



Contents list available <http://www.kinnaird.edu.pk/>

## Journal of Natural and Applied Sciences Pakistan

Journal homepage: <http://jnasp.kinnaird.edu.pk/>



### CLIMATE CHANGE, CONFLICT AND BALUCHISTAN

Hamna Moin\*<sup>1</sup>

<sup>1</sup>Asia pacific college of business and accounting, Charles Darwin University, Australia.

#### Article Info

\*Corresponding Author

Email: [hamna.moin@students.cdu.edu.au](mailto:hamna.moin@students.cdu.edu.au)

#### Abstract

This study is about understanding concepts of climate change in context of conflict in Baluchistan. Also it focuses how climate change leads toward conflict and is Baluchistan is dealing with climate change led conflict. Conflict can be defined as inharmonious relationship/contact/prospects between states/people/parties. Such conflict can become violent when mutual conflicts/tensions are not resolved and differences are not addressed that leading to the use of violence. Climate change amid the potential effects multiplies the threat of resource scarcity, such as water scarcity and food insecurity. In more violent cases that are interconnected to climate change, migration is underlined to be the response to such intense and not rare phenomena for instance floods. Therefore, migration, water scarcity, and food insecurity all centre on the road to conflict. Balochistan, which is primarily made up of dry and arid regions, has been affected by climate change in the same way as other areas of the nation. This is because the region has consistently seen below-average rainfall, which has led to droughts and water scarcity. Balochistan is already suffering from multiple conflicts that include, nationalist, sectarian, ethnic migration and criminality and violence. Under such circumstances Baluchistan is grieving more than other provinces of Pakistan, this research is to find out does climate change is also a major factor contributing to these grievances and conflicts, does it means climate change is or could worsen the already existing situation. This is also not wrong to say policy does not address the grievances of Baloch people so the main issue about conflict remain under the carpet so it creates more air of conflict.

#### Keywords

Climate change, water scarcity, food insecurity, ethnic migration.



## 1. Introduction

Environmental change and potentially violent conflict describes violence, as deliberate and intentional typically done with the aid of weapons and during the conflict. Only three studies include the destruction of property in their definition of violence; no study considers structural forms of violence or uses only human harm as a threshold for violence. For a violent incident or conflict to be acknowledged, the majority of the research looked at the requirement that at least one of the conflict parties be a state. (Scheffran, *et al.*, 2012). Thus, the typical concept of violence in the quantitative research on violent conflict and climate change might be summarised as follows: The intentional, direct, and reciprocal killing of individuals by state troops and a formally organized non-governmental group is known as violence. Although most of the quantitative work to date has focused on violent incidents involving at least one state actor, there is an emerging recognition that climate change is more likely to result in isolated acts of communal violence without the involvement of the state. Additionally, some qualitative research focuses on types of violence that may not always result in homicide. However, additional study is still required to resolve the paradox that climate change will likely be established for low-level conflict. Many contend that conflicts will worsen as a result of climate change or variability, though not as a direct result of a single causal mechanism. Wallenstein and Swain identified two aspects of environmental destruction in the context of armed conflict in the 1990s: (a) environmental destruction as a result of conflict, and

(b) environmental destruction as the root of conflict. Population migration is commonly cited as one of the primary connecting factors between climate change/variability and armed conflict in the discussion, which emerged significantly in the 1990s. Increased competition will eventually lead to new security issues as a result of the predicted increase in the number of climate change/variability migrants, which would put stress on receiving communities that may already be under resource stress (Swain, & Salehyan, 2005). Analyzing potential intricate connections and feedbacks between climate change, natural resources, human security, and social stability is a viable strategy. A systemic architecture like this takes into account indirect interactions. The relationship between the climatic system and societal stability, including violent conflict, as well as the effects on natural resources and human security, which may have an impact on society and the propensity for violent behaviour. (Reuveny, 2007). The physical and social environment creates conditions that encourage, restrain, or change the use of individual or group violence. People feel threatened and pressured to use force to defend themselves and their property from the threat of others in an atmosphere of insecurity and violence, which may result in a self-stabilizing collective "climate of violence." The political-economic environment, the dominant identity configurations, the specific class and power structures, and the ethnic composition of the respective societies, and how these filter environmental stresses, affect vulnerabilities, restrain human capacities and drive political

responses, determine whether such an environment is supportive of cooperative, confrontational, or even violent behaviour. (Krug *et al.*, 2002). Once critical levels of insecurity and violence have been reached, a self-reinforcing cycle of violence could start when one violent act leads to another. Violence can change (for example, from violent conflict between communities to insurrections and even wars between states) and spread to other states or regions, for example, through (cross-border) migration, racial ties, resource movements, underground marketplaces, or the export of weapons. Other characteristics, such as hard terrain or oil deposits for insurgencies, gender norms for domestic violence, or cultures of violence for armed conflict between various populations, also become key for escalation dynamics. Societies in transition or on the verge of instability, such as fragile and failed states with social fragmentation, poor governance institutions, and insufficient management capabilities, are more prone to the creation of spirals of violence. These regimes are unable to provide the essential tasks of government, such as the monopoly on the use of force, welfare, participation, and fundamental public services (including infrastructure, health, and education). (Theisen *et al.*, 2013) Since humans depend on resources to survive, resource scarcity can heighten the desire for individuals or groups to use violence to seize or defend resources. This may then contribute to the depletion of resources. Conflicts may result from forced migration owing to resource scarcity or cultural differences in the receiving communities. Political elites may use violence as a tool to impose unfriendly environmental policies on

the public. It is possible for a conflict to escalate or to twist into violence when this is met with violent opposition from the affected parties. This is illustrated by the copper mining situation in Bougainville, Papua New Guinea. The effects of climate change, as manifested by more extreme weather and frequent (intense) natural disasters, might overwhelm socially cohesive groups'(human security/societal relationship) capacity for adaptation and jeopardize the livelihood of entire communities. (Barnett & Adger, 2007). Environmental causes, for instance, were not to blame for the war in Afghanistan. However, the quick overexploitation of natural pistachio woods led to deforestation, soil erosion, and water scarcity because of uncertainty about future resource access during periods of war and land mines covering the farmed area. Present day, Climate change and human insecurity accompanied by it created by war make it harder to stop the violent conflict. It is reductionist and impractical to draw a direct connection between the consequences of climate change and violent crime or global security. They emphasize that "politically aware, societal, and cultural establishments in mediating between the two components of the equation" are the missing piece instead. In talks regarding disputes over natural resources and environmental deterioration, institutional accountability is claimed to be of paramount importance. (Smith *et al.*, 2008). In almost all scholarly works, the role of governmental institutions in resolving disputes and correcting inequities or problems related to livelihood is discussed. Goetschel & Peclard (2011) go further

than this, asserting "Climate change may render human interaction and social regulation more difficult, but it will hardly ever directly affect the probability of violence. Climate policy will not bring about peace any more than peace policy will improve the climate". They don't dismiss the notion that scarcity and conflict may be affected in some way by climate change, but instead they aim to transfer the blame from climate change as the primary cause of violence to state structures. Why are there no violent conflicts when developed nations are affected by severe droughts, massive floods, or high temps? One factor is the high levels of social and political stability that exist in comparably developed nations: when farmers' crops fail, they have insurance; when the property is damaged, there are recovery centres where victims can stay; when injuries occur, hospitals treat the victims; when state agencies rush to help. Poor governance, economic marginalization, and significant environmental vulnerabilities are already present when catastrophes strike really impoverished cultures with low levels of social stability. Social scientists are making the case that the link between climate change and violence is complicated and cannot be reduced to a simple one between environmental factors changing and individuals acting violently in general, climate change will make it harder for fragile nations to ensure stability and offer services. The social fabric and the connection between governments and the populace, in particular, can be put under stress by extreme climatic occurrences. While prompt government action in the wake of disasters might

enhance the social compact, inadequate action is more likely to damage it, fostering additional unrest and fueling the downward spiral of fragility, violence, and vulnerability. However, it is equally crucial to stress that conflict and fragility are caused by a variety of factors, including climate change. Threatening other hazards, climate change multiplies them. Ineffective state security force responses, a lack of conventional conflict resolution techniques, a lack of trust in the legitimacy of the government, marginalization, religion, identity, and pervasive corruption are other significant factors that contribute to fragility (Adano *et al.* 2012; Benjaminsen *et al.* 2012, *et al.*). In conceptual and statistical models of conflict occurrence, political (such as government) and economic (such as country-level profits and inequality) measures shouldn't be ignored. Most studies on the connections between climate change, resource depletion, violence, and disasters agree that political violence depends on the political and economic features of the public and civilizations. According to Hsiang, *et al.* (2011) environmental factors must be examined in relation to the political, social, demographic, and economic causes of conflict. The latter factors are "poor controls" since weather indicators could have endogenous effects. However, to disregard these variables in favor of "fixed effects" undercuts important elements known to affect political violence. These variables include the ability of the government, the degree of poverty, the evolution of democracy, population traits, the time of year, and patterns of the past and current violence. Civil wars, militia activity, intergroup conflict, and

riots can all happen in the same state, but they are all sparked by different political factors. Researchers frequently attempt to explain the findings through the incentives and disincentives for conflict, even when studies have discovered a climate/weather signature, such as the significant correlations between precipitation variance and violence. Studies on rebel activity, for instance, reveal a decline in violence during the rainy season, when it is challenging for both national and rebel troops to navigate the terrain with inadequate infrastructure. When strategic attempts are made to capture territory, riches (for example, by cow raiding), and control of migration routes, these are the times in pastoral areas when violent activity is at its peak. When making decisions, weighing costs and benefits, and taking logistical issues into account, accomplices in these strategic movements are influenced by climate trends. Every technique highlights the multicausality of the observed conflicts. There is general agreement that environmental deterioration is never the sole cause of conflict but rather frequently one of many intricately connected reasons. (Peluso & Watts, 2001). There is agreement on the location of the conflicts that are thought to have an environmental component. Even when they can be classified as cross-border conflicts, they are typically not conventional interstate conflicts in the sense of large-scale wars between countries, but rather locally focused conflicts at the sub-national level, such as between states that border on the same rivers and lakes. Finally, all of the methods stress the crucial role that a state's or society's capacity for

problem-solving plays in the creation and management of conflicts: conflict is proportionately more likely to arise in regions with weak political and social institutions. Therefore, it is predicted that future crisis hotspots will be found in nations and areas that are regarded problematic in terms of their potential to solve problems. (Verhoeven, 2011)

### *1.2 Balochistan, conflict and climate change*

The largest province in terms of territory and lowest in terms of people is Baluchistan, which is found in the southwest of Pakistan. Approximately 347,190 km<sup>2</sup> (or 44% of Pakistan's total land area) is covered by the province. Quetta, Zhob, Sibi, Nasirabad, Kalat, and Makran are the six administrative divisions of Balochistan. These divisions are further subdivided into 32 districts and 137 tehsils. A District Coordination Officer is in charge of each district. Geographically, the region is divided into flood plains and coastal plains, with the remaining 20% being defined as intermountain us. Sulaiman, Toba-Kakar, Central Brahui, Kirthar, Chagai, Raskoh, and central Makran are among the principal mountain ranges. (Ahmed *et al.* 2016). Because they have less capacity for adaptation, developing nations like Pakistan are more vulnerable to the effects of climate change. Pakistan is particularly vulnerable to the effects of climate change due to its dry topography and lack of resources. The country is experiencing a constant increase in climate-induced migration, and frequently older parents and people with disabilities are left behind in degraded areas where they are compelled to subsist on scarce natural resources and in extreme poverty (Brown, 2007) Floods, dry spells, extremely high temperatures, and

a water deficit are only a few of the weather dangers that have become more frequent and severe in the nation. Due to its arid climate, the province of Baluchistan is one of the most susceptible to hydrological risks. However, the province has recently seen sporadic, strong rainfall that have contributed to flash floods during monsoon season. Extreme weather patterns, decreased water availability, dwindling arable land, and protracted dry periods have all contributed to large-scale migration within the study area during the previous ten years. Long-term migrations are replacing seasonal migrations. Sometimes displaced communities don't come back. The rural population has moved to barrage regions in search of work, food, and water for their families and cattle as a result of protracted drought times. (Ahmed,2007). People are being forced to relocate more frequently because they have no other choice. The analysis reveals a growing pattern of local permanent migration in different regions. This monsoon brought significant rainfall to Pakistan. Extreme flash floods in various areas of the country occurred after the rain. The Balochistan infrastructure was damaged by the flood waves. 85 percent of the people of Balochistan make their living mostly from agriculture. Large-scale agricultural destruction from floods left some struggling financially. With a protracted Sui gas suspension, no electricity, a lack of food goods, and no cell network, life in the province was completely paralysed. Due to the ongoing flooding, the government declared a 7-day holiday for all educational institutions in the province. Only the heartbreaking images published

on social media, where people could be seen helplessly pulling dead bodies out of the waters, can be used to gauge the depth of the provincial government's indifference to the suffering of people in such a dreadful circumstance. (Routray *et al* .2013). Balochistan boasts a wide variety of wildlife. Balochistan's distinctive topography, which includes plains of varied elevations and a mix of hilly territories, presents difficulties that are related to climate change. The province has the lowest HDI (Human Development Index), which makes it more vulnerable to climate change, which has an effect on socioeconomic and health conditions. Locals and those in the periphery, such as Balochistan, are more likely to be impacted. In Balochistan, structural inequality and climate extremes are interwoven and have exacerbated marginalization. Conflicts cycle due to the intersection of militancy, terrorism, and criminality. Climate calamities are currently affecting disadvantaged places. The patterns of precipitation have altered and grown unpredictable as a result of climate change. In North-eastern Balochistan, recent torrential rains have caused damage. With the growing urbanization, climate disasters are wreaking havoc, particularly in the peripheries. Balochistan has seen every type of natural disaster, including drought, floods, water shortages, and forest fires. (Mazhar *et al*.2015). Additionally, the inferior material has been shattered through dozens of dams in Balochistan. Numerous homes were destroyed, and roads and bridges that connected them have washed away. When there is a lack of safety nets and poor infrastructure, exposure to these flash floods has become relatively high.

These costs of climate catastrophes aren't just materialistic; they also have an impact on people's mental health and well-being. Half of the 1.4% were destroyed by forest fires in the Sherani district in June 2022. The trade in pine nuts was the primary source of income for the Pashtun majority in the area, whose livelihoods were severely disrupted by the woods. People in PirKoh have been forced to drink water from ponds and filthy water sources, which has resulted in the spread of diseases including cholera. In PirKoh DeraBugti, the cholera outbreak claimed the lives of more than 21 individuals and infected hundreds more. PirKoh had 50,000 people without access to water. In Balochistan, more than 85% of the population lacks access to clean drinking water (Mishra, 2010).

## **2. Discussion**

The weight of the climate problem is already too much for the already impoverished lifestyles of those living on the margins. Due to displacement and forced migration, they have also lost their homes, means of support, and cultural connections to their home countries. By adding to the burdens currently being placed on already marginalized and vulnerable groups, climate change has made the disparities already present in Balochistan worse. Their homes becoming uninhabitable and their security and health are at risk is the worst effect. For instance, water scarcity and food insecurity are intrinsically linked to environmental deterioration and human security. No matter how it affects the entire world, marginalized people are disproportionately impacted by climate change. The causes of many oppressions are deeply entwined with the structural

underpinnings of climate change, which has dire repercussions. Droughts Despite being in a dry location, the Balochistan province experiences severe drought conditions due to lower annual precipitation. Floods and erosion of the soil, every year during the monsoon, flash floods occur as a result of heavy rains. such as heat waves, and extreme weather conditions in the last few decades, Balochistan has experienced heat waves. About 200,000 people were killed in Balochistan and Sindh in 2015 due to the heat wave. seasonal variations and lower crop production. The production of wheat and vegetables has decreased as a result of less rainfall, droughts, desertification, and seawater intrusion. Increased saltwater intrusion and sea level rise in the districts of Badin and Thatta, there has been a loss of productive land and waterlogging as a result of the salty sea water entering the river. According to the post-disaster evaluation, the provincial government's disregard for infrastructure development programs laid the way for the regrettable large-scale calamity. The Gwadar Ormara basin, Porlai River basin, and Hub River basin are the three principal river basins in the coastal districts of Baluchistan. These basins become inundated during the monsoon and spill tiny dams and reservoirs. In the catchment areas and floodplains, coastal residents always worry that a new wave of fresh floods may destroy their houses, other properties, and livelihoods. Most dams in Balochistan lack proper construction and are either improperly built or badly designed. For instance, numerous small dams and reservoirs collapsed after being filled to capacity or were on the verge of doing so, posing serious safety risks. increasing the risk to

more people's lives. As a result of the absence of a well-developed infrastructure, the severity of the crisis increased tremendously. (PDMA,2015). The provincial government must make sure that aid in the form of food and shelter as well as financial help is given to all those affected as soon as possible while the federal government works with the provincial and gives support. It must also take into account building resilient, weather-friendly infrastructure throughout the province so that upcoming extreme weather disasters may be handled quickly and effectively. The provincial government must make sure that aid in the form of food and shelter as well as financial help is given to all those affected as soon as possible while the federal government works with the provincial and gives support. It must also take into account building resilient, weather-friendly infrastructure throughout the province so that upcoming extreme weather disasters may be handled quickly and effectively. First and foremost, all nations should adopt and implement climate change programmes since everyone will suffer if the climate continues to deteriorate. However, there is disagreement over how emerging nations will help to reduce emissions. Developing nations are not held to the same standards as the highly polluting developed countries in global climate initiatives managed by international agencies. They must nevertheless be conscious of the issue posed by their contributions to and indulgences in regards to emissions, pollution, etc. However, it may be argued that their primary attention should be on the welfare of their own inhabitants and efforts to combat poverty. To be able to be more flexible when making

policy decisions, austerity should be abandoned as the standard framework large-scale public investment in creating a low-carbon, diversified economy that is supported by green technologies and renewable energy sources and where economic activities within and across sectors are connected through resource-effective links Adopt a green industrial policy that proactively identifies the areas where the biggest barriers to investing in climate adaptation are, directs funding to these initiatives from both the public and private sectors, and keeps an eye on how well the money is being managed Adopt a green agricultural strategy that safeguards small farmers, offers connections to green industrialization both backwards and forwards, safeguards the environment, and improves food security through higher agricultural productivity and economic stability. Utilize the circular economy and production of renewable energy to diversify your economy and lessen your reliance on basic commodities. Modest businesses and rural communities can benefit from the economic viability of renewable energy production on a small scale. Putting into practise ambitious climate change mitigation plans to reduce the rise in the world's average temperature and its effects on resource availability and structural violence. First and foremost, mitigation is switching from an energy system that relies heavily on carbon to one that relies on renewable energies like wind, solar, and hydropower. Disaster management requires the development of new skills, such as emergency planning and decision-making processes. Early warning global information systems could aid in



prompt reactions to extreme catastrophes. In order to maintain human livelihoods in the face of changing climatic conditions, societies can develop technology, physical, human, and social capital through adaptation strategies, such as more effective use of natural resources, the growth and production of new types of natural resources, and the provision of a sustainable energy source. Human migration is a kind of adaptation to climate change that not only poses a threat but also may present opportunity. In order to increase regional adaptive capacities and resilience to climate change, migrant networks can promote the interchange of information, the employment of regional security principles to stabilise weak and fragile governments affected by climate change would lessen the need for violence through crisis prevention, conflict resolution, and common security. Mechanisms for using armaments to restrict violent forces in conflicts go along with disarmament, non-proliferation, and control. Of money, and other resources.

### 3. Conclusion

People in climate change-affected regions are aided in their innovative efforts to protect livelihoods, share risks, and equally distribute resources by cutting-edge social and institutional procedures, such as participatory conceptions, stakeholder dialogues, mediation, and adaptive governance. The feasibility of all recommendations and strategies to deal with climate change is influenced by an analysis of the economic determinants and geopolitical forces that shape globalisation and governmental responses to it, including the rise of neo-liberalism and the disregard for traditional institutions at the local level.

### References

- Adano WR, Dietz T, Witsenburg K and Zaal F. (2012) 'Climate change, violent conflict and local institutions in kenya's dry lands'. *Journal of peace research*. 49(1):65-80
- Ahmed, K., Shahid, S., Sobri, H., Wang, X., (2016). Characterization of Seasonal Droughts in Balochistan Province, Pakistan. *Stochastic Environmental Research and Risk Assessment*. 30 (2). 747-762
- Ahmed, S., (2007). Persistent Drought of Balochistan and Impacts of Water Availability and Agriculture. *Water for Balochistan Policy Briefings*. Vol. (3) No.6. 1-7
- Ashok Swain *Third World Quarterly* Vol. 17, No. 5 (Dec., 1996), pp. 959-973 (15 pages) Published by: Taylor & Francis, Ltd.
- Ashraf, M., Routray, J.K., (2013). Perception and understanding of drought and coping strategies of farming households in north-west Balochistan. *International Journal of Disaster Risk Reduction*. (5). 49-60
- Benjaminsen TA, Alinon K, Buhug H and BUN seth JT (2012) 'Does climate change drive land-use conflicts in sahel?' *Journal of peace research*. 49(1):97-111
- D. H. Smith, 'Poverty-Environment Linkages and their Implications for Security', in *Environmental Change and Human Security: Recognizing and Acting on Hazard Impacts*, ed. P.H. Liotta, David A. Mouat, William G. Kepner and Judith M.

- Lancaster (Dordrecht: Springer, 2008), 327-340
- Etienne Krug, Linda Dahlberg, James Mercy, Anthony Zwi and Rafael Lozano, World report on violence and health (Geneva: World Health Organization, 2002).
- Harry Verhoeven, 'Climate Change, Conflict and Development in Sudan: Global NeoMalthusian Narratives and Local Power Struggles', *Development and Change* 42 (2011): 679-707; Marcel Leroy, *Environment and Conflict in Africa - Reflections on Darfur* (Addis Ababa, Ethiopia: University for Peace, 2009).
- Jon Barnett and W. Neil Adger, 'Climate change, human security and violent conflict', *Political Geography* 26 (2007): 639-655.
- Jürgen Scheffran, Michael Brzoska, Jasmin Kominek, P. Michael Link and Janpeter Schilling, 'Climate change and violent conflict', *Science* 336 (2012): 869-871; Nils Petter Gleditsch, 'Special issue on climate change and conflict', *Journal of Peace Research* 49 (2012): 3-257.
- Mazhar, N., Nawaz. M., Mirza, A.I., Khan, K., (2015). Socio-political Impacts of Meteorological Droughts and their spatial patterns in Pakistan. *Research Journal of South Asian Studies*. 30 (1). 151-152
- Mishra, A.K., & Singh, V.P., (2010). A review of drought concepts. *Journal of Hydrology*, 91(1), 202-216.
- Nancy Lee Peluso and Michael Watts, 'Violent Environments', in *Violent Environments*, ed. Nancy Lee Peluso and Michael Watts (Ithaca, London: Cornell University Press, 2001), 3- 38
- Nils Petter Gleditsch, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg and Håvard Strand, 'Armed Conflict 1946-2001: A New Dataset', *Journal of Peace Research* 39 (2002): 615-637
- Oil brown (2008) 'Migration and Climate change' chatham house. *Environment, Energy and Resources* 1-60
- Ole Magnus Theisen, Nils Petter Gleditsch and Halvard Buhaug, 'Is climate change a driver of armed conflict?' *Climatic Change* 117 (2013): 613-625; Jürgen Scheffran and Antonella Battaglini, 'Climate and conflicts: the security risks of global warming', *Regional Environmental Change* 11 (2011): S27-S39.
- PDMA (Provincial Disaster Management Authority) (undated). *Situation Analysis: Balochistan – Incorporating Gender in Disaster Risk Management*. Retrieved from: <http://www.pdma.gov.pk/wpcontent/publication/Situation%20AnalysisGender%20and%20Child%20Protection%20Cell.pdf> (access date: 16.12.2015)
- Peclard, Didier ; Published in, Goetschel, L. *The politics of peace: From ideology to pragmatism?* Münster: Lit Verlag. 2011, p. 95-106.

Peter wallenstein, Ashok swain, 30 May 1997

Chapter 41 Environment, Conflict and Cooperation In book: The Global Environment: Science, Technology and Management (pp.691 - 704)

Rafael Reuveny, 'Climate change-induced migration and violent conflict', *Political Geography* 26 (2007): 656-673.

Salehyan, I. 2005. Refugees, Climate Change, and Instability, paper presented at the Human Security and Climate Change, An International Workshop. Holmen Fjord Hotel, Asker, near Oslo, 21-23 June 2005.

Solomon M. Hsiang, Kyle C. Meng and Mark A. Cane (2011) 'civil conflicts are associated with the globalclimate' *Nature* volume 476, pages 438–441 *Bulletin of the National Research Centre*. 43: p.171.

Thiyagarajan SS and Kuppusamy H, 2014. Biological control of root knot nematodes in chillies through *Pseudomonas fluorescens*'s antagonistic mechanism. *Plant. Sci.*, 2: 152-158.