



Role Of Processed And Natural Cotton On *Aedes aegypti* Egg Hatching

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Abstract

Ae. aegypti is an invasive species and playing a crucial role in disseminating the infectious diseases like dengue and Zika fever. This mosquito, prefers to live in areas close to humans where blood is easily accessible (Powell, *et al.* 2013). Female *Ae. aegypti* mosquitoes use the blood meal to obtain the nutrients necessary for reproduction to complete their life cycle. After a female takes the blood meal into her midgut, the blood proteins are enzymatically digested into amino acids, which are then released into the hemolymph nutrients (Pacey & O'Donnell, 2014).

While working on mosquitoes in insectary, we observed that certain cotton types have effect on oogenesis as the obtained eggs were not hatching and if hatched it took longer time than usual. This leads us to key hypothesis, that either cotton fibers are blocking certain essential nutrients or there could be some chemicals in processed cotton that are affecting egg development. The current research can be a big step towards the suppression of mosquitoes. Considering the current situation in endemic areas we need to come up with new and effective tools.

Purpose

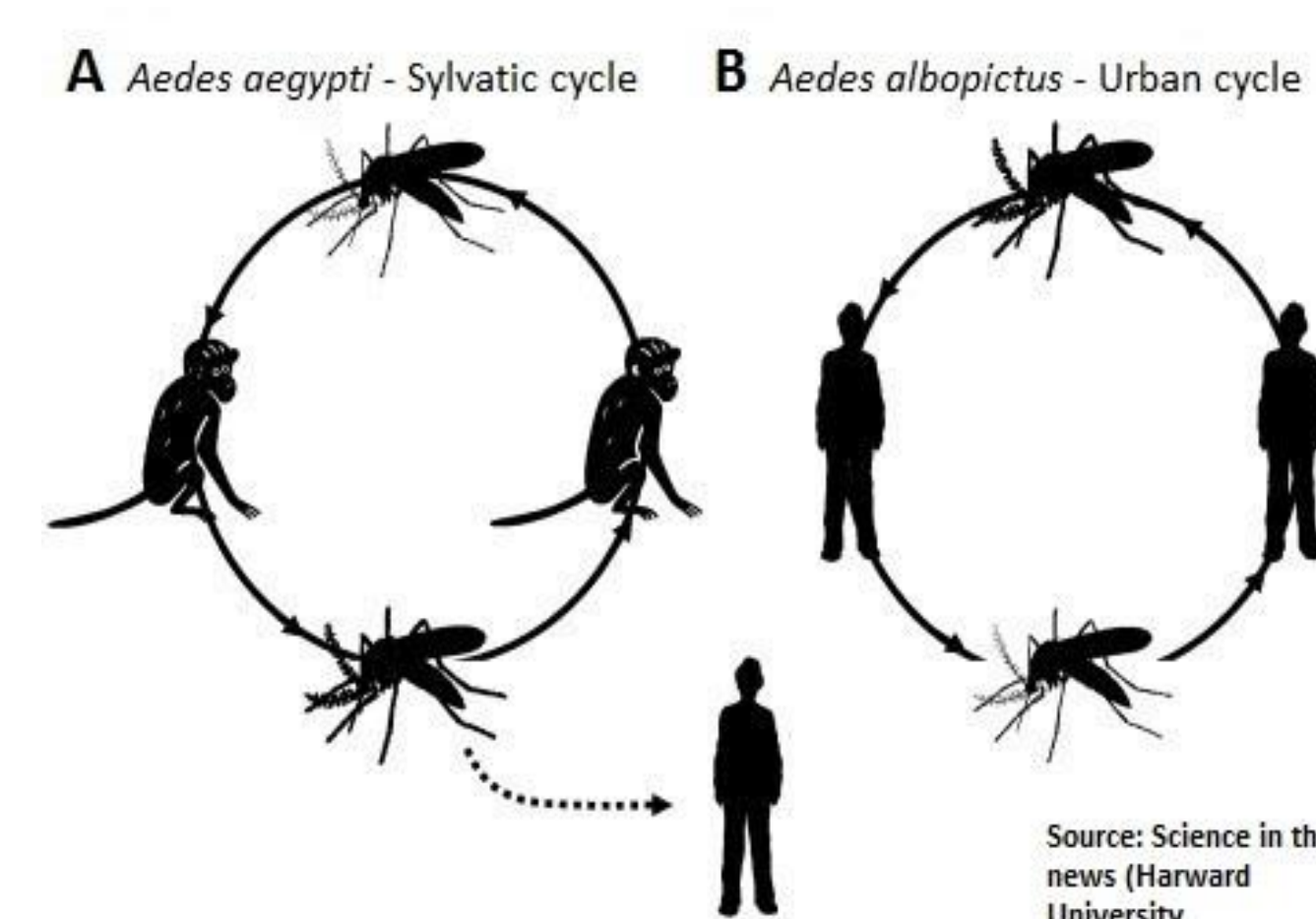
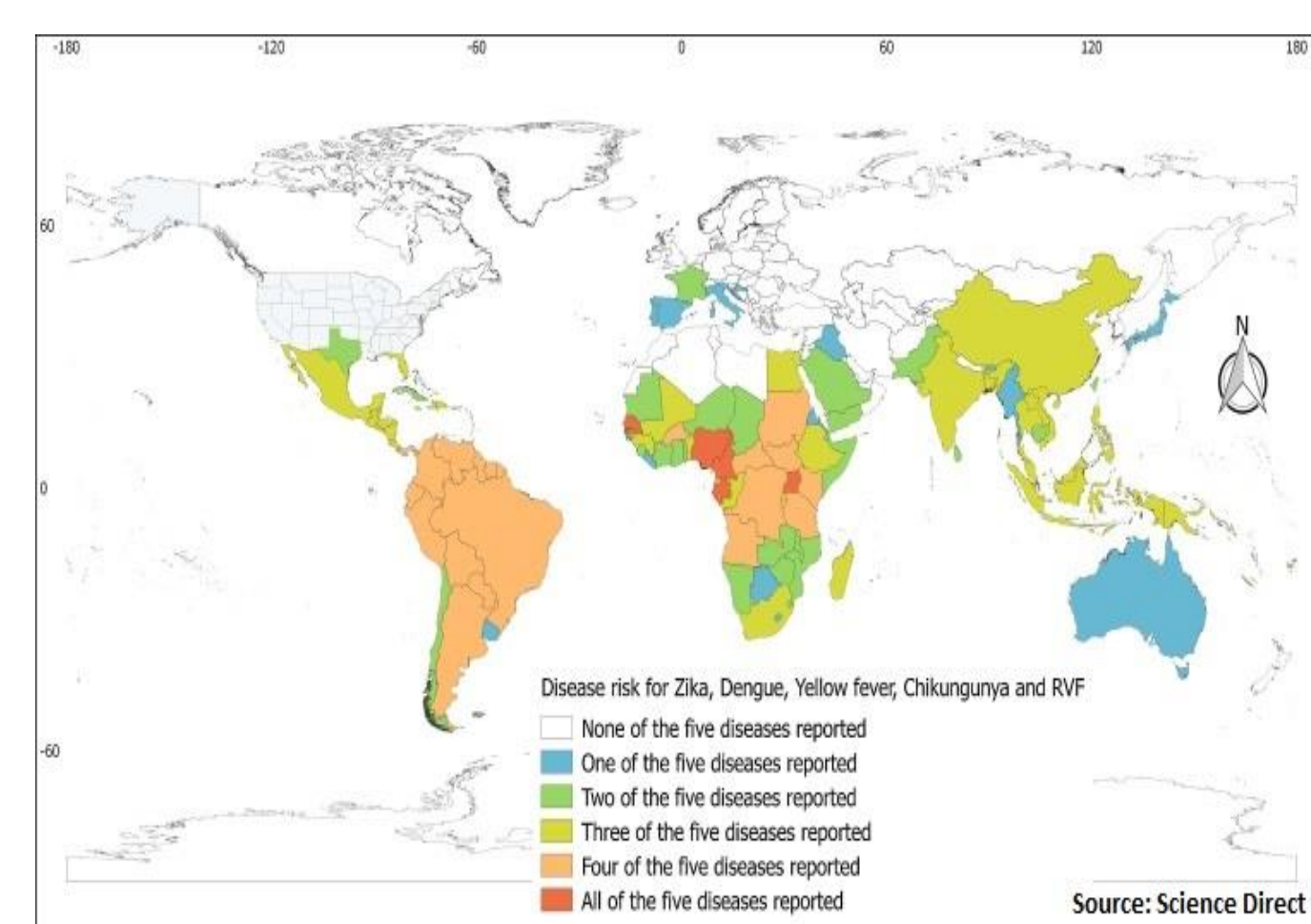
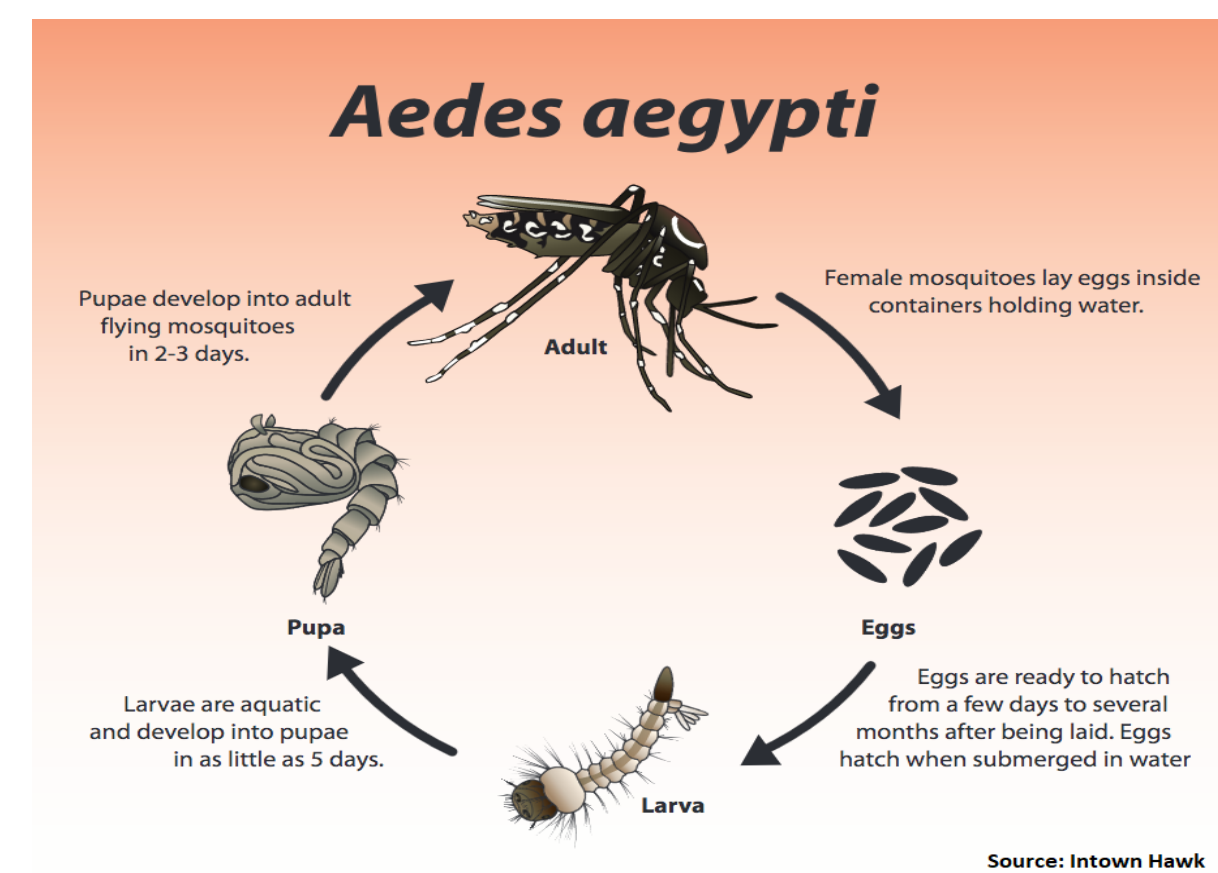
Our main research goal is to find effective mosquito control methods to check mosquitoes and block disease transmission.

Hypotheses, and Predictions

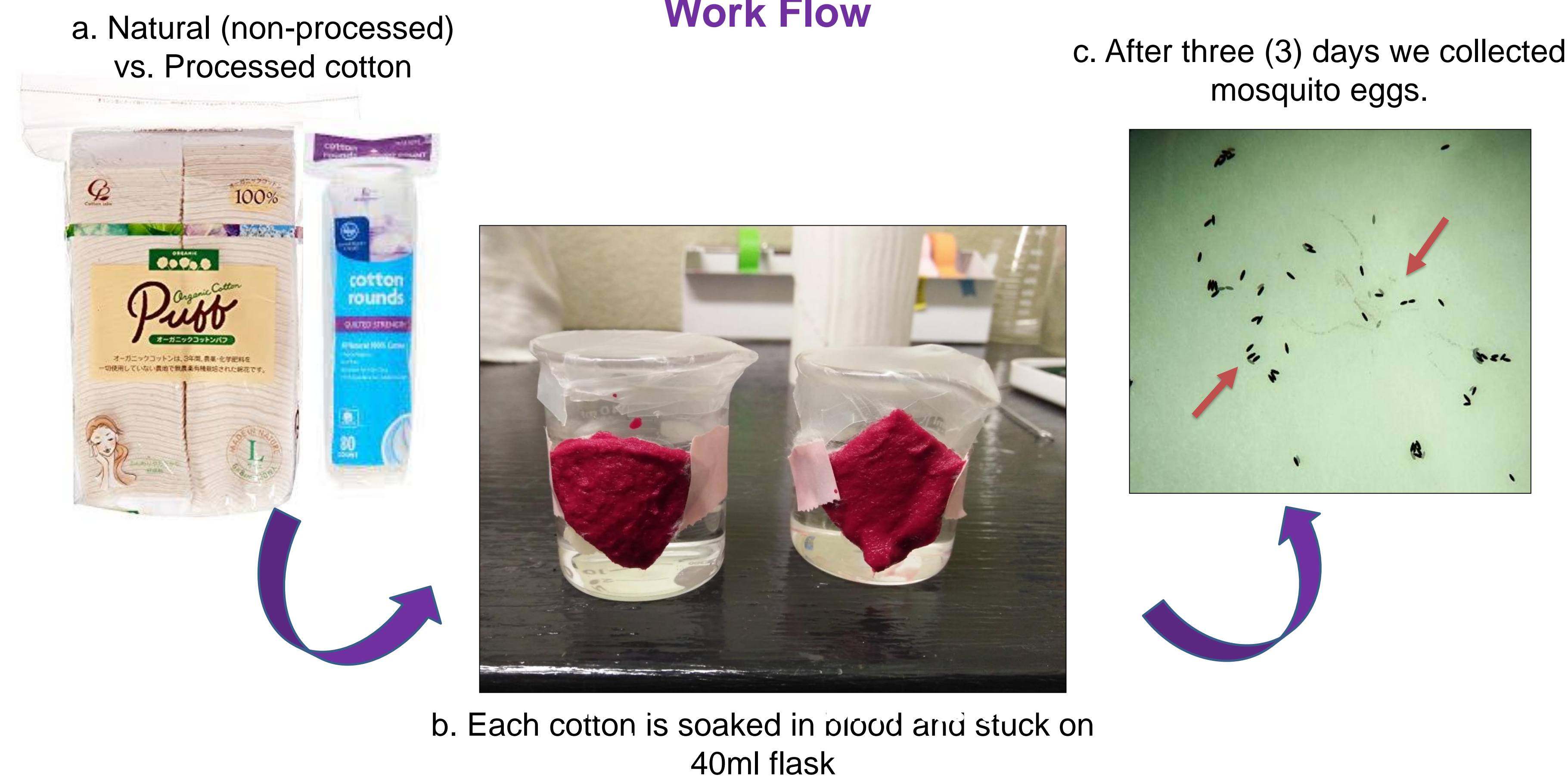
Hypothesis: Either cotton fibers are blocking blood nutrients or there are certain chemicals in (Processed) cotton that influence the oogenesis.

Impact: In future, the current research can be beneficial to generate the oogenesis suppression insecticide.

Study System



Work Flow



Results

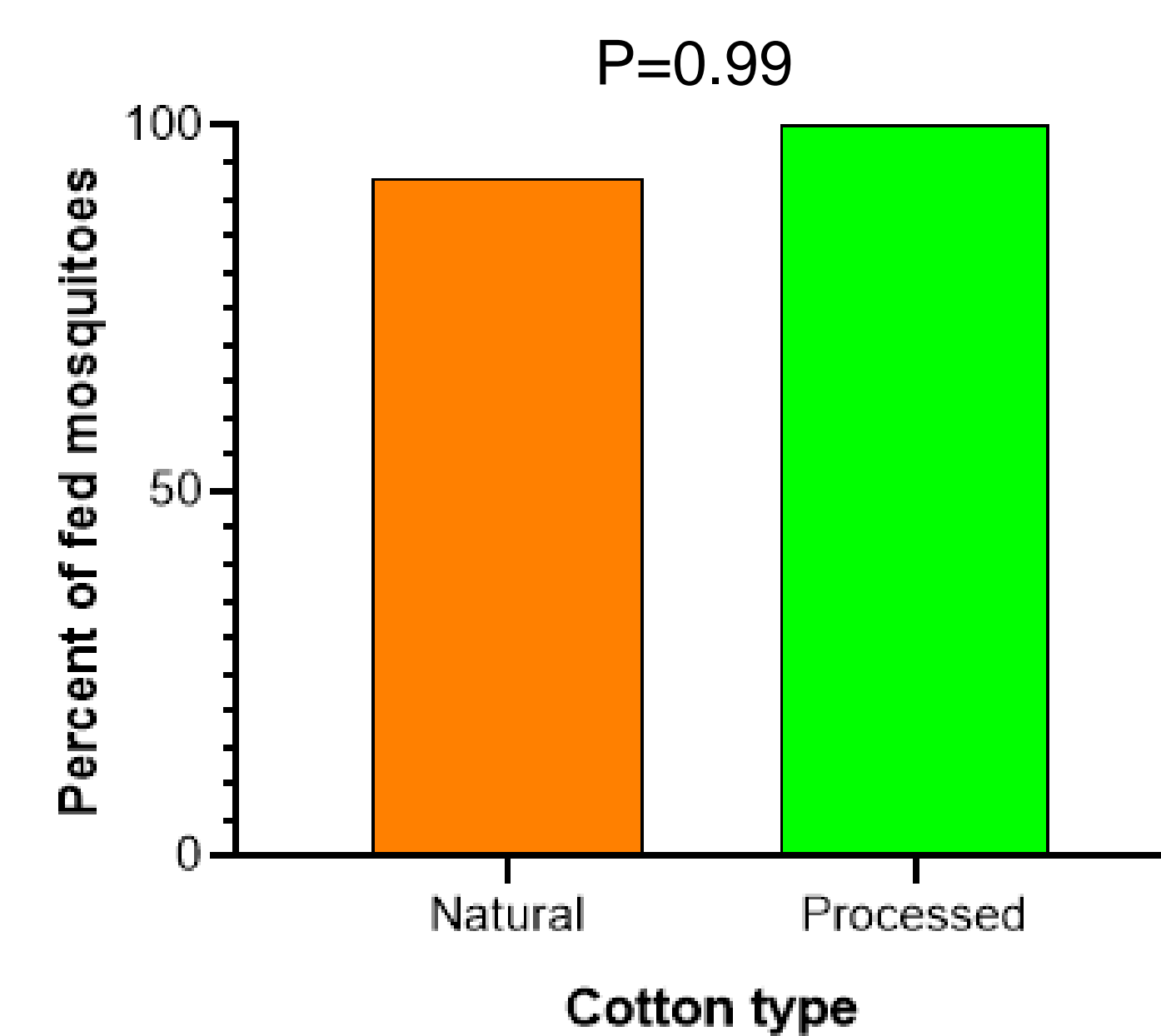


Fig.1 Percentage of mosquitoes that fed after exposed to each condition.

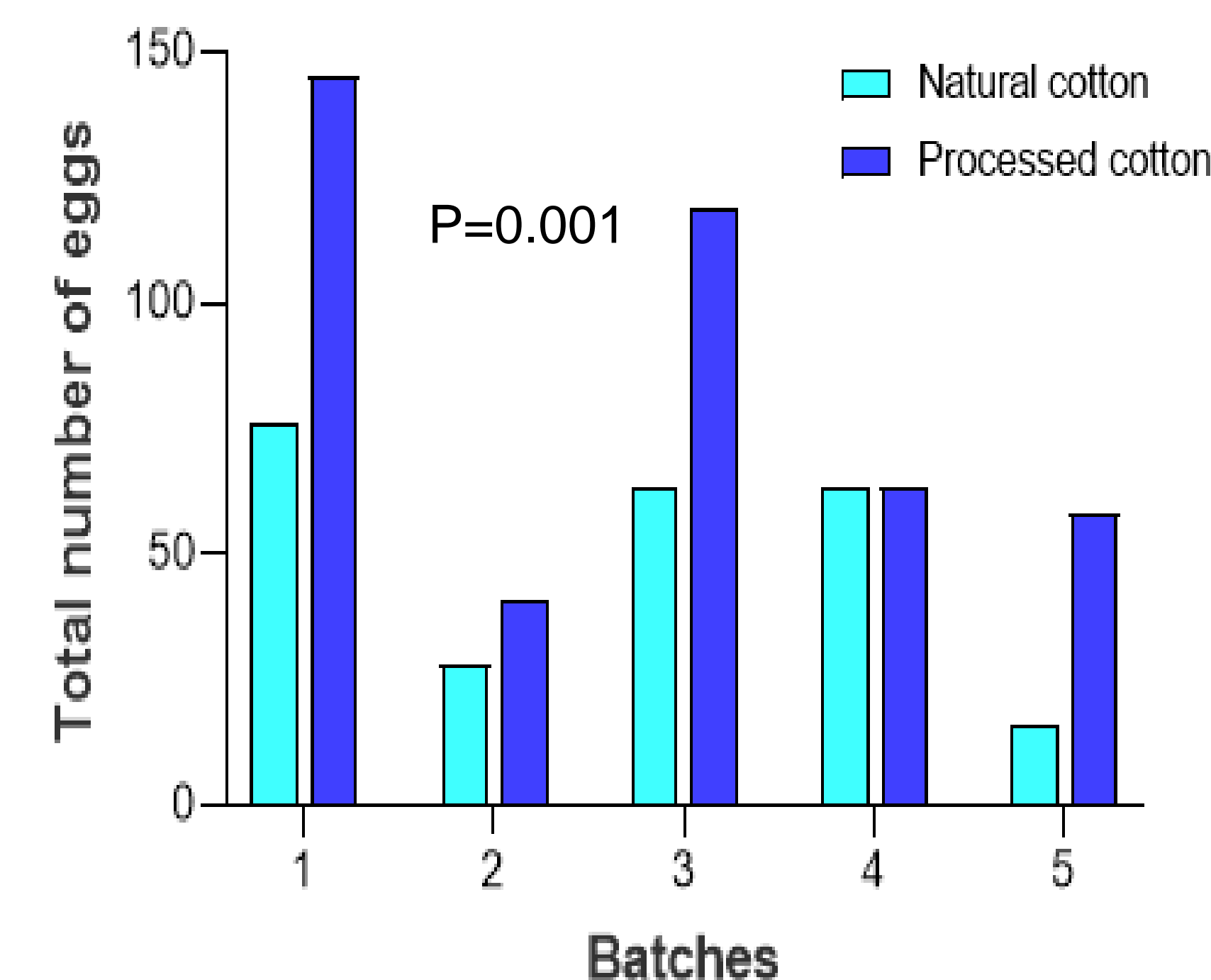


Fig.2. Higher number of eggs laid in processed cotton than natural cotton group.

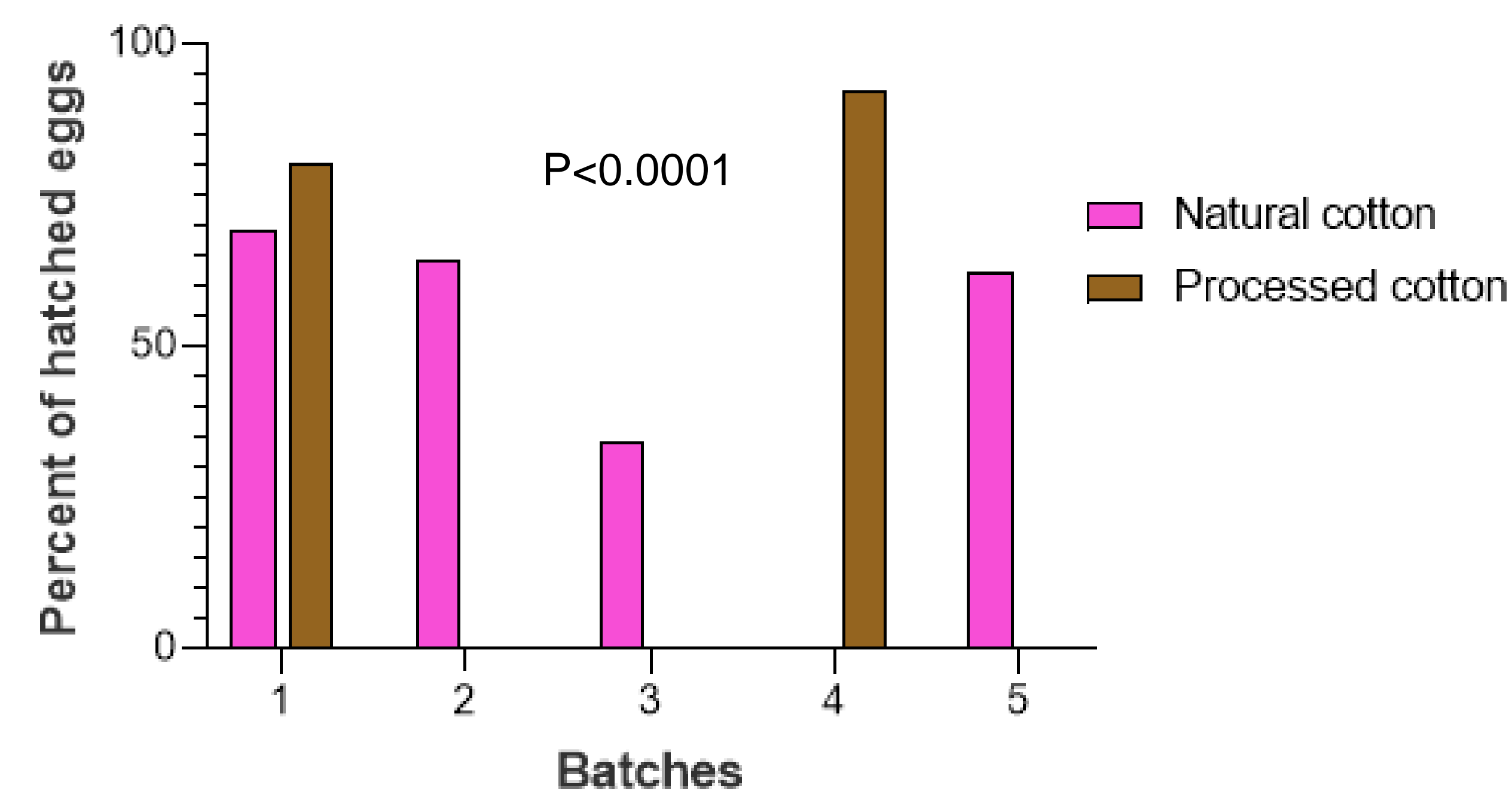


Fig.3. Only 2 batches in processed and 4 in natural cotton group mosquitoes hatched.

Methods and Experimental Design

Day before blood feeding total of 3 days old, 30 female mosquitoes (*Aedes aegypti*) were divided in two boxes (15 each) with 10% sucrose solution. Under controlled laboratory conditions with relative humidity 36% and temperature 26.5C. Usually, for blood feeding Hemotek or crystal glass feeders are used, however, to analyze if the cotton has any effect we blood fed mosquitoes with two types of cotton i.e. Kroger cotton rounds (Processed cotton) and Puff (organic/natural cotton).

Mosquitoes were fed with 1.5 ml of blood soaked on quarter cotton pad that was stuck to 40 ml beaker with lukewarm water covered with para film to avoid mosquitoes from drowning. The eggs were laid on white filter papers and counted before placing them in hatching container. For the 20 days data was recorded under the parameters: Hatching day, total numbers of eggs, numbers of eggs hatched.

Conclusions

Our results prove the hypothesis that processed cotton includes certain compounds (chemicals) that are suppressing egg development, however, more parameters are yet remained to be examined before we come up with final conclusion.

Future Directions

- We plan to continue the current research by including more variables like direct blood feeding by using Hemotek
- Examination of processed cotton from different companies.
- RNA sequencing of un-hatched eggs.
- Evaluation of treated cotton to figure out the chemicals.
- To find out the effect on hatched eggs, the other developmental stages need to be observed.
- The reproductive capacity of obtained generation need to be analyzed to know if there is any effect on the next generations.
- Moreover, there is need to examine other mosquito species too.

References

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