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THE HOUSE FLIES *MUSCA DOMESTICA* AS MECHANICAL VECTOR AND ITS MANAGEMENT TO CONTROL IN QUETTA CITY, BALOCHISTAN

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Abstract
Musca domestica, commonly known as the housefly, is a major insect pest that poses significant public health risks by transmitting diseases. Its control is essential to reduce its harmful impact. Key management strategies include maintaining cleanliness through regular waste disposal, particularly of organic materials, and ensuring proper sanitation. Removing breeding grounds by eliminating standing water, food sources, and other attractants is also critical. Preventing fly entry through physical barriers like window and door screens can be effective, as well as using traps such as sticky traps, UV light traps, or bait traps to capture adult flies. Targeted use of insecticides, including residual sprays or aerosols, and biological controls like introducing natural predators or parasites, can further help control fly populations. Behavioral changes, such as reducing attractants through cultural control, and Integrated Pest Management (IPM), which combines multiple methods, are effective approaches. Additionally, proper waste management, regular cleaning of surfaces, covering food and drinks, and sealing entry points can further prevent disease spread. By applying a multi-faceted approach, we can effectively manage Musca domestica populations, lowering the risk of disease transmission and enhancing public health and safety.
Keywords: *Control, House fly, Musca Domestica, Papulation*

INTRODUCTION

The binomial name of the house file is *Musca domestica*, derivative from the family *Muscidae* and order Diptera. House flies are native to the temperate Eastern Hemisphere. A common insect house fly found worldwide, especially prevalent in human settlement areas (1). It is a ubiquitous endophilic and cosmopolitan pest found in all human settlements. The flies thrive in regions where people have settled and on decomposing carbon-based materials like human waste, dung, natural food sources, and shrubberies.

Manure and other organic waste products produced by human or agricultural activity provide superior nutrition and a breeding ground for house flies. The ideal temperature range for houseflies to thrive and flourish is between 10°C to 26°C, while their latent phase occurs below 7. 2°C.The summer months see a lot of activity from *Musca domestica,* but it has been personally noticed that these flies are still active in the winter near hospitals because of the availability of breeding locations, materials, and favorable temperatures (2).

Every stage of the house fly life cycle, including larvae, pupae, and adults, was frequently contaminated with a wide variety of microbes. But because adult house flies are so mobile, they may contaminate their bodies and regurgitate crop contents, which transfer bacteria from septic environments to other substrates, legs, and wings. Depending on their habitat and geographic region, the bacteria on the inside and outside of house flies vary widely. The house fly population is rapidly increasing due to the availability of adequate habitat (3).

MORPHOLOGY

The mature fly has four dark stripes on its thorax and measures ¼ inch in length. There is only one set of membrane wings on a housefly. It has five segmented, dull grey tarsi and conspicuous compound crimson eyes. There are yellowish sides on the basal part of its abdomen. Its mouthparts, called proboscis, are spongy kind. Its function is like a sponge to absorb liquid food and have neither teeth nor sting (4). When the probiscis is not functioning, it is present all the way down to the head capsule.

There are two oval-shaped, fleshy labella at the end of the proboscis. Its mouthparts are of the sponging variety because they absorb liquid food like a sponge and have no fangs or sting. Flies consume a liquid food and can nevertheless consume a variety of compact foods by quickly dissolving them in their salivary gland secretions or in their harvest, or by spitting or vomiting on them. Pseudocranchiae is a type of labella, have fine channels that are used to remove fluids such as nasal discharge and broken feces. Three antennae segments make up a house fly because they are gravitationally orientated, they are difficult to see to determine a house fly's sex, numerous mechanisms are employed. The morphological difference between the eyes can be used to determine a fly's sex. Females have a bigger gap between them, called dichoptic eyes, whereas Males have compound eyes with a smaller space between them, called holoptic eyes (5).

NUTRIENT ACQUISTION STRATEGY

They consume any moist or decomposing material, but the pungent stench of pet excrement draws them in particularly. House flies, both male and female, consume all forms of human food as well as perspiration, excrement, trash, and animal manure. In order to make solid food easier to dissolve before consumption, house flies suck up liquid food and moisten solid food with saliva. Its food must include Water is an essential component of its nutrition because it cannot survive for longer than 48 hours without it. House flies can also feed on milk, sugar, beef broth, and a variety of other items found in regions where people live. House flies need to eat twice or three times a day (4).

THERMAL IMPACT ON HOUSE FLY

Ubiquitous houses fly multicultural and endophilic pest found in all areas with human populations. Although they are more prevalent in the summer, some adults in temperate regions may survive the winter. For house flies, the ideal temperature range for growth and development is 10°C to 26°C (2). House flies are prohibited from inhabiting polar locations due to their sustained freezing temperatures and greater elevations. *Musca domestica* flies mostly lay their eggs in fresh manure and are not hematophagous or bloodsuckers (6).

BREEDING AND LIFE CYCLE UNDERSTANDING HOUSE FLY INFESTATION

A housefly's clutch size ranges from 75 to 150 eggs every hatch, which it can lay four to six times. The house fly belongs to the superorder Endopterygota because it experiences holometabolous metamorphosis, meaning it evolves through all stages of insect life, including egg, larva, pupa, and adult. This is because the house fly's wings form internally during the pupal stage. Its capacity to survive primarily depends on the availability of sufficient food at a suitable temperature. The purpose of the cracks is to keep the eggs from drying out. Houseflies mostly reproduce in trash and dirty food (7).

Tiny white, 1-2 mm-long eggs develop into larvae in a day. Larvae, often known as maggots, are whitish-colored, 3-5 mm long, and without legs. They consume dead or decomposing organic matter, such as waste or feces. It attained 8 mm in length and a brown color after 14 to 36 hours. Eventually, it transformed into a pupa, which takes five days to mature into an adult housefly. Houseflies need two to three weeks to complete their life cycle, hence they like warm climates. Because of its high rate of development and prolific egg production, it generates a big population quickly (6).

Adult housefly has a life span from 15 to 30 days. In a year, it may produce 10-12 generations in temperate region. But in contrast, they may produce 4-6 generations in cold regions where its breeding is limited to warmer months (6). The day of their development, males are ready to mate but mating occurs when female is three days old (8). After few days of copulation, oviposition takes place. Maggots are

without legs, 3-9 mm long, whitish in color and saprophagous in nature as they feed on dead and decaying organic material, such as garbage or feces (6).

BIOME

House fly Live in close quarters with domestic animals and people, *Musca domestica* is frequently encountered in settings associated with human activity, including restaurants, hospitals, food centers, food marketplaces, fish marketplaces, and slaughterhouse. It has been reported that both larval and mature house flies have been recorded at fish markets, poultry operations, trash, and slaughterhouses and human bodies in the oviposition stage (9).

DISEASE TRANSMISSION AND RISKS FACTORS OF *MUSCA DOMESTICA*

The house fly develops without organism or amplification within the vector, the diseases spread from one vertebrate host to another. By using houseflies, over 100 pathogens can infect humans and animals and cause illnesses. Infantile diarrhea, anthrax, cholera, ophthalmia, bacillary dysentery, typhoid, and tuberculosis were spread by these pathogens. House flies were also responsible for the transmission of numerous helminthic eggs, including those from E. vermicularis, S. stercoralis, T. trichiura and T. caracanis, Trichomonas, Diphyllobothriam, hymenolepis, taenia, and Dipylidium species. Additionally, Giardia lamblia and E. histolytica protozoa cysts and trophozoites may be transmitted by it. (20). A few germs that houseflies carry include *Salmonella, Shigella species, E. Coli,* and viral diseases through their excreta or vomits. It serves as a mechanical vector for the spread of infections, just as tainted water, unclean food handlers, and carriers who are recovering from an illness (10).

There are three ways that diseases might spread. Initially, infections might adhere to certain bodily areas, particularly the legs and proboscis. Second, because their technique of eating involves sucking the meal after it has liquified in regurgitated saliva, germs are deposited along the vomit drop onto the food. Finally, after making their way through the digestive system, pathogens end up in their excrement (11).

HOUSE FLIES IMPACT IN HUMAN AND ANIMAL SPHERES

The house fly is a disease-carrying insect that spreads to human dwellings and activities from poultry, animals, and people. They are the greatest carriers of animal sickness that spreads infections because they frequently migrate between dietary supplies from animals and people and squalor. There have been reports of over a hundred distinct diseases on and in house.

It is a contributing factor to the spread a number of illnesses in people, including typhoid, dysentery, diphtheria, leprosy, TB, and intestinal parasites; illnesses affecting poultry and cattle include anthrax and chicken cholera. Additionally, they serve as intermediate hosts and vectors for some poultry cestodes and horse nematodes (10).

IMPACT OF MICROBIOTA ON HOUSE FLIES

The flies' microbiota can provide additional nutrition, provide resistance to hazardous organisms during colonization, improve tolerance to ecological fluctuations, and encourage the development and maturity of the host immune system, among other methods to support the physiology of the host (15). The variances in phenotypes, such as vector competency, have been suggested to be explained by changes in variances in the human microbiome. However, very little research has examined variations in the microbiota over time and space among individuals in natural environments. Additionally, research on *M. domestica's* microbiome sheds light on the house fly's interaction with pathogenic substances and capacity for disease transmission (16).

HOUSE FLY'S ROLE IN FOOD POISONING

The enterotoxin produced by *S. aureus* is the primary cause of *Staphylococcal* food poisoning and is a major contributor to food borne illness worldwide. The main sources of *staphylococcal* contamination that house flies establish are dust, soil excretory, human waste products and animals (17).

RESIDENTIAL FLIES AS ENVIRONMENTAL VECTORS

The isolation of harmful bacteria from house fly larvae that have been collected from various habitats. The Yersinia pseudo tuberculosis and Ochrobactrum, two animal diseases, were cut off from house fly larvae obtained from corn silage and turkey bedding. anthropic were isolated from their guts. According to many studies, flies are particularly significant (2–6) because they are known to transport germs that are resistant to drugs, including diseases that affect humans, in hospital settings (6). Additionally, a recent study revealed that bacteria from particular clonal lineages that are similar to those found in animal dung can be multidrug resistant in fish (2).

GENE ASSOCIATED WITH ANTIMICROBIAL RESISTANCE

An antimicrobial resistance has grown to be a major global problem in recent years, and novel resistance mechanisms inside microorganisms are being found and evolving on a daily basis. The most often used antibiotics for *staphylococcal* infections in humans and animals are those belonging to the β-lactamase group; nevertheless, treating these infections is getting more and harder because of the high level of resistance to these and other antibiotics. Currently known as a "superbug," methicillin-resistant S. aureus (MRSA) is resistant to practically all antibiotics (18).

Animals can spread genes linked to antibiotic resistance through houseflies. Antibiotic-resistant bacteria are easily acquired by houseflies and can spread to humans and other animals (19). Numerous investigations have been conducted recently to investigate the function of houseflies in connection with the spread of antibiotic resistance (20).

Because the weather in Bangladesh creates ideal circumstances for their existence, houseflies are a prevalent insect there. Bangladesh has carried out a number of investigations on the isolation and antibiogram pattern of bacteria from flies. On the other hand, not much is known about the existence of antibiotic resistance genes in Bangladeshi housefly-carried bacteria. The purpose of this study was to identify antibiotic-resistant bacteria and the genes that cause them from houseflies living in Bangladesh's Mymensingh city (21).

HOUSE FLY INVOLUNTARY SPREAD ZOONOTIC FOOD BORNE PATHOGEN

A growing number of public health experts are worried about insects connected to animal agriculture. as a result of ongoing urban growth into areas allocated for agriculture. These flies have the potential propagate food-borne diseases that are zoonotic (22). In Japan the house flies (*Musca domestica*) have been linked to the transmission of O157:H7 *Escherichia coli* from reservoir animals to humans and additional faunas (23). It was discovered that houseflies gathered from restaurant trash had Salmonella spp (24). The houseflies in cattle farms contribute to the spread of this food-borne infection when E. Coli O157:H7 was found in the intestinal tracts of house fly in a cow feedlot from forage bunk sand calf feed storage. The authors of that study also demonstrated that fecal coliforms were present in the guts of 95% of the houses investigated, with levels oscillating from 3.0 101 to 3.0 106 CFU/℃y. The high concentration of fecal coliforms in homes suggests that other zoonotic infections may be present. *E. Coli* O157:H7 is spread by vectors through contaminated feed and water, as well as by direct animal contact, to the cow digestive tract (25).

HOUSE FLY AS VECTOR FOR PARASITIC DISEASE

The numerous intestinal worms, including tapeworms, hook worms, and Ascaris species, are carried by house flies in the form of eggs and cysts. Given that this species is drawn to wounds and skin illnesses.It has been demonstrated that *M. Domestica* is involved in the transmission of epidemic conjunctivitis and trachoma (although *M. Sorbensis* is more significant in this case). The housefly is also implicated in the infection of these areas.

OVERSIDE STRATEGY FOR HOUSE FLY

Fly Regulations from the health department may encourage the management of house flies, but unhappy clients are the real force behind this. Brand reputation protection requires brand control because a single social media post has the potential to impact a firm. The companies are extremely motivated to avoid bad publicity since it can have a detrimental effect on their brand long after the issue has been fixed or even if they are proven not a terror. More than half of the market for insect light traps (ILTs) is made up of food processing businesses, restaurants, FDA-inspected institutions, pharmaceutical and biotech companies and plants. Urban housekeeping in commercial accounts, control is valued at more than USD 1.87 billion yearly.

The majority of pest treatment businesses rent out the traps and demand a service fee each month fee that includes cleaning the device, changing the adhesive boards, confirming that it is operating, and replacing the bulb every six months. Given that the top 10 marketplaces employ well over a million light traps, this entails a significant financial investment. Even while residential accounts make up a sizeable share of the fly control business, its yearly economic value cannot be determined with any degree of accuracy. Despite the fact that the yearly cost of home damage and control in U. S Agriculture was estimated to be 450 million US $ (13). Nuisance lawsuits have the potential to significantly raise that amount. The USD 50 million settlements that were reached against Smithfield foods is proof of this (29).

There are tons of advices on killing or repelling flies on the internet, most of which have no scientific basis and are most definitely not backed by research findings. A lot of these involve using everyday items that can be found in any household such as soaps, apple cider vinegar, herbal remedies etc. The argument goes that fish dislike strong smells, such those of essential oils and will be repulsed by them; however there is no proof that any scent will prevent a hungry fish from going for its favorite food. The majority of natural substances marketed for pest management have not their efficacy or safety thoroughly examined by science (30).

INTEGRATED PEST MANAGEMENT (IPM), A HOLISTIC APPROACH TO HOUSE FLY CONTROL

The worries raised by international trade over shipments from everywhere and recipients' reluctance to accept infected goods, production and giving out accommodations need to be open to flying insects, because U.S. FDA regulations forbid their usage. In facilities that prepare food and biotech products, ILTs are widely used there. When flies acquire resistance to traditional pesticides, new changes are needed, and house flies are notorious for swiftly developing pesticide resistance to treatments with novel modes of action (34). The US EPA only registers a small number of chemicals to deter house flies in "sensitive sites," which include locations close to people and food.

The general public is in search of substitutes for "hard chemicals." Expanding the options available for FY IPM is advantageous for several reasons. Understanding the biology and behavior of the pest is necessary to choose the most effective suppression strategy. For example, nematodes don't work well in highly alkaline settings. There are incompatibilities between various sections of any suppressor. For example, since parasitoids are often more vulnerable to pesticides than the host, employing them prevents biological control with parasitoids. Since adult house flies and pesticides are both undesirable in sensitive areas, alternative controls are needed. circumstances (like hospitals and facilities that handle food). Some methods for managing flies include sanitation, source reduction, interior control, and exclusion (35).

HOUSE FLY PREVENTION SEALING ENTRY POINTS AND EXCLUSION METHOD

The management's first line of defense of houses is prohibiting since constructions. Exclusion from buildings is crucial for public health, but it's also crucial in shops, houses food markets or medical services. Elimination from buildings that hold trash or polluted hospital waste is also crucial. Numerous methods that are widely used but have not undergone scientific evaluation were created by laypeople.

AIR CURTAINS TRAPPING AND ELIMINATION EFFECTIVE HOUSEFLY CONTROL OF *MUSCA DOMESTICA*

The systems of Air-Handling and Fans Air hangings are created by horizontally positioned cylinder-shaped fans above entrances, which create an air curtain with sufficient power (velocity) to keep insects out. House flies may be seen hovering about the margins of the air curtain, less than (91cm) centimeters the ground, when the air curtain is in operation, looking for a chance to enter. It has been shown that air traveling at 8 to 9.1 meters per seconds.91 centimeters above the ground offers 80% house fly exclusion.

The air exiting the fan must be flowing at a significantly greater velocity in order to reach the appropriate velocity at knee level. Overhead air curtains are not widely used because many individuals detest the intense velocity at the level of the head and shoulders. It was demonstrated that air curtain units positioned vertically on both sides of 91-cm-wide doors and blowing across them could effectively control mean air velocities as low as 4 m/s in a test facility. The entryway may prevent the ingress of 98 to 100% of the houseflies (7). Fly congregation areas can be kept out of by using fans positioned above them or blown across them. The best method to figure out the required airspeed for a given circumstance is to experiment with different speeds as many fans have basic on and off switches that might have several settings. Since overhead fans are immobile, fan height determines the effective fan speed. Rheostats make figuring out the right speed easier. With portable fans, determining the most efficient speed also involves repositioning the fan to the preferred spot.

The majority of commercial buildings feature that regulate the temperature air handling systems and air flow within, despite their total barrier from the external environment. These devices have to be configured to produce a positive airflow so that tiny, large amounts of air exit the buildings, particularly when doors are opened. When a door is opened, insects may be drawn inside by a negative air flow. This is especially crucial for big, self-opening doors that stay open for extended periods of time when customers are using them (35).

CULTURAL CONTROL MODIFYING HUMAN BEHAVIOR TO PREVENT INFESTATION

The using of mesh screen on windows and doors, adjusting the exhaust above them, and installing doors with automatic opening and closing mechanisms. Houseflies are kept out of indoor spaces by using odor-baited traps and light traps that are electrocuted. Furthermore, the death of helpful insects also occurs with the light- and odor-baited traps. The most effective cultural strategy is to properly dispose of any organic debris, such as the Issa Bulletin of the National Research Center, that serves as a breeding ground for housefly eggs.

The 50% of houseflies in metropolitan areas are caused by improper disposal of waste from homes, hospitals and markets. The waste containers should be disposed of on a regular basis. Every week, the waste products at the garbage disposal locations must be enclosed with a film of approximately 15 cm of earth or any additional appropriate inorganic substance (13).

INSECTICITE AND REPELLENT CHEMICAL CONTROL OF MUSCA DOMESTICA

The numerous pesticide sprays with a pre-hyoid foundation have the ability to reduce housefly populations in locations where people live. Additionally, it was noted that house flies shown resistance to pesticides such as DDT, carbamate, pyrethroid, and organophosphates. Additionally, resistance to growth regulators such as cyromazine and diflubenzuron was also noted. Although the initial use of insecticides to control housefly populations is highly effective, houseflies can quickly develop resistance to persistent insecticides due to either their inherent behavioral adaptations or the enzymes in their bodies that may break down the pesticides. Furthermore, cross-resistance similar to juvenile hormone mimics has also been reported.

The resistance and tolerance of houseflies to pesticide usage, rising pesticide costs, and the toxicity level of pesticides for creatures other than houseflies are some of the reasons that contribute to the reduced effectiveness of pesticide use. Moreover, it seems difficult to find new pesticides, and developing them comes at a great expense (13).

LARVICIDES (IGRS)

The only purpose of larvicides and insect growth regulators (IGRs) is to control house flies in their immature stages. Fly larvae frequently hatch in companion animals or livestock. Growth regulator, Granular form Remox, 2-N-cyclopropyl-1,3,5-triazine-2,4,6-triamine, is cyromazine.) is used to break down residues from hay. This effectively decreased the number of larvae of the *Stemoxys calcitrans* L., stable fly, that were developing inside. Additionally, cyromazine is used in chicken feed, Neporex (granular) works better against house fly larvae than Larvadex because it is applied directly to the habitat that has been contaminated with maggots at a higher concentration (38).

ADULTICIDES

Adulticides can be used as baits, sprays, or fogs. Because they are so simple to apply and have been so successful in the past, all adulticide applications have been overused to control house flies. This perspective has changed due to rising expenses and insecticide-resistant house flies. To extend product life, effective products should be utilized carefully.

SPRAYS

Spray application products are designed as ready-to-use liquids or aerosols, powders that need to be combined with water, or liquids or emulsions that need to be diluted in water. Liquid pesticides, with the exception of the majority of aerosols, are meant to be administered as surface residuals to kill flies through touch. When applied to nonporous surfaces like glass, residuals may continue to be effective for a few days to a few weeks, particularly when microencapsulated formulations are used. In the urban periphery, surface residuals may occasionally be required, but they should only be used in cases where adult fly populations are exceptionally high, and they are known to be congregating in specific areas.

FOGS

The objective of fogs is to kill flies instantly, and foggers or spray nozzles constructed specifically for this purpose produce the right droplet sizes. Fogging chemicals are often not intended to leave residues behind. In animal facilities, automated overhead fogging systems have been employed; nonetheless, natural pyrethrins remain the preferred chemical. Air movement can change the patterns of fog, and under windy situations, fog may not always reach the appropriate places.

RESISTANCE MANAGEMENT DEALING WITH INSECTICIDE-RESISTANT HOUSEFLIES

The emergence of resistance in houseflies to two commercial pesticides, permithrin and 2,2-dicholovinyl dimethyl phosphate (DDVP), in different research, twelve different kinds of pesticides were sprayed on manure and it was discovered that the insecticides had minimal effect on house fly control and did not kill fly predator mites. The house fly larvae population rose dramatically as a result of the insecticide's higher dosage killing mites. These substances are not good for the environment. Researchers worked to create more environmentally friendly chemicals and more effective fly pesticides (36).

THE PLANT EXTRACT USE TO CONTROL HOUSE FLY

The compounds derived from plants are thought to be more environmentally friendly and effective pesticide. The neem is a useful pesticide. Another effective repellant is the neem plant. It also produced the same outcomes as a pesticide, but more importantly, it was shown to be less hazardous and ecologically benign. The fly control with the employed wood vinegar is effective. He found that the feeding approach is more effective than the contact method, and that the death rate of the flies is closely correlated with the dosage concentration and exposure duration to wood vinegar. The oil from the basil plant is an effective and affordable way (37).

BIOLOGICAL CONTROL (NATURAL ENEMIES OF HOUSEFLY)

To utilize their natural enemies, such as parasitic wasps, fire ants, nematodes, mites, and predatory beetles (which are not hazardous to humans or animals), flies (hydrotaea aenescens wiedeman), \ and birds, can aid in reducing the number of houseflies. The MdSGHV virus, which infects flies both genders but infects more rapidly in men, is another biological control technique. The reason why females do not develop into young flies is due to the inhibition of hexamerin synthesis and yolk protein transcription. Fly infections have a reduced lifetime and worse success rate compared to healthy flies in mating. One way to control bacterial (housefly) larvae is to feed them to cattle and poultry at their breeding grounds in a way that releases exotoxin (31).

The flies' digestive tracts' acidic pH or a deficiency in endotoxin receptors, new bacterial strains have been discovered in a number of locations across the globe, including South Africa, Egypt, and Korea, to control houseflies. These strains of bacteria are used in conjunction with fungus such as E. schizophorae and Entomophthora muscae. The insects perished in 4-6 days (32). During the fall, more than 50% of houseflies in temperate zones are infected with natural epizootics. Nematodes, such as Steinernematids and Hetrohabditids, can regulate the number of houseflies; 34 recent strains of fungi have been shown to kill houseflies in less than 24 hours. When combined with soil, it produces greater effects in cow manure than in pig and poultry manure (13).

Essential oils derived from plants (the application of botanical oils, alterations in housefly behavior such as attraction, repulsiveness and toxicity upon contact with flies at various progressive phases have been documented). For adult houseflies, essential oils with certain concentrations menthol, limonene, and pulegone show effective toxicity of 1,8-cinesle. Because of their octopaminergic activity and inhibition of acetyl cholinesterase, essential oils have fumigant insecticide properties. They can be used on insects that are predators, parasites, or parasitoid houseflies (many housefly eggs and larvae are consumed by histoid beetles and macrochelid mites). For many years, the more effective biological control agent for housefly populations has been a parasitic pteromalid that consumes houseflies in their pupal stage (33).

ECOFRIENDLY APPROACHES TO FLY CONTROL

The neem was the main ingredient used to keep pests and insects under control. Neem cake has been shown through experimental research to be the most effective pesticide going forward. Over the course of a year, the growth of *Musca domestica* infestations was assessed at a plant that treated urban solid undifferentiated waste and control measures were put in place. Compost is created during garbage treatment and is used to enhance agricultural land. The plant is split up into four covered, closed sheds and is located in an urban area of Milan. There are two distinct waste treatment methods that are both based on aerobic biodegradation. One method promotes the growth and dissemination of *musca domestica*.It involves piling sorted debris for maturation.

SURVEILLANCE AND MONITORING TACKING HOUSE FLY POPULATION

In order to killing or catching flies that have been drawn to inside openings since within the building, window traps and window stickers are placed in the windows. It's crucial to read the tag to determine exactly what is being purchased because the terms "trap" and "sticker" are frequently used interchangeably. Contrary to their name, the majority of these devices use sticky, non-toxic surfaces to catch insects. To keep caught flies hidden, the sticky surface is occasionally put directly to the windowpane and hidden inside a decorative housing that is open at the top.

It is also possible to apply the adhesive surface directly to the windowpane, leaving the trapped flies clearly visible, sans housing. Certain gadgets have a toxicant-coated surface in place of a sticky one. Current toxicants, like acetamiprid, essential be eaten by other insects, flies and sugar may be added to encourage eating. The surface is toxicant-coated often sprayed straight to the window, with no housing present. These gadgets don't attract flies since they're not sticky. On the other hand, dead flies that have consumed the bait fall to the windowsill and gather there. The Cluster Buster is a trap with an entirely unique design.

It functions essentially as a reservoir filled with finely ground eggshell powder. The trap position on or above the sill, low in the window, the reservoir's top aperture aligns flush with the windowpane. After

exhausting themselves soaring up and down the glass panes, flies above the trap often fall through the slit, sink into the trap, and become suffocated by the powdered eggshells.

The window is, despite many assertions to the contrary, the standard attractant. It has to be seen what the relative effectiveness of these devices is after the fly get to the window (38).

STICKY TRAPS

Many sticky ribbons and tubes are available for capturing flies. Big, sticky ribbons and traps, the majority of which are too big for the urban setting, are made for agricultural usage. These gadgets have the advantages of being low cost, simple to use, and pesticide-free. They are intended to be positioned high, wherever they may hang freely, and are only intended for indoor (under a roof) use. It is common for flies to perch on things that are suspended vertically. The hanging gadgets in visible nature of the trapped flies are a drawback of these gadgets.

The significance of this may vary based on the location of the device deployment. It has been suggested that flies caught on these apparatuses draw in more flies. As a result, the surfaces of some kinds of sticky tubes are printed with black dots or realistic fly imagery. These have been utilized in the vicinity of food manufacturing centers, but not immediately above them. Some of these devices may melt and leak adhesive if they are positioned too near a heat source (39).

BAGS OF WATER WITH COINS

The intriguing development in the usage of transparent plastic bags filled with water with or without coins for fly repellent. At first, water-only bags were utilized. Where Ziplock bags. comparable sacks were wrapped with rope and hung beneath the animal's or a pole shed's eaves shelter instead. Bags eventually needed to contain two or three cents, then a nickel note. Approximately few supporters insisted that the bottoms of the bags have to be curled rather than flat. Others argued that the bag's bottom needed to be flat. Some people insisted that the bag's bottom be vertical to the earth, whereas others suggested hanging the bag top turn and bottom is angled toward the earth.

The water bags are suspended from the top of open windows. For instance, a bag might be left right on the service tables in a restaurant. The local currency must be a good replacement for US pennies and nickels, as it is reasonable to imagine that they may be hard to come by in some other nations. If the development of water bags started in the United States, it is impossible to determine how far these bags have traveled. The furthest recorded sighting in Petra City. Where an outdoor café was surrounded by ficus trees (*Ficus benjamina*) with water bags hung in them. House flies are repelled by bags of water, there are numerous hypotheses explaining why. According to one explanation, flies become scared away when they see their reflection in the bags.

The way light is reflected off the bags' surface is the subject of another theory, discovered that while pure bags with plain water repelled more than thirty percent of the house flies tested, clear bags with the golden water drew house flies. To validate the ideas that try to elucidate the functions of the water bags and determine whether a house fly behavior when exposed to water bags matches the theories, more research is required. According to one explanation, flies become scared away when they see their reflection in the bags. The way light is reflected off the bags' surface is the subject of another theory. The bags with plain water repelled more than thirty percent of the house flies tested yellow water in clear bags drew house flies (38).

SUSTAINABLE CONTROL METHODS ENVIROMENTALLY FRIENDLY HOUSE FLY MANAGEMENT

The fly swatter is an apparatus designed to killing tool that is so commonplace that people frequently overlook it. Empty appropriate pesticide's aerosol cans an attempt to kill a fly they detect indoors. The fly can also be eliminated using a fly swatter along with a tiny dexterity. The 20th century saw the development of fly swatters and has progressed from metal window shelter squares to plastic mesh patterns. Even while it may not appear very attractive to have a fly flyswat on your counter at work, having

one close by but hidden can allow you to quickly and easily kill flies without using pesticides when needed (40, 41).

AEROSOLS WITH A TIME RELEASE

In lavatories and other comparable places only commercial urban fly control programs may utilize aerosol pesticides, often pyrethrins, administered through time-released, battery-powered appliances used in food preparation and serving facilities, lavatories, also additional spaces where flies could cluster. Certain aerosol devices—including those that release perfumes and poisons have occasionally been restricted or taken out in response to complaints. The variance resistance in house fly across the country to pyrethroids and other approved active ingredients is one factor to take into account when thinking about using time-released aerosol pesticides.

House flies from nine distinct states and ten collections were treated with pyrethrins and piperonyl butoxide. The survival rate varied from 2.9 to 76%. One advantage of pyrethrins is that their residues are minimal; yet, for an insect to be impacted, it has to be in close proximity to the aerosol dispenser. There are many full airs changes every hour in many business buildings (42).

CONCLUSION

In all habitats, house flies are a common insect that are widely distributed in agricultural settings. They can therefore easily and frequently come into contact with the bodies of animals, which can be irritating and occasionally distressing factor. Effective control of houseflies as vectors requires a multifaceted approach that integrates sanitation, exclusion, biological control, chemical control, trap and bait methods, and cultural Practices. By implementing these measures comprehensively and consistently, the risks associated with housefly-borne diseases can be minimized, contributing to healthier environments and communities.

In this work, we demonstrated that the hypothesis that flies that have their habitat near animal production are more likely to transmit foodborne pathogens and potential diseases as well as certain virulence factors, and the presence of domestic animals, a kitchen, food, and gardens increases the risk. It is vitally important to limit fly breeding by using appropriate sanitation practices. It is obvious that flies will continue to multiply and spread from nearby locations in the absence of appropriate sanitation practices undermining any control efforts. The population of flies will decrease as a result of good cleanliness. Reducing the number of household flies in agricultural settings through effective biosecurity measures could lessen animal suffering and stop the spread of disease of possibly harmful, antibiotic-resistant bacteria.

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