



Technical Guide

Stored Product Moth Control



An effective alternative to fogging, nitrogen, carbon dioxide and pyrethrum treatment

Exosex® SP_{Tab} provides robust, reliable protection against stored product moths

“Active” mating disruption

Exosex® SP_{Tab} is a proven and cost-effective means of protecting stored products such as tobacco, flour and confections.

Unique to Exosect, the Entostat powder technology causes the male moths to act as mobile pheromone dispensers creating an “Auto-Confusion” effect amongst the male moths and thereby actively disrupting the mating cycle.

Exosex SP_{Tab} provides continuous 24/7 control with no production shutdown required

System provides year round continuous protection making it easier to budget for and manage costs

Provides anti-resistance support for insecticides

No restrictions to site entry and no disruption to site operations

Continuous, effective control avoids scheduling treatments during plant shutdowns



Highly convenient

Exosex SP_{Tab} is a highly convenient and effective moth control system designed to offer manufacturing and storage facilities a range of cost and ease of use benefits.

Dispensers easy to deploy and re-charge

Works with standard monitoring systems to help pinpoint the source of infestation

Treatment is prophylactic and aimed at long term population reduction





Palm



Wax



Entostat powder

Entostat™ is a food grade powder refined from a natural wax, which is harvested from a particular species of palm tree.

The active ingredient is a species-specific pheromone, which is impregnated into the Entostat powder.

How it works

Exosex® SP_{Tab} is an "Active" MD system using the male moth to distribute the pheromone impregnated Entostat powder.

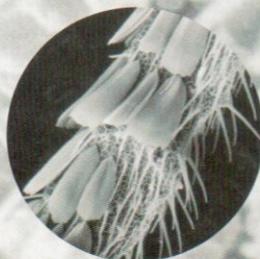
Entostat powder is natural technology

An electrostatic charge builds up on an insect cuticle and is generated through the insect's movement (tribo-charging), e.g. the insect walking on a surface or flying through the air.

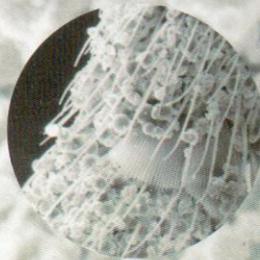
The charge is dependent upon the surface which can be either positive or negative. The entostat powder being bipolar will be attracted strongly to the charged insect cuticle.



entostat™
Technology Applied



Antenna
(before contact with
Entostat powder)



Antenna
(after contact with
Entostat powder)

Moth species list:

Tobacco/Warehouse moth
(*Ephestia elutella*)

Mediterranean Flour moth
(*Ephestia kuehniella*)

Indian Meal moth
(*Plodia interpunctella*)

Almond moth
(*Cadra cautella*)

Raisin moth
(*Ephestia figulilella*)

“Active” Mating Disruption

Unlike conventional pheromone traps which monitor moth numbers, Exosex SP_{Tab} is an “Active” Mating Disruption system which employs pheromone to control stored product moths. Using Exosect’s patented Entostat powder technology, Exosex SP_{Tab} uniquely produces an automatic transfer of a confusion effect in male moths. This process (Auto-Confusion) spreads sexual confusion throughout the male moth population thereby interrupting the mating cycle and reducing the moth population.



Male moths are attracted to the Exosex SP_{Tab}, which contains Entostat powder formulated with synthetic female pheromone.



Male moths pick up Entostat powder and female pheromone.



The male's pheromone receptors become overloaded and so the male is unable to locate females.



A male carrying Entostat powder will form a mobile pheromone dispenser, producing “false” pheromone trails, which attract additional males.



Contact between the males ensures that the Entostat powder and the confusion effect is automatically passed on, this process is called Auto-Confusion. The result is a state of sexual confusion amongst the male moth population leading to effective mating disruption.



The Auto-Confusion effect dramatically reduces the chances of the female moth to mate. In the unlikely event that mating does occur, delays beyond the optimum period of fertility of the female moth will reduce the number and viability of the eggs.



Exosex® SP_{Tab} product and assembly

Exosex SP_{Tab} consists of tablets made of compressed Entostat powder containing moth pheromone, and a deployment kit. Exosex SP_{Tab} tablets and the deployment kit are packaged separately.

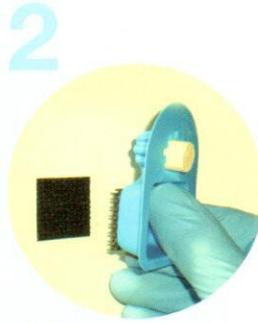
Deployment kit: Box contains 24 adhesive pads, cable-ties and hangers.

Tablets: Box contains 24 tablets.

Also included are instructions for use.



1 Push tablet firmly into dispenser, leaving approximately 50% of the tablet exposed.



2 Remove plastic protection from sticky mounting on back of dispenser.

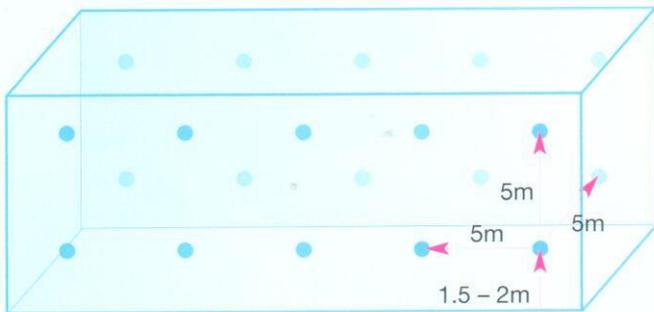


3 Clean surface of substrate and press dispenser, tablet upper-most into position.



How to deploy Exosex® SP_{Tab}

Where possible, place the tablets in a grid format at 1.5m to 2m above floor level and at a distance of 5m between each tablet. Refer to the placement advice below for more detail tips.



Exosex® SP_{Tab} placement advice

- Position close against a wall or surface – moths prefer to move along flat surfaces
- Avoid placing near extreme changes in temperature
- Avoid placing near extreme air movement, e.g. air conditioning vents or doorways
- Place, or increase tablets in areas where there is increased risk of food residues i.e. near to conveyor belts carrying food and machinery where it is hard to clean and likely to suffer greater infestation, (however, do not place directly above a food conveyor)
- In high facilities place second tablets approx 5m above first
- Attach securely in areas where it won't be dislodged
- Do not place directly above food conveyor belts



Q. If I use this system, do I have to carry out any other form of Pest Control?

A. Yes, this system is designed for Integrated Pest Management. It is an excellent alternative to products which have been taken off the market such as Methyl Bromide, however it must be used in conjunction with other methods such as hygiene and spot treatments. Particularly where infestation levels are high.

Q. Is the system safe for use near food production?

A. The system mainly consists of Entostat

powder, which is a food grade natural wax powder already used in food production. However for the integrity of the food being produced, the system should not be placed above conveyor belts or areas where the powder could fall into the recipe.

Q. Why does the tablet need to be changed every 2 months?

A. The pheromone is formulated in the Entostat powder. The pheromone is released at an optimum rate to attract male moths. In order to maintain this optimum level of pheromone, the tablets need to be replaced.

Q. Once the system is installed do I need to do any more?

A. Other than tablet changes very little maintenance is required but it is good practice particularly in busy areas to periodically check tablets haven't been moved or damaged.

Q. I currently use pheromone monitoring traps, do I still need to use monitoring traps if I am using Exosex SP_{Tab}?

A. Yes you do need to continue using monitoring traps in conjunction with Exosex SP_{Tab}. The monitoring trap will show you how

the system is working throughout the facility and will alert you or your pest controller to "hotspots" where new infestations may have been introduced.

Q. Why do certain monitoring traps show higher moth catches when in general, there has been an overall decline in the number of moth catches throughout the facility?

A. When the system is in place it will bring down the overall moth population. In doing so, localised infestation will be much more visible, and will enable you or your pest controller to

pinpoint areas of concern and take further action. These may be caused by the introduction of infested raw materials or a localised infestation of machinery which is difficult to clean. Also check the proximity of monitoring traps to tablets (traps may be more attractive if dispensers aren't effectively positioned).

Questions & Answers

Q. What should I be aware of when using Exosex SP_{Tab} in a site with a history of high moth pressure?

A. The presence of extra pheromone within the building is very likely to excite male moths and bring them out of their harborage. The system will not have caused a greater moth problem, it will just make the current numbers much more visible. This effect also occurs directly after a deep clean and may also be apparent immediately following replacement of lures in monitoring traps.

Q. Are there any situations where the system will be less effective?

A. The system is designed to reduce the overall level of infestation, after which, individual monitoring traps will clearly show where "hotspots" exist. If a "hotspot" (localised infestation) is not dealt with either by targeted cleaning or spot treatment, the level of infestation in that area is likely to persist or increase.

Q. How long will it take for the system to work?

A. Unlike spot sprays or fogging, Exosex SP_{Tab} provides a long term solution to moth infestation. The system does not kill moths, it breaks the lifecycle of

the pest by disrupting the mating process and results will be visible over at least one year. This is dependent on temperature and to a lesser extent relative humidity. Initial fluctuation in numbers may be noticed immediately after installation due to interference with pheromone monitoring traps. The system should be considered to show a direct effect on adult moth catches based on the time of one full life-cycle from mating through to next generation of adults, e.g. at a constant 20°C somewhere between 83–142 days for *Ephestia kuehniella* after initial installation of the system.

Q. Since the system was installed, many more moths have been sighted resting on surfaces. Why is this?

A. The presence of more pheromone is likely to excite the moths and make them more visible. Senses become overloaded and they often seem to sit around completely confused!

Q. Do the moths reproduce all year round?

A. The moth pests reproduce in response to an increase in ambient temperature. In facilities that do not have temperature control, mating and presence of moth will increase over the spring and summer period and lay dormant over the colder winter period. The following season will be the same but at much greater numbers if no intervention is made. In heated facilities the pest population is likely to reproduce continually throughout the entire year.



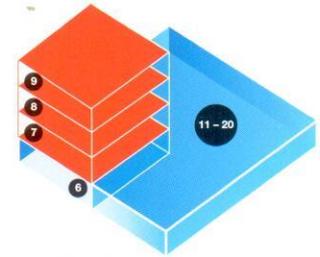
Exosex® SP_{Tab} UK Flour Mill Trial

Exosex SP_{Tab} was placed throughout a UK flour mill in June 2007. The diagram to the right illustrates the various sections of the mill, the blue indicating where the product was placed and the red indicating the untreated controls. Monitoring traps were placed throughout the treated and untreated areas.

Comparing both treated and untreated controls and reviewing historical monitoring trap data, Exosex SP_{Tab} has dramatically reduced the moth population.

- Mediterranean flour moth (*Ephestia kuehniella*)
- Treatment using 5 x 5 m grid layout
- Application every 8 weeks
- Assessment using adult moth catches
- Used as part of an IPM programme
- Mean temperature of 22° C
- Moth full life-cycle 80-140 days

■ (Untreated control)
■ (Exosex SP_{Tab})



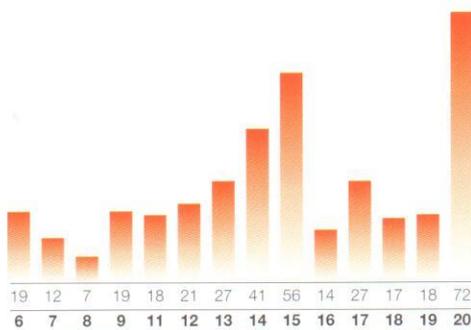
Trap number	Location of traps
9	Bins 1-4 Top
8	Process house top floor
7	Process house 1st floor
6	Process house ground floor
11	Packing floor gantry
12	Packing floor gantry
13	Packing floor gantry
14	Packing floor gantry
15	Packing floor line 3
16	Packing floor line 3
17	Packing floor palletisers
18	Packing floor line 4
19	Packing floor line 4
20	Packing floor conveyor

Exosex SP_{Tab} produced an excellent reduction in the population of Mediterranean flour moth (*Ephestia kuehniella*)

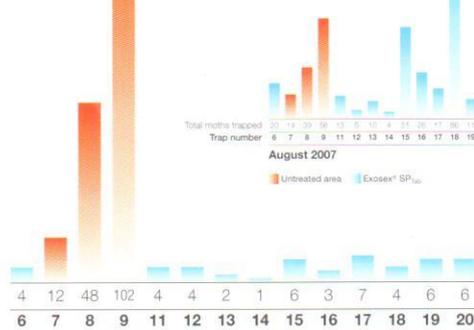


- A** Highlights the completion of one full lifecycle of *Ephestia kuehniella*. As predicted, clear results from Exosex SP_{Tab} become visible over one full lifecycle
- B** Shows a clear reduction in moth numbers in the treated area and in the untreated control. The untreated controls, due to their position, are more susceptible to changes in temperature. As there was a significant decrease in temperature in December the number of moths in the untreated control was reduced. However, in the uncontrolled areas, higher levels will emerge the following Spring time and this trend is already visible in February.

Case study

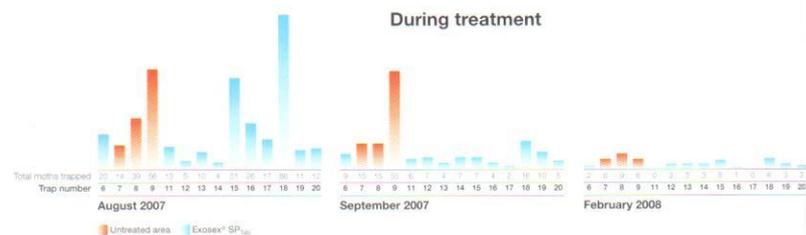
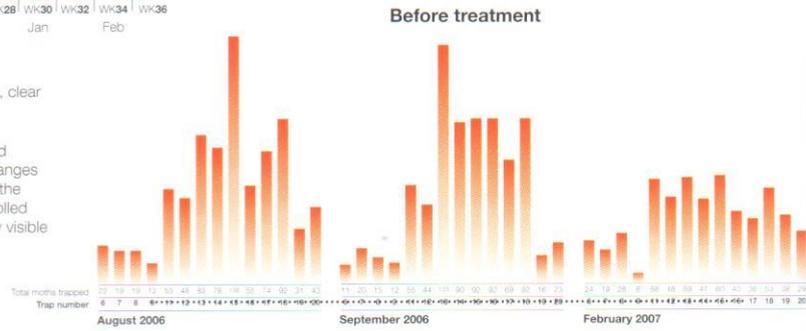


Pre-treatment WK 1

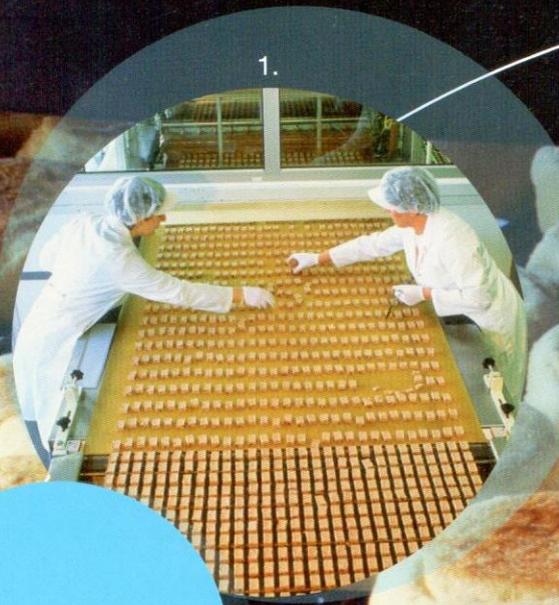


Post-treatment WK 24

■ Untreated area ■ Exosex® SP_{Tab}

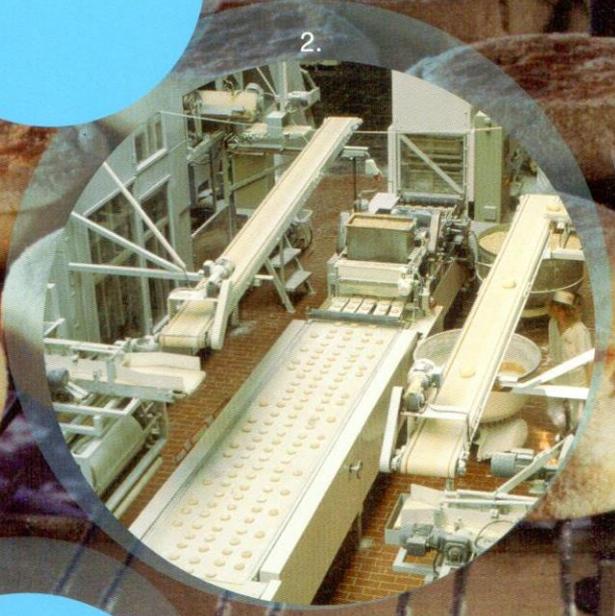


Total moths trapped
Trap number



1.

Bakeries



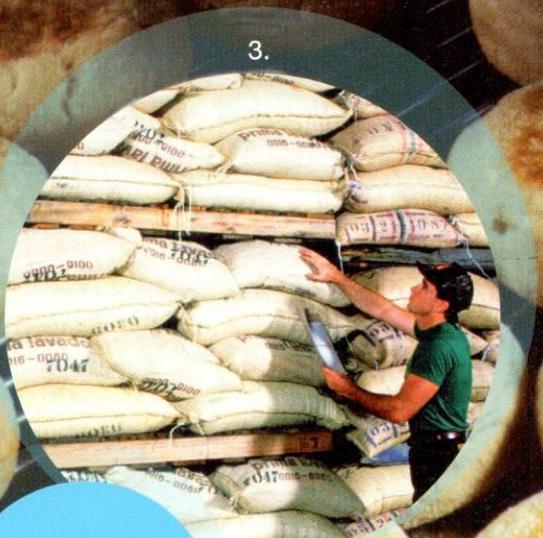
2.

**Confectionery
manufacturers**

Applications

**Cereal
manufacturers**

**Flour
mills**



3.

**Dried fruit
producers**

**Tobacco
factories**



1. Credit - ROSENFELD IMAGES LTD / SPL
 2. Credit - ROSENFELD IMAGES LTD / SPL
 3. Credit - ED YOUNG / AGSTOCKUSA / SPL

Effectiveness

Employs "Active" Mating Disruption, using male moths to distribute the product around the site	Moths act as mobile pheromone dispensers providing a huge increase in "free" dispensers and creating an "Auto-Confusion" [™] effect amongst the moth population
Control targets the mating process prior to egg laying	No perceived risk of resistance developing
Pest specific	Pheromone active on major moth pests of stored products
Able to be used as part of an IPM system	Increases tools available to control moth pests
Controls a different stage of the insect life cycle	Ability to target multiple stages of the insect for more effective control
Brings down background infestation levels of moth species	Ability to use monitoring traps to better identify and target hotspots or problem areas

Exosex SP_{Tab} can offer a safe alternative to broad spectrum insecticides

Exosex SP_{Tab} can provide substantial costs savings

Features and Benefits

Cost Saving

Deployment kits are re-usable	Savings in labour and cost for tablet re-applications
Tablets provide up to 60 days coverage	Fits in with monitoring regimes
System provides year round background protection	Can be budgeted for and gives more control over costs
System is compatible with supplementary targeted treatments such as cleaning and spot spraying of water based pyrethrum	Allows cost effective additional targeting of problem areas
Pest life cycle disrupted prior to egg laying	Ideal for IPM programmes – provides anti-resistance measure for insecticides

Convenience

Exosex SP _{Tab} provides continuous activity	Avoids having to schedule treatments during plant shutdowns
Tablets discreet and easy to deploy	Take little time to deploy and even less time to replace tablets
No restrictions on site entry	Site operations unaffected, no need to cancel shifts

Exosex SP_{Tab} will out perform where insecticide resistance has built-up

Exosect is actively focussed on the development and sales of Intelligent Pest Management solutions. Our innovative and cost-effective products help growers, food producers and processors actively reduce their use of insecticides. Our goal is to assist growers achieve zero residues in their crops and produce high quality food for the consumer.

Our products are used globally in a wide range of sectors including crop protection, (agriculture, horticulture and stored products), apiculture, amenity and public health.

For more information on Exosect and its products visit:

www.exosect.com



Exosect products are used extensively throughout the world

USA
South America
Europe
Middle East

Far East
South Africa
Australia
New Zealand





Toxicological information

Exosex SP_{Tab} contains
10 mg Technical Grade
Pheromone per gram of wax
powder.

**Ecotoxicological
information**

Not hazardous to the
environment.

Distributor details:

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exosect[®]
Intelligent Pest Management

Exosect Limited, Leylands Business Park, Colden Common, Winchester, Hampshire, SO21 1TH, United Kingdom
T +44 (0) 23 8060 3939 F +44 (0) 23 8060 3969 E info@exosect.com W www.exosect.com