







**Table 3** Density, frequency and abundance of parthenium weeds alongside road

Study sites	Density (Plants/m <sup>2</sup> )	Frequency (%)	Abundance
Nyabikulungo	1.9	36.7	5.3
Kagenyi	4.1	73.3	5.6
Rubwera	5.8	90.0	6.4

**Table 4** Density, frequency and abundance of parthenium weeds in crop land

Study sites	Density (Plants/m <sup>2</sup> )	Frequency (%)	Abundance
Nyabikulungo	1.2	53.3	2.3
Kagenyi	2.0	63.3	3.2
Rubwera	6.4	80.0	8.0

In three surveyed villages, parthenium weed was observed along the road side, crop and grazing lands. The presence of this weed alongside road might have helped the dispersal and spread of parthenium hysterothorus weed in crop and grazing lands in Kyerwa district. Also the quick spread of parthenium weed in non-infested areas of Kyerwa district could be attributed to dispersal of seeds by winds, water movement, animal and human activities such as using the weed as groom for cleaning the environment at residential areas. The findings of present study added information of the 2010 report and 2014 about the invasion and distribution of Parthenium weed in Arusha, Tanzania [12, 17]. Furthermore, results this study provide information to community, scientists, ecologists and other stakeholders on the extent of the widespread of the invasive weed *parthenium hysterothorus* along road side, residential areas, crop and grazing lands of the country.

#### 4. Conclusion and Recommendations

The results of the present study provide a baseline information and quantitative comparison of the invasion and spread of parthenium weed alongside roads, croplands, residential areas and grazing lands of Nyabikulungo,, Kagenyi and Rubwera villages in Kyerwa district. There is a need to develop appropriate measures to contain the further spread of this aggressive weed in non-infested areas of other villages and districts of the country.

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#### References

[1] Dogra, K.S., S.K. Sood, and R. Sharma, Distribution, Biology and Ecology of Parthenium hysterothorus L.(Congress Grass) an invasive species in the North-Western Indian Himalaya (Himachal Pradesh). African Journal of Plant Science, 2011. 5(11): p. 682-687.  
 [2] Khan, H., et al., Distribution of Parthenium weed in Peshawar valley, Khyber Pakhtunkhwa-Pakistan. Pakistan Journal of Botany, 2014. 46(1): p. 81-90.  
 [3] Gnanavel, I., Partbenium hysterothorus L.: A Major Threat to Natural and Agro Eco-systems in India. Science International, 2013. 1(6): p. 186e193.

[4] Pimentel, D., et al., Economic and environmental threats of alien plant, animal, and microbe invasions. Agriculture, Ecosystems & Environment, 2001. 84(1): p. 1-20.  
 [5] Riaz, T. and A. Javaid, Invasion of hostile alien weed Parthenium hysterothorus L. in Wah Cantt, Pakistan The Journal of Animal and Plant Sciences (Pakistan), 2009.  
 [6] Shabbir, A. and R. Bajwa, Distribution of parthenium weed (Parthenium hysterothorus L.), an alien invasive weed species threatening the biodiversity of Islamabad. Weed Biology and Management, 2006. 6(2): p. 89-95.  
 [7] Shabbir, A., K. Dhileepan, and S.W. Adkins, Spread of parthenium weed and its biological control agent in the Punjab, Pakistan. Pakistan Journal of Weed Science Research, 2012. 18(Special Issue): p. 581-588.  
 [8] Khan, H.M., Khan Bahadar Khan, Muhammad Azim Hashim, Saima, Herbicidal control of Parthenium weed in maize. Pak. J. Bot, 2014. 46 (2): p. 497-504.  
 [9] Javaid, A., S. Shafique, and S. Shafique, Management of Parthenium hysterothorus (Asteraceae) by Withania somnifera (Solanaceae). Natural Product Research, 2011. 25(4): p. 407-416.  
 [10] Zuberi, M.I., T. Gosaye, and S. Hossain, Potential threat of allien invansive species: Parthenium hysterothorus L. to subsistance agriculture in Ethiopia. Sarhad Journal of Agriculture, 2014. 30 (1): p. 117-125.  
 [11] Adkins, S.W., et al. Parthenium weed (Parthenium hysterothorus L.) research in Australia: new management possibilities. in Proceedings 17th Australasian Weeds Conference'.(Ed. SM Zydenbos.) pp. 2010.  
 [12] McConnachie, A., et al., Current and potential geographical distribution of the invasive plant Parthenium hysterothorus (Asteraceae) in eastern and southern Africa. Weed Research, 2011. 51 (1): p. 71-84.  
 [13] El-Azazi, E.-S., et al., Ecological Studies of some Acacia species grown in Egyptian Derserts. Earth, 2013. 7: p. 3.8542.  
 [14] Payne, R.W., GenStat. Wiley Interdisciplinary Reviews: Computational Statistics, 2009. 1 (2): p. 255-258.  
 [15] Kapoor, R., Awareness related survey of an invasive alien weed, Parthenium hysterothorus L. in Gautam Budh Nagar district, Uttar Pradesh, India. Journal of Agricultural Technology, 2012. 8 (3): p. 1129-1140.  
 [16] Kaur, M., et al., Effects and Management of Parthenium hysterothorus: A Weed of Global Significance. International Scholarly Research Notices, 2014. 2014.  
 [17] Ramadhan Kilewa, A.R., Distribution of Invasive Weed Parthenium hysterothorus in Natural and Agro-Ecosystems in Arusha Tanzania. International Journal of Science and Research (IJSR), 2014. Volume 3 ( Issue 12): p. 1724-1727.

#### Author Profile



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