The influence of climate change on the distribution pattern of *Colutea persica* (Fabaceae) in Iran

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INTRODUCTION & AIM

Climate change plays a key role in shaping and changing the distribution patterns of plant species by reducing or expanding their geographical ranges. In particular, endemic species, with their localized populations and low dispersal rates, show higher vulnerability to environmental changes, and as a consequence, the potential distribution of these taxa is a critical step in conservation planning. In this regard, species distribution modeling (SDM) has become a key method in ecology and conservation biogeography to predict the distribution of a species across geographic space and time using environmental data. Here, the objective of our study is to predict the current and future spatial distributions of *Colutea persica*, which is an endemic species in the flora of Iran (Browizc 1984, Pooyan et al. 2023).

METHOD

In this study, we developed a maximum entropy model (MaxEnt) to predict the present and future distributions of *Colutea persica* under two representative concentration pathways (RCP 4.5 and RCP 8.5) for the 2050s and 2070s.

Fig. 1. *Colutea persica* in natural habitats, Photographed by A. Zeraatkar
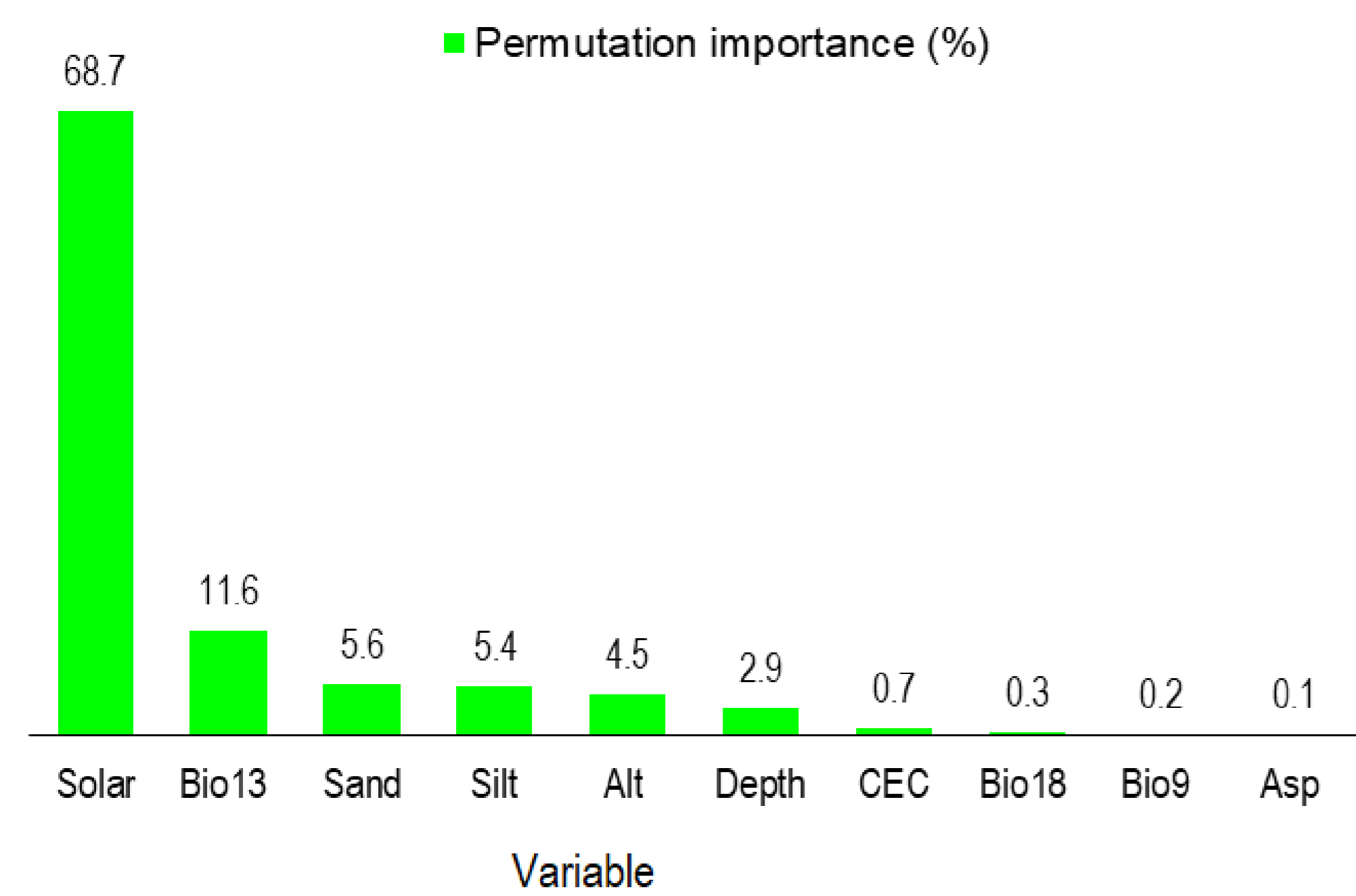

Fig. 2. The percentage of permutation importance for environmental factors used in SDM of *C. persica* in Iran

RESULTS & DISCUSSION

Colutea persica is the only representative of its genus in the highlands of Zagros region, extending its distribution to the central mountains of Iran (Fig. 1). The findings of our study showed that solar radiation, sand and silt content and precipitation of the wettest month (BIO13) are important environmental variables influencing the potential distributions of this species. Moreover, our results confirmed that the performance of the prediction model with an AUC of at least 0.9 was excellent (Fig. 2). The projected climate maps under optimistic and pessimistic scenarios (RCP2.6 and RCP8.5, respectively) of 2050 and 2070 resulted in negative range changes for this species in comparison to its current predicted distributions (Fig. 3).
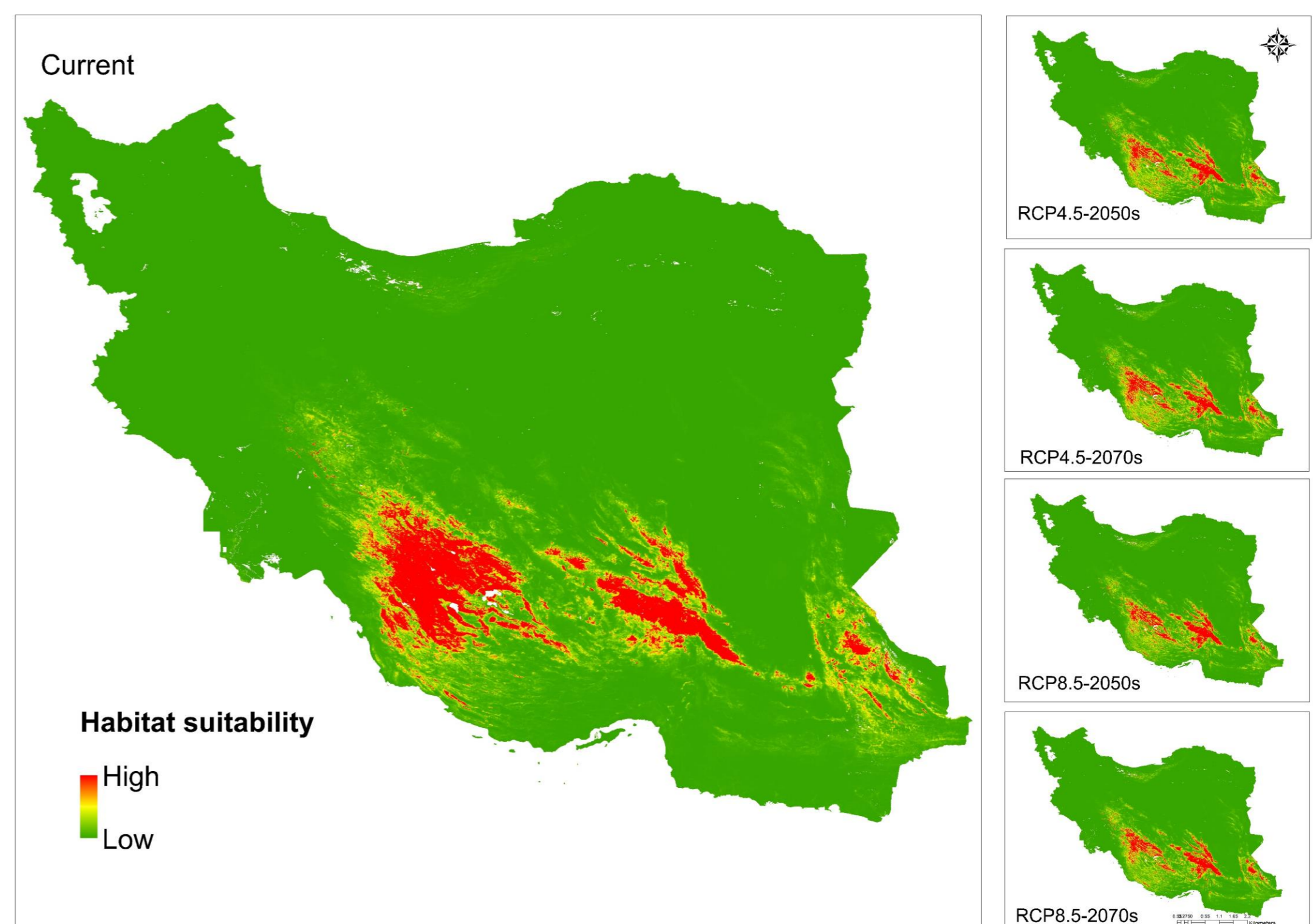

Fig. 3. Map for potential current and future habitat suitability of *C. persica* in Iran

CONCLUSION

Our results highlight the need for designing and applying conservation planning, cultivation and rehabilitation strategies for this target species.

REFERENCES

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