Title: THE FIGHT AGAINST THE COLORADO BEETLE (Europe)

Source: European periodicals (as indicated) 1944 to 1950, German, French, Dutch, Swedish and Russian

The Colorado Beetle, the fight against it (1923-1943) (Berne)

Chemicals investigated in Switzerland

Beginning in 1941 a thorough study of insecticides was begun, especially of the arsenates and commercial insecticides.

Following experiences gained in France, Switzerland concentrated especially on di-basic lead arsenate, but as soon as the laboratories in Mont-Calme and Oerlikon found time from directing the fight in the fields, they began to study new insecticides, especially if the di-basic lead arsenate might be replaced by calcium or aluminum arsenates. Other chemicals were "Arsenor" (Merk in Dielsdorf), "Thallonhil", and "Pollak" a solution based on rotenon and pyrethrum.

Calcium arsenate is very effective, as toxic as the lead arsenate; it causes no burning and remains in suspension a long time. It was recommended that it be manufactured in powder form for the preparation of sprays instead of pastes.

Aluminum arsenate was not found to be as effective.

Thallonhil proved to be worthless.

Pollak is a good contact poison which acts quickly.

Arsenor also proved to be effective against the beetle.

Calcium arsenate, even when mixed with Bordeaux mixture, does not cause burning, however, it was found that the Bordeaux mixture (copper) repelled the larvae.

The firm Geigy in Basel, brought out an organic product, non-toxic to humans. Tests were also made to discover which mixtures might be used to save copper.

All tests proved the effectiveness of lead- and calcium arsenates. The new product "Gesarol" also is an excellent insecticide.

"Nirosan" and "Nirosit" are useless against the Colorado Beetle.

Following these tests, the problems tackled were:

1) Tests with single and mixtures with respect to medium sized larvae.
2) Tests with various chemicals and their effects against full grown larvae.
3) Fight against the beetle itself.

Excerpts from Table II, p. [illegible], Zurich centre 19 September 1942 to 1943)

1942 Product	SPRAYS	mortality of larvae after 24 h	32 h	56 h	80 hours
		%	%	%	%
1.5% dibasic lead arsenate		12	85	100	
1.5% " " "	+ 2.0% Bordeaux mixture	15	65	91	96
1.5% " " "	+ 1.0% " "				
	+ 0.5% sulfur-calcium mixt.	6	67	93	100
1.5% " " "	+ 2% "Polysulfate Cupra"	2	82	98	100
0.4% "Calcium arsenate Chemico"		14	76	98	100
0.4% " "	+ 1.0% Bordeaux mixture				
	+ 0.5% sulfur-calcium mixt.	8	60	98	100
1.0 % Gésarol		24	93	100	
1.0 % Gésarol + Bordeaux mixture 2%		20	83	93	100
1.0 % Gésarol + 1.0% Bordeaux mixt.	+ 0.5% sulfur-calcium mixt.	6	75	100	
1.0 % Gésarol + 2.0% "Polysulfates Cupra"		20	93	100	
1.0 % Geigy 1020/I product		34	82	98	100
	DUSTS				
Gésarol		28	100		
Reymann-Gallinger rotenone powder		84	100		
"Flit-Gardin"		86	100		

1943	SPRAYS				number of adults dead after 80 hrs
1.5 % dibasic lead arsenate		24	75	98	100	7
1.0 % Gésarol		10	89	100		
Gésarol - 1.0% Bordeaux mixt. - 0.5% sulfur-calcium mixt.		6	87	98	100	5
Gésarol - 1.0% Bordeaux mixt. - 0.2% Geigy mixt.		2	57	100	100	5
Gésarol - 0.3% "Sando." Copper"		0	87	98	100	6
0.4 % Calcium arsenate Siegfried		18	83	100	100	7
0.4% Calcium arsenate Hunperbühler		0	73	93	100	7
0.4% Calcium arsenate Kex-Flora		22	65	100	100	9
1.5 % Geigy combined product 4006		4	87	100	100	7
	DUSTS					
Rotenone powder Maag		4	100	100	100	9
Gésarol for dusting		16	87	98	100	10
Gésarex		78	96	100	100	10
Geigy combination prod.4007		76	100	100	100	10
stabilised calcium cyanamide		26	84	100	100	7

Laboratory tests made in Oerlikon (1939) showed the following results:

Lead arsenate Maag in 1.5% paste	0	40	90	100
" " Siegfried in 0.4% powder	0	60	100	100
Calcium arsenate Flora 1% paste	10	50	100	100
" " Flora 0.4% powder	0	50	90	100
" " Mittens 0.4% powder	0	50	90	100
" " Maag 0.4% powder	10	20	80	100
" " " " "	20	80	100	100
" " Siegfried 0.4% powder	0	30	70	100
Arsédor Maag 1.5%	80	90	100	100
Dory Cobra Caubet powder	100	100	100	100

Several other chemicals and combinations of chemicals did not prove to be good enough: Aluminum arsenate Mattens especially.

Quite out of the question were: Arsalumina Pidima (Tverdon)
Aluminum Arsenate Rocol-Malstra (Paris)
Udine Peggi (Udine, Italy)
Phenothiazin Du Pont de Nemours (USA)

The latter had apparently had a fair success in the United States, however (previous)
results were disappointing in our own tests.

(The chemicals listed above are those which showed a 100% mortality of the larvae at 96 and 80 hours. Those that did not show 100% have not been listed.)

Because of its great effectiveness and (and ease of handling, the lack of toxicity/general (& humans / animals) is being more and more used in Switzerland.

Following is an additional list of products which are being recommended by officially:

1) arsenical:

Paste:
lead arsenate Maag
" " Mattens
" " Lex(Flora)

Powders (for sprays)
dilead arsenate Maag
" " Ortho (Barbezat)
" " Siegfried

calcium arsenate powder:
" " Arsein (Brändli)
Borchers (Mangold & Vernet)
Wangerthaler
Maag
Mattens
Siegfried
Verminarsen (Grisard)
Lex (Flora)
Spritzmerital Schering (Stehelin)

cupro-arsenical preparations (for sprays)
Kresolor (Maag)
Cuprin (Mattens)

II. Organic insecticides

simple products:
Derux K (Siegfried)
Pirox D. (Maag)
Derris powder "Chemico" (Mattens)
Pulvo-Lex D (Flora)

mixtures: (to be used only if the Colorado beetle and mildew are to be fought at the same time)
Deristen (Mattens) Derux (Siegfried), Pirox (Maag), Pulvo-Lex (Flora), Fol-pi (Wangerthaler)

Although the Colorado Beetle's wings do not help it to fly independently, yet, given strong enough winds, great flights of the insect have been observed and are in many cases to blame for the distribution of the plague. Such was the case when the beetle crossed the Jura Mountains from France and invaded Switzerland.

Since the war experiments with various flies and other insects, enemies of the Colorado beetle, have been started again. The fly Doryphorophaga, insects like Lydella grandis, Perillus bioculatus and Podisus mac liventris. The latter two seem to be very promising.

The various Swiss Cantons had nearly succeeded in ridding themselves of the beetle when new swarms were imported by severe winds and at present writing most of Switzerland is nearly solidly overrun.

Switzerland - La Lutte contre le Doryphore (1923 to 1943) (Berne)

..... Natural enemies of the Colorado Beetle are bacteria, fungi of the genus Isaria. They do not at present play a very important role in Europe. Some flies, imported from the United States, like those of the genus Doryphorophaga a beetle Lebia grandis, and the insects of the genus Perillus bioculatus and Podisus modestus. The latter seem to have promise.

In 1938 use of di-basic lead arsenate in the fields and Retenone in gardens.

In June and July storms carried thousands of the insects across the Jura mountains from France.

In 1942 chemical tests were undertaken near Lausanne:

Good results: (90 to 99% mortality)

di-lead arsenate plus 2% Bordeaux mixture
Arsenior 1.5%

Very good results (100% mortality) 2%

di-lead arsenate either alone or in mixtures (excepting bordeaux mixture
Lime arsenate alone 1%
Lime arsenate plus Bordeaux mixture plus

Insecticides developed and tested in 1941: (listed on those which show 100% larval mortality after 96 or 80 hours)

Westcal 25 (British product)	100%
Powder No. 1884 (Ceiby, Basel) 2nd test	100%
Retenone powder (Reynaud-Gallinger, 2nd test)	100% after 8 hours
Cuprin 1.5% (Martone plant)	100%
Antidoryphora mixture (Schlossing)	100%

Tested in 1942

Calcium arsenate "Chemico" 0.4%
(besides the already known mixtures)

Jordbrukarnas FÖRBUNDSBLAD

Lördagen (Sweden) 17 July 1948

A short article warning Sweden of the danger of an invasion by the Colorado Beetle which had by that time (1948) reached [redacted] Denmark. The article gives a short resume of the gradual spreading of the beetle from France to every part of Europe.

[illegible] l'Academie d'Agriculture de France
Vol XXXVI pp 39-41

new
[illegible] insecticides.
[illegible] experiments made at the experimental laboratories at Les Milles.

SAD I SOVKHOZOV [illegible] Sel'khozgiz
April/May 1946 pp 34 - 38

A. I.
The Colorado Beetle by/ S Timov
Central Laboratory on Seed Control and
Quarantine of Agricultural Pests.

A condensed revue of the spread of the Colorado Beetle since it was found for the first time in Europe. In the past 25 years the beetle spread to Belgium, Holland, Switzerland, Germany, Luxemburg, parts of Italy, Spain and Northern Africa. Appearance of the insect in Germany facilitated its importation into the USSR. During World War II the beetle was carried into Austria, Eastern Prussia, Poland, and at the present (1946) there exist serious troubles ots near the East Prussian - Lithuanian border and in Poland.

In 1944-45 the beetle approached 600 miles closer to the USSR and no attempt was made in Germany to check the spread.

It is also quite possible that German occupation forces have imported the insect into parts of the Ukrainia, Moldavia, Belorussia, Lithuania, Latvia and Estonia, the Karelo-Finnish SSR where the Germans were located for a long time.

- 6 -

The areas which are bordering on the infested areas should be very carefully patrolled to prevent the insect from gaining a foothold.

There are chemical methods to kill the beetle. They are also gathered by hand and the eggs, larvae, and adult insects are squashed, treated with formalin, kerosene, or gasolene and stored for a checking by the State Inspector. (No further indication in this article as to what particular chemicals are used in the fight against the beetle.)

LA CAMPAGNA MILANESE
Milano, Italy 15 June 1949

Article on the danger created by the spreading of the Potato Beetle. It points out the thorough way in which the British go about inspecting their potato fields and gardens and the immediate measures taken to destroy any beetle found, to trace it to its source, and to make sure that there will be no further infestation from that direction.

In 1949 1 insect was found in a garden in Kent, another one in a "wagon" imported from Germany. A little later one insect was found on a shipment of camomil from Belgium, or some lettuce from Perpignan, and finally 13 insects were found in April on a lettuce shipment from Italy. The Italian shipment was not accepted, sealed, and returned to Italy. The vessel - the Falaise - on which the shipment had come, was found to be badly infested.

In 1948 11 colonies were found in England, (5 in Kent, 2 in Sussex etc) They were immediately treated with DDT or lead arsenate-containing insecticides. This was supervised by Plant Protection Ltd, the strongest phitopharmaceutical organisation in England, with a daughter organisation - Solplant - in Italy.

Unfortunately Italy has not been as active in fighting the pest as England has been and still is. The situation is very serious in Northern Italy.

Agricultural Newspaper
Official publication of the provincial
LA CAMPAGNA Como, Italy
15 June 1947

Dr. Formigoni

Ever since 1944 the doryphora menace has been stressed by this paper when the insect was first found in the neighborhood of Tesrino, Northern Italy. Since then infestation has spread over the entire province (Erba, Canta, Mariano, Barsand, Merate). The insect was also found in the province of Varese (Castello, Uboldo,) In the south-western region (Annone, Oggiono, Carlate.)

Insecticides used:

Arsicida, Arsall, lead and calcium arsenates, preparations based on DDT, on Gammexane (Hexachloro-cyclo-hexane), Barium salts.

IL CAMPAGNOLO Modena, Italy
1 July 1948

Official journal of the Experimental Institute of Technical Zoology

(Istituto sperimentale de Zootecnia)
A. Draghetti

The spread of Doryphora has been very rapid in northern Italy. In the province of Modena it has been found in the communities Finale Emilia, Medolla, and Guiglia from where they can easily spread to adjoining communities.

Used by Dr. Della Beffa with good success is: Arsicida Rumianca . Best of all, however are the insecticides based on DDT and Gammexane. The most commonly is used lead arsenate, both as spray and in dustings.

ANNALI 1946-1947
Accademia de Agricoltura di Torino (Italy)

The Doryphora infestation in Piedmont (Piemonte) Italy — Prof. Giuseppe Della Beffa (see map of the province of Piemonte, pg. 85)

Distributions:

Within the province of Piemonte many communities have been infected with Doryphora: Cuneo, Alessandria, Aosta, and Vercelli for instance, also Santa Maria Maggiore in Novarra province and finally in Formazza. Val Formazza and Valle del Tanaro , that is to say the high alpine parts, remained immune until the end of 1946.

Experimentation with new insecticides.

Tests were made comparing the effectiveness of lead arsenates and the new organic compounds.

1) "Pentachlora" or thiodiphenilamine — used for dusting and in sprays. This acts within 24 hours, a little more effective on the young larvae, the older larvae and adult beetles were more resistant. Its effectiveness about equals that of the lead arsenate.

2) "DDT" used in the form of "Gésarol" (Geigy, Basel) and the American product called "Bug Mouse", as well as some Italian products. Of all these insecticides tested "DDT" is most effective on both adults and larvae within 24 hours.

3) "Gamexane" which is the gamma isomere of hexachlore benzene. Our experiments were done with "Tiogamma" Gamexane together with sulfocyanic acid (thiocyanate) and produced by Sipcam of Milan.

The results were excellent. Simply by contact larvae and adult insects became paralized in a short time and died within a few hours. Dusting and spraying with a suspension in water are equally effective.

4) Sodium fluosilicate and basic copper fluosilicate were tested, but results were negligible.

The results of our experiments then showed that "Tiogamma" was by far the most efficient insecticide against Doryphora, working both by ingestion and by contact. It is not poisonous to animals and as far as humans are concerned it can be used without the precautions necessary after spraying with lead arsenate. It can be used in gardens and fields close to other vegetables and the leaves of the potato plants can afterwards be used as feed.

Experimentation with biological means.

In its native land Doryphora is attacked by several insect enemies.: Doryphorophaga aberrans Townsend and D. doryphorae Rill. as well as a predatory beetle Lebia grandis Hentz; also by the larva of the genera Perillus and Podisus.

In our own country Coccinella septempunctata L. which is very common in potato growing regions and feeds on aphis etc., seems to hold out a promise of being an effective enemy of the Colorado Beetle, especially the larvae and eggs.

Hidden among the earth-clods we find the central European Carabus granulatus L (debilicostis Kr.) which attack the larvae of Doriphora when they descend from the plants and enter the ground. Another species, C. cancellatus L. (penninus Lap) is found in our alpine valleys, half-way up the mountains, where potatos are grown in quantities. This beetle is large and has a voracious appetite. The only species of genus Perichaeta which lives in Europe. Perichaeta unicolor Mam is also promising.

Boletin de Patologia Vegetal Y Entomologia Agricola Vol. XVI [illegible] 1 [illegible]

[illegible] (Ministerio de Agricultura)

Algunos aspectos de la biologia del escarabajo de la patata. (Leptinotarsa decemlineata Say) Agustin Alfaro, agronomist.

Madrid 1948

(Most of the article is devoted to [illegible] of [illegible] the Colorado beetle.)

[illegible] " Although the beetle is a rather poor flyer, once it is in the air the strong winds which blow in the central parts of Spain, carry it long distances which accounts for the deep penetration into the Spanish table lands. [illegible] "

Boletin de Patologia Vegetal & Entomologia Agricola Vol. XIV Madrid 1946
A. Alfaro

Parasites:

Coccinella septempunctata L.	attacks the eggs of Doryphora
Polistes gallicus L.	at times will attack the larvae (Zaragoza)
Zicrona caerulea L.	
Decticus albifrons F.	attacks adults and larvae (Lower Aragon)
Harpactor iracundus Poda	attacks larvae in Villacarrillo (Jaen) and Torre de Esteban Hambran (Toledo)

Fungi:

Beauveria effusa Vuill.

[illegible]:

Chemical fight against the Colorado Beetle.

The fight against Leptinotarsa decemlineata is still going on by treating the foliage with lead- and calcium arsenates in some parts of the country.

More effective are the newer insecticides, products of organic synthesis of the DDT series. (Gesarol, ZZ Insecticida Zeltia, Deisano, Merichol, Agrisalva, Pek, etc.) as well as 666. All the named products have the advantage of not being toxic to humans and animals in the generally used concentrations.

Distribution of the Potato Beetle in Spain

(See map of the distribution of the Colorado Beetle at the end of 1945 (page 5, Vol. XIV)
The shaded portions of this map show the areas where the beetle is well established
The spots indicate advanced foci where the insects have succeeded in gaining a foothold.

Boletin de Patologia Vegetal y Entomologia Agricola Vol. XV
A. Alfaro

Agricultural insecticides based on DDT and 666.

The following is a list of commercial insecticides and the percentage of active ingredients.

	DDT %	666 %	miscellaneous
Gesarol	5.0		
Inu	5.0		
Deisano	5.0		
ZZ	5.0		
Celón		15.0	
Agrisalva	5.0		
Medenal	5.0		2% de-tri-tetra-penta-hexa chlor derivatives
Doriphol	6.50		
Pek	6.5		
Gamadin		15.0	
Agriclor	1.0		30% dichloro and paradichloro benzene
Parisol	6.5		
Cruz Verde	6.5		
Polesa	8.0		
Dill	5.0		
Kob	6.0		

Servicio de Defensa Sanitaria de la Patata No. 15 Madrid 1944

a listing of the various lead-and calcium arsenates and organic products such as Gesarol which latter are away ahead in their value as insecticides, especially against the Colorado Beetle. Listed as most important insecticides based on dichloro dephenyl trichloro ethane and hexachloro benzene

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El Servicio de Defensa Sanitaria del Cultivo de la Patata y la Plaga del Escarabajo americano. No. 16 Madrid 1946

A review of the first appearance of the beetle in Spain, of its spreading, and the fight against it. The various chemicals used in the fight are listed; It is shown that the newly discovered organic materials, those based on DDT and 666, are far superior to the lead arsenates and calcium arsenates. Emphasis is laid on the insecticides produced in Spain.

Maandblad voor de Landbouwvoorlichtingsdienst s'Gravenhage, Holland
March 1948
M A. Ormel p.89-96

The Colorado Beetle in the Low Countries.

A short review of the fight against the beetle in Holland. In spite of all efforts the situation has not become better, especially because of the high temperatures in 1947. The prevailing southerly and easterly winds also carried swarms of the beetle into Holland.

The situation now has an international aspect:" Comité international pour l'étude en commun de la lutte contre le Doryphore."

Meetings were held in October 1947 in Brussels and in January 1948 in den Haag in which England, France, Belgium, Luxembourg, the Netherlands, and the British zone of Germany were represented.

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p 97 - 104

Discussion of the various chemicals used in Holland against the Colorado Beetle.

Calcium arsenate has been much in favor and the newer insecticides are rated as to whether or not they are poorer or better than it.

Results obtained with dusting powders.

a) work against larvae.

Internal poisons: Arsenates Calcium arsenate dust in dolomite marl

Contact poisons: containing DDT General (5% DDT) Geigy
DDT 10%
DDT 5%
DDT 2%

HCCH (666) containing Agrocide I (= 2.5% raw HCCH in a heavy "carrier") [C]

cont.

cont. <u>Dusting Powders</u>
used against larvae.

Agrocide III (6% raw HCCH) ICI
Agrocide III (3% raw HCCH) ICI
Hexyclan (5% raw HCCH)
Noury & V.D.Lande
Hexyclan (2% raw HCCH) same
Hexyclan (1½% raw HCCH) "

containing rotenone

Derris 3/4% rotenone
Derris 1/2% rotenone
Lonchocarpus 3/4% rotenone

Best in practice are:

DDT powder 10%,
" " 5% (Gesarol, A Avare and other trademarks.)
HCCH " 5% (Agrocide III, Hexyclan powder)
Derris 3/4 %

Dusting Powders against adult beetles.

The only insecticides which have given results of any consequence, are 5% DDT, Agrocide III (± 6% HCCH), Hexyclan (5% HCCH) and Derris 3/4% Much study will yet be necessary, but indications are that the HCCH containing insecticides are better and especially faster working than the others.

When it comes to protection, it seems that DDT is effective for a longer period of time.

<u>Sprays</u>

The article lists a long table of insecticides , all of them mentioned many times before. New seem to be only Gesarol emulsion 9552 (5%) and Flyolex (DDT plus Pyrethrum).

Nothing is mentioned about the spread of the Colorado Beetle anywhere but in Holland.

~~Comptes Rendus Hebdomadaires des Seances de l'Academie d'Agriculture de France~~
~~[illegible]~~ ~~Vol.~~

Bulletin Technique d'Information des Ingenieurs des Services Agricoles.
P. Grison and G. Vial No. 46 January 1950

This article is a report on experiments made in Caen with various types of equipment (helicopters) dusting and spraying potato fields. The only materials mentioned are "Product A" and "Product B" both containing DDT.
(They are of British make and no name is given)
There is no mention of the spreading of the beetle, ~~except the remark~~ that France is completely overrun.

Declassified in Part - Sanitized Copy Approved for Release 2012/06/08 : CIA-RDP82-00039R000100110016-2

Anzeiger für Schädlingskunde (Deutsche Gesellschaft für Angewandte Entomologie Year XXIII June 1950)
Erika Schwartz

The article is a discussion of an insecticide E 605-f which affects mainly the eggs of the Colorado Beetle either keeping the larvae from emerging at all, or killing them shortly after their emergence.

E 605-f is being produced in 0.025, 0.04, and 0.1% concentrations by the Bayerwerke at Leverkusen.

The percentages of results increase with increased concentration and larvae have been completely kept from emerging, that is to say were killed in the egg-stage, if the 0.1 concentration was used.
