repellent factors apply possibly more to humans than to other species of animal life.

It may be applied either as a dry powder by means of a powder applicator, or, mixed with water, sprayed by helicopter or light 'plane as at the Ben Gurion International Airport, or by any type of agricultural, horticultural or garden sprayer. The Israeli workers found it easier and more effective to spray powder when there was rain and the liquid when it was dry. Both were equally effective even during their very heavy February cloudbursts.⁽⁵⁾

An application rate of 35-lb. (16-kg) powder in 40-gallons (180-litres) of water preferably with a pH of under 5 and at a temperature of

about 20°C. has been found adequate for one acre of actual spray and this costs between £20 and £50 according to the strength of material used. But it is not normally necessary to spray over the whole of the area.

Effectiveness from one spraying can last two or three months or even longer according to local conditions, the strength and quantity per area of the material used, alternative sources of food and the degree of chemosensory perception of the birds in the area.

To date, the synergised ammonium alum has been tested three times on airfields. The first was in 1973, in the United States at Dekalb Peachtree Airport and the adjoining Dekalb County Landfill in North-East Atlanta,⁽⁶⁾ when there were present representatives from the University of Georgia, the airport authorities, the F.A.A., the Department of the Interior, etc., etc. The landfill at the edge of the runways received all the county's garbage amounting to some hundred tons daily. This was shredded and spread by bulldozers over 200 acres on two sides of the airfield to the delight of about 1,000 birds, including doves, grackles, starlings and blackbirds which visited daily between 17.00 and 20.00 hours.

These birds were a continuous hazard during the evenings: strikes were frequent and after one which resulted in the deaths of seven passengers, closing of the airport was considered.

In the tests, one application of the synergised ammonium alum was reported to have kept the birds from the runways; but clearing them from the landfill garbage was, of course, another matter. The report shows that the repellent was sprayed on the garbage on August 21st, 1973, followed by a second spraying eight days later on August 29. Apparently it was expected that effective repellency would continue through layers of hundreds of tons of garbage, and, indeed, a reduction to a maximum of 10% of the numbers of birds prior to the trial was shown at any one time. But the tests were not, for some unknown reason, continued.

The second test, which was at Ben Gurion International Airport in 1974, had the same type of problem. The garbage dump for the City of Tel Aviv was on the perimeter and full control of the birds there could not be obtained although they were cleared from the

runways as in America despite there being horticultural crops in those areas. However, when the birds returned after migration it was decided to spray again but at ten times the previous rate and trials at Ben Gurion International Airport were recommenced in September, 1975, when, as you have heard from Mr Dar, the birds were successfully kept from the runways with one spray of synergised ammonium alum; and the garbage dump, which was hand-sprayed with the repellent after each unloading, was also kept free from the birds.⁽⁵⁾

Here, I should add that it is reported that bird strikes are common at this airport and that all other known methods of bird control had been tried but without success.

Airports would not, however, appear, in general, to be of particular appeal to birds, and I submit that evidence of successful repellency of birds from various crops is of greater value than control at airfields. In this connection, the synergised ammonium alum now has an impressive folio of successes in several countries in trials carried out under the supervision of government and institutional authorities.^{(7)(d)} Outstanding, are the results of trials, again in Israel, over several years under the direction of Mr Y. de Wolf, Director of the Department of Crop Protection of the Israel Ministry of Agriculture.^{(9)(d)} Many were carried out in the testing stations of the Volcani Institute which are spaced over the deserts, and in these and at farms situated around wells sunk in the desert, migratory birds of many species travelling from Russia to Africa and back, were repelled from crops when they, the birds, were obviously at their last stages of hunger and thirst after crossing long stretches of desert. Yet, in all but one case, the crops treated with the repellent were saved while the untreated controls were completely ravaged.

In conclusion, I would say that synergised ammonium aluminium sulphate can apparently be brought to sufficient degree of potency to repel all birds from airports.⁽¹¹⁾ I would also stress the need, when testing the material, for careful study to be made of the reactions of the birds to the material so that the correct grade of material for each airport may be made, and in this I shall be pleased to advise and assist wherever possible.

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2. Moncrieff R.W. 1951. The Chemical Senses P. 172
3. Soudek S. 1929. The Sense of Smell in Birds: Int. Cong. Zool. 10:755.
4. Udagawa S. 1976. Private communication.
5. Dar G. 1976. Compte Rendu des Essais Effectues dans L'Enceinte de l'Aeroport International Ben Gourion & Lod avec le Bird Repellent RETA: BSCE/11
6. Howell J. Private report: CURB application - Dekalb County Landfill and Dekalb Peachtree Airport. 1973. Appendix A'
7. Leinati L. Contributo alla Conoscenza degli Ornitorpellenti per la Selvaggina - Nota preventiva. XXII Con. Soc. Ital. Sc. Vet. 1968.
8. Private communications - various.
9. Dar G. Private report: Summary of trials with CURB on cultivated vegetables and fruit from sowing to harvest. 1975
10. Dar G. Private report: Summary of Trials with CURB on Seeding Plants: Legumes and Sorghum in Israel. 1975
11. Manufacturers: Sphere Laboratories (London) Ltd.,
1 & 2, Onslow Mews East, LONDON SW7, England
Sold under Trade names of CURB and RETA.



September 10, 1973

TO: DR. HOCHBERG

SUBJECT: "CURB" APPLICATION - DEKALB COUNTY LANDFILL AND DEKALB PEACHTREE AIRPORT

The DeKalb County Landfill is located adjacent to the DeKalb Peachtree Airport in Northeast Atlanta. This landfill has been used for about seven years as the county dumping ground for garbage. Garbage is hauled to a large shed located at the entrance to the landfill, dumped into a large pulverizer and spread over a 200 acre area by bulldozers. The landfill has been quite an attraction for the feeding of doves, grackles, starlings, and blackbirds. Surrounding areas of the airport have been desirable for roosting and perching for many of these birds. Up to 1,000 birds may be observed on a given day. The largest concentration of birds are usually seen in the evening between 5:00 - 8:00 P.M. and appears to be increasing rapidly.

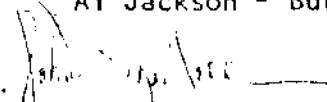
Six months ago a flock of birds flew into the engine of a small jet plane taking off and resulted in the death of seven passengers. This disaster has developed into a controversy about either closing the airport or the landfill to prevent further risk of other such incidences. Both the airport and landfill are in dire need of a way to solve their bird problem.

On August 21, a study was initiated with hopes of reducing the large population of birds in such areas. Three areas at the landfill and one at the airport were designated as test plots. (See attached sketch) The treated plots ranged from $\frac{1}{4}$ - $\frac{3}{4}$ acre in size with an adjacent replicate serving as the control plots. "Curb" was applied in the described forms by means of a pressurized 50-gallon tank attached to a jeep. Applications were made between 6:00 - 8:00 A.M. on a very clear and calm day. On August 29, a second application was made on the same plots at the landfill. Unfortunately, there was not enough material left to repeat the airport plot.

In summary, the two applications seemed to reduce the total population of birds. In order to evaluate the total effectiveness of "Curb", it will be necessary to repeat applications on a much larger scale.

The following people were involved in this study:

John Howell - Rachele Laboratories
Charles N. Dobbins, D.V.M. - University of Georgia
Stanley A. Vezey, D.V.M. - University of Georgia
Tom Helton, County Agent - Ext. Service, University of Georgia
Edward S. Weeks - Sanitation Dept., DeKalb Co.
L. M. Dunston - Rachele Laboratories
Doc Manget - Airport Manager, DeKalb Peachtree Airport
Representative from F.A.A.
Donald W. Hawthorne - Dept. of Interior
Al Jackson - Bureau of Sport Fisheries & Wild Life


John Howell

JH/th
cc: L. Zoller

PLOT

1ST TREATMENT

| | |
|------------------|--|
| A (¼ acre) | 10 gal. H_2O + 8½ lb. powder + 1 gal. emulsion. |
| B (½ acre) | 20 gal. H_2O + 17½ lb. powder + 1 gal. emulsion |
| C (¼ acre) | 10 gal. H_2O + 8½ lb. powder |
| Airport (¾ acre) | 30 gal. H_2O + 27½ lb. powder + 1½ gal. emulsion |

OBSERVATIONS

| | | <u>MORNING</u> | | <u>EVENING</u> | |
|---------|-----------|----------------|----------|---------------------------------------|------------------|
| | | TREATED | CONTROLS | TREATED | CONTROLS |
| | | 8/21/73 | | 8/21/73 | |
| A | | | | 48 sparrows | Few birds |
| B | | | | No birds | No birds (Windy) |
| C | | | | No birds | No birds (Windy) |
| Airport | | | | 40-50 starlings | |
| | | 8/22/73 | | 8/22/73 | |
| A | No birds | No birds | | 48 sparrows, 2 doves, 3 blackbirds | No birds |
| B | Few | Plenty | | 5 doves | 96 starlings |
| C | No birds | No birds | | No birds | No birds |
| Airport | | | | No birds | No birds |
| | | 8/23/73 | | 8/23/73 | |
| A | No birds | No birds | | 48 sparrows, 3 doves, 2 blackbirds | |
| B | 3-4 doves | 108 birds | | 8-10 doves | 108 birds |
| C | No birds | No birds | | 1 dove | No birds |
| Airport | | | | No birds | 3 crows |
| | | 8/24/73 | | 8/24/73 | |
| A | No birds | No birds | | | |
| B | 6 doves | 72 starlings | | | |
| C | No birds | No birds | | | |
| Airport | | | | | |

PLOT

2ND TREATMENT

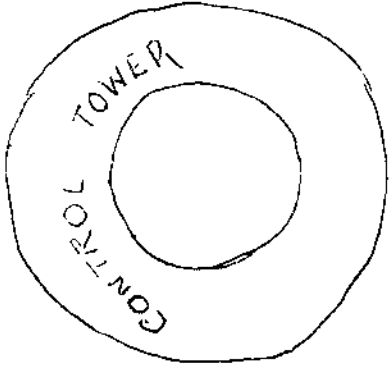
| | |
|------------|---|
| A (¼ acre) | 10 gal. H_2O + 8½ lb. powder + 1 gal. emulsion |
| B (½ acre) | 20 gal. H_2O + 17½ lb. powder + 1 gal. emulsion |
| C (¼ acre) | 10 gal. H_2O + 8½ lb. powder |

OBSERVATIONS

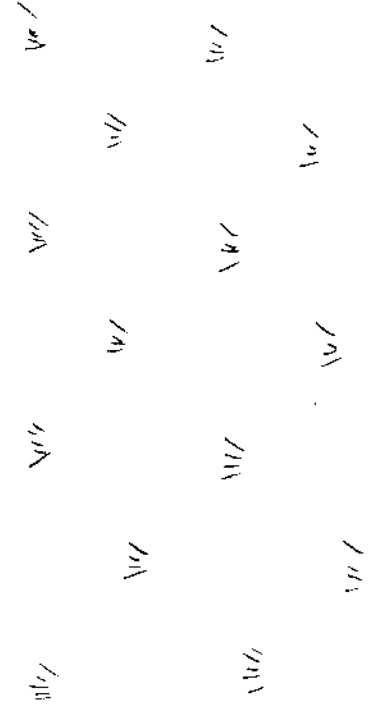
Similar to above with possible reduction of total population of flocks.

PEACHTREE DEKALB AIRPORT
(PART OF: ADJOINING
DEKALB COUNTY LANDFILL)

NOT TO SCALE: 1/4" = GRASS



RUNWAY



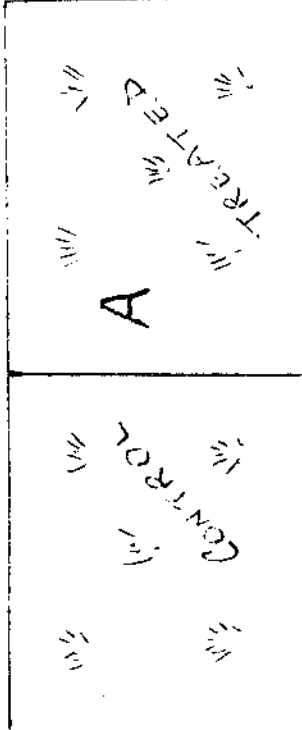
PERIMETER FENCE

R U N W A Y

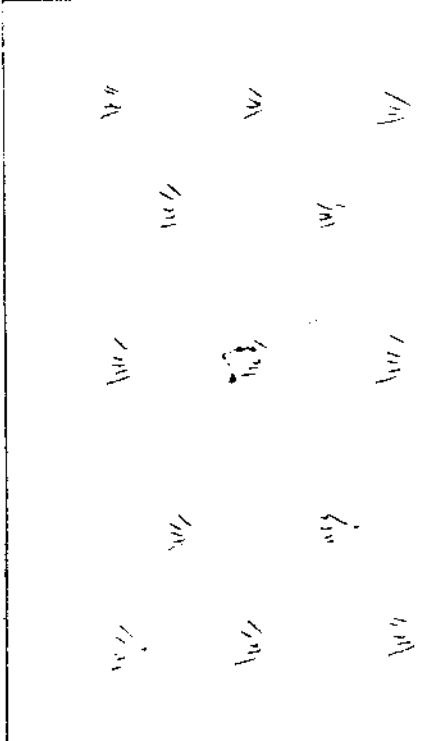
R U N W A Y



RUNWAY



RUNWAY



AIRPORT



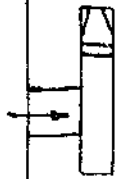
DEKALB COUNTY LANDFILL

(APPROX 200 ACRES NOT TO SCALE)

GARBAGE

CLD

GARBAGE SHED
RECEIVING
AND SHREDDER



SHREDDED GARBAGE TAKEN
BY TRUCK TO NEW GARBAGE
SPREADING AREAS AND
SPREAD BY BULLDOZER.

