

MONITORING TECHNIQUE FOR HEAVY METAL ASSESSMENT IN DIFFERENT REGIONS OF PUNJAB USING FEATHERS OF FERAL PIGEONS (*COLUMBA LIVIA*)

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ABSTRACT : Heavy metals are one of the major environmental issues due to large number of sources and diligence. The amount of heavy metals in washed and unwashed feathers of feral pigeon were investigated in this study. The feathers were collected from five distant locations: Agronomy Farm Punjab Agricultural University, Ludhiana, Jalandhar FCI (with low traffic volume and anthropogenic activities) and Cold Storage Jalandhar Bypass, Cold Storage Mullanpur, Hoshiarpur FCI (with high traffic volume and anthropogenic activities). Results revealed that metals such as Pb, Cd and Cr were deposited in feathers originating from air or soil. As was absorbed through pigeon's diet. The order of metal concentration was Jalandhar Bypass>Hoshiarpur FCI> Cold Storage Mullanpur> Jalandhar FCI> Agronomy Farm Punjab Agricultural University, Ludhiana which shows highest concentration due to high traffic and anthropogenic activities. Significant differences between As, Cd, Pb and Cr in washed and unwashed feathers recommend that concentrations of metals are directly related to exposure time. It is concluded that feathers of urban pigeons can be used to estimate heavy metals present in the atmosphere.

Key words : Atomic absorption spectroscopy, heavy metals, monitoring, environment, pigeon.

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INTRODUCTION

Birds occupy almost every habitat on earth, are present in large numbers and in different variety and forms. In India, agriculture sector experience the indiscriminate use of pesticides which leads to mortality of many birds (Dhindsa *et al*, 1994). As a result of urbanisation and industrialization, a significant number of contaminants have entered the atmosphere. Heavy metals are the pollutants that enter the food chain through manmade as well as natural sources, becoming very harmful to humans and animals (Swaileh and Sansur, 2006). Metals enter the body through food and can be eliminated or accumulated in the body. Metal elimination in birds occurs by deposition in uropygial glands, salt glands and feathers or through eggs (Braune *et al*, 2002; Lewis and Furness, 1991; Braune, 1987). Heavy metals are those elements that occur in small concentrations in the environment that is 5g/cm^3 (Adriano, 1986). The main sources of metals in the atmosphere are pesticides, fertilizers, oil combustion, emissions from the vehicles and

burning of industrial residues (Tavares and Carvalho, 1992; Egreja Filho, 1993).

Bioindicators for environmental contamination include fish, amphibians, terrestrial avians and beast (Fisk *et al*, 2005). Birds are useful bioindicators as they get exposure from a range of chemicals. Feathers can uptake metals by three ways; by having direct contact with air, water and soil, through food and by preening process (Bianchi, 2008). Feathers are used for metal contamination because they can be easily collectable without harming the bird (Goede and de Bruin, 1986; Burger, 1993). Metals may be processed, collected or even excreted until they've been absorbed into the body (Dauwe *et al*, 2000). Heavy metal levels estimated from bird's feathers is the total of endogenous and exogenous fractions. Exogenous exposure is during preening and direct exposure to air, water and soil. Endogenous exposure is due to ingestion of heavy metals with food then absorbed into the blood from the intestine and accumulates in the liver and kidney (Wayers, 2002).