

Parthenium Weed and Its Effects

Home to mountain gorillas, elephants, and giraffes, Uganda is well-known for its abundant and diverse natural beauty. International tourists, however, are not the only foreigners intermixing with this extraordinary ecosystem: enter, the invasive parthenium weed (*Parthenium hysterophorus* L.). At first glance, one might assume this plant all but adds to the rich biodiversity of the region. Parthenium weed, however, poses a great threat to the integrity of East Africa's agricultural prosperity, and ultimately human health, evident via indicators from the United Nations Sustainable Development Goals (SDGs).

Native to the Americas, parthenium weed has managed to traverse the globe and is found today on every continent except Antarctica (Weyl et al., 2019). The plant is typically seen along "naturally disturbed areas" such as roadsides, rivers, or open rangelands, and it is believed that motor vehicles may be the greatest contributor to the weed's high distribution (Adkins and Shabbir, 2014). Parthenium weed was not detected in Uganda until 2008, but now retains a substantial presence, especially in the western, central, southeastern, and northeastern regions of the country (Wabuye, et al., 2014).

Uganda continues to rely heavily on the agricultural industry for economic support, employing 70% of the population and contributing to 25% of the annual GDP (Making Farmers, 2018). Maize, one of the most important crops, has been detrimentally affected by the recent introduction of parthenium weed in the country. Approximately 0.7 - 1.8 million USD are lost each year to smallholders in maize production, thanks to the weed's rapid germination rate and spread, which has resulted in stiff competition for resources between the two plants (Pratt et al., 2017). This deficit is crushing for subsistence farmers who rely on their own food production for both financial stability, and nourishment. A well-defined health determinant, household income,

plays a significant role in the quality of one's health. Ugandan farmers who have lost money to decreased crop production might choose to invest what little they have in more imminent problems, such as housing or electricity, versus seeking primary health care for their families. A second consequence related to decreased production is food insecurity. SDG 2, with a goal of No Hunger, analyzes the percentage of children under five whose growth has been stunted. Children living in environments where their family's farm is their main source of food have a higher risk of attributing to this statistic if the production yield happens to be limited. The current UN goal for stunted growth is zero, however Uganda's under-five population was 31.10% stunted in 2019 (Prevalence, 2016).

In addition to negative impacts on crop yields, parthenium weed can affect cattle production as well. Consumers have agreed that cattle which grazed on property containing parthenium weed produced milk and meat with a tainted flavor, different from that which is typically enjoyed (Hundessa and Belachew, 2016). Additionally, too much parthenium weed consumption can be toxic to livestock, resulting in their inability to be used in the production process (Hundessa and Belachew, 2016). These factors can significantly decrease sales and revenue from what should be a lucrative business. As aforementioned, socioeconomic status is a major influence in regard to one's health, and SDG 1, No Poverty, monitors this in Uganda. There are currently over 18 million Ugandans living in extreme poverty, or under US\$1.9 per day, 47% of whom live in rural areas, where most of the agriculture industry takes place (World Poverty Clock, 2021). Living in extreme poverty increases the risk for a person to develop both non-communicable disease and communicable diseases. It also increases the risk of death due to injury, for example, a fall or automobile accident.

Not only does parthenium weed indirectly affect health, direct contact with the plant can result in dermatitis, with the possibility of becoming chronic if lichenification develops (Towers and Rao, 1992). Skin contact with the weed may occur, for example, if a farmer is attempting to rid their field of the nuisance, but lacks the proper tools to do so without putting themselves in harm's way. Further, some 73% of people are allergic to the weed's pollen grains which can result in asthma, hay fever, bronchitis, and other respiratory-related conditions, or more simply, seasonal discomfort for a prolonged period (Khari and Kumar, 2018). SDG 3, Good Health and Well-Being, uses the indicator, Age-Standardized Death Rate Due to Cardiovascular Disease, Cancer, Diabetes, or Chronic Respiratory Disease in Adults Aged 30-70 Years, to monitor various non-communicable diseases, including those related to the respiratory tract. The longtime goal for this indicator is a probability of 9.3% from dying from one of these illnesses. In 2016, however, this value was 21.90%, while that same year, was tenfold less in the United Kingdom with a probability of 10.90%. Parthenium weed's pollen grains may contribute to this value as it can be a precursor to developing serious non-communicable diseases later in life.

While it may not externally appear to be a malicious threat, parthenium weed has the capability to devastate Uganda's economy, the nourishment of its citizens, including millions of children, and contribute to various chronic respiratory conditions. The plant's ability to germinate and reproduce quickly have empowered it to avoid containment and to spread throughout the country, muchless the world. The triage of needs for developing nations is ethically complex, as concerns such as parthenium weed exist, competing against other pressing issues, like lack of water and sanitation resources. Slow advancements in invasive species management are promising, so one can hope that this silent, yet noxious weed's time is limited.

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