

The observed decrease in monarch butterfly population over the past years is a growing concern. Conservation efforts have arisen to maintain their historic annual migration but groups have been focusing on the wrong issues. A common explanation for the shrinking abundance is the increased use of genetically modified (GM) crops. Many argue that as crops with genetic resistance to herbicides become more frequent the use of herbicides also becomes more frequent. These chemical treatments then kill the common milkweed, the primary food source of monarch caterpillars during the summer, subsequently harming the monarch population.¹ In response many have begun planting milkweed to restore their abundance. While the increased usage of GM crops does put strain on monarch populations recent studies show that it is not the primary source of concern. Environmental groups must look beyond planting common milkweed to analyze broader systemic problems if they hope to save the monarch butterfly population.

Today's decline in monarch population is part of a trend that has been occurring for many years. In 2019, Boyle and his colleagues released a paper tracking the monarch butterfly population using museum and herbaria specimen.² This data showed that the monarch butterfly population has been declining since 1950, which greatly precedes the invention of genetically modified organisms (GMOs) in 1996.³ The start of the decline in milkweed also precedes the invention of GMOs, thus the use of GM crops cannot possibly be the main reason for the monarch's shrinking population. A study from 2016 similarly concluded that GM crops are not

¹ Stenoien, C., K. R. Nail, J. M. Zalucki, H. Parry, K. S. Oberhauser, and M. P. Zalucki. 2018. Monarchs in decline: a collateral landscape-level effect of modern agriculture. *Insect Science* 25:528–541.

² Boyle, J. H., H. J. Dalglish, and J. R. Puzey. 2019. Monarch butterfly and milkweed declines substantially predate the use of genetically modified crops. *Proceedings of the National Academy of Sciences* 116:3006–3011.

³ Boyle et al. 2019

to blame for the observed trend due to the stage of migration where population reduction occurs.⁴ It is in the spring and summer months when the monarch butterflies are in northern America feeding on common milkweed, but each year they migrate to Mexico for the winter. 22 years of citizen data on population abundance across North America found that the number of adult monarch butterflies is predictable in their migration from spring to summer and summer to fall but not from fall to winter as there is an abnormal drop in population during this stage.⁵ When in Mexico, during the winter, the monarch butterflies do not feed on milkweed so a loss of population at this time could not be due to reduction in common milkweed as a result of GM crops. Instead the decline must be due to issues in acclimating to their overwinter habitat.

More research is necessary to discern what exactly is causing the reduction of the monarch butterfly population but it is clear their re-establishment in Mexico is unsuccessful. Potential threats to the population include climate change, predators, parasitoid, disease and a lack of nectar from flowers during the fall.⁶ Since milkweed no longer flowers during this time in their migration, monarch butterflies turn to other flowers as a food source. Harm to the environment has potentially reduced available plants or disturbed their flowering cycle. The overall poor habitat quality for monarch butterflies as they travel south has been detrimental to their population abundance.

While planting milkweed is essential for maintaining the monarch population, due to the strain GM crops puts on them, it is not sufficient to stop the decline. Environmental groups can only hope to restore the monarch population by tackling more global issues. A declining

⁴ Inamine, H., S. P. Ellner, J. P. Springer, and A. A. Agrawal. 2016. Linking the continental migratory cycle of the monarch butterfly to understand its population decline. *Oikos* 125:1081–1091.

⁵ Inamine et al. 2016

⁶ Inamine et al. 2016

ecosystem is responsible for over 50 years of monarch butterfly population shrinkage.

Environmental groups need to push for further research into understanding the monarch's annual migration as well as efforts towards becoming greener. Unfortunately the shrinking abundance of monarch butterflies is not an issue with one clear answer. This trend is a product of broader systemic problems but through the efforts of student environmental groups we can better understand how to protect the monarch population in the years to come.

References:

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