



# Myiasis, an Overlooked Disorder in Livestock and Poultry, Mostly Caused by the Old World Screw-worm Fly, *Chrysomya bezziana*: An Analytical Review from an Indian Perspective

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10.18805/BKAP900

## ABSTRACT

Myiasis or flystrike is the infestation of live tissues of hosts by larvae of Dipteran flies. The flies responsible for this condition are referred to as blow flies or screw worm flies. This phenomena is distributed worldwide, especially in poor socio-economic regions of tropical and subtropical countries. The family calliphoridae (Diptera) is primarily known for its synanthropic, necrophagous and myiasis-causing species. *Chrysomya bezziana*, the old world Screw worm fly, is the commonest calliphorid fly, the larvae of which is responsible for causing myiasis in livestock and poultry in India. The principal hosts of *C. bezziana* are large domesticated animals and native wildlife and occasionally humans. In animals, it causes morbidity and in extreme cases, death. *C. bezziana*, is one of the most important myiasis-causing flies that parasitize warm-blooded animals in the Eastern Hemisphere. These flies are also forensically significant. The review tries to put light on the overall impact of myiasis in livestock and poultry with an emphasis on the Indian scenario. Extensive review of literature was carried out with the help of websites viz. google scholar, academia.edu etc. and also hardcopy of various books as mentioned in the reference section were consulted. *C. bezziana*, is one of the most important myiasis-causing flies that parasitize warm-blooded animals in the eastern hemisphere. These flies are also forensically significant. The review tries to put light on the overall impact of myiasis in livestock and poultry with an emphasis on the Indian scenario.

**Key words:** Calliphoridae, *Chrysomya bezziana*, Myiasis.

Flies have been the intimate companions of man since long before the dawn of recorded history which are insects belonging to the order Diptera, many species of which are capable of laying, eggs or larvae on the flesh of mammals and other animals (Scott and Littig, 1962). The order Diptera is a large order of insects that are commonly known as true flies (Francesconi and Lupi, 2012). Species of this order have only a pair of functional wings i.e. the mesothoracic pair and a pair of halteres (Soulsby, 1982). All these species have a complex life cycle with complete metamorphosis, hence, the larvae are completely different in structure and behaviour to the adults (Taylor *et al.*, 2007). Larvae of these flies of several families feed only on diseased and dead tissues or more severely, may involve in feeding living tissues of their hosts which are referred to as either bots (Grubs or warbles) or maggots. Mature bot larvae are barrel shaped and may have rows of spines on the body which in most cases are opportunistic parasites and on the contrary maggots are more elongated than bots and are narrower at the anterior than at the posterior end (Zajac and Conboy, 2012). Impressively, despite being a transmitter of several dreadful diseases, these dipterans have a diverse array of positive impacts on society as they aid in maintaining the proper balance of several terrestrial ecosystems (Bhattacharjee *et al.*, 2022).

Dipterans which are a diverse order of insect of which Calliphorids and Sarcophagids are the most ubiquitous, as several species of these families immature stages have been known to cause a deleterious condition of human

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**How to cite this article:** Bora, S. and Kakati, S. (2026). Myiasis, an Overlooked Disorder in Livestock and Poultry, Mostly Caused by the Old World Screw-worm Fly, *Chrysomya bezziana*: an Analytical Review from an Indian Perspective. *Bhartiya Krishi Anusandhan Patrika*. **41(2)**: 140-148. doi: 10.18805/BKAP900.

**Submitted:** 15-11-2025 **Accepted:** 13-05-2026 **Online:** 26-05-2026

and animal tissue, viz., collectively termed as myiasis (Chakraborty *et al.*, 2017). Diseases caused by insect larvae invading the body of animals were initially named scolechiasis without any distinction of insect species, from the historical term scolex indicating a larva (Pezzi *et al.*, 2019). The term myiasis was first coined by Hope in 1840 in a paper entitled "On insects and their larvae occasionally found in the human body" (Zumpt, 1965). The word "myiasis" has two parts: "myia" (which means fly) and "sis", which means sickness (Kadhim and Aaiz, 2025). It is a phenomenon of widespread occurrence throughout the tropical regions of the world (Singh and Singh, 2016). It is worthwhile to mention that, myiasis is a large field with

publications in many widely dispersed areas of the literature (Hall and Wall, 1995).

Myiasis carries a huge economic impact and may be ranked next to tick and mite infestations. Recognized in ancient times, flies causing myiasis are still some of the world's most devastating insects, responsible for severe losses in animal husbandry, with significant economic losses, including reduced milk production, weight and fertility issues and reduced hide quality (Francesconi and Lupi, 2012). Myiasis also has zoonotic importance that affects all vertebrates (Kadhim and Aaiz, 2025). Notably, there are no species of Diptera which are restricted to humans for their development but there are many that have a very restricted host range on animals (Hall and Wall, 1995). All the flies that act as economically important agents of veterinary myiasis are members of the superfamily Oestroidea within which superfamily there are three major families of myiasis producing flies viz. Oestridae, Calliphoridae and Sarcophagidae (Taylor *et al.*, 2007).

Dipterans affects a variety of tissues in domestic animals and man; with the tropical climate favourable to their breeding, most of the myiasis causing fly genera are prevalent in India (Singh and Singh, 2015). Numerous reports are available on incidence of myiasis in domestic animals in various parts of the world of which the earliest ones amongst domestic animals had been reported from India from 1920 to 1977 (Singh, 2020). Major W.S. Patton can be regarded as a pioneer of myiasis in India. Myiasis has a widespread incidence among domestic and wild animals all over the world especially in tropical countries like India which fulfil all the favourable conditions for the abundant growth of myiasis-causing flies (Singh and Singh, 2015). A lack of hygiene and poor socioeconomic status, in the presence of an open wound are the most important predisposing factors for human wound myiasis (Kapadiya *et al.*, 2024). It is worthwhile to mention that ignorance also plays a key role in its occurrence since people are generally unaware about the actual cause and often correlate the condition to their superstitious beliefs (Singh and Singh, 2015). Poor hygienic and sanitation conditions, rural background, emaciated condition of the animal accompanied by multiple underlying illnesses and neglect can also be regarded as major likely causes of the infection.

This paper has been envisaged to review and summarize prevalence and incidence of myiasis caused by the Old World Screwworm fly, *C. bezziana* with a special attention to the Indian perspective and the predisposing factors for the onset of the same. This review can be regarded as a preliminary basis for future research and an information guide to veterinarians, medical entomologists and wildlife biologists exploring the field of *C. bezziana*. References to the literature compiled for this review were collected from appropriate and reputed abstracts, parasitology textbooks, websites and citations in mentioned papers.

## Classification of myiasis

Myiasis can be classified on the basis of different forms as described in the following Table 1.

Myiasis may also be classified on the basis of its specificity viz. primary (specific)/obligatory, secondary (semi-specific)/facultative and tertiary/pseudomyiasis, referring to their dependency on the host and order of invasion as in the following, Table 2.

Myiasis can also be classified based on anatomical localization of the larva (or larvae) in the host, either external or internal: auricular, cutaneous, gastrointestinal, ophthalmic, oral and urogenital (Pezzi *et al.*, 2019). The majority of myiasis causing flies have short life span and most of their period is passed in the host as a larval stage which is a way of adaptation (Kour *et al.*, 2015).

## Family: Calliphoridae

Calliphoridae is a very large family of flies which includes the 'Screw-worm flies' also referred to as 'Blow flies'. These flies are widely distributed calyptate flies represented by 150 genera and 1,500 species throughout the world and in India, the family is represented by 9 subfamilies, 32 genera and 134 species (Dar and Mir, 2022). Several species of these flies in three main families (Diptera: Calliphoridae, Sarcophagidae, Muscidae) are responsible for myiasis in India (Jeyathilakan *et al.*, 2011). The Indian myiasis causers, especially the family Calliphoridae and Sarcophagidae has been poorly known as most species were described in the 19<sup>th</sup> century (Chakraborty *et al.*, 2017). The family Calliphoridae is primarily known for its synanthropic, necrophagous and myiasis-causing species (Bharti, 2023). Screw-worm flies are of medical, veterinary, sanitary, forensic and agricultural importance and are distributed in all zoo-geographical regions (Nandi, 2002) and are of great economic importance (Dar and Mir, 2022). Blow flies being ubiquitous seem to occur in almost all the available ecosystems on Earth (Bharti, 2023).

Different species of flies belonging to different families are involved in cases of myiasis, but flies belonging to family Calliphoridae and Sarcophagidae mostly cause traumatic and wound myiasis (Sinha, 2012). The house fly (*Musca domestica*) is also sometimes responsible to cause this problem. Among the blow flies, The Old World Screwworm fly; *C. bezziana*, the Greenbottle fly-*Lucilia sericata*, the Blackbottle fly-*Phormia terraenovae* and the Bluebottle fly- *Calliphora erythrocephala* are the key species responsible for the parasitic infestations by laying eggs in the wounds of livestock (Singh *et al.*, 2023). The Calliphoridae family along with three other Dipteran families viz. Sarcophagidae, muscidae and fannidae are the most important families that facilitate medico-legal investigations as the flies of these families are mostly necrophagous in nature and are known to colonize cadavers and carcasses depending on the stage of decomposition, thus following a chronological sequence

of colonization, as mentioned earlier (Bhattacharjee *et al.*, 2022). Calliphorids especially blowflies acts as important forensic indicators as they are foremost visitors of the corpse and act as silent witness after the accomplishment of crime (Babu *et al.*, 2022).

### ***Chrysomya bezziana*, the old world screw-worm fly**

*C. bezziana* Villeneuve; the old world screw-worm fly is an obligatory myiasis causing species (Francesconi and Lupi, 2012) belonging to order diptera, family calliphoridae and suborder cyclorrhapha. *C. bezziana*, one of the parasites causing myiasis, exists as an obligate ectoparasite in the animals and afflicts humans (Talari *et al.*, 2002). It is the commonest Calliphorid fly and etiologic agent the larvae of which not only involved in wounds in various animal hosts, but also invade nose, mouth, ear and orbit of humans (Chhabra and Pathak, 2009). *C. bezziana* differ from other maggot infestations by its ability to cause tissue invasion even without pre-existing necrosis (Kumar *et al.*, 2011). Myiasis due to *C. bezziana* is among the 117 OIE-listed diseases (World Organisation for Animal Health) (Zhou *et al.*, 2019). New World screwworm myiasis is caused by the larvae of *C. hominivorax* and old world screwworm myiasis by the larvae of *C. bezziana* (Fig 1) both flies are members of the subfamily chrysomyinae in the family calliphoridae (blowflies) and are obligatory parasites of warm-blooded animals (homeotherms), feeding only on living tissues during their larval stage

(CSFPH, 2025). This fly has also been reported as the agent causing urogenital myiasis, cutaneous myiasis, otomyiasis and ocular myiasis (Kumar *et al.*, 2011). Even the wounds as small as the sizes of a tick bite are reported to be sufficient to attract these flies (Singh and Singh, 2016). The mature *C. bezziana* is blue or green-blue in color and 8 to 10 mm in size, the anterior spiracle of which is dark brown and/or dark orange in colour (Talari *et al.*, 2002) that is widely distributed in tropical and subtropical countries of Africa and Asia, including Southeast Asia, India, Saudi Arabia, Indonesia, the Philippines, Papua, New Guinea and Persian Gulf (Kumar *et al.*, 2011). They lay eggs on the living tissues of domestic and wild warm-blooded animals and humans such as wounds, normal body orifices



**Fig 1:** Larvae of *C. bezziana* (Bora *et al.*, 2019).

**Table 1:** Classification of myiasis producing dipteran flies (Patton, 1920).

Types	Description	Examples
Tissue destroying forms	Larvae attack living animals secondarily, mainly breeding in the bodies of dead animals.	<i>Cochliomyia (Chrysomya) macellaria</i> , <i>Lucilia sericata</i> and species of <i>Sarcophaga</i>
Subdermal migratory forms	Species, the larvae of which are true parasites of man and animals during the greater part of their lives, living beneath the skin and in the subcutaneous tissues.	<i>Dermatobia hominis</i> , <i>Hypoderma bovis</i> and <i>Cordylobia anthropophaga</i>
Larvae infesting the intestinal and urogenital tracts	Here there are two cases viz. one case, the larvae only accidentally pass into the gastro-intestinal tract, the species concerned normally breeding outside the human body, whereas in the case of the family Oestridae mentioned, the larvae can only live in special parts of the alimentary tract.	<i>Fannia canicularis</i> and those of many species of <i>Sarcophaga</i>
Forms infesting the head passages	These are true parasites of man and animals, the larvae of which live in the nose and its accessory sinuses, the throat, etc. Here again, this group would have to include <i>C. bezziana</i> , for its larvae also live in the nose and accessory sinuses and are true human and animal parasites.	<i>C. bezziana</i>
Blood-sucking forms	Larvae are blood-suckers. Blood-sucking can, however, hardly be considered a form of myiasis	<i>Sarcophaga</i> sp.

including the eyes, ears, nose, mouth and urogenital tract (Talari *et al.*, 2002). Maggots of flesh flies (Sarcophagidae) and blue bottle flies (Calliphoridae) found on dead bodies are of forensic importance in estimation of postmortem interval (Bhuvaneshwaran *et al.*, 2025). The fly causes not only morbidity and death to animals and humans, but also economic losses in the livestock industries and also *C. bezziana* myiasis is a devastating and rapidly-progressing condition, posing a risk to public health (Zhou *et al.*, 2019). However, humans act as an accidental host. They feed on the living tissues and the wounds increase in sizes as they feed (Kumar *et al.*, 2011). Notably, flies of the genus *Chrysomyia* are composed of a group of blow flies that exhibit important roles in the decomposition ecology of the environment which are often referred to as carrion flies and recycle dead organic materials from the environment (Salem *et al.*, 2015).

### Lifecycle

The principal hosts of *C. bezziana* are large domesticated animals and native wildlife and occasionally humans. *C. bezziana* females are attracted to hosts with wounds or moist body openings, including the navel of newborn animals, where batches of up to 245 eggs are laid (Zhou *et al.*, 2019). The eggs, laid by the flies at the edge of the wound of the host, hatch after 12-18 hours and the first stage larvae, white in colour and 1.5 mm in length, will emerge from the eggs and then burrow gregariously, head

downward into flesh, wound or wet tissues in characteristic screw worm pattern and destroy the living tissues (Kumar *et al.*, 2011; Bhatia *et al.*, 2014) wherein they feed on the living tissues and the wounds increase in sizes as they feed. In about four days, the larvae moult into the second and third stages, 4-18 mm in length and after moulting through three larval instars, the mature larvae evacuate the wound after 6-7 days, drop to the ground and burrow into the soil where they form a puparium, which transforms into the adult fly around seven days later. Adults emerge subsequently, depending on ambient temperatures (Zhou *et al.*, 2019) which feed on honeydew, nectar and animal excrement in addition to decomposing corpses (Taylor *et al.*, 2007). Within a short period of time, the eggs are hatched and fly larvae (maggots) born. In optimal conditions, the entire life history of the fly from egg to adult can be completed in 8 to 10 days (Singh *et al.*, 2023). The length of the screwworm life cycle varies with the temperature *i.e.*, at the high temperatures in the tropics, it may be completed in less than three weeks, but at low temperatures, maturation can take up to 2-3 months (CFSPH, 2025). Fly populations are generally abundant during the summers, though due to the variations in climate, the period of risk can also be witnessed during winters (March to December) in certain geographical regions (Singh *et al.*, 2023). Wounds infested by screwworms often attract other female screwworms and multiple infestations are common (CFSPH, 2025). The ideal environmental conditions for their survival and activity are

**Table 2:** Classification of myiasis producing dipteran flies based on its specificity (Patton, 1920).

Type	Description	Examples
Specific myiasis-producing diptera (Obligatory myiasis)	Those diptera (primary flies) whose larvae are found only in living tissues, the flies selecting a number of tissues or organs, or one particular organ, depending on the species, in which or near which to lay their eggs or deposit their larvae.	<i>C. bezziana</i> , <i>Cordylobia anthropophaga</i> , <i>C. rodhaini</i> , <i>Wohlfahrtia magnifica</i> and all the family Oestridae.
Semi-specific myiasis-producing diptera (Facultative myiasis)	Those flies (secondary flies) which, though normally breeding in the bodies of dead animals and even in vegetable matter, will occasionally lay their eggs, or deposit their larvae, in the diseased tissues of man and animals. The female fly is in each case attracted by a foul discharge from a sore, wound or diseased organ, such as the nose or ear, or even in soiled wool.	<i>C. bezziana</i> , <i>C. megacephala</i> , <i>Lucilia sericata</i> , <i>Phormia regina</i> , <i>Sarcophaga</i> sp. etc.
Accidental myiasis-producing diptera (Pseudomyiasis)	The larvae of which occasionally find their way into the intestinal tract of man. They normally breed outside the human body in organic and vegetable matter, some of which is used as human food and people who are not particular with regard to what they eat become infested.	<i>Fannia canicularis</i> , <i>C. bezziana</i> , <i>Sarcophaga</i> sp., <i>Musca domestica</i>



temperatures ranging between 25 to 30°C (77 to 86°F) and relative humidity of 30-70%. Additionally, monsoon is the most congenial season for the breeding of these flies resulting in a highest prevalence rate during this season (Bora *et al.*, 2019) as in the Fig 2.

### Distribution

Myiasis is distributed worldwide especially in poor socio-economic regions of tropical and subtropical countries (Francesconi and Lupi, 2012). The Old World Screwworm, *C. bezziana*, is one of the most important myiasis-causing flies that parasitize warm-blooded animals in the Eastern Hemisphere (Hosni *et al.*, 2020). But they have never become permanently established in Europe, Australia, New Zealand or the Western Hemisphere (CFSPH, 2025). It is prevalent in India, Arabian Peninsula, Indonesia, Philippines, Malaysia, Sri Lanka, Africa, Bismark Archipelago, Great Britain, Brazil, Hong Kong and New Guinea (not Australia) (Nandi, 2002; Francesconi and Lupi, 2012; Singh *et al.*, 2023). The larvae of this fly causes traumatic myiasis and remains a major problem in sub-Saharan Africa and Asia (Wardhana *et al.*, 2018). Australia is the only continent with a tropical zone without a true invasion of this fly (Hosni *et al.*, 2020). However, *C. bezziana* has been inadvertently introduced into several countries in the Middle East and such an introduction is believed to pose a major economic threat to the pastoral industry of Australia (Taylor *et al.*, 2007). It is widely distributed over the tropical and subtropical parts of Ethiopian and the Oriental regions (Zumpt, 1965). Canine and feline myiasis is a widespread infection and number of cases reported all around the world (Bandara *et al.*, 2016). In the Middle East, *C. bezziana* is endemic in the Kingdom of Saudi Arabia, the United Arab Emirates, the Sultanate of Oman, Iraq, Iran and incidentally in Bahrain, Kuwait and Yemen (Hosni *et al.*, 2020). However, the Screwworms were eradicated from the United States in the 1960s through a sterile-male release program which has now been successful in removing the fly from Mexico, North and Central America, Puerto Rico, the Virgin Islands and parts of the caribbean with only occasional outbreaks still reported (Zajac and Conboy, 2012; CFSPH, 2025). They have also been absent from Chile since 1947 and are rarely found above 7,000 feet in South America, which is believed to have been possibly introduced with infested livestock of Portuguese speaking immigrants from Angola in the year 1975 (Urquhart *et al.*, 1987; CFSPH, 2025). Like many other groups of plants and animals, blow flies show a strong latitudinal gradient in their diversity, with the highest at the equator and declining towards the poles (Bharti, 2023). Recently, this fly has been expanding out of its typical range through the commercial movement of livestock and possibly also due to climate change (Hosni *et al.*, 2020).

### Indian scenario regarding the fly distribution

In India, there are reports of their prevalence in Assam, Arunachal Pradesh, Bihar and West Bengal (Nandi, 2002;

Chakraborty *et al.*, 2017; Dar and Mir, 2022). The distance a fly will travel can range from 10-20 km in tropical environments (Taylor *et al.*, 2007). Patton, way back in 1920 had suggested that in India, *C. bezziana* is the chief myiasis- producing Calliphorine and its larvae are commonly found in both men and animals. Thus, in India it can be considered as a serious pest (Bhatia *et al.*, 2014).

### Pathology

Myiasis may be asymptomatic or may result in more or less severe problems and even death due to toxemia or septicemia when larvae invade body cavities or areas that forbid their direct visual examination (Singh and Singh, 2015). There is a widespread incidence of myiasis among domestic animals throughout the world in especially in tropical countries like India which provides conducive climatic conditions for the exuberant growth of myiasis causing flies and their larvae. Infestation by *C. bezziana* causes intermittent irritation and pyrexia, followed by the production of a cavernous lesion (Taylor *et al.*, 2007). Affected animals can be first detected exhibiting signs of depression, anorexia and separation from herd mates; may be irritated and attempt to bite or rub at the struck area (Singh *et al.*, 2023). They cause lesions and make the domestic animals deficient of blood, debilitated and in severe cases may result into death, if the vital organs like brain or lungs are invaded. Infestations are very common in the navels of newborns and the vulvar and perineal regions of their dams (CFSPH, 2025). The maggots create tunnels through the thinned epidermis into the subcutis. This process gives rise to tissue pockets in the skin that may measure up to several centimetres. Once established, strikes can propagate rapidly and makes the wound vulnerable to other types of blow flies, the consequence of the amalgamation if mild can cause rapid loss of condition but in severe cases fatal. Infested wounds often have a

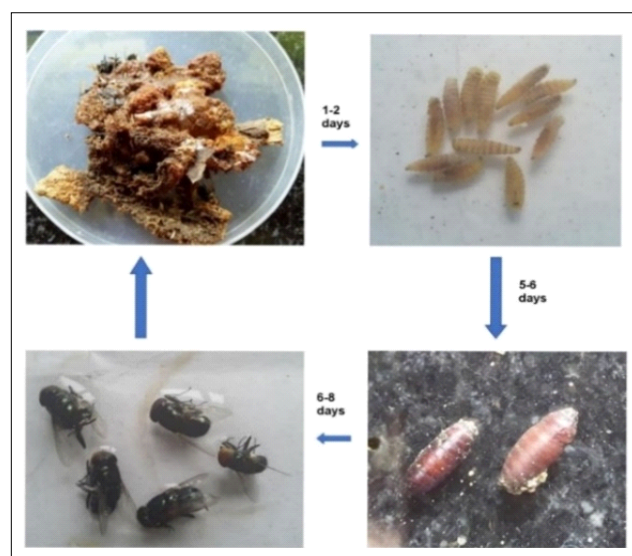


Fig 2: Life cycle of *C. bezziana* (Bora *et al.*, 2019).

serosanguineous discharge and sometimes a distinctive foul-smelling odour, also, there may be large pockets of larvae with only small openings in the skin (Taylor *et al.*, 2007). If a screwworm deposits its eggs on mucous membranes, the larvae hence hatched may enter any orifice including the nostrils, sinuses, mouth, ears, genitalia or orbit of the eye. Affected animals with fly strike have irregular patterns of grazing and result in rapid weight loss if kept untreated for many days (Singh *et al.*, 2023). Myiasis in small ruminants accounts for extensive seasonal morbidity, even mortality, decreased value of the skin, reduced meat and milk production (Kour *et al.*, 2015). Cutaneous myiasis is a potentially deadly condition, particularly in sheep and goats during the moist, warm weather conditions when the wounds or carrion of the animals get contaminated with larvae of the dipteran flies (Kour *et al.*, 2015). These maggots remain on animal; secrete enzymes which liquefy the skin flesh of the animal on which they are feeding. Flystrike occurring on foot lesions results into serious non-weight bearing lameness, increasing the welfare consequences of lameness alone and death with estimated death rate of 5% generally results in affected animals (Singh *et al.*, 2023). The maggots can quickly travel beneath the skin and infestation can spread throughout the animal's body (Kour *et al.*, 2015). Another important factor is an abundance of exposed pre-existing suppurative lesions that attract and stimulate the deposit of eggs by the female insect (Francesconi and Lupi, 2012). Myiasis is often a case of negligence or mistreatment in animals and humans (Bandara *et al.*, 2016). Unless the process is checked by appropriate treatment, the affected animal may die owing to shock, intoxication and histolysis of the muscle tissues. The authors of the article observed such a severe case of maggot infestation, depicted in Fig 3.

### Indian scenario and its host range

*C. (Pycnosoma) bezziana*, Villeneuve proves to be the common myiasis-producing Calliphorine of India and adjacent parts (Patton, 1920). Incidence of myiasis is spread worldwide among domestic animals in the tropical regions including India where all the favourable conditions for the abundant growth of myiatic flies and their larvae are prevalent of which wound myiasis (maggoted wound) is one of the commonest and widespread clinical problems in veterinary practice in India (Singh *et al.*, 2023). Myiasis due to *C. bezziana* in animals have been well documented in India viz. Singh and Singh (2015) in domestic animals; Kour *et al.* (2015) in sheep and goats; Singh and Singh (2016) in dairy animals; Soundararajan *et al.* (2019) in elephants; Bora *et al.* (2019) in poultry; *etc.* Human myiasis caused by *C. bezziana* was first reported in 1909 in India (Zhou *et al.*, 2019). Cases of human wound myiasis by *C. bezziana* are prevalent in Indian sub-continent, South East Asia and Africa (Kaur and Singh, 2016). These flies are more active during the summer and monsoon seasons

in different parts of India (Kour *et al.*, 2015; Bora *et al.*, 2018 *etc.*). It is of great economic importance in an agriculture based country like India, where the economic status of a big chunk of the population depends on the livestock industry (Singh and Singh, 2016). The condition has long been identified as a cause of decline in productivity of the livestock industry as a result of pathological effects and recurring expenditures on prevention and management of flystrike (Singh *et al.*, 2023).

### Public health concern

Myiasis is considered in Hindu mythology as "God's punishment for sinners" (Kumar *et al.*, 2011). It is a zoonotic disease that affects all vertebrates (Kadhim and Aaiz, 2025). The presence of *C. bezziana* in wounds, normal body orifices such as eyes, ears, nose, mouth and the urogenital tract causes pruritus, pain, vertigo, inflammation, erythema, bleeding, eosinophilia and occasionally secondary bacterial infection in humans (Talari *et al.*, 2002). Manson has reported tissue destruction and occasionally demise of humans and livestock due to the presence of numerous larvae (Talari *et al.*, 2002). A massive initial infestation or a series of repeated strikes can lead to enormous soft tissue destruction and wound extension (Zhou *et al.*, 2019). The incidence of this disease can be correlated with existing level of sanitation, the density of prevailing fly populations and economic status of the individual (Singh and Singh, 2015). Cutaneous myiasis has been recorded to be the most frequent clinical form and can be further categorized into three subtypes i.e. furuncular, creeping and wound myiasis depending on the type of invading maggots (Kaur and Singh, 2016). Probably, homeless people, mentally retarded patients, drug addicts and infants are more vulnerable to attack (Singh and Singh, 2016). Human myiasis is an important zoonosis, given its close association with animal myiasis. The preventive measures viz. maintenance of neat and clean surroundings, control of fly populations and covering of wounds can be taken up for prevention of onset of myiasis. Greater awareness of the danger is desirable to develop more potent ways and



Fig 3: A heavily infested animal.

means for prevention of suffering and losses presently being endured (Chhabra and Pathak, 2009). Public awareness of this infestation is needed to encourage personal hygiene and cleanliness (Rana *et al.*, 2020).

### Economic impact

In the Eastern Hemisphere, particularly in Iraq in the 1990s, the FAO estimated the economic loss to the livestock industry as a result of *C. bezziana* invasion to be US\$ 8,555,00013, as also in other research studies estimated the annual losses in the livestock industries in Australia to be equal to A\$ 500 million due to the possible incursion of the *C. bezziana* (Hosni *et al.*, 2020). Neglected open wounds, faecal staining, posterior paralysis and ignorance among farmers were found to be the key predisposing factors for onset of myiasis among dairy animals (Singh and Singh, 2016). In spite of the fact that, myiasis is very rare in birds (Hall and Wall, 1995), the economic impact of this condition in poultry too cannot be underestimated as there was reduced weight gain as compared to the non-infected one due to constant irritation and abhorrence of consumer that may affect economically to farming community (Bora *et al.*, 2019). Although mortality is negligible, morbidity may be enormous resulting in reduced both egg and meat production in birds (Bora *et al.*, 2018). Other countries have a good number of reports suggesting the losses incurred in livestock and poultry industries due to the infestations of *C. bezziana*. In India, no estimate has been reported but huge economic loss due to myiasis among domestic animals is apprehended posing a major threat to livestock industry (Singh and Singh, 2016). Oral myiasis due to *C. bezziana* is found in buffalo in Jammu region (Bhagat, 2016). It is the most important obligate myiasis-causing fly in India and has been reported from 99% of traumatic myiasis cases in cattle (Baidya *et al.*, 2006). In cattle, the hide gets degraded due to the infestation. Added to that the animals are not able to work properly due to constant irritation and annoyance caused by the fly maggots. Nonetheless, if infested livestock are not treated appropriately they can die or suffer permanent disability and so the economic effects on small farms, with small numbers of livestock, can be relatively severe (Wardhana *et al.*, 2018). Affected animal generally become restless and scratches the affected body regions and in extreme cases death may occur within few days but is possibly due to ammonia poisoning and septicaemia (Singh *et al.*, 2023). Overall, there are huge economic losses incurred. India ranks first among nations with high zoonotic disease occurrences and is the 7<sup>th</sup> largest country in the world (Debbarma *et al.*, 2025). Furthermore, screwworm is listed by the World Organization for Animal Health as a notifiable infestation because myiasis cases affect livestock and other domestic animal species, wildlife and humans in endemic areas (Altuna *et al.*, 2021). This emphasizes the need to address the control measures of these kind of screwworm myiasis from an one health perspective, especially in an endemic region

like India. Appropriate and timely treatment addressing non-negligence can minimize the deleterious effect of this condition. A multi-sectoral, "One Health" strategy including cooperation between public health, environmental and veterinary service is necessary for effective control and prevention (Debbarma *et al.*, 2025). Therefore, further work in this aspect is warranted.

### CONCLUSION

After going through all the available literature and considering all the aspects of the Calliphorid fly, *C. bezziana*, an analysis could be drawn that this fly species has every potential of creating havoc and huge losses in commercial setups. And that too, it is of zoonotic importance. It is also an economically important parasite of animals which has been prevalent in India since a very long time. These flies are of a major concern in the livestock and poultry industry. As compared to other parasites these fly species might not been given due importance with regards to prevention and control but it is a topic that should not be ignored. In extreme cases, it might even cause death of the animals. In commercial set ups it is likely to cause huge losses. But the fact that these Calliphorids especially *C. bezziana*, also facilitate in medico-legal/vetero-legal cases by aiding in estimation of the Post Mortem Interval (PMI), is a striking feature which has given rise to the Forensic Entomology subject. In this subject, by studying the insect population and the developing larval stages, the forensic scientists can estimate the postmortem interval, any change in position of the corpse as well as the cause of death. India is amongst one of the tropical countries providing the conducive environment for their propagation and this is yet another challenge in control. It is high time that the menaces caused by these flies are highlighted in detailed manners especially with regards to the economic losses and technologies such as the sterile male release should be employed in the fields as a means of control of these flies. Thus, it is imperative that the Indian scientists and entomologists take up this subject with concern and so that this fly species is eradicated from India as well, as has been done by the USA, not ignoring that fact these flies can be exploited judiciously for Forensic Entomological purposes. A lot of works has been carried out in the taxonomical aspect but a systematic approach in the prevention and control of these flies, hampering the economy of the agriculture sector in India is still lagging behind. Appropriate measures can be taken so that these are bred only in controlled laboratory conditions. Added to this, in individual levels there should be proper scientific methods of cleaning, treatment and covering of wounds of animals. Myiasis caused by *C. bezziana* in animals should also be given due importance at par with the human myiasis.

### ACKNOWLEDGEMENT

The authors have made substantive and intellectual contributions to the article and assume full responsibility



for all opinions, conclusion and statements expressed in the articles.

### Disclaimers

The views and conclusions expressed in this article are entirely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the entirety and exactness of the information provided but do not accept any accountability for any direct or indirect losses resulting from the use of this content.

### Informed consent

NA (Since it is a review article).

### Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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