

Herbal medicine in the time of climate change: How does climate change impact on how we select herbs and use them responsibly?

With the initiation of this new millennium one big question is arisen; "Are we leaving a safe world for our future generations?" It is now clear that climate change will bring more catastrophes in our life and further effect of this change will be increased day by day. Millions of people are now suffering from the disastrous effect of climate change like, Drought in many places has now become more frequent. Cyclones and hurricanes are now more common in south Asia and in pacific region. Many of the countries are now facing demolishing heat waves and wildfires. Environmental catastrophes due to climate change causing extinction of many herbal plants. Many emerging and re-emerging diseases are now threatening our existence. These diseases are causing a stress in using synthetic and human made drugs. More uses of antimicrobials are causing more resistance of drugs and leaving less choice for us as alternatives. So, Protecting these herbal plants and using herbal medicine as an alternative can be an effective solution in this climate change.

Herbal plants are being damaged in many ways due to adverse effects of climate change. The synthesized product of herbs are indispensable natural resource which comprises as a potential source of new products. This natural therapeutic plants gives numerous help to human population, Specially in zones where western medication is inaccessible. Additionally, Herbal medicine are also extensively used in veterinary medicine which helps to improve livestock health and thus gives economic security to the owner. But, Many local herbs or plant species of different geographic regions vulnerable to climate change may face high risk of extinction in near future due to their limited distribution. The consequences of climate change are already being felt in many places across the world and its effects in terrestrial ecosystem are significant. Due to climate change, Many countries like Bangladesh have changing atmosphere and temperature that breaking down of commensal connections relationship and thus causing extinction of many herbs. Some species of plant due to this continuous environmental disaster not only decreases in biomass but also their chemical content can also be altered which can also reduce quality of that herb and may also create safety problem using that herb. Moreover, Due to climate change the life cycle and environmental distribution of different types of herbal plants is changing.

In addition to changes in plant physiology, Climate change influences the switch in species distribution. Due to more urbanization and industrialization more trees are being cut down thus resulting loss of habitat in recent years. For some species, Relationship with pollinators and other commensal organisms may be disrupted due to climate change. Insect populations have already been greatly reduced by human activities specially habitat destruction and pollution from pesticides and other chemicals and using insecticide without hindrance worsening this extinction and will exacerbate this situation in upcoming future. Furthermore, Changes in temperature may lead to long-term abnormalities in interspecies interaction and may alter plant population dynamics and ecosystem functioning in any specific geographic region. Also, Climate change could affect the chemical constituents of an specific herb and ultimately cause extinction of that herb. Particularly, The increasing temperature due to green house effect can

also causes stress in plants, Can affect metabolism and other physiological mechanism that a specific plants follow thus leads towards disruption in their medicinal effect. Effects of climate change on plants which are used both as food and medicine contributing to peoples health are also affected. Such for example, Several major oilseed crops in our country having lower oil content when they were grown at higher temperatures. Also, Due to warming temperature and rising carbon-di oxide level as a result of more industrialization, Greenhouse effect can causes variation in growth cycles of different plants and herbs and also active ingredients of the plants that act as a drug may also can be changed due to physiological stress. Additionally, Herbal plants and yields in numerous areas can be influenced by environmental change and are relied upon to be increasingly helpless towards pathogens that can leads to danger both the food security and quality. As a result, Due to these above mentioned reasons our choice of herbal drug to treat the diseases of humans and animals are decreasing and become selective day by day as a result of unfavourable climate changes.

Because of the effect of climate change, Diseases of human and livestock population are increasing and creating pressure on existing drugs and also in our practice. Climate change has already resulted in the introduction of certain infectious diseases into previously unaffected geographic areas. Due to this climate change our environment is being adversely affected. Human and livestock population are not being able to cope with this adverse effect. As a result it is effecting their body condition. Climate change also causing increase in vector of diseases, May cause changes in the vector range and abundance in a geographical area, Causing persistent survival of pathogen in the vector population. As for example, Insect vector like tropical mosquito such as anopheles species is increasing which transmit malaria. Chikonguniya and Dengue is now becoming more frequent in our country. At present in our country, Lumpy skin disease (LSD) epidemic has broken out which is also a vector borne viral disease. Changing weather and temperatures can also cause shifting and increase in pollen occurrence season. This could lead extend in the hay fever season and people who have not previously suffered to this may also suffer. Due to more industrialization and pollution changes occur in air quality and dust. Above mentioned factor could have potentials to increase the risk of asthma and other respiratory diseases which also causing increase use of synthetic pharmaceuticals.

Due to all above reasons, In our country Antimicrobials like Antibiotics, Anti-fungal, Anti-helminthic being used more and more to treat not only infectious diseases but also in any kind of common diseases and symptom of human and livestock. As a vet student, I am observing that antimicrobials are not only being used to treat only infectious diseases of the animal but also as a growth promoter and metaphylactic, Meaning the clinical sign present in only one animal but the whole herd is being treated with antibiotic. A recent example is LSD epidemic in our country. Though its an viral disease but due to insufficiency of viral drug in my region many practioners using antibiotic. Also, In some cases where it was totally not needed. Aggressive use not only causing side effects in animals but also widespread use of antimicrobials may lead to strong adaptive response in the microbial world and thus lead to resistance of these drugs. Moreover, These drugs has also side effects that could effect the food quality of farm animals reared for food purpose. Maximum farmer in our country don't follow the withdrawal period of the antimicrobial drugs. Though, We can't completely ban the use of antimicrobial as it can cost a huge damage in animal health and welfare. In this case, Herbal

medicine can help us a lot to solve this issue. We can Use herbal medicine in those areas where antimicrobials is not needed in order to tackle this resistance. As for example, As previously mentioned, In our Country Lumpy skin Disease(LSD) epidemic has broken out recently. In some cases of cattle in my village I used Neem(*Azadirachta indica*) extract mixing with soda, molasses and salt and after giving that mixture to cattle for seven days and also treating with autohemotherapy I have got tremendous result. Neem leaves also have antiseptic and antifungal properties. At younger age, When I was affected with chicken pox, My mother used Neem leaf and it was very effective. In addition to this, Different indigenous plant of our Indian subcontinent region like, Akanadi (*Cissampelos Pereira*) is effective as it has antiviral properties. Kachner (*Bauhinia variegata*), Mehndi (*Lawsonia inermis*) has immunomodulatory and anthelmintic properties. And also, indigenous plant like Dhak (*Butea monosperma*) has anthelmintic, antibacterial and antiasthmatic properties. These plants can be used in livestock to decline the overuse of antimicrobials. Also in some cases of livestock we use Pineapple seed and Neem leaf as anthelmintic. We also use Ginger (*Zingiber officinale*) in cattle in order to reduce gas bloat. In case of human, Turmeric (*Circuma longa*), Ginger (*Zingiber officinale*) is effective as they posses anti-inflammatory property. Ginger also can be used a decongestant .We use Garlic (*Allium sativum*) as its posses anti fungal properties. Tamarind (*Tamarindus indica*), Tea tree oil posses antimicrobial property. We also use Tulsi (*Ocimum tenuiflorum*) against cough. We can use peppermint as carminatives to eases gas and also to promote digestion. Peppermint also useful to reduce headache. Furthermore, Eucalyptus can be used as expectorant as it helps expel mucous from respirtaory tract. Also, Black tea and green tea can be used as astringent. In additon to, Ashwagandha (*Withania somnifera*) increase ability to handle mental and physical stress. We can use Aloe vera as its promotes wound healing. I am belonging from a family benefited from above mentioned herbal medicine. In our family we are used to taking green tea and black tea that helps us to reduce fatigue. So, If we use herbal medicine instead of antimicrobials where it is not needed, We can tackle resistance of this drugs and also have less side effect.

Herbal medicine can also contribute to protect our environment. Due to climate change, Many new emerging and re-emerging disease effecting us more. As a result it seems that future generation will taking more medicines than ever before. There is an increased demand of Synthetic drugs and more pharmaceutical industry are being set up globally. This Can lead to more disruption in natural environment as many of the developing countries does not have proper maintenance protocol. Huge amount of Chemicals is needed to prepare this synthetic drugs. If this products does not prepared with proper maintenance protocol, Pharmaceuticals residue can mix with aquatic environment, soil and even also in the food chain. This can act as a Chemical and Biological hazard of public health Concern. As a result, We can see that different type of toxicity cases are being increasing day by day due to more use of insecticide and pesticide. Due to overuse of antimicrobials in livestock and human the residue of those drug can mix up with soil and manure and thus leads to antimicrobial resistance. So, If we can use herbal medicine as an alternative to synthetic medicine we will be able to control the excessive use of synthetic medicine. Also, Herbal medicine has less side effects, residual effect and these can help to maintain balance in environment and food chain. So using, Herbal medicine instead of synthetic medicine can help us to protect our environment.

Climate change is now becoming a global problem. It is not only causing environmental imbalance but also leading towards extinction of many indigenous medicinal plants. Human and animal population is now becoming more susceptible towards new diseases and thus use of more synthetic drug causing more drug resistance. Also, Environmental imbalance is occurring due to lack of maintenance and production protocol of this drug. So, Herbal medicine could be a possible solution to combat this war. I am Ifteqar Hassan, Final year doctor of veterinary medicine student at Chattogram Veterinary and Animal Sciences University, Bangladesh. My future dream is to create a Veterinary Botanical Medical association in Bangladesh and to lead herbal medicine profession in my country. If I could win this scholarship this would help me to fulfil my dream.