



Propagated *Salvia daiguii* flowering at Shanghai Chenshan Botanical Garden, and hand-pollinated individuals covered with nylon mesh bags, in early July 2021. Photo: Hanwen Xiao and Yanbo Huang.

seeds, respectively. Seeds collected in 2019 were sown in petri dishes in August 2019 and 57 seedlings successfully germinated. Seeds collected in 2021 were sown in nurseries in March 2022 and 11 seedlings successfully germinated. As a result of these various efforts, thousands of *S. daiguii* plants in Shanghai Chenshan Botanical Garden produced inflorescences and started flowering in mid June 2022.

Normal germination, flowering and fruiting of *S. daiguii* in Shanghai Chenshan Botanical Garden indicates successful ex situ conservation of this species, and provides an insurance in the case of any potential threats to the small wild population. Physiological tests on plants growing in the nursery have shown that the species can tolerate high temperature and humidity, drought, salinity and acid rain. To provide information for the recovery of the wild population, we are conducting a comprehensive study of the species' population ecology, seed physiological ecology and genetics, and of artificial hybridization.

HANWEN XIAO* (orcid.org/0000-0003-4527-696X, hwxiao777@163.com), YANBO HUANG (orcid.org/0000-0003-0620-3071) and YUKUN WEI (orcid.org/0000-0001-7967-3846) Shanghai Chenshan Botanical Garden, Eastern China Conservation Center for Wild Endangered Plant Resources, Shanghai, China. *Also at: College of Landscape Architecture, Nanjing Forestry University, Nanjing, China

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Little time left to conserve the Asiatic cheetah

There are currently an estimated 12 free-ranging Asiatic cheetahs *Acinonyx jubatus venaticus* in the wild in Iran,

excluding four newborn cubs recorded by remote cameras in 2021 and three other cubs separated from their mother in early 2021, and potentially a few individuals in North Khorasan Province for which there are not yet identifiable, independent images. Following our recommendation to the Iranian government in 2017, Iran's Department of the Environment developed a breeding programme to save this Critically Endangered subspecies (Parchizadeh & Williams, 2017, *Nature*, 552, 31). Iran is the only country where the Asiatic cheetah subspecies is known to occur in the wild (Parchizadeh et al., 2018, *Current Biology*, 28, R1141–R1142).

In a historic event, three Asiatic cheetah cubs were born in captivity in Iran on 1 May 2022. However, two of these cubs died shortly thereafter, apparently as a result of poor husbandry. According to the Deputy Head of Natural Environment and Biodiversity of the Department of the Environment, their biologists and veterinarians lacked experience with large carnivore captive breeding programmes. The Plan and Budget Organization of Iran did not provide the Department with funding to train biologists and veterinarians abroad, and in 2018 the Department ceased working with an NGO specializing in felids.

Collaborative and international cooperation has potential to resolve diverse conservation issues in Iran. For instance, in 2013 the Government of Iran partnered with Japanese experts and the UN to revive Lake Urmia (AghaKouchak et al., 2015, *Journal of Great Lakes Research*, 41, 307–311). Subsequently, the surface area of Lake Urmia was restored to > 50% of its maximum size in recent decades, and migratory birds returned. We recommend the Department of the Environment consider seeking expert assistance from programmes with long-term success in breeding African cheetahs in captivity (e.g. Saint Louis Zoo, USA), as cheetahs require unique breeding and behavioural practices.

Iran has lost two felid species (the Asiatic lion *Panthera leo persica* and Caspian tiger *Panthera tigris virgata*), and there are unsubstantiated estimates of only 550–850 free-ranging Persian leopards *Panthera pardus saxicolor* remaining in the country (Parchizadeh & Adibi, 2019, *Ecology and Evolution*, 9, 11972–11978), further emphasizing the need for conservation of the Asiatic cheetah. Recovery of the Asiatic cheetah will require immediate and close cooperation among the Government of Iran and its agents (Parchizadeh et al., 2018, *Oryx*, 52, 211–212), Iranian and international experts, and NGOs.

JAMSHID PARCHIZADEH (orcid.org/0000-0001-8184-9142, jamshid.parchizadeh@gmail.com) and JERROLD L. BELANT (orcid.org/0000-0001-7021-1338) Department of Fisheries and Wildlife, Michigan State University, East Lansing, USA

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