Trissolcus species (Hymenoptera: Scelionidae) are the most promising biological control agents against sunn pest. The accurate identification of natural enemies is crucial in order to develop successful biological control programs. This paper presents phylogenetic analyses of Trissolcus species based on data sets consisting of 18S, 28S, ITS1, ITS2 and cytochrome oxidase subunit I (COI) genes. The most commonly used genetic loci in Trissolcus species identification is the cytochrome oxidase I gene (COI). Also restriction fragment length polymorphism analyses of PCR amplified COI gene have been developed to discriminate closely related species. We suggest that Trissolcus grandis Thompson and Trissolcus semistriatus Nees split significantly into two different genetic groups while there is another species diverging from T. semistriatus which is described as 'Trissolcus flavotibialis Kocak & Guz, n. sp.'