

Seven spots fusion patterns of elytra as a marker of melanization in ladybird, *Coccinella septempunctata* Linnaeus (Coleoptera: Coccinellidae)

The seven-spotted ladybird beetle, *Coccinella septempunctata* Linnaeus is an ectothermic insect and a potential biocontrol agent of different aphid populations. In ectothermic insects, patterns of melanization are effectively involved in different aspects of their behaviour and ecology¹. The occurrence of insect melanism is a kind of variation in the pigment pattern within as well as between closely related species, which makes them polymorphic². The general assumption for *C. septempunctata* is that there is little elytral pattern variation. However, in the large coccinellid species, there is a high chance of variation in the elytral pattern, but it is expressed very rarely³. In previous studies, only typical (having seven distinct black spots) and melanic (fused black spots) morphs have been discussed⁴⁻⁶.

Some field-based observations and records indicate the presence of such variations in elytral colour pattern in *C. septempunc-*

tata. We found seven different sympatric populations with distinct stable elytral colour patterns and different fusion patterns of seven spots (Figure 1 a-g) within this species in mustard-cultivated ecosystems in and around the Amarkantak (22°40'N, 81°45'E, 1048 m amsl average elevation), Madhya Pradesh, India. After arranging the collected beetles with respect to melanization, we observed the set pattern of fusion of seven spots from the typical light morphs to the melanic morphs, passing through different intermediate forms. Such elytral pattern differences within the population might be due to geographical isolation.

Melanization in individuals is usually found in cooler areas and the degree of melanization significantly increases with an increase in latitude and altitude; warmer areas are inhabited by non-melanic morphs^{7,8}. Such kinds of geographical variation were

found in the study fields, which could be the possible reason for the melanization. Along with geographical variation, fluctuation in season and temperature may also regulate the frequency of melanic morphs in a population⁹. Due to the plastic nature of the melanics, other factors may also be associated with such patterns, e.g. sexual selection¹⁰, aposematism¹, fire melanism¹¹ and thermoregulation¹².

Thus, the present field-based observation reveals the existence of stable multivariate elytral colour polymorphic populations in *C. septempunctata*. The literature also reveals that such multivariate morphic patterns have not been recorded earlier in seven-spotted beetles.

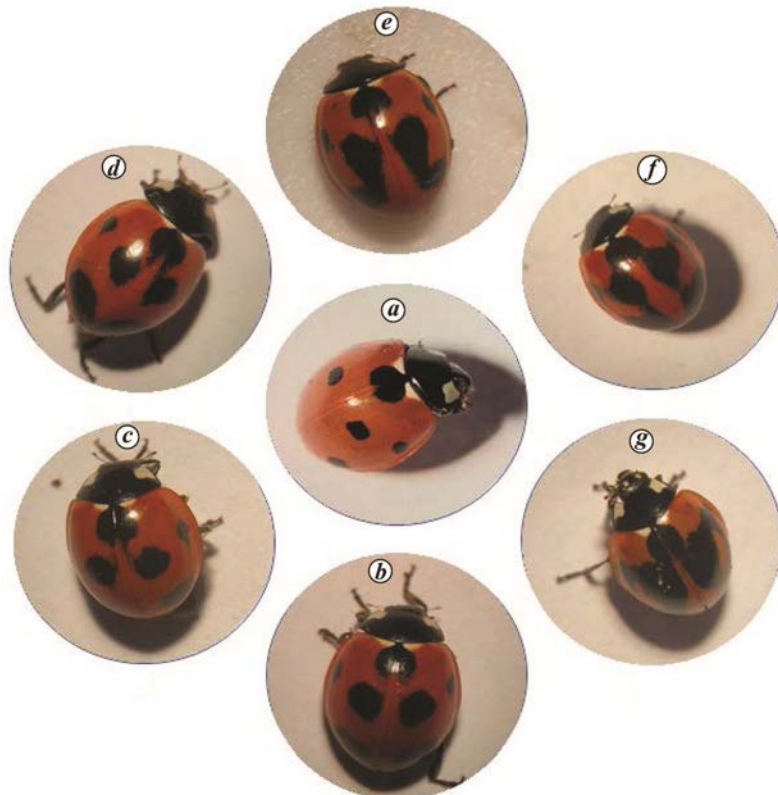


Figure 1. Elytral melanization of *Coccinella septempunctata*. **a**, Typical morph; **b-g**, Fusion patterns of seven spots.

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LANKESH YASHWANT BHAIASARE
DESH DEEPAK CHAUDHARY*

Department of Zoology,
Indira Gandhi National Tribal University,
Amarkantak 484 887, India
*e-mail: ddchaudhary90@gmail.com