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"In vivo" and "in vitro" insecticide efficacy of Nuvan 1000 EC (Novartis Animal Health Inc., Switzerland)

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Abstract. Indoor and outdoor testings performed during June-July 1999, with Nuvan 1000 EC, on flying and creeping insects, as well as a contact test, revealed the following:
Treatment of indoor spaces by aerosols and spraying with Nuvan 1000 EC in dose of 3 ml/0.2 l of water had the maximum effect at 5 minutes after the treatment on all flying insects from the room *(Musca domestica, Drosophylla spp., Calliphora spp.)*. The effect lasted for 120 minutes, while the traps had been examined.
Treatment of indoor spaces by spraying with Diacap 300 CS (100 ml) and Nuvan 1000 EC (20 ml) mixture in 5 litres of water had the maximum efficacy for 4 hours, decreasing fly population from 32 to 3/m^2. Persistence stayed high to the end of examination.
Treatment of outdoor spaces with 250 ml Nuvan 1000 EC per 20 l/hectare significantly decreased the total *Diptera* number from the treated area in the first 30-60 minutes, but the initial fly population was replaced by new ones after that interval.
Biological contact test with Nuvan 1000 EC showed a 100% mortality: for flying insects *(Musca domestica),* in the first 3 minutes; for creeping insects (*Blatella germanica),* after 120 minutes.

INTRODUCTION

Flies represent a continuous irritation source, they divert animals from grazing. They are also the cause of weight gain and milk production decrease and vectors for bacteria and parasites larvae (Cosoroabă, 1992; Keiding 1986).

Some species produce myiasis (Hall, 1995; Kenneth *et al.*, 1986; Smart *et al.*, 1985).

For fly control in the environment there are used different insecticides, among them, the organophosphates (Șuteu and Cozma, 1998).

The aim of this experiment is to test the efficacy of Nuvan 1000 EC, emulsionable concentrate (Novartis, Switzerland) for indoor and outdoor control of flies, mosquitos, mothes, cockroaches, fleas, bed bugs, ants and other vectors or disconfort generating insects.

MATERIALS AND METHODS

The product was tested in June-July 1999, at the Faculty of Veterinary Medicine Cluj-Napoca and Valea Chintaului farm (Cluj region, Romania).

1. For indoor spaces there have been used the following methods:

A. Aerosols. The experiment was performed at the Clinic and Hospital for Parasitic Diseases and for Reproduction from the Faculty of Veterinary Medicine Cluj-Napoca. The application pattern was the use of a hot fog generator with an ULV nozzle; the dose was 3 ml Nuvan 1000 EC in 0.2 liters of water, recommended for flies by the producers.

Aerosols were applied in the absence of animals, protecting the food, stopping the ventilation,

closing doors and windows 4 hours after substance was applied.

Identification and estimation of flying insect density were performed by using the sticky bands method of 1/10 m^2 (Natural History Museum, London method). Density was estimated in number of flies per square meter.

For placing the bands there have been chosen three representative places (windows level, above the cages, near the door) with two bands in each room. Before applying the aerosols we estimated insect density by placing the bands for 1 minute. After the treatment we made flies counting and identification at 5, 10, 15, 20, 30, 60 and 120 minutes (number per m^2).

B. By spraying we used a dose of 50 ml Nuvan 1000 EC in 10 l of water (0.5%) per 100 m^2 treated area. Estimation of flying insect density and their identification before and after spraying were performed in the Morphopathology laboratory by the same pattern.

For increasing shock effect of the persistent product Diacap 300 CS we prepared a tank mix (20 ml of Nuvan 1000 EC + 100 ml of Diacap 300 CS in 5 l of water). This mixture was sprayed in swine stables from Valea Chintaului microfarm. Bands were applied before spraying by the same pattern.

Estimation of insect density and persistance of the mixture after spraying was performed at 15, 30 and 60 minutes; 2 and 4 hours; 2, 4 and 7 days. Traps were kept a minute for each interval.

2. Treatment of outdoor spaces was done by aerosols using a dose of 250 ml Nuvan 1000 EC in 20 l of water per hectar of treated area, with a hot fog generator, around and on the manure platform of the Hospital of Veterinary Medicine Faculty Cluj-Napoca.

Identification and estimation of insect density were performed by the same pattern.

3. The contact test was performed on *Musca domestica* and *Blatella germanica* using the tarsal contact method. This technique, recommended by the Medical Entomology Laboratory from the "Dr. I.Cantacuzino" Institute, consists in allowing direct contact of 3 days old *Musca domestica* females with insecticide on filter paper. Fly and cockroach exposure was done for 120 minutes. There have been used 100 females of *Musca domestica* and 100 cockroaches in a Petri dish. The filter paper was treated with 0.5% Nuvan 1000 EC and mortality was recorded at 5, 10, 15, 30, 45, 60 and 120 minutes.

RESULTS AND DISCUSSION

1. Treatment of indoor spaces

A. Trap positioning before treatment revealed an insect load of 1 fly per m^2. After treatment with Nuvan 1000 EC we obtained the following results:

- at 5 minutes after exposure 10 flies per m^2 were caught (Table No. 1);

- results at 10, 15, 20, 30, 30, 60 and 120 minutes were identical with those obtained at 10 minutes.

Observations following sticky bands examination revealed that Nuvan 1000 EC aerosols were lethal in the first 5 minutes for all flying insects. After the first 5 minutes the flight of these insects was absent.

In the Reproduction clinic, trap positioning before treatment revealed an insect load of 10 flies per 1 m^2. After treatment there have been counted 60 flies *(Musca domestica)* per 1 m^2 and 20 *Drosophylla spp.* per 1 m^2.

Band examination at 10, 15, 20, 30, 60 and 120 minutes showed that the number of flies remained the same as during the first examination after treatment (Table No. 2).

B. Spraying. Insect load before spraying in the Morphopathology laboratory was two *Musca domestica* per 1 m^2 and one *Calliphora sp.* per 1 m^2. After treatment, at 5 minutes there were ten *M. domestica* and four *Calliphora* per 1 m^2.

At 10, 15, 20, 30, 60 and 120 minutes, the number of flies remained the same. This result shows the lethal effect in the first 5 minutes against insect population of the room (Table No. 3). Nuvan 1000 EC is characterized by a high shock effect compared to same class insecticides.

In swine stables from Valea Chintaului farm, before treatment with Diacap + Nuvan tank mix, number of flies per 1 m^2 was 32.

Thus, we can notice that maximum effect against fly populations was recorded after 4 hours, number of flies being 3 compared to 32, before spraying.

Number of flies grows when stables are aired and animals are introduced. Thus, after 7 days fly population decreases: 19 *Musca domestica* per 1 m^2, compared to 3, before spraying (Table No. 4).

2. Treatment of outdoor spaces

The effect against all insect population is maximum in the first 5 minutes, insect flight in the treated area being absent for 30-60 minutes. After that the initial fly population is replaced by a new one (Table No. 5).

The product is recommended for outdoor spaces mixed with kerosene or Diesel oil for higher persistence, aspect recommended by the producer.

3. Contact test

Flying *(Musca domestica)* and creeping *(Blatella germanica)* insect mortality (%) using tarsal contact method (surfaces treated with 0.5% sol.) is maximum in the first 3 minutes in *M. domestica.* In *B. germanica* 100% mortality was reached after 120 minutes (Table No. 6).

Table 1
Number of flies, before and after aerosolisation, in the Clinic for Parasitic Diseases

Time (minutes)	**0**	**5**	**10**	**15**	**20**	**30**	**60**	**120**
No. of *M. domestica*/m^2	1	10	-	-	-	-	-	-

Table 2
Number of flies (per m^2), before and after aerosolisation,
in F.M.V. Cluj-Napoca Hospital

Time (min) / **Insect**	**0**	**5**	**10**	**15**	**20**	**30**	**60**	**120**
M. domestica	10	60	-	-	-	-	-	-
Drosophylla spp.	-	20	-	-	-	-	-	-

Table 3
Number of flies (per m^2), before and after spraying (Necropsy Room)

Time (min) / **Insect**	**0**	**5**	**10**	**15**	**20**	**30**	**60**	**120**
M. domestica	2	10	-	-	-	-	-	-
Calliphora spp.	1	4	-	-	-	-	-	-

Table 4
Number of sticked flies, after spraying (Valea Chintăului farm)

Moment / **Insect**	**0**	**15'**	**30'**	**60'**	**120'**	**4 h**	**2 days**	**4 days**	**7 days**
Musca domestica	32	7	6	5	5	3	9	15	19

Table 5
Structure and density of *Diptera* population on the manure platform
(Faculty of Veterinary Medicine Cluj-Napoca)

Insect	Before desinsection	After desinsection					
		5'	10'	15'	30'	60'	120'
Drosophylla spp.	50	110	110	110	110	170	290
Musca domestica	30	70	70	70	70	110	210
Lucilia spp.	10	20	20	20	20	30	70
Calliphora spp.	-	-	-	-	-	-	30

Table 6
Insect mortality for contact test

Test / Insect	Mortality (%)							
	3'	5'	10'	15'	30'	45'	60'	120'
Musca domestica	100	-	-	-	-	-	-	-
Blatella germanica	7	10	32	40	71	79	85	100

CONCLUSIONS

Indoor and outdoor testings performed during June-July 1999, with Nuvan 1000 EC, on flying and creeping insects, as well as contact test, revealed the following:

Treatment of indoor spaces by aerosols and spraying with Nuvan 1000 EC had the maximum effect between 5-120 minutes after the treatment on all flying insects from the room *(Musca domestica, Drosophylla spp., Calliphora spp.).*

Treatment of indoor spaces by spraying with Diacap 300 CS and Nuvan 1000 EC mixture had the maximum efficacy at 4 hours.

Treatment of outdoor spaces with Nuvan 1000 EC significantly decreased the total *Diptera* number from the treated area in the first 30-60 minutes.

Biological contact test with Nuvan 1000 EC showed a 100% mortality: for flying insects *(Musca domestica)* and for creeping insects (*Blatella germanica).*

REZUMAT

Verificarea eficacității insecticide "in vivo" şi "in vitro" a produsului Nuvan 1000 EC (Novartis Animal Health Inc., Elveția)

Pentru verificarea eficacității insecticide a produsului Nuvan 1000 EC s-au efectuat experimentări în spații închise şi deschise, în perioada iunie-iulie 1999, asupra insectelor zburătoare şi târâtoare, ca şi teste de contact.

Tratamentul spațiilor închise prin aerosoli şi spray-ere cu Nuvan 1000 EC, în doză de 3 ml/0,2 l apă, a avut efect maxim la 5 minute după tratament asupra tuturor insectelor zburătoare din încăpere *(Musca domestica, Drosophylla spp., Calliphora spp.).* Efectul a durat 120 minute, în timpul examinării capcanelor.

Tratamentul spațiilor închise prin spray-ere cu un amestec de Diacap 300 CS (100 ml) şi Nuvan 1000 EC (20 ml) în 5 litri de apă a avut eficacitate maximă la 4 ore, reducând populația de muşte de la 32 la 3/m^2. Persistența a rămas ridicată până la sfârşitul examinării.

Tratamentul spațiilor deschise cu 250 ml Nuvan 1000 EC la 20 l/ha a redus semnificativ numărul total de diptere pe suprafața tratată, în primele 30-60 minute, dar populația inițială de muşte a fost înlocuită de altele noi, după acest interval.

Testul de contact biologic cu Nuvan 1000 EC a dovedit o mortalitate de 100%: pentru insectele zburătoare *(Musca domestica),* în primele 3 minute; pentru insectele târâtoare *(Blatella germanica),* după 120 minute.

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