

Gregarized desert locust females and males encounter just before oviposition in West Africa

Desert locusts are found in semi-arid regions from West Africa to India, and often cause serious agricultural damage. Since desert locusts are found in vast areas and adults in particular fly long distances, it is difficult to control them by spraying pesticides, and in order to mitigate the damage, it is necessary to develop control technologies based on desert locust ecology. To solve this problem, it is important to understand the behavioral patterns of desert locusts, especially how adult desert locusts mate and lay eggs in the field during the breeding season. Therefore, we conducted a field survey from 2011 to 2019 with the aim of elucidating the reproductive strategies of desert locusts in the Sahara Desert.

In this study, we conducted a field survey in the Sahara Desert, which stretches across Mauritania in West Africa, the habitat of desert locusts. We simultaneously recorded the sex ratio, mating status, and degree of ovarian development of a gregarized population. The results showed that the sex ratio of the population was skewed towards either sex. In the female-biased population, most of the female desert locusts were developing ovaries and were not mating, but most of the females in the male-biased population had large eggs that were about to be laid and were mating (Fig. 1). A closer look at the male-biased population revealed that during the daytime, gravid female desert locusts flew into the male group (Fig. 2) just before oviposition. After mating, the male remained on the female's back and continued their post-mating guarding (Fig. 3). In the evening, they gathered in the open sand near where they met, and we also found that they spawned in pairs at night (Fig. 3). It can be inferred that the male and female desert locusts are able to meet their partners efficiently while resolving sexual conflicts by living separately in groups. Pairs that are spawning in groups remain in place for several hours, making them good targets for pest control. If a group of male desert locusts is found, it is possible to reduce the amount of pesticides used by waiting for the group to spawn until nighttime instead of immediately controlling them.

As recommended by the Food and Agriculture Organization of the United Nations, intensive pesticide application timed to coincide with the identified periods of desert locust inactivity will lead to an environmentally and health-conscious pest control that does not use more pesticides than necessary.

(K.O. Maeno, P. Cyril [The French Agricultural Research Centre for International Development], S. Ould Ely [The Mauritanian National Anti-Locust Centre (CNLA)], M.E.H. Jaavar [CNLA], S. Ould Mohamed [CNLA], M.A. Ould Babah Ebbe [CNLA], S. Ghaout [The Moroccan National Anti-Locust Centre])

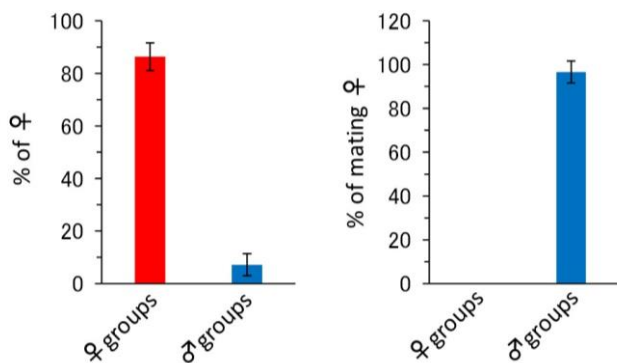


Fig. 1. Sex ratios and percentage of mating females of either groups of female- or male-biased sex ratios

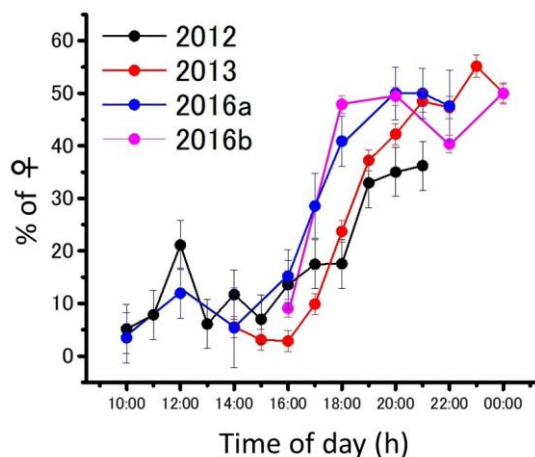


Fig. 2. Diel changes in the percentages of females in male-biased sex groups based on data from transect (2 m × 25 m)

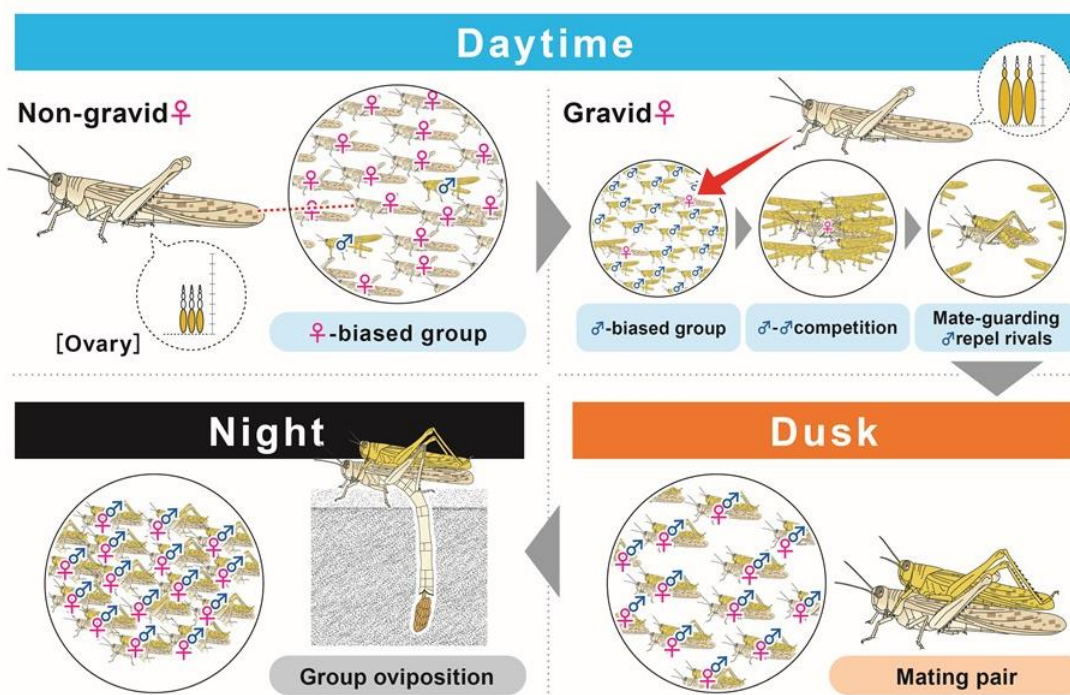


Fig. 3. During the day, female desert locusts with developing ovaries stay in groups with a skewed sex ratio toward females and do not mate. When females ready to lay eggs fly into a group of males, many males compete to mate. When one male rides on the back of the female, the other males give up, no further fighting occurs and then they mate. In the evening, they move in pairs to sandy areas suitable for oviposition and begin to aggregate. At night, they oviposit in groups.

Reference: Maeno et al. (2021) *PNAS*, 118 (42): e2104673118, <https://doi.org/10.1073/pnas.2104673118>

Figures reprinted/modified with permission.