THE MICRO HABITAT ECOLOGY AND EFFECTS OF THE ENVIRONMENTAL FACTORS ON *CULEX* MOSQUITOES

Shobhag Mal Meena

Department of Zoology, Government P.G. College Bundi, Rajasthan, India
Corresponding author- Dr. **Shobhag Mal Meena**

Abstract
Microhabitat ecology of *Culex*mosquitoes are affected by several ecological factors for hydrologic variation, precipitation, temperature, availability of proper breeding, blood feeding and humidity. The ecological components are the highly significant abiotic factors influencing the life expectancy of *Culex* borne disease mosquitoes. *Culex* borne disease infection has turned into a significant worldwide medical issue and it is flagged that environmental fluctuations will be impact the mosquitoes increasing, which can be permit these mosquitoes to get now pathogens population. Changes in climate will effect on different parts of these components, however human style and the circumstance of the nearby territory stay undeniably more persuasive taking into account the dissemination of *Culex* mosquito and reasons for *Culex*disease under any viewed as ecological situation.

Keywords: *Culex*, breeding, pathogen, ecological factors

INTRODUCTION

Mosquitoes, the parasitic dipteran insects are outstanding vectors for the transmission of different perilous infection from one side of the world to the other and all of these mosquito-borne illnesses continue to be a basic issue in essentially all tropical and subtropical countries (Tolle, 2009)[1].Different sorts of mosquitoes are evaluated to send infections more than 700 million individuals consistently in Africa, Mexico, South America, Central America, and most of the Asian countries with in excess of 1,000,000 passing's reliably universally(WHO, 2019)[2]. More than 3, 000 types of mosquitoes have been recorded from one side of the planet to the other that goes under the family *Culicidae*. Mosquitoes are holo-metabolous insects experiencing a hard and fast change in their life history including egg, larva, pupa and adult. The fundamental three stages are oceanic and continue onward for 5 to 13 days, dependent upon species and encompassing temperature. Principally, mosquitoes flourish in lifeless water and have specific bringing ecological elements up in perspective on species. The most broadly perceived genera of mosquitoes are *Aedes, Culex*, *Anopheles* and *Mansonia*, each having numerous species with its own fascinating credits and potential to send different diseases (Clements, 1992)[3].*Culex* is the extremely normal kind of mosquito predominant all through the year, laying eggs in pontoons seen on the outer layer of standing water(Jackson, 2004)[4].Both male and female mosquitoes are nectar feeders, while females of many species have endless supplies of people, different mammals, and domesticated animals particularly during rearing season since female requires specific proteins from the host's blood for the maturation of eggs (Klowden, 1995)[5].Various types of *Culex* mosquitoes like *Culexpipiens, Culexquinquefasciatus, Culexvishnui*, and so on are going about as vectors for the transmission of a few arbovirus diseases like West Nile fever, Japanese encephalitis, St. Louis encephalitis. *Culex* mosquitoes are likewise answerable for the transmission of avian malaria and lymphatic filariasis in various parts of the world (Brugman*et al*., 2018)[6]. Mosquitoes are one

of the most noticeable gatherings of insects which are going about as irritation bothers and hazardous vectors for the transmission of malaria, filariasis, chikungunya, Japanese encephalitis, dengue fever, and so on to human beings (Naseem*et al*., 2016 ; Webb *et al*., 2016)[7,8].

Mosquitoes are found all through the world, aside from Antarctica. They have a place with the order, Diptera of the class Insecta. Individuals from the genera *Anopheles*, *Culex*, and *Aedes* mostly bite human beings. Mosquitoes influence human government assistance by direct irritation and by the transmission of microorganisms causing diseases like malaria, filariasis, chikungunya, Japanese encephalitis, and dengue fever in man and an assortment of infections in different creatures. They communicate infections to in excess of seventy cores of people yearly and will be answerable for the passings of 1 of each 17 people at present living. Consequently, for the control of mosquitoes, many states and organizations have set up mosquito control programs (Naseem*et al*., 2016; Williams, 2000; Rueda, 2007; Kline, 2007; Manguin and Boete, 2011)[7, 9, 10, 11, 12]. The administration of vector-borne disease transmission is essentially reliant upon mosquito control programs. The data of mosquito species commonness and disperse is one of the deciding elements for the evaluation of vector-borne pathogen transmission hazards in regions. Worldwide, around 3583 types of mosquitoes are recorded. In India, 406 species having a place with 50 genera of mosquitoes are listed (Tyagi*et al.*,2015)[13]. The *Culex* southern house mosquito has been somewhat very much reviewed in recent years for its part in the disease ofmostly human diseases like lymphatic filariasis, Saint Louis encephalitis infection and western equine encephalitis infection. The prevalence of the mosquito species is impacted, among different factors by the physical climate for reproducing, seasonal prevalence, overrunning and resting each of which can be changed by human activities and convert the disease infection dynamics. This survey sums up the rearing, seasonal prevalence, resting, and biting habitat of *Culex* mosquitoes (Meena and Sakhuniya, 2021)[14].

1. BREEDING HABITAT

I. Life – cycle

Mosquitoes display a holo-metabolous life cycle that returns through four distinct life stages. Eggs laid by blood-fed female mosquitoes hatch into larva that transforms into pupae lastly to imago or adult mosquitoes. These stages display distinct morphological and physiological differences as portrayed by their decision of various ecological niches. After hatching, larva develops and intermittently sheds its old cuticle by the course of ecdysis. This process brings about larval development through progressive instar to arrive at the fourth instar transformative phase. Larval transformation into pupa includes practically complete histolysis and phagocytosis of the larval tissues. Pupa is the non-feeding inert stage during which remaking of histolysed tissue brings about the development of organs of an adult mosquito(Shanu*et al*., 2015)[15].Complete transformation includes complex exchange of ecdy-steroid and juvenile hormones activities and regulation of transcriptional events(Harker*et al*., 2013; Perez-Hedo*et al*., 2011)[16, 17].

Culexpipiens is a mosquito that is found all through calm scopes including North America and has overlapped the generations throughout the mid-year. Subsequent to overwintering as adults, mated females start the pattern of blood-feeding and ovipositing when evening temperatures become adequately warm for action. Many generations happen all through the late spring until temperatures drop and the photoperiod abbreviates (Spielman and Wong, 1973; Vinogradova, 2000)[18, 19]. These holometabolous insects have an intricate life cycle including radically various conditions: eggs hatch into aquatic natural surroundings where the larvae develop for as long as a little while, then, at that point, following pupation, adults arise into the terrestrial habitat. Thus, people divide their life among two definite niches, with various food sources, various methods of movement, and various anxieties. Mosquitoes spend their life possible in the water,

where high warm idleness brings about moderately stable conditions. Following transformation, adults end up in the terrestrial habitat and logically experience more warm fluctuation than they did as larvae. Given the extraordinary difference in natural surroundings, it is muddled how larval conditions impact adult warm resilience (Emilie, 2013)[20].

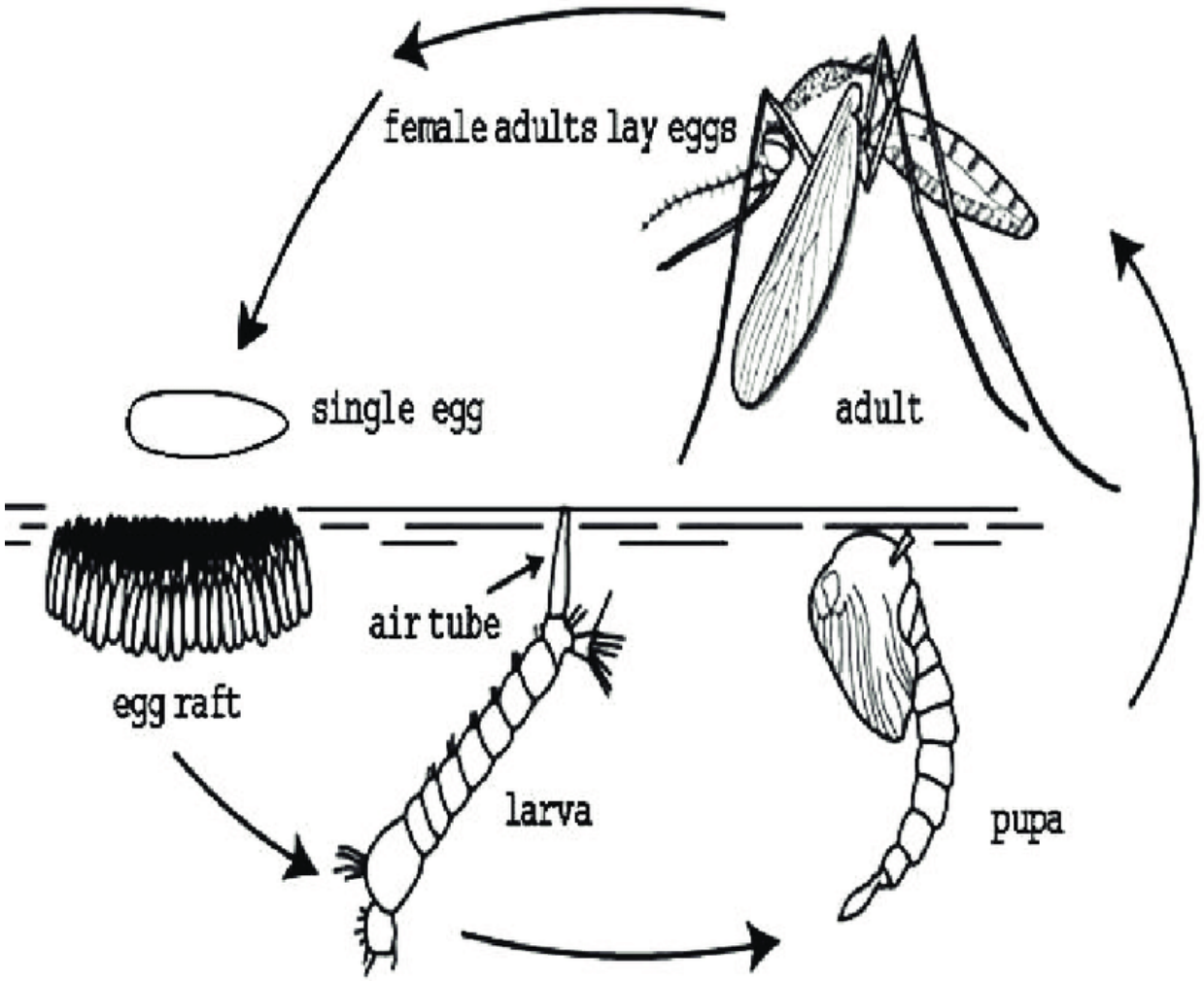

Fig. 1 Life cycle of C*ulex* mosquito (Source: Baranitharan*et al*.,2018)[21]

II. Oviposion

Oviposition is an essential stage in the mosquito lifecycle, especially for *Culex* mosquitoes, which are thought to lay a single hold of eggs in a singular living space for each gonotrophic cycle. (Clements, 1992)[3]. Despite the fact that there is close to no speculative composing unequivocal to mosquito oviposition, optimality models have been applied to basically comparable to systems, for instance, plant-herbivore oviposition (Mangel, 1987)[22] and suggest that females will help their wellbeing by picking first rate larval regular environmental factors for their egg grasps. Regardless, the choices that gravid females make may be affected by the openness of sensible larval living spaces near with resources expected by the Adult (Mayhew, 2001; Scheirs and De Bruyn, 2002)[23, 24]. This suggests that while female mosquitoes might pick oviposition living spaces of unrivaled grade for their family, their choice may moreover be affected by factors connecting with adult endurance.Egg-laying mosquitoes experience a grouping of naturally construed semiochemicals in ordinary oviposition objections that are missing in oviposition site choice bioassays using developed standard water. However bioassays using Gambusia-exudate developed ordinary water potentially discard most various synthetics materials found in typical oviposition objections,

control for expected differences in the substance piece of water between field districts with and without fishes that are not clearly associated with the presence of fish, and focus on synthetics materials related with fish trackers, it is conceivable that factors other than fish-related semiochemicals (i.e., presence/nonappearance of sustenance for descendants, (Ponnusamy*et al.*, 2008)[25], exudates and degradation aftereffects of different plant species (Du and Millar, 1999; Isoe*et al.*, 1995)[26, 27] or presence/nonattendance of conspecifics (Allan and Kline, 1998)[28] influence oviposition choices by female mosquitoes.The determination of an oviposition site is a significant part of the conduct collection of mosquitoes (Diptera: Culicidae), and the right decision is critical for the endurance of offspring. The engaging quality of these locales to ovipositing mosquitoes is conditioned to various physical, substances, and organic prompts introduced under normal conditions. (Millar *et al*. 1994, Dhileepan 1997, Olagbemiro*et al*. 1999, Geetha*et al*. 2003)[29, 30, 31, 32].*Culex*oviposition conduct likely comprises of various successive advances, including long-range direction to a potential oviposition site, drifting at the site (arrestment), arriving on the fluid substrate, examining the substrate, lastly statement of an egg raft. The oviposition conduct of gravid females can be affected by unpredictable signals, both while situating to a site and keeping in mind that laying on the water surface. On the water, female conduct might be interceded further by prompts apparent by contact chemoreceptors (Yongjun and Jocelyn, 1999)[33].Mosquitoes are known to find their particular hosts and oviposition locales by detecting substance signals, other than different physical stimuli, that are identified by sensory receptors on the antennae (Davis and Bowen, 1994)[34]. By utilizing oviposition attractants, vector mosquitoes could be drawn to picked destinations for laying eggs. Different synthetics fill in as oviposition attractants for mosquitoes in any event, when present in somewhat little amounts (Beehler and Mulla, 1993)[35].

2. MORPHOLOGICAL HABITAT

I. Larva position on the water body

Culexquinquefasciatus can involve compartments as larval habitats and shows the environmental versatility to raise in both contaminated and clear water (Forattini, 2002)[36]. Almirón and Brewer (1996)[37]depicted and arranged immature stage mosquito natural surroundings in Córdoba Province, where *Culexquinquefasciatus* was assembled with other *Culex* species that common similar environment prerequisites, with *Culexquinquefasciatus* being viewed as more regular in artificial larval territories. In another review, artificial and natural larval living habitats (pools, ditches, waterways, tidal ponds and water sources) were overviewed in Córdoba city during the summer months. A few types of *Aedes*, *Culex*, and Mansonia were distinguished and *Culexquinquefasciatus* was demonstrated to be the most abundant and most universally distributed in the city (Pires and Gleiser, 2010)[38]. *Culex* larvae normally hold tight water surfaces. They have all around created head with mouth brushes, huge chest, and an eight-sectioned midsection. In the larval stage, there are no legs. Siphon (breathing cylinder) is found on the eighth abdominal portion (Dhanasekaran and Thangaraj, 2013)[39].

II. Pupae and adult position

Fundamental perception recommended that pupae resting in curved menisci are less likely to dive than those resting in open, level surfaced water and that pupa will quite often rise along an upward surface while ending a dive. Together these attributes would establish a conduct component that advances resting in a concave meniscus related to a new, hydrophobic surface. In this review, we present proof for such an instrument in pupae of *Aedesaegypti* (Linn.), *Aedestriseriatu.s* (Say) and *Culexrestuans* "Iheobald. On the premise that pupae resting in curved menisci plunge less frequently than those resting in open water, we

assumed that pupae in concave menisci are less responsive to mechanical vibrations than those in open water. This hypothesis was tried utilizing *Aedesaegypti* (Shuey*et al*., 1987)[40].

III. Blood feeding behaviour

Studies on the blood-taking care of direct of *Culexquinquefasciatus* showed that this species gets blood from an alternate extent of birds and well evolved creatures, dependent upon the overflow and openness of vertebrate hosts inside a specific geographical area (Molaei*et al*., 2007; Kay *et a*l 1985; Jansen *et al.,* 2009; Dixit *et al.,* 2001; Elizondo-Quiroga*et al.,* 2006; Samuel *et al.,* 2004)[41, 42, 43, 44, 45,46]. Blood wellsprings of *Culexquinquefasciatus* accumulated in metropolitan and peri-metropolitan states of Australia showed an ornithophilic have dealt with direct with avian dealing with rates up to 80% (Kay *et al* 1985; Jansen *et al*., 2009)[42, 43]. In Kenya, *Culexquinquefasciatus* was simply benefiting from well evolved creatures with blood dinners degrees of 86.2%, 72.5%, 18.9%, and 3.9% for ox-like, goat, jackass, and human blood dinners, independently, including mixed blood dinners (Muturi*et al*., 2008)[47]. In India, outstandingly anthropophilic taking care of living space of indoor-resting mosquitoes with anthropophilic records of 90% and 74% were seen. Blood-took care of *Culexquinquefasciatus* mosquitoes trapped in Monterrey, north-eastern Mexico, inside houses generally feed on individuals (38.8%) and chickens (36.4%), while outside resting mosquitoes feed on a very basic level on chickens (44.1%) and canines (10.2%) (Elizondo-Quiroga*et al*., 2006)[45].Hybridization between *Culexpipiens*s.s. structures have been considered a main issue influencing WNV transmission (Fonseca *et al*., 2004)[48]. Hybridization among molestus and pipiens may achieve catholic dealing with direct as needs be extending the risk of admixed populace to go about as expansion vectors of WNV among birds and individuals (Chevillon*et al*., 1995)[49].

IV. Fecundity and hatching rate

In this survey, the effects of increasing temperature on perseverance and improvement pace of pre-imaginal stages and on wing length of adult *Culexpipiens* (Diptera: Culicidae) were evaluated. Hatchlings were raised until adult improvement at seven steady temperatures some place in the scope of 7 and 33˚C. The most endurance was found at 25˚C. The advancement pace of the adolescent stages lessened with extending temperature until 30˚C. The edge temperature and warm consistency were, independently, 5.2˚C and 186.5 degree-days for males, and 5.5˚C and 199.5 degree-days for females. As shown by a non-straight model, the lower and upper warm cut-off points were, independently, 8.4˚C and 34.4˚C for males, and 9.8˚C and 34.2˚C for females. Wing length reduced with growing temperature. The wings of females were longer than those of guys. This audit showed that endurance and improvement of immature and grown-ups were impacted by raising the temperature. Moreover, results suggest that this effect may differentiate between sexual orientations (Loetti*et al*., 2011)[50].In Culicidae, as another arthropod, the temperature is one of the most critical abiotic factors affecting the development and endurance of the young stages (Clements 1992)[3]. Moreover, the warm raising circumstances may fluidly influence a couple of adult credits, for instance, body size, ripeness, life length, and vector skill (Kay *et al.,* 1989; Briegel 1990a& 1990b; Briegel and Timmermann, 2001; Kay and Jennings, 2002; Oda*et al*., 2002)[51, 52,53, 54,55,56].

3. BIOLOGICAL AND CHEMICAL HABITATS

CulexquinquefasciatusSay larvae, in Peninsular Malaysia, were generally bountiful in dirtied channels containing 1.0 to 2.0 g/liter of disintegrated oxygen, 1.0-2.4 g/liter of solvent reactive phosphate, and 0.1-0.9 g/liter of ammoniacal nitrogen (Hassan *et al*. 1993)[57].In spite of the significance of *culexquinquefasciatus* in the transmission of Bancroftianfilariasis in Kenya (Mwandawiro*et al*., 1997)[58], little is had some significant awareness of its larval ecology. Hardly any examinations have detailed a huge

relationship between the variety *Culex* and ecological factors like pH, shade inclusion, garbage inclusion (Minakawa*et al*., 1999)[59], and decaying organic matter (Asimeng and Mutinga, 1993)[60], with a little attempt to survey the impact of these variables on species population dynamics (Muturi*et al*., 2007a)[61].

4. ENVIRONMENTAL FACTORS

Change in the climate significantly affects the breeding habitats of various species. The meteorological variables influence adult mosquito species by adjusting the quality and amount of reproducing natural surroundings. The connection between climate boundaries and mosquito population can give significant data to decide vector abundance and chance related to their expanding density (Rani *et al*., 2021)[62].Physicochemical marks of mosquito rearing destinations might have a few effect on mosquito vectors' oviposition, endurance, and spatial distribution (Garba and Olayemi, 2015)[63].

I.Temperature

The organic showing of preimaginal mosquitoes results from the communication between the inherent qualities of the species and the ecological states of the reproducing site, with the temperature being one of the most significant abiotic factors influencing the turn of events, development, and survival of juveniles (Clements, 1992)[3]. There is a positive direct connection between temperature and developing pace of preimaginal phases of mosquitoes inside a specific warm reach, and the relationship becomes sigmoidal when a more extensive territory. Numerous nonlinear models have been proposed to portray the relationship in the preimaginal phases of arthropods. These models change regarding boundary number and essential suppositions about the temperature impact close to the limit. Some of them are expressive models that permit a graphic translation of boundaries (Briére*et al*., 1999)[64]; others are biophysical models in light of the catalyst reaction rates hypothesis (Sharpe and DeMichele, 1977)[65].

Then again, the ideal temperature for development doesn't concur with that for survival. There are a few reports of the impact of rearing temperature on the advancement time and endurance of various youthful mosquito species (Rueda *et al*., 1990; Su and Mulla, 2001)[66, 67]. Information on the impact of temperature on the development time and survival of the diverse mosquito species gives standard data fundamental for studies on populace elements, spatial-temporal distribution, and the study of disease transmission.The generally dispersed individuals from the *Culexpipiens*group have been considered as a result of their role as vectors of microorganisms for people and domestic animals. The juvenile phases of *Culexpipiens* are found at various rearing sites, the greater part of which is firmly connected with anthropogenic habitat (Forattini, 1965)[68].The raising temperature significantly affected the survival of pre-imaginal phases of *Culexpipiens*. A large portion of the people arrived at adulthood at 25˚C, proposing that it is the most positive raising temperature. This outcome is predictable with field studies done in Buenos Aires City that announced the high occurrence of *C. pipiens* larvae throughout the summer, in temporary rain pools at mean week by week temperatures somewhere in the range of 20˚C and 27˚C (Fischer and Schweigmann, 2004)[69]and artificial containers filled with water at temperatures somewhere in the range of 22˚C and 25˚C, inside a burial ground (Vezzani and Albicócco, 2009)[70].

II.Rainfall

Changes in the abiotic climate might modify the result of interactivity inside the biotic climate (*e.g.*, through a condition-explicit competition) (Costanzo *et al*., 2005)[71]. Rain is a significant variable for the juvenile phases of numerous mosquito species; although, little is known on how rain, or its absence, really shapes mosquito communities. Rain might drive the juvenile mosquito populations in many ways. A sufficient

measure of rain will make regular water bodies and fill artificial environments, giving females valuable chances to lay their eggs. Vibrations coming about because of the effect of raindrops on the water surface can cause a jumping reaction (alert response) in the larva (Markl and Hauff, 1973)[72] and may even animate incubating of eggs currently present in natural surroundings (Roberts, 2001)[73]. But, the drawn-out dry season might make more modest territories parch quickly. Inside the family Culicidae, species have developed different systems to endure these antagonistic conditions.Unnecessary rain might flush the juvenile stages from their living spaces and may hence be significant density-independent mortality. Proof for the flushing impact of rain has just been episodic from field studies, and it is generally founded on the relationship between weighty rain and lower get numbers without direct perceptions (Geery and Holub, 1989; DeGaetano, 2005)[74,75].

Appropriate comprehension of the connection among rainfall and the bounty of mosquito vectors, for example, has assisted with fostering a possible vector control program (Alten*et al*., 2000; Bashar and Tuno, 2014)[76, 77]. Rainfall and temperature give fundamental mosquito life history attributes, for example, transmission force which incorporates mosquito development rate, biting rate, and survival rate (Blandford*et al*., 2013)[78]. Precipitation and temperature are the intermediary factors that have been addressing the density level of mosquitoes (Lin and Lu, 1995)[79]. Precipitation and temperature influence the development of hatchlings in the aquatic climate and the survival of adult mosquitoes (McMichael *et al*., 1996)[80].

III.Relative humidity

The geo-climatic impacts of a tropical climate on mosquito dispersed in Midwestern Nigeria include ideal reproducing temperatures, two definite seasons: a dry, cruel, development restricting period with higher temperatures, relative humidity, and precipitation (November-February), followed by a wet season with plentiful precipitation and flooding (April-October), supporting the development and growth of the amphibian (larva and pupa) stages and bountiful enlistment of adults. The wet seasons are related to higher predominance levels of mosquito vector-borne infections. The beginning of rainfall upholds the improvement of extra mosquito reproducing destinations, bringing forth eggs following oviposition, high relative humidity. Different elements influence mosquito plenitude and their species dispersion. They incorporate climatic impacts, vegetation cover, and the right kind of natural reproducing sites (Igbinosa, 1989)[81].Mosquito species once settled in a biological zone are hard to remove. In any event, when the empowering natural factors that help their development, growth, and survival are deficient with regards to them simply will quite often briefly vanish, just to get back to a flourishing status once these variables are restored. This is a figure critical to the control of mosquito vector diseases. A plenitude of vegetation cover additionally gives shade to adult mosquitoes resting positions and reproducing activities. Mosquitoes for the most part incline toward a cool concealed region in their gnawing and rearing activities (Gilliet, 1971)[82].Temperatures above 36°C and rate relative humidity underneath half are known to cause larval mortality and diminished life span in mosquitoes (Herbert *et al*., 1982; Cramptonet *al*., 1997; Umaru*et al*., 2014)[83,84,85].

IV.Spatial distribution

The cosmopolitan dispersion of *Culexquinquefasciatus* is across landmasses and ecozones for the most part south of 39° N latitude (Bartholomay*et al*., 2010)[86].*Culexquinquefasciatus* is a person from one side of the planet to the other scattered *Culexpipiens* species complex. also, the *Culexpipiens* species complex has many related species, ecotypes, and crossbreeds which are organized in geological introgression zones on various central areas (Farajollahi*et al*., 2011)[87]. Mosquitoes of the Culexpipiens complex have a cosmopolitan apportionment and fuse a numerous animal categories, subspecies, structures, races,

physiological varieties, or biotypes. (Becker *et al*., 2012)[88]. No understanding exists on the arranged status of the people from this complex. In Europe, *Culexpipiens* is brought into three intraspecific constructions: *Culexpipiensmolestus, Culexpipiens*, and *Culexpipiens* combinations. (Brugman*et al.*, 2018)[6]. Combinations between *Culexpipiens* and *Culexquinquefasciatus* have moreover been accounted from the Mediterranean Basin. (Shaikevich*et al.*, 2016)[89]. Both *Culexpipiens* structures (*pipiens* and *molestus*) and their crossbreeds are accessible in the Iberian Peninsula. (Martínez-de la Puente *et al.*, 2016)[90].Lately, Suman*et al*. (2008)[91] have recognized *Culexquinquefasciatus* and *Culextritaeniorhynchus* based on egg morphometrics. Although, no report is accessible on the varieties in morphology and morphometric of eggs of *Culexquinquefasciatus* from various topographical regions in India. Eggs of all mosquito species have a chorion included the outer exochorion and inside endochorion (Clements, 1992)[3].

V.Elevation

Data on the connection between rising or climatic circumstances and spatial mosquito scattering and mass examples in the Rocky Mountain area is critical because expected climate warming all through the accompanying 50 years in this piece of the country, which joins projected summer temperature increments of 1-2°C (Leung *et al.*, 2004)[92], may allow *Aedesvexans, Culexpipiens,* and *Culextarsalis* to loosen up their apportionments to higher ascents and become more abundant near the cool completion of their ranges. This would demolish the inside and out troublesome issue with WNV disease in the Colorado Front reach by widening the area of danger for receptiveness to WNV vectors into montane areas energetically used for wearing exercises all through the late spring when the vectors show up at top bounties (Smith *et al*., 1993; Bolling*et al.*, 2007)[93, 94]. The fundamental target of this survey was to conclude the way in which mosquito species' wealth, design, and abundance change alongside regular environment rise tendencies in Colorado.In the course of the most recent twenty years, the ecological situation of the Garhwal locale of Uttaranchal has completely changed because of development and improvement projects including urbanization, advancement of water assets, large-scale populace development, recently possessed regions, and so on. Other than this, the water system framework has likewise significantly changed the nature of the area. The natural surroundings that are accessible to the survival of mosquitoes contrast with rising vegetation and, consequently, the mosquito species that are explicit for territory would be dispersed by rising/elevation. During dispersal the mosquito frequently stops and refuels with energy along the flight way, return/vanishing/appearance is probable of up until recently obscure mosquito structures. With this foundation, it warrants to decide how mosquito species (adults/larvae) are dispersed as to height/elevation in the uneven areas of Garhwal district and is there any relationship with altitudinal vegetation in the existing mosquito variety (Pemola and Jauhari, 2004)[95].

VI. Predation and parasitism

The term 'invasive' presented species that have expanded and spread, making the potential for impacts on local species and biological systems, or on human activities (horticulture, preservation). We allude to species that have become set up, yet have neither spread broadly nor had significant effects as 'non-local'. Invasive species produce impacts on different species and biological systems fundamentally using their biotic cooperations, including predation and parasitism, interspecific competition, or environment designing (Williamson, 1996)[96].At the point when a non-local species type gets away from the hunters and parasites that assault it in its local reach, the probability of that species achieving high riches and spreading can be upgraded. Likewise, the presence of predators or parasites that are fit for assaulting non-local species might assist in withholding those species back from becoming invasive or to be sure from prevailing with regards to becoming set up. These impacts have been reported in a few attacks, and structure the premise of most

natural control endeavors coordinated at invasive species (Williamson, 1996)[96], including endeavors to control invasive mosquitoes (Focks and Sackett, 1985)[97]. These sorts of impacts of predation or parasitism are clear, yet there are other more unpretentious impacts of hunters and parasites, for example, 'apparent competition, in which a common foe produces results on prey that copy impacts of the interspecific competition (Holt and Lawton, 1994)[98].

CONCLUSION

The microhabitats of *culex* mosquitoes are directly influenced by ecological factors including as temperature, precipitation, relative humidity, elevation and other biotic and abiotic components. Many ecological factors affect the abundance of the activity of *culex* mosquitoes. *Culex* mosquitoes are sensitive of variable temperature, significance of the tolerance maximum and minimum temperature by *culex* mosquito. Hence the situations of ecological factors affect the *culex* borne diseases.

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