**Background:** Fire modulate herbivore dynamics in open ecosystems, i.e. grasslands and savannas. While extensive work demonstrates the interaction between fire and vertebrate grazers, less research describes how grasshopper herbivory dynamics respond to fire.

**Aim:** We examined how fire improved forage quality to increase the density of and offtake by grasshoppers at two times since fire and in unburned mixed-grass prairie.

**Methods:** We deployed grasshopper exclusion cages to determine grasshopper offtake of aboveground plant biomass, counted grasshopper abundance throughout the study period, and measured crude protein content of available forage.

**Key results:** Offtake and density were higher in burned versus unburned plots. Burned plot grasshopper density increased over time, with greater rates of increase in recently burned plots, while density remained constant in unburned locations.

**Conclusions:** Patterns are the result of higher crude protein content in burned plots, on account of them having a much higher proportion of recent growth after fire removed aboveground senesced material. These findings present a mechanism by which fire interacts with grasshoppers in open ecosystems.

**Implications:** Fire could be a sustainable, low-cost alternative to chemical control of grasshopper outbreaks. Grasshopper herbivory might extend the life of grassland fuel reduction efforts prone to rapid biomass recovery.