

MOLECULAR TAXONOMY

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Introduction

About 5.5 million insects are estimated to exist and till now only 0.85 to 1 million insects were described. Most of these descriptions are mainly based on morphology and the task of routine species identification has significant limitations viz., difficulty in identifying cryptic taxa, advances in microscopy and other technology made description of species more detailed which can be understood only by specialist, morphological keys are with high technical content, stage and gender specific and phenotypic plasticity. Nevertheless, accurate identification of insect pests is the basis of biological information retrieval and without that detailed biological information may be ascribed to the wrong species. Correct identification of the target pest and its natural enemies is important and is essential before initiating an IPM programme. Meanwhile, study of the diversification of these pests and natural enemies, both past and present, and the relationships among living things through time that is systematics also plays major role in initiating IPM programme. Many efforts were made by scientists in understating population genetics of insect pests using common visible markers including eye colour, body spots or bands and hairs or spines were used as phenotypic markers. However, these phenotypic markers are relatively infrequent and often hard to score. Also, it is difficult and time-consuming to induce genetic mutations in laboratory populations to develop new phenotypic markers, and sometimes they interfere with the overall fitness of the organism. To avoid all these difficulties and recent advances in molecular techniques have greatly helped scientists to adopt molecular markers.

A molecular marker is a fragment of DNA that is associated with a certain location within the genome and must show heritable DNA sequence differences, should be phenotypically neutral and developmentally and environmentally stable. A number of molecular markers were used for molecular analysis of various pest species and their populations. Details of molecular markers with their utility in diagnosis were provided in Table 1. There are many markers developed over a period and the priority of choosing one marker over another is dependent on the material that is being studied or the nature of the questions to be addressed.

DNA-Barcoding