

Heavy metals toxicity and the environment

[Environment](#), [Ecology](#)



Contamination of the environment by heavy metal is becoming the major global issue (Chauhan & Chauhan, 2014). Heavy metals have an atomic density greater than 4g/cm^3 which are often detected at different concentrations level in various environmental mediums. Because of their direct and indirect toxicities to plants, animals and human, those metals are identified as harmful environmental pollutants (Asati, Pichhode, & Nikhil, 2016; Martinez & Motto, 2000; Girmaye, 2014; Woldetsadik et al. 2017). Due to their persistency and ability of being deposited in plant tissue, soil, water and sediments; they are among the potential source of environmental contamination and bioaccumulation (Grul, E. 2005; Al-Balwai et al., 2013). Moreover, they are mobile from one place to another through different pathways (Ha, al., 2014).

Heavy metals can be accumulated in the environment through natural process (weathering process, leaching, soil erosion etc) and anthropogenic activities (industrialization, urbanization, mining, agricultural activity etc (Hanif et al., 2005; Khan et al., 2009; Addis & Abebaw, 2016). But currently, anthropogenic activities are the major sources for the accumulation of heavy metals in the environment (McLaughlin et al., 2000; Mengistie, Mol et al. 2015; Mengesha et al., (2017).

Researches revealed that inappropriate application of an agricultural pesticide, herbicide, fertilizers, fungicide, insecticide and other agricultural inputs are among the major contributors for heavy metals accumulation in Ethiopia (Mengistie, Mol, & Oosterveer, 2017). Awash River Basin is highly utilized basin in Ethiopia; due to availability water and land, the strategic place. Currently, the basin is one of the pollution-prone basins of the country

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Degefu et al.,(2013). Even though such kinds of pollution problems are found in the country, there is shortage of research on pollution. Consequently, there is lack of data on the different pollutants including heavy metals(Mekonnen & Agonafir, 2002).

Plants can be used as indicators of environmental pollution (Radulescu et al., 2013), they can accumulate heavy metals in their bodies (Emamverdian & Ding, 2017). Plants may not selectively take essential nutrients from soil, water and air; they can also take toxic heavy metals (Negussie & Endale Teju, 2015). Heavy metals in the plant cause DNA damage, inactivation of enzymes, peroxidation of lipids, protein oxidation etc (Hossain et al., 2012) Consequently, the productivity of plant can reduced (Hossain et., 2012; Chang et al., 2014; R. Nazir et al., 2015). Excessive accumulation of those metals not only reduce plant productivity but also plant nutrient quality (Pandey et al., 2009). Moreover, heavy metals are not only causing the above problem but also they can result in plant death (Asati et al., 2016; Emamverdian & Ding, 2017).

Human can expose to toxic metals and other pollutants in different ways; including consumption of unsafe plants in the form offood, medicine, drinking unsafe water and inhaling polluted air (Asati et al., 2016). Medicinal plants are one of the major pathways of heavy metals tohuman being. As a result, of using plant affected by heavy metals, human being can be exposed tohealtheffects like digestive problems, nervous malfunction and cancer and other health problems (Kos, V. et., 1996; Rukhsanda et al. 2015; Ogunlaja, Moodley et al. 2017).

According to reports, more than 80% of Ethiopian population is dependent on traditional medicine(Nibret et al., 2011; Ahmed et al., 2012) from a plant for curing from different diseases; due to the relatively low cost and other cultural backgrounds (Krauth-siegel, & Wink, 2011; Atinafu et al., 2015). However, those medicinal plants are collected from wild habitats without any study about their origin, purity and others(Wondimu et al., 2007; Stanojkovic-Sebic, et al ., 2015). Thus, using those plants for medicine can cause accumulation of heavy metals in human body which can result in different health problems. *Xanthium strumarium* L.(Asteraceae), *Ficus exacerbate* Val(Moraceae), *Persicaria attenuata*(R. Br)Sojak (Polygonaceae) and *Kanahia laniflora*(Asclepiadaceae) are among the common medicinal plants that are used in Ethiopia.

Xanthium strumarium L.(Asteraceae) locally called 'Bandaa' in Ethiopia(Nibret et al., 2011) and it is used for treatment of the fungal infections (Wondimu, Asfaw et al. 2007). Additionally, this plant is used for malaria diseases, cancer, eczema and rheumatism(Ma et al., 1998; Yin et al., 2005; Gautam et al., 2007). *Ficus exacerbate* Val is another medicinal plant with a wide distribution in Ethiopia and other African countries (Swanepoel & Van Jaarsveld, 2015).

These plant is used to treat different diseases like cough, wound healing, vermifuge, abortifacient, diuretic, hemorrhoid, lowering high blood pressure and for another disease (Ahmed et al., 2012; I. O. Lawal et al., 2012).

Persicaria attenuate (R. Br) Sojak (Polygonaceae) is another medicinal plant used in different African countries including Ethiopia. Besides to medicinal

value *Persicaria attenuate* (R. Br) Sojak (Polygonaceae) is used as a vegetable for food in different countries of the world (Maroyi , 2017).

The effects of heavy metals on plants were reported from different countries of the world. However, there are still few publications from Ethiopia related to heavy metals contamination on plants. Thus, determining the content of heavy metal accumulated in the plant is very important. Therefore, the main objective of this research was (1) To determine the concentration of heavy metals on selected plants namely; *Xanthium strumarium* L.(Asteraceae), *Ficus exasperata* Vahl (Moraceae), *Persicaria attenuata*(R. Br)Sojak (Polygonaceae) and *Kanahia laniflora* (Asclepiadaceae) from Awash River Basin, Ethiopia (2) To identify potential sources of heavy metals in plants.