Comparing LED bulbs

Testing the Astron LED against the Astron II LED lamp

ALCOCHEM HYGIENE

Conclusions

with an additional energy saving of around 20%, the Astron II LED lamp showed an increase of its effectiveness of 35%

Wade Environmental Ltd

Evaluating the comparative efficacy of a range of LED bulbs at capturing flying insects within a 'Y' Maze.

Report

Certification.

WE Reference; WE-ALCO-EFK-0124-FI

Alcochem Hygiene Reference: AH_RL-AW/240205_02

All data obtained by this report, including both raw data and a copy of the final document, will be held at Wade Environmental Ltd, for a minimum period of five years.

This report has been written to the guidance set in;

- Internal SOPs on the testing of insecticides

Declaration

The data in this report is a true and accurate record of all data obtained.

Signed; Date; 25/03/2024

Approved by; Date;

Page No.

Contents

Study Information

Simulated use test using a 'Y'-Maze to determine the attractiveness of new LED lightbulbs to flying insects.

This project was devised to assess whether flying insects exhibit a stronger attraction towards the test product compared to the Astron LED. This was achieved by offering the test insects a choice between two LED options within a controlled environment.

i. Testing facility: Wade Environmental LTD.
Preston Candover
Basingstoke
Hampshire,
RG252DS
UK

ii. Sponsor: Alcochem Hygiene
Zeilmaker 4,
3861 SM Nijerk
The Netherlands

iii. Alcochem Reference: AH_RL-AW/240229_02
iv. Experimental start date: 02/2024
v. Experimental end date: 02/2024
vi. Interim report date: 03/2024
vii. Study Director: Alexander Wade
viii. Primary personnel: Ellen Fitzgibbons
ix. Candidate Materials:

Candidate Material	**Bulb Details & Physical description.**	**BATCH**	**WE - Item Code**
Astron LED I	240V/50Hz	2.04.0500	WE-ALCH-0001
Astron LED II	240V/50Hz	2.04.0508	WE-ALCH-0002

Experimental Synopsis.

A series of 'runs' were performed to assess if there was a favoured bulb between any two given choices within the test. For each of the tests, each bulb was placed at opposing ends of a 'Y' Maze, this area being referred to as the top. Each side was visually separated from with an external and internal baffle. Flies were then introduced at the bottom of the 'Y'. After the given time period, the number of flies at each bulb were counted and recorded as a percentage of the total.

The comparison tests will be run as follows:

Test No	**Lamp 1**	**Lamp 2**
1	Astron LED I	Astron LED II

All flies were introduced from the same entrance at the bottom of the 'Y'. Assessments of the migration rate to each bulb was measured at 15, 30, 45 and 60 minutes after entry to the maze.

The test was run 3 times; the average was taken and used as the final result.

Each test will be run with 1 species of flying insect.

1. *Musca domestica* (Housefly)

Test No	**Insect**	**Lamp 1**	**Lamp 2**
1M	*Musca domestica*	Astron LED I	Astron LED II

Aim

A series of tests were run to assess the attraction of flying insects to Test Sample LED bulbs, compared to a control Astron LED II bulbs, in terms of percentage of initial sample at each bulb at the end of the given time frame.

Methodology.

Test insects:

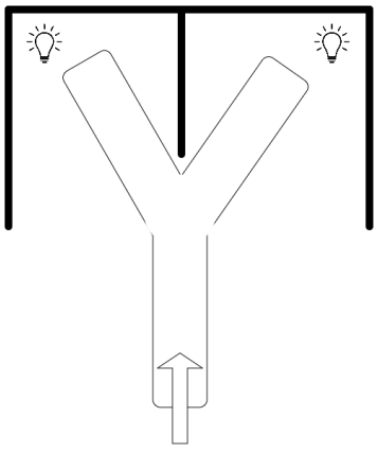
Musca domestica were obtained from laboratory cultures maintained at Wade Environmental Culture Labs. Mixed sex adult insects were selected for the trial. All test organisms were checked to be free of symptoms of disease or poor health prior to testing, for a full review of specific rearing and handling methods an SOP can be provided.

Experimental design.

Y –maze procedure

The appropriate bulbs for the relevant tests were placed at the top of the 'Y' maze and connected prior to the test starting to ensure functionality. Each bulb was separated from the other visually by the insertion of a baffle placed between the two bulbs.

Insects were introduced into the entrance (bottom) of the Y-maze as a group so that there will be no bias on migration through the tunnels.



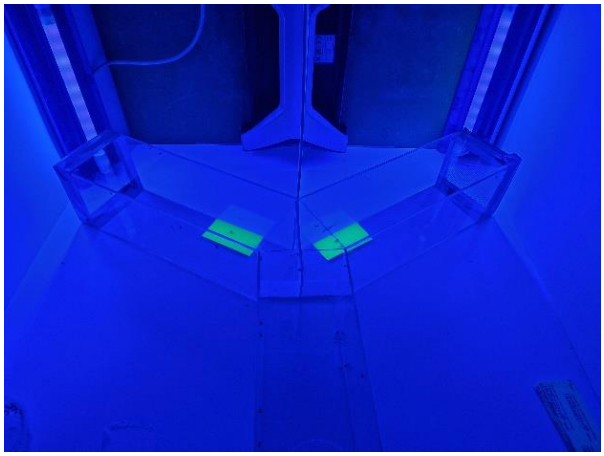


Figure 1&2. Orientation and design of 'Y' Maze

The insects were observed for 1 hour with readings being taken at 15/30/45 and 60 minutes to record migration.

The insects were then removed from the Y-maze and given time to acclimatise to external conditions

This test was run in two parts over three replicates.

a. LED's situated Short distance apart (indicative of multiple bulbs in the same unit)
   - The comparison bulbs housed in the same EFK (X-lure), separated by a baffle.

b. LED's situated Long distance apart (indicative of bulbs housed in competing units).
   - The comparison bulbs were separated a meter in distance in separate single bulb EFKs (I-30), separated by a baffle.

The setup aimed to prevent any cross contamination of visible and ultraviolet light between the bulbs by use of the baffle.

It was hoped that by observing the results of both, it would give a clear indication to the flies' ability to discern between separate and near sources of attraction.

Establishing effect.

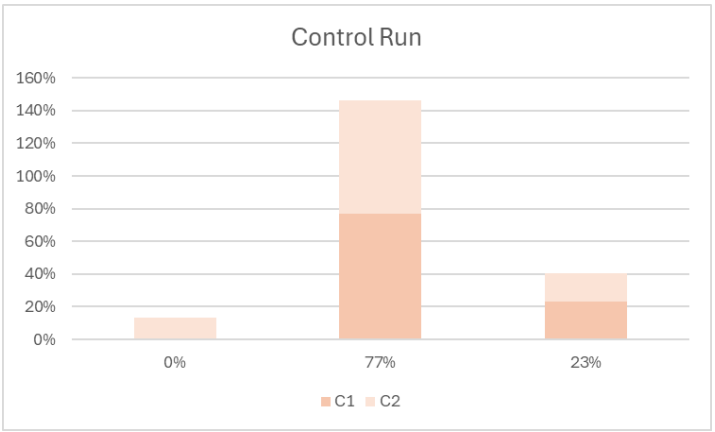
- The test will have been deemed to be successful if there is a significant difference in fly's numbers between any of the three arms of the 'Y' Maze.
- The test will have been considered a success if the number of insects in the active arms of the Y maze exceeds the number of insects in the no choice section of the Y Maze.

Ensuring experimental validation.

To ensure that there were no unaccounted bias, a pre test control was undertaken with a standard LED UV tube compared against a no-tube test.

From this test it was clearly observed that the presence and subsequent absence of bulbs within the Y-Maze has a significant impact on the behaviour and movement of the test insects.

The results of this control can be seen in Figure 3 and Table 1. Numbers in tables exceed 100% as they are stacked compound of two trial replicates.



	No Bulb	LED II	Niether
C1	0%	77%	23%
C2	13%	70%	17%

Figure 3 and Table 1 – Results from the validation of experimental design control.

Results.

Musca Domestica

The results of this study can be seen in Figure 4 and Table 2. Numbers in tables exceed 100% as they are stacked compound of three trial replicates.

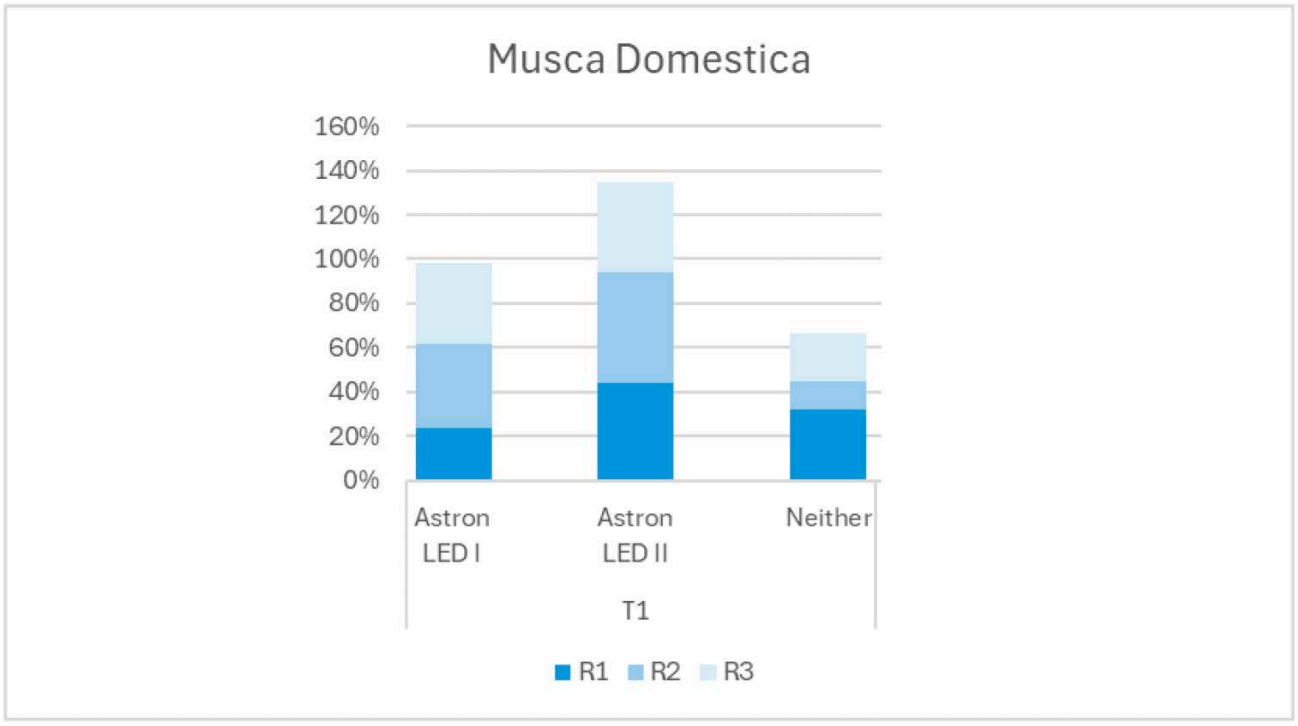


Figure 4: Distribution of M. Domestica in each test and replicate.

Test Bulb	Test Run	R1	R2	R3	Total
T1	**Astron LED I**	24%	38%	37%	33%
	Astron LED II	44%	50%	41%	45%
	Neither	32%	12%	22%	22%

Table 2: Results from each test and replicate, highlighting the preferred choice in each test and the preferred choice on average over the three replicates.

Discussion.

M.domestica

From the results we can see that the *M.domestica* showed a preference for movement towards the LED lights over a no choice outcome.

Astron LED II showed a preference for attraction when compared to the Astron LED I bulb.

Conclusion.

In conclusion this report finds that when tested against *M.domestica*, the new Astron LED II bulb is 35% more attractive than the Astron LED I bulb.

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More information: Alcochem Hygiene • Tel.: +31 (0)33 299 4139 • www.alcochemhygiene.com • hygiene@alcochem.com