The elemental analysis of biologically synthesized nanoparticles was done by EDX (Fig. 2) where strong optical absorption peaks were observed approximately at 3keV, which is typical for absorption of metallic silver nanoparticles (Mouxing *et al*., 2006).

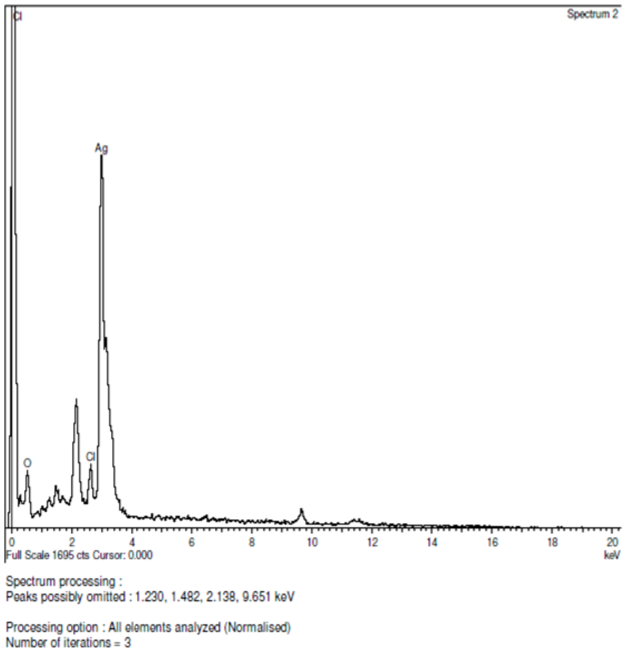

Figure 2: EDX spectra of silver nanoparticles

FT-IR spectrum was carried out to recognize the possible biomolecules accountable for the reduction of silver ions and capping of the bioreduced silver nanoparticles synthesized by *A. bidentata* leaf extract. The FT-IR spectrum of silver nanoparticles is shown in Fig.3. The band at 3303.6 cm^{-1} corresponds to O-H stretching H-bonded alcohols and phenols. The assignment at 1637.6 cm^{-1} corresponds to the amide bond of proteins arising due to carbonyl stretch in protein. Carbonyl group from amino acid and proteins has the stronger ability to bind to metal indicating that proteins could possibly form the metal nanoparticles (Singh *et al*., 2012).

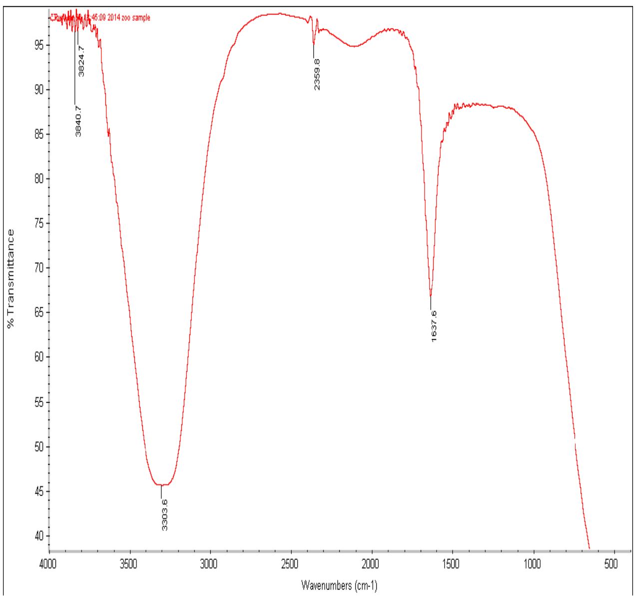

Figure 3: FT-IR Spectra of silver nanoparticles

The larvicidal activity of silver nanoparticles against larvae of *Aedes aegypti* is presented in table 1. The silver nanoparticles at 10 mg/L slightly decreased the survival of larvae at 32 hrs of exposure, while 100% mortality of the larval population was observed in concentration of 50 mg/L at 16 hrs of exposure. The nanoparticle at 30 mg/l killed the larvae slowly and nearly 80% mortality was observed at 44 hrs of exposure. The data obtained from the present study clearly indicates that silver nanoparticles could provide an excellent larval control of *Aedes aegypti*. Major reduction on the bodily movements, especially the wriggling activity of larvae was found to decrease with increase in time of exposure to silver nanoparticles. This behavioral change is due to the binding of silver nanoparticles to proteins leading to the denaturation of cell organells and enzymes. Subsequently, a loss in cellular function finally leads to cell death (Singh *et al.*, 2013)

Table 1: Screening of larvicidal activity against fourth instar *A. aegypti* larvae

Time (Hr)	*Control*	*10 mg/L*	*20 mg/L*	*30 mg/L*	*40 mg/L*	*50 mg/L*
0	0	0	0	0	0	0
4	0	0	0	0	2	4
8	0	0	0	0	7	8
12	0	0	0	0	13	16
16	0	0	0	1	16	20
20	0	0	0	3	18	20
24	0	0	1	4	20	20
28	0	0	2	6	20	20
32	0	0	4	10	20	20
36	0	1	5	12	20	20
40	0	2	6	14	20	20
44	0	3	8	16	20	20
48	0	4	10	18	20	20

4. Conclusion

In the present investigation, environmentally benevolent biogenic method is used for the synthesis of silver nanoparticles from the leaf extract of *Achyranthes bidentata*. The biomolecules present in the leaves were responsible for the reduction of silver to silver nanoparticles. The synthesized nanoparticles ranged in size from 20-40 nm as shown by SEM. The results of larvicidal bioassay clearly indicate that silver nanoparticles could provide an excellent larval control of *Aedes aegypti*. Further research is required to gain insight into the bioactive principles and their mode of action in effectively using plant mediated silver nanoparticles as an anti-mosquito product.

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