H-trap | *Test reports*

France

Central & South America

ALCOCHEM
HYGIENE

Test environment 1

Tests done by: Sitona ArgoExpert. France
'Independent test expertise in post-harvest - Fumigation - Entomology - Experimentation

Test environment 2

Test done by: Spansol. the Netherlands
Independent tests done in South America

Summary Sitona

Study and identification of insects caught using the H-trap in different environments

Summary Spansol

Introduction Test 1: France

H-trap traps are marketed to capture blood-sucking insects. The purpose of this study is to determine the species or families of insects trapped.

Three H-traps traps were installed in different countryside environments to capture insects and try to connect these catches to the environment in which they were located.

The H-trap operates without the need for insecticides, chemical attractants or electricity which provides significant benefits as regards environmental protection and sustainability.

When looking for a host, horseflies are attracted by the infra-red radiation emitted by the ball as it heats (high temperature) . The attraction of the trap is improved when it is placed in an open space where the insects can spot it from a long distance.

Once they land on the ball and discover no blood meal, the insects fly off and are caught in the umbrella shaped funnel on top of which a chamber is used to collect captured insects. In these French tests, the number of captured was recorded every two weeks for two months and examined in a laboratory where the individual species were identified.

Materials and Methods

H-trap:

Figure 1 : H-trap

H-traps function without attractant, electricity or insecticide.

The principle of the trap is to use sunlight to heat a black plastic ball (Figure 1).

This "hot" mass then becomes attractive to blood-sucking insects that commonly attack mammals.

Locations of the traps:

Three traps were placed in different locations during the second half of July:

Trap # 1: City of Sauternes (33210).

Background: This trap was installed near a meadow containing cattle and a water source. A plot of alfalfa and vines were also nearby in the surrounding environment (Figures 2 and 3).

This trap was set up July 20, 2012.

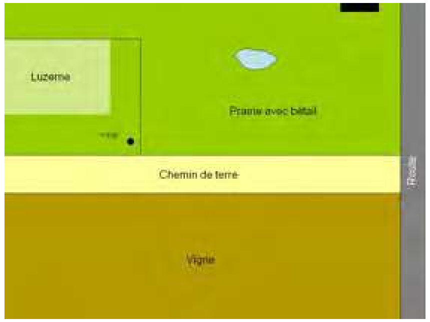


Figure 2 : Location of the H-trap installed in Sauternes

Figure 3 : H-trap #1

Trap # 2: Town of Blanquefort (33290).

Background: This trap was installed at an equestrian center near to horse stables and a training track (Figure 4 and 5). The trap was placed close to wetlands and marsh region of Blanquefort which lies at the heart of the National Nature Reserve, Gironde. A high mosquito population is located at the site annoying training riders at the end of the day.

This trap was set up July 23, 2012.

Figure 4 : installed in the equestrian center Blanquefort

Figure 5 : H-trap #2

Trap # 3: City of Margueron (33220) close to Ste-Foy-la-Grande.

Background: This trap was placed near a meadow containing cattle (Montbeliarde and Limousine). Also located near to the trap were a pond, an orchard (pear, plum, peach, quince) and an area of vines. (Figure 6 and 7).

This trap was set up July 28, 2012.

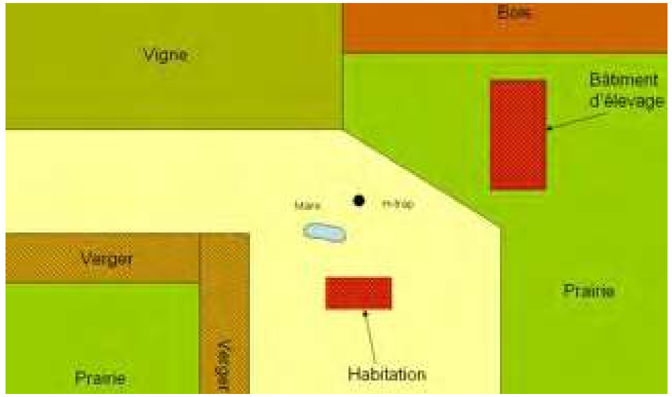


Figure 2: Location of H-traps installed at Margueron

Figure 7: H-trap #3

Calendar survey traps

Table 1: Date records of three H-traps

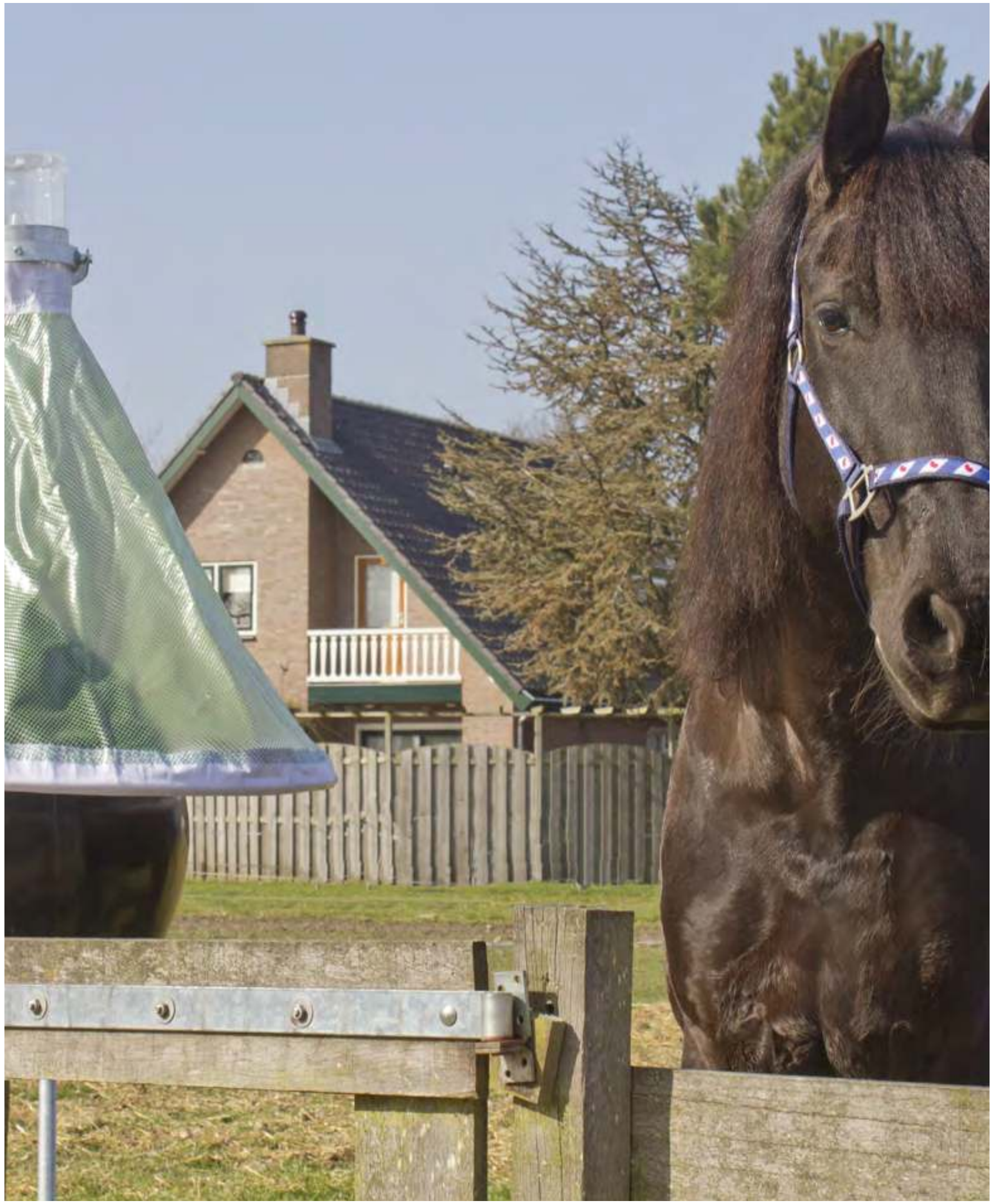
Traps	Trap n°1 (Sauternes)	Trap n°2 (Blanquefort)	Trap n°3 (Margueron)
Date of Installation	20/07/2012	23/07/2012	28/07/2012
	07/08/2012	06/08/2012	11/08/2012
	24/08/2012	20/08/2012	25/08/2012
	Trap #1 temporarily withdrawn 24-08 to 03-09		
	14/09/2012	03/09/2012	08/09/2012
	27/09/2012	17/09/2012	22/09/2012

Identification of the insects

The traps were changed approximately every two weeks and the captured insects recovered and identified in the laboratory (Figure 8).

The identification allowed a determination of the scientific orders, families, genus or species to which the insects belonged. More detail was given to insects of particular interest (eg parasites of horses).

Figure 8: Sorting and identification of the collected insects



Results and Discussion - *Insects captured with trap #1 at Sauternes*

Table 2: Identification of insects found in trap No. 1 placed in Sauternes

Insect Indentification	1st period	2nd period	3rd period	4th period	TOTAL 8 weeks
Tabanidae	38	27	10	4	**79**
Mosquito	19	3	2	1	**25**
Flies Carbonaceous	7	2	1	0	**10**
Stable Fly	2	1	5	5	**13**
Flat Fly	0	0	0	0	**0**
Sarcophagidae	2	2	0	1	**5**
Green Fly	0	0	1	0	**1**
Ulidiidae (Ceroxys sp.)	2	0	3	1	**6**
Fruit Fly	0	1	0	0	**1**
Eristales	0	0	0	0	**0**
Solitary Bee	1	12	3	2	**18**
Honey Bee	0	0	1	0	**1**
Bumble Bee	0	0	0	0	**0**
Wasps	0	3	1	0	**4**
Hornets	0	1	1	0	**2**
Hymenoptera parasitoids	0	5	2	2	**9**
Sphecidae	0	0	0	0	**0**
Sirphes	0	0	0	0	**0**
Asilidae	2	1	4	0	**7**
Membracidae	0	3	2	0	**5**
Leafhoppers	3	11	3	1	**18**
Bugs	1	0	0	0	**1**
Drosophiles	0	0	0	0	**0**
Ephemeridae	0	0	0	0	**0**
Phryganes	0	0	0	0	**0**
Lacewings	3	2	2	0	**7**
Beetles	0	0	0	0	**0**
Lepidoptera	0	8	4	5	**17**
Grasshoppers	0	0	0	0	**0**
Cockroaches	0	0	0	0	**0**
Asian Ladybugs	1	5	0	0	**6**
Anthophoridae	1	1	0	0	**2**
Other Diptera	47	26	13	19	**105**

Note: A little over a hundred different species of flies (Diptera) were captured during the trapping campaign. Owing to the diversity of species caught, with a small number of individuals belonging to the same species and the purpose of this study, the identification of all species was not felt necessary and so they were recorded as Other Diptera'.

Comments on the main insects caught in the trap 1:

Tabanid: Trap No. 1 placed in Sauternes captured 79 horseflies during 8 weeks of trapping. Captured horseflies were all females as only females are blood-feeding.
Female horseflies are equipped with mouth-parts adapted for piercing the skin of mammals (cattle, horses, humans, etc).

Males do not have these moth-parts as they feed on flowers. It is this difference which explains the fact that only females were attracted to the trap.The heat of the ball attracted females in search of a blood meal. The peak population was in late July-early August during the first two weeks of recording. The number of individuals captured then decreased over time.The presence of livestock is certainly believed to contribute to the presence of a large population of horseflies in the area.

Several Pale Giant Horse-flies *(Tabanus bovinus)* were captured (Figure 9) at the Sauternes site. This species is one of the largest Tabanidae in Europe, measuring on average about 2 cm (Tabanidae in France and neighboring countries, J.-M. - R. Surcouf, 1924).

Figure 9 : Pale Giant Horsefly (Tabanus bovinus) caught in the trap #1

Leafhoppers: The presence of 18 leafhoppers (several species) in an area close to vines is not surprising. It is felt that these insects were intercepted by the traps, that is to say that these individuals may have not have been attracted to the trap but were caught by accident.

Asian Ladybirds: As with leafhoppers Asian Ladybirds were also captured without being attracted by the H-trap. The crop of alfalfa nearby which is attacked by aphid predators may explain the presence of the insect. Although this Asian species is displacing the native European ladybird and has become a pest (contaminating homes and spoiling the taste of wine) the trap can not however be considered as a suitable control for this insects.

Robber Flies: The Asilidae are carnivorous predators feeding on other insects that they catch in flight (Wildlife France, Brachycera Diptera (Asilidae), E. Séguy, 1927). Seven specimens were probably captured by interception.

Figure 10 : Robber fly captured in trap No. 1

Results and Discussion -Insects captured with trap #2 at Blanquefort :

Table 3: Identification of insects found in trap # 2 located in Blanquefort

Insect Indentification	1st period	2nd period	3rd period	4th period	TOTAL 8 weeks
Tabanidae	11	9	8	2	30
Mosquito	110	156	114	219	**599**
Anthrax Fly	211	35	79	29	**354**
Stable Fly	6	11	33	7	57
Flat Fly	0	0	0	0	**0**
Sarcophagidae	1	5	2	1	**9**
Green Fly	0	1	1	0	**2**
Ulidiidae (Ceroxys sp.)	20	33	139	12	**204**
Fruit Fly	0	0	0	0	**0**
Eristales	0	1	1	1	**3**
Solitary Bee	69	61	76	21	**227**
Honey Bee	2	2	1	0	**5**
Bumble Bee	0	1	0	0	**1**
Wasps	0	1	0	0	**1**
Hornets	0	0	0	0	**0**
Parasitec wasps	5	7	7	9	**28**
Sphecidae	0	1	1	0	**2**
Sirphes	0	0	0	1	**1**
Asilidae	0	0	0	0	**0**
Membracidae	0	1	1	0	**2**
Leafhoppers	13	4	6	11	**34**
Bugs	1	0	2	3	**6**
Drosophiles	11	14	7	7	**39**
Ephemeridae	0	0	0	1	**1**
Caddisfly	2	1	1	1	**5**
Lacewings	1	9	4	0	**14**
Beetles	2	0	0	1	**3**
Lepidoptera	1	5	3	4	**13**
Grasshoppers	0	0	0	1	**1**
Cockroaches	0	3	0	0	**3**
Asian Ladybugs	0	2	0	0	**2**
Anthophoridae	0	8	2	1	**11**
Other Diptera	39	53	114	101	**307**

Note: the presence of some Sarcophagidae. This family of flies comprises thousands of species throughout the world. These insects are often parasites of other insects (caterpillars, locusts, beetle larvae ...) but also of mammals, causing myiasis (the infestation of a vertebrate body by fly larvae that feed on its tissue). One species well known to livestock owners (e.g. sheep, horses) *Wohlfahrtia magnifica* (the Spotted Flesh Fly) is able to colonize the wounds of animals or infect the genitals. All species caught have not been identified and *W. magnifica* was not trapped in all three experimental sites.

Comments on the main insects caught in trap #2:

Tabanid: Thirty horseflies females were captured during the eight weeks of trapping at the equestrian center. The pressure of the blood-sucking insect population was lower than at the Sauternes site.

Mosquitoes: Nearly 600 adult individuals were captured during the two months of trapping with trap #2. The surrounding wetland is an ideal place for the development of these bloodsucking flies. 93% of captured individuals were female, the male does not sting mammals.

The peak population was in the last two weeks of trapping with 219 individuals collected from 3 to 17 September 2012. There was an average of 10.7 individual insects captured per day, demonstrating the presence of a large population in the area. In recent years chemical control treatments against mosquitoes in the marshes of Blanquefort were abandoned. The H-trap trap is one way to fight without impacting on the environment and potentially could be used to help reduce mosquito populations around public places, residential or business areas.

The best way to fight mosquitoes however is the introduction of prophylactic means to remove areas ideal for development of aquatic larvae. However in protected areas such as the Blanquefort marshes, the trapping of adult mosquitoes could help maintain a level low population level in defined areas. Several different species of mosquitoes were captured and mainly Culicidae (Wildlife France, biting Diptera Nematocera, E. Séguy, 1925). The biology differs between species, but a female can lay an average of several hundred eggs during her life.

Stable flies *(Stomoxys calcitrans)*:

These flies are very similar to houseflies *(Musca domestica)*. Adult males and females are both blood-sucking, preferentially biting horses (Insects, OPIE, No. 146 (3), 2007) with the majority of attacks happening between noon and 17 hours.

The bites are painful and a blood meal can take several minutes. The proboscis of the stable fly is black, long, and thin, protruding from the front of the head. Its other mouthparts are modified, with the labellum having rows of teeth in order to pierce the skin of its host. (Figure 11).
A female lays an average of 600 to 800 eggs.

An accumulation of stable fly bites can lead to a degree of anemia, weight loss in cattle and reduced milk production. For oxen, horses and sheep, *S. calcitrans* is a vector of Trypansomes. For domestic animals and humans it is a vector of anthrax. The species is also a vector for T. evansi (the agent of Surra), T. brucei, ERF, brucellosis, swine erysipelcs, equine swamp fever, African horse sickness, and fowl pox. (Bishop, 1913; Catangui, et al., 1993; Cook, et al., 1999; Janovy and Roberts, 2000)

In total 354 stable flies were captured during the eight-week period with an average of 6.3 insects caught per day. The aggressiveness of these insects is highest in autumn but the peak population during the eight weeks of trapping was in the first two weeks of capture.

Figure 11: mouthparts of a Stable fly caught in trap #2

Ulidiidae (formerly Otitidae): This family of Diptera was well represented in the traps by the *Ceroxys sp* or Picture Winged Flies. Larvae of these flies live mainly in feces and decaying organic matter. Some adults may possibly prey on small arthropods (aphids) (Wildlife France, E. Séguy, Diptera Brachycera II, 1934). It does not, however, present a particular harm to horses or humans except for their presence which can be an issue in buildings and surrounding houses.

Note the presence of some Sarcophagidae, this family of flies comprises thousands of species in the world. These insects are often parasites of other insects (caterpillars, locusts, beetle larvae ...) but also of mammals causing myiasis.

A species well known animal breeders (of sheep, horses etc.) is *Wohlfahrtia magnifica* which is able to infest the wounds of animals or infect the genitals. Species caught have not been identified, but this species has not been trapped in the three experimental sites.

Results and Discussion -Insects captured with trap #3 at Margueron:

Table 4: Identification of insects found in trap # 3 located in Margueron

Insect Indentification	1st period	2nd period	3rd period	4th period	TOTAL 8 weeks
Tabanidae	37	110	186	37	**370**
Mosquito	25	34	11	27	**97**
Anthrax Fly	1	2	3	2	**8**
Stable Fly	7	2	4	4	**17**
Flat Fly	0	1	0	0	**1**
Sarcophagidae	6	5	7	3	**21**
Green Fly	0	0	0	0	**0**
Ulidiidae (Ceroxys sp.)	49	25	89	59	**222**
Fruit Fly	0	1	0	0	**1**
Eristales	0	0	1	0	**1**
Solitary Bee	44	13	7	1	**65**
Honey Bee	0	0	0	0	**0**
Bumble Bee	0	0	0	0	**0**
Wasps	0	0	0	0	**0**
Hornets	0	0	0	0	**0**
Hymenoptera parasitoids	4	5	5	1	**15**
Sphecidae	0	0	0	0	**0**
Sirphes	0	0	0	0	**0**
Asilidae	1	3	0	0	**4**
Membracidae	0	0	0	0	**0**
Leafhoppers	29	44	9	35	**117**
Bedbugs	2	1	2	0	**5**
Drosophiles	1	0	0	1	**2**
Ephemeridae	0	0	0	0	**0**
Phryganes	0	0	0	0	**0**
Lacewings	0	1	0	1	**2**
Beetles	0	0	0	0	**0**
Lepidoptera	4	7	18	7	**36**
Grasshopper	0	0	0	0	**0**
Cockroaches	0	0	0	0	**0**
Asian Ladybugs	0	0	0	0	**0**
Anthophoridae	1	1	0	0	**2**
Other Diptera	48	47	67	99	**261**

Comments on the main insects caught in the trap #3:

Tabanidae: Over the eight weeks, 370 female horseflies were captured at the Margueron site, at an average of 6.6 individuals captured per day. The presence of nearby cattle could explain the origin of a large population living in the environment of the trap. The discomfort caused to livestock by the painful sting of horseflies is greatest when the fly population pressure is high.

Ulidiidae (formerly Otitidae): A large number of *Ceroxys* species (Picture Winged Flies) were captured at the Margueron site using the H-trap trap. Their biology is very poorly described and their presence in the trap is unlikely to be a coincidence but the attractiveness of the trap for these insects is unknown.

Leafhoppers: More than a hundred leafhoppers (of several species) were caught in trap No. 3. The presence of vines and fruit trees is probably the reason for their presence in the environment; but capture in the trap is unlikely to affect the population level present in the area. There is nothing to say if they are trapped by chance or if the lure of the trap helped capture these insects which are not bloodsucking.

Sarcophagidae:
Just over twenty adults of this family of Diptera were captured but none belonged to the species *Wohlfahrtia magnifica*. The presence of this family of flies means that in the presence of this species on a farm, H-traps could potentially act as a control or as a means of detecting the presence of this parasitic species of fly, this hypothesis remains to be confirmed.

Forest Fly *(Hippobosca equina)*:
A flat fly was captured. These are blood-feeding ectoparasites of horses, and sometimes cattle, inflicting painful bites (Figure 12).

Figure 12 : Forest Fly (Hippobosca equina)

Major insects groups captured and a comparison of influence of the surrounding environment:

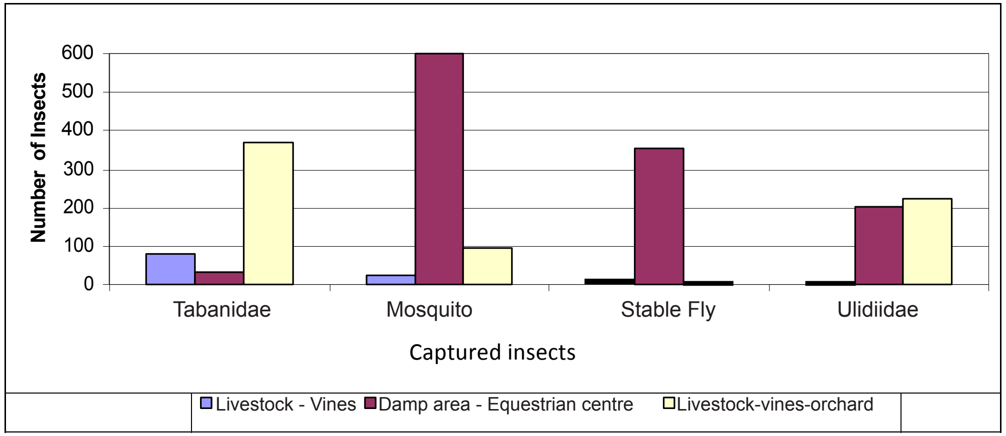


Figure 13: Major insects captured according to surrounding areas in the trap-trap H 1 (Livestock - Vine), the H-trap trap # 2 (wet area - Horseback riding) and the H-trap trap 3 (Breeding - Vine - Orchard) for 8 weeks followed.

The environment in which the largest number of horseflies were trapped was a medium sized farm which included a vineyard and orchards (Margueron). About 4.5 times more individuals were captured at Margueron compared to the Sauternes site which consisted mainly of vines but also contained a livestock meadow (Figure 13).

The Blanquefort site composed of wetlands and an equestrian center is obviously the site where the largest number of mosquitoes (about 600) were captured compared to the other two sites. Environmental conditions are favorable for the development of these insects whose larvae are aquatic. The H-trap trap thus shows very good results in terms of the attractiveness of mosquitoes and other bloodsucking insects.

Stable flies were captured in large quantities at the Blanquefort site (about 350 individuals). The installation of the trap at the equestrian center thus shows very good catch results for these bloodsucking flies.

The use of H-traps could be considered to reduce the population of these flies or as a tool to monitor population trends and initiate treatment when the damage threshold is crossed. These flies are potential vectors of parasites in horses.

The Ulidiidae family consists of small flies whose gender *Ceroxys sp.* was trapped in a very large number of sites (Blanquefort & Margueron) with more than 200 catches for each trap over 8 weeks. These insects have been poorly studied and do not cause economic or health problems, but are a nuisance when present in large quantities, such as in the reception area including to the public (stables).

The attraction of the H-trap for these insects is unknown but real.

Conclusion for the H-trap Test 1:

The introduction of H-trap at the three experimental sites with different environmental conditions, provided the opportunity to acquire valuable information as to the traps attraction towards different insects species.

In humid areas, ideal for the development of mosquitoes, the trap captured nearly 600 individuals from mid-July to mid-August. It is impossible to judge how the number of mosquites caught relates to the population in the environment, but these results confirm a strong attraction of H-trap traps vis-à-vis these blood-sucking insects.

The presence of horses in an environment promotes the attraction and development of other biting insects like Stable flies. The capture of more than 350 individuals in the H-trap trap located in the heart of the equestrian center shows the interest of the trap to limit or monitor the level of population of these blood-sucking insects that can be pests or disease vectors.

The H-trap has an extremely high catch rates of tabanids (horseflies family) at the experimental sites hosting a cattle. The traps are very attractive for this family of blood-sucking insects. All horseflies caught in traps are female (biting insects). The catch rate reached more than 350 individuals at one site between late July and late September.

The attractiveness of H-trap traps for bloodsucking insects (mosquitoes, tabanids or other flies) is clear.

The use of these traps can:

- Limit the development of an insect population by capturing biting individuals from the surrounding environment
- Permit monitoring of a population of bloodsucking insects
- Also monitor an insect population and evaluate the effectiveness of a chemical treatment by comparing the catch rates between treated and control plots

Summary of Results from Test 2: South America

The heading of the test results, made by testcompany Spansol says:

"ALCOCHEM CONGRATULATIONS ON YOUR H-TRAP"

This is the second season that we have had a field test on the H-trap. We wanted to see how efficient the H-trap really is. This on basis of the old model with a white funnel and the new model with a green funnel. The study has already been promoted in several countries in Central & South America.

Indeed the old model with the white funnel catches a few bees, wasps and a moth. While the new model with the green funnel only captures gnats, flies and mosquitoes. This is really impressive.

At +/- 80 meters from a flock of sheep and horses, the H-trap captured over 100 horse flies and 300 flies within three weeks. This was in June 2012.
At +/- 230 meters from the flock of sheep and horses, between some trees and a pond, the H-trap still catches about 50 percent of these insects.
At +/- 380 meters from the flock of sheep and horses, nearby a pond, the H-trap caught considerably less.

Figure 1: over a 100 captured flies

Conclusion for the H-trap Test 2:

1. Undoubtedly the H-trap captures many gnats, flies and mosquitoes. Close by the horses the trap is very efficient. Even at a few hundred meters away the trap still works.

2. It really controls the entire area, where many gnats and flies are active.

3. With the green funnel the H-trap cought no bees and butterflies. Only two ladybugs have been caught.

4. With the white funnel the H-trap catches a few bees and wasps.

5. Capture times: little insects are captured in the morning time. By noon some more insects are already captured. After 14.00 hours most of the insects are captured. In the night time the horse fly rests on the inside of the green funnel till the next morning. Then they fly up into the trap.

6. I recommend to use some water (and soap) in the catch jar. Without this water, the horse fly and flies can be still alive when you try to clean the catch jar.

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