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Studies on Comparative Larvicidal Efficacy of Methanol Extracted Latex of *Calotropis Procera* and Temephos against *Aedes Aegypti* in Arid Parts of Rajasthan

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Dengue fever (DF) associated with Dengue hemorrhagic fever (DHF) is emerging as an alarming public health problem in India [1]. Rajasthan is an endemic states where many outbreaks have been reported [2-4] . The main vector of dengue & DHF in the urban and rural areas of Arid region is *Aedes aegypti* . These mosquitoes are found breeding in domestic as well as peri-domestic habitats of the area [5]. There is no specific anti-viral therapy or vaccination for the treatment or prevention of the disease and on the other hand transovarial transmission of dengue virus [6-7] along with development of resistance by synthetic insecticide making the transmission of dengue rampant [8] Due to scanty rain fall and irregular supply of water people in desert develop habit of storing water in adhoc domestic containers and this habit leads to create protective conditions for mosquitoes to breed in fresh water and this leads to increase number of domestic breeding sites. To control of these domestic breeding sites , we require effective bio- larvicide which is easily accessible, economic, available through out the year , non- toxic to non targeted population and also known to local population.

Temephos as larvicide has been used in the present vector control measures against *Aedes* mosquitoes . Temephos is an organophosphate insecticide which has been in use over last 30 years . Recently resistance of *A.aegypti* towards organophosphate insecticide has been reported [9-11]. Water use practices also limits the effectiveness of a temephos-based Aedes aegypti larval control program [12]. Due to increasing vector resistance against temephos more attention has been given on the development of plant based biocide .Under the Integrated Mosquito Management (IMM) more emphasis was given on the application of alternative strategies in mosquito control. One of the most effective alternative approach is to explore the bio- larvicide of botanic origin as a simple and sustainable method [13].

Further unlike conventional insecticides which are based on a single active ingredient plant derived biocide comprises chemical compounds which act on behavioral and physiological processes thereby reducing the chances of developing resistance among vectors [14].

Calotropis procera is a perennial herb with long history of its use in traditional medicine distributed widely in tropical and sub tropical regions of Asia and Africa. Biological activity of chemicals present in *C.procera* have been reported by DUKE Data base [15].

Latex of Calotropis procera has been reported as larvicidal for mosquito control [16] and further this has also been found effective as larvicide against dengue, malaria and Lymphatic filariasis [17-18].further a herbal composition has been developed by extracting latex from methanol which contains larvicidal action against dengue vector [19]. The Present paper deals with the comparative effectiveness of larvicidal potential of methanol extracted latex of *Calotropis procera* with temephos, a synthetic larvicide which is widely used in all vector control programme against *Aedes* mosquitoes.

Latex from healthy plant of *Calotropis procera* has been extracted manually directly into disposable bottles . Collected latex has been extracted using AR grade methanol to separate rubber part from non protein part of the latex . After 1 hour, the mixture was filtered with Whatman filter paper. The clear filtrate was collected in small beakers and then dispensed on Petri dishes and left for air drying at room temperature till a dried layer of extract was left on the plate. The dried extract is then made into powdered form using pestle and mortar and stored for application as herbal composition.

larval bio-assay have been undertaken as per standard protocol 3 rd instar larvae of Aedes aegypti were collected from field. Batches of 20 larvae were suspended in water to lethal concentration of methanol extracted latex , water extract and temephos ,as standard along with control in three replicate under the standard condition of temperature and humidity. Larval mortality was observed in 1, 8 and 24 hours in treated and control batches.

Elimination of available larval stock of Ae. aegypti and applying larvicide which can provide sustain release of larvicidal effect across the time, carries crucial importance in controlling this vector which is reported to maintain vertical transmission of dengue viruses (Joshi et al. 1996; Joshi et al., 2002). The larvicidal efficacy of latex of *C. procera* compared with that of temephos will contribute significant knowledge, in finding an alternative and natural larvicide which can be effective for many days in the breeding containers such as coolers and toilet water tanks, not getting cleaned up frequently. Moreover, the long term and sustainable effectiveness of latex will also take care of elimination of fresh larval batches emerging from the eggs laid on the wall of these containers. For effective vector control , it is important to have shortest time in achieving killing 100 % mortality so that larvae do not get opportunity to develop into pupae and subsequently adult mosquitoes. From the study results it emerges out that methanol extracted latex of *C.procera* is long term effective larvicide against dengue vectors.

C.procera can be the future of mosquito control programmes. Different part of plant that are tested against *A.aegypti, An. stephensi and Cx. quinquifaciatus* have potential uses as growth and reproduction inhibitor, repellent and oviposition deterrents [21-22] and further methanol extracted latex of C.procera have found effective and feasible in water storing containers of different socio-economic settings of arid Rajasthan . The plant C.procera grows in nature through out the arid part of Rajasthan and does not require any

care. Latex in a plant is available throughout the year, more in post rainy season when mosquito population is also higher. Extraction of latex do not require any technique and this can be applied to stagnant water , puddles or open gutters . Toxicity of latex is also very limited, it is less hazards than chemical insecticides.

Table-1: Comparative efficacy of methanol extracted latex over temephos

% mortality of *Ae.aegypti*					
S. No.	Time exposure (hrs)	Control	Temephos	Methanol extracted latex	Water extract
1.	1	0	0	100	60
2.	8	10	60	DS	70
3.	24	10	100	DS	100

Key words: *Calotropis procera*, Aedes aegypti, methanol extracted latex, dengue

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