# AERIAL TREATMENTS AGAINST STARLING ROOSTS IN FRANCE WITH CHLORO-PARA-TOLUIDIN (CPT): RESULTS OF EIGHT YEARS OF EXPERIMENTS

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ABSTRACT: The starling is one of the major pest birds in France. During the winter, starlings coming from other parts of Europe gather in the Northwest of France and cause extensive damage in the corn silage distributed to the cattle, by eating and spoiling the grains. As it is impossible to protect the cattle food by physical means in most of the situations, the persons in charge of resolving the problem have chosen to turn towards chemical roost treatments. Between 1980 and 1988, nearly 40 treatments have been carried out on 25 different roosts. The chemical used is CPT (chloro-para-toluidin) applied at the rate of 100 kg per hectare. Water is added to the formulated product and a volume of 1000 liters per hectare of the treatment mixture is applied with a fixed-wing aircraft. Results usually ranged from 30% to 80% of the birds killed. No phytotoxic problems have been reported on the roost sites, and only light wildlife adverse effects are mentioned. Studies are going on with the following points: degradation of CPT in the soil, and reduction of the amount of CPT and/or water without drop of effectiveness.

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The starling (Sturnus vulgaris) is one of the major pest birds in France. It has extended its European populations northwards and southward since the 1940's, and now the breeding area covers most of the continent and islands (Fig. 1). During the winter, a large part of the northern populations of starlings gathers in France, while central European populations go further south, down to North Africa (Fig. 2). At present, after this 50 year starling boom, the European populations seem to be declining. The number of starlings wintering in France has decreased from about 60 million in 1975 to about 20 million nowadays, with a marked decline since 1985, possibly related with three consecutive hard winters. Ten to twenty percent of these starlings are native birds. The main wintering area is the northwestern part of the country with about 60% of the birds.

Native starlings do substantial damage to cherries and wine grapes. But wintering birds are a more important concern for many French farmers with starling depredations on livestock food, mainly corn silage. Winter damage involves large numbers of birds over wide areas, whereas fruit damage is confined to small areas with a comparatively few birds involved.

On grounds of animal and plant health, the suspicion that starlings would transmit a number of diseases is sometimes put forward, but no evidence of this has yet been provided. Moreover, there is no (or not yet?) histoplasmosis in France.

Let us come back to our wintering starlings. As they do anywhere else, they congregate at night in roosts of different sizes, the largest ones gathering more than one million birds. Between the roosts and the feeding places, starlings make a daily round-trip within a range of over 40 kilometers. During the winter season, there is a continuous turnover of birds, some of them leaving the roost as newcomers arrive. Sometimes the whole roost moves to a new location. Climatic changes or human disturbances may increase these movings.

Most of the big roosts are occupied several years in a row. Small woodlots with conifer trees up to ten meters high are the most common roosting site chosen. Droppings accumulate on branches and on the ground, where the layer may reach several centimeters in depth. Among the droppings, we can see a number of corn grains undigested by the starlings. This provides a daily food to rodents and to several kind of birds, such as chaffinches. Starlings often choose their roosting sites in wet or marshy woodlands. After 2 or 3 winters of starlings presence, the conifers die, because of the accumulation of acid droppings.

During the day, in mild weather, starlings feed mainly on grasslands, looking for insect prey. But in cold weather, especially when the soil is frozen, they gather around the livestock farms to feed on corn silage, eating or spoiling the grains. Pellets, when they are available, are eaten as well.

At present, the highest densities of wintering starlings found in France--particularly when the winter is cold--correspond to the area where corn silage is used (Fig. 3). This connection provides an explanation of the starling boom which moreover occurred at the same time as corn silage

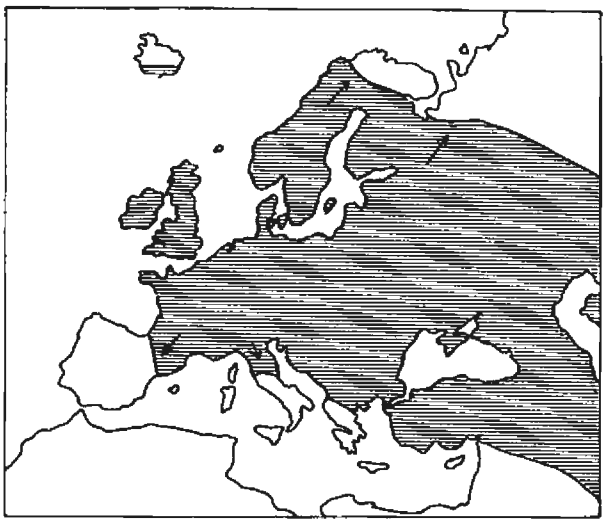

Fig.1. Breeding area of starling (Sturnus vulgaris) in Europe with recent extensions.

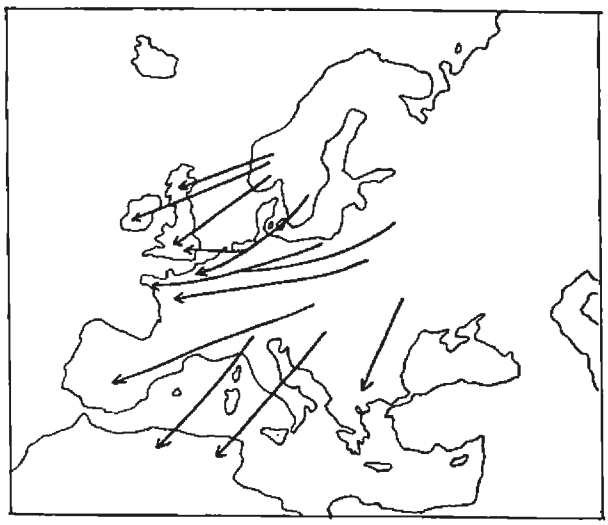

Fig. 2. Main autumnal migratory routes of starling (Sturnus vulgaris) in Western Europe.

development. This easily available food allows a better survival rate of the young inexperienced starlings during the wintering period, and this is a very strong factor of population development.

The amount of corn silage losses has been roughly assessed at 50 F ($8)/1,000 starlings/day of real damage (updated data). With a number of damage days ranging from twenty to eighty during the wintering period, and a number of 10 million really damaging birds, the annual losses in France can be assessed between 10 million Francs ($1,800,000) and 40 million Francs ($7,000,000).

Besides those corn silage depredations, starlings do significant damage to the young seedlings of winter cereals, especially in the pre-roosting areas, when they land in large flocks : they probe the ground to obtain the grain at the base of the seedlings. Thus some plots can be destroyed from ten to thirty percent usually, but sometimes more than fifty percent.

Furthermore, frequent problems with starlings on airports, power lines, buildings, etc., have been reported.

In order to conduct experiments and suggest solutions to this starling problem, a working group was set up in 1976, by 3 organizations conducting agricultural research and development: ACTA, INRA and SPV. This working group has developed or encouraged the use of different control means, such as sound or visual scaring, physical protection with plastic strands allowing cattle to pass through, and cage-traps. But those methods were insufficient or difficult to use in many situations. Baiting with pellets treated with CAT (chloro-aceto-toluidin) was ineffective because starlings did not eat them readily. So the working group turned towards aerial treatments of roosts with chemicals. American studies, conducted mainly by researchers of the Wildlife Research Center in Denver, had

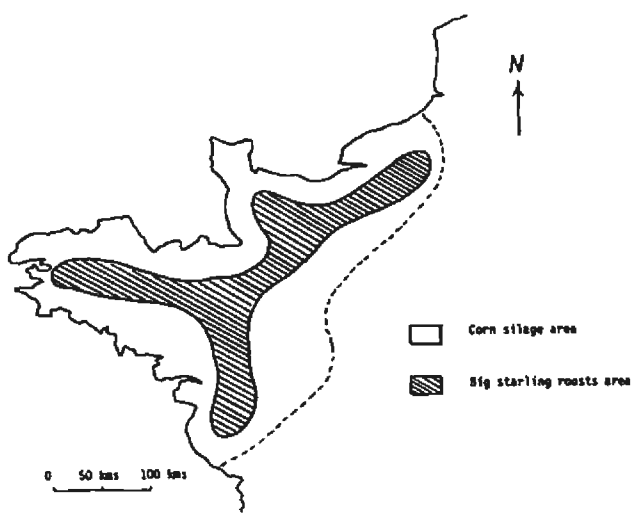


Fig.3. Correspondence between the area where corn silage is widely used and the area where the biggest starling roosts are observed in North-Western France.

pointed out that CPT (chloro-para-toluidin) could be an interesting product for roost treatments. Relying on these studies, the working group chose CPT as an experimental material for roost treatments.

Between 1980 and 1988, nearly 40 treatments were carried out on 25 different roosts, with an experimental authorization. The applications were done by fixed-wing aircrafts (either a Cessna 188 or a Piper Pawnee) equipped with a Venturi system usually intended to spread microgranulates. A preliminary trial with a 6 m-boom, delivering 170 l/ha, proved ineffective. An attempt with a helicopter resulted in a pilot's definite fear, and was not re-

peated.

Before the nighttime treatment, the roost site is surrounded with beacon lights fastened on top of poles or trees. This requires sometimes the use of a string-thrower device. The flying line in and out the roost is marked out with another type of beacon light placed on the ground. During the operation, ground observers give information to the pilot with walkie-talkies. The aircraft flies at an altitude of 35 m (100 feet) above the ground level; it is monitored by an altitude sonde. At each aircraft pass, some birds may fly away, but extensive flushing occurs only in moonlight. The Venturi system allows spreading a volume of 1000 l/ha in one pass, covering a width of 25 meters. As we usually treat roosts having a surface area of 1 ha or so, the aircraft makes 2 rotations of 500 liters each, and the tank is emptied after 2 or 3 passes above the roost. This is a very high volume indeed, but attempts to reduce it have led to a lower effectiveness. In fact, the spreading of the toxicant on the roost is very rough: the spraying is thicker in the central vein than in the edges. And there is a drift problem from the wind and from the aircraft propeller. So the amount of toxicant applied at a given place of the roost is obviously approximate.

For practical reasons (staff or fog complications), the operations are generally carried out during the first part of the night, though aviary experiments have shown that the mortality rate was higher with a treatment made at the end of the night.

The product applied is composed of:

| | | |
|---|---|---|
| CPT(chloro-para-toluidin).... | 30% | 300 l |
| Solvent ..... | 20% | |
| Tensio-active product ..... | 30% | |
| Making heavier & antifreeze product | 20% | 1000 l/ha |
| Water..... | 600 l | |

Concentration of active ingredient in the final mixture: 9% in volume.

The mortality begins six hours or so after the operation, with part of the birds dying inside the roost or in the neighborhood, and other ones dying anywhere in the countryside. Intoxicated starlings look for puddles or ditches to drink. They are unable to fly for some 3 or 4 hours before dying. If a rain occurs some hours after the treatment, a part of the starlings die more quickly because of the wetting agent present in the formulation. But another part, less sprayed, escape because the active material is washed off. Laboratory studies have shown that the toxicant gets into the birds through the skin. So the feathers barrier has to be crossed. This explains why such a large quantity of liquid

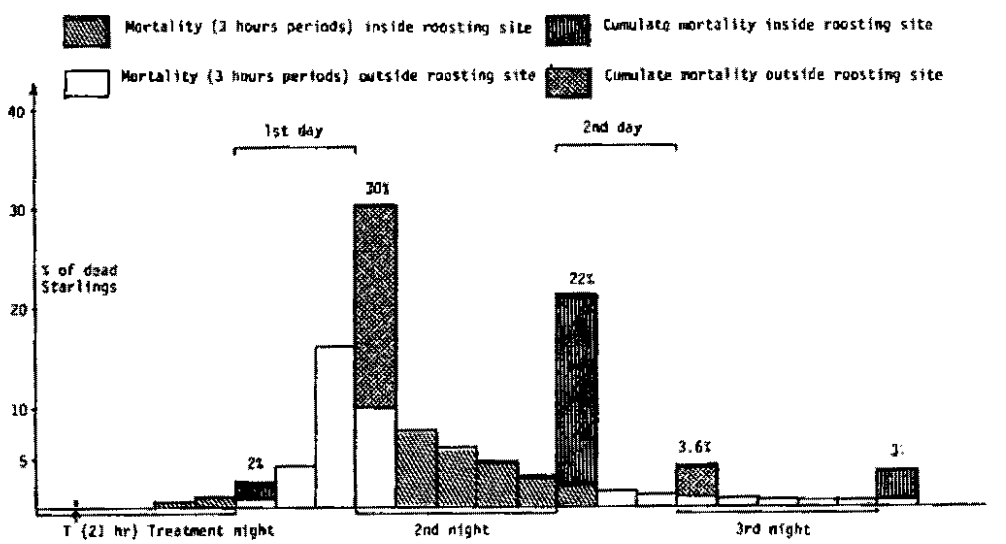


Fig. 4. Diagram of mortality over time following a CPT treatment of a starling roost with an overall mortality of 65% (a theoric case built with partial data).

has to be spread.

The efficacy evaluation remains rather subjective. It is based on several criteria:

First, the difference of the roost area occupied by the starlings before and after the treatment. In a conifer roost the average is 100 birds or so/m². In a deciduous roost, the average is lower, maybe 60 or 80. Thus one may calculate roughly the number of dead starlings. But this criterion may be biased by newcomers arriving to the roost just after the treatment, or by a part of the birds shifting to another roost site. In this later case, actually, dead birds may be found in the new roost.

Secondly, inside the roost, plots of 25 m² are marked out and dead starlings are counted and removed every day. This gives an assessment of the mortality rate. If the roost remains on the same site (which occurs most of the time) dead starlings may be found for 5 days after treatment and sometimes for 10 days or even more for the very last ones. The number of dead starlings found at the roosting site or in the neighborhood depends on the treatment time. With a treatment realized before midnight, there will be a lot of birds dead at the roosting site on the next morning. If the treatment is made later, intoxicated birds are able to fly away and they die anywhere in the countryside; so, at the roosting site, dead birds are found only after the next night.

Thirdly, the partial removing of the dead birds in and around the roosting site gives another idea of the number of killed starlings. Numbers of 100,000 or more birds removed after an operation are reached.

Another criterion is the number of birds observed at several farms before and after treatment.

Those various criteria give a rough idea of the effectiveness of the treatment. This effectiveness usually ranges from 30% to 60% in conifer roosts and from 60% to 80% in deciduous roosts. An example of the result of a roost treatment is provided in Fig. 4.

Next studies are focused on a reduction of the amount of CPT and/or water applied, without a drop in effectiveness. This involves spraying system and formulated product improvements.

On grounds of environmental effects, studies on degradation of CPT in the soil and water are currently being made. Results are not yet available.

Only light phytotoxic problems are reported, such as temporary grass burns when a wind drift occurs. Trees are not damaged at all by this treatment.

Wildlife adverse effects are minor as they are confined to the roosting site itself: some nontarget dead birds may be found, such as chaffinches or thrushes; some crows may die as well, after having consumed a lot of dead starlings, but this has no noticeable impact on the local population. Mammals, such as foxes, martens or rodents do not appear to be victims of treatments. After an operation, many birds, rabbits, rodents and other animals can be observed on the roosting site.

In spite of these low environmental problems, ecological movements complain about those operations and this is of concern for future continuation of roost treatments. On the other hand, farmers insist on our going on. That promises passionate discussions in the near future.