MARCH 2010 | ISSUE 2

PESTWEST NEWSLETTER

CLIMATE CHANGE AND FLIES

The public health significance of synanthropic flies is well established, the classic example being the housefly, *Musca domestica*, which has been implicated in the spread of many diseases (Greenberg, 1973). Furthermore, the nuisance value of such flies can be considerable. It follows that potential increases in fly abundance due to climate change is of concern, in terms of both the risk to public health and the considerable nuisance value.

The effects of climate change on fly populations other than mosquitoes are little studied. Current understanding comes from the essential 2005 paper by Goulson et al, entitled 'Predicting calyptrate fly populations from the weather, and probable consequences of climate change'.

Goulson et al (2005) examined an extensive data set of fly catches and used this data to develop predictive models to forecast fly populations. A number of models were produced for *Musca domestica*, *Calliphora* spp and all calyptrate flies sampled. Predictions based on climatic factors only, such as humidity, temperature and rainfall were strongly correlated with observed data. This observation suggests that fly population changes are largely driven by the weather rather than biotic factors.

The models were then used to simulate the effects of the most recent predicted climate change scenarios regarding temperature increases. The models predicted that fly populations could increase substantially, under likely scenarios of climate change. Increases are anticipated of up to 244% by 2080 when compared with current levels and the greatest increases would occur in the summer months. If this prediction holds true, it is possible that increases in the incidence of fly-borne diseases may occur. Most predictions suggest an increase in temperature ranging from 1.5°C to 5°C by 2080. This means that small increases in temperature could result in substantial increases in fly populations.

Fly species

Calliphora spp were least affected by climate change, with predicted increases of abundance of up to 85% by 2080 under the worst-case scenario.

Musca domestica numbers were predicted to increase by 244% by 2080 under the worst-case climatic scenario, and by 156% under the moderately optimistic medium–low emissions scenario.

Significance

The possible effects of climate change on fly abundance are likely to be complex, as other, less well understood climatic factors such as precipitation are involved. Biotic factors such as increases in fly predators / parasites / pathogens could also have an influence.

Other studies

The influence of climate change on the stable fly, *Stomoxys calcitrans*, a *haematophagous* biting pest of livestock and humans, was examined in an international study, the main conclusion of which was that stable fly infestations are unlikely to worsen in response to global warming (Gilles et al, 2008). This study noted that although infestations are unlikely to worsen, a shift in the infestation period could occur, which is still of importance. As stable flies breed in livestock manure and rotting vegetation, sanitation / husbandry practices can have a major impact on abundance and are likely to compensate for the effects of climate change on these flies.

Fly Management

Studies such as this are essential, as they enable the forecasting of fly populations to ensure that control measures can be focussed and targeted as part of an integrated pest management programme.

Conclusions

One of the problems of research is that it can pass under the radar of most people, often hidden in journals that are often only accessible to the academic community. It is crucial that awareness of such important research is communicated to a wider audience, particularly influential figures in the public health pest management industry as well as policy makers in government, so that informed evidence-based decisions can be made.

DID YOU KNOW...

Fly larvae are the only insect larvae which can be aged accurately because of the work which has been carried out in forensic entomology

Aristotle confused the world of his time by stating that flies had four legs and two arms!

Flies land on the ceiling by reaching out with their front legs and flipping their whole body over

Fruit flies were the first animals in space

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FLYING INSECT SCIENCE

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Shatterproof Coating

In line with European Food Hygiene Regulation the use of shatterproof tubes is a legal requirement in the food industry to avoid glass contamination from accidental lamp breakage. Unfortunately not all shatterproof coatings come up to standard. Depending on the material used, coatings can become brittle, yellow/brown and crack before the end of a tube's life and as a result do not prevent the escape of glass fragments in case of a lamp breakage. This is because the majority of plastics inhibit Ultra Violet radiation and rapidly deteriorate causing either discoloration and/or destruction of the shatterproof coating.

PestWest Quantum BL UVA-tubes with DuPont Teflon® Fluoropolymer coating have been tested to conform with the latest industry standards for shatterproof tubes. To conform to these standards, shatterproof coatings have to be, amongst other things, resistant to heat and fire and have sufficient impact resistance throughout their life-span.

Resistance to heat and fire is checked by means of the 650 °C Glow wire test whereby a nickel-chromium glow-wire is heated to 650°C. The lamp coating is removed from the lamp, mounted on a carriage and pressed against the glow-wire for 30 seconds. Any flame or glowing of the coating shall extinguish after 30 seconds and any burning or molten drop shall not ignite a 5-layer tissue paper.

Impact resistance is checked by a drop test whereby lamps that have been in use for 8,000 hours are dropped horizontally from a height of 4 m onto a flat concrete or similar surface. Lamps have passed the test if all glass fragments and the lamp caps are retained by the coating/sleeving.

Furthermore, the DuPont Teflon® Fluoropolymer has the highest UVA transmission of this type of material and will operate continuously at temperatures of up to 200° C. It has a melting temperature of 260°C and a life-span of +50,000 hours.

PestWest Quantum BL UV tubes are coated with DuPont Teflon fluoropolymer shatterproof coating by Fotolec Technologies Ltd. Fotolec Technologies is a leading supplier of lamp coatings in the lighting industry, whose 'Glassguard' shatterproof coating is recommended by the German 'Bundesverband der Lebensmittelkontrolleure'. Further, lamps coated with this coating meet the requirements of the BRC Global Food Standards and IFS as well as HACCP standards.

All PestWest'professional range of flying insect control units are equipped with Quantum BL UVA-tubes with DuPont Teflon® Fluoropolymer coating.

Inferior quality of shatterproof coating after 1 month's use. Unknown brand.

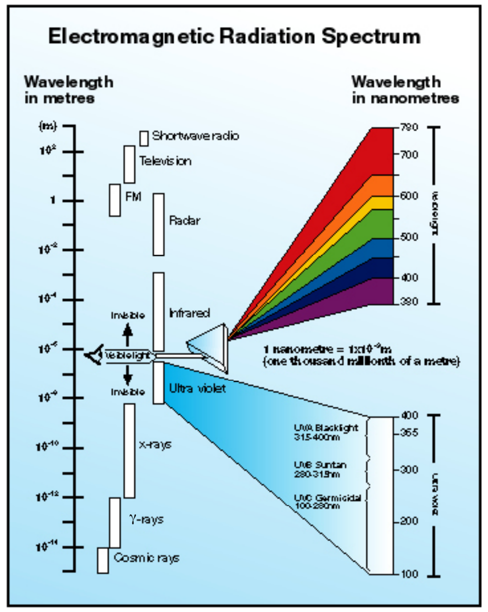
FLYTRAPS, UV LIGHT AND LED'S

One of the greatest areas of misunderstanding concerns something we all automatically assume we know about, and that is light.

We see light and that is the end of it! Or is it?

In actual fact it most certainly is not. The light we see is just a small part of the electromagnetic spectrum that bathes us and is emitted not only by the sun but is also provided in man made forms through radio's, TV's, mobile phones and a host of other sources.

The white light we see is actually made up of a range of colours, and from our school days many of us will recall using a glass prism to split this light up into its constituent colours from red through to yellow, green, blue to violet etc. The same thing is repeated in the atmosphere by water droplets after it has rained which form a rainbow, under the right conditions.



But what about the "light" outside of the range visible to humans?

At the red end of the spectrum light advances into Infra-red (IR) and beyond, as its wavelength gets progressively longer. This can be seen when using remote controls for TV's, garage doors etc. These employ semiconductor emitters that generate IR radiation to activate electrical equipment.

Similarly at the violet end of the spectrum where the wavelength is shorter the light becomes invisible to us once again. However some species of life are able to "see" this light whereas we humans cannot. Many flying insects belong to the organisms able to see this light which we term Ultra Violet.

This phenomena has been exploited for over 50 years by using UV emitters to attract flying insects. The vast majority of such insect traps employ fluorescent tubes

JUST BECAUSE THE TUBE IS LIT DOESN'T MEAN TO SAY IT IS STILL PRODUCING ENOUGH UV TO ATTRACT INSECTS

to generate light from the UV part of the spectrum. The physical processes involved in producing this light also produce blue light, which of course can be seen by humans. However, what is often not appreciated is that the blue light, we see, is not the prime attractant for the flying insects, it is the UV light, which is important.

Because fluorescent tubes employ the shorter wavelength of UV light and these create certain types of phosphors in the tubes, the output of UV light decreases more rapidly than the equivalent "white light tubes". Therefore, just because the tube is lit and we can see light, doesn't mean to say it is still producing enough UV to attract insects.

There have also been rapid advances in devices called Light Emitting Devices (LED's). LED's were originally developed as red or green indicators, through a careful selection of the elements used in their construction. Over the years the range of LED's has been expanded to cover the whole of the visible spectrum and additionally their power levels have advanced dramatically.

Recent advances in **"white light" LED technology** have enabled efficiency levels approaching, and in some instances exceeding, those achieved by the best fluorescent tubes. When coupled to the lower voltage requirements of these devices, LED's make attractive alternatives to fluorescent tubes as a lighting source. Furthermore, the light emitting junction of an LED is much smaller than an equivalently rated fluorescent tube and the surface brightness is many times greater, making it an attractive option for many compact applications.

An obvious application for **UV LED's** is of course flying insect units and in recent years a number of companies have been tempted to produce fly control products using this technology. However, for the same reasons that constrain UV fluorescent tubes, the production of highly efficient LED UV emitters has until recently proven difficult. This has meant that the power levels of UV light emitted by individual LED's remained orders of magnitude below even the poorest of fluorescent tube.

Research at the University of Birmingham, UK, sponsored by PestWest has shown that most urban flying pest insects respond to the UV range 340-380nm. The majority of UV LEDS, currently available, have their centre spectrum output well above this, typically around 400nm.

The relatively high cost of LED's compared to UV tubes and factors such as rapid fall of output against time, their susceptibility to high operating temperatures, electrostatic discharge etc. has kept responsible manufacturers from going down this route until better devices became available.

Undoubtedly the situation will change as technology advances and PestWest has actively been and continues to conduct research in the potential of LED technology for use in flytraps.

Flying insect control in potentially explosive atmosphere

Areas where flammable substances like gas, vapour or dust are likely to mix with air are considered 'potentially explosive atmospheres'. Should there be a need for flying insect control units in such an environment, only the use of explosion-proof UV-flytraps approved under the ATEX directive is permitted. The ATEX directives 99/92/EC and 94/9/EC describe what equipment and work environment are allowed with a potentially explosive atmosphere. Under the ATEX directive potentially explosive atmospheres are classified into zones, depending on the explosive substance present and the likelihood of an explosive atmosphere occurring.

The Chameleon EXG by PestWest Electronics has been specifically designed for use in potentially explosive atmospheres e.g. in sugar refineries, distilleries, dairies and flour mills as well as in the petrochemical and pharmaceutical industries. The unit has been tested according to the latest ATEX Directives 99/92/EC and 94/9/EC and is suitable for use in Zones 22 and 21 (atmospheres with combustible dust or powder) as well as Zones 2 and 1 (atmospheres with flammable gases or vapours). Furthermore, the EXG also has an IP66 rating. These high specifications of the Chameleon EXG ensure that the unit complies with the highest possible standards for explosion-proof fly traps in the market.

The Chameleon EXG has an anti-corrosive construction including 304 brushed stainless steel, marine grade aluminium alloy and a flameproof glass enclosure that prevents the transfer of a potential explosion to the surrounding area. It is fitted with two powerful 18 watt shatterproof PestWest Quantum BL UV-tubes enclosed in an ATEX certified flameproof enclosure which consists of a special high-quality glass with excellent UV light transmission. As a result the UV-A emission of the tubes is not compromised which guarantees the maximum attraction of flying insects which are caught on two large adhesive boards. The position of the adhesive board holders is adjustable which allows for installation of the EXG in confined spaces as well as the flexibility to move the boards closer to the light source to increase the catch-rate.

Maintenance of the Chameleon EXG is simple and safe as the unit is fitted with an 'Automatic switch off on opening" mechanism cutting power to the unit on opening.

Specification:

ATEX Marking : **EX II 2G/D**

Ex	II	2	G	D
Specific marking of explosive protection	Equipment Group II: for all industrial atmospheres other than underground mines	Equipment Category 2 : explosive atmospheres are likely to occur occasionally	Gas atmospheres	Dust atmospheres

Certification Code : Eexde IIC T6

E	Ex	de	IIC	T6
E prefix denotes compliance with Cenelec standards	Explosion protected equipment	Protection Concept d=flameproof: contain the explosion e= increased safety: no arcs, sparks or hot surfaces	Explosion group/ gas group : highly explosive atmosphere	Temperature class T6 = highest class, equipment surface temperature will not exceed 85C°

IP66

IP	6	6
Ingress Protection	First Digit - Solids 6 – Totally protected against dust	Second Digit - Fluids 6 – protected against strong jets of water

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