## A true muslim essay sample

**Environment** 



## A true muslim essay sample – Paper Example

Chromium is a heavy metal which is considered as an environmental pollutant (Nafish et al, . 2012). It is 7th most occurring element on earth and its average concentration in the earth is about 100mg/kg. (Panda and Choudhory, . 2005). Apart from its importance chromium causing serious hazards for those organisms and plants that are exposed to the chromium in polluted areas of high concentrations. Being highly toxic metal it mainly comes from leather tanning, textile and electroplanting industries (Stern, 1982). As a result of smelting process, chromium is also found in air as aerosol. (Kimbrough et al., 1999). By the use of water wastes and industrial effluents, soil pollution is increasing day by day due to chromium contaminants present in the soil usually in urban areas (Mushtaq & Khan, 2010).

Chromium occurs in different oxidative states like trivalent Cr (III) and hexavalent chromium Cr(VI). Both these states differ in different aspcets like mobility, bioavailabilty and toxicity (Shanker et al,. 2005; Panda and Choudhory ,. 2005). Toxic effects of chromium highly depend on the different states of the oxidative states. As the solubility and toxicity of the trivalalent chromium Cr+3 form is less than hexavalent chromium Cr+6 form (Pandey and Sharma,. 2003). Hexavalent chromium is converted to trivalent chromium when it reacts with matter of organic nature, Fe (II), and sulfides and this is facilitated by the manganese oxides. (Becquerel et al, 2003).

Hexavalent chromium is easily available for living organisms because it is more soluble in water than trivalent chromium (Shrivastava et al,. 2002). Plants can grow well when there is less amount of chromium in the environment whether in case of high concentration of chromium it is https://assignbuster.com/a-true-muslim-essay-sample/

Page 2

carcinogenic to plants and animals (Shanker et al., 2005). At low concentration trivalent chromium is not as much harmful for the plants but when the concentration of the trivalent chromium is increased its lowers the plant growth (Sharma et al,. 2003; Cervantes et al, 2001). Every heavy metal supress the activity of plants according to its nature or its extent of toxicity (Ahmad et al., 2012). Due to wide use of hexavalent chromium in industries and processing unites it is second largest cause of soil and water pollution so it gains attention from the researchers. Among both forms of Chromium Cr(VI) is the most constant in the soil and is very harmful for the living systems. Being un essential plants have no specific mechanism to uptake the chromium so different type of compounds such as sulfate through sulfate transporters are used for its transport.

When chromium is taken up by the plants it causes highly harmful effect in the form of reduced development and growth, biomass accumulation, and many structural changes that are caused by the chromium. Chromium also interrupts certain mechanisms related to respiration and photosynthesis processes, water and minerals uptake mechanism. Many activities for starch and nitrogen metabolism are declined by Cr harmful effects both by direct interaction with the enzymes or through the secondary compounds production like ROS as a result Cr may even cause the death of plant species. There are some species are plants that can accumulate the Cr concentration in them without damage to their growth and development, Such Cr-tolerant, hyperaccumulator plants are browbeaten for their bioremediation property. ( HYPERLINK " http://link. springer. com/search? facet-author=%22Harminder+Pal+Singh%22" " \_self" Harminder. et al 2013) Growth and development of plants are mainly based on external means that are found in water and soil, however growth and development of plants are mainly affected be the presence of chromium in the exterior environment. Physiological processes of plants includes germination, root growth, stem growth, leaf growth and total dry matter production.

These all factors are affected by the presence of chromium although the capability of seed to grow in the chromium environment would depend upon its ability of bearing chromium toxicity (Peralta et al., 2001). Most important toxicity of chromium is related to photosynthetic pigment, photosynthesis, nitrate reductase activity and protein were documented in some species of alga (Rai et al ., 1992). The direct contact of metal with many cell components can start multiple metabolic responses and as a result on the way of plants normal development and growth (Assche and Clijsters, 1990). Chlorosis and necrosis in plants are also result of chromium toxicity in the plants (Cervantes et al., 2001). Plants uptake the chromium and this chromium is move to the food chain. Chromium interfares with many metabolic processes and deviate them from normal, harmful effects of chromium can be seen by reduced growth and phyto mass, chlorosis, impaired photosynthesis, stunting and finally plant death (Rai, et al 2002) (Sharma et al, 1995). Additionally plants rising in chromium-stressed environment face a potential risk from reactive oxygen species (ROS) like superoxide (O2), hydroxyl radicals (OH) and hydrogen peroxide (H2O2). (Vajpayee, at al 2002).

Some factors like biochemical changes in fields, reducing of root and shoot length and lowering the number of branches due to chromium.( Purohit et https://assignbuster.com/a-true-muslim-essay-sample/ al,. 2003). Plants exposed to many environmental stresses effected from oxidative stress, and this is the Important limiting factor leading to altered metabolism and cell death (Panda and Choudhury, 2005a, b). Mechanisms by which they mediate the deleterious effects of the Reactive Oxygen Species ROS. Such defense systems involve both enzymatic and non-enzymatic antioxidants (Panda. 2002). The enzymatic defensive machinery operates by chronological and immediate action of a number of antioxidant enzymes such as Catalase (CAT), Superoxide dismutase (SOD), Ascorbate peroxidase (APX), Guaiacol Peroxidase (GPX) and Glutathione Reductase (GR). These are inducible when they are exposed to biotic or abiotic stresses (Foyer et al., 1994; Panda., 2002). Non-enzymic antioxidants like Ascorbate (AsA), Glutathione (GSH) and a-tocopherol also play an important role in regulating the toxic effects of the ROS in cells (Panda et al., 2003; (Choudhury and Panda, 2005).

Plants can detoxify the metal cations by means of phytochelatins (PCs). However, unlike heavy metals such as Cu, Pb and Cd, Cr is unable to induce PCs, and thus plant responses to this metal are less clearly understood (Sanita di Toppi et al., 2002; Panda and Choudhury, 2005a, b). The Cr detoxification pathway in higher plants might be achieved by the synthesis of MTs, although the mechanisms involved are not yet clearly elucidated (Shanker et al., 2004; Panda and Choudhury, 2005 a, b). Plants are familiar with the environment due to the process of phytoremediation, the process which is used to clean up the toxic metals and xenobiotics from the environment(Suresh and Ravishankar, 2004). Before 1980's there was no concept of phytoremediation related to scintific study of plants although it was introduce for about 300 years ago(Lasat, 2000). Pollution is controlled by the process of phytoremediation with the help of plants as during this process toxic metals are degraded. (Raskin et al., 1997; Pulford and Watson, 2003). While in the process of phytoextraction and phytominning hyperaccumulator plants play an important role as they have the ability to recover heavy metals from the soil that degrade during the process of phtyoremediation as comapred to the plants that have less ability to tolearte the stress of heavy metals.

For making plants hyperaccumulated or familiar with the process of phytoremediation should have notice on amount of metal taken by the paints, its physical condition that in what time the length of the whole plant decreases after the stress of heavy/toxic metals. These type of hyperaccumulated plants belong to the family of vascular plants (Revees and Baker, 2000; Prasad and freitas 2003). Even though it is inexpensive process weather phytoremediation is not as much simple as the natural method. Besides all these phytoremediation is not simple technology in which hyperaccumulator plants grow in the polluted environment, for this purpose highly expert scientists do well in choosing best varities of the plants that grow in the specific area according to the nature of metals.,(Alkorta et al., 2004). Contamination due to toxic metals like chromium in the soil contains minning of these metals in the soil(Lombi et al., 2001). The extensive use of toxic metals like chromium became a major problem of the pollution as a result of its excessive use in the industry. Some important factors like major wastes coming from minning, paper mill and textile industries cause a major problem leading to pollution of toxic metals in the environment.

## A true muslim essay sample – Paper Example

The amount of heavy metals present in the soil is much more higher than the amount needed by the plants that puts toxic effect. The plants affected by the highly toxic metals like chromium resulting in unhygenic food . (Wang et al., 2003). Toxicity effects of hexavalent chromium also seen on wheat plants as it reduces the length of plants, growth of seeds, shoot and root length also in the net result of photosynthesis rate (Dey et al., 2009). The mechanism of action of superoxide dismutase, glutathione reductase and ascorbate peroxidase is also affected by the activity of hexavalent chromium Cr(VI) (Subrahmanyam, 2008). By the use of biological and physiochemical test , effects of toxic metals like chromium on plants can be reduced. Rhizobacteria play an important role in reducing the toxic effects of chromium in plants as it is growth promoting bacteria (Khan et al., 2012a & 2012b).