



## **Noble Fiber Technologies, Inc.**

### Clinical Studies Synopsis

## **DUST MITES**

### OVERVIEW OF STUDIES CONDUCTED TO DETERMINE THE EFFECT OF X-STATIC® - THE SILVER FIBER™ ON THE POPULATION OF DUST MITES IN BEDDING MATERIALS

#### **Fiti Testing & Research Institute (Seoul, Korea) ©2003**

##### *Test For Avoidance and Destruction of Dust Mite*

The sample "Anti Allergy Pad : X-static Silver Yarn" reduced the infestation of mites by 99.9%. The test insects were *Dermatophagoides farinae* and *Dermatophagoides pteronyssinus*.

#### **Techniques Environnement Consultants (France) ©2003**

##### *Laboratory Assessment of the Efficacy of a Fabric Treatment to Control House Dust Mites*

"In the conditions of the trial, with samples, mites strain and methodology used, the sample PL200 X-Static has proved a 94% reduction of the house dust mites population."



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BTTG, IGS, LD, TMSJ

## TEST REPORT

APPLICANT : MAXTEX CO., LTD. (S.T.T CO., LTD.)

REPORT NO : 41-41-03-02126-1

DATE : 2003-02-14

SAMPLE DESCRIPTION : ONE(1) SAMPLE OF "ANTI ALLERGY X-PAD (X-STATIC SILVER YARN)",  
SUBMITTED ON 2003-01-24

### TEST CONDUCTED

### TEST RESULTS

#1

(1) ANTIBACTERIAL ACTIVITY TEST (KS K 0593-2001) : CFU/ml, BIOSTATIC REDUCTION RATE %

	BLANK	AS RECEIVED	AFTER THE 10TH WASHING
BACTERIA-1 : START	$1.5 \times 10^5$	$1.5 \times 10^5$	$1.5 \times 10^5$
AFTER 18HRS.	$6.9 \times 10^0$	<10	<10
BIOSTATIC REDUCTION RATE	---	99.9	99.9
BACTERIA-2 : START	$1.4 \times 10^5$	$1.4 \times 10^5$	$1.4 \times 10^5$
AFTER 18HRS.	$6.9 \times 10^0$	<10	<10
BIOSTATIC REDUCTION RATE	---	99.9	99.9

- NOTE) • SAMPLE WEIGHT : 0.4g  
 • AN INCREASING RATE : BACTERIA-1 : 46 TIMES  
 BACTERIA-2 : 49 TIMES  
 • INOCULUM CONCENTRATION : BACTERIA-1 :  $1.5 \pm 0.3 \times 10^5$ /ml  
 BACTERIA-2 :  $1.4 \pm 0.3 \times 10^5$ /ml  
 • STANDARD FABRIC(KS K 0905-1996) : COTTON  
 • NONIONIC WETTING AGENT : TWEEN 80 (0.05%)  
 • WASHING CONDITION : KS K 0432-1999, NORMAL CYCLE, WASH TEMP  $40 \pm 3^\circ\text{C}$ , LINE DRY.  
 • TEST BACTERIA : BACTERIA-1 - *Staphylococcus aureus* ATCC 6538  
 BACTERIA-2 - *Klebsiella pneumoniae* ATCC 4352.  
 • < = LESS THAN.  
 • SEE ATTACHED PHOTOS.

SAMPLE :



*Ho-chul Kim*  
HO CHUL KIM  
EXECUTIVE DIRECTOR

OUR REPORTS APPLY ONLY TO THE SAMPLE TESTED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS.





# TEST REPORT

**APPLICANT** : MAXTEX CO., LTD(S.T.T CO., LTD.) **REPORT NO.** : 414103-02126-2

**ADDRESS** : Rm302, Seowon Bldg, 395-13, Seokyo  
-Dong, Mapo-Ku, Seoul, Korea  
MBC Academy Bldg, 7F,198, Chamshil  
-Dong, Songpa-gu, Seoul, Korea

**ISSUED DATE** : 2003. 02. 11.

**APPLIED DATE** : 2003. 01. 24.

## SAMPLE DESCRIPTION

# Anti Allergy X-Pad : X-static Silver Yarn (SEE ATTACHED SAMPLE)

## CONCLUSION

According to result of test for avoidance and destruction of mite, we consider that the tested sample "Anti Allergy X-Pad : X-static Silver Yarn - After 10 th wash" has an effect on avoidance of a mite for test insect (*Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*).

\*\*\*\*\*

**INCLOSURE** : A copy of test result.

*Ho Chul Kim*

HO CHUL KIM  
EXECUTIVE DIRECTOR  
FITI TESTING & RESEARCH INSTITUTE





## TEST METHOD AND RESULT

### 1. A object

An efficiency test for avoidance of a mite for a test sample "Anti Allergy X-Pad : X-static Silver Yarn".

### 2. A purpose

It is a purpose that a submitted sample is tested, and evaluated the efficiency for avoidance of a mite destruction of worms on test insect "3.B" paragraph.

### 3. A test outline & material

#### A. An outline of the test

##### 1) A method of keeping off the invasion

An observation whether a mite is lured and moved with the bait of allurement contained in a medium of a tested material or not.

##### 2) A method of keeping off the spreading

An observation whether a mite alternatively invades in conditions mixed a material of allurement in the tested material or not.

##### 3) A method of use of a glass tube

An observation whether a mite goes through the test material and has a movable transmissivity to the material of allurement or not.

#### B. Test insect

##### 1) *Dermatophagoides farinae*

##### 2) *Dermatophagoides pteronyssinus*

#### C. A material of the test

##### 1) Plastic plate

(Diameter 3.5 cm × Height 1cm, Diameter 13 cm × Height 2 cm)



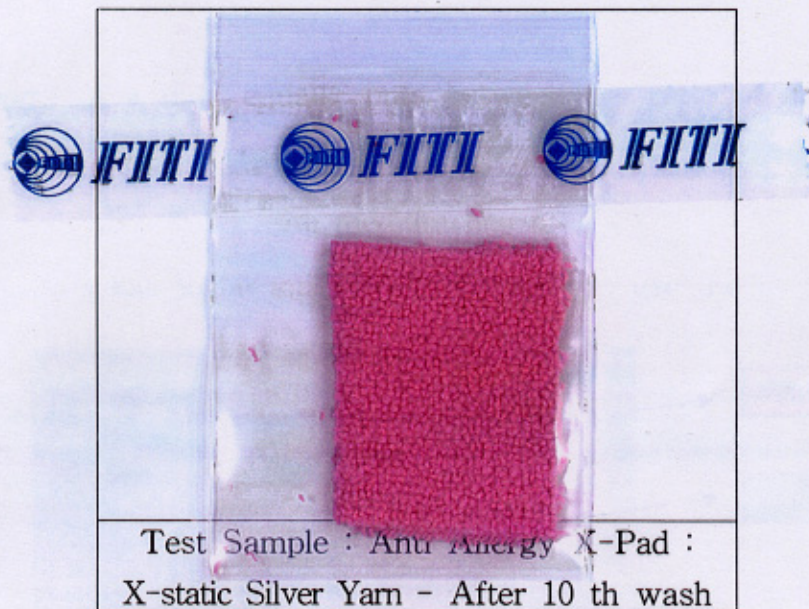


2) Plastic container

(Width 27 cm × Length 13 cm × Height 9 cm)

3) Glass tube

(Inner Diameter 2 cm × Length 10 cm × Thickness 0.1 cm)







## 4. A method of test

### A. A way for keeping off the invasion

① The tested material puts on the plastic plate of diameter 3.5 cm × height 1 cm, and an allurement material of 0.05 g on a medium without a mite.

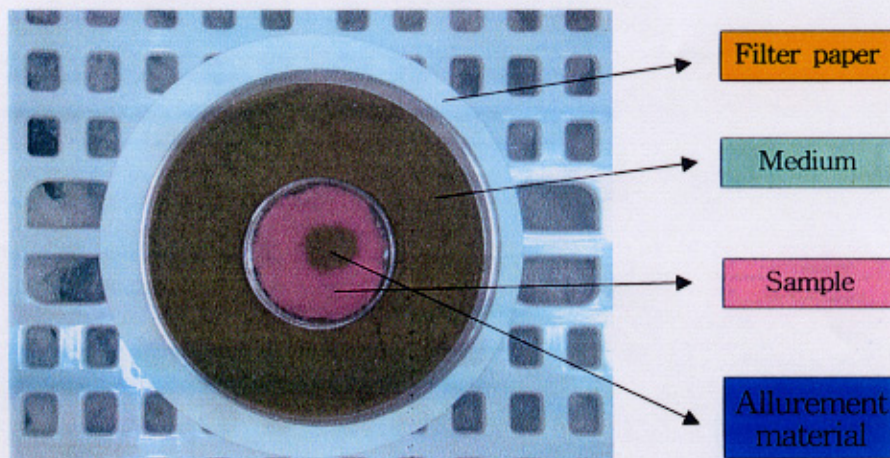
\* A tested material on the seat has to adhere closely to the bottom, provided the tested material of cotton, it is equally put that of 0.1 g on the plate.

② The plate of ① puts on the middle of the plastic plate of diameter 3.5 cm × height 1 cm.

\* The (medium) of a mite equally puts between the plate of diameter 3.5 cm and that of diameter 9 cm.

\* The usable density of an mite medium has to 30,000 mites per gram.

\* A mite medium has to be made by N = 1 and to use the living 10,000 mites.



③ It puts the mites setting on ② into an attached seat in order not to creep out them and it puts them into a preservative plastic container for foods of width 27 cm × length 13 cm × height 9 cm.

\* The inside of a preservative plastic container for foods is to maintain  $75 \pm 2\%$  RH to use a saturated saline solution.

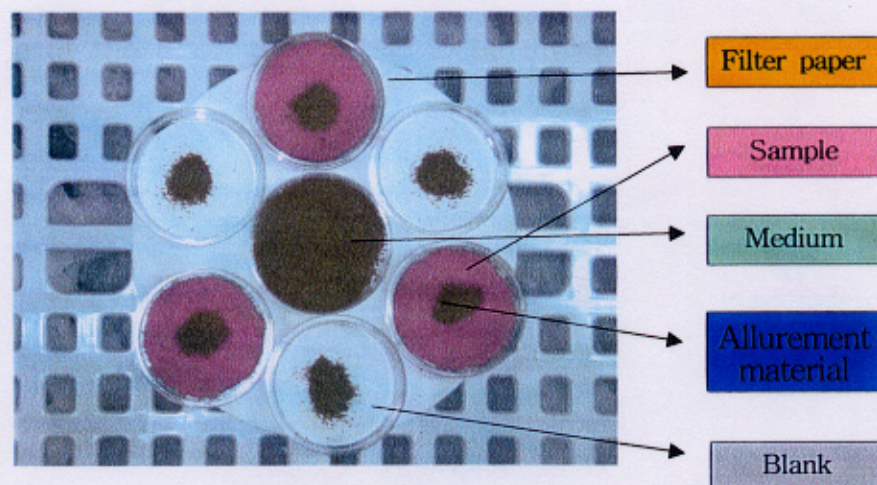




- ④ It softly puts the setting on ③ into thermostat-moisture incubator of  $25 \pm 2$  °C in turn-on the power.
- ⑤ After 48 hours, It measures the number of the invasive mites alive in the medium with a tested material and the material of allurement with in plate of diameter 3.5 cm.

## B. A method of keeping off the spreading

- ① It puts the plastic plate of diameter 3.5 cm × height 1 cm on the center of a filter bed, and it installs the plates of the petal type of 6 pieces around at intervals of each 2 mm between the adjoining sides.
- ② It puts an extracted test-material and an unprocessed test-material of comparison by alternating on the six plates installed around in order to adhere closely to the bottom of their plates and puts 0.05 g of a medium without containing the mite with a material of allurement in each center of the plates.



- ③ It puts the medium of mites into the center plate
  - \* The medium density of an available mites has to be 30,000 mites per gram.
  - \* A medium of mites is made by  $N = 1$ , and it uses the living 10,000 mites.





④ It puts the setting on ③ with a filter bed into a preservative plastic container for foods of width 27cm × length 13 cm × height 9 cm.

\* The inside of a preservative plastic container for foods is to maintain  $75 \pm 2 \%$  RH to use a saturated saline solution.

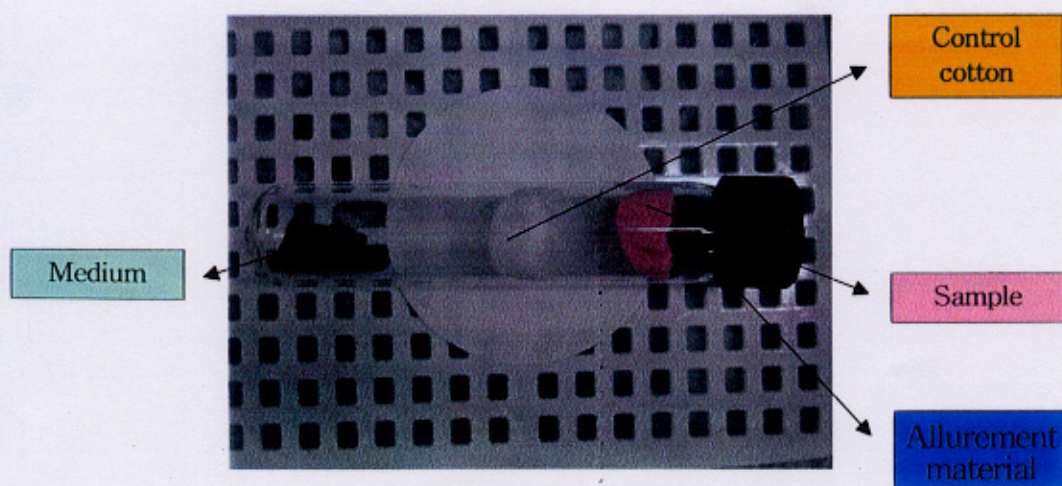
⑤ It softly puts the setting on ④ into thermostat-moisture incubator of  $25 \pm 2 \text{ }^\circ\text{C}$  in turn-on the power.

⑥ After 24 hours, the number of the invasive mites alive measures in the medium with a tested material and the material of allurement with in 6 plates around.

### C. A method of glass tube

① It attaches an attached tape on one side of the glass tube of inner diameter 20 mm × length 100 mm and the tested material of an alluring power in order to feed mites without containing a mite equally attaches that of 0.01 g on that.

② An control cotton of 0.025 g for the test puts a thickness of 5 mm into an attached tape of the glass tube of ① to be attached it closely, and then it puts the test material of 0.4g into it up to thickness of 20 mm.







③ A mite medium, with horizontality, puts 10,000 mites alive into 40 mm interval from the end of the other side without attaching the attached tape on the glass tube in ②, and stops up its entrance with the textile if a high density.

\* It binds the textile of a high density which closed the glass tube with a rubber band.

④ It puts the setting on ③ into a preservative plastic container for foods of width 20 cm × length 13 cm × height 9 cm, and then it is to put into thermostat-moisture incubator of  $25 \pm 2$  °C in turn-on the power.

\* The inside of a preservative plastic container for foods is to maintain  $75 \pm 2$  % RH to use a saturated saline solution.

⑤ After 48 hours(with in two hours), it measures the number of the mites alive allured with a power feed.

\* It observes a cotton for the test, a powder feed and an attached tape.





## 4. Test result

### A. A way for keeping off the invasion

(mite number / g)

Division		Beginning of a mite		Survivor of a mite		Avoidance rate	
		<i>D. farinae</i>	<i>D. pteroyssinus</i>	<i>D. farinae</i>	<i>D. pteroyssinus</i>	<i>D. farinae</i>	<i>D. pteroyssinus</i>
Blank		$4.6 \times 10^4$	$6.1 \times 10^4$	$4.5 \times 10^3$	$6.4 \times 10^3$		
Anti Allergy X-Pad : X-static Silver Yarn	①	$4.3 \times 10^4$	$5.4 \times 10^4$	$1.5 \times 10^2$	$2.3 \times 10^2$	96.7	96.4
	②	$4.2 \times 10^4$	$5.3 \times 10^4$	$1.6 \times 10^2$	$2.2 \times 10^2$	96.4	96.6
	③	$4.4 \times 10^4$	$5.6 \times 10^4$	$1.3 \times 10^2$	$2.5 \times 10^2$	97.1	96.1

### B. A method of keeping off the spreading

(mite number / g)

Division		Beginning of a mite		Survivor of a mite		Avoidance rate	
		<i>D. farinae</i>	<i>D. pteroyssinus</i>	<i>D. farinae</i>	<i>D. pteroyssinus</i>	<i>D. farinae</i>	<i>D. pteroyssinus</i>
Mite medium		$4.7 \times 10^4$	$5.3 \times 10^4$	-	-		
Blank	①	0	0	$5.0 \times 10^3$	$6.6 \times 10^3$	-	-
	②	0	0	$5.1 \times 10^3$	$6.4 \times 10^3$	-	-
	③	0	0	$4.8 \times 10^3$	$5.9 \times 10^3$	-	-
Anti Allergy X-Pad : X-static Silver Yarn	①	0	0	$2.4 \times 10^2$	$2.5 \times 10^2$	95.2	96.2
	②	0	0	$2.3 \times 10^2$	$2.2 \times 10^2$	95.5	96.6
	③	0	0	$2.5 \times 10^2$	$2.3 \times 10^2$	94.8	96.1

### C. A method of glass tube

(mite number / g)

Division		Beginning of a mite		Survivor of a mite		Avoidance rate	
		<i>D. farinae</i>	<i>D. pteroyssinus</i>	<i>D. farinae</i>	<i>D. pteroyssinus</i>	<i>D. farinae</i>	<i>D. pteroyssinus</i>
Blank		$5.8 \times 10^4$	$5.5 \times 10^4$	$6.4 \times 10^3$	$5.9 \times 10^3$		
Anti Allergy X-Pad : X-static Silver Yarn	①	$5.6 \times 10^4$	$4.8 \times 10^4$	0	0	99.9	99.9
	②	$5.4 \times 10^4$	$5.2 \times 10^4$	0	0	99.9	99.9
	③	$5.3 \times 10^4$	$5.0 \times 10^4$	0	0	99.9	99.9





## 5. Conclusion

According to result of test for avoidance for test insect (*Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*). The following is the sample "Anti Allergy Pad : X-static Silver Yarn - After 10 th wash" which had decrement, that is, 96.4 ~ 97.1 %, 96.1 ~ 96.6 % in a way for keeping off the invasion, 94.8 ~ 95.5 %, 96.1 ~ 96.6 % in a method of keeping off the spreading, 99.9 %, 99.9 % in a method of glass tube for *Dermatophagoides farinae* & *Dermatophagoides pteronyssinus*. End.





## LABORATORY ASSESSMENT OF THE EFFICACY OF A FABRIC TREATMENT TO CONTROL HOUSE DUST MITES

**PL200 X-Static**

Sponsor :

**LIFE SRL**

Viale Andreis n°74  
25015 Desenzano del Garda (Brescia)  
ITALY

MAY 2003

Report # 845/0403R

The acceptance of this trial report means the acceptance of the Sales General Conditions at the back of this page

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# LABORATORY ASSESSMENT OF THE EFFICACY OF A FABRIC TREATMENT TO CONTROL HOUSE DUST MITES

## 1. PURPOSE

To assess efficacy of a treated fabric on the development of a population of house dust mites (*Dermatophagoïdes pteronyssinus*) in comparison with the development on an untreated fabric.

The trial is done by putting in some dust mites on the fabrics and by the monitoring of the development along a 6 weeks period which is corresponding to 2 development cycles.

## 2. MATERIALS AND METHOD (adapted from NF G 39011 standard)

### 2.1. Mites strain preparation

Mites used are *Dermatophagoïdes pteronyssinus* strain originated from a stock culture of I.N.R.A. Bordeaux (France). It was a susceptible strain reared at 25°C and 76%RH for several years in laboratory conditions without any contact with insecticides on a oligidic diet of wheat germ (dried and powdered) and of brown brewers' yeast (Prolabo, debittered, dried and powdered) (1/1 w/w).

The mites are retrieved from the surface of the rearing medium where the mite colony is generally concentrated.

### 2.2. Preparation of test surfaces and test arena

The test surface is a square piece of glass (7 cm x 7 cm) receiving a piece of treated net ticking of the same size. The test arena is delimited by a rubber ring (internal diameter 40 mm, thickness 3 mm) internally coated with Fluon GP1™ (Whitford France) to prevent escape of the mites.

The surface for mites crawling within the rubber ring on the cotton ticking was 12,56 cm<sup>2</sup>. After mites colony deposition in the centre of this test arena the rubber ring was then covered by a filter paper (Whatman n°4, diameter 70 mm), maintained by a electro-plated iron ring and tightly gripped by two sprung paper-clips.

### 2.3. Food sources :

FOOD 3 : yeast / skin flakes (50% - 50% w/w)

Yeast : brewer's yeast *Saccharomyces cerevisiae* PROLABO code 24.979.297 batch B83F

Skin flakes : barb hairs (unwashed)



All substrates are grinded and mixed with each other in the intended proportions and the powder obtained must go through a 125µm sieve.

100mg of the food is sprinkled along the fabrics.

#### **2.4. Count dates and mortality assessment procedure**

50 mites (25 males and 25 females) are held in contact with the fabrics.

Incubation of the treated surfaces was inside a large plastic vessels made in polycarbonate (Bank <sup>TM</sup>) on saturated salt solution at 23°C and 80% RH.

The assessment of mites survival is done using the 'Heating Escape Method' with low temperatures (30 to 40°C) (Bischoff).

The trial duration is 6 weeks which is corresponding to 2 development cycles in the climatic conditions of the test.

#### **2.5. Replicates, Standard, Control :**

4 replicates are conducted, including for the untreated fabric which is the Control.

### **3. SAMPLES :**

The sample is provided by LIFE SRL (Italy) :

Art. PL200 X-Static

Colour : silver

Composition : 53% cotton - 44.2% polyester - 2.8% Ag X-Static

Weight : gr 260 mq

An untreated cotton 150g/m<sup>2</sup> is used as an Untreated Control.

### **4. RESULTS :**

#### **4.1. Presentation :**

Synthesis of data is given in the table next page. Raw data are given in Addendum.

The trial is validated by the amount of mites alive in the untreated sample, showing the good acclimatization of the mites in the trial conditions.

#### **4.2. Comments :**

The sample gave a 94% reduction of the mites populations.

### **CONCLUSION :**

In the conditions of this trial, with samples, mites strain and methodology used :  
the sample PL200 X-Static has proved a 94% control of the house dust mites populations



HOUSE DUST MITES POPULATIONS REDUCTIONS

after 6 weeks

	replicate	A	%reduction
sample PL200 X-Static			
	1	56	93,9
	2	72	92,1
	3	37	95,9
	4	49	94,6
	mean	53,5	<b>94,1</b>
	sq.		1,6
untreated control	1	925	-
	2	963	-
	3	877	-
	4	883	-
	mean	<b>912</b>	-
	sq.	40,1	-

A = alive mites