

## BIOLOGICAL ACTIVITY OF CONSULT (HEXAFLUMURON) AGAINST *LEPTINOTARSA DECEMLINEATA* ON POTATO: SEVEN YEARS OF TRIALS IN ITALY

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### ABSTRACT

The results of many trials conducted by Dow Elanco and Officials Organisation are reported. The product used at 5 gai/100 l at the hatching of the eggs of *L. decemlineata* has showed a very good efficacy. The "anti-feeding" activity on larvae stops the damages and prolongs the activity of the product outperforming the traditional insecticides like pyrethroids or organophosphates, but other IGR's too. Registered in Italy since Feb. 1994 as EC and SC formulations, it is normally introduced in Integrated Pest management Official Indications to control the pest. Its good selectivity on beneficials, mainly on *Phytoseiidae* mites, *Anthocoris* spp. and bees, together with a safety on human, are well appreciated.

### IZVLEČEK

#### BIOTIČNA UČINKOVITOST CONSULTA (HEKSAFLUMURONA)

V referatu so prikazani rezultati številnih poskusov, ki jih je izvedla firma Dow Elanco in uradne ustanove. Pripravek (5 g aktivne snovi/100 l) je bil, uporabljen ob izleganju ličink koloradskega hrošča (*Leptinotarsa decemlineata*), zelo učinkovit. Anti-feeding učinkovitost pri ličinkah ustavi poškodbe in podaljša učinkovitost pripravka in s tem preseže tradicionalne insekticide, kakor npr. piretroide ali organske fosforne estre, pa tudi druge IGR. V Italiji je registriran od februarja 1994 kot formulacija EC in SC in je normalno vključen v Uradne smernice za integrirano uravnavanje škodljivcev oz. njihovo zatiranje. Zelo cenjena je tudi njegova dobra selektivnost za koristne organizme, predvsem pršice iz skupine *Phytoseiidae*, *Anthocoris* spp. in za čebele, kot tudi varnost za ljudi.

### 1 INTRODUCTION

Hexaflumuron is a new insecticide growth regulator (I.G.R.) from the Dow Elanco Ltd. The toxicological and environmental issues of the molecula show a very favourable picture, in terms of both acute toxicity (LD<sub>50</sub> acute oral/rat > 5000 mg/kg) and of chronic and ecotoxicological effects as well.

Through various field tests carried out on worldwide basis, hexaflumuron showed to be primarily effective via larvicidal and ovicidal activity against a large number of insects pests belonging to Lepidoptera, Coleoptera, Diptera and Homoptera.

Hexaflumuron has been tested in Italy against many pests since 1985 and *Leptinotarsa decemlineata* has been one of the target pests. Potato is an important crop in Italy and it's grown during the whole year as a main crop, second harvest and early crop. As main crop it's grown from March to August mainly in the north (Veneto, Emilia-Romagna and Piemonte regions) and then in the centre-south (Abruzzi and

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Campania). The early crop goes since December-February to April-June and it's grown mainly in the south (Campania, Puglia and Sicilia). The second harvest crop goes since august to December but it is less important than the others. *L. decemlineata* is the most important pest. It spends the winter as adult and has two generations of larvae since May to August. In the Italian region, *L. decemlineata* has no important natural enemies and, for this reason, the biological alternative doesn't exist. The chemical control is done with organo-phosphates and pyrethroids with 3-5 sprays/season. For farmers it's very important to reduce the number of sprays 7 seasons to diminish the work spent for this crop.

## 2 MATERIALS AND METHODS

The trials have been carried out since 1985 to evaluate the biological activity of hexaflumuron (Sonet/Consult) in different areas of the north-centre of Italy. The plots were 5-10 sqm and with four replications. The treatments were applied using different motor pumps and with a volume of water of 400-1000 l/ha depending of the crop conditions. The evaluation of the results was made counting the number of adults and larvae/plot or evaluating the percentage of eaten leaves/plot. Before submission to Duncan's Multiple range test (DMRT), data were scaled to values between 0-1 and transformed into Arcsin Square Root. Data, as means of 4 replications, are reported in the original scale in the following tables 1-7.

Hexaflumuron		Italy 1986		Table 1		
Control of <i>Leptinotarsa decemlineata</i> on potato						
Number of larvae + adults/plot						
Time of appl'n: hatching of eggs for hexaf. first larvae for others(7 days later)						
Treatments	g a.l./ 100 L	3 DAA	10 DAA	17 DAA	24 DAA	31 DAA
Hexaflumuron	2.5	19.7 c	8.5 b	6.2 c	45.0 b	24.6 c
Hexaflumuron	5.0	7.5 c	1.3 b	0.3 c	33.8 b	26.9 c
Azinphos-methyl	35	11.5 c	170.5 b	60.5 b	31.5 b	61.2 bc
Phosalone	50	88.9 bc	87.5 b	28.9 bc	34.8 b	82.8 abc
Cypermethrin	5	12.6 c	14.4 b	2.6 c	22.6 b	40.4 bc
UNTREATED	-	588.4 a	399.3 a	89.1 a	93.4 a	111.2 a

**Hexaflumuron Italy 1988 Table 2**  
 Control of *Leptinotarsa decemlineata* on potato  
 Number of larvae + adults/plot  
 Time of appl'n: first young larvae for all the treatments

Treatments	g a.i./ 100 L	4 DAA	10 DAA
Hexaflumuron	5.0	116.5 b	6.3 b
Carbaryl	150	27.8 c	30.3 a
UNTREATED	-	330.5 a	18.5 ab

**Hexaflumuron Italy 1989 Table 3**  
 Control of *Leptinotarsa decemlineata* on potato  
 Number of larvae + adults/plot  
 Time of appl'n: eggs for hexaflumuron  
 first young larvae for the others (7 days later)

Treatments	g a.i./ 100 L	6 DAA	14 DAA	21 DAA	28 DAA
Hexaflumuron	2.0	140.0 b	7.0 b	17.3 b	44.0 a
Hexaflumuron	3.0	75.8 bc	1.0 b	15.0 b	34.8 a
Hexaflumuron	5.0	53.0 bc	1.5 b	8.8 b	22.5 a
Deltamethrin	1.4	3.5 c	4.5 b	18.8 b	95.5 a
UNTREATED	-	313.8 a	156.3 a	65.8 a	73.3 a

**Hexaflumuron Italy 1989 Table 4**  
 Control of *Leptinotarsa deolineata* on potato  
 % of eaten leaves/plot  
 Time of appl'n: eggs for hexaflumuron  
 first young larvae for the others (7 days later)

Treatments	g a.l./ 100 L	35 DAA	48 DAA
Hexaflumuron	2.0	11.3 c	32.5 cd
Hexaflumuron	3.0	11.3 c	23.8 d
hexaflumuron	5.0	10.0 c	22.5 d
Deltamethrin	1.4	21.3 bc	62.5 ab
UNTREATED	-	75.0 a	82.5 a

**Hexaflumuron Italy 1990 Table 5**  
 Control of *Leptinotarsa deolineata* on potato  
 Number of larvae + adults/plot  
 Time of appl'n: eggs for hexaflumuron  
 first young larvae for the others (7 days later)

Treatments	g a.l./ 100 L	7 DAA	14 DAA	21 DAA	32 DAA	43 DAA
Hexaflumuron	3.0	4.5 b	19.0 b	38.5 b	26.7 c	153.5 ab
Hexaflumuron	5.0	3.0 b	4.5 b	5.7 b	26.7 c	160.2 ab
Deltamethrin	1.4	3.0 b	6.5 b	27.7 b	82.7 c	216.7 ab
Teflubenzuron	2.25	1.7 b	72.2 b	69.5 b	47.5 bc	165.2 ab
UNTREATED	-	207.5 a	656.0 a	261.2 a	136.2 a	244.2 a

Hexaflumuron		Italy 1990			Table 6
Control of <i>Leptinotarsa decemlineata</i> on potato					
Number of larvae + adults/plot					
Time of appl'n: eggs hatching					
Treatments	g a.i./ 100 L	7 DAA	14 DAA	21 DAA	
Hexaflumuron	3.0	0.0 b	2.5 b	2.7 b	
Hexaflumuron	5.0	0.0 b	2.5 b	2.7 b	
Deltamethrin	1.4	4.5 b	2.7 b	16.2 ab	
Teflubenzuron	2.25	0.2 b	9.0 b	27.0 ab	
UNTREATED	-	20.2 a	47.2 a	37.0 a	

Hexaflumuron		Italy 1991			Table 7
Control of <i>Leptinotarsa decemlineata</i> on potato					
Number of larvae + adults/plot					
Time of appl'n: before eggs hatching					
Treatments	g a.i./ 100 L	7 DAA	14 DAA	21 DAA	29 DAA % of eaten leaves
Hexaflumuron	2.5	123.8 ab	29.0 b	11.0 b	17.0 b
Hexaflumuron	3.0	136.5 ab	25.3 b	4.3 b	11.3 b
Teflubenzuron	2.25	161.0 ab	30.0 b	18.3 b	12.8 b
UNTREATED	-	256.3 a	330.5 a	184.0 a	65.8 a

### 3 RESULTS AND DISCUSSION

Hexaflumuron showed to be very effective product. It's efficacy was mainly on active larvae so the product needed to on the leaves before the hatching of the eggs. The larvae didn't die immediately, but dehydrate and didn't eat. They seemed died after 2-4 days. The efficacy was good for 25-30 days. The rate of 3-5 gai/hl seemed to be the best in italian field conditions.

#### 4 CONCLUSIONS

Hexaflumuron showed its best time of application at the hatching of the eggs. It performed better than the standards with a period of 25-30 days of efficacy giving the possibility to substitute 2-3 sprays with organophosphates or pyrethroids. This last aspect could be very interesting in an Integrated Pest Management Program.

#### 5 LITERATURE

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