

In defence of the fruit fly

Generally, the term 'you have a mind like a fruit fly' is intended to insult. But funnily - quite helpful little chaps in all sorts of ways. If you're wondering why, you may be surprised (dismayed) to know that humans share 60% of the same DNA - a fact that has put fruit flies at the forefront of groundbreaking research.



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Of course, fruit flies are also able to inflict immense damage to a wide range of fruit and vegetables, significantly impacting farming, food production and market economics. And they are well-designed to do their job. While capable of flying only short distances, they have the annoying ability to be safely transported long distances. The havoc they can wreak can run to millions – not only in financial terms but also with regard to livelihoods that are lost as a result of an infestation in valuable produce.

How the fruit fly harms us

The fruit fly loves fruit but also enjoys vegetables. Apples, mangoes, tomatoes, grapes, pears, bananas, etc., are all on the menu. The female fly can lay up to 400 eggs in her lifetime. She begins by attacking ripening fruit in order to lay her eggs, burrowing in. Once the maggots hatch, the fruit begins to rot from the inside, eventually falling to the ground, destroying edibility and any commercial value.

The cost of fruit fly damage in the Western Cape alone can run to R20m per year. In addition, a ban on exports as a result of fruit fly infestation can further devastate the financial welfare of local communities and businesses that depend on the fruit and vegetable industry.

Recently, Kenya has started commercial production of a protein bait to clear pests that attack fruits and vegetables. In the past, farmers had to rely on synthetic pesticides to which the flies eventually become immune, and which also have the tendency to eliminate the helpful insects that contribute to pest control naturally.

Kenya's new toxicant-laced bait is particularly good at attracting and destroying fruit flies. Ecologically-friendly, its cost is 70% lower than that of similar products.

Removing the fruit fly from the equation means greater security of crop production and, as a result, Africa stands to significantly increase its competitiveness across both local and international markets.

How the fruit fly helps us

It was Groucho Marx who made the pertinent and valuable observation: "Time flies like an arrow, but fruit flies like a banana."

The humble fruit fly helps us to understand a range of human issues with regard to genetics, sleep and certain diseases. For instance, the way our 24-hour body clock works also works for fruit flies – and about 75% of known human disease genes have a match in fruit flies, including autism, Down's syndrome, diabetes, Alzheimer's, and various cancers.

Their myriad usefulness lies in that they are a really cheap, quick way of studying the far more complex biological issues in humans. Fruit flies have a life cycle of two weeks, can be housed in tiny tubes, and survive on a simple diet of cornmeal, yeast and sugar. There's a fresh generation every two weeks, which makes them useful for studying gene mutation. While humans have 23 pairs of chromosomes, the fruit fly has only four, making it easier to study and monitor the interaction of genes. As against mice, which may take up to a year, fruit flies can churn out experimental answers in three weeks.

Alzheimers: Like humans, fruit flies have chromosomes that are inherited. The fruit fly has provided a greater understanding of nerve cell extensions known as axons. These degenerate as people age, but more quickly in the case of Alzheimer's. Studying the axon development in fruit flies helps to gain insight into the causes of neurodegenerative disease.

Cancer: "There is a biological process known as cell death which occurs in all living creatures – from worms to humans," says professor Pascal Meier, Institute of Cancer Research. This key aspect was discovered first in fruit flies. When a cell becomes damaged, it is killed off by a process known as apoptosis, allowing organs to remain healthy. In cancers, however, this natural death process is not triggered, allowing tumours to spread. From fruit fly research, we know that certain inhibitors of cell deaths are involved. Preventing these inhibitors from functioning is, therefore, a key factor in regaining control of cells and preventing cancer.

Insulin: Fruit flies produce a substance similar to insulin. And when they lose it, they respond with elevated blood sugar levels like those seen in diabetics. In this way, researchers can study possible treatments using the fly as a reactive model.

Sleep: The fruit fly (*Drosophila*) exhibits all the behaviours that we evince with regard to sleep. You may be surprised to know that flies go to sleep – but they do. Not only that, if a fly loses sleep on one day, it will try to make up for it the next day. Sound familiar? It makes them extremely useful models when studying the mechanisms of sleep, including how it relates to learning and memory. Interestingly enough, fruit flies can be put to sleep, and this is useful in understanding how anaesthetics affect humans.

No fly by night

At Netafim, we know that farmers are constantly seeking to apply good, sustainable farming practices. Our vision is to find solutions through innovation and technology that is durable and dependable. And it's not only about understanding the

elements, pest control and the journey to market; it's about acknowledging the importance of the interaction of nature and working continually to maintain a healthy crop against all odds – working with systems most closely aligned to the environment while doing an effective job.

The fruit fly may be useful to research into human health, but it also has the capability of ruining that health if allowed to freely compromise our food. Researching them for our health benefit makes much more sense.

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