

**Abstract No: PO-28**

**A novel method for spectrophotometric detection of Glyphosate using a simple terpyridine-based Zn complex**

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Glyphosate (*N*-[phosphomethyl] glycine, GLP) is an organophosphorus and widely applied as an herbicide. Also, it is a non-selective, effective, and broad-spectrum herbicide. Nevertheless, excessive use, misapplication, and residue of glyphosate adversely affect the environment. Therefore, it is very important to detect the glyphosate in environment samples. The current techniques for detection of glyphosates include chromatographic methods and spectrophotometric methods. However, these methods still confront many challenges such as complexity, requirement of sample preparation, time consuming, and low sensitivity. Thus, there is an exclusive need of a rapid and high sensitive system for detection of glyphosate. Therefore, in the present study, a simple terpyridine-based Zinc-complex (Zn-GLP) was successfully employed for the detection of GLP. 2,2':6,2''-Terpyridine is a tridentate ligand which contain three coordination sites belonging to three *N*-heteroaromatic rings. A range of applications of terpyridine based compounds has been reported including catalysis, supramolecular chemistry, medicinal applications, and as sensors. The capability of metal-terpyridine as a sensor is least studied for Glyphosate. A 4-functionalized terpyridine ligand, 4-(4-*N,N*-dimethylaminophenyl)-2,2':6,2''-terpyridine was synthesized through the Krohnke reaction by condensation of 2-acetylpyridine with 4-Dimethylamino-benzaldehyde followed by oxidation under ammonium hydroxide and finally a green colored solid was obtained in yield 54%. This product was recrystallized with ethanol to obtain the ligand in pure form. Then its Zn-complex was synthesized by treating 4-(4-*N,N*-dimethylaminophenyl)-2,2':6,2''-terpyridine ligand with ZnCl<sub>2</sub> in methanol. The ligand and Zn-complex were fully characterized by a combination of <sup>1</sup>H NMR spectroscopy, UV-Vis spectroscopy, FT-IR spectroscopy and Fluorescence spectroscopy. The UV-Vis spectrum of Zn-complex exhibited bands at 240 nm, 285 nm, 315 nm, and a characteristic band at 410 nm. GLP content was tested at 410nm using UV-visible spectroscopy with method LOQ 18 ppm GLP, LOD 18 ppm GLP and the method sensitivity was found to be 10 ppb. Here, the yellowish colour of solution of Zn-terpyridine in methanol instantly disappeared when the concentration of added Glyphosate was above 1 ppm, and this could be observed in naked eye. Therefore, this work evident the Zn-terpyridine complex as a novel method for the detection of GLP.

**Keywords:** Glyphosate, Spectrophotometry, Terpyridine, Detection